FINAL

AMENDMENT 2 TO THE CONSOLIDATED ATLANTIC HIGHLY MIGRATORY SPECIES FISHERY MANAGEMENT PLAN

Including:
A Final Environmental Impact Statement,
A Final Regulatory Impact Review,
A Final Regulatory Flexibility Analysis,
A Final Social Impact Analysis

April 2008

DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Highly Migratory Species Management Division
Office of Sustainable Fisheries
1315 East-West Highway
Silver Spring, Maryland 20910

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Amendment 2 to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan

Actions: Implement management measures consistent with recent stock assessments for sandbar, porbeagle, dusky, blacktip, and Large Coastal Sharks (LCS); initiate rebuilding plans for porbeagle, dusky, and sandbar sharks consistent with stock assessments; implement commercial quotas and retention limits consistent with stock assessment recommendations to prevent overfishing and rebuild overfished stocks; modify recreational measures to reduce fishing mortality of overfished/overfishing stocks; modify reporting requirements; modify timing of shark stock assessments; clarify timing of release for annual Stock Assessment and Fishery Evaluation (SAFE) reports; update dehooking requirements for smalltooth sawfish; collect shark life history information through the implementation of a shark research program; and, implement time/area closures proposed by the South Atlantic Fishery Management Council.

Type of Statement: Final Environmental Impact Statement; Final Regulatory Impact Review; Final Regulatory Flexibility Analysis; Final Social Impact Statement

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Abstract: The National Marine Fisheries Service (NMFS) is amending the Consolidated Atlantic Highly Migratory Species Fishery Management Plan based on several stock assessments that were completed in 2005/2006. Assessments for dusky and sandbar shark indicate that these species are overfished with overfishing occurring and porbeagle sharks are overfished. National Standard 1 of the Magnuson Stevens Fishery Conservation and Management Reauthorization Act (Magnuson-Stevens Act) requires Agencies to implement management measures that prevent overfishing and rebuild overfished stocks, as necessary. Based on the new stock assessments, after considering comments received during the proposed rule stage, and considering all of its legal obligations under the Magnuson-Stevens Act, NMFS prefers measures that will reduce fishing mortality and reduce effort in order to rebuild overfished Atlantic shark species while ensuring that a limited shark fishery can be maintained.

EXECUTIVE SUMMARY

The National Marine Fisheries Service (NMFS) is implementing management measures via rulemaking that would reduce fishing mortality and fishing effort to rebuild overfished Atlantic shark species while ensuring that a limited shark fishery can be maintained.

Atlantic Highly Migratory Species (HMS) are managed under the dual authority of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) and the Atlantic Tunas Convention Act (ATCA). Under the Magnuson-Stevens Act, NMFS must conserve and manage fisheries to maintain Optimum Yield (OY) by rebuilding overfished fisheries and preventing overfishing consistent with the nine national standards. Under ATCA, NMFS is authorized to promulgate regulations, as may be necessary and appropriate, to implement the recommendations from the International Commission for the Conservation of Atlantic Tunas (ICCAT). The measures preferred in this rulemaking are taken under the authority in the Magnuson-Stevens Act. Currently, tunas, swordfish, billfish, and sharks are managed under the 2006 Consolidated Atlantic HMS Fishery Management Plan (FMP). This action would amend that FMP.

NMFS announced its intent to prepare an Environmental Impact Statement (EIS) on November 7, 2006 (71 FR 65086). In that notice, NMFS asked for comments on existing commercial and recreational shark management measures that would assist the Agency in determining options for conservation and management of Atlantic sharks consistent with relevant Federal statutes. On January 3, 2007 (72 FR 123), NMFS announced the availability of a scoping document and details of seven scoping meetings to be held during the month of January and a public comment period that closed on February 5, 2007. A pre-draft document describing potential alternatives that may be included in the Draft EIS and proposed rule for Amendment 2 to the HMS FMP was released to HMS consulting parties on March 6, 2007, and presented to the HMS Advisory Panel (AP) with comments accepted until March 31, 2007. The Notice of Availability announcing the Draft EIS and the proposed rule were both published on July 27, 2007 (72 FR 41325 and 41392, respectively). The public comment period was originally slated to end on October 10, 2007, however, it was subsequently extended (72 FR 56330) and reopened until December 17, 2007 (72 FR 64186), to provide Regional Fishery Management Councils, the Inter State Marine Fisheries Commissions, and the general public additional opportunities to submit comments. To collect comments on the proposed rule and draft Amendment 2 to the Consolidated HMS FMP, NMFS attended five Fishery Management Council meetings (New England, Mid-Atlantic, South Atlantic, Gulf of Mexico, and Caribbean), attended an Atlantic States Marine Fisheries Commission meeting, held ten public hearings between Texas and New Hampshire, held one HMS Advisory Panel meeting, and accepted public comments throughout the comment periods.

NMFS considered a range of alternative suites that analyzed various management measures from each of seven different topics including quotas/species complexes, retention limits, time/area closures, seasons, regions, reporting, and recreational measures. Various approaches to two administrative measures, modification of stock assessment and SAFE report timing are also analyzed. A total of nine alternatives (five alternative suites and four

alternatives) were analyzed. The FEIS considers all of the comments received from the general public during the scoping, pre-draft, and proposed rule/DEIS stages. Details on the different alternatives (suites) can be found in Chapters 2 and 4 of this document. NMFS believes that the preferred alternative suite in this document should, consistent with the Magnuson-Stevens Act and other domestic laws, rebuild overfished Atlantic shark stocks, end overfishing of Atlantic sharks, balance the needs of the fishermen and communities with the needs of the resource and scientists, and maximize sustainable fishing opportunities. In response to public comments, some of the management measures within the preferred alternative suite have changed. Appendix D includes comments received on the DEIS/proposed rule and responses. Changes from the draft Amendment 2 to the Consolidated HMS FMP are summarized in the table below. The management measures in Amendment 2 to the Consolidated HMS FMP would likely be effective by approximately July 1, 2008.

Table 1 The preferred alternative suite and alternatives at the draft and final stage of Amendment 2 to the Consolidated HMS FMP.

Management Measure	Measures in Preferred Alternative Suite in Draft Amendment 2 to the Consolidated HMS FMP	Selected Measures in Preferred Alternative Suite in Final Amendment 2 to the Consolidated HMS FMP
Quotas/ Species Complexes	- Sandbar: 116.6 mt dw quota for sandbar sharks and EFP/display subquota - Non-sandbar: 541.2 mt dw non-sandbar LCS - Status Quo SCS - Status Quo Pelagic Sharks - Porbeagle: Add porbeagle sharks to Prohibited spp.	***Shark Research Fishery*** - Sandbar: Base quota: 116.6 mt dw - Adjusted quota for 2008-2012 due to overharvests = 87.9 mt dw - Non-sandbar: base quota of 50 mt dw; - Adjusted quota for 2008-2012 due to overharvests = 37.5 mt dw ***Outside Research Fishery*** - Sandbar: Prohibited - Non-sandbar: Base quotas (mt dw): GOM = 439.5; ATL = 188.3 (per SEFSC recommendation) - Adjusted quota for 2008-2012 due to overharvests: GOM = 390.5; ATL = 187.8 - Status Quo SCS - Status Quo Pelagic Sharks - Porbeagle: Reduced TAC of 11.3 mt dw; commercial quota of 1.7 mt dw

Management Measure	Measures in Preferred Alternative Suite in Draft Amendment 2 to the Consolidated HMS FMP	Selected Measures in Preferred Alternative Suite in Final Amendment 2 to the Consolidated HMS FMP
Retention Limits	- Sandbar: Sandbar retention by vessels with shark research permit ONLY (retention limits depend upon research objectives) - Non-sandbar: 22 non-sandbar LCS/vessel/trip for directed and incidental permit holders - All sharks landed with fins naturally attached	- Sandbar: Sandbar retention by vessels with shark research permit ONLY (retention limits depend upon research objectives) - Non-sandbar (outside research fishery): **33** non-sandbar LCS/vessel/trip for **directed** permit holders and **3** non-sandbar LCS/vessel/trip for **incidental** permit holders (in all regions) through 2012; **36** non-sandbar LCS/vessel/trip for **directed** permit holders and **3** non-sandbar LCS/vessel/trip for **incidental** permit holder in both regions after 2012 - All sharks landed with fins naturally attached
Regions	- One Region	- Two regions (GOM and ATL) for non-sandbar LCS
Reporting	- Research Fishery: 100% observer coverage on research vessels - Observers/Logbooks: Status Quo - Dealer Reporting: Dealer reports ***received*** within 10 days of end of reporting period - Unclassified sharks counted against sandbar shark quota	- Research Fishery: 100% observer coverage on research vessels - Observers/Logbooks: Status Quo - Dealer Reporting: Dealer reports ***received*** within 10 days of end of reporting period - Unclassified sharks counted against appropriate quota per spp. composition on observed non-research trips and/or dealer reports - Modify dealer reports to include "fins naturally attached" verification
Seasons	- Opening: Jan. 1 - Closing: Close *both* non-sandbar LCS and Sandbar sharks when either @ 80% with 5 days notice - Pelagic sharks and SCS each close @ 80% (individually) with five days notice	- Opening: Jan. 1 - Closing: Close individual shark seasons @ 80% with 5 days notice to allow research fishery to continue if non-sandbar quotas are filled
Time/Area closures	- Status Quo + SAFMC's closures	- Status Quo + SAFMC's closures
Recreational Measures	- Size and retention limit: Status Quo - Authorized Species: Nurse, lemon, tiger, smooth hammerhead, scalloped hammerhead, great hammerhead, Atlantic sharpnose, bonnethead, shortfin mako, common thresher, oceanic whitetip, and blue sharks	- Size and retention limit: Status Quo - Authorized Species: Non-ridgeback LCS plus tiger sharks, SCS, and pelagic sharks – (LCS: blacktip, spinner, bull, , nurse, lemon, tiger, smooth hammerhead, scalloped hammerhead, and great hammerhead sharks SCS: Atlantic sharpnose, finetooth, bonnethead, and blacknose sharks Pelagics: porbeagle, common thresher, shortfin mako, oceanic whitetip, and blue sharks) - Porbeagles permitted for recreational anglers

Management Measure	Measures in Preferred Alternative Suite in Draft Amendment 2 to the Consolidated HMS FMP	Selected Measures in Preferred Alternative Suite in Final Amendment 2 to the Consolidated HMS FMP
Modification of Stock Assessment Schedule	- Stock assessments for sharks at least every 5 years	- Same
Modification of SAFE Report Schedule	- SAFE report published in the fall of every year	- Same

MASTER TABLE OF CONTENTS

MASTER LIST OF TABLES

MASTER LIST OF FIGURES

List of Commonly Used Abbreviations and Acronyms

AA	Assistant Administrator for Fisheries
ACCSP	Atlantic Coastal Cooperative Statistics Program
ACS	Angler consumer surplus
ACL	Annual Catch Limit
AES	American Elasmobranch Society
ALRS	Automated Landings Reporting System
ALS	Accumulative Landings System
ALWTRP	Atlantic Large Whale Take Reduction Plan
ALWTRT	Atlantic Large Whale Take Reduction Team
AMs	Accountability Measures
ANPR	Advanced Notice of Proposed Rulemaking
AOCTRP	Atlantic Offshore Cetacean Take Reduction Plan
AOCTRT	Atlantic Offshore Cetacean Take Reduction Team
AP	Advisory Panel
APA	Administrative Procedure Act
ASA	American Sportfishing Association
ASMFC	Atlantic States Marine Fisheries Commission
ATCA	Atlantic Tunas Convention Act
ATL	Atlantic
AVHRR	Advanced Very High Resolution Radiometer
B	Biomass
B_{MSST}	Biomass of the minimum stock size threshold
B_{MSY}	Biomass expected to yield maximum sustainable yield
B_{OY}	Biomass expected to yield optimum yield
BAYS	Bigeye, albacore, yellowfin, skipjack tunas
BET	Bigeye tuna
BETYP	Bigeye Tuna Year Program
BFT	Bluefin tuna
BiOp	Biological Opinion
BLL	Bottom Longline
BSD	Bluefin Tuna Statistical Document
BTF	By the fish
BUM	Blue marlin
CAR	Caribbean Statistical Area
CBP	U.S. Bureau of Customs and Border Protection
Census Bureau	U.S. Bureau of the Census
CF	Coastal Fisheries
CFDBS	Commercial Fisheries Database System

CFMC	Caribbean Fishery Management Council
CFL	Curved fork length
CFR	Code of Federal Regulations
CHB	Charter/Headboat
CIAT	Spanish for IATTC
CIE	Center for Independent Experts
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COASTSPAN	Cooperative Atlantic States Shark Pupping and Nursery Survey
COE	Certificate of Eligibility
COFI	Committee on Fisheries
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CPCs	Contracting Parties, Cooperating non-Contracting Parties, Entities and Fishing Entities
CPI	Consumer Price Index
CPUE	Catch Per Unit Effort
CSFOP	Commercial Shark Fishery Observer Program (run by University of Florida)
CSR	Center for Shark Research
CSTP	Cooperative Shark Tagging Program
CV	Coefficient of Variation
CZMA	Coastal Zone Management Act
DEA	Data Envelopment Analysis
DEIS	Draft Environmental Impact Statement
DPS	Distinct Population Segment
DRG	Dredge
DSGFOP	Directed Shark Gillnet Fishery Observer Program
dw	Dressed weight
EA	Environmental Assessment
EDA	Economic Development Administration
EEZ	Exclusive Economic Zone
EFC	East Florida Coast closed area
EFH	Essential fish habitat
EFP	Exempted fishing permit
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
F	Instantaneous fishing mortality
F_{MSY}	Instantaneous fishing mortality rate expected to yield maximum sustainable yield
F_{OY}	Fishing mortality rate expected to yield optimum yield
FAD	Fish aggregating device
FAO	United Nations Food and Agriculture Organization

f.a.s.	Free Alongside Ship
FCZ	Fishery Conservation Zone
FDA	Food and Drug Administration
FEC	Florida East Coast Statistical Area
FEIS	Final Environmental Impact Statement
FL	Fork length
FMP	Fishery management plan
FMU	Fishery management unit
FR	Federal Register
FRFA	Final regulatory flexibility analysis
GDP	Gross Domestic Product
GIS	Geographic Information System
GN	Gillnet
GOM	Gulf of Mexico
GSAFDF	Gulf and South Atlantic Fishery Development Foundation
GMFMC	Gulf of Mexico Fishery Management Council
GSMFC	Gulf States Marine Fisheries Commission
Gulfspan	Cooperative Gulf of Mexico States Shark Pupping and Nursery Survey
HACCP	Hazard Analysis Critical Control Point
HAPC	Habitat Area Of Particular Concern
HBS	Headboat Survey, Southeast
HMS	Highly migratory species: Atlantic sharks, tunas, swordfish, and billfish
HTS	Harmonized Tariff Schedule
IATTC	Inter-American Tropical Tuna Commission
ICCAT	International Commission for the Conservation of Atlantic Tunas
IFQ	Individual Fishing Quota
ILAP	Initial limited access permit
IMARPE	Instituo del Mar del Peru
INP	Instituto Nacional de Pesca
IPOA	International Plan of Action
IRFA	Initial regulatory flexibility analysis
ITP	International Trade Permit
ITQ	Individual transferable quota
ITS	Incidental take statement
IUCN	World Conservation Union
IUU	Illegal, Unregulated, and Unreported
kg	Kilogram
LAP	Limited access permit
LAPP	Limited Access Privilege Program

lb	Pound
LCS	Large coastal sharks
LJFL	Lower jaw fork length
LOA	Letter of Acknowledgment
LOF	List of Fisheries
LPS	Large Pelagic Survey
LWTRP	Large Whale Take Reduction Plan
LWTRT	Large Whale Take Reduction Team
M	Mortality
MAB	Mid-Atlantic Bight Statistical Area
MAFMC	Mid-Atlantic Fishery Management Council
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MFMT	Maximum fishing mortality threshold
MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service
MPA	Marine protected area
MRAG Americas	Marine Resources Assessment Group
MRFSS	Marine Recreational Fishing Statistics Survey
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSL	Mississippi Laboratories, SEFSC, NMFS
MSRA	Magnuson-Stevens Fishery Conservation and Management Reauthorization Act
MSST	Minimum stock size threshold
MSY	Maximum sustainable yield
mt	Metric tons
NAS	National Academy of Sciences
NAT	North Atlantic
NCA	North Central Atlantic
NEC	Northeast Coastal Statistical Area
NED	Northeast Distant Statistical Area
NEFMC	New England Fishery Management Council
NEFSC	Northeast Fisheries Science Center, NMFS
NEPA	National Environmental Policy Act
NERO	Northeast Regional Office, NMFS
NFRDI	National Fisheries Research and Development Institute
NGO	Non-governmental organization
NMFS	National Marine Fisheries Service
nmi	Nautical mile
NOA	Notice of Availability
NOAA	National Oceanographic and Atmospheric Administration

NOI	Notice of Intent
NPOA	National Plan of Action
NRC	Natural Resources Consultants, Inc.
NS	National Standards
NWGB	National Working Group on Bycatch
NYB	New York Bight
OPR	Office of Protected Resources
OSF	Office of Sustainable Fisheries
OY	Optimum yield
PAT	Pop-up satellite archival tag
PFD	Personal flotation device
PIFSC	Pacific Islands Fisheries Science Center
PLL	Pelagic longline
PLTRP	Pelagic Longline Take Reduction Plan
PLTRT	Pelagic Longline Take Reduction Team
PMP	Preliminary Fishery Management Plan
POP	Pelagic observer program
PPI	Producer price index
PRA	Paperwork Reduction Act
PRM	Post-release mortality
PSAT	Pop-up satellite archival tag
RBS	Recreational Billfish Survey
RFA	Regulatory Flexibility Act
RIR	Regulatory Impact Review
RFMC	Regional Fishery Management Council
RFMO	Regional Fishery Management Organizations
RPAs	Reasonable and Prudent Alternatives
RPMs	Reasonable and Prudent Measures
RUM	Random utility model
SA	South Atlantic
SAB	South Atlantic Bight
SAFE Report	Stock Assessment and Fishery Evaluation Report
SAFMC	South Atlantic Fishery Management Council
SAI	Sailfish
SAR	Sargasso Sea
SARA	Species at Risk Act
SAT	South Atlantic
SAV	Submerged aquatic vegetation
SBR	Spawning Stock Biomass Ratio

SBRM	Standardized Bycatch Reporting Methodology
SCRS	Standing Committee for Research and Statistics
SCS	Small coastal sharks
SCUBA	Self contained underwater breathing apparatus
SD	Statistical document
Secretary	Secretary of Commerce
SEDAR	Southeast Data, Assessment, and Review
SEFSC	Southeast Fisheries Science Center, NMFS
SEIS	Supplemental Environmental Impact Statement
SEN	Seines
SERO	Southeast Regional Office, NMFS
SEW	Stock evaluation workshop
SFA	Sustainable Fisheries Act
SFL	Straight fork length
SK Program	Saltonstall-Kennedy Program
SQ	Status quo
SRP	Scientific research permit
SSB	Spawning stock biomass
SSF	Spawning Stock Fecundity
SSN	Spawning Stock Number
SWFSC	Southwest Fisheries Science Center
TAC	Total allowable catch
TAG	Tag-A-Giant
TAL	Total allowable landings
TCs	Terms and Conditions
TL	Total length
TRP	Take Reduction Plan
TUNS	Tuna North and Tuna South
TWL	Trawls
TXPWD	Texas Parks and Wildlife Department
UNK	Unknown
U.S. DPS	U.S. Distinct Population Segment
USFWS	United States Fish and Wildlife Service
VIMS	Virginia Institute of Marine Science
VMS	Vessel monitoring system
VTR	Vessel Trip Report, NMFS NER
WHM	White marlin
WPFMC	Western Pacific Fishery Management Council
WTP	Willingness to pay

ww	Whole weight
WWF	World Wildlife Fund
YFT	Yellowfin tuna
YOY	Young of the year
ZMRG	Zero Mortality Rate Goal

CHAPTER 1 TABLE OF CONTENTS

1.0 INTRODUCTION

Atlantic Highly Migratory Species (HMS)[1] are managed under the dual authority of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) and the Atlantic Tunas Convention Act (ATCA). Under the Magnuson-Stevens Act, the National Marine Fisheries Service (NMFS) must, consistent with the National Standards, manage fisheries to maintain optimum yield (OY) by rebuilding overfished fisheries and preventing overfishing. Under ATCA, NMFS is authorized to promulgate regulations, as may be necessary and appropriate, to implement the recommendations from the International Commission for the Conservation of Atlantic Tunas (ICCAT). The management measures proposed for this FMP amendment and associated rulemaking, which primarily address Atlantic shark issues, are taken under the authority of the Magnuson-Stevens Act. In addition to these two laws, any management measures must also be consistent with other applicable laws including, but not limited to, the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), and the Coastal Zone Management Act (CZMA).

Chapters 2 and 4 of this document provide a description of the alternatives considered and the analyses of the potential impacts. Chapter 3 provides a description of the fishery and Chapter 5 discusses any mitigating measures regarding the alternatives. Chapters 6, 7, and 8 fully analyze the economic impacts of the alternatives and address the requirements of a Regulatory Impact Review (RIR) and Final Regulatory Flexibility Analysis (FRFA). Chapter 9 provides the community profiles and social impact analysis. Chapter 10 describes consistency with the National Standards, other requirements of the Magnuson-Stevens Act, and other applicable law. There are also several appendices, which explain quotas and retention limits under the DEIS and FEIS, a technical response to a comment submitted on the latest large coastal shark stock assessment, additional analyses based on public comment, responses to public comments received on the DEIS and proposed rule, and an HMS Fishing Communities Final Report.

NMFS is implementing management measures via rulemaking that would reduce fishing mortality and effort for the purpose of rebuilding overfished Atlantic shark species while ensuring that a limited shark fishery can be maintained.

1.1 Brief Management History

This section provides a brief overview of HMS management. More detail regarding the management history of Atlantic shark management can be found in Section 3.1.

In the 1980s, the Regional Fishery Management Councils were responsible for the management of Atlantic HMS. Thus, in 1985 and 1988, the five Councils finalized joint FMPs for swordfish and billfish, respectively. In 1989, the Councils requested that the Secretary of

[1]The Magnuson-Stevens Act, at 16 U.S.C. 1802(14), defines the term "highly migratory species" as tuna species, marlin (*Tetrapturus* spp. and *Makaira* spp.), oceanic sharks, sailfishes (*Istiophorus* spp.), and swordfish (*Xiphias gladius*). Further, the Magnuson-Stevens Act, at 16 U.S.C. 1802(27), defines the term "tuna species" as albacore tuna (*Thunnus alalunga*), bigeye tuna (*Thunnus obesus*), bluefin tuna (*Thunnus thynnus*), skipjack tuna (*Katsuwonus pelamis*), and yellowfin tuna (*Thunnus albacares*).

Commerce (Secretary) manage Atlantic sharks. NMFS finalized a shark FMP in 1993. Atlantic Tunas did not have a Fishery Management Plan until 1999.

On November 28, 1990, the President of the United States signed into law the Fishery Conservation Amendments of 1990 (Pub. L. 101-627). This law amended the Magnuson Fishery Conservation and Management Act (later renamed the Magnuson-Stevens Fishery Conservation and Management Act or Magnuson-Stevens Act) and gave the Secretary the authority (effective January 1, 1992) to manage HMS in the exclusive economic zone (EEZ) of the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea under authority of the Magnuson-Stevens Act (16 U.S.C. §1811). This law also transferred from the Fishery Management Councils to the Secretary, effective November 28, 1990, the management authority for HMS in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea (16 U.S.C. §1854(f)(3)). At this time, the Secretary delegated authority to manage Atlantic HMS to NMFS.

Under the Magnuson-Stevens Act, NMFS must maintain OY of each fishery by preventing overfishing and rebuilding overfished stocks. To do this, NMFS must, among other things, consider the National Standards, including using the best scientific information as well as the potential impacts on residents of different States, efficiency, costs, fishing communities, bycatch, and safety at sea (16 U.S.C. §1851 (a)(1-10)). The Magnuson-Stevens Act also has a specific section that addresses preparing and implementing FMPs for Atlantic HMS (16 U.S.C. §1854 (g)(1)(A-G)). In summary, the section includes, but is not limited to, requirements to:

- Consult with and consider the views of affected Councils, Commissions, and advisory groups;
- Evaluate the likely effects of conservation and management measures on participants and minimize, to the extent practicable, any disadvantage to U.S. fishermen in relation to foreign competitors;
- Provide fishing vessels with a reasonable opportunity to harvest any allocation or quota authorized under an international fishery agreement;
- Diligently pursue comparable international fishery management measures; and,
- Ensure that conservation and management measures promote international conservation of the affected fishery, take into consideration traditional fishing patterns of fishing vessels, are fair and equitable in allocating fishing privileges among U.S. fishermen and do not have economic allocation as the sole purpose, and promote, to the extent practicable, implementation of scientific research programs that include the tagging and release of Atlantic HMS.

1.2 Rebuilding and Preventing Overfishing of Atlantic Sharks

Under National Standard (NS) 1 of the Magnuson-Stevens Act and implementing regulations (50 CFR 600.310), NMFS is required to "prevent overfishing while achieving, on a continuing basis, the OY from each fishery for the U.S. fishing industry." In order to accomplish this, NMFS must determine the maximum sustainable yield (MSY) and specify status determination criteria to allow a determination of the status of the stock. In cases where the fishery is overfished or where overfishing is occurring, NMFS must take action to rebuild the stock (by specifying rebuilding targets) or take action to prevent overfishing. In the 1999 Fishery Management Plan (FMP) for Atlantic tunas, swordfish, and sharks (HMS) and

maintained in the 2006 Consolidated HMS FMP, NMFS outlined these status determination criteria and a set of rebuilding targets. This amendment does not change these criteria or targets.

On February 14, 2007 (72 FR 7016), NMFS published a Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) to develop alternatives for guidance regarding Annual Catch Limits (ACLs) and Accountability Measures (AMs) and other overfishing provisions of the Magnuson-Stevens Act. Both ACLs and AMs are new requirements of the Magnuson-Stevens Reauthorization Act. The intent is to revise the NS1 guidelines consistent with these new requirements through a forthcoming proposed and final rule. Per section 104(b) of the Magnuson-Stevens Reauthorization Act, these ACL and AM requirements would take effect in fishing year 2010, for stocks determined by the Secretary of Commerce to be undergoing overfishing. Stocks not determined to be undergoing overfishing will need ACLs and AMs by 2011. Fish stocks determined to be overfished by the Secretary after July 12, 2009, would need to prepare and implement a FMP, FMP amendment, or proposed regulations within two years. Despite the fact that this FMP amendment will be finalized before the final revised guidelines for NS1 are completed, NMFS has been developing this action bearing in mind the Agency's preliminary and developing interpretations of ACLs and AMs as reflected in the NOI and elsewhere. Thus, NMFS intends for the management measures included for rebuilding overfished sharks and preventing overfishing of sharks to be consistent, as much as possible, with the revised National Standard 1 Guidelines when finalized.

Rebuilding Targets and Status Determination Criteria in the Consolidated HMS FMP

According to the definition at § 600.310 (d) of the Magnuson-Stevens Act regulations, overfishing occurs whenever a stock or stock complex is subjected to a rate or level of fishing mortality that jeopardizes its capacity to produce MSY on a continuing basis. The 1999 HMS FMP established the maximum fishing mortality threshold (MFMT) as F_{MSY}. F_{MSY} is defined as the fishing mortality level necessary to produce MSY on a continuing basis. If the MFMT exceeds F_{MSY} for more than one year then the stock is considered to be subject to overfishing, and remedial action must be taken. This is the current situation for sandbar and dusky sharks.

The 1999 FMP for Atlantic Tunas, Swordfish, and Sharks (1999 FMP) established the minimum stock size threshold (MSST) as $(1\text{-}M)B_{MSY}$ when natural mortality (M) is less than 0.5. Most species of sharks have M less than 0.5. When the stock falls below MSST, the stock is overfished and remedial action must be taken to rebuild the stock. This is the current situation for sandbar, dusky, and porbeagle sharks.

Stocks are considered rebuilt when current biomass (B) levels are equal to B_{MSY}. B_{MSY} is the level of stock abundance at which harvesting the resource can be sustained on a continual basis at the level necessary to support MSY. Stocks are considered healthy when F is less than or equal to $0.75\ F_{MSY}$ and B is greater than or equal to B_{OY} (the biomass level necessary to produce OY on a continuing basis). Blacktip sharks in the Gulf of Mexico region are considered healthy; however, the 2005/2006 assessment recommended that catches of blacktip sharks in this region should not increase.

Unlike past assessments, the 2005/2006 LCS stock assessment determined that it is inappropriate to assess the LCS (Large Coastal Sharks) complex as a whole and determined that

status of the complex is unknown. This is due to the variation in life history parameters across species in the complex, different intrinsic rates of increase, and different catch and abundance data for all the species included in the LCS complex. Because of insufficient data available for some individual species within the complex, individual species assessments were not possible with the exception of blacktip and sandbar sharks. Therefore, NMFS is examining alternative options to managing the LCS complex as a whole, which are described in more detail in Chapters 2 and 4. Similarly, the assessment concluded that the status of blacktip sharks in the South Atlantic region is unknown because the assessment was unable to provide estimates of stock status or reliable population projections. As a result, the assessment recommended that current catch levels should not change.

The 1999 FMP established that management measures for Atlantic tunas, swordfish and sharks should have at least a 50-percent chance of reaching the target reference points used in developing rebuilding projections. This target is consistent with the technical guidelines for National Standard 1. The 1997 shark quota rule used a 50-percent probability in order to ensure that the stock levels were maintained and did not decline further while a rebuilding plan was developed (April 7, 1997, 62 FR 16647). However, as described in the 1999 FMP and maintained in the 2006 Consolidated HMS FMP, 50-percent is minimally acceptable for sharks. In both the 1999 FMP for Atlantic Tunas, Swordfish, and Sharks and the 2003 Amendment 1 to that FMP, NMFS used a 70-percent probability to determine the rebuilding plan for the LCS to ensure that the intended results are actually realized.

Compared to other HMS and fish species, many shark species are slow growing, take a long time to mature (*e.g.*, sandbar sharks mature between 12 and 15 years), have few pups per brood, and generally reproduce every two or three years (*e.g.*, the sandbar shark has an average of eight to nine pups every other year). Given these life history traits, many shark species have a low reproductive potential. Moreover, while there is sufficient data for certain shark species facilitating species specific stock assessments (*i.e.*, blacktip and sandbar sharks), many other shark species are not encountered as frequently in commercial fisheries or fishery-independent surveys and data is lacking, resulting in an inability to conduct species specific assessments. Such data constraints make it difficult to manage most sharks on a species basis. However, in this amendment, NMFS has taken a step towards species-specific management by removing sandbar sharks from the LCS complex and defining a new complex as "non-sandbar LCS," comprised of silky, tiger, blacktip, spinner, bull, lemon, nurse, scalloped hammerhead, great hammerhead, and smooth hammerhead sharks. Given that most sharks have low reproductive potential, are long-lived, and experience slow growth, this amendment to the Consolidated HMS FMP will result in NMFS using a 70-percent chance of success in order to ensure that shark stocks are able to rebuild.

National Standard 1 and Determining the Rebuilding Timeframe

Under the NS1 Guidelines, if a stock is overfished, NMFS is required to "take remedial action by preparing an FMP, FMP amendment, or proposed regulation...to rebuild the stock or stock complex to the MSY level within an appropriate time frame" (50 CFR 600.310(e)(3)(ii)). Additionally, "in cases where a stock or stock complex is overfished, [the] action must specify a time period for rebuilding the stock or stock complex that satisfies the requirements of section

304(e)(4)(A) of the Magnuson-Stevens Act." The time frame to rebuild the stock or stock complex must be as short as possible taking into account a number of factors including:

- The status and biology of the stock or stock complex;
- Interactions between the stock or stock complex and other components of the marine ecosystem;
- The needs of the fishing communities;
- Recommendations by international organizations in which the United States participates; and
- Management measures under an international agreement in which the United States participates.

The lower limit of the specified time frame for rebuilding is determined by the status and biology of the stock and "is defined as the amount of time that would be required for rebuilding if fishing mortality were eliminated entirely" (50 CFR 600.310 (e)(4)(ii)(B)(1)).

The National Standard 1 Guidelines specify two strategies for determining the rebuilding time frame depending on the lower limit of the specified time frame for rebuilding. The first strategy (50 CFR 600.310 (e)(4)(ii)(B)(2)) states that:

> "[i]f the lower limit is less than 10 years, then the specified time period for rebuilding may be adjusted upward to the extent warranted by the needs of fishing communities and recommendations by international organizations in which the United States participates, except that no such upward adjustment can result in the specified time period exceeding 10 years, unless management measures under an international agreement in which the United States participates dictate otherwise."

The second strategy (50 CFR 600.310 (e)(4)(ii)(B)(3)), which is applicable for most species of sharks because the lower limit is generally 10 years or greater, specifies that:

> "[i]f the lower limit is 10 years or greater, then the specified time period for rebuilding may be adjusted upward to the extent warranted by the needs of fishing communities...except that no such upward adjustment can exceed the rebuilding period calculated in the absence of fishing mortality, plus one mean generation time or equivalent period based on the species' life-history characteristics."

2005/2006 Stock Assessments and Rebuilding Timeframe for Sandbar Sharks

The 2005/2006 LCS stock assessment conducted assessments for sandbar sharks, blacktip sharks, and the LCS complex. Unlike past assessments, the 2005/2006 LCS complex assessment determined that it is inappropriate to assess the LCS complex as a whole, and the Agency determined that the status of the LCS complex is unknown. Results of the sandbar shark stock assessment determined that sandbar sharks are overfished (Spawning Stock Fecundity$_{2004}$ (SSF) / SSF_{MSY} = 0.72) and overfishing is occurring (F_{2004}/F_{MSY} = 3.72). The assessment recommended a sandbar specific total allowable catch (TAC) level and a corresponding rebuilding timeframe. Because the LCS complex is no longer appropriate for assessment purposes, and specific recommendations were made for sandbar sharks, NMFS is setting a separate rebuilding plan for

sandbar sharks in this amendment. One objective of this amendment is to ensure that fishing mortality levels for sandbar sharks are maintained at or below levels that would result in a 70-percent probability of rebuilding in the timeframe recommended by the assessment.

The base-case model from the 2005/2006 assessment for sandbar sharks provided probable values for future population condition and status. In all cases, OY is the yield from a fishery that will provide the greatest overall benefit to the nation, considering all of the requirements of the Magnuson-Stevens Act National Standards, particularly with respect to food production and recreational opportunities and taking into account the protection of marine ecosystems. As such, the TAC recommended by the stock assessment is considered OY. The stock assessment discussed three rebuilding scenarios, including: 1) rebuilding timeframe under no fishing, 2) a TAC corresponding to a 50-percent probability of rebuilding, and 3) a TAC corresponding to a 70-percent probability of rebuilding. Under no fishing, the stock assessment estimated that sandbar sharks would rebuild in 38 years. Adding a generation time (28 years), as described under NS1 for species that require more than 10 years to rebuild even if fishing mortality were eliminated entirely, the target year for rebuilding the stock was estimated to be 2070 (28 years mean generation time + 38 years to rebuild if fishing mortality eliminated = 66 years, starting in 2008). Assuming fishing mortality from 2005 to 2007 would be maintained at levels similar to 2004 (the last year of data used in the stock assessment was from 2004) and that there would be a constant TAC between 2008 and 2070, the assessment estimated that sandbars would have a 70-percent probability of rebuilding by 2070 with a TAC of 220 metric tons (mt) whole weight (ww) (158 mt dressed weight (dw))/year and a 50-percent probability of rebuilding by 2070 with a TAC of 240 mt ww (172 mt dw)/year. As described previously, NMFS is using the 70-percent probability of rebuilding to ensure that the intended results of a management action are actually realized given the life history traits of sandbar sharks.

Measures considered in this amendment include modifying species complexes, reducing commercial quotas, accounting for recreational landings and dead discards, implementing strict retention limits, increasing reporting, and limiting the number of participants authorized to land sandbar sharks. Such measures are necessary to ensure that the rebuilding timeframe is met for sandbar sharks with a 70 percent probability of success. The amendment also includes potential AMs (*e.g.*, adjusting commercial quotas based on overharvests and counting all unclassified sharks against the appropriate shark quotas based on observer reports) that could be used to ensure rebuilding by 2070. Sandbar sharks would be separated from the LCS complex and the quota would be reduced to 116.6 mt dw/year, which would bring the total TAC to 158.3 mt dw (220 mt ww) once other sources of sandbar sharks mortality are accounted for. The actual commercial quota available may fluctuate based on overharvests in the preceding year. At this time, NMFS considers the 220 mt ww to be the ACL required by Magnuson-Stevens Act. Under the preferred alternative, NMFS would close the fishery when reports indicate that 80 percent of the quota has been taken) as a means to decrease the likelihood that quotas are exceeded. In the future, the ACL of 220 mt ww might change depending on previous years' overharvests if any and/or when the final rule is published for new Magnuson-Stevens Reauthorization Act requirements regarding ACLs (per the notice of intent published February 14, 2007, 72 FR 7016).

As initially established in the 1999 FMP, Amendment 2 to the Consolidated HMS FMP would maintain quota adjustment as a management measure to account for overharvests. All alternatives, except Alternative 5 (which would close Atlantic shark fisheries), include a process for harvest-based quota adjustment. Thus, the actual commercial base quota available may fluctuate due to overharvests in the preceding year, resulting in an adjusted quota. To account for the 2007 overharvest while retaining an allowable amount of fishing effort that is consistent with the TAC recommended by the stock assessment to ensure rebuilding, NMFS would close the commercial sandbar shark fishery and establish a small research fishery and distribute the 2007 overharvest over multiple years to allow for the research fishery to start in 2008. A multiyear (5) adjusted quota is also the preferred measure for accounting for 2007 overharvest in the non-sandbar shark LCS fishery as described in Appendix C.

2005 Stock Assessment and Rebuilding Timeframe for Dusky Sharks

Dusky sharks have been a prohibited species since 2000. Prior to that time, they were managed in the LCS complex. The first species-specific stock assessment for dusky sharks was conducted by the Southeast Fisheries Science Center (SEFSC) in 2006 (the SEFSC started the assessment before the decision was made to conduct stock assessments using the Southeast Data Assessment and Review (SEDAR) process; the last year of data used in the assessment was 2003). This stock assessment employed three formal stock assessment methodologies to determine stock status, including: surplus production modeling, age-structured production catch-free modeling, and age-structured production modeling. Within each scenario, baseline scenarios were identified that should be regarded as the most appropriate. All methodologies and scenarios explored (approximately 30 scenarios) indicated that dusky sharks are overfished (SSF_{2003}/SSF_{MSY} = 0.15-0.47). Of the scenarios explored, 27 of 30 indicated that dusky sharks are experiencing overfishing (F_{2003}/F_{MSY} = 1.68 – 1,180). The SEFSC was not able to determine which scenario was the most appropriate to use for management purposes. Therefore, NMFS is providing the range of SSF and F estimates from the baseline methodologies.

Projections incorporating the status determination criteria were completed with three modeling approaches. Projections to the year 2100 with no fishing mortality indicate that the stock would only have a nine-percent probability of being rebuilt in that timeframe. This means it would take much longer to reach the 70-percent probability success threshold for rebuilding as described earlier. Projections with the age-structured production model *(i.e.*, baseline scenario) predicted that dusky sharks could be rebuilt with a 70-percent probability by the year 2400. Other projections from the three modeling approaches indicate that rebuilding of dusky sharks will take between 100-400 years. NMFS is also assuming that the rebuilding timeframe for dusky sharks would be at least 100 years.

As mentioned earlier, the harvest of dusky sharks has been prohibited since 2000. Despite this fact, they are still overfished with overfishing occurring. NMFS believes this is at least partly due to the fact that they are caught as bycatch, predominantly in longline fisheries. Fishermen are likely to catch dusky sharks when targeting sandbar sharks with bottom longline (BLL) or pelagic longline (PLL) gear. By reducing dusky shark bycatch, NMFS can reduce dusky shark mortality to the extent practicable as required by the Magnuson-Stevens Act. Thus, given the rebuilding timeframe for dusky sharks and their bycatch on BLL gear, the measures preferred in this amendment focus on reducing bycatch of dusky sharks in BLL fisheries. The

preferred measures included would limit the number of vessels that are authorized to land sandbar sharks to reduce dusky shark bycatch. There would also be a finite number of trips that would be taken targeting sandbar sharks as the quota for sandbar sharks would be reduced by approximately 80 percent compared to the previous quota. Once this quota was met, there would be no more targeting or possession of sandbar sharks and other shark species within the shark research fishery. Trips targeting sandbar sharks would also be subject to 100 percent Federal observer coverage, therefore, the Agency would be attaining near real-time information on catch composition from those vessels that are most likely to be catching dusky sharks as bycatch. This would allow the Agency to respond to and implement additional measures if necessary.

Implementing a more restrictive retention limit for non-sandbar LCS (*e.g.*, 33 non-sandbar LCS/vessel/trip for directed permit holders) would also result in reduced fishing effort targeting sharks with BLL gear. NMFS is also preferring measures that would not allow dusky sharks to be collected for public display, limiting the number of dusky sharks authorized for research, not allowing certain species of sharks that look like dusky sharks to be possessed in recreational fisheries, maintaining the mid-Atlantic shark closed area, and implementing additional time/area closures for BLL gear as recommended by the South Atlantic Fishery Management Council in Amendment 14. More information on these time/area closures can be found in Chapters 2 and 4. These measures are all expected to reduce effort and fishing mortality, which will increase the likelihood of rebuilding dusky sharks.

Despite not having a definitive TAC, NMFS does have some measures that could be implemented if catch of dusky sharks in the commercial fishery is higher than expected (*e.g.*, if catches are higher than those estimated in the analyses described in Chapter 4). Under the preferred measures, NMFS would take several measures depending on the situation. In the research fishery, if dusky catch is high by a particular vessel or in a particular region, NMFS could stop that trip or stop all research trips in that region and/or time. Additionally, if after reviewing the data from a particular year, NMFS decides that the catch was too high, NMFS could adjust the research protocols and reduce effort or modify gear requirements, as needed. For the non-research trips, NMFS could either reduce the retention limit in an attempt to reduce effort or work with the appropriate regional Fishery Management Council to reduce bycatch mortality in certain fisheries, or consider other measures, as appropriate.

2005 Stock Assessment and Rebuilding Timeframe for Porbeagle Sharks

A stock assessment was conducted for North Atlantic porbeagle sharks in 2005 by the Canadian Department of Fisheries and Oceans. This assessment was reviewed by NMFS and determined to be the best available science and appropriate for use in U.S. domestic management. Results indicate that porbeagle sharks are overfished (Spawning Stock Number $(SSN)_{2004}/SSN_{MSY} = 0.15\text{-}0.32$), however, overfishing is not occurring ($F_{2004}/F_{MSY} = 0.83$). The assessment recommended that there is a 70-percent probability of rebuilding in 100 years if F levels are maintained at or below 0.04 (current F level). As such, NMFS is establishing the rebuilding timeframe to be 100 years.

NMFS had proposed prohibiting porbeagle landings in commercial and recreational fisheries in the draft Amendment 2 to the Consolidated HMS FMP. Commercial landings of porbeagle sharks are well below the 92 mt dw/year quota allocated for this sector as there is no

directed fishing for porbeagle sharks in the United States. Recreational landings generally only occur in a small number of tournaments in the Northeastern United States (NMFS, 2006). Furthermore, the United States does not contribute to a significant proportion of Atlantic-wide fishing mortality of porbeagle sharks, porbeagle sharks are not currently experiencing overfishing, and a prohibition may simply lead to an increase in the number of dead discards of porbeagle sharks. Thus, the Agency prefers to implement a reduced TAC for porbeagle sharks to cap porbeagle mortality at its current level while allowing possession of porbeagle sharks in recreational and commercial fisheries.

The 2005 Canadian porbeagle stock assessment incorporated U.S. commercial landings in their assessment. Based on their assessment, if fishing mortality for porbeagle sharks is kept at or below its current level (F = 0.04), then porbeagle sharks have a 70-percent probability of rebuilding within 100 years. Because porbeagle sharks are not currently experiencing overfishing, the rate of fishing mortality does not need to be reduced in order for rebuilding to occur. As mentioned above, even if F were below its current level (or equal to zero) the same rebuilding timeframe would still be required because of the status and biology of the species. Therefore, NMFS will set a TAC of 11.3 mt dw based on current commercial landings of 1.7 mt dw, current commercial discards of 9.5 mt dw, and current recreational landings of 0.1 mt dw. This will result in a commercial quota of 1.7 mt dw, which would likely allow porbeagle sharks to rebuild within 100 years. If the TAC is exceeded, the Agency may explore additional accountability measures, including reducing the TAC or other management measures, as necessary. In addition, NMFS will encourage the release of all live porbeagle sharks to maximize their chances of post-release survival as well as to reduce the number of dead discards by allowing some harvest of porbeagle sharks.

2005/2006 Assessments for Blacktip Sharks

The 2005/2006 stock assessment assessed blacktip sharks for the first time as two separate populations: Gulf of Mexico and Atlantic. Blacktip sharks were assessed separately in the two regions based on tagging studies that suggested that the stocks are geographically distinct and isolated. Therefore, NMFS determined the status of the Gulf of Mexico blacktip shark population is not overfished (SSF_{2004}/SSF_{msy} = 2.54 – 2.56) and that overfishing is not occurring (F_{2004}/F_{msy} = 0.03 – 0.04), yet the status of the Atlantic population is unknown. As a result, NMFS is implementing management measures to ensure that current catches do not increase in order to keep these populations at sustainable levels consistent with advice from the stock assessment. Currently, NMFS is not implementing a rebuilding plan for blacktip sharks.

1.3 Purpose and Need

As described above, based on the results of the 2005 Canadian porbeagle shark stock assessment, the 2006 dusky shark stock assessment, and the 2005/2006 LCS stock assessment, NMFS has determined that a number of shark fisheries are overfished and an amendment to the 2006 Consolidated HMS FMP is needed to implement management measures in order to rebuild overfished stocks and prevent overfishing. In addition to the management measures described in this document, NMFS is also making clarifications and other changes to the regulatory text that were described in the proposed rule. These changes include modifying the frequency of shark

stock assessments conducted by the Agency and clarify the timing of issuing the annual Stock Assessment and Fishery Evaluation (SAFE) Report.

NMFS published updated determinations for the shark species/complexes that were assessed in conjunction with a Notice of Intent (November 7, 2006, 71 FR 65086) to prepare an Environmental Impact Statement. An issues options presentation was released on January 5, 2007, followed by seven scoping hearings and a public comment period that closed on February 5, 2007. A pre-draft document describing potential alternatives that might be included in the DEIS and proposed rule for Amendment 2 to the HMS FMP was released to HMS consulting parties on March 6, 2007, and presented to the HMS Advisory Panel (AP). The AP and consulting parties submitted comments prior to March 31, 2007. The Notice of Availability announcing the DEIS and the proposed rule were both published on July 27, 2007, at 72 FR 41325 and 41392, respectively. The public comment period was originally slated to end on October 10, 2007, however, it was subsequently extended (October 3, 2007, 72 FR 56330) and reopened until December 17, 2007 (November 15, 2007, 72 FR 64186), to provide Fishery Management Councils, the Atlantic States Marine Fisheries Commission, and the general public additional opportunities to submit comments.

1.4 Objectives

Consistent with the Consolidated HMS FMP objectives, the Magnuson-Stevens Act, and other relevant Federal laws, the specific objectives of this action are to:

- Implement rebuilding plans for sandbar, dusky, and porbeagle sharks;
- Provide an opportunity for the sustainable harvest of blacktip sharks and other sharks, as appropriate;
- Prevent overfishing of Atlantic sharks;
- Analyze bottom longline (BLL) time/area closures and take necessary action to maintain or modify the closures, as appropriate;
- Improve, to the extent practicable, data collections or data collection programs.

1.5 Other Considerations

Fisheries Disasters

NMFS received several comments during the public comment period concerning declaration of a fisheries disaster. Section 312 (a) of the Magnuson-Stevens Act states:

"At the discretion of the Secretary or at the request of the Governor of an affected State or a fishing community, the Secretary shall determine whether there is a commercial fishery failure due to a fishery resource disaster as a result of natural causes, man-made causes beyond the control of fishery managers to mitigate through conservation and management measures, including regulatory restrictions (including those imposed as a result of judicial action) imposed to protect human health or the marine environment, or undetermined causes."

Capacity Reduction Programs

The Magnuson-Stevens Act provides for voluntary reduction of excess fishing capacity through fishing capacity reduction programs. Some participants of the Atlantic shark fishery expressed interest in reducing fishing capacity for sharks via some form of buyout program. Buyouts can occur via one of three mechanisms, including: through an industry fee, via appropriations from the United States Congress, and/or provided from any State or other public sources or private or non-profit organization(s). A buyout plan was not proposed in this rulemaking, despite requests for consideration from the HMS Advisory Panel and other affected constituents, because the Agency is unable to independently initiate a buyout or consider it as a management option. Instead, buyouts must be initiated via one of the aforementioned mechanisms. However, should appropriations be made available or another business plan be presented to the Agency, NMFS would consider these options, as appropriate.

Some participants in the shark fishery requested that an industry "business plan" be developed. A business plan was drafted under a cooperative agreement with the Gulf & South Atlantic Fishery Development Foundation (GSAFDF). The final report was received by NMFS on September 12, 2006 (Gulf & South Atlantic Fisheries Foundation, 2006).

The objective of the buyout business plan submitted by GSAFDF was to assess the feasibility of a buyout program within the Atlantic commercial shark fishery. The buyout plan consisted of four components, including the analysis of socioeconomic impacts to shark-dependent communities, management, policy and resource analysis, calculation of fair-market value for a shark permit and/or vessel, and the development of the buyout business plan. Mailings to shark fishery permit holders were conducted to solicit feedback on options being considered for the buyout business plan. These options included a "reverse buyback" and several permit buyback scenarios. No vessel or non-shark permit buybacks were included in the analysis. The majority of the industry respondents to the study did not support the options being considered in the business plan. As a result, the report concluded, "An evaluation of the Buyout Business Plan options, and comments received by commercial fishermen, indicates that the Total Allowable Catch (TAC) of the shark fishery cannot adequately support a buyback which industry would support." It is worth noting that this determination was made prior to the sandbar stock assessment recommending a TAC of 158 mt dw for sandbar sharks. The report also concluded that a buyout program within the shark fishery could still be feasible if issues surrounding latent effort and additional financial resources outside of the shark fishery fleet could be attained in order to implement a buyout program. The recent stock assessments (2005/2006) have indicated that further reductions in shark quotas will be necessary. These reductions may result in more latent and underutilized capacity in the shark fishery.

Limited Access Privilege Programs (LAPP)

Section 303A of the Magnuson Stevens Act (16 U.S.C. 1853a) describes the requirements for Limited Access Privilege Programs (LAPPs). A LAPP is a federal permit to harvest a quantity of fish, usually expressed as a percentage of a fishery's TAC that may be held for exclusive use by an entity. These programs may be implemented to address numerous issues, including but not limited to: ending the race for fish, reducing overcapitalization, improving efficiency and safety, while still addressing the biological needs of a stock. These programs can

be designed specifically to meet the needs of a fishery for which they are designed, provided they meet the requirements outlined in the Magnuson-Stevens Act. There are numerous examples of LAPPs in the United States, including the Alaska halibut and sablefish, Gulf of Mexico red snapper, and Mid-Atlantic surf clam and ocean quahog Individual Fishing Quota (IFQ) programs. The Agency received comments from the public on Amendment 2 to the Consolidated Atlantic HMS FMP related to the potential for a LAPP in the Atlantic shark fishery. A LAPP for the shark fishery was not considered or analyzed in this amendment because of the ramifications this type of program would have for the existing permit structure and the time required for implementing these programs. Setting up a LAPP or ITQ system would have taken too much time to set up and implement, therefore allowing overfishing of sharks to continue in spite of the mandate to rebuild overfished stocks in § 304(e) of the Magnuson-Stevens Act.

The Magnuson-Stevens Act states that for stocks identified as overfished or having overfishing occurring, the appropriate Council or Secretary shall prepare a fishery management plan, plan amendment, or proposed regulations for the fishery to end overfishing in the fishery and rebuild affected stocks within one year of that determination. NMFS satisfied that timing provision: sandbar sharks and dusky sharks were determined to be overfished with overfishing occurred on November 7, 2006 (71 FR 65086), and NMFS published the draft Amendment 2 to the Consolidated HMS FMP on July 27, 2007 (72 FR 41325). NMFS notes that the 2006 Magnuson-Stevens Fishery Conservation and Management Reauthorization Act amended § 304(e) to include a two-year timing provision for preparation and implementation of actions, and the new provision will be effective July 12, 2009. To properly design an ITQ system that appropriately considers the views of all stakeholders and then to implement such a system would take NMFS several years, and therefore was not considered as a reasonable alternative for this action due to the MSA two-year action mandate. However, the HMS Management Division intends to explore options for permit reform that may include implementation of a LAPP for the shark fishery with the HMS Advisory Panel in April 2008.

2005/2006 Sandbar Stock Assessment

A report entitled "Report to Directed Shark Fisheries, Inc. on the 2006 SEDAR 11 Assessment for Sandbar Shark" prepared by Dr. Frank J. Hester and Dr. Mark Maunder was received by NMFS during the scoping period for this amendment. This report provided a critique of the sandbar shark stock assessment methods, data, and results. The authors stated concerns regarding which data sets were used in the assessment, selectivity curves employed, appropriateness of catch series included, the age-at-maturity (*i.e.* maturity ogive: the age at which 50 percent of individuals in a given species are sexually mature) for sandbar sharks, and the selection of biological parameters for sandbar sharks. During the review workshop held June 5-9, 2006, the panel selected by the Center for Independent Experts (CIE) found that the data and the models employed during the data and assessment workshops, respectively, were the best available for evaluating the stock status of sandbar sharks. The CIE is responsible for providing independent peer-review of the science involved in Agency decisions and was created in response the U.S. Ocean Action Plan (2004) which emphasized the need to increase independent peer review NMFS science. The Agency has sent a formal response to the authors addressing their concerns and is moving forward with management measures with the recommendations of the stock assessments. The report submitted by Dr.'s Hester and Maunder and the Agency

response are included in Appendix B. Dr. Hester has also submitted an additional comment during the open comment period on the proposed rule which NMFS has incorporated into the overall responses to comments. However, a formal Agency response to Dr. Hester addressing this comment was not prepared.

Circle Hooks

The Agency compiled the results of several studies which used circle hooks in various BLL fisheries. Yet, the results of these BLL studies were found to be inconclusive regarding the impact that circle hooks have on protected resources as well as target species caught in BLL fisheries. The efficacy using of circle hooks to reduce bycatch and post-hooking mortality of sea turtles is well-documented in other fisheries, including the HMS PLL fishery. Circle hooks are required for the Atlantic HMS pelagic longline fishery consistent with the June 2004 Biological Opinion. The Agency is not proposing that circle hooks be required for BLL fisheries targeting shark at this time for several reasons: 1) lack of data demonstrating conservation benefits in BLL fisheries, 2) potential inconsistencies between Council-managed and HMS BLL fisheries that may occur as a result of requiring circle hooks, and 3) observer data indicating that circle hooks are already the most frequently used type of hook on trips targeting shark in the South Atlantic and Gulf of Mexico regions. The preferred alternative described in this document would implement a shark research fishery. As a part of this research fishery, NMFS could conduct field trials that assess the efficacy of circle hooks for reducing bycatch and post-hooking mortality of sea turtles in the shark BLL fishery.

Chapter 1 References

Gulf & South Atlantic Fishery Development Foundation, Inc. 2006. Development of a Buyout Business Plan for the Southeast U.S. Commercial Shark Fishery. Cooperative Agreement No. NA17FD2367 (GSAFFI #84).

CHAPTER 2 TABLE OF CONTENTS

CHAPTER 2 LIST OF TABLES

2.0 SUMMARY OF THE ALTERNATIVES

As described in Chapter 1, NMFS is considering various shark management measures to meet the objectives of the Magnuson-Stevens Act and the Consolidated HMS FMP based on the 2006 stock assessments for Large Coastal Sharks (LCS), sandbar sharks, blacktip sharks, dusky sharks, and porbeagle sharks. NMFS produced a Pre-Draft of Amendment 2 to the Consolidated HMS FMP (pre-draft) which was presented to the HMS Advisory Panel (AP) in early March 2007, at which time NMFS asked for written comments. The Notice of Availability for the draft Amendment 2 to the Consolidated Atlantic Highly Migratory Species (HMS) Fishery Management Plan (FMP) and the proposed rule were published in the Federal Register on July 27, 2007 (72 FR 41324 and 41392, respectively). The draft amendment included the Draft Environmental Impact Statement (DEIS). The pre-draft, summaries of the March 2007 AP meeting and copies of the written comments received, as well as the DEIS and proposed rule are available upon request. This section provides a description and basis for all alternatives considered in Amendment 2 to the Consolidated HMS FMP, including the consideration of public comment. The ecological, economic, and social impacts of these alternatives are discussed in later chapters.

NMFS has grouped the potential management measures into seven key topics:

1) Quotas/Species complexes;
2) Time/Area closures;
3) Commercial retention limits;
4) Reporting requirements;
5) Seasons;
6) Regions; and,
7) Recreational management measures.

Traditionally, NMFS has analyzed various alternatives under each of these key topics separately for the Atlantic shark fishery. For example, under Quotas/Species Complexes, NMFS could analyze a range of quota alternatives specific to that key topic from no fishing (*i.e*. a quota of zero with all species prohibited) to status quo (SQ) (*i.e*. a quota of 1,017 mt dw with 19 species prohibited), and so forth, for each of the key topics.

Analyzing these different alternatives separately may add to public confusion since it may not be obvious what the ramifications of selecting different alternatives within a key topic may be on the shark stocks and participants in the shark fishery in aggregate. Using the alternative suite approach, it is clearer to a directed shark permit holder for example, the ramifications of a suite of alternatives that contain measures concerning quotas, retention limits, reporting, etc. Additionally, listing and analyzing the topics separately may not reinforce why NMFS chose particular preferred alternatives across the different topics. Given the specific objectives of this rulemaking (including rebuilding overfished shark stocks and ending overfishing), only certain combinations of alternatives under the different key topics will meet the management goals. For example, to rebuild overfished shark stocks it is necessary to implement a quota consistent with the rebuilding plan, reduced retention limits that would ensure

that the quota is not achieved too quickly, and increase reporting frequency to improve the likelihood that the smaller quota for rebuilding is not exceeded.

NMFS intends for this method of analyzing alternative suites that contain measures for the key topics:

- To capture the entire range of potential environmental and socioeconomic impacts and better describe the relationship between the different alternatives;
- To provide a clearer representation of the impacts of the alternatives and why an alternative suite is considered or preferred;
- To reduce the number of permutations or combinations of alternatives that may be combined, and which could be at odds with one another;
- To provide fishermen with a better understanding of how a particular alternative suite would affect them based on the permit(s) they possess;
- To elucidate the viable combination of management measures that will rebuild several shark stocks and end overfishing; and,
- To clarify the approach being used to reach the management goals outlined in this rulemaking (*i.e.*, outline how the total allowable catch for sandbar sharks is being attained while allowing retention of other shark species).

The alternative suites are described below and in Table 2.1.

2.1 Description of Alternative Suites

Five alternative suites were developed, each proposing a specific combination of the seven key topics. The same alternative suite that was preferred in the DEIS remains preferred in the final EIS (FEIS) (alternative suite 4). However, based on public comments, several aspects of the management measures in alternative suite 4 have been modified between the DEIS and FEIS. These changes are described in detail in Chapter 4 and Appendix C, and a detailed discussion of public comments and Agency responses is provided in Appendix D.

In addition to the five alterative suites, the proposed action also included two administrative topics, one related to the timing of stock assessments and the other to the timing of SAFE reports. Two alternatives (alternative 6 and 7) for the timing of stock assessments are analyzed and two alternatives for the timing of Stock Assessment and Fishery Evaluation Report (SAFE) (numbered 8 and 9) are analyzed. Alternative 7 regarding the timing of stock assessments and alternative 9 regarding the timing of the SAFE reports have been identified as the preferred alternatives in the FEIS. Thus, the complete action under consideration comprise one alternative suite selected from suites 1 through 5 (Sections 4.1 through 4.5), plus alternative 6 or 7 (Sections 4.6 and 4.7), and alternative 8 or 9 (Sections 4.8 and 4.9). In addition to alternative suite 4, NMFS identifies alternative 7 regarding the timing of stock assessments and alternative 9 regarding the timing of SAFE reports as the preferred alternatives in the FEIS. These alternatives were also preferred in the DEIS.

2.1.1 Alternative Suite 1: Maintaining the Existing Atlantic Commercial and Recreational Shark Fisheries (Status Quo)

The status quo alternative suite would maintain the existing commercial and recreational management measures for the Atlantic LCS, Small Coastal Sharks (SCS), and pelagic shark fisheries as established in the Consolidated Atlantic HMS FMP. The seventy-two species of Atlantic sharks managed by NMFS are divided into four species groups for management: LCS, SCS, pelagic sharks, and prohibited sharks. The LCS complex is comprised of 11 species including sandbar, silky, tiger, blacktip, spinner, bull, lemon, nurse, scalloped hammerhead, great hammerhead, and smooth hammerhead sharks. SCS consist of finetooth, Atlantic sharpnose, blacknose, and bonnethead sharks. Pelagic sharks consist of blue, oceanic whitetip, porbeagle, shortfin mako, and common thresher sharks. Prohibited sharks consist of sand tiger, bigeye sand tiger, whale, basking, white, dusky, bignose, Galapagos, night, Caribbean reef, smalltail, Caribbean sharpnose, narrowtooth, Atlantic angel, longfin mako, bigeye thresher, sevengill, sixgill, and bigeye sixgill sharks. The remaining 33 species are included for data collection purposes only.

Specific management measures currently in place include:

Commercial Management Measures

Quotas/Species Complexes:

- Base quota: LCS Complex (11 species, includes sandbar sharks) = 1,017 mt dw; SCS complex = 454 mt dw; Pelagic Sharks (Other than Blue and Porbeagle Sharks) = 488 mt dw; Blue Sharks = 273 mt dw; Porbeagle Sharks = 92 mt dw; and Display and Scientific Research = 60 mt ww;
- Process for adjusted quota: Overharvests and underharvests are deducted from/added to the next years corresponding regional trimester quota;

Time/Area Closures:

- Mid-Atlantic Shark Closed Area and Caribbean Sustainable Fisheries Act (SFA) closures are seasonal bottom longline (BLL) closures; the Atlantic Large Whale Take Reduction Plan (ALWTRP) has implemented a suite of gear restrictions, observer requirements, etc. to reduce the likelihood of interactions between shark gillnet (GN) gear and endangered north Atlantic right whales during the winter calving period. Several pelagic longline (PLL) time/area closures apply if shark permit holders are using this gear;

Retention Limits:

- LCS: 4,000 lb dw for directed permit holders and 5 LCS for incidental permit holders;
- SCS: No retention limit for directed permit holders and 16 SCS and pelagic sharks combined for incidental permit holders;
- Pelagic Sharks: No retention limit for directed permit holders and 16 SCS and pelagic sharks combined for incidental permit holders;

- Fishermen may land sharks with fins removed except for the anal and 2nd dorsal fins. The total quantity of fins may not exceed 5 percent of the total dressed carcass weight of sharks on board;

Reporting:

- Dealer reports must be *postmarked* by the dealer within 10 days of the 1st and 15th of every month;
- Logbooks (Coastal Fisheries or HMS Logbook) must be submitted by fishermen within seven days of offloading any sharks;
- Mandatory vessel observer coverage if selected;

Seasons:

- Three trimesters (January – April; May – August; and, September – December) for LCS, SCS, and pelagic sharks;
- Seasons are established based on quota availability, catch rates, and public comment. LCS opening and closing dates are announced prior to season opening. Pelagic and SCS sharks closed, as needed, with 14-day notice; and,

Regions:

- Three regions (Gulf of Mexico, South Atlantic, and North Atlantic) for SCS and LCS; no regions for pelagic sharks.

Recreational Management Measures

- Authorized species include LCS: blacktip, spinner, bull, nurse, tiger, lemon, great hammerhead, smooth hammerhead, scalloped hammerhead, silky, and sandbar; SCS: bonnethead, Atlantic sharpnose, finetooth, and blacknose sharks; Pelagics: porbeagle, shortfin mako, common thresher, oceanic whitetip, and blue sharks; and,
- Possession limit: 1 shark > 54" fork length (FL) per vessel per trip, also 1 sharpnose and 1 bonnethead per person per trip with no minimum size requirements.

2.1.2 Alternative Suite 2: Shark Fishery for Directed, HMS Angling, and HMS Charter/Headboat Permit Holders Only

Alternative suite 2 would allow only directed shark permit holders to commercially harvest sharks, but would prohibit retention of sandbar sharks on PLL gear. Incidental permit holders would not be allowed to retain any shark species. Porbeagle sharks would be placed on the prohibited list in alternative suites 2 through 3 and 5, resulting in no retention of porbeagle sharks by commercial or recreational fishermen. Species complexes, commercial quotas, and commercial retention limits for alternative suites 2-4 are described in Appendix A. Recreational bag limits would stay the same as the status quo for alternative suites 2 through 5; however, only the species listed in Table 2.1 would be allowed to be retained by recreational fishermen (*i.e.*, those that possess a HMS Angling, HMS Charter/Headboat, or Atlantic tunas General Category permit if participating in a registered HMS tournament). This list of authorized species is based

on species of shark that recreational fishermen could easily identify to reduce fishing pressure as a result of mis-identification on dusky, sandbar, and porbeagle sharks.

Dusky sharks would not be authorized for collection for public display under alternative suites 2 through 5. However, based on research needs and objectives, NMFS would review the allocation of dusky sharks for research on a case-by-case basis and subtract these allocations from the research and display quota. NMFS would allocate 1 mt dw (1.39 mt ww) of the status quo 60 mt ww (43.2 mt dw) display and research set-aside to sandbar sharks for public display. An additional 1 mt dw (1.39 mt ww) of the sandbar sharks would be allocated specifically for research conducted by industry vessels (however, this would be separate from any sandbar quota used in the research fishery in the preferred alternative suite 4). The remaining research and display set-aside (41.2 mt dw or 57.2 mt ww) would be authorized for all other shark species, excluding dusky and sandbar sharks, under the exempted fishing program. These new allocations would apply to alternative suites 2 through 5.

Specific management measures implemented via this alternative suite would include:

Commercial Management Measures

Quotas/Species Complexes:

- Base quota: Sandbar = 116.6 mt dw; non-sandbar LCS = 541.2 mt dw; SCS = 454 mt dw; Pelagic Sharks (Other than Blue and Porbeagle Sharks) = 488 mt dw; Blue Sharks = 273 mt dw; Porbeagle Sharks = Prohibited (0 mt dw quota); and Display and Scientific Research = 60 mt ww (Sandbar = 2.8 mt ww (2 mt dw); all other shark species (except dusky sharks) = 57.2 mt ww (41.2 mt dw);
- Adjusted quota process: Overharvests would be removed from the next season's quota in their entirety. Underharvests for species whose status is not unknown, overfished, or experiencing overfishing would be transferred to the next season's quota, up to 50 percent of the base quota. For species/complexes whose status is overfished, experiencing overfishing, or unknown, underharvests would not be transferred to the next season's quota;

Time/Area Closures:

- Maintain status quo mid-Atlantic shark closed area closure; close the eight marine protected areas (MPAs) listed in the South Atlantic Fishery Management Council's (SAFMC) Amendment 14;

Retention Limits:

- 8 sandbar/vessel/trip and 21 non-sandbar LCS/vessel/trip for directed permit holders only; no trip limit for SCS and pelagic sharks for directed permit holders;
- No retention of any sharks by incidental permit holders;
- No sandbar sharks retained with PLL onboard;
- Retention of porbeagle sharks would be prohibited in all fisheries;
- All sharks must be landed with all fins naturally attached;

Reporting:

- Dealer reports must be *received* by NMFS within 24 hours of sale of shark;
- Logbook and vessel observer requirements would be maintained and not modified;
- All unclassified sharks reported would be categorized as sandbar sharks;

Seasons:

- One commercial season opening on January 1 of each year;
- Close seasons for sandbar and non-sandbar LCS when landings of either reach 80% of the available quota with a five day notice;
- SCS and pelagic sharks would continue to be retained until SCS and pelagic shark landings reach 80% of their respective quotas; and,

Regions:

- One region for all managed shark species.

Recreational Management Measures

- Authorized species include LCS: nurse, tiger, lemon, great hammerhead, smooth hammerhead, and scalloped hammerhead; SCS: bonnethead and Atlantic sharpnose; Pelagics: shortfin mako, common thresher, oceanic whitetip, and blue sharks; and,
- Possession limit: 1 shark > 54" FL per vessel per trip, also 1 sharpnose and 1 bonnethead per person per trip with no minimum size requirements.

2.1.3 Alternative Suite 3: Shark Fishery for Directed, Incidental, HMS Angling, and HMS Charter/Headboat Permit Holders

Alternative suite 3 would implement management measures resulting in a reduced shark fishery for sandbar sharks and non-sandbar LCS by incidental and directed shark permit holders. Incidental and directed shark permit holders would also be allowed to land SCS and pelagic sharks (except porbeagle sharks). Recreational fishermen (*i.e.*, those that possess a HMS Angling, HMS Charter/Headboat, or Atlantic tunas General Category permit if participating in a registered HMS tournament) would be allowed to retain species of sharks that are easy to identify (see Table 2.1). Unlike alternative suite 2, this alternative would allow incidental shark permit holders to retain some sharks. Species complexes, commercial quotas, and commercial retention limits for this alternative suite are described in Appendix A.

Specific management measures implemented via this alternative would include:

Commercial Management Measures

Quotas/Species Complexes:

- Base quotas: Sandbar = 116.6 mt dw; non-sandbar LCS = 541.2 mt dw; SCS = 454 mt dw; Pelagic Sharks (Other than Blue and Porbeagle Sharks) = 488 mt dw; Blue Sharks = 273 mt dw; Porbeagle Sharks = Prohibited (0 mt dw quota); and Display and Scientific

Research = 60 mt ww (Sandbar = 2.8 mt ww (2 mt dw)); all other shark species (except dusky sharks) = 57.2 mt ww (41.2 mt dw);

- Adjusted quota process: Overharvests would be removed directly from the next season's quota in their entirety. Underharvests for species whose status is not unknown, overfished, or experiencing overfishing would be transferred to the next season's quota, up to 50 percent of the base quota. For species/complexes whose status is overfished, unknown, or experiencing overfishing, underharvests would not be transferred to the next season's quota;

Time/Area Closures:

- Maintain existing time area closures and close the eight time/area closures recommended by the SAFMC in their Amendment 14;

Retention Limits:

- 4 sandbar/vessel/trip and 10 non-sandbar LCS/vessel/trip for directed and incidental permit holders;
- No retention limit for SCS and pelagic sharks for directed permit holders;
- 16 SCS and pelagic sharks/vessel/trip (combined) for incidental permit holders;
- Retention of porbeagle sharks would be prohibited in all fisheries;
- All sharks must be landed with all fins naturally attached;
- All gears allowed (no restrictions for PLL);

Reporting:

- Dealer reports must be *received* by NMFS no later than 10 days after each reporting period (*i.e.*, 25th and 10th of each month);
- Logbook and vessel observer requirements would remain status quo;
- All unclassified sharks reported would be categorized as sandbar sharks;

Seasons:

- One commercial season opening on January 1 of each year;
- Close seasons for sandbar and non-sandbar LCS when landings of either reach 80% of the available quota with a five day notice;
- SCS and pelagic sharks could continue to be retained until SCS and pelagic shark landings reach 80% of their respective quotas; and,

Regions:

- One region for all managed shark species.

Recreational Management Measures

- Authorized species include LCS: nurse, tiger, lemon, great hammerhead, smooth hammerhead, and scalloped hammerhead; SCS: bonnethead and Atlantic sharpnose; pelagic: shortfin mako, common thresher, oceanic whitetip, and blue sharks; and,
- Possession limit: 1 shark > 54" FL per vessel per trip, also 1 sharpnose and 1 bonnethead per person per trip with no minimum size requirements.

2.1.4 Alternative Suite 4: Establish a Research Fishery for Sandbar Sharks; Shark Fishery for Directed, Incidental, HMS Angling, and HMS Charter/Headboat Permit Holders – Preferred Alternative

Alternative suite 4 would establish a small research fishery that would harvest the entire available sandbar quota on an annual basis. Vessels inside the research fishery could also retain non-sandbar LCS, SCS, and pelagic sharks. Vessels with commercial shark permits outside of the research fishery could only retain non-sandbar LCS as well as SCS and pelagic sharks (see Table 2.1). Vessel participation in the research fishery would be conditioned on vessels meeting specific criteria designed to meet research objectives while allowing fishermen to earn revenue from selling sandbar and other sharks that are caught under the purview of this fishery. These criteria may include, but are not limited to: possession of a commercial shark permit, seasonal flexibility with regard to trips targeting sandbar sharks, willingness and ability to take an observer on 100 percent of fishing trips and collect biological samples from landed and released sharks, and ability to participate in the program for at least one year. Vessels not participating in the research program would still be authorized to land non-sandbar LCS, SCS, and pelagic sharks subject to the retention limits described below. Species complexes, commercial quotas, and commercial retention limits for this alternative suite are described in Appendix A and Appendix C. Only vessels participating in the research fishery could land sandbar sharks.

The Agency is preferring incorporation of the shark research fishery into the existing program for issuance of Exempted Fishing Permits, Display Permits, Scientific Research Permits, and Letters of Acknowledgement. NMFS would publish a request for proposals in the Federal Register and would invite permit holders to submit an application to participate in the shark research fishery on an annual basis. Applications would be evaluated based on several criteria, examples of which may include: selected vessels are willing to take an observer and participate in data collection efforts on all trips under the purview of this permit, vessels are flexible with regard to timing of fishing excursions to ensure that samples are collected throughout the year, past compliance with observer program requirements, vessels are selected from all regions to ensure that samples are collected throughout the U.S. Atlantic and Gulf of Mexico consistent with research objectives, and if selected vessels have had any HMS fisheries violations for which they received a Notice of Violation Assessment (NOVA) or other significant violations in the past. Actual criteria would be further described in the annual Federal Register notice published to solicit applications for the shark research fishery. The Agency is interested in collecting biological samples from sandbar and non-sandbar LCS throughout the year, therefore, the Agency would determine when the research vessels would fish to ensure adequate spatial and temporal sampling throughout the year. The Agency would determine the number of vessels that may participate in the shark research fishery annually based on available quota and research objectives. Data collected from the shark research fishery would assist

fisheries scientists and managers in maintaining catch series data from the commercial shark fishery which is critical for future stock assessments. Shark life history data, including age at first maturity for sandbar sharks could also be improved as a result of this research fishery. Furthermore, research assessing methods to reduce interactions with dusky sharks, protected resources, or other bycatch may be investigated on vessels participating in this program.

Specific management measures implemented via this alternative would include:

Commercial Management Measures

Quotas/Species Complexes:

- Base quotas: Sandbar research quota = 116.6 mt dw; non-sandbar LCS research quota = 50 mt dw; Gulf of Mexico non-sandbar LCS = 439.5 mt dw; Atlantic non-sandbar LCS = 188.3 mt dw; SCS = 454 mt dw; Pelagic Sharks (Other than Blue and Porbeagle Sharks) = 488 mt dw; Blue Sharks = 273 mt dw; Porbeagle Sharks = 1.7 mt dw; and Display and Scientific Research = 60 mt ww (Sandbar = 2.8 mt ww (2 mt dw)); and all other shark species (except dusky sharks) = 57.2 mt ww (41.2 mt dw);
- Adjusted quota process: Overharvests would be removed from the next season's quota or over multiple years (*i.e.,* 5 years) depending on the level of overharvest. Underharvests for species whose status is not unknown, overfished, or experiencing overfishing would be transferred to the next season's quota, up to 50 percent of the base quota. For species/complexes whose status is overfished, unknown, or experiencing overfishing; underharvests would not be transferred to the next season's quota;
- NMFS would implement adjusted annual quotas for 5 years (through the end of 2012) for sandbar sharks and non-sandbar LCS based on overharvests of the LCS complex during 2007 (see Appendix C for more details). These adjusted quotas are as follows: Sandbar research quota = 87.9 mt dw; non-sandbar LCS research quota = 37.5 mt dw; Gulf of Mexico non-sandbar LCS = 390.5 mt dw; and Atlantic non-sandbar LCS = 187.8 mt dw. These quotas may be reduced further, if necessary, depending on future overharvests in the fishery;

Time/Area Closures:

- Maintain status quo time area closures and close the eight time/area closures recommended by the SAFMC;

Retention Limits:

- No sandbar sharks may be landed outside of the research program;
- Trip limit for sandbar and non-sandbar LCS (combined) for vessels participating in research program would vary depending on research criteria and data needs;
- Under the base non-sandbar LCS quota, 36 non-sandbar LCS/vessel/trip for directed permit holders and 3 non-sandbar LCS/vessel/trip for incidental permit holders outside the shark research program;

- Under the adjusted non-sandbar LCS quotas, 33 non-sandbar LCS/vessel/trip for directed permit holders and 3 non-sandbar LCS/vessel/trip for incidental permit holders (from 2008-2012; see above) outside the shark research program;
- No trip limit for SCS or pelagic sharks for directed permit holders; 16 SCS and pelagic sharks combined for incidental permit holders;
- All sharks must be landed with all fins naturally attached;

Reporting:

- Dealer reports must be *received* by NMFS no later than 10 days after each reporting period (*i.e.*, 25th and 10th of each month);
- 100 percent observer coverage for vessels participating in sandbar shark research program;
- Other logbook and vessel observer requirements would be maintained for vessels outside the research program;
- Landings from dealer reports and/or observer reports from outside the research fishery would be used to proportion unclassified sharks according to the sandbar, non-sandbar LCS, SCS, and pelagic shark quotas;

Seasons:

- One commercial season opening on January 1 of each year;
- Sandbar, non-sandbar LCS, SCS, and pelagic sharks would close with a five day notice when landings of each species/complex reach 80% of their respective quotas;
- NMFS would send out e-mail notices and other outreach materials to notify the public of the fishery closure when the notice files with the Federal Register. The fishery would close five days after the filing of the notice;

Regions:

- Non-sandbar LCS: Two regions: an Atlantic (South Atlantic and North Atlantic combined) and Gulf of Mexico region;
- Sandbar: One region;
- SCS: One region; and,
- Pelagic sharks: One region.

Recreational Management Measures

- Recreational fishermen could land tiger sharks and non-ridgeback LCS (blacktip, spinner, bull, lemon, nurse, great hammerhead, smooth hammerhead, and scalloped hammerhead sharks). In addition, they can land SCS (bonnethead, Atlantic sharpnose, finetooth and blacknose sharks), and Pelagic sharks (shortfin mako, common thresher, oceanic whitetip, blue, and porbeagle sharks). Recreational anglers would not be allowed to retain sandbar or silky sharks (and any other prohibited species); and,
- Possession limit: 1 >54" FL shark per vessel per trip, also 1 sharpnose and 1 bonnethead per person with no minimum size.

2.1.5 Alternative Suite 5: Close All Atlantic Shark Fisheries

This alternative would close all Atlantic, Gulf of Mexico, and Caribbean shark fisheries for all fishermen until reopening is warranted based on new stock assessments. Since interactions with sharks would likely occur in other commercial fisheries (*e.g.*, snapper grouper, tilefish, mackerel), this alternative suite would modify the process of selection for discard reporting in the Coastal Fisheries Logbook to ensure that data on shark interactions in other non-HMS fisheries would be available. Shark landings would be limited to research and the collection for public display via the HMS Exempted Fishing Program. Recreational fisheries would be catch and release only.

Specific management measures implemented via this alternative would include:

Commercial Management Measures

Quotas/Species Complexes:

- Sandbar = 0 mt dw; non-sandbar LCS = 0 mt dw; SCS = 0 mt dw; Pelagic Sharks (Other than Blue and Porbeagle Sharks) = 0 mt dw; Blue Sharks = 0 mt dw; Porbeagle Sharks = Prohibited (0 mt dw quota); and Display and Scientific Research = 60 mt ww (Sandbar = 2.8 mt ww (2 mt dw); all other shark species (except dusky sharks) = 57.2 mt ww (41.2 mt dw);

Time/Area Closures:

- Time/Area closures for BLL gear for the commercial shark fishery would no longer be applicable since all retention of sharks would be prohibited;
- HMS time/area closures for other gear types and fisheries would still be in effect;

Retention Limits:

- No sharks of any species could be possessed in the Atlantic, Caribbean, and Gulf of Mexico;

Reporting:

- Modify logbook dead discard reporting for the Coastal Fisheries Logbook to ensure that information on shark interactions would be available;
- Request Atlantic, Gulf of Mexico, and Caribbean Fishery Management Councils that manage fisheries using longline and/or gillnet gear to place observers on vessels to monitor shark bycatch;

Seasons:

- No open seasons; and,

Regions:

- No regions for sharks.

Recreational Management Measures

- Recreational fisheries for sharks would be catch and release only with no possession allowed.

2.2 Other Alternatives Analyzed

NMFS is also considering alternatives that would modify the existing schedule for conducting shark stock assessments and clarifying when the annual Stock Assessment SAFE report should be released. These alternatives are not analyzed within alternative suites.

2.2.1 Stock Assessment Frequency

Alternative 6: Stock Assessments for Sharks Every 2-3 Years (Status Quo)

Alternative 6 would maintain current requirements to conduct stock assessments every 2-3 years. The 1999 Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks (1999 FMP) established that stock assessments be conducted for each species or species group every two to three years. HMS stock assessments are crucial in order to define stock boundaries, monitor rebuilding plans, improve knowledge of stock dynamics, and incorporate additional data in a timely manner. Since 2000, there have been two stock assessments completed by NMFS for LCS (2002, 2005/2006), and two assessments completed for SCS (May 2002 and 2007). Other assessments have been completed by other entities, including: SCS (August 2002 by Mote Marine Laboratory), two assessments for pelagic sharks (2004 by ICCAT), and the porbeagle assessment completed by the Canadian Department of Fisheries and Oceans (2005). The Agency is aware of another stock assessment being conducted by the Standing Committee on Research and Statistics (SCRS) of ICCAT for shortfin mako and blue sharks in 2008.

Alternative 7: Stock Assessments for Sharks At Least Every 5 years - Preferred Alternative

Alternative 7 would change the current process outlined in the 1999 FMP by requiring stock assessments for sharks at least every five years versus every 2-3 years. Stock assessments could occur more frequently, however, they must be conducted at least every five years. Because of the time necessary to modify management measures consistent with stock assessments, lengthening the amount of time between stock assessments would allow existing or forthcoming measures to attempt to achieve their stated objectives. In 2003, the Agency adopted the Southeast Data Assessment and Review (SEDAR) process for completing shark stock assessments at the request of industry, environmentalists, and academics. This process increases the time necessary to complete a stock assessment because it entails three week long workshops where data are reviewed, stock assessment models run, and results reviewed by an outside panel. Since the process to complete necessary assessments on a species complex can take up to a year, completing these assessments every 2-3 years is not practical. This alternative would not modify any stock assessments that are already scheduled, nor would it modify assessments conducted by

other management entities, or the frequency of stock assessments conducted for other HMS species.

2.2.2 SAFE Report Timing

Alternative 8: SAFE Report Published in January or February of Every Year (Status Quo)

Alternative 8 would maintain the current process of publishing a SAFE report in January or February of each year. According to the 1999 FMP, each year in January or February, NMFS publishes one SAFE report for the Atlantic tunas, swordfish, billfish, and sharks. The SAFE report follows the guidelines specified in National Standard (NS) 2 and is used by NMFS to develop and evaluate regulatory adjustments under the framework procedure or the FMP amendment process. This information provides the basis for determining annual harvest levels from each stock, documenting significant trends or changes in the resource, bycatch, and the fishery over time, and assessing the relative success of existing state and Federal fishery management programs.

Alternative 9: SAFE Report Published in the Fall of Every Year – Preferred Alternative

Alternative 9 would modify the existing regulations by requiring the publication of a SAFE report in the fall of each year. The annual SAFE report would still be used to develop and evaluate regulatory adjustments under the framework procedure or the FMP amendment process as it is currently under the status quo, but it would be released to the public by the fall of each year.

2.3 Alternative Considered But Not Further Analyzed

2.3.1 Shark Fishery for Directed, Incidental, HMS Angling, and HMS Charter/Headboat Permit Holders Only (No BLL Gear)

This alternative would remove BLL gear from the HMS authorized gear list but would still allow a fishery for directed, incidental, HMS Angling, Atlantic tunas general category (if participating in a registered tournament), and HMS Charter/Headboat permit holders using other authorized gears, including: gillnet, handline, rod and reel, bandit gear, and PLL. Commercial shark permit holders would not be able to possess sharks with BLL gear on board. The alternative was considered but not further analyzed at this time because BLL gear is the primary gear used to harvest sharks. As such, in order to reduce shark mortality, the Agency considered not allowing BLL gear in the shark fishery. However, this gear type is also deployed in other fisheries to target other non-HMS species (snapper/grouper, reef fish, and tilefish). Selecting this alternative could result in excessive regulatory discards of sharks because vessels with commercial shark permits would have to discard all sharks landed incidentally in the pursuit of other non-HMS species when BLL gear is onboard. Further, the increased retention limits described in this alternative suite may encourage shark fishermen to increase effort significantly in the shark gillnet fishery which, depending on where this effort were concentrated, may increase bycatch and the likelihood of interactions with marine mammals, sea turtles, and smalltooth sawfish.

Not allowing BLL gear in the shark fishery would have significant economic and social impacts on commercial shark permit holders primarily using BLL gear. While it is assumed that few directed shark permit holders subsist entirely on revenues attained from the shark fishery, impacts would still be severe for those participants that depend on any income from participating in the directed shark fishery at certain times of the year. Because of the extensive economic impacts to shark directed permit holders as a result of not allowing BLL gear in the shark fishery, it is assumed that directed permit holders would likely pursue one of the following options as a result of closing the Atlantic shark fishery to BLL gear: (1) transfer fishing effort to other fisheries for which they are already permitted (snapper grouper, king and Spanish mackerel, tilefish, lobster, dolphin/wahoo, *etc*.), (2) acquire the necessary permits to participate in other fisheries (both open access and/or limited access fisheries), or (3) relinquish all permits and leave the fishing industry.

Specific management measures implemented via this alternative would include:

Commercial Management Measures

Quotas/Species Complexes:

- Base quota: Sandbar = 116.6 mt dw; non-sandbar LCS = 514.2 mt dw; SCS = 454 mt dw; Pelagic Sharks (Other than Blue and Porbeagle Sharks) = 488 mt dw; Blue Sharks = 273 mt dw; Porbeagle Sharks = Prohibited (0 mt dw quota); and Display and Scientific Research = 60 mt ww (Sandbar = 2.8 mt ww (2 mt dw)); all other shark species (except dusky sharks) = 57.2 mt ww (41.2 mt dw);
- Adjusted quota process: Overharvests would be removed from the next season's quota. Underharvests for species that are not unknown, overfished, or experiencing overfishing would be transferred to the next season's quota, up to 50 percent of the base quota. For species/complexes that are overfished, unknown, or experiencing overfishing; underharvests would not be transferred to the next season's quota;

Time/Area Closures:

- Revise existing BLL closures to reflect the fact that BLL is no longer an authorized gear in HMS fisheries;
- HMS time/area closures for other gear types and fisheries would still be in effect;

Retention Limits:

- 10 sandbar/vessel/trip and 48 non-sandbar LCS/vessel/trip for directed and incidental permit holders;
- No trip limit for SCS or pelagic sharks (except porbeagle sharks) for directed permit holders;
- 16 SCS and pelagic sharks (except porbeagle sharks) combined for incidental permit holders;
- Retention of porbeagle sharks would be prohibited in all fisheries;
- All sharks must be landed with all fins naturally attached;

Reporting:

- Dealer reports must be received by NMFS within 14 days;
- Other logbook and observer requirements would be maintained;
- All unclassified sharks reported would be categorized as sandbar sharks;

Seasons:

- One commercial season opens for all sharks on January 1 of each year;
- Retention of sandbar, non-sandbar LCS, SCS, and pelagic sharks (except porbeagle sharks) would be prohibited within 5 days of achieving 80 percent of their respective quotas; and,

Regions:

- One region for all managed shark species.

Recreational Management Measures

- Authorized species include LCS: nurse, tiger, lemon, great hammerhead, smooth hammerhead, and scalloped hammerhead; SCS: bonnethead and Atlantic sharpnose; pelagics: shortfin mako, common thresher, oceanic whitetip, and blue sharks; and,
- Possession limit: 1 >54" FL shark per vessel per trip, also 1 sharpnose and 1 bonnethead per person with no minimum size.

Table 2.1 Overview of alternative suites

Alternative Suite	Quotas/Species Complexes	Time/Area Closures	Retention Limits	Reporting		Regions	Recreational Measures
1 – Status Quo	- 1,017 mt dw LCS - 454 mt dw SCS - 488 mt dw Pelagic Sharks (other than Blue and Porbeagle) - 273 mt dw Blue Sharks - 92 mt dw Porbeagle Sharks - 60 mt ww for EFPs - 19 Prohibited spp.	Mid-Atlantic (BLL), Caribbean (BLL), Right Whale (GN) restrictions, PLL closures	- Directed permit holders: 4,000 lb dw LCS; no trip limit for Pelagics/SCS - Incidental permit holders: 5 LCS and 16 Pelagics/SCS combined	- Dealer weigh-out slips, logbooks, observers	- Trimesters	- 3 Regions for LCS and SCS - no Regions for Pelagics	1 shark > 54" FL vessel/trip, plus 1 sharpnose and 1 bonnethead per person/trip (no minimum size)

Alternative Suite	Quotas/Species Complexes	Time/Area Closures	Retention Limits	Reporting		Regions	Recreational Measures
2 – Limited Shark Fishery for Directed Permit Holders Only	- 116.6 mt dw Sandbar sharks - 541.2 mt dw non-sandbar LCS - SQ SCS - SQ Pelagic Sharks (other than Blue and Porbeagle) - SQ Blue Sharks - Add porbeagle sharks to Prohibited spp. - 60 mt ww for EFPs (includes sub-quota of 2.8 mt ww (2 mt dw) for Sandbar sharks; all other shark spp. (except dusky sharks) 57.2 mt ww (41.2 mt dw)) - No dusky sharks authorized for display -Remove overharvests from next season - Carryover up to 50 percent of base quota for spp. not overfished (*i.e.*, SCS) - No carryover for overfished, overfishing, or unknown spp. (*e.g.*, LCS)	- SQ + SAFMC's closures	- Directed permit holders: 8 Sandbar sharks/vessel/trip; 21 non-sandbar LCS/vessel/trip ; SCS/Pelagics no trip limit - Incidental permit holders: no shark retention - No Sandbar sharks with PLL onboard - Porbeagle prohibited - All sharks landed with all fins naturally attached	- Increase dealer reporting frequency to *received* within 24 hrs from time of sale -Logbooks/Observers SQ - Unclassified sharks = add to Sandbar shark quota	- Open Jan. 1 - Close both Sandbar and non-sandbar LCS when either @ 80% of quota - SCS and pelagic sharks close @ 80% of quota - 5 days notice	1 Region	- SQ retention and size limit - Possession of: LCS: nurse, tiger, lemon, and hammerheads; SCS: bonnethead and Atlantic sharpnose,; Pelagics: shortfin mako, common thresher, oceanic whitetip, and blue sharks ONLY

Alternative Suite	Quotas/Species Complexes	Time/Area Closures	Retention Limits	Reporting		Regions	Recreational Measures
3 – Limited Shark Fishery for Directed and Incidental Permit Holders (all gears)	Same as Alt 2	Same as Alt 2	- Directed and Incidental permit holders: 4 Sandbar sharks /vessel/trip; 10 non-sandbar LCS/vessel/trip (~499 lb dw/trip for Sandbar and non-sandbar LCS combined) - Directed permit holders: no trip limit for SCS/Pelagic sharks - Incidental permit holders: 16/vessel/trip for SCS/Pelagic sharks (combined) - Porbeagle prohibited - All sharks landed with all fins naturally attached - All gears allowed	- Dealer reports *received* within 10 days - Logbooks/Observers SQ - Unclassified sharks = added to Sandbar quota	Same as Alt 2	Same as Alt 2	Same as Alt 2

Alternative Suite	Quotas/Species Complexes	Time/Area Closures	Retention Limits	Reporting		Regions	Recreational Measures
4 - Research set aside; allows for very small directed fishery for LCS – Preferred Alternative Suite	- 116.6 mt dw Sandbar shark base quota; 50 mt dw non-sandbar LCS quota for research fishery - 87.9 mt dw sandbar shark adjusted quota; 37.5 mt dw non-sandbar LCS quota for research fishery (2008-2012) - Non-sandbar base quotas outside of research fishery: 439.5 mt dw for the Gulf of Mexico region; 188.3 mt dw for the Atlantic region - Non-sandbar adjusted quotas outside of research fishery: 390.5 mt dw for the Gulf of Mexico region; 187.8 mt dw for the Atlantic region (2008-2012) - 454 mt dw SCS - 488 mt dw Pelagics (other than Blue and Porbeagle) - 273 mt dw Blue - 1.7 mt dw Porbeagle Sharks Quota - 60 mt ww for EFPs (includes sub-quota of 2.8 mt ww (2 mt dw) for Sandbar sharks; all other shark spp. (except dusky sharks) 57.2 mt ww (41.2 mt dw))	Same as Alt 2	- Sandbar retention allowed ONLY by vessels with shark research permit - Sandbar/non-sandbar LCS retention depends upon research objectives - Base quota: 36 non-sandbar LCS/vessel/trip for directed permit holders; 3 non-sandbar LCS/vessel/trip for incidental permit holders - Adjusted quota: 33 non-sandbar LCS/vessel/trip for directed permit holders; 3 non-sandbar LCS/vessel/trip for incidental permit holders (2008- 2012) - Directed permit holders: no trip limit for SCS/Pelagic sharks - Incidental permit holders: 16/vessel/trip SCS/Pelagic sharks (combined) - All sharks landed with all fins naturally attached	- Dealer reports *received* within 10 days - 100% observer coverage on research vessels -Logbooks/Observers SQ - Unclassified shark species proportioned out among sandbar, non-sandbar LCS, SCS, and Pelagic shark quotas based on dealer reports and/or observer reports from outside research fishery	- Open Jan. 1 - Close Sandbar, non-sandbar LCS, SCS, and Pelagics when landings of each species/complex @ 80% of quota - 5 days notice	2 Regions: Atlantic and Gulf of Mexico for non-sandbar LCS; one region for sandbar sharks, SCS, and pelagic sharks	- SQ retention and size limit - Recreational fishermen can land tiger sharks and non-ridgeback LCS (LCS: blacktip, spinner, bull, lemon, nurse, hammerheads, and tiger sharks; SCS: bonnethead, Atlantic sharpnose, finetooth, and blacknose sharks; Pelagics: shortfin mako, common thresher, oceanic whitetip, blue, and porbeagle sharks)

Alternative Suite	Quotas/Species Complexes	Time/Area Closures	Retention Limits	Reporting		Regions	Recreational Measures
5 – Close Atlantic Shark Fishery	All species prohibited	NA	None, all species prohibited	- Improve logbook dead discard reporting for Coastal Fisheries Logbook - Request observers on other vessels to monitor shark bycatch in other fisheries	NA	NA	No possession of any sharks, catch and release only

CHAPTER 3 TABLE OF CONTENTS

CHAPTER 3 LIST OF TABLES

CHAPTER 3 LIST OF FIGURES

3.0 DESCRIPTION OF AFFECTED ENVIRONMENT

This chapter serves several purposes. It describes the affected environment (the fishery, the gears used, the communities involved, *etc*.), and provides a view of the current condition of the fishery, which serves as a baseline against which to compare impacts of the different alternatives. This chapter also provides a summary of information concerning the biological status of shark stocks; the marine ecosystems in the fishery management unit; the social and economic condition of the fishing interests, fishing communities, and fish processing industries; and, the best available scientific information concerning the past, present, and possible future condition of shark stocks, ecosystems, and fisheries.

3.1 Introduction to Highly Migratory Species Management and Highly Migratory Species Fisheries

Atlantic Highly Migratory Species (HMS) fisheries are managed directly by the Secretary of Commerce, who designated that responsibility to the National Marine Fisheries Service (NMFS). The HMS Management Division within NMFS is the lead in developing regulations for HMS fisheries, although some actions (*e.g.*, Large Whale Take Reduction Plan) are taken by other NMFS offices if the main legislation (*e.g.*, Marine Mammal Protection Act) driving the action is not the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) or Atlantic Tunas Convention Act (ATCA). Because of their migratory nature, HMS fisheries require management at the international, national, and state levels. NMFS manages HMS fisheries in Federal waters (domestic) and the high seas (international) while individual States establish regulations for some HMS in their own waters. There are exceptions to this generalization. For example, Federally-permitted commercial shark fishermen, as a condition of their permit, are required to follow Federal regulations in all waters, including state water, unless the state has more restrictive regulations, in which case the state laws prevail. Additionally, in 2005, the Atlantic States Marine Fisheries Commission (ASMFC) agreed to develop an interstate coastal shark FMP. Once complete, this interstate FMP would coordinate coastal shark management measures among all states along the Atlantic coast (Florida to Maine). NMFS is participating in the development of this interstate FMP.

Generally, on the domestic level, NMFS implements relevant international agreements and management measures that are required under domestic laws such as the Magnuson-Stevens Act. While NMFS does not generally manage HMS fisheries in state waters, states are invited to send representatives to Advisory Panel (AP) meetings and to participate in stock assessments, public hearings, or other fora. NMFS is working to improve its communication and coordination with state agencies. In 2006, NMFS reviewed the shark regulations of several states and has asked for some states to consider changing their regulations to become more consistent with Federal regulations. This request resulted in changes and dialogues with certain states regarding the regulations such as the Commonwealth of Virginia and the State of Florida. Additionally, as a result of ASMFC's decision to develop an interstate FMP, the State of Maine opened a dialogue with NMFS regarding shark regulations. NMFS shared the FMP amendment draft with the states and will work with states, to the extent practicable, to ensure complementary regulations. See Section 3.1.3 for more information regarding state regulations by state.

On the international level, NMFS participates in the stock assessments conducted by the International Commission for the Conservation of Atlantic Tunas' (ICCAT) Standing Committee on Research and Statistics (SCRS) and in the annual ICCAT meetings. In regard to sharks, ICCAT assesses two pelagic sharks only: the Atlantic blue and the shortfin mako. Stock assessments and management recommendations or resolutions are listed on ICCAT's website at http://www.iccat.es/. ATCA authorizes NMFS to promulgate regulations as may be "necessary and appropriate" to carry out ICCAT recommendations. NMFS also actively participates in other international bodies that could affect U.S. shark fishermen and the shark industry including Convention on International Trade in Endangered Species (CITES) and the Food and Agriculture Organization (FAO). More information on the current status of shark stocks and the dates of the next ICCAT stock assessments are provided in Section 3.2.

3.1.1 History of Domestic Shark Management

Sharks are managed along with other HMS species. Thus, management of the shark fishery is presented in FMPs along with Atlantic billfish, Atlantic tunas, and Atlantic swordfish. This section gives a relatively brief history of shark management of Atlantic sharks. This history is organized by previous FMPs. For more detail regarding the history of management and of other HMS species besides sharks, please see the original documents. Proposed rule, final rules, and other official notices can be found in the Federal Register at http://www.gpoaccess.gov/fr/index.html. Supporting documents can be found on the HMS Management Division's webpage at http://www.nmfs.noaa.gov/sfa/hms. Documents can also be requested by calling the HMS Management Division at (301) 713-2347.

3.1.1.1 Pre-1999 Atlantic Shark Fisheries and Management

Unless otherwise specified, the main sources of the following history are the 1993 Fishery Management Plan for Sharks of the Atlantic Ocean (NMFS, 1993), the 1999 FMP for Atlantic Tunas, Swordfish, and Sharks (NMFS, 1999a), and the 2006 Consolidated HMS FMP (NMFS, 2006a).

Recreational fishing for Atlantic sharks occurs in Federal and state waters from New England to the Gulf of Mexico and the Caribbean Sea. In the past, sharks were often called "the poor man's marlin." Recreational shark fishing with rod and reel is now a popular sport at all social and economic levels. Sharks can be caught virtually anywhere in salt water, with even large specimens available in the nearshore area to surf anglers or small boaters. Most recreational shark fishing takes place from small to medium-size vessels. Mako, white, and large pelagic sharks are generally accessible only to those aboard ocean-going vessels. Recreational shark fisheries are exploited primarily by private vessels and charter/headboats although there are some shore-based fishermen active in the Florida Keys.

The commercial shark fishery has been sporadic in nature. In the early 1900s, a Pacific shark fishery supplied limited demands for fresh shark fillets and fish meal as well as a more substantial market for dried fins of soupfin sharks. In 1937, the price of soupfin shark liver skyrocketed when it was discovered to be the richest source of vitamin A available in commercial quantities. A shark fishery in the Caribbean Sea, off the coast of Florida, and in the Gulf of Mexico developed in response to this demand (Wagner, 1966). At this time, shark

fishing gear included gillnets, hook and line, anchored bottom longlines (BLL), floating longlines, and benthic lines for deepwater fishing. These gear types are slightly different than the gears used today and are fully described in Wagner (1966). By 1950, the availability of synthetic vitamin A caused most shark fisheries to be abandoned (Wagner, 1966).

A small fishery for porbeagle existed in the early 1960s off the U.S. Atlantic coast involving Norwegian fishermen. Between the World Wars, Norwegians and Danes had pioneered fishing for porbeagles in the North Sea and in the region of the Shetland, Orkney, and the Faroe Islands. In the late 1940s, these fishermen caught from 1,360 to 2,720 mt yearly, with lesser amounts in the early 1950s (Rae, 1962). The subsequent scarcity of porbeagles in their fishing area forced the Norwegians to explore other grounds, and around 1960, they began fishing the Newfoundland Banks and the waters east of New York. Between 1961 and 1964, their catch increased from 1,800 to 9,300 mt, then declined to 200 mt (Casey *et al*., 1978).

The U.S. Atlantic shark fishery developed rapidly in the late 1970s due to increased demand for their meat, fins, and cartilage. At the time, sharks were perceived to be underutilized as a fishery resource. The high commercial value of shark fins led to the controversial practice of finning, or removing the valuable fins from sharks and discarding the carcass. Growing demand for shark products encouraged expansion of the commercial fishery throughout the late 1970s and the 1980s. Tuna and swordfish vessels began to retain a greater proportion of their shark incidental catch, and some directed fishery effort expanded as well. In January 1978, NMFS published the Preliminary Fishery Management Plan (PMP) for Atlantic Billfish and Sharks (43 FR 3818), which was supported by an EIS (42 FR 57716). This PMP was a Secretarial effort. The management measures contained in the plan were designed to:

1. Minimize conflict between domestic and foreign users of billfish and shark resources;
2. Encourage development of an international management regime; and
3. Maintain availability of billfishes and sharks to the expanding U.S. fisheries.

Primary management measures in the Atlantic Billfish and Shark PMP included:

- Mandatory data reporting requirements for foreign vessels;
- A prohibition on the foreign commercial retention of all billfishes caught within the Fishery Conservation Zone (FCZ) of the United States and stipulated release in a manner that will maximize the probability of survival;
- A hard cap on the catch of sharks by foreign vessels, which when achieved would prohibit further landings of sharks by foreign vessels;
- Permit requirements for foreign vessels to fish in the FCZ of the United States;
- Radio checks by foreign vessels upon entering and leaving the FCZ;
- Boarding and inspection privileges for U.S. observers; and
- Prohibition on intentional discarding of fishing gears by foreign fishing vessels within the FCZ that may pose environmental or navigational hazards.

As catches accelerated through the 1980s, shark stocks started to show signs of decline. Peak commercial landings of large coastal and pelagic sharks were reported in 1989. In 1989, the five Atlantic Fishery Management Councils asked the Secretary of Commerce to develop a Shark FMP. The Councils were concerned about the late maturity and low fecundity of sharks, the increase in fishing mortality, and the possibility of the resource being overfished. The Councils requested that the FMP cap commercial fishing effort, establish a recreational bag limit, prohibit "finning," and begin a data collection system. NMFS responded to that request by starting to develop a FMP soon thereafter.

In 1993, the Secretary of Commerce, through NMFS, implemented the FMP for Sharks of the Atlantic Ocean. The management measures in the 1993 FMP included:

- Establishing a fishery management unit (FMU) consisting of 39 frequently caught species of Atlantic sharks, separated into three groups for assessment and regulatory purposes (Large Coastal Sharks (LCS), Small Coastal Sharks (SCS), and pelagic sharks);
- Establishing calendar year commercial quotas for the LCS and pelagic sharks and dividing the annual quota into two equal half-year quotas that apply to the following two fishing periods – January 1 through June 30 and July 1 through December 31;
- Establishing a recreational trip limit of four sharks per vessel for LCS or pelagic shark species groups and a daily bag limit of five sharks per person for sharks in the SCS species group;
- Requiring that all sharks not taken as part of a commercial or recreational fishery be released uninjured;
- Establishing a framework procedure for adjusting commercial quotas, recreational bag limits, species size limits, management unit, fishing year, species groups, estimates of maximum sustainable yield (MSY), and permitting and reporting requirements;
- Prohibiting finning by requiring that the ratio between wet fins/dressed carcass weight not exceed five percent;
- Prohibiting the sale by recreational fishermen of sharks or shark products caught in the Economic Exclusive Zone (EEZ);
- Requiring annual commercial permits for fishermen who harvest and sell shark (meat products and fins);
- Establishing a permit eligibility requirement that the owner or operator (including charter vessel and headboat owners/operators who intend to sell their catch) must show proof that at least 50 percent of earned income has been derived from the sale of the fish or fish products or charter vessel and headboat operations or at least $20,000 from the sale of fish during one of three years preceding the permit request;
- Requiring trip reports by permitted fishermen and persons conducting shark tournaments and requiring fishermen to provide information to NMFS under the Trip Interview Program; and,
- Requiring NMFS observers on selected shark fishing vessels to document mortality of marine mammals and endangered species.

At that time, NMFS identified LCS as overfished and pelagic and SCS as fully fished. The quotas were 2,436 mt dressed weight (dw) for LCS and 580 mt dw for pelagic sharks. No quota was established for SCS. Under the rebuilding plan established in the 1993 FMP, the LCS quota was expected to increase every year up to the MSY estimated in the 1992 stock assessment, which was 3,787 mt dw.

A number of difficulties arose in the initial year of implementation of the 1993 FMP that resulted in a short season and low ex-vessel prices. To address these problems, a commercial trip limit of 4,000 lb for permitted vessels for LCS was implemented on December 28, 1993 (58 FR 68556), and a control date for the Atlantic shark fishery was established on February 22, 1994 (59 FR 8457). A final rule to implement additional measures authorized by the 1993 FMP published on October 18, 1994 (59 FR 52453), which:

- Clarified operation of vessels with a Federal commercial permit;
- Established the fishing year;
- Consolidated the regulations for drift gillnets;
- Required dealers to obtain a permit to purchase sharks;
- Required dealer reports;
- Established recreational bag limits;
- Established quotas for commercial landings; and
- Provided for commercial fishery closures when quotas were reached.

In 1994, under the rebuilding plan implemented in the 1993 Shark FMP, the LCS quota was increased to 2,570 mt dw. Additionally, a new stock assessment was completed in March 1994 that indicated rebuilding LCS could take as long as 30 years and suggested a more cautious approach for pelagic sharks and SCS. A final rule that capped quotas for LCS and pelagic sharks at the 1994 levels was published on May 2, 1995 (60 FR 21468).

In June 1996, NMFS conducted another stock assessment to examine the status of LCS stocks. The 1996 stock assessment found no clear evidence that LCS stocks were rebuilding and concluded that "[a]nalyses indicate that recovery is more likely to occur with reductions in effective fishing mortality rate of 50 [percent] or more." In response to these results, in 1997, NMFS reduced the LCS commercial quota by 50 percent to 1,285 mt dw and the recreational retention limit to two LCS, SCS, and pelagic sharks combined per trip with an additional allowance of two Atlantic sharpnose sharks per person per trip (62 FR 16648, April 2, 1997). In this same rule, NMFS established an annual commercial quota for SCS of 1,760 mt dw and prohibited possession of five species. As a result of litigation, NMFS prepared additional economic analyses on the 1997 LCS quotas and was allowed to maintain those quotas during resolution of the case.

3.1.1.2 1999 Fishery Management Plan for Atlantic Tunas, Swordfish, & Sharks

In June 1998, NMFS held another LCS stock assessment. The 1998 stock assessment (NMFS, 1998a) found that LCS were overfished and would not rebuild under the 1997 harvest levels. Based in part on the results of the 1998 stock assessment, in April 1999, NMFS published the 1999 FMP which included numerous measures to rebuild or prevent overfishing of Atlantic sharks in commercial and recreational fisheries. The 1999 FMP replaced the 1993 FMP. Management measures related to sharks that changed in the 1999 FMP included:

- Reducing commercial LCS and SCS quotas;
- Establishing ridgeback and non-ridgeback categories of LCS;
- Implementing a commercial minimum size for ridgeback LCS;
- Establishing blue shark, porbeagle shark, and other pelagic shark subgroups of the pelagic sharks and establishing a commercial quota for each subgroup;
- Reducing recreational retention limits for all sharks;
- Establishing a recreational minimum size for all sharks except Atlantic sharpnose;
- Expanding the list of prohibited shark species to 19 species;
- Implementing limited access in commercial fisheries;
- Establishing a shark public display quota;
- Establishing new procedures for counting dead discards and state landings of sharks after Federal fishing season closures against Federal quotas; and
- Establishing season-specific over- and underharvest adjustment procedures.

The implementing regulations were published on May 28, 1999 (64 FR 29090). However, in 1999, a court enjoined implementation of the 1999 regulations, as they related to the ongoing litigation on the 1997 quotas. Further history of this litigation and shark management is provided under Section 3.1.1.4 below. A year later, on June 12, 2000, the court issued an order clarifying that NMFS could proceed with implementation and enforcement of the 1999 prohibited species provisions (64 FR 29090, May 28, 1999).

As described, the 1999 FMP replaced the existing Atlantic Shark and Atlantic Swordfish FMPs, and established the first FMP for Atlantic tunas. NMFS began working on the 1999 FMP shortly after the U.S. Congress reauthorized the Magnuson-Stevens Act in 1996. The 1996 Magnuson-Stevens Act amendments added new fishery management requirements including requiring NMFS to halt overfishing; rebuild overfished fisheries; minimize bycatch and bycatch mortality, to the extent practicable; and identify and protect essential fish habitat (EFH). These provisions were coupled with the recognition that the management of HMS requires international cooperation and that rebuilding programs must reflect traditional participation in the fisheries by U.S. fishermen, relative to foreign fleets.

Development of the 1999 FMP began in September 1997 with the formation of the HMS AP. The HMS AP was established under a requirement of the Magnuson-Stevens Act, and is

composed of representatives of the commercial and recreational fishing communities, conservation and academic organizations, the five regional fishery management councils involved in Atlantic HMS management, the Atlantic and Gulf coastal states, and the U.S. ICCAT Advisory Committee. The HMS AP met seven times during development of the 1999 FMP, including once during the public comment period on the draft FMP, and provided extensive comment and advice to NMFS.

In October 1997, NMFS prepared and distributed a scoping document to serve as the starting point for consideration of issues for the 1999 FMP. The scoping document described major issues in the fishery, legal requirements for management, and potential management measures that could be considered for adoption in the FMP and solicited public comment on these issues. The scoping document was the subject of 21 public hearings that were held in October and November 1997 throughout the management area. The scoping meetings allowed NMFS to gather information from participants in the fisheries, and provided a mechanism by which the public could provide input to NMFS early in the FMP development process.

In October 1998, NMFS announced in the Federal Register the availability of the draft FMP. The comment period on the draft FMP lasted from October 25, 1998, to March 12, 1999. The proposed rule that accompanied the draft FMP was published in the Federal Register on January 20, 1999. The supplemental part that related to the bluefin tuna rebuilding program published in the Federal Register on February 25, 1999. The comment period on the proposed rule and its supplement also went until March 12, 1999. Subsequent to the release of the proposed rule, NMFS held 27 public hearings in communities from Texas to Maine and the Caribbean. During the comment period, NMFS received several thousand comments from commercial and recreational fishermen, scientists, conservationists, and concerned individuals. An HMS AP meeting was held toward the end of the comment period to allow HMS AP members to view most of the comments NMFS had received on the draft FMP and accompanying proposed rule.

The 1999 FMP incorporated all existing management measures for Atlantic tuna and north Atlantic swordfish that have been issued previously under the authority of the ATCA. It also incorporated all existing management measures for north Atlantic swordfish and Atlantic sharks that had previously been issued under the authority of the Magnuson-Stevens Act. Southern Atlantic swordfish and southern Atlantic albacore tuna continue to be managed only under ATCA. In November 2004 and 2006, ICCAT adopted recommendations for Atlantic sharks.

Some of the non-species specific management measures of the 1999 FMP included vessel monitoring systems for all pelagic longline (PLL) vessels; gear and vessel marking requirements; moving PLL gear after an interaction with a protected species; a requirement for charter/headboats to obtain an annual vessel permit; tournament registration for all HMS tournaments; time limits on completing a vessel logbook; and expanded observer coverage. The 1999 FMP also established the threshold levels to determine if a stock is overfished, if overfishing is occurring, or if the stock is rebuilt. Finally, the 1999 FMP identified EFH for all Atlantic tunas, swordfish, and sharks. As part of the 1999 FMP, the regulations for all Atlantic HMS, including billfish, were consolidated into one part of the Code of Federal Regulations, 50

CFR § 635. Before then, each species had its own part. This often led to confusion and, in some cases, conflicting regulations.

3.1.1.3 Post 1999 FMP

After issuance of the 1999 FMP, a number of constituents (environmental, commercial fishermen, and recreational fishermen) sued the NMFS (the Agency) over aspects of the plan, including the BFT rebuilding program, the use of vessel monitoring systems in the PLL fleet, the time/area closure for the PLL fleet, the pelagic shark quotas, the shark and yellowfin tuna recreational retention limits, the large and small coastal shark (SCS) quotas, and the bluefin tuna purse seine allocation. The Agency received favorable court rulings, upholding its actions, in most of these cases, and resolved some matters via settlement agreements. All of the briefings and court orders are a matter of the public record.

3.1.1.4 Amendment 1 to the 1999 Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks

As noted under Section 3.1.1.1, in 1999, a court enjoined the Agency from implementing many of the shark-specific regulations in the 1999 FMP. In 2000, the injunction was lifted when a settlement agreement was entered to resolve the 1997 and 1999 lawsuits. The settlement agreement required, among other things, an independent (*i.e.*, non-NMFS) review of the 1998 LCS stock assessment. The settlement agreement did not address any regulations affecting the pelagic shark, prohibited species, or recreational shark fisheries. Once the injunction was lifted, on January 1, 2001, the pelagic shark quotas adopted in the 1999 FMP were implemented (66 FR 55). Additionally, on March 6, 2001, NMFS published an emergency rule implementing the settlement agreement (66 FR 13441). This emergency rule expired on September 4, 2001, and established the LCS and SCS commercial quotas at 1997 levels.

In late 2001, the Agency received the results of the peer review of the 1998 LCS stock assessment. These peer reviews found that the 1998 LCS stock assessment was not the best available science for LCS. Taking into consideration the settlement agreement, the results of the peer reviews of the 1998 LCS stock assessment, current catch rates, and the best available scientific information (not including the 1998 stock assessment projections), NMFS implemented another emergency rule for the 2002 fishing year that suspended certain measures under the 1999 regulations pending completion of new LCS and SCS stock assessments and a peer review of the new LCS stock assessment (66 FR 67118, December 28, 2001; extended 67 FR 37354, May 29, 2002). Specifically, NMFS maintained the 1997 LCS commercial quota (1,285 mt dw), maintained the 1997 SCS commercial quota (1,760 mt dw), suspended the commercial ridgeback LCS minimum size, suspended counting dead discards and state landings after a Federal closure against the quota, and replaced season-specific quota accounting methods with subsequent-season quota accounting methods. That emergency rule expired on December 30, 2002.

On May 8, 2002, NMFS announced the availability of a SCS stock assessment (67 FR 30879) (Cortés, 2002). The Mote Marine Laboratory and the University of Florida provided NMFS with another SCS assessment in August 2002. Both of these stock assessments indicate that overfishing was occurring on finetooth sharks while the three other species in the SCS

complex (Atlantic sharpnose, bonnethead, and blacknose) were not overfished and overfishing was not occurring. On October 17, 2002, NMFS announced the availability of the 2002 LCS stock assessment (Cortés *et al*., 2002) and the workshop meeting report (67 FR 64098). The results of this stock assessment indicate that the LCS complex was still overfished and overfishing was occurring. Additionally, the 2002 LCS stock assessment found that sandbar sharks were no longer overfished but that overfishing is still occurring and that blacktip sharks were rebuilt and overfishing was not occurring.

Based on the results of both the 2002 SCS and LCS stock assessments, NMFS implemented an emergency rule to ensure that the commercial management measures in place for the 2003 fishing year were based on the best available science (67 FR 78990, December 27, 2002; extended 68 FR 31987, May 29, 2003). Specifically, the emergency rule implemented the LCS ridgeback/non-ridgeback split, set the LCS and SCS quotas based on the results of stock assessments, suspended the commercial ridgeback LCS minimum size, and allowed both the season-specific quota adjustments and the counting of all mortality measures to go into place.

In December 2003, NMFS implemented the regulations in Amendment 1 to the Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks (68 FR 74746) (NMFS, 2003a). These regulations were based on the 2002 small and large coastal shark (LCS) stock assessments. Some of the measures taken in Amendment 1 included revising the rebuilding timeframe for LCS; re-aggregating the LCS complex; establishing a method of changing the quota based on MSY; updating some shark EFH identifications; modifying the quotas, seasons, and regions; adjusting the recreational bag limit; establishing criteria to add or remove species to the prohibited shark list; establishing gear restrictions to reduce bycatch and bycatch mortality; establishing a time/area closure off North Carolina for BLL fishermen; and establishing vessel monitoring system (VMS) requirements for BLL and gillnet fishermen.

3.1.1.5 Other Post-1999 FMP Regulations for Sharks

Since the 1999 FMP, there have been a number of other shark regulatory actions in addition to the rules mentioned above. Below is a short list of some of these actions.

- National Plan of Action for the Conservation and Management of Sharks: On February 15, 2001, NMFS released the final National Plan of Action (NPOA) for the Conservation and Management of Sharks (66 FR 10484). The NPOA was developed pursuant to the endorsement of the International Plan of Action (IPOA) by the United Nations' FAO Committee on Fisheries Ministerial Meeting in February 1999. The overall objective of the IPOA is to ensure conservation and management of sharks and their long-term sustainable use. The final NPOA, consistent with the Magnuson-Stevens Act, requires NMFS and the Regional Fishery Management Councils to undertake extensive data collection, analysis, and management measures in order to ensure the long-term sustainability of U.S. shark fisheries. The NPOA also encourages Interstate Marine Fisheries Commissions and State agencies to initiate or expand current data collection, analysis, and management measures and to implement regulations consistent with federal regulations, as needed. For additional information on the U.S. NPOA and its implementation, see http://www.nmfs.noaa.gov.

- Shark Finning Prohibition Act: On December 21, 2000, President Clinton signed the Shark Finning Prohibition Act into law (Public Law 106-557). This amended the Magnuson-Stevens Act to prohibit any person under U.S. jurisdiction from (i) engaging in the finning of sharks; (ii) possessing shark fins aboard a fishing vessel without the corresponding carcass; and (iii) landing shark fins without the corresponding carcass. NMFS published final regulations on February 11, 2002 (67 FR 6194). These regulations prohibit the finning of sharks, possession of sharks without the corresponding carcasses, and landings of shark carcasses without the corresponding carcasses in U.S. fisheries in the EEZ and on the high seas.

- Recreational permits and reporting requirements: On December 18, 2002 (67 FR 77434), NMFS published a final rule requiring all vessel owners fishing recreationally (*i.e.*, no sale) for Atlantic HMS, including billfish, to obtain an Atlantic HMS recreational angling category permit. On January 7, 2003 (68 FR 711), a final rule establishing a mandatory reporting system for all non-tournament recreational landings of Atlantic marlins, sailfish, and swordfish was published. These requirements became effective in March 2003.

Other regulatory actions that have been taken, including the opening and closing of fisheries and adjustments to quota allocations. All of these actions are not listed here but can be found by searching the Federal Register webpage at http://www.gpoaccess.gov/fr/index.html or by reviewing the annual HMS Stock Assessment and Fishery Evaluation (SAFE) Reports (http://www.nmfs.noaa.gov/sfa/hms).

3.1.1.6 Consolidated HMS FMP and Beyond

As stated in the previous sections, NMFS issued two separate FMPs in April 1999 for the Atlantic HMS fisheries. The 1999 Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks, combined, amended, and replaced previous management plans for swordfish and sharks, and was the first FMP for tunas. Amendment 1 to the Billfish Management Plan (NMFS, 1999b) updated and amended the 1988 Billfish FMP (SAFMC, 1988). The 2006 Consolidated HMS FMP consolidated the management of all Atlantic HMS into once comprehensive FMP, and combined and simplified the objectives of the previous FMPs.

During the five-and-a-half years that these two FMPs co-existed, there was a growing recognition by the Agency of the interrelated nature of these fisheries and the need to consider management actions together. In addition, the Agency had identified some adverse ramifications stemming from separation of the plans, including unnecessary administrative redundancy and complexity, loss of efficiency, and public confusion over the management process. Therefore, NMFS proposed to improve coordination of the conservation and management of the domestic fisheries for Atlantic swordfish, tunas, sharks and billfish by consolidating the management of all HMS into one FMP. In 2005, NMFS released the draft Consolidated HMS FMP. The Final Consolidated HMS FMP was completed in July 2006 and the implementing regulations were published on October 2, 2006 (71 FR 58058).

The Final Consolidated HMS FMP changed certain management measures, adjusted regulatory framework measures, and continued the process of updating HMS EFH. Measures

that were specific to the shark fisheries included mandatory workshops and certifications for all vessel owners and operators that have PLL or BLL gear on their vessels and that had been issued or were required to be issued any of the HMS limited access permits (LAPs) to participate in HMS longline and gillnet fisheries. These workshops provide information and ensure proficiency with using required equipment to handle release and disentangle sea turtles, smalltooth sawfish, and other non-target species. The Consolidated HMS FMP also requires Federally permitted shark dealers to attend Atlantic shark identification workshops to train shark dealers to properly identify shark carcasses. Additional measures specific to sharks include the differentiation between PLL and BLL gear based upon the species composition of the catch onboard or landed, the requirement that the 2nd dorsal fin and the anal fin remain on all sharks through landing, and a new prohibition making it illegal for any person to sell or purchase any HMS that was offloaded from an individual vessel in excess of the retention limits specified in § § 635.23 and 635.24. The Consolidated HMS FMP also implemented complementary HMS management measures in Madison-Swanson and Steamboat Lumps Marine Reserves and established criteria to consider when implementing new time/area closures or making modifications to existing time/area closures.

Recent actions taken by NMFS affecting the Atlantic shark fishery include a combined emergency and final rule (December 14, 2006, 71 FR 75122) that adjusted the 2007 first season commercial quotas for LCS, SCS and pelagic sharks based on over- or underharvests from the 2006 fishing season and that announced the season opening and closing dates for the first season of 2007. In late 2007, NMFS published a final rule (November 29, 2007, 72 FR 67580) which established the 2008 first trimester season commercial quotas for LCS, SCS, and pelagic sharks based on over- or underharvests from the 2007 first trimester fishing season. Specifically, NMFS closed the LCS fishery in all regions for the 2008 first and second trimester seasons. The SCS and pelagic shark fisheries opened January 1, 2008, and remain open during the first trimester season, as long as quota is available. During the first trimester season of 2007, the South Atlantic region landed 16.0 mt dw with no LCS quota available (-112.9 mt dw) and 28.7 mt dw (9.3 percent) of their SCS quota. The Gulf of Mexico region landed 186.9 mt dw (300 percent) of their LCS quota and 14.7 mt dw (97.4 percent) of their SCS quota. The North Atlantic region experienced underharvests for both LCS and SCS.

The measures under the first season rule for 2008 will remain effective until they are replaced by those implemented under Amendment 2 to the Consolidated HMS FMP. If Amendment 2 to the Consolidated HMS FMP is finalized and effective after the start of the 2008 second trimester season, May 1, 2008, the SCS and pelagic shark fisheries will open on May 1, 2008, with the baseline quotas. Therefore, there will be no rulemaking establishing LCS, SCS, and pelagic shark quotas and seasons for the 2008 second trimester.

The management measures in this amendment seek to address extensive overharvests in the South Atlantic and Gulf of Mexico regions in 2007 and to take into consideration the results of the recent stock assessment, which have indicated that a number of shark stocks are overfished and experiencing overfishing. NMFS is investigating possible causes of the overharvest that began in 2006. In terms of overharvests in 2006, the South Atlantic region had an overharvest of LCS during all three trimesters, with the largest during the first trimester (278.2 percent of the quota). In total, 365.9 mt dw of LCS were harvested above the South Atlantic's regional quota

in 2006, which approximately doubled the overall annual South Atlantic's regional LCS quota of 343.3 mt dw for 2006. This increase in harvest could have been due, in part, to the nine percent increase in fishing effort in terms of the number of trips taken by directed permit holders in South Atlantic region during 2006 (see discussion below).

The Gulf of Mexico region had overharvests in 2006 of LCS in all three trimesters, with the largest LCS overharvest occurring during the third trimester (155.9 percent of the quota). In total, 430.4 mt dw of LCS were harvested above the Gulf of Mexico's regional quota of 649.5 mt dw for 2006; this was approximately 66 percent of the Gulf of Mexico's regional quota that was harvested in addition to its base quota during 2006. The Gulf of Mexico region also had overharvests of SCS in the first and second trimesters, with the largest SCS overharvest occurring during the first trimester (527 percent of the quota). In total, 104.4 mt dw of SCS were harvested above the Gulf of Mexico's regional SCS quota of 84.5 mt dw for 2006. This is approximately 1.2 times the Gulf of Mexico's regional SCS quota that was harvested in addition to its regular regional SCS quota during 2006. These additional harvests could have been due, in part, to the 32 percent increase in fishing effort in terms of number of trips landing sharks by directed permit holders in the Gulf of Mexico region during 2006.

NMFS investigated possible causes of the overharvests that started in 2006. Specifically, NMFS analyzed 2006 Coastal Fisheries and HMS logbook data to evaluate whether or not overharvests in 2006 could have been due to increased fishing effort in the shark fishery during that year. 2007 logbook data is not available at this time to investigate changes in effort and overharvests of the LCS complex that occurred in 2007. NMFS evaluated the number of vessels and the number of trips that landed sharks by each permit type in 2006 as reported in the two logbooks. On average, more trips that landed sharks were taken by directed permit holders in the Atlantic region compared to the Gulf of Mexico region from 2003 to 2005 (62 percent of trips were taken in the Atlantic region versus 38 percent taken in the Gulf of Mexico region). This pattern was also seen in 2006 where 57 percent of the trips taken were in the Atlantic region and 42 percent were taken in the Gulf of Mexico region. There were more trips taken by directed permit holders that landed sharks in 2006 (1,312 trips) than the average number of trips each year by directed permit holders from 2003 to 2005 (1,107 trips). This increase in effort by directed permit holders was larger in the Gulf of Mexico region where there was an approximate 32 percent increase in the number of trips taken by directed permit holders that landed sharks compared to a nine percent increase in the Atlantic over the same time period.

Incidental permit holders typically do not contribute to a significant portion of sharks landings. For instance, they only landed an average of 26.9 mt dw LCS/year between 2003 and 2005 (compared to an average of 1,263 mt dw of LCS/year for directed permit holders). Incidental permit holders took 302 trips in 2006, roughly the same as the average number of trips taken between 2003 and 2005 (326 trips). In addition, fishermen without HMS permits took about the same number of trips landings sharks in 2006 (51 trips) as they did, on average, from 2003 to 2005 (54 trips) according to the Coastal Fisheries logbook.

NMFS also evaluated the average number of vessels landing sharks each year and in each region from 2003 to 2005 compared to the number of vessels landing sharks in 2006. In general, there were more vessels with directed and incidental permits landing sharks in 2006 than the

average number of vessels landing sharks each year between 2003 to 2005 (140 directed vessels in 2006 versus an average 128 directed vessels from 2003 to 2005; 72 incidental vessels in 2006 versus an average 62 vessels incidental vessels from 2003 to 2005). NMFS also estimated the number of trips taken per individual vessel that landed sharks for each time period; however, the number of trips taken per vessel that landed sharks varied by region and time period with no discernible pattern.

NMFS also expanded the equipment required for the safe handling, release, and disentanglement of sea turtles caught in the Atlantic shark BLL fishery (72 FR 5633, February 7, 2007). As a result, equipment required for BLL vessels is now consistent with the requirements for the PLL fishery. Furthermore, this action implemented several year-round BLL closures to protect spawning areas and EFH consistent with the Caribbean Fishery Management Council Sustainable Fisheries Act (SFA) Amendment.

3.1.2 International Shark Management

ICCAT is responsible for the conservation of tunas and tuna-like species in the Atlantic Ocean and adjacent seas. Tuna-like species include the following pelagic sharks only: the Atlantic blue shark and the shortfin mako. The organization was established at a Conference of Plenipotentiaries, which prepared and adopted the International Convention for the Conservation of Atlantic Tunas, signed in Rio de Janeiro, Brazil, in 1966. The 2006 Regular Meeting of ICCAT was held November 17 – 26, 2006, in Dubrovnik, Croatia. As such, much of the work at the 2006 Commission meeting dealt with improvement of ICCAT statistics and conservation measures, compliance with existing ICCAT recommendations, and the functioning of the Commission. The 2007 Commission meeting resulted in a recommendation regarding pelagic sharks, as discussed below. For purposes of clarity, it should be understood that ICCAT recommendations are binding instruments for Contracting Parties while ICCAT resolutions are non-binding and express the will of the Commission. All ICCAT recommendations and resolutions are available on the ICCAT website at http://www.ICCAT.es. Under ATCA, however, NMFS has authority to promulgate regulations as "necessary and appropriate" to implement ICCAT measures.

3.1.2.1 Atlantic Sharks

The first binding measure passed by ICCAT dealing specifically with sharks, *Recommendation 04-10 Concerning the Conservation of Sharks Caught in Association with Fisheries Managed by ICCAT*, includes, among other measures: reporting of shark catch data by Contracting Parties, a ban on shark finning, a request for Contracting Parties to live-release sharks that are caught incidentally, a review of management alternatives from the 2004 assessment on blue and shortfin mako sharks, and a commitment to conduct another stock assessment of selected pelagic shark species no later than 2007. In 2005, additional measures pertaining to pelagic sharks were added to the 2004 ICCAT recommendation. Measures included a requirement for Contracting Parties that have not yet implemented the 2004 recommendation, to reduce shortfin mako mortality, and annually report on their efforts to the commission.

At the 2007 ICCAT annual meeting in Antalya, Turkey, ICCAT adopted a recommendation concerning pelagic sharks (07-06, "Supplemental Recommendation by ICCAT

Concerning Sharks"). The new operative paragraphs call for SCRS to conduct stock assessments and recommend management alternatives for porbeagle sharks (*Lamna nasus*), take appropriate measures to reduce fishing mortality in porbeagles (*Lamna nasus*) and North Atlantic shortfin mako sharks (*Isurus oxyrinchus*), and implement research on pelagic shark species caught in the Convention area in order to identify potential nursery areas. It also requires that Contracting Parties, Cooperating non-Contracting Parties, Entities and Fishing Entities submit Task I and II data for sharks in advance of the next SCRS assessment.

3.1.3 Existing State Regulations

Table 3.1 outlines the existing State regulations as of April 19, 2007, with regard to shark species. While the HMS Management Division updates this table periodically throughout the year, persons interested in the current regulations for any state should contact that state directly.

Table 3.1 **State Rules and Regulations Pertaining to Sharks, as of April 19, 2007.** Please note that state regulations are subject to change. Please contact the appropriate state personnel to ensure that the regulations listed below remain current. X = Regulations in Effect; n = Regulation Repealed; FL = Fork Length; CL = Carcass Length; TL = Total Length; LJFL = Lower Jaw Fork Length; CFL = Curved Fork Length; DW = Dressed Weight; and SCS = Small Coastal Sharks; LCS = Large Coastal Sharks.

State	Cite Reference	Regulatory Details	Contact Information
ME	Code ME R. 13-188 ' 50	Regulations apply to coastal sharks and Spiny dogfish. Regulations prohibit dogfish & shark finning; dogfish trip limit and matches federal closures	ME Department of Marine Resources George Lapointe Phone: 207/624-6553 Fax: 207/624-6024
NH	FIS 603.19	Regulations apply to Spiny dogfish only	NH Fish and Game Clare McBane Phone: 603/868-1095 Fax: 603/868-3305
MA	322 CMR § 6.35 & 6.37 CMRs available online at http://www.mass.gov/dfwele/dmf/commercialfishing/cmr_index.htm	Regulations apply to Spiny dogfish; Prohibition on harvest, catch, take, possession, transportation, selling or offer to sell any basking, dusky, sand tiger, or white sharks	MA Division of Marine Fisheries Melanie Griffin Phone: 617/626-1528 Fax: 617/626-1509
RI	RIMFC Regulations § 7.15	Regulations apply to spiny dogfish only	RI Department of Environment Management April Valliere Phone: 401-423-1939 FAX: 401-423-1925
CT	Regulations of Connecticut State Agencies § 26-159a-19	Regulations apply to spiny dogfish only	CT Department of Environmental Protection David Simpson Phone: 860/434-6043 Fax: 860/434-6150
NY	NY Environmental Conservation ' 13-0338; State of New York Codes, Rules and Regulations (Section 40.1)	Shark finning prohibited; Reference to the Federal regulations 50 CFR part 635; Prohibited sharks listed	NY Department of Environmental Conservation Gordon Colvin Phone: 631/444-0435 Fax: 631/444-0449

State	Cite Reference	Regulatory Details	Contact Information
NJ	NJ Administrative Code, Title 7. Department of Environmental Protection, NJAC 7:25-18.1 and 7:25-18.12(d)	Commercial/Recreational: min size 48" TL or 23" from the origin of the first dorsal fin to pre-caudal pit; possession limit - 2 fish/vessel or 2 fish per person if fishing from shore or a land based structure, must hold Federal permit to possess or sell more than 2 sharks; no sale during Federal closures; Finning prohibited; Prohibited Species: basking, bigeye sand tiger, sand tiger, whale and white sharks	NJ Fish and Wildlife Hugh Carberry, Phone: 609/748-2020 Fax: 609/748-2032 Additional contact: Peter Clarke 609 748-4334
DE	DE Code Regulations 3541	Reference to Federal regulations for sharks; Recreational/Commercial: min size – 54" FL; bag limit – 1 shark/vessel/trip; shorebound anglers – 1 shark/person/day; 2 Atlantic sharpnose/vessel/trip with no min size; Prohibited Species: same as Federal species. Prohibition against fins without being naturally attached to the body	DE Division of Fish and Wildlife Roy Miller Phone: 302/739-9914
MD	Code of Maryland Reg. title 8, § 02.05.17	Recreational: min size - 54" FL or 31" carcass; 1 shark/vessel/trip; 1 Atlantic sharpnose/person/trip with no min size; Commercial: 4000 lbs/day; Finning and longline prohibition; Prohibited Species are same as Federal regulations	MD Department of Natural Resources Harley Speir Howard King Phone: 410/260-8264

State	Cite Reference	Regulatory Details	Contact Information
VA	4 VA Administrative Code 20-490	Recreational regulations are identical to Federal regulations for restricted species, species groupings, and possession limits. The only difference between VA and Federal recreational shark regulations is that VA allows fishermen to remove the head and the tail, but the CL must be at least 30 inches. If whole, must be 54 inches, just like the Federal regulations; For smooth and spiny dogfish, same as Federal regulation Commercial regulations (for all non smooth or spiny dogfish)—east of the COLREGS line—are identical to Federal regulations (VA does not require fishermen to have the Federal permit), all other restrictions—same as Federal regulations. One exception: when Federal waters are closed, VA does not close. Commercial regulations (for all non smooth or spiny dogfish)—west of COLREGS line—same as above, except VA established a 58 inch FL or 31 inch CL minimum size limit and there is no tolerance for an under-sized shark. Smooth dogfish – identical to Federal regulations. Spiny dogfish – VA is complying with the ASMFC spiny dogfish FMP. VA is near to adopting a 3,000 pound possession limit. Fishing periods and division of yearly quota in the ASMFC FMP are same as Federal, but the ASMFC TAC is 2 million pounds greater for this fishing year (2007). When the quota for either fishing period has been determined to be caught, further state landings prohibited. All spiny dogfish are required to be sold to Federally permitted dealers. Gear restrictions—1. no longlining in any state waters; 2. large mesh gill net restrictions (>7 inches) for protected resources (sea turtles and bottlenose dolphin) are in place much of the warm months of the year.	VA Marine Ressources Commission Lewis Gillingham Phone: 757/247-2243 Fax: 757/247-2020

State	Cite Reference	Regulatory Details	Contact Information
NC	NC Administrative Code tit. 15A, r.3M.0505; Proclamation FF-38-2006 ***** Modify closed area off NC to allow fishing outside 15 fathoms during 1st trimester (Jan 1 - Feb 15)	Director may impose restrictions for size, seasons, areas, quantity, *etc*. via proclamation; Commercial: open seasons and species groups same as Federal; 4000 lb trip limit for LCS; retain fins with carcass through point of landing; LL shall only be used to harvest LCS during open season, shall not exceed 500 yds or have more than 50 hooks; Recreational: LCS (54" FL min size) - no more than 1 shark/vessel/day or 1 shark/person/day, SCS (no min size) – no more than 1 finetooth or blacknose shark/vessel/day and no more than 1 Atlantic sharpnose and 1 bonnethead/person/day, pelagics (no min size) -1 shark/vessel/day; Same prohibited shark species as Federal regulations	NC Division of Marine Fisheries Louis B. Daniel III Phone: 252/726-7021 Fax: 252/726-0254
SC	SC Code Ann. § 50-5-2725, 50-5-2730	Recreational: 2 Atlantic sharpnose/person/day and 1 Bonnethead/person/day, no min size; All others – 1 shark/boat/trip, min size – 54" FL; Reference to Federal commercial regulations and prohibited species; Illegal in state waters to harvest/retain sharks taken in gillnet; Annual state permit required in addition to federal permit to take sharks for commercial purposes in state waters	SC Department of Natural Resources Mel Bell Phone: 843/953-9007 Fax: 843/953-9386
GA	GA Code Ann. § 27-4-130.1; OCGA §27-4-7(b); GA Comp. R. & Regs. § 391-2-4-.04	Gear Restrictions/Prohibitions - Use of gillnets and longlines are prohibited in state waters. Sharks – Commercial/Recreational: 2 sharks from the Small Shark Composite (bonnethead, sharpnose, and spiny dogfish, daily limit may consist of 2 of the same species (*e.g*., 2 bonnetheads, 2 Atlantic sharpnose) or 2 different species, SSC min size 30" TL; all other sharks - 2 sharks/person or boat, whichever is less, min size 48" TL, may include only 1 greater than 84"; Prohibited Species: sand tiger sharks; All species must be landed head and fins intact; Sharks may not be landed in Georgia if harvested using gillnets	GA Department of Natural Resources Phone: 912/264-7218 Fax: 912/262-3143

State	Cite Reference	Regulatory Details	Contact Information
FL	FL Administrative Code Ann. r.68B-44, F.A.C	Commercial/Recreational: min size - none; possession limit – 1 shark/person/day or 2 sharks/vessel on any vessel with 2 or more persons on board; State waters close to commercial harvest when adjacent Federal waters close; Federal permit required for commercial harvest, so Federal regulations apply unless state regulations are more restrictive; Finning & Filleting prohibited; and same prohibited species as Federal regulations, except Caribbean sharpnose is not included; Spiny dogfish is prohibited	FL Fish and Wildlife Conservation Commission Lisa Gregg Phone: 850/488-6058 Fax: 850/488-7152
AL	AL Administrative Code r. 220-2-.46, r.220-3-.30, r.220-3-.37	Recreational & Commercial: bag limit – 2 sharpnose/person/day; no min size; all other sharks – 1/person/day; min size – 54" FL or 30" dressed; state waters close when Federal season closes; Prohibition: Atlantic angel, bigeye thresher, dusky, longfin mako, sand tiger, basking, whale, white, and nurse sharks	AL Department of Conservation and Natural Resources Major Jenkins Phone: 251/861-2882
LA	LA Administrative Code Title 76, Pt. VII, Ch. 3, § 357	Recreational: min size – 54" FL, except Atlantic sharpnose and bonnethead; bag limit - 1 sharpnose/person/day; all other sharks – 1 fish/person/day; Commercial: 4,000 lb LCS trip limit, no min size; Com & Rec Harvest Prohibited: 4/1-6/30; Prohibition: same as Federal regulations, as well as smalltooth and largetooth sawfish	LA Department of Wildlife and Fisheries Harry Blanchet 225/765-2889 fax 225/765-2489
MS	MS Code Title-22 part 7	Recreational: min size - LCS/Pelagics 37" TL; SCS 25" TL; bag limit - LCS/Pelagics 1/person up to 3/vessel; SCS 4/person; Commercial & Prohibited Species - Reference to Federal regulations	MS Department of Marine Resources Mike Buchanan Phone: 228/374-5000
TX	TX Administrative Code Title 31, Part 2, Parks and Wildlife Code Title 5, Parks and Wildlife Proclamations 65.3 and 65.72	Commercial/Recreational: bag limit - 1 shark/person/day; Commercial/Recreational possession limit is twice the daily bag limit (*i.e.*, 2 sharks/person/day); min size 24" TL	TX Parks & Wildlife Aaron Reed (Austin) Phone: 512/389-8046 Fax: 512/389-4450 Mark Lingo (Brownsville) Phone: 956/350-4490

State	Cite Reference	Regulatory Details	Contact Information
Puerto Rico	Regulation #6768 Article 8 – General Fishing Limits Article 13 – Limitations Article 17 – Permits for Recreational Fishing	Sharks are covered under the federal regulation known as Highly Migratory Species of the United States Department of Commerce (50 CFR, Part 635); Fishers who capture these species shall comply with said regulation	Puerto Rico Department of Natural and Environmental Resources Craig Lilyestrom Phone: 787-724-8774 x4042 craig@caribe.net
U.S. Virgin Islands	US VI Commercial and Recreational Fisher's Information Booklet Revised June 2004	Federal regulations and federal permit requirements apply in territorial waters	www.caribbeanfmc.com http://www.caribbeanfmc.com/usvi%20booklet/fisher%20booklet%20final.pdf

3.2 Status of the Stocks

The thresholds used to determine the status of Atlantic HMS, including sharks, are fully described in Chapter 3 of the 1999 FMP and Amendment 1 to the Billfish FMP, Chapter 3 of the 2006 Consolidated HMS FMP, and are presented in Figure 3.1. These thresholds are based on the thresholds described in a paper describing the technical guidance for implementing National Standard (NS) 1 of the Magnuson-Stevens Act (Restrepo *et al*., 1998). These thresholds will not change as a result this Amendment 2 to the 2006 Consolidated HMS FMP.

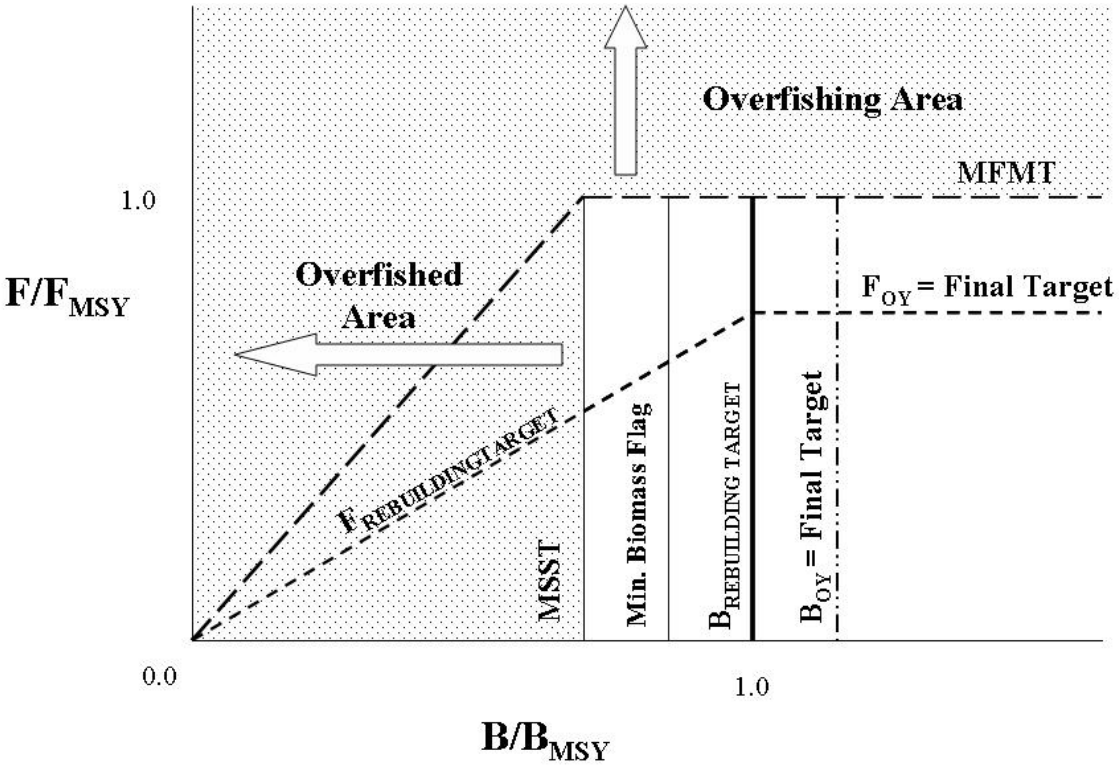

Figure 3.1 Illustration of the status determination and rebuilding terms.

In summary, a species is considered overfished when the current biomass (B) is less than the minimum stock size threshold ($B < B_{MSST}$). The minimum stock size threshold (MSST) is determined based on the natural mortality of the stock and the biomass at MSY (B_{MSY}). Maximum sustainable yield (MSY) is the maximum long-term average yield that can be produced by a stock on a continuing basis. The biomass can be lower than B_{MSY}, and the stock not be declared overfished as long as the biomass is above B_{MSST}.

Overfishing may be occurring on a species if the current fishing mortality (F) is greater than the fishing mortality at MSY (F_{MSY}) ($F > F_{MSY}$). In the case of F, the maximum fishing mortality threshold is F_{MSY}. Thus, if F exceeds F_{MSY}, the stock is experiencing overfishing.

If a species is declared overfished or has overfishing occurring, action to rebuild the stock and/or prevent further overfishing is required by law. A species is considered rebuilt when B is greater than B_{MSY} and F is less than F_{MSY}. A species is considered healthy when B is greater

than or equal to the biomass at optimum yield (B_{OY}) and F is less than or equal to the fishing mortality at optimum yield (F_{OY}).

In summary, the thresholds to use to calculate the status of Atlantic HMS, as described in the 1999 FMP and 2006 Consolidated HMS FMP, are:

- Maximum Fishing Mortality Threshold (MFMT) = $F_{limit} = F_{MSY}$;
- Overfishing is occurring when $F_{year} > F_{MSY}$;
- Minimum Stock Size Threshold (MSST) = $B_{limit} = (1\text{-}M)B_{MSY}$ when $M < 0.5 = 0.5B_{MSY}$ when $M >= 0.5$;
- Overfished when $B_{year}/B_{MSY} <$ MSST;
- Biomass target during rebuilding = B_{MSY};
- Fishing mortality during rebuilding < F_{MSY};
- Fishing mortality for healthy stocks = $0.75F_{MSY}$;
- Biomass for healthy stocks = B_{OY} = ~1.25 to $1.30B_{MSY}$;
- Minimum biomass flag = $(1\text{-}M)B_{OY}$; and
- Level of certainty of *at least* 50 percent but depends on species and circumstances; for sharks, a level of certainty of 70 percent is used as a guide.

Amendment 2 to the Consolidated HMS FMP does not change these threshold levels. The current status of sandbar, dusky, blacktip, porbeagle, and LCS stocks is provided in Table 3.2 below.

Table 3.2 Stock Status Summary Table for LCS, Sandbar, Blacktip, Dusky, and Porbeagle Sharks.

Species	Current Relative Biomass Level	Current Biomass B_{YEAR}	N_{MSY}	Minimum Stock Size Threshold (MSST)	Current Relative Fishing Mortality Rate	Maximum Fishing Mortality Threshold (F_{MSY})	Outlook
Sandbar Sharks	*SSF_{2004}/SSF_{MSY} = 0.72	3.06E+07	5.94E+05	4.75 - 5.35E+05	F_{2004}/F_{MSY} = 3.72	0.015	Overfished; Overfishing is occurring
Gulf of Mexico Blacktip Sharks**	*SSF_{2004}/SSF_{MSY}= 2.54 - 2.56	1.33E+08 – 1.93E+09	1.23 – 1.78E+07	0.99 - 1.07E+07	F_{2004}/F_{MSY} = 0.03-0.04	0.20	Not overfished; No overfishing is occurring
Atlantic Blacktip Sharks	unknown	unknown	unknown	unknown	unknown	unknown	unknown
Dusky Sharks**	B_{2003}/B_{MSY}= 0.15 - 0.47	687,290	4,409,144	unknown	F_{2003}/F_{MSY}=1.68-1,810	0.00005 – 0.0115	Overfished; Overfishing is occurring
LCS Complex	unknown	unknown	unknown	unknown	unknown	unknown	unknown
Porbeagle Sharks	*SSN_{2004}/SSN_{MSY} = 0.15 – 0.32	5,520-12,945	29,382 – 40,670	unknown	F_{2004}/F_{MSY} = 0.83	0.033 – 0.065	Overfished; overfishing is not occurring

*Spawning stock fecundity (SSF) or spawning stock number (SSN) was used as a proxy of biomass since biomass (B) does not influence pup production in sharks.
** Ranges of values are provided for these species because the assessment did not recommend a specific value for that parameter, rather the ranges reflect high and low estimates of different outputs achieved from numerous models that were employed.

3.2.1 Atlantic Sharks

3.2.1.1 Life History/Species Biology

Sharks belong to the class Chondrichthyes (cartilaginous fishes) that also includes rays, skates, and deepwater chimaeras (ratfishes). From an evolutionary perspective, sharks are an old group of fishes characterized by skeletons lacking true bones. The earliest known sharks have been identified from fossils from the Devonian period, over 400 million years ago. These primitive sharks were small creatures, about 60 to 100 cm long, that were preyed upon by larger armored fishes that dominated the seas. The life span of all shark species in the wild is not known, but it is believed that many species may live 30 to 40 years or longer.

Relative to other marine fish, sharks have a very low reproductive potential. Several important commercial species, including large coastal carcharhinids, such as sandbar (*Carcharhinus plumbeus)* (Casey and Hoey, 1985; Sminkey and Musick, 1995; Heist *et al*., 1995), lemon (*Negaprion brevirostris)* (Brown and Gruber, 1988), and bull sharks (Branstetter and Stiles, 1987), do not reach maturity until 12 to 18 years of age. Various factors determine this low reproductive rate: slow growth, late sexual maturity, one to two-year reproductive cycles, a small number of young per brood, and specific requirements for nursery areas. These biological factors leave many species of sharks vulnerable to overfishing.

There is extreme diversity among the approximately 350 species of sharks, ranging from tiny pygmy sharks of only 20 cm (7.8 in) in length to the giant whale sharks, over 12 meters (39 feet) in length. There are fast-moving, streamlined species such as mako (*Isurus* spp.) and thresher sharks (*Alopias* spp.), and sharks with flattened, ray-like bodies, such as angel sharks (*Squatina dumerili)*. The most commonly known sharks are large apex predators including the white (*Carcharadon carcharias*), mako, tiger (*Galeocerdo cuvier*), bull (*Carcharhinus leucas)*, and great hammerhead (*Sphyrna mokarran*). Some shark species reproduce by laying eggs, while others nourish their embryos through a placenta. Despite their diversity in size, feeding habits, behavior and reproduction, many of these adaptations have contributed greatly to the evolutionary success of sharks.

The most significant reproductive adaptations of sharks are internal fertilization and the production of fully developed young or "pups." These pups are large at birth, effectively reducing the number of potential predators and enhancing their chances of survival. During mating, the male shark inseminates the female with copulatory organs, known as claspers that develop on the pelvic fins. In most species, the embryos spend their entire developmental period protected within their mother's body, although some species lay eggs. The number of young produced by most shark species in each litter is small, usually ranging from two to 25, although large females of some species can produce litters of 100 or more pups. The production of fully-developed pups requires great amounts of nutrients to nourish the developing embryo. Traditionally, these adaptations have been grouped into three modes of reproduction: oviparity (eggs hatch outside body), ovoviviparity (eggs hatch inside body), and viviparity (live birth).

Adults usually congregate in specific areas to mate and females travel to specific nursery areas to pup. These nurseries are discrete geographic areas, usually in waters shallower than those inhabited by the adults. Frequently, the nursery areas are in highly productive coastal or estuarine waters where abundant small fishes and crustaceans provide food for the growing pups. These areas also may have fewer large predators, thus enhancing the chances of survival of the young sharks. In temperate zones, the young leave the nursery with the onset of winter; in tropical areas, young sharks may stay in the nursery area for a few years.

Shark habitat can be described in four broad categories: (1) coastal, (2) pelagic, (3) coastal-pelagic, and (4) deep-dwelling. Coastal species inhabit estuaries, the nearshore and waters of the continental shelves, *e.g*., blacktip (*Carcharhinus limbatus*), finetooth, bull, lemon, and Atlantic sharpnose sharks (*Rhizoprionondon terraenovae*). Pelagic species, on the other hand, range widely in the upper zones of the oceans, often traveling over entire ocean basins. Examples include shortfin mako (*Isurus oxyrinchus*), blue (*Prionace glauca*), and oceanic whitetip (*Carcharhinus longimanus*) sharks. Coastal-pelagic species are intermediate in that they occur both inshore and beyond the continental shelves, but have not demonstrated mid-ocean or transoceanic movements. Sandbar sharks are examples of a coastal-pelagic species. Deep-dwelling species, *e.g*., most cat sharks (*Apristurus* spp.) and gulper sharks (*Centrophorus* spp.) inhabit the dark, cold waters of the continental slopes and deeper waters of the ocean basins.

Seventy-three species of sharks are known to inhabit the waters along the U.S. Atlantic coast, including the Gulf of Mexico and the waters around Puerto Rico and the U.S. Virgin Islands. Thirty-nine species are managed by HMS; spiny dogfish also occur along the U.S. coast,

however management for this species is under the authority of the ASMFC as well as the New England and Mid-Atlantic Fishery Management Councils. Deep-water sharks were removed from the management unit in 2003. Based on the ecology and fishery dynamics, the sharks have previously been divided into four species groups for management: (1) LCS, (2) SCS, (3) pelagic sharks, and (4) prohibited species (Table 3.3).

Table 3.3 Common names of shark species included within the four species management units under Amendment 2 to the Consolidated HMS FMP.

Management Unit	Shark Species Included
LCS (11)	Sandbar, silky, tiger, blacktip, bull, spinner, lemon, nurse, smooth hammerhead, scalloped hammerhead, and great hammerhead sharks
SCS (4)	Atlantic sharpnose, blacknose, finetooth, and bonnethead sharks
Pelagic Sharks (5)	Shortfin mako, thresher, oceanic whitetip, porbeagle, and blue sharks
Prohibited Species (19)	Whale, basking, sand tiger, bigeye sandtiger, white, dusky, night, bignose, Galapagos, Caribbean reef, narrowtooth, longfin mako, bigeye thresher, sevengill, sixgill, bigeye sixgill, Caribbean sharpnose, smalltail, and Atlantic angel sharks

3.2.1.2 Stock Status and Outlook

NMFS is responsible for conducting stock assessments for the LCS and SCS complexes (Cortés, 2002; Cortés *et al*., 2002). ICCAT and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) have recently conducted assessments of three pelagic shark species. Stock assessments were conducted for the LCS complex, sandbar sharks, and blacktip sharks in 2006 (NMFS, 2006b), and the SCS stock assessment was finalized during the summer of 2007 (NMFS, 2007a), which also assessed finetooth, Atlantic sharpnose, blacknose (*Carcharhinus acronotus*), and bonnethead sharks (*Sphyrna tiburo*) separately. NMFS also recently released a stock assessment for dusky sharks (May 25, 2006, 71 FR 30123) (Cortés *et al*., 2006). The last species-specific assessments for blacktip and sandbar sharks within the LCS complex and finetooth sharks, Atlantic sharpnose sharks, blacknose sharks, and bonnethead sharks within the SCS complex, were conducted in 2002. The conclusions of these assessments were fully described in Amendment 1 to the 1999 Atlantic Tunas, Swordfish, and Sharks FMP. Summaries of recent stock assessments and reports on several species of pelagic sharks (blue sharks, shortfin mako sharks, and porbeagle sharks (*Lamna nasus*) by COSEWIC and ICCAT are also included in this section.

A number of new shark stock assessments were conducted in 2005 and 2006 (see descriptions below) (Gibson and Campana, 2005; Cortés *et al*., 2006; NMFS, 2006b). These assessments have been deemed the best available science and are the basis for the new management measures proposed in this amendment. Based on those assessments, NMFS has determined that sandbar, dusky, and porbeagle sharks are overfished; sandbar and dusky sharks have overfishing occurring; the status of the Atlantic blacktip shark population and the LCS complex is unknown; and the Gulf of Mexico blacktip shark population is healthy (November 7,

2006, 71 FR 65086). Based on the 2005 and 2006 stock assessments and these stock status determinations, NMFS has developed new management measures in this amendment to rebuild sandbar, dusky, and porbeagle sharks while providing an opportunity for the sustainable harvest of blacktip sharks in the Gulf of Mexico.

3.2.1.3 Large Coastal Sharks

The 2005/2006 stock assessment for LCS follows the Southeast Data, Assessment, and Review (SEDAR) process. This process is a cooperative program designed to improve the quality and reliability of the stock assessments. The SEDAR process emphasizes constituent and stakeholder participation in the assessment development, transparency in the assessment process, and a rigorous and independent scientific review of the completed stock assessment. The Data Workshop for the stock assessment, which documented, analyzed, reviewed, and compiled the data for conducting the assessment, was held from October 31 to November 4, 2005, in Panama City, FL (September 15, 2005, 70 FR 54537; correction October 5, 2005, 70 FR 58190). The Assessment Workshop, which developed and refined the population analyses and parameter estimates, was held from February 6 to February 10, 2006, in Miami, FL (December 22, 2005, 70 FR 76031). At the Review Workshop held on June 5 to June 9, 2006, in Panama City, FL (March 9, 2006, 71 FR 12185), independent scientists reviewed the assessment and data.

The latest 2005/2006 stock assessments for LCS in the Gulf of Mexico and Atlantic Ocean were recently completed (July 24, 2006, 71 FR 41774). Unlike past assessments, the 2005/2006 LCS stock assessment determined that it is inappropriate to assess the LCS complex as a whole due to the variation in life history parameters, different intrinsic rates of increase, and different catch and abundance data for all species included in the LCS complex. Based on these results, NMFS changed the status of the LCS complex from overfished to unknown and is continuing to examine viable options to assess shark populations (November 7, 2006; 71 FR 65086).

Sandbar Sharks

According to 2005/2006 sandbar shark stock assessment, sandbar sharks (*Carcharhinus plumbeus*) are overfished ($SSF_{2004}/SSF_{MSY} = 0.72$; SSF is spawning stock fecundity and was used a proxy for biomass), and overfishing is occurring ($F_{2004} / F_{MSY} = 3.72$). The assessment recommends that rebuilding could be achieved with 70 percent probability by 2070 with a total allowable catch across all fisheries of 220 metric tons (mt) whole weight (ww) each year and fishing pressure (F) between 0.0009 and 0.011.

Blacktip Sharks

The 2005/2006 stock assessment assessed blacktip sharks for the first time as two separate populations: Gulf of Mexico and Atlantic. The results indicate that the Gulf of Mexico stock is not overfished and overfishing is not taking place (November 7, 2006, 71 FR 65086), but the assessment Panel did not accept the absolute estimates of the stock status. The three abundance indices believed to be most representative of the stock were consistent with each other, suggesting that stock abundance has been increasing over a period of declining catch during the past 10 years. Based on life history characteristics, blacktip sharks are a relatively

productive shark species, and a combination of these characteristics and recent increases in the most representative abundance indices, suggested that the blacktip stock is relatively healthy. There was no scientific basis, however, to advise an increase in catch.

This assessment also indicated that the current status of the blacktip shark population in the South Atlantic region is unknown. The assessment scientists were unable to provide estimates of stock status or reliable population projections, but indicated that current catch levels should not change. NMFS has declared the status of the South Atlantic blacktip shark population to be unknown (November 7, 2006, 71 FR 65086).

Dusky Sharks

The first dusky-specific shark assessment was released on May 25, 2006 (71 FR 30123) (Cortés *et al.*, 2006). The 2006 dusky shark stock assessment used data through 2003 and indicates that dusky sharks (*Carcharhinus obscurus*) are overfished (B_{2003}/B_{MSY} = 0.15 – 0.47) with overfishing occurring (F_{2004}/F_{MSY} = 1.68 – 1,810). The assessment recommends that rebuilding for dusky sharks could require 100 to 400 years. Based on these results, NMFS declared the status of dusky sharks as overfished with overfishing occurring (November 7, 2006, 71 FR 65086).

3.2.1.4 Small Coastal Sharks

In 2007 a stock assessment for SCS following the SEDAR process was completed on November 13, 2007 (72 FR 63888). The SCS Data Workshop was held February 5-9, 2007 (December 7, 2006, 71 FR 70965). The SCS Assessment workshop was held May 7-11, 2007 (April 19, 2007, 72 FR 19701), and the SCS Review workshop was held on August 6-10, 2007 (July 19, 2007, 72 FR 39606). All workshops were held at the Bay Point Marriott Resort in Panama City, Florida. The assessment reviewed data and models for the SCS complex and for each individual within the SCS complex, as per recommendations in previous assessments. This allowed individual analyses, discussions, and stock status determinations for five separate assessments: 1) SCS complex, 2) Atlantic sharpnose shark, 3) bonnethead shark, 4) blacknose shark, and 5) finetooth sharks. These assessments are included in one report as many of the indices, data, and issues overlap among assessments. The results of the assessment are shown in Table 3.4. The Review Panel found that the data and methods used were appropriate and the best available. The Review Panel also endorsed recommendations for future research contained in the Data Assessment workshop reports, added additional recommendations, and provided comments on the SEDAR process to consider in the future. Based on this assessment, NMFS is currently making stock status determination for the SCS complex and individual species that make up the complex. NMFS would take additional management actions, as necessary, based on those determinations.

The last assessment for SCS occurred in 2002. This was the first assessment since 1992, and as such, the assessment included new information regarding SCS age and growth, reproduction, and population dynamics. Additional information relative to commercial and recreational catches as well as extended bycatch estimates for the shrimp trawl fishery was also considered.

Trends in catch were analyzed for the SCS complex as well as the four species comprising this aggregate grouping. Overall, SCS commercial landings exceeded recreational harvest in all years since 1996, with the exception of 2000. Of the four species of SCS analyzed, bonnetheads contributed to over 50 percent of all SCS commercial landings in 1995, but Atlantic sharpnose and finetooth sharks each accounted for over 30 percent of the commercial landings in years 1996 – 1999 and 1998 – 2000 respectively. Atlantic sharpnose dominated recreational catch in all years between 1995 and 2000.

Also, in 2002 researchers at the Mote Marine Laboratory and the University of Florida, conducted a stock assessment for SCS using similar data but different models. The results were similar to the NMFS assessment in that current biomass levels for Atlantic sharpnose, bonnethead, and blacknose were at least 69 percent of the biomass in 1972 while the current biomass level for finetooth sharks was only nine percent the level in 1972 (Simpfendorfer and Burgess, 2002). Both stock assessments note that the data used for finetooth sharks is not as high a quality as the data used for Atlantic sharpnose due to shorter catch-per-unit-effort (CPUE) and catch series, lack of bycatch estimates, and no catches reported in some years.

Table 3.4 Summary Table of Biomass and Fishing Mortality for Small Coastal Sharks (SCS). Source: SEDAR 13 Julie Neer, pers. comm. Age-structured SPASM models were used for bonnethead, Atlantic sharpnose, and blacknose sharks. Surplus-production BSP models were used for the SCS complex and finetooth sharks.

Species	Current Relative Biomass Level	Current Biomass N_{2005}	Stock Abundance N_{MSY}	Minimum Stock Size Threshold (MSST)	Current Relative Fishing Mortality Rate (F_{2005}/F_{MSY})	Maximum Fishing Mortality Threshold (F_{MSY})
Small Coastal Sharks (SCS)	1.69 (N_{2005}/N_{MSY})	5.16E+07	2.98E+07	2.1E+07	0.25	0.09
Bonnethead Sharks	1.13 (SSF_{2005}/SSF_{MSY})	1.59E+06	1.92E+06	1.4E+06	0.61	0.31
Atlantic Sharpnose Sharks	1.47 (SSF_{2005}/SSF_{MSY})	5.96E+06	4.45E+06	4.09E+06	0.74	0.19
Blacknose Sharks	0.48 (SSF_{2005}/SSF_{MSY})	3.49E+05	5.7E+05	4.3E+05	3.77	0.07
Finetooth Sharks	1.80 (N_{2005}/N_{MSY})	6.00E+06	3.20E+06	2.4E+06	0.17	0.03

3.2.1.5 Pelagic Sharks

Pelagic sharks are subject to exploitation by many different nations and exhibit trans-oceanic migration patterns. As a result, ICCAT's SCRS Subcommittee on Bycatch has recommended that ICCAT take the lead in conducting stock assessments for pelagic sharks.

An ICCAT meeting was held in September 2001 to review available statistics for Atlantic and Mediterranean pelagic sharks. Newly available biological and fishery information presented for review included age and growth, length/weight relationships, species identification, species composition of catch, catch per unit effort, mortality (both natural and fishing estimates for blue sharks), bycatch, and tagging and migration studies. Landings estimates, which incorporated data for both the Atlantic and Mediterranean populations of blue shark, suggested that landings declined in 2000 (3,652 mt) following a peak of 32,654 mt in 1999. Landings of porbeagles peaked in 1997, with an estimated total of 1,450 mt, and have slowly declined each year since that time period (1998 – 2000). Similarly, landing estimates for shortfin mako also peaked in 1997 (5,057 mt) and have declined by 83 percent (863 mt in 2000) since that time. Meeting participants expressed concern regarding the lack of information pertaining to the number of fleets catching sharks, landing statistics, and dead discards for sharks.

The SCRS decided to conduct an assessment of Atlantic pelagic sharks beginning in 2004. Emphasis was placed on blue sharks and shortfin mako sharks. Several models such as non-equilibrium production and statistical age/length-structured models were considered to analyze the population dynamics of pelagic shark species. The SCRS plans to conduct another assessment of Atlantic pelagic sharks in 2008. All SCRS stock assessments can be found at http://www.iccat.es/assess.htm.

ICCAT Stock Assessment on Blue and Shortfin Mako Sharks

At the 2004 Inter-Sessional Meeting of the ICCAT Subcommittee on bycatch, stock assessments for Atlantic blue shark and shortfin mako were conducted. This work included a review of their biology, a description of the fisheries, analyses of the state of the stocks and outlook, analyses of the effects of current regulations, and recommendations for statistics and research. The assessment indicated that the current biomass of North and South Atlantic blue shark seems to be above MSY ($B>B_{MSY}$), however, these results are conditional and based on assumptions that were made by the committee. These assumptions indicate that blue sharks are not currently overfished, however, this conclusion is conditional and based on limited landings data. The committee estimates that between 82,000 and 114,000 mt ww (180,779,054 – 251,326,978 lb) of blue shark are harvested from the Atlantic Ocean each year.

The North Atlantic shortfin mako population has experienced some level of stock depletion as suggested by the historical CPUE trend and model outputs. The current stock may be below MSY ($B<B_{MSY}$), suggesting that the species may be overfished. Overfishing may also be occurring as between 13,000 and 18,000 mt ww (28,660,094 – 39,683,207 lb) of shortfin mako are harvested in the Atlantic Ocean annually. South Atlantic stocks of shortfin mako shark are likely fully exploited as well, but depletion rates are less severe than in the North Atlantic.

The results of both of these assessments should be considered preliminary in nature due to limitations on quality and quantity of catch data available (SCRS, 2004a). The subcommittee stated that catch data currently being reported to ICCAT does not represent the total catch actually landed, and are very limited with regard to size, age, and sex of shark harvested or caught incidentally. In order to attain a more accurate estimate of total landings, and improve future stock assessments, the committee made several recommendations, including: increase the infrastructure investment for monitoring the overall catch composition of sharks, standardize catch-per-unit-effort (CPUE) from major fishing fleets, expand use of trade statistics (fins) to extend historical time series, and include scientists from all Contracting Parties with significant blue and shortfin mako catches in future assessments (SCRS, 2004a). ICCAT is holding pelagic shark (blue and shortfin mako) assessments in fall 2008.

COSEWIC Stock Assessment on Porbeagle

COSEWIC conducted a species report and assessment for porbeagle in 2004 (COSEWIC, 2004). They suggest that significant declines in porbeagle abundance have occurred as a result of overexploitation in fisheries. In May 2004, the COSEWIC recommended to the Canadian Minister of Fisheries that porbeagles be listed as endangered under the Species at Risk Act (SARA). In 2006, the Canadian government decided not to list the porbeagle shark under SARA due to the economic impact of a listing, both on the commercial fishing industry and on the government who would have to expend over $50,000 annually in monitoring funds (Canada Gazette 2006; http://canadagazette.gc.ca/partII/2006/20060906/html/si110-e.html).

The Canadian Department of Fisheries and Oceans has conducted stock assessments on porbeagle sharks in 1999, 2001, 2003, and 2005. Reduced Canadian porbeagle quotas in 2002 brought the 2004 exploitation rate to a sustainable level. According to the 2005 recovery assessment report conducted by Canada (Canadian Science Advisory Secretariat, 2005), the

North Atlantic porbeagle stock has a 70 percent probability of recovery in approximately 100 years if F is less than or equal to 0.04. To date, the United States has not conducted a stock assessment on porbeagle sharks. NMFS has reviewed the Canadian stock assessment and deems it to be the best available science and appropriate to use for U.S. domestic management purposes (NMFS, 2006c). The Canadian assessment indicates that porbeagle sharks are overfished (SSN_{2004}/SSN_{MSY} = 0.15 – 0.32; SSN is spawning stock number and used as a proxy for biomass) (Gibson and Campana, 2005). However, the Canadian assessment indicates that overfishing is not occurring (F_{2004}/F_{MSY} = 0.83) (Gibson and Campana, 2005). Based on these results, NMFS declared the status of porbeagle sharks as overfished, but overfishing is not occurring (71 FR 65086).

3.2.1.6 Effects of Regulations

Atlantic sharks have been managed by NMFS since the 1993 FMP for Atlantic Sharks. The 1999 FMP for Atlantic Tunas, Swordfish, and Sharks addressed numerous shark management measures, including: reducing commercial LCS and SCS quotas; establishing a commercial quota for blue sharks and a species-specific quota for porbeagle sharks; expanding the list of prohibited shark species; implementing a LAP system in commercial fisheries; and establishing season-specific over- and under-harvest adjustment procedures. The 1999 FMP also partitioned the LCS complex into ridgeback and non-ridgeback categories but did not include regional quota measures. Due to litigation, many management measures in the 1999 FMP were not implemented.

The regulations governing the recreational and commercial shark fisheries allow opportunities for participants to pursue sharks for leisure, subsistence, and/or commercial gain while maintaining compliance with statutes that include, but are not limited to, the Magnuson-Stevens Act, Endangered Species Act (ESA), Marine Mammal Protection Act (MMPA), and the National Environmental Policy Act (NEPA). These regulations seek to minimize bycatch of non-target, prohibited shark species, and protected resources by a variety of measures, including, but not limited to: mandating the use of corrodible, non-stainless steel hooks; requiring possession of handling and release equipment for protected resources; conducting gillnet checks every two hours; mandatory observer coverage for commercial fisheries (if selected); limits on the deployment and operation of authorized gears; and, maintaining 19 species of shark on the prohibited species list (possession not authorized). Rebuilding overfished stocks is another objective of shark fishery regulations, and is accomplished through numerous measures, including, but not limited to: regional and trimester fishing quotas based on MSY; regional and trimester fishing seasons; commercial trip limits (4,000 lbs dw for LCS); recreational bag limits (1 shark/vessel/day for all authorized species except Atlantic sharpnose and bonnethead sharks (1 shark/person/day); and, recreational minimum size limits (>54" FL for all authorized species except Atlantic sharpnose and bonnethead sharks). Controlling fishing effort is accomplished by the requirement to possess a LAP for commercial shark fisheries and upgrading restrictions for transferred permits. Reducing fishing mortality of prohibited dusky sharks and juvenile sandbar sharks is achieved by the Mid-Atlantic time area closure (January 1 – July 31) and the requirement to use VMS when BLL gear is onboard during this time period.

The final rule implementing Amendment 1 to the 1999 FMP was published in the Federal Register on December 23, 2003. This final rule revised the shark regulations based on the results

of the 2002 stock assessments for SCS and LCS. Results of these stock assessments indicate the SCS complex is not overfished (*e.g.*, depleted in abundance) and overfishing is not occurring; the LCS complex continues to be overfished, and overfishing is occurring; sandbar sharks are not overfished, but overfishing is occurring; blacktip shark stocks are rebuilt and healthy; and finetooth sharks are not overfished, but overfishing is occurring. In Amendment 1 to the 1999 FMP, NMFS revised the rebuilding timeframe for LCS to 26 years from 2004, and implemented several new regulatory changes. Management measures enacted in the amendment included: re-aggregating the LCS complex; using MSY as a basis for setting commercial quotas; eliminating the commercial minimum size restrictions; implementing a commercial trip limit for LCS and SCS; implementing trimester commercial fishing seasons effective January 1, 2005; imposing gear restrictions to reduce bycatch; implementing a time/area closure off the coast of North Carolina effective January 1, 2005; and establishing three regional commercial quotas (Gulf of Mexico, South Atlantic, and North Atlantic) for LCS and SCS management units. For more detail on the management history surrounding shark regulations see Section 3.1.

As a result of using the MSY as a basis for setting quotas and implementing a new rebuilding plan, the overall quota for LCS in later years, such as 2004, of 1,017 metric tons (mt) dressed weight (dw) (2.24 million lbs dw) was lower than both the 2002 LCS quota of 1,285 mt dw (2.83 million lbs dw) and the 2003 LCS quota of 1,714 mt dw (3.78 million lbs dw). The annual SCS quota is 454 mt dw per year. The annual quotas for pelagic sharks are 273 mt dw for blue sharks, 92 mt dw for porbeagle sharks, and 488 mt dw for pelagic sharks other than porbeagle and blue sharks.

Shark landings are monitored for adherence to regional and trimester quotas by requiring the submission of shark dealer landings reports every two weeks. Fishermen must also submit trip reports describing target and incidental landings within seven days of offloading. These data are used for stock assessments. Regulations are subject to change based on stock assessments, international obligations, litigation, and public sentiment. An updated LCS stock assessment became available in 2006 and data workshops for an updated SCS stock assessment began in early 2007. Domestic management measures affecting the U.S. shark fishery are constantly being evaluated for their effectiveness; furthermore, the United States is taking steps to improve the conservation and management of pelagic sharks within international fora, including ICCAT.

At the 2004 ICCAT annual meeting in New Orleans, ICCAT adopted *Recommendation 04-10 Concerning the Conservation of Sharks Caught in Association with Fisheries Managed by ICCAT*. This was the first binding measure passed by ICCAT dealing specifically with sharks. This recommendation includes, among other measures: reporting of shark catch data by Contracting Parties, a ban on shark finning, a request for Contracting Parties to live-release sharks that are caught incidentally, a review of management alternatives from the 2004 assessment on blue and shortfin mako sharks, and a commitment to conduct another stock assessment of selected pelagic shark species no later than 2007. In 2005, additional measures pertaining to pelagic sharks were added to the 2004 ICCAT recommendation. Measures included a requirement for Contracting Parties that have not yet implemented the 2004 recommendation, to reduce shortfin mako mortality, and annually report on their efforts to the Commission.

At the 2007 ICCAT annual meeting in Antalya, Turkey, ICCAT adopted a recommendation (07-06) concerning pelagic sharks. The new operative paragraphs call for SCRS to conduct stock assessments and recommend management alternatives for porbeagle sharks (*Lamna nasus*), take appropriate measures to reduce fishing mortality in porbeagles (*Lamna nasus*) and North Atlantic shortfin mako sharks (*Isurus oxyrinchus*), and implement research on pelagic shark species caught in the Convention area in order to identify potential nursery areas. It also requires that Contracting Parties, Cooperating non-Contracting Parties, Entities and Fishing Entities submit Task I and II data for sharks in advance of the next SCRS assessment.

3.2.1.7 Recent and Ongoing Research

Northeast Fisheries Science Center (NEFSC)

Fishery Independent Survey for Coastal Sharks

The biannual fishery-independent survey of Atlantic LCS and SCS in U.S. waters from Florida to Delaware was conducted from April 19 to June 1, 2004. The goals of this survey were to: (1) monitor the species composition, distribution, and abundance of sharks in the coastal Atlantic; (2) tag sharks for migration studies; (3) collect biological samples for age and growth, feeding ecology, and reproductive studies; (4) tag sharks whenever feasible for age validation studies; and (5) collect morphometric data for other studies. Results from the 2004 survey included 557 sharks representing eight species caught on 69 longline sets. The time series of abundance indices from this survey are critical to the evaluation of coastal Atlantic shark species.

Age and Growth of Coastal and Pelagic Sharks

A comprehensive aging and validation study for the shortfin mako continued in conjunction with scientists at Moss Landing Marine Laboratories, California, using bomb carbon techniques. Additional validation studies were begun on the sandbar shark, dusky shark, tiger shark, and white shark (*Carcharodon carcharias*). Age and growth studies on the tiger shark (with scientists at the University of New Hampshire), thresher shark (*Alopias vulpinus*, with scientists at the University of Rhode Island), night shark (*Carcharhinus signatus*, with NMFS scientists at the SEFSC Panama City Laboratory), and bull shark (with scientists with the Florida Division of Natural Resources) are under way. Collection, processing, photographing, and reading of samples are in various stages for these species, including intercalibration of techniques, criteria, and band readings. This intercalibration process involves sharing samples and comparing counts between researchers, including a researcher from the Natal Sharks Board, South Africa, for joint work on shortfin mako, blue, and basking shark band periodicity. Collections of vertebrae took place at tournaments and on the biannual research cruise, with 285 sharks injected with oxytetracycline for validation. Night and dusky sharks were prepared with gross sectioning to determine the best method for reading, and all processing was initiated using histology. Readings were completed on the thresher and tiger sharks toward intercalibration to generate bias graphs. Vertebrae, length-frequency data, and tag/recapture data collected from 1962 to present are being analyzed on each of these species to obtain growth parameters.

Using the standard age and growth techniques, the Narragansett Laboratory is currently processing samples from mako and thresher sharks obtained from sportfishing tournaments, research cruises, and from cooperating scientists and commercial fishermen in the Northeast. Additionally, a comprehensive validation study using bomb carbon techniques is being undertaken in cooperation with Dr. Greg Cailliet, Lisa Kerr, and graduate student Daniele Ardizzone of the Moss Landing Marine Laboratories. This study will attempt to validate the periodicity of band formation in the shortfin mako for both the Atlantic and Pacific Oceans, and perhaps elsewhere in the world.

Biology of the Thresher Shark

Life history studies of the thresher shark (*Alopias vulpinus*) continue. Reproductive organs from over 200 thresher sharks, ranging in size from 62 to 263 cm fork length (FL), caught in the western North Atlantic Ocean are being examined to determine size at maturity and reproductive cycle. Preliminary evidence indicates that maturity in males is best indicated by an inflection in the relationship of clasper length to fork length when combined with clasper calcification. In females, all reproductive organ measurements related to body length show a strong inflection around the size of maturity. As in other lamnids, young are nourished through oophagy. Histological processing of a variety of reproductive organs is currently underway and will provide more detailed information on reproductive condition.

Biology of the Porbeagle Shark

A cooperative U.S.–Canada research program continued on the life history of the porbeagle shark (*Lamna nasus*), with preliminary analysis of porbeagle tagging and recapture data using information from U.S., Canadian, and Norwegian sources.

Collection of Recreational Shark Fishing Data and Samples

Biological samples for age and growth, feeding ecology, and reproductive studies and catch data for pelagic sharks were collected at recreational fishing tournaments in the Northeast. Analysis of these tournament landings data was initiated by creating a database of historic information (1961–2004) and producing preliminary summaries of one long-term tournament. The collection and analysis of these data are critical for input into species- and age-specific population and demographic models for shark management.

Essential Fish Habitat and Shark Identification Updates

Through the cooperation of NMFS staff in the HMS Management Division and the Northeast Fisheries Science Center, updates of EFH maps began for shark using information from observer and tagging databases. In addition, a guide was published to aid in identification of sharks and other HMS.

Cooperative Shark Tagging Program (CSTP)

The CSTP — involving over 6,500 volunteer recreational and commercial fishermen, scientists, and fisheries observers since 1962—continued to tag large coastal and pelagic sharks and provide information to define EFH for shark species in U.S. Atlantic and Gulf of Mexico

waters. Research is being conducted on shortfin mako migration patterns and survival rates using CSTP mark-recapture data and satellite tags with movements correlated with Advanced Very High Resolution Radiometer (AVHRR) sea surface temperature data. Data from tagging programs, such as the NMFS CSTP, provide valuable information on migration and the extent of fish movements. The need for international cooperation in such work is underscored by the fact that many shark species have wide ranging distributions, frequently traverse national boundaries, and are exploited by multinational fisheries. The CSTP is also an important means to increase biological understanding of sharks and to obtain information for rational resource management. The tagging of sharks (and other aquatic animals) provides information on stock identity, movements and migration (including rates and routes), abundance, age and growth (including verification/validation of age-determination methods), mortality, and behavior.

Atlantic Blue Shark Life History and Assessment Studies

A collaborative program to examine the biology and population dynamics of the blue shark in the North Atlantic is ongoing. Research on the food and feeding ecology of the blue shark is being conducted cooperatively with University of Rhode Island staff with additional samples collected and a manuscript under revision. A detailed reexamination of the reproductive parameters of the blue shark continued with collection of additional biological samples to determine if any changes have occurred since the 1970s. A manuscript on blue shark stock structure based on tagging data was completed, detailing size composition and movements between Atlantic regions. In addition, research focused on the population dynamics in the North Atlantic with the objectives of constructing a time series of blue shark catch rates (CPUE) from research surveys, estimation of blue shark migration and survival rates, and the development of an integrated tagging and population dynamics model for the North Atlantic for use in stock assessment continued in collaboration with scientists at the School of Aquatic and Fishery Sciences, University of Washington. Progress, to date, includes the preliminary recovery of historical research survey catch data, size composition, and biological sampling data on pelagic sharks and preliminary analysis of survival and movement rates for blue sharks based on tag and release data from the NMFS CSTP. Preparation of standardized catch rate and size composition data compatible with PLL observer data continued with a resulting ICCAT submission. As part of this comprehensive program, cooperative research continued with the Irish Marine Institute and Central Fisheries Board on mark-recapture databases, including coordination of formats and programs with the NMFS CSTP for joint data analyses.

Atlantic Shortfin Mako Life History and Assessment Studies

A collaborative program with students and scientists at the University of Rhode Island to examine the biology and population dynamics of the shortfin mako in the North Atlantic was continued. Ongoing research included an update on age and growth and reproductive parameters and an examination of the predator–prey relationships between the shortfin mako and its primary prey, the bluefish (*Pomatomus saltatrix*). A manuscript was completed comparing contemporary and historic levels of bluefish predation.

Currently, 290 shortfin mako shark samples are being reprocessed and new counts generated using the standard Age and Growth techniques of the Narragansett Laboratory. To date, the total number of sharks sampled is 188, and 118 of these sharks had prey in their

stomachs. The Narrgansett laboratory counted 235 prey items, 168 of which were bluefish. Some of the other prey items included mackerel, menhaden, tuna, triggerfish, and both long and short finned squid. In stomachs containing bluefish, 1 or 2 prey fish was the most common. In the first year of this study, bluefish made up 94.1 percent of the overall diet of inshore sharks by volume, compared to previous studies 20 years ago where bluefish made up 85 percent of the weight. Although this comparison is preliminary, it could elude to increased predation by makos on bluefish compared to 20 years ago.

Two shortfin mako sharks were tagged with pop-up archival transmitting tags off Martha's Vineyard and had moved south off the Delaware coastline when the transmitters popped up and began transmitting data. These data represent the first long-term and detailed record of the movements of mako sharks in the Atlantic. Currently, three more transmitters are scheduled to be deployed on mako sharks.

Blacktip Shark Migrations

Analysis is ongoing of movements of the blacktip shark (*Carcharhinus limbatus*) in the western North Atlantic and Gulf of Mexico based on release and re-capture data, with the examination of general migration patterns and exchange between and within regions of United States and Mexican waters. Release and re-capture data were analyzed for evidence of Atlantic and Gulf of Mexico primary and secondary blacktip nursery grounds.

Cooperative Atlantic States Shark Pupping and Nursery Survey (COASTSPAN)

NEFSC Apex Predators Program staff manage and coordinate this project, using researchers in major coastal Atlantic states from Florida to Delaware to conduct a cooperative, comprehensive, and standardized investigation of valuable shark nursery areas. This research identifies which shark species utilize coastal zones as pupping and nursery grounds, gauges the relative importance of these areas, and determines migration and distribution patterns of neonate and juvenile sharks.

Juvenile Shark Survey for Monitoring and Assessing Delaware Bay Sandbar Sharks

NEFSC staff conducts this part of the COASTSPAN monitoring and assessment project for the juvenile sandbar shark population in the Delaware Bay nursery grounds using monthly longline surveys from June to September each year. A random stratified sampling plan based on depth and geographic location is ongoing to assess and monitor the juvenile sandbar shark population during the nursery season. In addition, the tagging and recapture data from this project are being used to examine the temporal and spatial relative abundance and distribution of sandbar sharks in Delaware Bay.

Habitat Utilization, Food Habits, and Essential Fish Habitat of Delaware Bay Sandbar and Smooth Dogfish Sharks

The food habits portion of the study characterizes the diet, feeding periodicity, and foraging habits of the sandbar shark, and examines the overlap in diet and distribution with the smooth dogfish shark (*Mustelus canis*). Over the past four years over 1,150 sandbar sharks have been sampled, with approximately 55 percent of those sharks containing food. Preliminary

analysis indicates a diet dominated by teleosts, but strong trends in ontogeny are evident. Gastric evacuation data has been collected, but only very preliminary analysis has been conducted. However, gastric evacuation estimates for the digestion of menhaden appear to be shorter than those reported previously.

During this same period, over 350 dogfish stomachs have been sampled with nearly all of them containing food. The diet is composed of predominately crustaceans with some bivalves, annelids, mollusks, and fish. Some ontogeny is evident with bivalves, shrimp, annelids and other small invertebrates of importance to smaller sharks, with more and larger crabs becoming important to large juveniles and adults, which also begin to consume small quantities of fish.

Preliminary work has begun on a dietary and habitat study of smooth dogfish in coastal New England waters. This study will characterize the diet of the species in these waters, especially in relation to predation on large commercially important crustaceans. Habitat, geographic, seasonal, and ontogenetic aspects of the diet will be examined in detail, and related to previous research in other locales. Acquired data will be coupled with environmental data, providing information on preferred habitat. This information is an important contribution toward understanding EFH and provides information necessary for nursery ground management and rebuilding of depleted shark populations.

Ecosystems Modeling

Ecosystem modeling, focusing on the role of sharks as top predators, will be conducted using ECOPATH–ECOSIM models, using the sandbar shark as a model species and examining the ecological interactions between sandbar and smooth dogfish sharks in Delaware Bay.

Overview of Gulf and Atlantic Shark Nurseries

To meet the need for a better understanding of shark nursery habitat in U.S. coastal waters, NEFSC staff are the editors for an American Fisheries Society symposium proceedings volume on U.S. Atlantic and Gulf of Mexico coastal shark nursery ground and habitat studies. A compilation of these papers was published in McCandlesss, C.T., N.E. Kohler, and H.L. Pratt, Jr., editors. 2007. Shark Nursery Grounds of the Gulf of Mexico and the East Coast of the United States. American Fisheries Society, Symposium 50, Bethesda, Maryland.

Other Shark Research

Aires-Da-Silva, A. M., & Gallucci, V. F. (2007). Demographic and risk analyses applied to management and conservation of the blue shark (*Prionace glauca*) in the North Atlantic Ocean. *Marine & Freshwater Research, 58*(6) 570-580.

Babcock, E. A., McAllister, M. K., & Pikitch, E. K. (2007). Comparison of harvest control policies for rebuilding overfished populations within a fixed rebuilding time frame. *North American Journal of Fisheries Management, 27*(4) 1326-1342.

Benz, G. W., Hoffmayer, E. R., Driggers, W. B., Allen, D., Bishop, L. E., & Brown, D. A. (2007). First record of a sleeper shark in the western Gulf of Mexico and comments on

taxonomic uncertainty within *Somniosus* (Somniosus). *Bulletin of Marine Science, 80*(2) 343-351.

Castro, A. L. F., Stewart, B. S., Wilson, S. G., Hueter, R. E., Meekan, M. G., & Motta, P. J. (2007). Population genetic structure of earth's largest fish, the whale shark (*Rhincodon typus*). *Molecular ecology, 16*(24) 5183-5192.

Cavalcanti, M. J. (2007). A phylogenetic supertree of the hammerhead sharks (Carcharhiniformes: Sphyrnidae). *Zoological Studies, 46*(1) 6-11.

Chapman, D. D., Pikitch, E. K., Babcock, E. A., & Shivji, M. S. (2007). Deep-diving and diel changes in vertical habitat use by Caribbean reef sharks *Carcharhinus perezi*. *Marine Ecology Progress Series, 344* 271-275.

Chapman, D. D., Shivji, M. S., Louis, E., Sommer, J., Fletcher, H., & Prodoehl, P. A. (2007). Virgin birth in a hammerhead shark. *Biology Letters, 3*(4) 425-427.

Conrath, C. L., & Musick, J. A. (2007). The sandbar shark summer nursery within bays and lagoons of the eastern shore of Virginia. *Transactions of the American Fisheries Society, 136*(4) 999-1007.

Conrath, C. L., & Musick, J. A. (2007). Investigations into depth and temperature habitat utilization and overwintering grounds of juvenile sandbar sharks, *Carcharhinus plumbeus*: the importance of near shore North Carolina waters. *Environmental Biology of Fishes*, in press.

Cortés, E. (2007) Chondrichthyan demographic modelling: an essay on its use, abuse and future. *Marine and Freshwater Research,* 58, 4–6.

Cortés, E., Brown, C. A., & Beerkircher, L. R. (2007). Relative abundance of pelagic sharks in the western North Atlantic Ocean, including the Gulf of Mexico and Caribbean Sea. *Gulf and Caribbean Research, 19*(2) 37-52.

Dibattista, J. D., Feldheim, K. A., Gruber, S. H., & Hendry, A. P. (2007). When bigger is not better: Selection against large size, high condition and fast growth in juvenile lemon sharks. *Journal of Evolutionary Biology, 20*(1) 201-212.

Edwards, R. G. (2007). The significance of parthenogenetic virgin mothers in bonnethead sharks and mice. *Reproductive Biomedicine Online, 15*(1) 12-15.

Ellis, J. K., & Musick, J. A. (2007). Ontogenetic changes in the diet of the sandbar shark, *Carcharhinus plumbeus*, in lower Chesapeake Bay and Virginia (USA) coastal waters. *Environmental Biology of Fishes, 80*(1) 51-67.

Gonzalez-Cano, J., Venegas, R. D. L. P., Ramirez, J. P., Suarez, F. R., & Mendoza, M. T. (2007). Impact of annual aggregations of whale shark (*Rhincodon typus*) on the north and northeast communities of the Yucatan peninsula. *Gulf and Caribbean Research, 19*(2) 175.

Graham, R. T. (2007). Whale sharks of the western Caribbean: An overview of current research and conservation efforts and future needs for effective management of the species. *Gulf and Caribbean Research, 19*(2) 149-159.

Heithaus, M. R., Burkholder, D., Hueter, R. E., Hethaus, L. I., Pratt, H. L., & Carrier, J. C. (2007). Spatial and temporal variation in shark communities of the lower Florida Keys and evidence for historical population declines. *Canadian Journal of Fisheries and Aquatic Sciences, 67*(10) 1302-1313.

Heithaus, M. R., Burkholder, D., Hueter, R. E., Heithaus, L. I., Pratt, H. L.,Jr, & Carrier, J. C. (2007). Spatial and temporal variation in shark communities of the lower Florida Keys and evidence for historical population declines. *Canadian Journal of Fisheries and Aquatic Sciences, 64*(10) 1302-1313.

Heupel, M. R., Carlson, J. K., & Simpfendorfer, C. A. (2007). Shark nursery areas: Concepts, definition, characterization and assumptions. *Marine Ecology Progress Series, 337* 287-297.

Hoffmayer, E. R., Franks, J. S., Driggers, W. B.,III, Oswald, K. J., & Quattro, J. M. (2007). Observations of a feeding aggregation of whale sharks, *Rhincodon typus*, in the north central Gulf of Mexico. *Gulf and Caribbean Research, 19*(2) 69-73.

Hueter, R., De La Parra, R., Tyminski, J., Mendoza, M. T., Simpfendorfer, C., & Cano, J. G. (2007). Biological studies of the whale shark aggregation off Isla Holbox and Isla Contoy, where the Gulf of Mexico meets the Caribbean Sea. *Gulf and Caribbean Research, 19*(2) 167.

Kaplan, I. C., Cox, S. P., & Kitchell, J. F. (2007). Circle hooks for pacific longliners: Not a panacea for marlin and shark bycatch, but part of the solution. *Transactions of the American Fisheries Society, 136*(2) 392-401.

Manire, C. A., Rasmussen, L. E. L., Maruska, K. P., & Tricas, T. C. (2007). Sex, seasonal, and stress-related variations in elasmobranch corticosterone concentrations. *Comparative Biochemistry and Physiology Part A, Molecular & Integrative Physiology, 148*(4) 926-935.

Martin, R. A. (2007). A review of behavioral ecology of whale sharks (*Rhincodon typus*). *Fisheries Research (Amsterdam), 84*(1) 10-16.

Levesque J. C. (2007) International fisheries agreement: Review of the International Commission for the Conservation of Atlantic Tunas. *Marine Policy*, in press.

Magnussen, J. E., Pikitch, E. K., Clarke, S.C., Nicholson, C., Hoelzel, A.R. & Shivji, M. S. (2007) Genetic tracking of basking shark products in international trade. *Animal Conservation* 10, 199–207.

Morgan, A., & Burgess, G. H. (2007). At-vessel fishing mortality for six species of sharks caught in the Northwest Atlantic and Gulf of Mexico. *Gulf and Caribbean Research, 19*(2) 123-129.

Myers, R.A., Baum, J. K., Shepherd, T. D., Powers, S. P., & Peterson, C.H. (2007) Cascading Effects of the Loss of Apex Predatory Sharks from a Coastal Ocean. *Science,* 315, 1846-1850.

Piercy, A. N., Carlson, J. K., Sulikowski, J. A., & Burgess, G. H. (2007). Age and growth of the scalloped hammerhead shark, *Sphyrna lewini*, in the north-west Atlantic Ocean and Gulf of Mexico. *Marine & Freshwater Research, 58*(1) 34-40.

Portnoy, D. S., Piercy, A. N., Musick, J. A., Burgess, G. H., & Graves, J. E. (2007). Genetic polyandry and sexual conflict in the sandbar shark, *Carcharhinus plumbeus*, in the Western North Atlantic and Gulf of Mexico. *Molecular ecology, 16*(1) 187-197.

Seberry, G. R., Meister, H. S., & Loefer, J. K. (2007). First in-situ observation of a frill shark, *Chlamydoselachus anguineus*, and an additional record for the Western North Atlantic. *Journal of the North Carolina Academy of Science, 123*(3) 127-132.

Shepard, E. L. C., Ahmed, M. Z., Southall, E. J., Witt, M. J., Metcalfe, J. D., & Sims, D. W. (2007). Diel and tidal rhythms in diving behavior of pelagic sharks identified by signal processing of archival tagging data. *Marine Ecology Progress Series, 328* 205-213.

Tvares, R., & Arocha, F. (2007). Composition, diversity, and relative abundance of oceanic sharks in the Caribbean sea and adjacent waters. *Gulf and Caribbean Research, 19*(2) 166.

Walker, T. (2007) The state of research on chondrichthyan fishes. *Marine and Freshwater Research*, 58, 1–3.

Wigley S. E., Palmer M. C., Blaylock J., Rago P. J. (2008). A brief description of the discard estimation for the National Bycatch Report. US Department of Commerce, Northeast Fish Science Center. Reference Document 08-02. 35 pp.

Wiley, T. R., & Simpfendorfer, C. A. (2007). Occurrence of *Carcharhinus isodon* (finetooth shark) in Florida Bay. *Southeastern Naturalist, 6*(1) 183-186.

Wiley, T. R., & Simpfendorfer, C. A. (2007). The ecology of elasmobranchs occurring in the Everglades National Park, Florida: Implications for conservation and management. *Bulletin of Marine Science, 80*(1) 171-189.

Southeast Fisheries Science Center (SEFSC)

Stock Assessments of LCS, SCS, and Prohibited Sharks

The 2005/2006 assessment for the LCS Complex was run according to the SEDAR process. The SEDAR 11 Stock Assessment Report (NMFS, 2006b) compiles the new data used in the assessments, the report from the Assessment Workshop, and the final report by the peer reviewers (the Consensus Summary Report). This Stock Assessment Report constitutes the best available science. The overall assessment process involves three meeting workshops: Data, Assessment, and Review. The Data Workshop for the LCS complex was held in Panama City, FL, October 31 through November 4, 2005. Initial data compilations and exploratory analyses for SEDAR assessments were requested from participants in the form of "working documents" to be submitted in advance and evaluated over the course of the workshop. Three working groups were established to address the quality and suitability of available data for stock assessment. The working groups were: 1) life history, 2) catch statistics, and 3) indices of relative abundance. Participants were initially assigned to one of the groups based on their expertise and the type of documents they were submitting; however, participants were allowed to participate in any working group they wished. Group rapporteurs reported issues and progress to Data Workshop plenary sessions several times during the week. Written reports from the life history and catch statistics working groups were substantially complete by week's end, whereas the indices group report was only in the preliminary stages. There was some subsequent editing and further analyses sketched out during the Data Workshop that was completed later. Some additional analyses recommended at the Data Workshop were too extensive to allow completion prior to circulation of the Data Workshop report. These analyses were reported and evaluated at the Assessment Workshop that was held in February 2006, and reviewed at the Review Workshop in June 2006. The results of the assessment were released on July 24, 2006 (71 FR 41774). A stock assessment of dusky shark, a prohibited species and candidate for listing under the ESA, was also almost completed and was to be released on May 25, 2006 (71 FR 30123).

In 2007 a stock assessment for SCS following the SEDAR process was completed on November 13, 2007 (72 FR 63888). The SCS Data Workshop was held February 5-9, 2007. The SCS Assessment workshop was held May 7-11, 2007, and the SCS Review workshop was held on August 6-10, 2007. All workshops were held at the Bay Point Marriott Resort in Panama City, Florida. The assessment reviewed data and models for the SCS complex and for each individual within the SCS complex, as per recommendations in previous assessments. This allowed individual analyses, discussions, and stock status determinations for five separate assessments: 1) SCS complex, 2) Atlantic sharpnose shark, 3) bonnethead shark, 4) blacknose shark, and 5) finetooth sharks. These assessments are included in one report as many of the indices, data, and issues overlap among assessments. The Review Panel found that the data and methods used were appropriate and the best available. The Review Panel also endorsed recommendations for future research contained in the Data Assessment workshop reports, added additional recommendations, and provided comments on the SEDAR process to consider in the future.

Based on this assessment, NMFS is currently making stock status determination for the SCS complex and individual species that make up the complex. NMFS would take additional management actions, as necessary, based on those determinations.

Update on Catches of Atlantic Sharks

An update on catches of large and small coastal and pelagic sharks in U.S. Atlantic, Gulf of Mexico, and Caribbean waters was generated in October 2006 (Cortés and Neer, 2005; LCS05/06-DW-16) and formed the basis of the catch scenarios included in the SEDAR Data Workshop report described above. Time series of commercial and recreational landings and discard estimates from several sources were compiled for the LCS complex and sandbar and blacktip sharks. In addition, recent species-specific commercial and recreational landings were provided for sharks in the large coastal, small coastal, and pelagic groups. Species-specific information on the geographical distribution of commercial landings by gear type and geographical distribution of the recreational catches was also provided. Trends in length-frequency distributions and average weights and lengths of selected species reported from three separate recreational surveys and in the directed shark bottom-longline observer program were also included. Another update on catches of Atlantic sharks was generated in 2007 for the SCS assessment (Cortés and Neer, 2007; SEDAR 13-DW-15). This document presents updated commercial and recreational landings of Atlantic SCS up to 2005. Species-specific information on the geographical distribution of commercial landings and recreational catches is presented along with the different gear types used in the commercial fisheries. Length-frequency information and average weights of the catches in three separate recreational surveys and in the directed shark bottom-longline observer program are also included.

Observer Programs: Shark Longline Program

From 1994 to 2004, the southeastern United States commercial shark BLL fishery was monitored by the University of Florida Commercial Shark Fishery Observer Program. In 2005, the responsibilities of the program were moved to the NOAA Fisheries Service Panama City Laboratory Shark Population Assessment Group in Panama City, FL. This program is designed to meet the intent of the ESA and the FMP for HMS. It was created to obtain better data on catch, bycatch, and discards in the shark BLL fishery. All observers are required to attend a 1-week safety training and species identification course prior to being dispatched to the fishery. While onboard the vessel, the observer records information on gear characteristics and all species caught, condition of the catch (*e.g.*, alive, dead, damaged, or unknown), and the final disposition of the catch (*e.g.*, kept, released, *etc*.). The target coverage level is 3.9 percent of the total fishing effort. This level is estimated to attain a sample size needed to provide estimates of protected resource interaction with an expected coefficient of variation of 0.3.

Observer Programs: Shark Gillnet Program

Since 1993, an observer program has been underway to estimate catch and bycatch in the directed shark gillnet fisheries along the southeastern U.S. Atlantic coast. This program was designed to meet the intent of the MMPA, ESA, and the 1999 revised FMP for HMS. It was also created to obtain better data on catch, bycatch, and discards in the shark fishery. The ALWTRP and the BiOp issued under Section 7 of ESA mandate 100 percent observer coverage during the

right whale calving season (15 November - 1 April). Outside the right whale calving season (1 April - 14 November), observer coverage equivalent to 38 percent of all trips is maintained. Based on June 25, 2007 rule (72 FR 34632) shark gillnet vessels fishing between 29° 00' N and 26° 46.5' N have certain requirements as outlined 50 CFR § 229.32 from December 1 through March 31 of each year. These include vessel operators contacting the SEFSC Panama City Laboratory at least 48 hours prior to departure of a fishing trip in order to arrange for an observer. In addition, a recent rule (October 5, 2007, 72 FR 57104) amends restriction in the Southeast U.S. Monitoring Area from December 1 through March 31. In that area the 100 percent observer coverage has been replaced with VMS requirements found in 50 CFR 635.69. Similar to the shark longline observer program, all observers are required to attend a 1-week safety training and species identification course and while onboard the vessel record information on gear characteristics and all species caught, condition of the catch and the final disposition of the catch.

Ecosystem Modeling: Reconstructing ecosystem dynamics in the Gulf of Mexico. An assessment of the trophic impacts of fishing and its effects on keystone predator dynamics

Keystone species, such as sharks, can play a central role in the structure and function of marine communities. There are conflicting views surrounding the ecological interactions between sharks and fisheries. One view suggests that removals of keystone species are thought to cause a cascading trophic effect within the remaining community. These effects may involve changes in species composition among the prey or changes in the preferred prey of the predator. An alternate view has been suggested that the high diversity of oceanic systems may oppose strong "top-down" effects. In light of the recent revelations on the reductions of higher trophic levels species and fishing down food webs, an improved understanding of the role of keystone predators in the Gulf of Mexico would be useful in evaluating the impacts of fishing on the marine ecosystem. An Ecopath with Ecosim model has been developed to model the Gulf of Mexico ecosystem dynamics (Carlson, 2007). Hypotheses regarding the depletion of apex predators, and their impact on predation mortality of major prey groups were examined. Further, hypotheses regarding the role of complementary niches among sharks were explored.

Elasmobranch Feeding Ecology and Shark Diet Database

Amendment 2 to the Consolidated HMS FMP gives little consideration to ecosystem function because there is little quantitative species-specific data on diet, competition, predator-prey interactions, and habitat requirements of sharks. Therefore, several studies are currently under way describing the diet and foraging ecology, habitat use, and predator–prey interactions of elasmobranchs in various communities. Atlantic angel sharks (*Squatina dumerili*) have been collected for stomach content analysis from a trawl fishery in northeastern Florida since 2004. Evidence suggests angel sharks consumed mostly teleost fishes, with Atlantic croaker (*Micropogonias undulatus*) being the most common fish species (Baremore *et al*., 2006). The diet of the roundel skate *Raja texana* from the northern Gulf of Mexico is also being examined (Bethea and Hale, 2006). A database containing information on quantitative food and feeding studies of sharks conducted around the world has been in development for several years and presently includes over 200 studies. This fully searchable database will continue to be updated and fine-tuned in FY 2007 and will be used as part of a collaborative study with researchers from the University of Washington, University of Wisconsin, and the Inter-American Tropical Tuna

Commission, aimed at characterizing intra-guild predation and cannibalism in pelagic predators and evaluate the implications for the dynamics, assessment and management of Pacific tuna populations.

Cooperative Gulf of Mexico States Shark Pupping and Nursery Survey (Gulfspan)

The SEFSC Panama City Shark Population Assessment Group manages and coordinates a survey of coastal bays and estuaries between northwest Florida (Cedar Key-Pensacola) and Texas. Surveys identify the presence/absence of neonate and juvenile sharks and attempt to quantify the relative importance of each area as it pertains to EFH requirements for sharks. The SEFSC Panama City Shark Population Assessment Group also initiated a juvenile shark abundance index survey in 1996. The index is based on random, depth-stratified gillnet sets conducted throughout coastal bays and estuaries in northwest Florida monthly from April to October. The species targeted for the index of abundance are juvenile sharks in the large and small coastal management groups. This index has been utilized as an input to various stock assessment models.

Essential Fish Habitat

Conventional theory assumes that shark nursery areas are habitats where female sharks give birth to young or lay eggs, or where juvenile sharks spend their first weeks, months, or years of life. The SEFSC Panama City Shark Population Assessment Group is currently testing a number of hypotheses regarding juvenile sharks and EFH that challenge this assumption. There are many bays and inlets along the Gulf of Mexico coastline which may serve as EFH for sharks. These habitats vary from near-oceanic conditions to shallow, enclosed estuarine areas. Following Beck *et al*. (2001), the SEFSC Panama City Shark Population Assessment Group is determining which habitats provide a greater "nursery value" for a given species. A study using diet and bioenergetics published in 2006 by the Panama City Laboratory (Bethea *et al*., 2006) concluded that Crooked Island Sound provided a greater "nursery value" than Apalachicola Bay, FL.

Determining differences in the ratios of fin to carcass weight among sharks

Although many different species are harvested for their fins, the "5 percent rule" was established using data from only sandbar sharks due to a lack of data for other shark species. Using standardized data collated from state and federal databases, additional fin weight ratios were calculated for several commercially valuable shark species from coastal waters of the U.S. Atlantic Ocean and Gulf of Mexico. The wet fin to dressed carcass weight ratio of the sandbar shark (5.3 percent) was the largest of the 14 species examined, while the silky shark exhibited the lowest ratio at 2.5 percent. The fin-to-dressed weight ratio of the sandbar shark was significantly higher than most of the other large coastal species examined, and the bonnethead shark had a fin weight ratio (4.9 percent) significantly higher than other small coastal species examined.

Life History Studies of Elasmobranchs

Biological samples are obtained through research surveys and cruises, recreational fishers, and collection by onboard observers on commercial fishing vessels. Age and growth rates and other life history aspects of selected species are processed and data analyzed following

standard methodology. This information is vital as input to population models incorporating variation and uncertainty in estimates of life-history traits to predict the productivity of the stocks and ensure they are harvested at sustainable levels. Samples are obtained from commercial fishers and fishery-independent surveys. Samples and preliminary analysis continue on determining life history parameters for skates in the Gulf of Mexico, a group of elasmobranchs often ignored despite being harvested as catch and bycatch in commercial fisheries. In 2006, the age and growth parameters of blacktip sharks (Carlson *et al.*, 2006) and scalloped hammerhead shark (Piercy *et al.*, 2007) from the Gulf of Mexico and southeast United States were published. In addition, a study was published on the reproductive cycle of blacknose sharks in the Gulf of Mexico, which concluded that not all carcharhinid sharks exhibit a biennial reproductive cycle (Sulikowski *et al.*, 2007). Along this line, new studies began in 2006 on the reproductive cycle of blacktip sharks in the Gulf of Mexico and sandbar sharks in the Atlantic Ocean.

Elemental chemistry of elasmobranch vertebrae

Although numerous studies have utilized elemental analysis techniques for age determination in bony fishes, little work has been conducted utilizing these procedures to verify age assessments or temporal periodicity of growth band formation in elasmobranchs. A study was completed in 2006 to determine the potential of laser ablation inductively coupled plasma-mass spectrometry (LA-ICP-MS) to provide information on the seasonal deposition of elements in the vertebrae of the round stingray. Spatially resolved time scans for elements across the round stingray vertebrae showed peaks in calcium intensity that aligned with and corresponded to the number of seasonal growth bands identified using standard light microscopy. Higher signals of calcium were associated with the wide opaque bands while lower signals of calcium corresponded to the narrow translucent bands. While a close alignment between the numbers of calcium peaks and annual growth bands was observed in round stingray samples aged five years or younger, this relationship was less well defined in vertebral samples from round stingrays over 11 years old. To the best of our knowledge, this is the first study of its kind to utilize ICP-MS to verify age assessments and seasonal band formation in an elasmobranch. The results of this research were published in 2006 (Hale *et al*., 2006).

Cooperative Research—Habitat Utilization among Coastal Sharks

Through a collaborative effort between the SEFSC Panama City Shark Population Assessment Group and Mote Marine Laboratory, the utilization of coastal habitats by neonate and young-of-the-year blacktip and Atlantic sharpnose sharks will be monitored through an array of underwater acoustic receivers (VR2, Vemco Ltd.) placed throughout each study site. Movement patterns, home ranges, activity space, survival, and length of residence of individuals will be compared by species and area to provide information for better management of critical species and EFH.

Cooperative Research—Definition of Summer Habitats and Migration Patterns for Bull Sharks in the Eastern Gulf of Mexico

A collaborative effort between the SEFSC Panama City Shark Population Assessment Group, University of Florida, and Mote Marine Laboratory is under way to determine summer habitat use and short-term migration patterns of bull sharks. Sharks are being outfitted with pop-

off satellite archival tags (PAT) during July and August and scheduled to deploy in autumn. Preliminary results indicate sharks, while occupying summer habitats, do not travel extensive distances. This project is driven by the lack of data for this species and its current prominence within the Florida coastal community. A better understanding of this species is required to effectively manage this species for both commercial and recreational fishers as well as the general public. Concerns regarding this species will continue to be an issue as fishers and the public demand that state and federal governments provide better information concerning the presence and movements of these sharks.

Shark Assessment Research Surveys

The SEFSC Mississippi Laboratories (MSL) has conducted BLL surveys in the Gulf of Mexico, Caribbean, and Southern North Atlantic since 1995 (21 surveys completed through 2005). The primary objective was assessment of the distribution and abundance of large and SCS across their known ranges to develop a time series for trend analysis. The surveys were designed to satisfy five important assessment principles: stockwide survey, synopticity, well-defined universe, controlling biases, and useful precision. The BLL surveys are the only long-term, nearly stock-wide, fishery-independent surveys of Western North Atlantic Ocean sharks conducted in U.S. and neighboring waters. Ancillary objectives were to collect biological and environmental data, and to tag-and-release sharks. Starting in 1997 and under the auspices of the MEXUS Gulf Program, MSL have provided logistical and technical support to Mexico's Instituto Nacional de la Pesca to conduct a cooperative research cruise aboard both the NOAA Ship OREGON II (1997 and 1998) and the Mexican research vessel Onjuku (2001 and 2002) in Mexican waters of the Gulf of Mexico. The circumference of Cuba was surveyed with the NOAA Ship OREGON II during 1998. One of the most noteworthy changes in the surveys was a shift from the standard "J" hook used in all the earlier surveys to a circle "C" hook (gear testing surveys conducted in 2000), which is much more efficient for capturing teleosts and slightly more efficient for elasmobranchs. Current surveys continue to address expanding fisheries management requirements for both elasmobranchs and teleosts and annual surveys include the U.S. Atlantic coast from Cape Hatteras to southern Florida and the U.S. Gulf of Mexico.

3.3 Habitat

Section 303(a)(7) of the Magnuson-Stevens Act, 16 U.S.C. §§ 1801 *et seq*., requires FMPs to describe and identify EFH, minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of such habitat. The Magnuson-Stevens Act defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity." (16 U.S.C. § 1802 (10)). The EFH regulations (at 50 C.F.R. 600 Subpart J) provide additional interpretation of the definition of EFH:

> "Waters' include aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include aquatic areas historically used by fish where appropriate; 'substrate' includes sediment, hard bottom, structures underlying the waters, and associated biological communities; 'necessary' means the habitat required to support a sustainable fishery and the managed species' contribution to

a healthy ecosystem; and 'spawning, breeding, feeding, or growth to maturity' covers a species' full life cycle."

The EFH regulations require that EFH be described and identified within the U.S. EEZ for all life stages of each species in a fishery management unit. FMPs must describe EFH in text, tables, and figures that provide information on the biological requirements for each life history stage of the species. According to the EFH regulations, an initial inventory of available environmental and fisheries data sources should be undertaken to compile information necessary to describe and identify EFH and to identify major species-specific habitat data gaps. Habitats that satisfy the criteria in the Magnuson-Stevens Act have been identified and described as EFH in the 1999 FMPs and in Amendment 1 to the 1999 Tunas, Swordfish, and Shark FMP and are currently being identified and described as EFH in Amendment 1 to the 2006 Consolidated HMS FMP.

NMFS originally described and identified EFH and related EFH regulatory elements for all HMS in the management unit in the 1999 FMPs, and more recently updated EFH for five shark species (blacktip, sandbar, dusky, nurse, and finetooth sharks) in Amendment 1 to the 1999 Tunas, Swordfish, and Shark FMP, which was implemented in 2003. The EFH regulations further require NMFS to conduct a comprehensive review of all EFH related information at least once every five years and revise or amend the EFH boundaries if warranted. To that effect, NMFS undertook the comprehensive five-year review of information pertaining to EFH for all HMS in the management unit in the 2006 Consolidated HMS FMP. Based on the findings of this review, NMFS issued a Notice of Intent to amend EFH for HMS on November 7, 2006 (71 FR 65087). NMFS may recommend that certain EFH boundaries need to be modified in a subsequent rulemaking. At that time, alternatives for boundary modifications would be proposed. For a complete description of the comprehensive five-year review of all new EFH information see Chapter 10 and Appendix B of the 2006 Consolidated HMS FMP.

3.3.1.1 Habitat Areas of Particular Concern

To further the conservation and enhancement of EFH, the EFH guidelines encourage FMPs to identify Habitat Areas of Particular Concern (HAPCs). HAPCs are areas within EFH that meet one or more of the following criteria: they are ecologically important, particularly vulnerable to degradation, undergoing stress from development, or are a rare habitat type. HAPCs can be used to focus conservation efforts on specific habitat types that are particularly important to managed species. Currently, only one area for sandbar sharks off of North Carolina, Chesapeake Bay, MD, and Great Bay, NJ, has been identified as a HAPC for HMS (1999 FMP). Although no new HAPCs have been identified since the 1999 FMP, and no new HAPCs were proposed in the Consolidated HMS FMP, the information compiled during the review may be used to identify HAPC areas in the EFH Amendment.

3.3.2 Habitat Types and Distributions

Sharks may be found in large expanses of the world's oceans, straddling jurisdictional boundaries. Although many of the species frequent other oceans of the world, the Magnuson-Stevens Act only authorizes the description and identification of EFH in Federal, state or territorial waters, including areas of the U.S. Caribbean, the Gulf of Mexico and the Atlantic

coast of the United States to the seaward limit of the EEZ. For a detailed description of shark coastal and estuarine habitat, continental shelf and slope area habitat, and pelagic habitat for the Atlantic, Gulf of Mexico, and U.S. Caribbean, please refer to section 3.3.2 of the 2006 Consolidated HMS FMP.

3.4 Fishery Data Update

In this section, HMS fishery data are analyzed by gear type. While HMS fishermen generally target particular species, the non-selective nature of most fishing gears promote effective analysis and management on a gear-by-gear basis. In addition, issues such as bycatch, and safety are generally better addressed by gear type.

The revised list of authorized fisheries (LOF) and fishing gear used in those fisheries became effective December 1, 1999 (64 FR 67511). The rule applies to all U.S. marine fisheries, including Atlantic HMS. As stated in the rule, "no person or vessel may employ fishing gear or participate in a fishery in the EEZ not included in this LOF without giving 90 days' advance notice to the appropriate Fishery Management Council (Council) or, with respect to Atlantic HMS, the Secretary of Commerce (Secretary)." Acceptable HMS fisheries and authorized gear types for Atlantic tunas, swordfish, and sharks include: swordfish handgear fishery - rod and reel, harpoon, handline, bandit gear; PLL fishery - longline; shark drift gillnet fishery - gillnet; shark BLL fishery - longline; shark recreational fishery - rod and reel, handline; tuna purse seine fishery - purse seine; tuna recreational fishery- rod and reel, handline; and tuna handgear fishery - rod and reel, harpoon, handline, bandit gear. For Atlantic billfish, the only acceptable fishery and authorized gear type is recreational fishery - rod and reel. Species whose life history characteristics may lead to their eventual categorization as highly migratory, but which are not currently under the Secretary or Regional Council management authority, are covered in two broad categories: Recreational Fisheries (Non-FMP) and Commercial Fisheries (Non-FMP). Species that fit this description may be harvested with the gears listed for these catchall categories.

3.4.1 Bottom Longline

3.4.1.1 Domestic History and Current Management

Commercial shark fishing effort is generally concentrated in the southeastern United States and Gulf of Mexico (Cortés and Neer, 2002). During 1997 – 2003, 92 – 98 percent of LCS, 38 – 49 percent of pelagic sharks, and nearly all SCS (80 – 100 percent) came from the southeast region (Cortés, pers. comm.). McHugh and Murray (1997) found in a survey of shark fishery participants that the largest concentration of BLL fishing vessels is found along the central Gulf coast of Florida, with the John's Pass - Madeira Beach area considered the center of directed shark fishing activities. Consistent with other HMS fisheries, some shark fishery participants move from their homeports to other fishing areas as the seasons change and fish stocks move.

The Atlantic BLL fishery targets both LCS and SCS. BLL is the primary commercial gear employed in the LCS and SCS fisheries in all regions. Gear characteristics vary by region, but in general, an approximately ten-mile long BLL, containing about 600 hooks is fished

overnight. Skates, sharks, or various fin fishes are used as bait. The gear typically consists of a heavy monofilament mainline with lighter weight monofilament gangions. Some fishermen may occasionally use a flexible 1/16 inch wire rope as gangion material or as a short leader above the hook.

3.4.1.2 Recent Catch and Landings Data

The following section provides information on shark landings as reported in the shark BLL observer program. In January 2002, the observer coverage requirements in the shark BLL fishery changed from voluntary to mandatory participation if selected. NMFS selects approximately 40 - 50 vessels for observer coverage during each season. Vessels are randomly selected if they have a directed shark LAP, have reported landings from sharks during the previous year, and have not been selected for observer coverage during each of the three previous seasons.

The U.S. Atlantic commercial shark BLL fishery was monitored by the University of Florida and Florida Museum of Natural History, Commercial Shark Fishery Observer Program (CSFOP) from 1994 through the first season of 2005. In June 2005, responsibility for the observer program was transferred to the SEFSC's Panama City Laboratory. The observer program trains and places the observers aboard vessels in the directed shark BLL fishery in the Atlantic and Gulf of Mexico to collect data on the commercial shark fishery and thus improve overall management strategies for the fishery. Observers provide baseline characterization information, by region, on catch rates, species composition, catch disposition, relative abundance, and size composition within species for the LCS and SCS BLL fisheries.

During 2003, six observers logged 263 sea days on shark fishing trips aboard 20 vessels in the Atlantic from North Carolina to Florida and in the eastern Gulf of Mexico off Florida. The number of trips taken on each vessel ranged from one to five and the number of sea days each observer logged ranged from nine to 35. Observers documented the catches and fishing effort on approximately 150 longline sets that fished 103,351 hooks. During 2003, LCS comprised 68.4 percent of the total catch, and sandbar sharks were 30.6 percent of total LCS catch.

During 2004, five observers logged 196 sea days on 56 shark fishing trips aboard 11 vessels. Observers documented the catches and fishing effort during 120 longline sets that fished 90,980 hooks. In 2004 LCS comprised 66.7 percent of the total catch, and sandbar sharks were 26.6 percent of catch in 2004. Regional differences in sandbar shark abundance were evident. For example, in the Carolina region, sandbar sharks comprised 67.4 percent of the total catch and 77.2 percent of the LCS catch. In the Florida Gulf region, sandbar sharks comprised 62.0 percent of the total catch and 66.5 percent of the large coastal catch, whereas in the Florida East Coast region, sandbar sharks comprised only 17.2 percent of the total observed catch, and 37.1 percent of the LCS catch (Burgess and Morgan, 2003). Blacktip sharks comprised 13.9 percent of total observed catch and 20.3 percent of the large coastal catch (Burgess and Morgan, 2002). Tiger sharks comprised 7.5 percent of the total observed catch and 11.0 percent of the LCS catch. A majority of tiger sharks (71.7 percent) and nurse sharks (98.8 percent) were tagged and released.

From July 2005 through December 2006, five observers logged 89 trips on 37 vessels with a total of 211 hauls for the second and third seasons in the Atlantic from North Carolina to Florida and in the eastern Gulf of Mexico off Florida (Hale and Carlson, 2007). Observers documented the catches and fishing effort on 34 hauls on four trips targeting grouper/snapper or grouper/shark in the Gulf of Mexico, 82 hauls on 31 trips targeting shark in the Gulf of Mexico, 77 hauls on 50 trips targeting ships in the South Atlantic, and 18 hauls on four trips observed targeting tilefish in the South Atlantic.

From January to November 2007, the shark BLL observer program covered a total of 42 trips on 25 vessels with a total of 264 hauls. Gear characteristics of trips varied by area (Gulf of Mexico or the U.S. Atlantic Ocean) and target species (grouper/snapper or grouper/tilefish, shark or tilefish) (for more details, see Hale *et al*., 2007). There were no grouper/snapper-targeted trips observed in the U.S. Atlantic Ocean. No trips were observed in the northern U.S. Atlantic Ocean. Observers documented the catches and fishing effort on 179 hauls and 10 trips targeting snapper/grouper or grouper/tilefish in the Gulf of Mexico. There were 24 hauls on 7 trips observed targeting sharks in the Gulf of Mexico. In the U.S. Atlantic Ocean, 39 hauls on 21 trips were observed targeting shark, and 22 hauls on three trips were observed targeting tilefish.

In 2007 on the trips targeting shark in the Gulf of Mexico, 1,302 individual animals were caught. This consisted of 94.9 percent sharks, 4.1 percent teleosts, 0.5 percent invertebrates, and 0.2 percent batoids. LCS comprised the greatest amount of shark catch, at 69.5 percent, and SCS comprised 30.3 percent. The prohibited dusky shark was also caught (0.1 percent). Red grouper was the most caught teleost, while blacktip sharks was the most commonly caught shark (Hale *et al*., 2007).

In 2007 on the trips targeting grouper/snapper or grouper/tilefish in the Gulf of Mexico, 8,980 individual animals were caught. This consisted of 87.3 percent teleosts, 11.6 percent sharks, 0.2 percent batoids, and 0.8 percent invertebrates. Large coastal shark species comprised 16.5 percent of the shark catch, while SCS comprised the majority of the shark catch at 73.7 percent. Red grouper was the most caught teleost, and Atlantic sharpnose were the most caught sharks (Hale *et al*., 2007).

On the trips targeting shark in the South Atlantic in 2007, 2,735 individual animals were caught. This consisted of 95.7 percent sharks, 2.5 percent teleosts, 1.2 percent batoids, and 0.4 percent invertebrates. Large coastal shark species comprised 78.7 percent of the shark catch while SCS species comprised 19.2 percent of the shark catch. Sandbar sharks and tiger sharks were the most commonly caught LCS. Other shark species caught were dusky sharks, sand tiger sharks, night sharks, and sixgill sharks. Great amberjack, almaco jack, and great barracuda were the most commonly caughts teleosts (Hale *et al.*, 2007).

On the trips targeting tilefish in the South Atlantic in 2007, 1,293 individual animals were caught. This consisted of 97.2 percent teleosts, 2.5 percent sharks, and 0.2 percent invertebrates. Large coastal sharks comprised 9.4 percent of the shark catch, while no SCS species caught. Other shark species caught included the sevengill shark, shortfin mako shark, smooth dogfish and spiny dogfish (87.5 percent). Spiny dogfish was the most commonly caught shark species (75 percent) while tilefish was the most caught teleost at 97.5 percent (Hale *et al*., 2007).

BLL for sharks has relatively low observed bycatch rates. For vessels targeting sharks in the Gulf of Mexico in 2007, four loggerhead turtles were observed caught in BLL gear. Of these, two were released alive, and two were released dead. For vessels targeting shark in the Atlantic, no loggerhead turtles were observed caught in BLL gear. However, three smalltooth sawfish were observed caught, with two being released alive and one released dead.

3.4.1.3 Bottom Longline Bycatch

Under MMPA (16 U.S.C. 1361 *et seq*.) the Atlantic shark gillnet fishery is classified as Category II (occasional serious injuries and mortalities), and the shark BLL as Category III (remote likelihood or no known serious injuries or mortalities) (June 28, 2007; 72 FR 35393). The Southeast Regional Office of Protected Resources Division is preparing a new BiOp regarding the proposed actions under Amendment 2 to the Consolidated HMS FMP, which is expected to be completed by Spring of 2008, before the release of the final rule. The last consultation on HMS shark fisheries resulted in an October 29, 2003 BiOp, which concluded that the proposed action was likely to adversely affect, but not likely to jeopardize the continued existence of, green, Kemp's ridley, leatherback, and loggerhead sea turtles and smalltooth sawfish. The opinion also concluded that marine mammals, the Gulf of Maine Atlantic salmon DPS, shortnose sturgeon, Gulf sturgeon, and right whale critical habitat were not likely to be adversely affected by the action.

Consultation has been reinitiated because of new information regarding interactions between ESA listed species and the fishery and to evaluate the proposed changes to the fishery under Amendment 2 to the Consolidated HMS FMP. Information on the likelihood of post-release mortality has also been updated since the 2003 BiOp. Incidental take authorized for gillnet gear in the 2003 BiOp was specified only for drift gillnets. This was because: (1) Sink gillnets were not known to be used in this fishery so were not analyzed or authorized take, and (2) the strike-netting technique was analyzed in the opinion, but was not expected to result in any adverse effects on listed species. However, through NMFS' shark gillnet observer program, NMFS has discovered that sink gillnetting is used to target sharks and does occasionally interact with sea turtles, and sea turtles are occasionally caught in strike-net sets. Also, although the total number of estimated sea turtle and smalltooth sawfish takes in BLL gear is below the authorized level, incidental take mortality for smalltooth sawfish has been exceeded by one member of the species. The fishery continues to be in compliance with the terms and conditions of the ITS in the 2003 BiOp, and consultation has been reinitiated. The proposed changes under Amendment 2 are expected to reduce fishing effort and reduce the fishery's impacts on ESA-listed species in the action area. Additional management measures may result based on the 2008 BiOp expected this Spring.

Loggerhead Sea Turtles

In the BLL fishery, a total of 79 sea turtles were observed caught from 1994 through 2007 (Table 3.7 and Table 3.8). Seasonal variation indicates that most of the sea turtles were caught early in the year. Of the 79 observed sea turtles, 64 were loggerhead sea turtles, of which 33 were released alive. Another 14 loggerheads were released in an unknown condition and 17

were released dead. Based on extrapolation of observer data 784.3 loggerhead interactions with BLL gear occurred between 2004 and 2006, the time period for the latest ITS under the October 29, 2003 BiOp for the shark fisheries. An additional 17.4 unidentified sea turtles were estimated to have been taken (NMFS, 2007b; Richards, 2007).

Leatherback Sea Turtles

Of the 79 observed sea turtle interactions in the BLL fishery from 1994 – 2007, six were leatherback sea turtles of which one was dead and five were released with its condition unknown (Table 3.7 and Table 3.8). Based on extrapolated takes from observer data, it was estimated that 83.2 leatherback sea turtles were taken in the shark BLL fishery from 2004 through 2006 (NMFS, 2007b; Richards, 2007). Given the large number of turtles released in an unknown condition, these estimated take numbers do not discriminate between live and dead releases. However, leatherback mortality is usually low because it is known that leatherbacks rarely ingest or bite hooks, but are usually foul hooked on their flippers or carapaces, reducing the likelihood of post-hooking release mortality. However, leatherback-specific data for this fishery is not available.

Smalltooth Sawfish

As of April 1, 2003, NMFS listed smalltooth sawfish as an endangered species (68 FR 15674) under the ESA. After reviewing the best scientific and commercial information, the status review team determined that the continued existence of the U.S. Distinct Population Segment of smalltooth sawfish was in danger of extinction throughout all or a significant portion of its range from a combination of the following four listing factors: the present or threatened destruction, modification, or curtailment of habitat or range; over-utilization for commercial, recreational, scientific, or educational purposes; inadequacy of existing regulatory mechanisms; and other natural or manmade factors affecting its continued existence. NMFS is in the process of designating critical habitat for smalltooth sawfish.

From 1994 through 2006, 12 smalltooth sawfish interactions have been observed (11 released alive, and one released in unknown condition) in shark BLL fisheries (Morgan pers. comm.; Burgess and Morgan, 2004; Hale and Carlson, 2007; Hale *et al*., 2007). In 2007, there were three observed smalltooth sawfish interactions with shark BLL gear (Hale *et al*., 2007). Two were released alive, and one released dead. All three interactions occurred in the South Atlantic region. Based on extrapolated takes for 2004 through 2006, 60 smalltooth sawfish have taken in the BLL fisheries (NMFS, 2007b; Richards, 2007). No mortalities were extrapolated based on the overall extrapolated takes; however, one known mortality occurred in 2007. NMFS has not calculated the extrapolated takes since the mortality occurred.

Marine Mammals

Four delphinids have been observed caught and released alive between 1994 and 2007, and one bottlenose dolphin was observed dead in 2003 (G. Burgess, pers. comm.; Hale and Carlson, 2007; Hale *et al*., 2007). Based on this one dead encounter in 2003 (no interactions with marine mammals and BLL were observed in 2004 through 2007), NMFS extrapolated that a total of 100 bottlenose dolphin interactions with BLL gear (Richards, 2007).

Seabirds

Bycatch of seabirds in the shark BLL fishery has been virtually non-existent. A single pelican has been observed killed from 1994 through 2007. The pelican was caught in January 1995 off the Florida Gulf Coast (between 25° 18.68 N, 81° 35.47 W and 25° 19.11 N, 81° 23.83 W) (G. Burgess, University of Florida, pers. com.). No expanded estimates of seabird bycatch or catch rates are available for the BLL fishery.

Table 3.5 Species composition of observed BLL catch during 2007 for BLL trips targeting sharks in the South Atlantic. Source: Hale *et al*., 2007.

Species	Total Number Caught	% Total Catch	% Kept	% Discarded Dead	% Discarded Alive
Sandbar shark	827	30.3	98.9	0.1	0.1
Tiger shark	779	28.5	23.2	19.4	56.9
Atlantic Sharpnose shark	352	12.9	91.5	7.7	0.6
Blacktip shark	243	8.9	98.8	0.8	0.0
Blacknose shark	148	5.4	98	2	0.0
Nurse Shark	83	3.0	0.0	0.0	100
Scalloped hammerhead shark	37	1.4	91.9	2.7	2.7
Great hammerhead shark	29	1.1	100	0.0	0.0
Bull shark	21	0.8	90.5	4.8	0
Spinner shark	17	0.6	100.0	0.0	0.0
Silky shark	15	0.5	73.3	20.0	6.7
Smooth dogfish	14	0.5	71.4	0.0	28.6
Dusky shark	13	0.5	0.0	84.6	15.4
Sand tiger shark	10	0.4	0.0	0.0	100
Sharks	10	0.4	0.0	100	0.0
Lemon shark	9	0.3	100.0	0.0	0.0
Sixgill shark	7	0.3	0.0	0.0	100
Bonnethead shark	3	0.1	100	0.0	0.0
Night shark	1	0.0	0	100	0.0
Requim sharks	1	0.0	0	0	0
Total	2619	95.8			

Table 3.6 Species composition of observed BLL catch during 2007 for BLL trips targeting sharks in the Gulf of Mexico. Source: Hale *et al*., 2007.

Species	Total Number Caught	% Total Catch	% Kept	% Discarded Dead	% Discarded Alive
Blacktip shark	428	33.0	95.6	3.7	0.7
Blacknose shark	199	15.3	74.9	20.6	4.5
Atlantic sharpnose shark	174	13.4	57.5	42.5	0.0

Species	Total Number Caught	% Total Catch	% Kept	% Discarded Dead	% Discarded Alive
Sandbar shark	160	12.3	98.8	0.0	0.0
Nurse shark	95	7.3	0.0	0.0	100
Spinner shark	56	4.3	96.4	0.0	1.8
Tiger shark	34	2.6	8.8	8.8	82.4
Lemon shark	32	2.5	84.4	3.1	0
Bull shark	29	2.2	96.6	0.0	0.0
Great hammerhead shark	21	1.6	61.9	0.0	38.1
Sharks	2	0.2	0.0	100	0.0
Scalloped Hammerhead shark	2	0.2	100	0.0	0.0
Dusky shark	1	0.1	0.0	0.0	100
Finetooth shark	1	0.1	100	0.0	0.0
Silky shark	1	0.1	0.0	100	0.0
Total	1235	95.1			

Table 3.7 **Total Number of Observed Sea Turtle Interactions by Species by Month for Years 1994-2007 in the Shark BLL Fishery.** Source: Shark BLL Observer Program

Month	Leatherback Sea Turtle	Loggerhead Sea Turtle	Other Sea Turtles	Total
Jan	1	16	1	18
Feb	3	10	6	19
Mar		7		9
Apr		4		4
May	1			1
Jun				
July		18		18
Aug		4		4
Sept	1	3	1	5
Oct		2	1	3
Nov				
Dec				
Total	6	64	9	79

Table 3.8 **Total number of Observed Sea Turtle Interactions by Year for Years 1994-2007 in the Shark BLL Fishery.** Source: Shark BLL Observer Program. Letters in parentheses indicate whether the sea turtle was released alive (A), dead (D), or in an unknown (U) condition.

Year	Leatherback Sea Turtle	Loggerhead Sea Turtle	Other Sea Turtle	Total
1994	1 (1U)	5 (5U)	6 (6U)	12
1995		4 (3A, 1D)		4
1996	1 (1U)	6 (3A, 2D, 1U)		7
1997	1 (1U)	5 (3A, 2U)		6
1998		2 (1A, 1D)	1 (1A)	3
1999		2 (2A)		2
2001	1 (1D)	2 (2A)		3
2002		5 (3A, 1D, 1U)		5
2003		7 (6A, 1D)	1 (1U)	8
2004		5 (3A, 2D)		5
2005	2 (1A, 1D)	4 (1A, 3D)	1 (1U)	7
2006		12 (3A, 4D, 5U),		12
2007		5 (3A, 2D)		5
Total	6	64	9	79

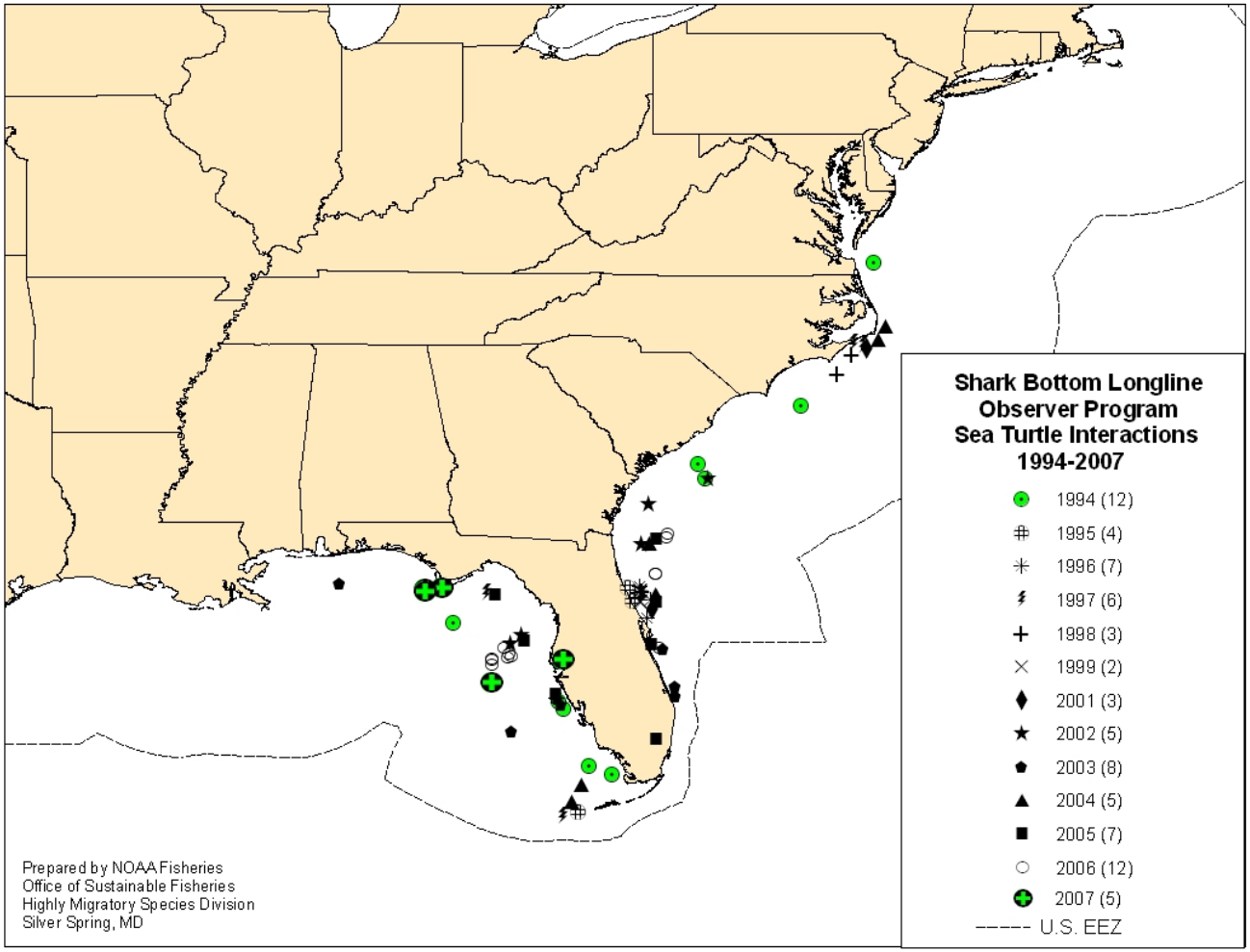

Figure 3.2 **Observed sea turtle interactions in the shark BLL fishery from 1994-2007.** Source: Commercial Shark Fishery Observer Program data (1994-1st season of 2005) and NMFS' Shark Observer Program data (2nd season 2005-2007).

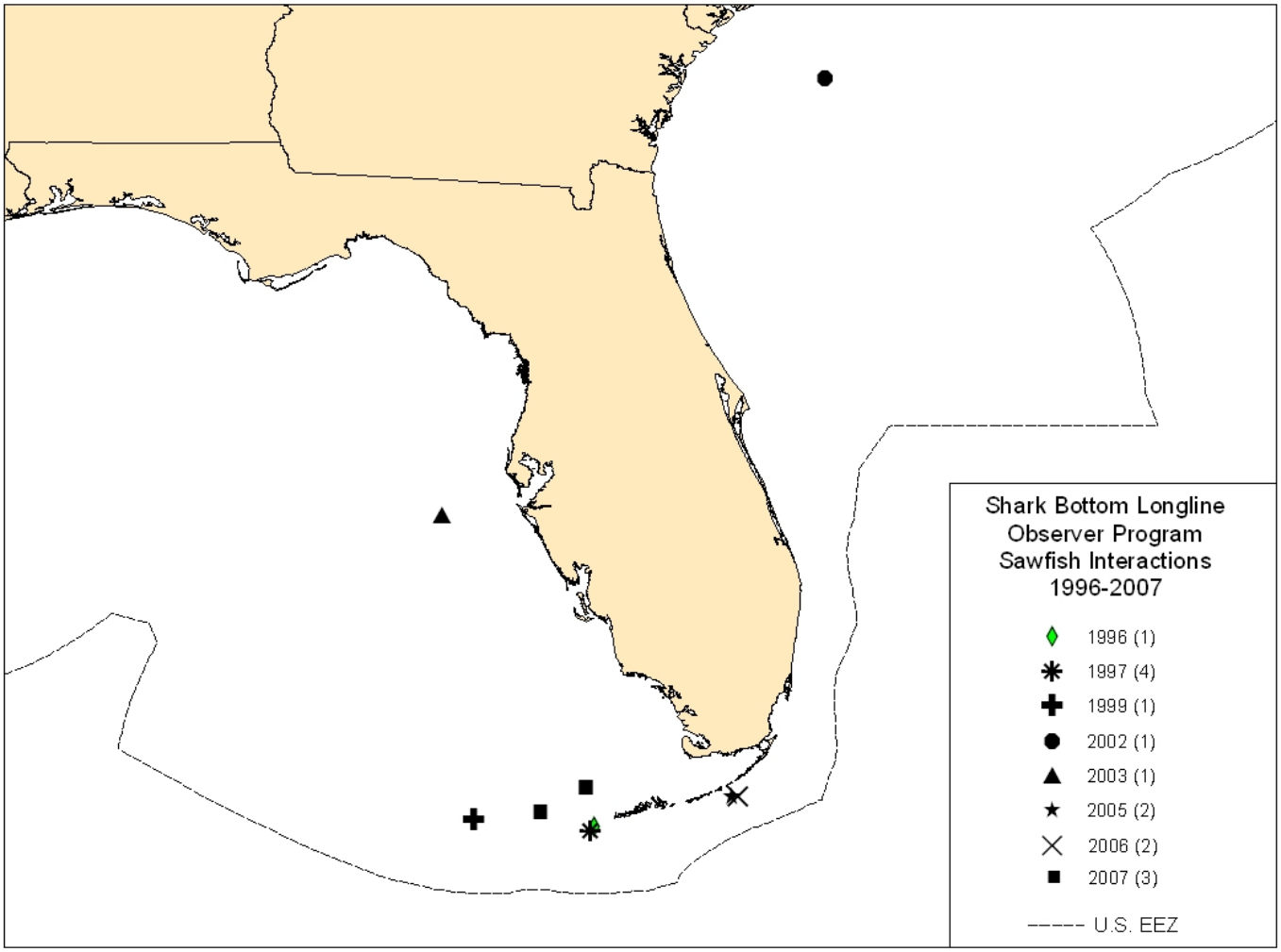

Figure 3.3 **Observed sawfish interactions and observed sets (smaller grey circles) in the shark BLL fishery from 1994-2007.** Source: Commercial Shark Fishery Observer Program data (1994-1st season of 2005) and NMFS' Shark Observer Program data (2nd season 2005-2007).

3.4.2 Gillnet Fishery

3.4.2.1 Domestic History and Current Management

The southeast shark gillnet fishery is comprised of several vessels based primarily out of ports in northern Florida (South Atlantic Region) that use nets typically 456 to 2,280 meters long and 6.1 to 15.2 meters deep, with stretched mesh from 12.7 to 22.9 cm. This fishery is currently prohibited in the state waters off South Carolina, Georgia, and Florida, thereby forcing some of these vessels to operate in deeper waters under Federal jurisdiction, where gillnets are less effective. The entire process (set to haulback) takes approximately 9 hours (Carlson and Baremore, 2002a).

In the southeast shark gillnet fishery, NMFS modified the requirement to have 100 percent observer coverage at all times on March 30, 2001 (66 FR 17370), by reducing the level required to a statistically significant level outside of right whale calving season (100 percent observer coverage is still required during the right whale calving season from November 15 through March 31). This modification of observer coverage reduced administrative costs while maintaining statistically significant and adequate levels of coverage to provide reasonable estimates of sea turtle and marine mammal takes outside the right whale calving season. The level of observer coverage necessary to maintain statistical significance will be reevaluated annually and adjusted accordingly. Additionally, in 2001 NMFS established a requirement to conduct net checks every two hours to look for and remove any protected species (March 30, 2001, 66 FR 17370).

3.4.2.2 Recent Catch and Landings

The following section provides information on shark landings as reported in the shark gillnet observer program. The 2006 Directed Shark Gillnet Fishery Observer Program report described the gear and soak time deployed by drift gillnet, strike gillnet, and sink gillnet fishermen. Set duration was generally 0.3 hours in depths averaging 20.9 m, and haulback averaged 3.3 hours. The average time from setting the net through completion of haulback was 10.2 hours. Stretched mesh sizes measured from 12.7-25.4 cm. Strikenetters use the largest mesh size (22.9-30.4 cm) and the set times were 3.2 hours. Sink gillnets used to target sharks generally use 7.3-20.3 cm mesh size and the process lasted for approximately 6.1 hours. This gear was also observed being deployed to target non-HMS (teleosts); using a stretched mesh size of 6.4-12.7 cm, and the entire process took approximately 2.3 hours (Carlson and Bethea, 2007).

Gillnet Landings and Bycatch

Strikenets - NMFS published a final rule (72 FR 34632, June 25, 2007) to reduce bycatch of right whales. It prohibits gillnet fishing or gillnet possession during periods associated with the right whale calving season. Limited exemptions to the fishing prohibitions are provided for gillnet fishing for sharks and for Spanish mackerel south of 29°00' N. lat. In this area, only gillnets used in a strikenet fashion can operate during day time when right whales are present. Operation in this area at that time requires VMS and observer coverage, if selected. Vessels

fishing in a strikenet fashion used nets 364.8 meters long, 30.4 meters deep, and with mesh size 22.9 cm.

The total observed strike gillnet catch consisted of eight species of sharks from 2005-2006. Finetooth and blacktip sharks made up the greatest percentage of catch in terms of total number caught in strike gillnets from 2005-2006 (Table 3.9). There were no strike gillnet trips observed in 2007.

In the strikenet fishery from 2005-2006, 99.7 percent of the observed catch were sharks with only 0.15 percent teleosts, and 0.07 percent non-shark elasmobranchs. Blacktip, finetooth, and spinner shark comprised over 94 percent of the observed shark strike net catch by number and weight. Tarpon and little tunny were the teleosts encountered most frequently (Carlson and Bethea, 2007).

Drift Gillnets - In 2005 and 2006, observed drift gillnet catches by number were 88.7 percent shark, 10.8 percent teleosts, 0.5 percent non-shark elasmobranchs, and 0.03 percent protected resources. Three species of sharks made up 91.3 percent of the observed drift gillnet catch: Atlantic sharpnose, blacktip, and bonnethead sharks. Two species of teleosts made up the majority of the catch, including: little tunny and king mackerel (Carlson and Bethea, 2007).

In 2007, a total of five driftnet gillnet vessels were observed making 84 sets on 11 trips. Of those trips, there were 3 vessels observed that targeted sharks for a total of 4 trips and 4 hauls. The total observed catch composition for sets targeting sharks was 86.7 percent shark, 13.3 percent teleosts, zero non-shark elasmobranches, and zero percent protected resources. Two species of sharks made up 98.1 percent of the observed shark catch: Atlantic sharpnose shark and blacknose shark (Table 3.10). By weight, the shark catch was composed of Atlantic sharpnose, followed by scalloped hammerhead shark, blacknose shark, and blacktip shark. Three species of teleosts made up approximately 97 percent by number of the overall non-shark species. These species were little tunny, king mackerel, and barracudas (Baremore *et al.*, 2007).

Total observed catch composition for sets targeting Spanish mackerel was 84.5 percent, 15.3 percent sharks, 0.1 percent non-shark elasmobranches, and 0.05 protected resources. Three species of teleosts made up 96.6 percent of the total teleost catch: Spanish mackerel, bluefish, and menhaden. Shark catch was dominated by Atlantic sharpnose shark followed by bonnethead shark (Baremore *et al.*, 2007).

Sink Gillnets - Sinknet landings and bycatch vary by target species. Four main groups were targeted on observed sink gillnet trips in 2005 and 2006, including: shark, Spanish mackerel, kingfish, and various teleosts. Vessels targeting sharks with this gear caught 79.3 percent sharks, 17.6 percent teleosts, and 3.1 percent non-shark elasmobranchs. Vessels targeting Spanish mackerel caught 89.5 percent teleosts, 10.4 percent sharks, and 0.02 non-shark elasmobranchs. Vessels targeting kingfish caught 90.5 percent teleosts, 3.9 percent sharks, and 6.1 percent non-shark elasmobranchs. When targeting various teleosts with sink gillnet gear, vessels caught 98 percent teleosts and 2 percent shark (Carlson and Bethea, 2007).

There were 41 species of teleosts, four species of rays, and no marine mammal species observed caught during the sink gillnet season from 2005-2006 (Carlson and Bethea, 2007). The species of teleosts making up the largest percentage by number of the overall non-shark species in observed strikenet catches were southern kingfish, gulf flounder, whitebone porgy, and crevalle jack.

A total of 29 trips making 112 sink net sets on six vessels were observed in 2007. Of those, 17 trips making 60 sets targeted sharks, 3 trips making 27 sets targeted Spanish mackerel, and 4 trips making 9 sets targeted Atlantic croaker, and 6 trips making 16 sets targeted other teleosts. Sink gillnets that targeted sharks caught 97.8 percent shark, 1.4 percent teleosts, 0.7 percent non-shark elasmobranches, and 0.1 percent protected resources. By number, the shark catch was primarily bonnethead shark, finetooth shark, Atlantic sharpnose shark, and blacknose shark (Table 3.12). By weight the shark catch was made up of mostly finetooth shark, followed by bonnethead shark, blacknose shark, and spinner shark. Cobia made up 25.8 percent of the teleost catch, followed by Gulf kingfish and banded drum. Cownose ray and Atlantic guitarfish and other stingrays made up 100 percent of the non-shark elasmobranch catch (Baremore *et al*., 2007).

Catch of vessels targeting Spanish mackerel was 99.4 teleosts and 0.6 percent shark. Shark catches were mostly Atlantic sharpnose by number, and blacktip and bonnethead sharks. By weight, spiny dogfish were the predominant catch, followed by smooth dogfish, blacktip shark, and bonnethead shark. Spanish mackerel, butterfish, and bluefish made up the majority of the catch (Baremore *et al*., 2007).

Sink gillnet vessels targeting croaker caught 3.2 percent sharks, 96.7 percent teleosts, an 0.01 percent non-shark elasmobranches. Sink gillnet vessels that targeted other species other than sharks, Spanish mackerel, and Atlantic croaker caught mostly bluefish and Atlantic croaker (Baremore *et al*., 2007).

Loggerhead Sea Turtles

Loggerhead sea turtles are rarely caught in the shark gillnet fishery. No loggerheads were observed caught with strikenets during the 2000 – 2002 right whale calving seasons (Carlson, 2000; Carlson and Baremore, 2001; Carlson and Baremore, 2002a). However, three loggerhead sea turtles were observed caught with drift gillnets during right whale calving season, one each year from 2000 to 2002 (Carlson, 2000; Carlson and Baremore, 2001; Carlson and Baremore, 2002a; Garrison, 2003a).

No loggerhead sea turtles were caught outside of the right whale calving season in 2002 (Carlson and Baremore, 2002b), and no loggerhead turtles were observed caught during or after the right whale calving season in 2003 or 2004 in the directed shark gillnet fishery (Carlson and Baremore, 2003; Carlson, pers. comm). In 2005, five loggerheads were observed caught, and in 2006 three loggerheads were observed caught (Table 3.13). In 2007, 4 loggerhead sea turtles were observed, three were released alive, and one was released in an unknown condition (Baremore *et al*., 2007).

Leatherback Sea Turtles

In the shark gillnet fishery, leatherback sea turtles are sporadically caught. No leatherback sea turtles were observed caught with strikenets during the 2000 – 2002 right whale calving seasons (Carlson, 2000; Carlson and Baremore, 2001; Carlson and Baremore, 2002a). Leatherback sea turtles have been observed caught in shark drift gillnets, including 14 in 2001 and 2 in 2002 (Carlson, 2000; Carlson and Baremore, 2001; Carlson and Baremore, 2002a; Garrison, 2003a). NMFS temporarily closed the shark gillnet fishery (strikenetting was allowed) from March 9 to April 9, 2001, due to the increased number of leatherback interactions that year (66 FR 15045, March 15, 2001).

From 2003 – 2004, no leatherback sea turtles were observed caught in gillnets fished in strikenet or driftnet methods (Carlson and Baremore, 2003; Carlson, pers. comm.). In 2005, one leatherback turtle was caught and released alive (Table 3.13). In 2006 and 2007, no leatherbacks were observed caught in gillnets (Carlson and Bethea, 2007; Baremore *et al*., 2007; Table 3.13).

Smalltooth Sawfish

To date there has been only one observed catch of a smalltooth sawfish in shark gillnet fisheries. The sawfish was taken on June 25, 2003, in a gillnet off the west coast of Florida and was released alive (Carlson and Baremore, 2003). The sawfish was cut from the net and released alive with no visible injuries. This indicates that smalltooth sawfish can be removed safely if entangled gear is sacrificed. The set was characteristic of a typical drift gillnet set, with gear extending 30 to 40 feet deep in 50 to 60 feet of water. Prior to this event it was speculated that the depth at which drift gillnets are set above the sea floor may preclude smalltooth sawfish from being caught. From 2004-2007, there were no observed catches of smalltooth sawfish in shark gillnet fisheries (Table 3.14).

Although sometimes described as a lethargic demersal species, smalltooth sawfish feed mostly on schooling fish, thus they would occur higher in the water column during feeding activity. In fact, smalltooth sawfish and Atlantic sharks may be attracted to the same schools of fish, potentially making smalltooth sawfish quite vulnerable if present in the area fished. The previous absence of smalltooth sawfish incidental capture records is more likely attributed to the relatively low effort in this fishery and the rarity of smalltooth sawfish, especially in Federal waters. These factors may result in little overlap of the species with the gear.

Given the high rate of observer coverage in the shark gillnet fishery, NMFS believes that smalltooth sawfish takes in this fishery are very rare. The fact that there were no smalltooth sawfish caught during 2001 when 100 percent of the fishing effort was observed indicates that smalltooth sawfish takes (observed or total) most likely do not occur on an annual basis. Based on this information, the 2003 BiOp permitted one incidental take of smalltooth sawfish (released alive) from 2004 through 2008 as a result of the use of gillnets in this fishery (NMFS, 2003b). Additional management measures may result based on the 2008 BiOp expected this Spring.

Marine Mammals

Observed takes of marine mammals in the Southeast Atlantic shark gillnet fishery during 1999 – 2007, totaled 12 bottlenose dolphins and four spotted dolphins. Extrapolated observations from 2004-2006 suggest 1.4 interactions with bottlenose dolphin and zero Atlantic spotted dolphin outside the right whale season. During the right whale season, there was one interaction with bottlenose dolphins and zero interactions with Atlantic spotted dolphins in the shark gillnet fishery from 2004 through 2006 (Garrison, 2007).

On January 22, 2006, a dead right whale was spotted offshore of Jacksonville Beach, Florida. The survey team identified the whale as a right whale calf, and photos indicated the calf as having one large wound along the midline and smaller lesions around the base of its tail. The right whale calf was located at 30°14.4' N. Lat., 81° 4.2'′ W. Long., which was approximately 1 nautical mile outside of the designated right whale critical habitat, but within the Southeast U.S. Restricted Area. NMFS determined that both the entanglement and death of the whale occurred within the Southeast U.S. Restricted Area, and all available evidence suggested the entanglement and injury of the whale by gillnet gear ultimately led to the death of the animal.

On February 16, 2006, NMFS published a temporary rule (71 FR 8223) to prohibit, through March 31, 2006, any vessel from fishing with any gillnet gear in the Atlantic Ocean waters between 32°00' N. Lat. (near Savannah, GA) and 27°51' N. Lat. (near Sebastian Inlet, FL) and extending from the shore eastward out to 80°00' W. long under the authority of the ALWTRP (50 CFR 229.32 (g)) and ESA. NMFS took this action based on its determination that a right whale mortality was the result of an entanglement by gillnet gear within the Southeast U.S. Restricted Area.

NMFS implemented the final rule on June 25, 2007 (72 FR 34632), that prohibits gillnet fishing, including shark gillnet fishing, from November 15 to April 15, between the NC/SC border and 29° 00' N. The action was taken to prevent the significant risk to the wellbeing of endangered right whales from entanglement in gillnet gear in the core right whale calving area during calving season. Limited exemptions to the fishing prohibitions are provided for gillnet fishing for sharks and for Spanish mackerel south of 29°00' N. lat. Shark gillnet vessels fishing between 29° 00' N and 26° 46.5' N have certain requirements as outlined 50 CFR § 229.32 from December 1 through March 31 of each year. These include vessel operators contacting the SEFSC Panama City Laboratory at least 48 hours prior to departure of a fishing trip in order to arrange for an observer.

In addition, a recent rule (October 5, 2007, 72 FR 57104) amends restriction in the Southeast U.S. Monitoring Area from December 1 through March 31. In that area no person may fish with or possess gillnet gear for sharks with webbing of 5" or greater stretched mesh unless the operator of the vessel is in compliance with the VMS requirements found in 50 CFR 635.69. The Southeast U.S. Monitoring Area is from 27°51' N. (near Sebastian Inlet, FL) south to 26°46.5' N. (near West Palm Beach, FL), extending from the shoreline or exemption line eastward to 80°00' W. In addition, NMFS may select any shark gillnet vessel regulated under the ALWTRP to carry an observer. When selected, the vessels are required to take observers on a mandatory basis in compliance with the requirements for at-sea observer coverage found in 50

CFR 229.7. Any vessel that fails to carry an observer once selected is prohibited from fishing pursuant to 50 CFR § 635. There are additional gear marking requirements that can be found at 50 CFR § 229.32.

Table 3.9 Total Strike gillnet Shark Catch and Bycatch by Species in order of Decreasing Abundance for all Observed Trips, 2005-2006. Source: Carlson and Bethea, 2007.

Species	Total Number Caught	Kept (%)	Discarded Alive (%)	Discarded Dead (%)
Blacktip shark	9,831	89.5	0.2	10.3
Finetooth	1,687	100	0	0
Spinner Shark	1,108	100	0	0
Blacknose shark	541	100	0	0
Dusky shark	20	0	25	75
Atlantic sharpnose	7	100	0	0
Scalloped Hammerhead	7	71.4	0	28.6
Tarpon	5	0	0	100
Blackfin tuna	5	100	0	0
Manta ray	4	0	100	0
Bonnethead shark	3	100	0	0
Cobia	3	100	0	0
Cownose ray	3	0	33.3	66.7
Red drum	2	0	50	50
Bull shark	2	100	0	0
Spotted eagle ray	2	0	100	0
Nurse shark	1	100	0	0
Crevalle jack	1	100	0	0
Southern flounder	1	100	0	0
Barracudas	1	0	0	100
Remoras	1	100	0	0
Ocellated flounder	1	0	0	100
Total	**13,236**			

Table 3.10 Total Shark Catch by Species and Species Disposition in Order of Decreasing Abundance for all Observed Drift gillnet Sets 2007. Source: Baremore *et al*., 2007.

Species	Total Number Caught	Kept (%)	Discarded Alive (%)	Discarded Dead (%)
Atlantic sharpnose	1643	99.5	0.3	0.2
Blacknose	20	100	0.0	0.0
Scalloped Hammerhead	12	100	0.0	0.0

Species	Total Number Caught	Kept (%)	Discarded Alive (%)	Discarded Dead (%)
Bonnethead	8	100	0.0	0.0
Blacktip	7	85.7	14.3	0.0
Spinner	5	80.0	20.0	0.0
Total	**1,695**			

Table 3.11 Total bycatch in NMFS observed drift gillnet sets in order of decreasing abundance and species disposition for all observed trips, 2007. Source: Baremore *et al*., 2007.

Species	Total Number Caught	Kept (%)	Discard Alive (%)	Discard Dead (%)
Little tunny	210	99.0	0.0	1.0
King mackerel	37	81.1	0.0	18.9
Barracuda	8	100	0	0
Moonfish	4	0.0	0.0	100
Remora family	2	0.0	50.0	50.0

Table 3.12 Total Sink gillnet Shark Catch and Bycatch by Species in order of Decreasing Abundance for all Observed Trips, 2007. Source: Baremore *et al*., 2007.

Species	Total Number Caught	Kept (%)	Discarded Alive (%)	Discarded Dead (%)
Bonnethead shark	1223	99.7	0.2	0.2
Finetooth	371	99.7	0.3	0.0
Atlantic Sharpnose	256	99.6	0.0	0.4
Blacknose	240	100	0.0	0.0
Spinner	40	60.0	10	30
Blacktip	26	38.5	26.9	34.6
Scalloped hammerhead	7	14.3	14.3	71.4
Nurse	1	100	0.0	0.0
Bull	1	100	0.0	0.0
Tiger	1	0.0	100	0.0
Cownose ray	10	0.0	0.0	100
Cobia	8	50	50	0.0
Gulf kingfish	5	100	0.0	0.0
Stingray family	4	0.0	100	0.0
Banded drum	2	0.0	0.0	100
Southern kingfish	4	100	0.0	0.0
Silver seatrout	3	0.0	0.0	100
Bluefish	2	50	0.0	50
Spanish Mackerel	2	50	0.0	50
Moonfish	2	0.0	0.0	100

Species	Total Number Caught	Kept (%)	Discarded Alive (%)	Discarded Dead (%)
Toadfish family	1	0.0	100	0.0
Southern flounder	1	100	0.0	0.0
Atlantic guitarfish	1	0.0	100	0.0
Red drum	1	0.0	100	0.0

Table 3.13 **Total number of Observed Sea Turtle Interactions by Year from 2000-2007 in the Shark Gillnet Fishery.** Source: Directed Shark Gillnet Observer Program. Letters in parentheses indicate whether the sea turtle was released alive (A), dead (D), or unknown (U).

Year	Leatherback Sea Turtle	Loggerhead Sea Turtle	Total
2000		1 (U)	1
2001		1 (U)	1
2002		1 (U)	1
2003			0
2004			0
2005	1(A)	5 (4A, 1D)	6
2006		3 (2A, 1D)	3
2007		4 (3A, 1U)	4
Total	1	15	16

Table 3.14 **Observed Interactions of Protected Species with the Shark Gillnet Fishery from 2004-2007.** Source: Directed Shark Gillnet Observer Program.

Observed Total Takes (2004-2007)				
Species	**Drift Gillnet**	**Strikenet**	**Sink Gillnet**	**Total Observed Takes/5 yr ITS (total takes)**
Loggerhead Sea Turtle	3	3	4	10/10
Leatherback Sea Turtle	1	0	0	1/22
Smalltooth Sawfish	0	0	0	0/1
Observed Dead Takes (2004-2007)				
Species	**Drift Gillnet**	**Strikenet**	**Sink Gillnet**	**Total Observed Takes/5 yr ITS (total takes)**
Loggerhead Sea Turtle	1	1	1	3/1
Leatherback Sea Turtle	0	0	0	0/3
Smalltooth Sawfish	0	0	0	0/0

*The 5 yr ITS was established for the drift gillnet fishery only under the 2003 BiOp. However, one dead loggerhead was encountered in the drift and sink gillnet and strikenet fisheries.

3.4.3 Pelagic Longline Fishery

3.4.3.1 Domestic History and Current Management

The U.S. PLL fishery for Atlantic HMS primarily targets swordfish, yellowfin tuna, and bigeye tuna in various areas and seasons. Secondary target species include dolphin, albacore tuna, pelagic sharks (including shortfin mako, thresher, and porbeagle sharks), as well as several species of LCS. Although this gear can be modified (*e.g.*, depth of set, hook type, *etc.*) to target swordfish, tunas, or sharks, it is generally a multi-species fishery. These vessel operators are opportunistic, switching gear style and making subtle changes to target the best available economic opportunity of each individual trip. PLL gear sometimes attracts and hooks non-target finfish with little or no commercial value as well as species that cannot be retained by commercial fishermen due to regulations, such as billfish. Pelagic longlines may also interact with protected species such as marine mammals, sea turtles, and seabirds. Thus, this gear has been classified as a Category I fishery with respect to MMPA. Any species (or undersized catch of permitted species) that cannot be landed due to fishery regulations is required to be released, whether dead or alive. PLL gear is composed of several parts (see 3.4[1]) (NMFS, 1999a).

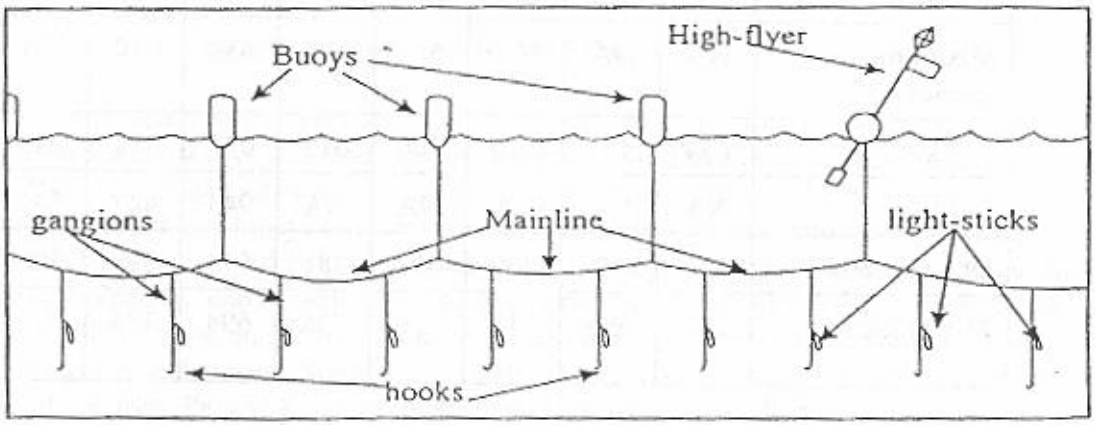

Figure 3.4 Typical U.S. PLL Gear. Source: Arocha, 1996

The primary fishing line, or mainline of the longline system, can vary from five to 40 miles in length, with approximately 20 to 30 hooks per mile. The depth of the mainline is determined by ocean currents and the length of the floatline, which connects the mainline to several buoys, and periodic markers which can have radar reflectors or radio beacons attached. Each individual hook is connected by a leader, or gangion, to the mainline. Lightsticks, which contain chemicals that emit a glowing light, are often used, particularly when targeting swordfish. When attached to the hook and suspended at a certain depth, lightsticks attract baitfish, which may, in turn, attract pelagic predators (NMFS, 1999a).

When targeting swordfish, PLL gear is generally deployed at sunset and hauled at sunrise to take advantage of swordfish nocturnal near-surface feeding habits (NMFS, 1999a). In general, longlines targeting tunas are set in the morning, deeper in the water column, and hauled in the

[1] As of April 1, 2001, (66 FR 17370) a vessel is considered to have pelagic longline gear on board when a power-operated longline hauler, a mainline, floats capable of supporting the mainline, and leaders (gangions) with hooks are on board.

evening. Except for vessels of the distant water fleet, which undertake extended trips, fishing vessels preferentially target swordfish during periods when the moon is full to take advantage of increased densities of pelagic species near the surface. The number of hooks per set varies with line configuration and target species (Table 3.15) (NMFS, 1999a). The PLL gear components may also be deployed as a trolling gear to target surface feeding tunas. Under this configuration, the mainline and gangions are elevated and actively trolled so that the baits fish on or above the water's surface. This style of fishing is often referred to as "green-stick fishing," and reports indicate that it can be extremely efficient compared to conventional fishing techniques. For more information on green-stick fishing gear and the configurations allowed under current regulations, please refer to the discussions of alternative H4 in Chapters 2 and 4 of the 2006 Consolidated HMS FMP. At present, NMFS is considering alternatives in regard to changes with greenstick use in HMS fisheries.

Table 3.15 Average Number of Hooks per PLL Set, 1999-2006. Source: PLL logbook data.

Target Species	1999	2000	2001	2002	2003	2004	2005	2006
Swordfish	521	550	625	695	711	701	747	742
Bigeye Tuna	768	454	671	755	967	400	634	754
Yellowfin Tuna	741	772	731	715	720	696	691	704
Mix of tuna species	NA	638	719	767	765	779	692	676
Shark	613	621	571	640	696	717	542	509
Dolphin	NA	943	447	542	692	1,033	734	988
Other species	781	504	318	300	865	270	889	236
Mix of species	738	694	754	756	747	777	786	777

Regional U.S. Pelagic Longline Fisheries Description

The U.S. PLL fishery sector has historically been comprised of five relatively distinct segments with different fishing practices and strategies, including the Gulf of Mexico yellowfin tuna fishery, the South Atlantic-Florida east coast to Cape Hatteras swordfish fishery, the Mid-Atlantic and New England swordfish and bigeye tuna fishery, the U.S. distant water swordfish fishery, and the Caribbean Islands tuna and swordfish fishery. Each vessel type has different range capabilities due to fuel capacity, hold capacity, size, and construction. In addition to geographical area, these segments have historically differed by percentage of various target and non-target species, gear characteristics, and deployment techniques. Some vessels fish in more than one fishery segment during the course of the year (NMFS, 1999a). Due to the many changes in the regulations since 1999 (*e.g.*, time/area closures and gear restrictions), the fishing practices and strategies of these different segments may have changed.

Management of the U.S. Pelagic Longline Fishery

The U.S. Atlantic PLL fishery is restricted by a swordfish quota, divided between the North and South Atlantic (separated at 5°N. Lat.). Other regulations include minimum sizes for swordfish, yellowfin, bigeye, and bluefin tuna, LAPs, bluefin tuna catch requirements, shark

quotas, protected species incidental take limits, reporting requirements (including logbooks), gear and bait requirements, and mandatory workshop requirements. Current billfish regulations prohibit the retention of billfish by PLL vessels, or the sale of billfish from the Atlantic Ocean. As a result, all billfish hooked on PLL gear must be discarded, and are considered bycatch. This is a heavily managed gear type and, as such, is strictly monitored. Because it is difficult for PLL fishermen to avoid undersized fish in some areas, NMFS has closed areas in the Gulf of Mexico and along the east coast. The intent of these closures is to decrease bycatch in the PLL fishery by closing those areas with the highest rates of bycatch. There are also time/area closures for PLL fishermen designed to reduce the incidental catch of bluefin tuna and sea turtles. In order to enforce time/area closures and to monitor the fishery, NMFS requires all PLL vessels to report positions on an approved VMS.

On July 15, 2001, NMFS closed the Northeast Distant (NED) to PLL fishing. In June 2004, NMFS conditionally re-opened the NED to PLL fishing. NMFS limited vessels with PLL gear onboard in that area, at all times, to possessing onboard and/or using only 18/0 or larger circle hooks with an offset not to exceed ten degrees. Only whole mackerel and squid baits may be possessed and or utilized with allowable hooks. In August of 2004, NMFS limited vessels with PLL gear onboard, at all times, in all areas open to PLL fishing, excluding the NED, to possessing onboard and/or using only 16/0 or larger non-offset circle hooks and/or 18/0 or larger circle hooks with an offset not to exceed ten degrees. Only whole finfish and squid baits may be possessed and/or utilized with allowable hooks. All PLL vessels must possess and use sea turtle handling and release gear in compliance with NMFS careful release protocols.

Permits

The 1999 FMP established six different LAP types: (1) directed swordfish, (2) incidental swordfish, (3) swordfish handgear, (4) directed shark, (5) incidental shark, and (6) tuna longline. To reduce bycatch in the PLL fishery, these permits were designed so that the swordfish directed and incidental permits are valid only if the permit holder also holds both a tuna longline and a shark permit. Similarly, the tuna longline permit is valid only if the permit holder also holds both a swordfish (directed or incidental, not handgear) and a shark permit. This allows limited retention of species that might otherwise have been discarded.

As of May 11, 2007, approximately 182 directed swordfish LAPs, 78 incidental swordfish LAPs, 231 directed shark LAPs, and 290 incidental shark LAPs had been issued. As of April 30, 2007, approximately 236 tuna longline permits had been issued.

Monitoring and Reporting

PLL fishermen and the dealers who purchase HMS from them are subject to reporting requirements. NMFS has extended dealer reporting requirements to all swordfish importers as well as dealers who buy domestic swordfish from the Atlantic. These data are used to evaluate the impacts of harvesting on the stock and the impacts of regulations on affected entities.

Commercial HMS fisheries are monitored through a combination of vessel logbooks, dealer reports, port sampling, cooperative agreements with states, and scientific observer coverage. Logbooks contain information on fishing vessel activity, including dates of trips,

number of sets, area fished, number of fish, and other marine species caught, released, and retained. In some cases, social and economic data such as volume and cost of fishing inputs are also required.

Pelagic Longline Observer Program

During 2005, NMFS observers recorded 796 PLL sets for an overall fishery coverage of 10.1 percent. In non-experimental fishing, the overall observer coverage was 7.2 percent. A total of 247 experimental PLL sets were observed in the NEC, GOM, FEC, MAB, and SAB areas, primarily during the second and third quarters. These experimental sets (EXP) had 100 percent observer coverage and are separated from the normal commercial fishery in Table 3.16 (Walsh and Garrison, 2006). In 2004, NMFS observers recorded 702 PLL sets for an overall coverage of 7.3 percent. During the first and second quarters of 2004, 60 experimental sets employing circle hooks were made in the Gulf of Mexico. These sets had 100 percent observer coverage (Garrison, 2005). One thousand eighty-eight PLL sets were observed and recorded by NMFS observers in 2003 (11.5 percent overall coverage – 100 percent coverage in the NED; and 6.2 percent coverage in remaining areas) (Garrison and Richards, 2004). Table 3.16 details the amount of observer coverage in past years for this fleet. Generally, due to logistical problems, it has not always been possible to place observers on all selected trips. NMFS is working towards improving compliance with observer requirements and facilitating communication between vessel operators and observer program coordinators. In addition, fishermen are reminded of the safety requirements for the placement of observers specified at 50 CFR 600.746, and the need to have all safety equipment on board required by the U.S. Coast Guard.

Table 3.16 **Observer Coverage of the PLL Fishery.** Source: Yeung, 2001; Garrison, 2003b; Garrison and Richards, 2004; Garrison, 2005; Walsh and Garrison, 2006, 2007.

Year	**Number of Sets Observed**			**Percentage of Total Number of Sets**		
1999	420			3.8		
2000	464			4.2		
2001*	Total	Non-NED	NED	Total	Non-NED	NED
	584	398	186	5.4	3.7	100.0
2002*	856	353	503	8.9	3.9	100.0
2003*	1088	552	536	11.5	6.2	100.0
	Total	Non-EXP	EXP	Total	Non-EXP	EXP
2004**	702	642	60	7.3	6.7	100.0
2005**	796	549	247	10.1	7.2	100.0
2006	568			7.5		

*In 2001, 2002, and 2003, 100 percent observer coverage was required in the NED research experiment.
** In 2004 and 2005 there was 100 percent observer coverage in experimental fishing (EXP).

3.4.3.2 Recent Catch and Landings

U.S. PLL catch (including bycatch, incidental catch, and target catch) is largely related to these vessel and gear characteristics, but is summarized for the whole fishery in Table 3.17.

From May 1992 through December 2000, the Pelagic Observer Program (POP) recorded a total of 4,612 elasmobranchs (15 percent of the total catch) caught off the southeastern U.S. coast in fisheries targeting tunas and swordfish (Beerkircher *et al.*, 2004). Of the 22 elasmobranch species observed, silky sharks were numerically dominant (31.4 percent of the elasmobranch catch), with silky, dusky, night, blue, tiger, scalloped hammerhead, and unidentified sharks making up the majority (84.6 percent) (Beerkircher *et al.*, 2004).

Table 3.17 Reported Catch of Species Caught by U.S. Atlantic PLLs, in Number of Fish, for 2000-2006. Source: PLL Logbook Data.

Species	2000	2001	2002	2003	2004	2005	2006
Swordfish Kept	62,978	47,560	49,320	51,835	46,440	41,139	38,241
Swordfish Discarded	17,074	13,993	13,035	11,829	10,675	11,134	8,900
Blue Marlin Discarded	1,443	635	1,175	595	712	567	439
White Marlin Discarded	1,261	848	1,438	809	1,053	989	557
Sailfish Discarded	1,091	356	379	277	424	367	277
Spearfish Discarded	78	137	148	108	172	150	142
Bluefin Tuna Kept	235	177	178	273	475	375	261
Bluefin Tuna Discarded	737	348	585	881	1,031	765	833
Bigeye, Albacore, Yellowfin, Skipjack Tunas Kept	94,136	80,466	79,917	63,321	76,962	57,132	73,058
Pelagic Sharks Kept	3,065	3,460	2,987	3,037	3,440	3,149	2,098
Pelagic Sharks Discarded	28,046	23,813	22,828	21,705	25,355	21,550	24,113
Large Coastal Sharks Kept	7,896	6,478	4,077	5,326	2,292	3,362	1,768
Large Coastal Sharks Discarded	6,973	4,836	3,815	4,813	5,230	5,877	5,326
Dolphin Kept	29,125	27,586	30,384	29,372	38,769	25,707	25,658
Wahoo Kept	4,193	3,068	4,188	3,919	4,633	3,348	3,608
Turtle Interactions	271	424	465	399	369	152	128
Number of Hooks (X 1,000)	*7,976*	*7,564*	*7,150*	*7,008*	*7,276*	*5,911*	*5,662*

Incidental bycatch

Other species including marine mammals, turtles, seabirds, and finfish are occasionally hooked by pelagic longling vessels. For detailed descriptions of interactions with these species, please refer to section 3.4.1.2 of the 2006 Consolidated HMS FMP.

3.4.3.3 Safety Issues

Like all offshore fisheries, pelagic longlining can be dangerous. Trips are often long, the work is arduous, and the nature of setting and hauling longline gear may result in injury or death. Like all other HMS fisheries, longline fishermen are exposed to unpredictable weather. NMFS does not wish to exacerbate unsafe conditions through the implementation of regulations. Therefore, NMFS considers safety factors when implementing management measures in the PLL fishery. For example, all time/area closures are expected to be closed to fishing, not transiting, in order to allow fishermen to make a direct route to and from fishing grounds. NMFS seeks comments from fishermen on any safety concerns they may have. Fishermen have pointed out that, due to decreasing profit margins, they may fish with less crew or less experienced crew or may not have the time or money to complete necessary maintenance tasks. NMFS encourages fishermen to be responsible in fishing and maintenance activities.

3.4.3.4 International Issues and Catch

PLL fisheries for Atlantic HMS primarily target swordfish and tunas. Directed PLL fisheries in the Atlantic have been operated by Spain, the United States, and Canada since the late 1950s or early 1960s. The Japanese PLL tuna fishery started in 1956 and has operated throughout the Atlantic since then (NMFS, 1999a). Most of the 35 other ICCAT nations now also operate PLL vessels.

ICCAT generally establishes management recommendations on a species (*e.g.*, swordfish) or issue basis (*e.g.*, data collection) rather than by gear type. For example, ICCAT typically establishes quotas or landing limits by species, not gear type. In terms of data collection, ICCAT may require use of specific collection protocols or specific observer coverage levels in certain fisheries or on vessels of a certain size, but these are usually applicable to all gears, and not specific to any one gear type. However, there are a handful of management recommendations that are specifically applicable to the international PLL fishery. These include, a prohibition on longlining in the Mediterranean Sea in June and July by vessels over 24 meters in length, a prohibition on PLL fishing for bluefin tuna in the Gulf of Mexico, and mandated reductions in Atlantic white and blue marlin landings for PLL and purse seine vessels from specified levels, among others.

Because most ICCAT management recommendations pertain to individual species or issues, as discussed above, it is often difficult to obtain information specific to the international PLL fishery. For example, a discussion of the authorized TAC for specific species in this section of the document would be of limited utility because it is not possible to identify what percentage of quotas are allocated to PLL. Division of quota, by gear type, is typically done by individual countries.

Nevertheless, ICCAT does report landings by gear type. Available data indicate that longline effort produces the second highest volume of catch and effort, and is the most broadly distributed (longitudinally and latitudinally) of the gears used to target ICCAT managed species (Figure 3.5) (SCRS, 2004b). Purse seines produce the highest volume of catch of ICCAT managed species from the Atlantic (SCRS, 2004b). From 1999 through 2002 (inclusive) there was a declining trend in estimated international landings of HMS for fisheries in which the United States participated. In 2004, international landings of HMS for fisheries in which the U.S. participated totaled 106,774 mt, which represented a modest decrease from 2003 (SCRS, 2005).

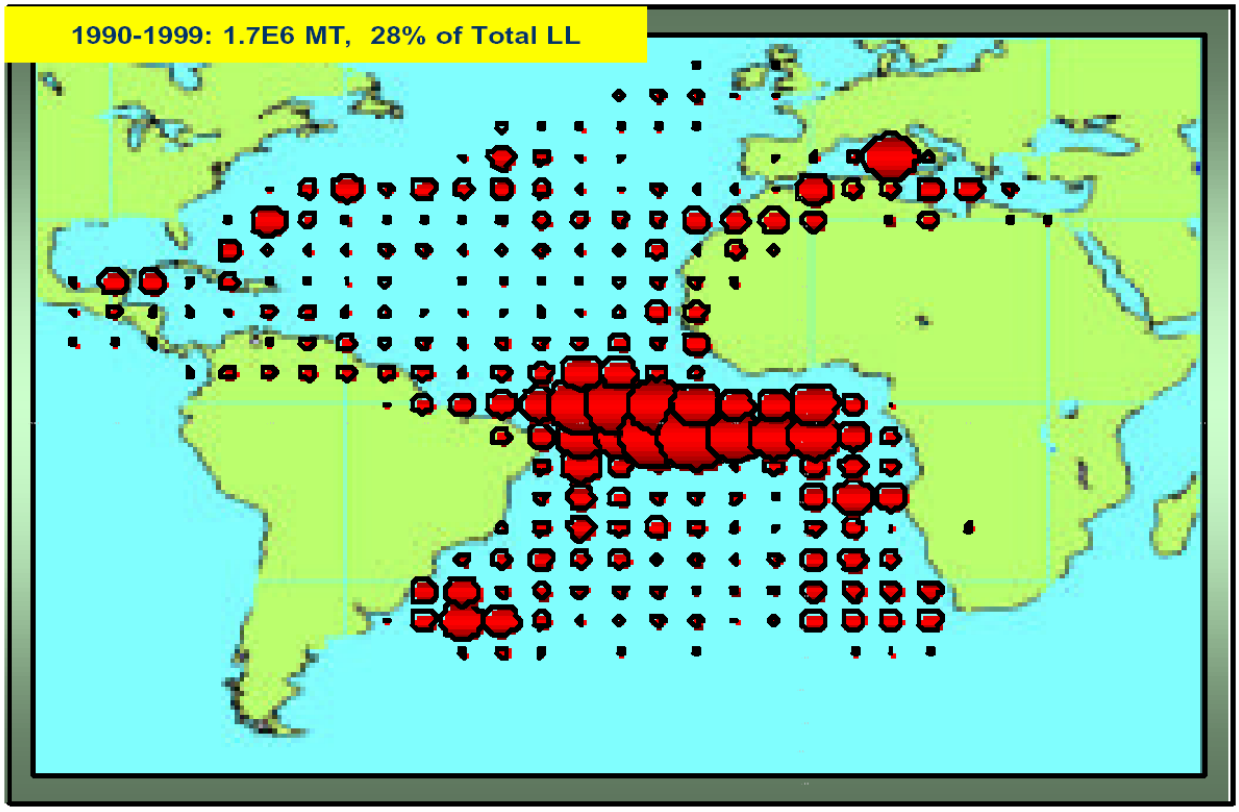

Figure 3.5 **Distribution of Atlantic Longline Catches for all Countries 1990-1999.** Source: SCRS, 2004b.

Scientific observer data are being collected on a range of PLL fleets in the Atlantic and will be increasingly useful in better quantifying total catch, catch composition, and disposition of catch as these observer programs mature. Previous ICCAT observer coverage requirements of five percent for non-purse seine vessels that participated in the bigeye and yellowfin tuna fishery, including PLL (per ICCAT Recommendation 96-01), are no longer in force. There is currently no ICCAT required minimum level of observer coverage specific to PLL fishing. Nevertheless, the United States has implemented a mandatory observer program in the U.S. PLL fishery. Japan is required to have eight percent observer coverage of its vessels fishing for swordfish in the North Atlantic, which are primarily PLL vessels, however, the recommendation is not specific to vessel or gear type. ICCAT recommendation 04-01, a conservation and management recommendation for the bigeye tuna fishery, entered into force in mid-2005 and requires at least five percent observer coverage of PLL vessels over 24 meters fishing for bigeye.

ICCAT has also developed a running tabulation of the diversity of species caught by the various gears used to target tunas and tuna-like species in the Atlantic and Mediterranean (Table 3.18). For all fish species, longline gear shows the highest documented diversity of catch, followed by gillnets and purse seine. For seabirds, longline gear again shows the highest diversity of catch, while for sea turtles and marine mammals, purse seine and gillnet have a higher documented diversity of species for Atlantic tuna fleets (SCRS, 2004b).

Table 3.18 ICCAT Bycatch Table (LL, longline; GILL, gillnets; PS, purse-seine; BB, baitboat; HARP, harpoon; TRAP, traps). Source: SCRS, 2004b.

ICCAT Bycatch Table (www.iccat.es)

Count	Group	LL	GILL	PS	BB	HARP	TRAP	OTHER
214	*All Groups*	149	110	78	12	33	20	43
		69.6%	51.4%	36.4%	5.6%	15.4%	9.3%	20.1%
12	*Skates and Rays*	10	6	6	0	2	0	1
		83.3%	50.0%	50.0%	0.0%	16.7%	0.0%	8.3%
46	*Coastal Sharks*	45	19	6	1	7	2	9
		97.8%	41.3%	13.0%	2.2%	15.2%	4.3%	19.6%
11	*Pelagic Sharks*	10	7	5	0	5	2	4
		90.9%	63.6%	45.5%	0.0%	45.5%	18.2%	36.4%
23	*Teleosts (ICCAT Species)*	23	18	16	9	6	7	11
		100.0%	78.3%	69.6%	39.1%	26.1%	30.4%	47.8%
82	*Teleosts (excluding Scombridae and billfishes)*	44	37	25	2	5	4	17
		53.7%	45.1%	30.5%	2.4%	6.1%	4.9%	20.7%
5	*Sea Turtles*	3	4	5	0	2	1	1
		60.0%	80.0%	100.0%	0.0%	40.0%	20.0%	20.0%
9	*Sea Birds*	8	2	0	0	0	0	0
		88.9%	22.2%	0.0%	0.0%	0.0%	0.0%	0.0%
26	*Marine Mammals*	6	17	15	0	6	4	0
		23.1%	65.4%	57.7%	0.0%	23.1%	15.4%	0.0%

U.S. Pelagic Longline Catch in Relation to International Catch

Highly Migratory Species

The U.S. PLL fleet represents a small fraction of the international PLL fleet that competes on the high seas for catches of tunas and swordfish. In recent years, the proportion of U.S. PLL landings of HMS, for the fisheries in which the United States participates, has remained relatively stable in proportion to international landings. The U.S. fleet accounts for less than 0.5 percent of the landings of swordfish and tuna from the Atlantic Ocean south of 5°N. Latitude and does not operate at all in the Mediterranean Sea. Tuna and swordfish landings by foreign fleets operating in the tropical Atlantic and Mediterranean are greater than the catches from the north Atlantic area where the U.S. fleet operates. Even within the area where the U.S. fleet operates, the U.S. portion of fishing effort (in numbers of hooks fished) is less than 10 percent of the entire international fleet's effort, and likely less than that due to differences in reporting effort between ICCAT countries (NMFS, 2001b).

Atlantic Sharks

There is currently no comprehensive international reporting system for Atlantic shark catches and landings. While there are some international data, not all countries report shark catches and landings and those that do use varying reporting methods. The most recent landings reports for blue, shortfin mako, and porbeagle sharks are presented in Table 3.19, Table 3.20, and Table 3.21, respectively. In 2001, ICCAT passed a resolution on Atlantic sharks to determine needed improvements in data collection for Atlantic shortfin mako and blue sharks, and to conduct an interim meeting in 2003 to discuss the issue. In addition, the resolution called upon Contracting Parties and non-Contracting Parties to: (1) submit catch and effort data on Atlantic shortfin mako, porbeagle, and blue sharks; (2) encourage the release of live sharks that are caught incidentally; (3) minimize waste and discards from shark catches; and (4) voluntarily agree not to increase fishing effort targeting Atlantic porbeagle, shortfin mako and blue sharks until sustainable levels of harvest can be determined through stock assessments.

At its annual meeting in New Orleans in 2004, ICCAT adopted *Recommendation 04-10 Concerning the Conservation of Sharks Caught in Association with Fisheries Managed by ICCAT* which, among other things, bans shark finning, requires vessels to fully utilize their entire catches of sharks, encourages the release of live sharks that are caught incidentally and are not used for food, and reviews the assessment of shortfin mako sharks in 2005, and reassess blue sharks and shortfin mako no later than 2007. The ICCAT recommendation also encouraged countries to engage in research to identify shark nursery areas and collect data on shark catches.

At the 2006 ICCAT annual meeting in Dubrovnik, Croatia, ICCAT adopted Recommendation 06-10 which amended Paragraph 7 of *Recommendation 04-10 Concerning the Conservation of Sharks Caught in Association with Fisheries Managed by ICCAT*. The new paragraph calls for SCRS to conduct stock assessments and recommend management alternatives for Atlantic blue sharks and shortfin mako sharks in time for consideration at the 2008 annual ICCAT meeting. It also requires a data prepatory meeting to be held in 2007 to review all relevant data on biological parameters, catch, effort, discards, trade, and historical data.

Table 3.19 **Nominal Catches of Blue Shark Reported to ICCAT (landings and discards) by Major Gear and Flag between 1991 and 2006.** Source: SCRS, 2007.

		1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Atlantic Total		3,533	2,343	7,879	8,310	8,422	9,036	36,895	33,211	34,208	38,512	33,859	31,867	35,301	35,359	20,596	13,066
LANDINGS	BELIZE	0	0	0	0	0	0	0	0	0	0	0	0	0	37	259	0
	BENIN	0	0	0	0	0	0	6	4	27	0	0	0	0	0	0	0
	BRAZIL	0	0	0	0	0	743	1,103	0	179	1,689	2,173	1,971	2,166	1,667	2,523	2,591
	CANADA	0	0	0	0	276	12	11	5	54	18	0	5	6	0	11	4
	CAPE VERDE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CHINA P.R.	0	0	0	0	0	0	0	0	0	0	750	420	600	0	0	0
	CHINESE TAIPEI	0	0	0	0	0	0	0	0	0	0	0	0	692	1,006	1,155	2,560
	EC CYPRUS	0	0	0	0	0	0	0	0	0	9	0	0	3	6	5	0
	EC DENMARK	1	1	0	1	2	3	1	1	0	2	1	13	0	0	0	0
	EC ESPANA	0	0	0	0	0	0	29,917	28,137	29,005	31,094	25,110	21,037	22,601	24,682	0	0
	EC FRANCE	187	2760	322	350	266	278	213	163	0	395	207	109	0	106	120	0
	EC IRELAND	0	0	0	0	0	0	0	0	66	9	66	11	0	0	0	0
	EC ITALY	0	0	0	0	0	0	0	0	0	0	0	0	0	113	1	95
	EC PORTUGAL	2,257	1,583	5,726	4,669	5,569	5,710	3,966	3,318	3,337	4,220	4,713	4,602	7,486	3,888	7,267	7,111
	EC UNITED KINGDOM	0	0	0	0	12	0	0	1	0	12	9	6	0	0	5	242
	JAPAN	0	0	0	2,596	1,589	1,044	996	850	893	494	532	749	890	1,245	1,967	0
	MEXICO	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0
	NAMIBIA	0	0	0	0	0	0	0	0	0	0	0	2,213	0	1,906	6,616	0
	PANAMA	0	0	0	0	0	0	0	0	177	22	0	0	0	0	0	82
	SOUTH AFRICA	0	0	0	0	0	0	0	23	21	0	83	63	232	128	154	90
	TRINIDAD & TOBAGO	0	0	0	0	0	0	0	0	0	0	0	6	3	2	1	0
	USA	308	215	680	29	23	283	211	255	217	291	42	0	1	7	2	2
	UK BERMUDA	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0
	URUGUAY	8	84	15	93	64	252	286	242	126	119	59	159	620	492	400	234
	VENEZUELA	0	0	0	0	0	0	0	0	0	0	0	0	0	9	26	10
DISCARDS	CANADA	0	0	0	0	0	0	0	16	0	0	0	0	0	0	0	0
	USA	772	184	1,136	572	618	710	185	195	101	137	106	68	0	653	66	45
	UK BERMUDA	0	0	0	0	3	1	0	0	8	0	0	0	0	0	0	0

Table 3.20 **Nominal Catches of Shortfin Mako Shark Reported to ICCAT (landings and discards) by Major Gear and Flag between 1991 and 2006.** Source: SCRS, 2007**.**

		1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Atlantic Total		1,210	1,302	2,957	2,952	4,866	2,771	5,577	5,275	4,002	4,858	4,683	5,380	7,370	7,510	3,801	3,346
LANDINGS	BRAZIL	0	0	0	0	0	83	190	0	27	219	409	226	283	238	256	183
	CANADA	0	0	0	0	111	67	110	69	70	78	69	78	73	80	91	0
	CHINA P.R.	0	0	34	45	23	27	19	74	126	306	22	208	260	0	0	0
	CHINESE TAIPEI	0	0	0	0	0	0	0	0	0	0	0	0	710	178	118	115
	CÔTE D'IVOIRE	9	13	7	17	12	15	23	10	10	9	15	15	30	15	14	22
	EC CYPRUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	EC ESPAÑA	0	0	0	0	0	0	3,777	3,347	2,895	2,769	2,921	2,859	3,226	4,107	0	0
	EC PORTUGAL	314	220	796	649	749	785	519	0425	446	706	523	471	1,874	485	1,366	1,449
	EC UNITED KINGDOM	0	0	0	0	0	0	0	0	2	3	2	1	0	0	0	5
	JAPAN	663	778	1,126	1,583	2,209	1,304	502	1,159	271	402	161	571	385	970	0	0
	MEXICO	0	0	0	0	10	0	0	0	0	10	16	0	10	6	9	5
	NAMIBIA	0	0	0	0	0	0	0	0	1	0	0	459	0	509	1,415	1,243
	PANAMA	0	0	0	0	0	0	0	0	25	1	0	0	0	32	0	0
	SOUTH AFRICA	0	0	0	0	0	0	0	19	13	0	79	19	138	126	125	99
	ST VINCENT AND THE GRENADINES	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0
	TRINIDAD & TOBAGO	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0
	USA	210	250	945	628	1,703	465	408	148	69	292	395	415	142	410	187	130
	UK BERMUDA	0	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0
	URUGUAY	14	15	29	12	21	24	28	21	43	63	70	58	239	275	185	73
	VANUATU	0	0	0	0	0	0	0	0	0	0	0	0	0	52	12	13
	VENEZUELA	0	0	0	0	0	0	0	0	0	0	0	0	0	58	20	6
DISCARDS	MEXICO	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	USA	0	26	20	18	28	0	0	0	0	0	0	0	0	0	0	0
	UK BERMUDA	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0

Table 3.21 **Nominal Catches of Porbeagle Shark Reported to ICCAT (landings and discards) by All Gears and Flag between 1991 and 2006.**
Source: SCRS, 2007 ·

		1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	
Atlantic Total		1,944	2,588	1,889	2,676	2,121	1,548	1,859	1,468	1,143	1,469	998	848	332	725	556	272
LANDINGS	BENIN	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0
	CANADA	329	813	919	1,575	1,353	1,051	1,334	1,070	965	902	499	237	142	232	202	192
	CHILE	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	BULGARIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EC DENMARK	85	80	91	93	86	72	69	85	107	73	76	42	0	0	0	0
	EC ESPAÑA	1	0	0	0	0	31	27	27	0	20	25	57	35	15	0	0
	EC FRANCE	300	496	633	820	565	267	315	219	0	410	361	461	0	413	276	0
	EC GERMANY	0	0	0	0	0	0	0	0	0	17	1	3	0	0	0	0
	EC IRELAND	0	0	0	0	0	0	0	0	7	1	6	3	0	0	0	0
	EC ITALY	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1
	EC POLAND	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	EC PORTUGAL	1	0	0	0	0	0	0	0	0	7	4	10	101	54	16	6
	EC SWEDEN	2	4	3	2	2	1	1	1	1	1	1	0	0	0	0	0
	EC UNITED KINGDOM	0	0	0	0	0	0	0	1	6	8	12	10	0	0	24	11
	FALKLANDS	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	FAROE ISLANDS	1,189	1,149	165	48	44	8	9	7	10	0	0	0	0	0	0	0
	ICELAND	0	1	3	4	6	5	3	4	2	2	3	2	0	0	0	0
	JAPAN	0	0	1	0	0	8	18	0	1	0	0	0	0	0	0	0
	NORWAY	32	41	24	24	26	28	17	27	32	22	11	14	19	0	8	27
	SEYCHELLES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	USA	5	1	50	106	35	78	56	13	3	1	1	1	0	1	0	0
	URUGUAY	0	0	0	0	3	0	5	13	2	4	0	8	34	8	28	34
DISCARDS	EC IRELAND	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	USA	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	URUGUAY	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0

3.4.4 Recreational Handgear

The following section describes the recreational portion of the handgear fishery, and is primarily focused upon rod and reel fishing. The HMS Handgear (rod and reel, handline, and harpoon) fishery includes both commercial and recreational fisheries and is described fully in Section 2.5.8 of the 1999 FMP. Handgear components may also be deployed as a specialized trolling gear to target surface-feeding tunas. Under this configuration, the line and leaders are elevated and actively trolled so that the baits fish on or above the water's surface. This style of fishing is often referred to as "green-stick fishing," and reports indicate that it can be extremely efficient compared to conventional fishing techniques. For more information on green-stick fishing gear and the configurations allowed under current regulations, please refer to the discussions of alternative H4 in Chapters 2 and 4 of the 2006 Consolidated HMS FMP. At present, NMFS is considering alternatives in regard to changes with greenstick use in HMS fisheries, and what NMFS should keep in mind about greenstick gear when considering a change in authorization of this gear.

3.4.4.1 Overview of History and Current Management

Atlantic tunas, swordfish, and sharks are managed under the Consolidated FMP and Amendment 1 to the 1999 FMP. Summaries of the Atlantic shark fishery are found in Sections 2.4.3 of the 1999 FMP.

Atlantic tunas, sharks, swordfish, and billfish are all targeted by domestic recreational fishermen using rod and reel gear. The recreational swordfish fishery had declined dramatically over the past twenty years, but recent information indicates that the recreational swordfish fishery is rebuilding in the Mid-Atlantic Bight, and off the east coast of Florida. Effective March 1, 2003, an HMS Angling category permit has been required to fish recreationally for any HMS-managed species (Atlantic tunas, sharks, swordfish, and billfish) (67 FR 77434, December 18, 2002). Prior to March 1, 2003, the regulations only required vessels fishing recreationally for Atlantic tunas to possess an Atlantic Tunas Angling category permit.

Recreational fishing for Atlantic HMS is managed primarily through the use of minimum size limits and bag limits. The recreational shark fishery is managed using bag limits, minimum size requirements, and landing requirements (sharks must be landed with head and fins attached). Additionally, the possession of 19 species of sharks is prohibited.

3.4.4.2 Most Recent Catch and Landings Data

The recreational landings database for HMS consists of information obtained through surveys including the Marine Recreational Fishery Statistics Survey (MRFSS), Large Pelagic Survey (LPS), Southeast Headboat Survey (HBS), Texas Headboat Survey, and Recreational Billfish Survey Tournament Data (RBS). Descriptions of these surveys, the geographic areas they include, and their limitations, are discussed in Section 2.6.2 of the 1999 FMP.

Shark Recreational Fishery

Recreational landings of sharks are an important component of HMS fisheries. Recreational shark fishing with rod and reel is a popular sport at all social and economic levels, largely because the resource is accessible. Sharks can be caught virtually anywhere in salt water, depending upon the species. Recreational shark fisheries are oftentimes exploited in nearshore waters by private vessels and charter/headboats. However, there is also some shore-based fishing and some offshore fishing. The following tables provide a summary of landings for each of the three species groups. Amendment 1 to the 1999 Atlantic Tunas, Swordfish, and Shark FMP limited the recreational fishery to rod and reel and handline gear only.

Table 3.22 Estimates of Total Recreational Harvest of Atlantic Sharks: 1999-2006 (numbers of fish in thousands). Source: Cortés and Neer 2005, Cortés, pers. comm. Estimates include prohibited species.

Species Group	1999	2000	2001	2002	2003	2004	2005	2006
LCS	92.3	140.0	137.2	82.8	88.8	66.6	86.2	59.5
Pelagic	11.1	13.3	3.8	4.7	4.3	5.0	5.4	18.1
SCS	125.7	199.9	212.5	153.8	133.7	126.0	119.1	121.7
Unclassified	6.9	10.9	24.5	5.4	18.1	27.9	47.4	7.3

Table 3.23 Recreational Harvest of Atlantic LCS by Species, in number of fish: 1999-2006. Sources: Cortés and Neer 2005, Cortés, pers. comm.

LCS Species	1999	2000	2001	2002	2003	2004	2005	2006
Basking**	0	0	0	0	0	0	0	0
Bignose*	0	0	0	0	0	17	0	0
Bigeye sand tiger**	0	0	0	0	0	0	0	0
Blacktip	31,778	73,998	49,488	39,756	40,402	30,872	44,831	31,724
Bull	2,775	6,075	4,117	1,823	3,455	4,883	1,377	4,284
Caribbean Reef*	3	59	268	741	0	652	5	47
Dusky*	5,337	3,116	5,993	1,047	2,806	142	3,050	191
Galapagos*	0	0	0	0	0	0	0	0
Hammerhead, Great	555	925	3,446	4	47	9	162	139
Hammerhead, Scalloped	614	3,781	1,494	1,358	2,956	930	5,212	537
Hammerhead, Smooth	1	2	703	2	1	0	0	2
Hammerhead, Unclassified	0	3,691	0	5,247	0	0	2,676	1,099
Lemon	122	5,434	5,884	4,921	4,876	5,578	506	1,145
Night*	50	24	0	0	0	0	15	1
Nurse	1,429	2,214	4,934	2,562	563	3,463	2,341	1,553
Sandbar	20,228	10,965	36,094	8,530	5,151	3,853	2,795	848
Sand tiger**	0	0	604	0	0	0	0	1,040
Silky	361	6,233	3,928	1,741	1,943	399	3,589	2,042
Spinner	6,075	4,810	3,384	3,732	4,483	3,435	3,055	2,022
Tiger	7	1,480	732	126	110	1	1,321	1,309
Whale**	0	0	0	0	0	0	0	0
White**	0	0	0	0	0	0	0	0
Requiem shark unclassified	12,813	17,164	16,136	11,173	21,990	12,388	15,319	11,511
Total:	82,148	139,971	137,205	82,763	88,783	66,622	86,254	59,494

*indicates species that were prohibited in the recreational fishery as of July 1, 1999.

** indicates species that were prohibited as of April 1997.

Table 3.24 Recreational Harvest of Atlantic Pelagic Sharks by Species, in number of fish: 1999-2006. Sources: Cortés and Neer 2005, Cortés, pers. comm**.**

Pelagic Shark Species	1999	2000	2001	2002	2003	2004	2005	2006
Bigeye thresher*	0	0	0	65	0	0	0	42
Bigeye sixgill*	0	0	0	0	0	0	0	0
Blue Shark	5,218	7,011	950	0	376	0	31	980
Mako, Longfin*	0	0	0	0	0	0	0	0
Mako, Shortfin	1,383	5,813	2,827	3,206	3,922	4,964	3,857	3,363
Mako, Unclassified	9	0	0	0	0	0	0	0
Oceanic whitetip	0	0	0	0	0	0	0	0
Porbeagle	0	0	0	0	0	0	0	0
Sevengill*	0	0	0	0	0	0	0	0
Sixgill*	0	0	0	0	0	0	0	0
Thresher	4,512	529	0	1,467	0	0	1,504	13,747
Total:	11,122	13,353	3,777	4,738	4,298	4,964	5,392	18,132

* indicates species that were prohibited in the recreational fishery as of July 1, 1999.

Table 3.25 Recreational Harvest of Atlantic SCS by Species, in number of fish: 1999-2006. Sources: Cortés and Neer 2005, Cortés, pers. comm.

SCS Species	1999	2000	2001	2002	2003	2004	2005	2006
Atlantic Angel*	0	0	0	0	0	0	0	0
Blacknose	6,139	10,410	14,885	11,438	6,615	15,215	7,110	9,947
Bonnethead	37,341	56,436	59,017	51,048	40,066	42,050	31,369	24,302
Finetooth	78	1,390	6,628	3,027	1,758	286	2,847	268
Sharpnose, Atlantic	69,153	130,727	131,912	88,297	85,299	68,421	77,712	87,180
Sharpnose, Caribbean*	0	0	0	0	0	0	0	0
Smalltail*	4	973	70	0	0	71	35	0
Total:	112,71	199,936	212,512	153,810	133,738	126,043	119,073	121,697

*indicates species that were prohibited in the recreational fishery as of July 1, 1999.

3.4.4.3 Bycatch Issues and Data Associated with the Fishery

Bycatch in the recreational rod and reel fishery is difficult to quantify because many fishermen value the experience of fishing and may not be targeting a particular pelagic species. Recreational "marlin" or "tuna" trips may yield dolphin, tunas, wahoo, and other species, both undersized and legal sized. Bluefin tuna trips may yield undersized bluefin, or a seasonal closure may prevent landing of a bluefin tuna above a minimum or maximum size. Therefore, in some cases, rod and reel catch may be discarded. The Magnuson-Stevens Act (16 USC 1802 (2)) stipulates that bycatch does not include fish under recreational catch-and-release.

Bycatch can result in death or injury to discarded fish. Therefore, bycatch mortality should be incorporated into fish stock assessments, and into the evaluation of management measures. Rod and reel discard estimates from Virginia to Maine during June – October could be monitored through the expansion of survey data derived from the LPS (dockside and

telephone surveys). However, the actual numbers of fish discarded for many species are so low that presenting the data by area could be misleading, particularly if the estimates are expanded for unreported effort in the future. The number of kept and released sharks reported or observed through the LPS dockside intercepts for 1997 – 2004 is presented in Table 3.26.

Table 3.26 **Observed or reported number of Atlantic Shark kept and released in the rod and reel fishery, Maine through Virginia, 1997-2005.**
Source: Large Pelagic Survey (LPS) Preliminary Data**.**

	Number of Fish Kept								Number of Fish Released Alive							
Species	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Thresher Shark	7	3	2	5	20	24	58	45	2	2	1	0	5	8	27	8
Mako Shark	78	49	49	27	72	141	216	99	92	49	114	65	120	208	350	143
Sandbar Shark	2	2	1	2	0	9	7	1	56	6	4	10	17	26	68	37
Dusky Shark	6	1	0	0	1	0	0	0	54	7	32	8	9	0	60	49
Tiger Shark	2	0	0	1	1	0	0	1	5	0	3	2	3	12	0	6
Porbeagle	1	0	0	0	1	0	1	1	6	0	0	0	14	3	1	1
Blacktip Shark	1	0	0	1	0	1	0	1	2	5	0	0	6	0	1	19
Atlantic Sharpnose Shark	1	0	0	0	0	0	0	0	3	0	0	0	0	0	0	11
Blue Shark	26	11	12	2	36	65	74	67	780	572	374	141	505	2,061	2,242	821
Hammerhead Shark	1	1	1	2	0	0	1	0	4	5	0	1	6	38	2	5

3.4.5 Fishery Data: Landings by Shark Species

The purpose of this section is to provide a summary of recent landings of sharks on a species by species basis, including sharks caught under special permits (such as EFPs), which are not recorded in commercial logbooks. Landings for sharks were compiled from the most recent stock assessment documents.

Table 3.27 Commercial landings of LCS in lb dw: 2001-2006. Sources: Cortés 2003; Cortés and Neer 2002, 2005; Cortés pers. comm.

Large Coastal Sharks	2001	2002	2003	2004	2005	2006
Basking**	0	0	0	0	0	0
Bignose*	1,442	0	318	0	98	61
Bigeye sand tiger**	0	0	0	0	0	0
Blacktip	1,135,199	1,099,194	1,474,362	1,092,600	993,380	1,272,016
Bull	27,037	40,463	93,816	49,556	133,265	173,125
Caribbean Reef*	1	0	0	0	0	0
Dusky*	1,973	8,779	23,288	1,025	874	4,183
Galapagos*	0	0	0	0	0	0
Hammerhead, Great	0	0	0	0	0	0
Hammerhead, Scalloped	0	0	0	0	0	0
Hammerhead, Smooth	0	0	0	92	54	108
Hammerhead, Unclassified	69,356	108,160	150,368	116,546	197,067	153,592
Large Coastal, Unclassified	172,494	147,359	51,433	0	0	0
Lemon	24,453	56,921	80,688	67,810	71,805	62,738
Narrowtooth*	0	0	0	0	0	0
Night*	0	0	20	0	0	0
Nurse	387	69	70	317	97	2,258
Sandbar	1,407,550	1,863,420	1,425,628	1,223,241	1,282,477	1,516,497
Sand Tiger**	1,248	409	624	1,832	5,167	3,166
Silky	14,197	30,731	51,588	11,808	17,646	16,173
Spinner	6,970	8,447	12,133	14,806	44,150	96,259
Tiger	26,973	16,115	18,536	30,976	33,477	53,706
Whale**	0	0	0	0	0	0

Large Coastal Sharks	2001	2002	2003	2004	2005	2006
White**	26	0	1,454	58	0	88
Unclassified, assigned to large coastal	525,661	771,450	908,077	603,229	527,026	397,851
Unclassified, fins	23,988	142,565	181,431	137,375	110,613	145,928
Total (excluding fins)	**3,414,967 (1,549 mt dw)**	**4,151,594 (1,883 mt dw)**	**4,292,403 (1,947 mt dw)**	**3,213,896 (1,458 mt dw)**	**3,306,583 (1,500 mt dw)**	**3,751,821 (1,698 mt dw)**

* indicates species that were prohibited in the commercial fishery as of June 21, 2000.
** indicates species that were prohibited as of April 1997.

Table 3.28 **Commercial landings of SCS in lb dw: 2001-2006**. Sources: Cortés and Neer 2002, 2005; Cortés 2003; Cortés pers. comm.

Small coastal sharks	2001	2002	2003	2004	2005	2006
Atlantic Angel*	0	495	1,397	818	3,587	249
Blacknose	160,990	144,615	131,511	68,108	120,320	187,907
Bonnethead	63,461	36,553	38,614	29,402	33,295	33,911
Finetooth	303,184	185,120	163,407	121,036	107,327	80,536
Sharpnose, Atlantic	196,441	213,301	190,960	230,880	375,881	519,019
Sharpnose, Atlantic, fins	209	0	0	0	0	0
Sharpnose, Caribbean*	205	0	0	0	0	0
Unclassified Small Coastal	51	35,831	8,634	1,407	9,792	471
Total (excluding fins)	**724,332 (329 mt dw)**	**615,915 (279 mt dw)**	**534,523 (242 mt dw)**	**451,651 (205 mt dw)**	**650,202 (295 mt dw)**	**822,093 (373 mt dw)**

* indicates species that were prohibited in the commercial fishery as of June 21, 2000.

Table 3.29 **Commercial landings of pelagic sharks in lb dw: 2001-2006.** Sources: Cortés and Neer 2002, 2005; Cortés 2003; Cortés pers. comm.

Pelagic Sharks	2001	2002	2003	2004	2005	2006
Bigeye thresher*	330	0	0	719	267	0
Bigeye sixgill*	0	0	0	0	0	0

Pelagic Sharks	2001	2002	2003	2004	2005	2006
Blue shark	65	137	6,324	423	0	588
Mako, longfin*	9,453	3,008	1,831	1,827	403	2,125
Mako, shortfin	171,888	159,840	151,428	217,171	188,608	107,267
Mako, Unclassified	73,556	58,392	33,203	50,978	35,241	27,231
Oceanic whitetip	922	1,590	2,559	1,082	713	338
Porbeagle	1,152	2,690	1,738	5,832	2,452	3,456
Sevengill*	0	0	0	0	0	0
Sixgill*	0	0	0	0	0	0
Thresher	56,893	53,077	46,502	44,915	24,280	32,549
Unclassified, pelagic	0	5,965	79,439	0	0	411
Unclassified, assigned to pelagic	31,636	182,983	314,300	356,522	18,057	12,936
Unclassified, pelagic, fins	12,239	0	0	41	0	0
Total (excluding fins)	**345,895 (157 mt dw)**	**467,682 (212 mt dw)**	**637,324 (289 mt dw)**	**679,469 (308 mt dw)**	**270,021 (122 mt dw)**	**186,901 (85 mt dw)**

* indicates species that were prohibited in the commercial fishery as of June 21, 2000

Table 3.30 **The number of sharks and non-shark species that were discarded alive, discarded dead, and kept under the exempted fishing program during 2006, including exempted fishing permits, display permits, scientific research permits, and letters of acknowledgement.** These numbers do not include fish that were reported in commercial logbooks.

Species	Number Discarded Alive	Number Discarded Dead	Number Kept	Total Number of Interactions
Shark Species				
Angel Shark	12			12
Atlantic Sharpnose Shark	2,512	354	3	2,869
Bigeye Thresher Shark	1	1	1	3
Blacknose Shark	190	44		234
Blacktip Shark	124	117	1	242
Blue Shark	52			52
Bonnethead Shark	407	28	3	438
Bull Shark	33	2		35
Caribbean Reef Shark	4	2		6
Caribbean Sharpnose Shark	3			3
Cuban Dogfish Shark	5			5
Dusky Shark	36			36
Finetooth Shark	1			1
Florida Smoothhound Shark	152	2		154
Great Hammerhead Shark	5	18		23
Lemon Shark	47	2		49
Longfin Mako Shark		1		1

Species	Number Discarded Alive	Number Discarded Dead	Number Kept	Total Number of Interactions
Mako Shark	7			7
Night Shark	3			3
Nurse Shark	146		15	161
Porbeagle Shark	1			1
Sand Tiger Shark	21		6	27
Sandbar Shark	330	61	6	397
Sawfish	5			5
Scalloped Hammerhead Shark	33	8		41
Sevengill Shark	1			1
Silky Shark	15			15
Smooth Dogfish Shark	86	1		87
Smooth Hammerhead Shark			1	1
Spinner Shark	60	10		70
Spiny Dogfish Shark	25			25
Tiger Shark	120			120
Unidentified Shark	10			10
Non-Shark Species				
Barracuda	13			13
Bigeye Tuna		2		2
Black Seabass	5			5
Blacktail Moray	3			3
Blue Marlin	8		1	9
Bluefin Tuna	32	2	108	142
Bluefish	4	2	11	17
Blueline Tilefish		1		1
Bullnose Ray			2	2
Clearnose Skate	3			3
Croaker	1			1
Dasyatis Spp.	3			3
Escoler			2	2
Gafftopsail Catfish	19			19
Goldeye Tilefish	1			1
Goliath Grouper	1			1
Gulf Hake	2	1		3
Hardhead Catfish	5			5
Inshore Lizardfish	1			1
King Mackerel		1		1
King Snake Eel	72			72
Leatherback Sea Turtle	1			1
Leopard Toadfish	1			1
Little Tunny			1	1
Loggerhead Turtle	2		1	3
Dolphin Fish	3	2	13	18
Malabar Grouper		1		1
Palespotted Eel	5			5
Red Drum	4			4
Red Grouper	42	2		44
Red Snapper	36	3		39
Reticulate Moray	2			2

Species	Number Discarded Alive	Number Discarded Dead	Number Kept	Total Number of Interactions
Sailfish	3			3
Sand Perch		1		1
Sand Seabass		1		1
Scamp	3			3
Shark Sucker	3			3
Snakefish	1			1
Snapper Eel	1			1
Snowy Grouper	13			13
Southern Stingray	25			25
Swordfish	1			1
Tilefish	30			30
Unidentified Fish	2			2
Vermilion Snapper	4			4
Warsaw Grouper	1			1
White Marlin	26	1	6	33
Yellowedge Grouper	35			35
Yellowfin Tuna			1	1

Table 3.31 **Estimates of total landings and dead discards for LCS from 1981 through 2006 (numbers of fish in thousands).** Sources: Modified from Table 2.2 in SEDAR 11 LCS Data Workshop Report (NMFS, 2006b) and Cortés, pers. comm.

Year	Commercial Landings	Pelagic longline discards	Recreational catches	Unreported catches	Bottom longline discards	Mexican catches	Menhaden fishery discards	Confiscated Mexican catches in US	Total
1981	16.2	0.9	285.1		0.5	119.971	37.5		460.2
1982	16.2	0.9	539.3		0.5	81.913	38.5		677.3
1983	17.5	0.9	812.7		0.6	85.437	38.0		955.1
1984	23.9	1.3	273.3		0.8	120.684	38.0		458.0
1985	22.2	1.2	407.8		0.7	87.748	34.2		553.9
1986	54	2.9	426.7	24.9	1.7	81.835	33.8		625.8
1987	104.7	9.7	298.3	70.3	3.3	80.16	35.2		601.7
1988	274.6	11.4	317.2	113.3	8.7	89.29	34.2		848.6
1989	351	10.5	224.8	96.3	11.1	105.562	36.1		835.3
1990	267.5	8	219.2	52.1	8.5	122.22	35.2		712.7
1991	200.2	7.5	306.2	11.3	6.3	95.695	27.2		654.4
1992	215.2	20.9	218.0		6.8	103.366	23.9		588.2
1993	169.4	7.3	189.2		5.4	119.82	24.4		515.5
1994	228	8.8	155.2		3.7	110.734	26.1		532.6
1995	222.4	5.2	186.0		5.2	95.996	24.0		538.8
1996	161.0	5.7	196.6		4.8	106.057	23.9		498.0
1997	130.6	5.6	167.6		6.7	83.051	24.4		418.0
1998	174.9	4.3	161.4		6.6	74.136	23.5		444.8
1999	111.5	9.0	82.1		2.9	57.061	25.8		288.4
2000	111.2	9.4	140.0		4.1	52.057	22.1	1.000	339.9
2001	95.8	5.6	137.2		5.5	52.057	20.6	1.470	318.2
2002	123.7	2.43	82.8		4.8	52.057	20.2	1.390	287.4
2003	128.0	3.5	88.8		7.1	52.057	19.7	1.310	300.5
2004	103.4	5.2	66.6		4.7	52.057	20.2	2.120	254.3
2005	107.4	4.5	86.3		8.1	52.057	20.2	2.120	280.6
2006	128.8	2.7	59.5		7.5	52.057	20.2	2.120	272.9

3.5 HMS Permits and Tournaments

This section provides updates for the number of permits that were issued in conjunction with HMS fishing activities. These are current through 2006 and, in some cases, October 1, 2007, depending on the table in which the data appears. Furthermore, Section 3.9.6 provides a comprehensive synthesis of recreational fishing tournaments and their role in the context of HMS management.

NMFS' HMS Management Division continues to monitor capacity in HMS fisheries. Updated permit numbers for HMS and non-HMS fisheries as of 2006 (and beyond) are included in Table 3.32. The overall number of HMS permits for Atlantic swordfish and sharks (directed and incidental) decreased between 2006 and October 1, 2007 (Table 3.32), however, these numbers are subject to change based upon on-going permit renewal or expiration.

Table 3.32 Distribution of Shark Directed and Incidental Permits and Other held in other Fisheries by State as of Oct. 1, 2007.

State	SHK-Directed	SHK Incidental	SWO Directed	SWO Incidental/ Handgear	GOM Reef Fish	Dolphin Wahoo	*Mackerel: King and Spanish	Lobster	Snapper-Grouper		Other
ME	2	1	2	1		2					
NH	2	2		1							
MA	4	10	7	13		11	5	2			3
RI			1	18		5		2			
CT	1	1		1	1	1				3	
NY	9	9	12	8		17	6		2	1	
NJ	25	27	26	18		33	33	2	2	8	4
DE											
MD	4	5	7	1		9	2			3	
VA	2	5		3		2	2		1		
NC	20	15	11	8		28	42		16	7	4
SC	7	12	4	1		14	14	1	14	9	2
GA	2	1				3	5	4	3		
FL	132	137	63	69	111	186	309	46	81	154	13
AL	5	1		2	5		3				
MS	1	5									

State	SHK-Directed	SHK Incidental	SWO Directed	SWO Incidental/ Handgear	GOM Reef Fish	Dolphin Wahoo	*Mackerel: King and Spanish	Lobster	Snapper-Grouper		Other
LA	4	35	31	4	3	4	7				2
TX	3	9	2	5	11	1	8				1
No Vessel ID	7	14	14	7							4
	231	**296**	**180**	**160**	**134**	**316**	**444**	**54**	**119**	**193**	**29**
	240	**312**	**191**	**86**	***	***	***	***	***	***	***
	235	**320**	**190**	**91**	***	***	***	***	***	***	***

*** Numbers for 2005 and 2006 were taken from the Consolidated HMS FMP. Non-HMS permits were not calculated at that time.

3.5.1 Upgrading and Safety Issues

When the limited access program was implemented, NMFS included upgrading restrictions that were the same as those implemented by the New England Fishery Management Council (NEFMC) and Mid-Atlantic Fishery Management Council (MAFMC) in order to help minimize the number of regulations for fishermen in those areas. These regulations restrict vessels from any increase over ten percent length overall (LOA), ten percent gross or net tonnage, and 20 percent horsepower. NMFS continued to receive comments that these vessel upgrading restrictions are not appropriate for longline fisheries, may inhibit full utilization of the domestic swordfish quota, are not the preferred vessel characteristics to limit overcapitalization, and have caused safety at sea concerns. In developing the current upgrading restrictions, hold capacity was identified by constituents as a vessel characteristic that would not impact safety at sea and would meet the objective of addressing overcapitalization in HMS commercial fisheries. NMFS did not implement hold capacity as a measure to limit vessel upgrading in 1999 due to the lack of standard measurements of vessel hold capacity as well as the lack of consistent collection of this information for HMS commercial vessels as part of existing vessel registration systems. NMFS considered other possible options including: eliminating upgrading restrictions; limiting hold capacity instead of, or in addition to, the current restrictions; allowing a greater percentage increase; and creating vessel categories. NMFS heard similar comments as those listed above from the HMS AP in March of 2007.

On June 7, 2007, NMFS published a final rule which modified HMS limited access vessel upgrading restrictions for vessels concurrently issued certain HMS permits (72 FR 31688). According to this rule, effective August 6, 2007, HMS limited access vessel upgrading restrictions are modified, but only for vessels that concurrently possess, or are eligible to renew, on August 6, 2007, incidental or directed swordfish and shark permits, as well as an Atlantic Tunas Longline category permit. These vessels may be upgraded, or permits transferred, so long as the upgrade or permit transfer does not result in an increase in vessel size (LOA, GRT, and NT) of more than 35 percent, relative to the vessel first issued the HMS LAP. Also, all horespower upgrading restrictions for these vessels are removed by the rule. In addition, effective July 9, 2007, restrictions specifying that a vessel may be upgraded only once will be removed for all HMS LAPs. NMFS will provide additional information to LAP holders regarding eligibility for the modified vessel upgrading restrictions in a future notice.

3.5.2 HMS CHB Permits

In 2002, NMFS published a final rule (67 FR 77434, December 18, 2002) expanding the HMS recreational permit from tuna only to include all HMS and define CHB operations. This established a requirement that owners of charterboats or headboats that are used to fish for, take, retain, or possess Atlantic tunas, sharks, swordfish, or billfish must obtain a HMS CHB permit. This permit replaced the Atlantic Tunas CHB permit. A vessel issued a HMS CHB permit for a fishing year will not be issued an HMS Angling permit or any Atlantic Tunas permit in any category for that same fishing year, regardless of a change in the vessel's ownership. The total number of CHB increased between February 1, 2006, and April 25, 2007 (Table 3.33).

Table 3.33 CHB Permits by State as of October 1, 2007.

State	CHB permits	State	CHB Permits
AL	62	NH	51
CT	93	NJ	555
DE	143	NV	1
FL	598	OH	2
GA	21	PA	48
LA	77	PR	18
MA	643	RI	155
MD	163	SC	127
ME	90	TN	--
MI	2	TX	152
MS	25	VA	123
NC	375	VI	20
NY	341	Other	14
Total (2007)			**4,899**
Total (2006)			**4,173**

3.5.3 HMS Angling Permits

Effective March 2003 (67 FR 77434, December 18, 2002), the HMS Angling category permit allows all recreational anglers aboard permitted vessels to fish for HMS and is required to fish for, retain, or possess, including catch and release fishing, any Federally regulated HMS. These species include: sharks, swordfish, white and blue marlin, sailfish, spearfish, and Federally regulated Atlantic tunas (bluefin, yellowfin, bigeye, skipjack, and albacore). Atlantic HMS caught, retained, possessed, or landed by persons on board vessels with an HMS Angling permit may not be sold or transferred to any person for a commercial purpose. By definition, recreational landings of Atlantic HMS are those that cannot be marketed through commercial channels, therefore it is not possible to monitor anglers' catches through ex-vessel transactions as in the commercial fishery. Instead, NMFS conducts statistical sampling surveys of the recreational fisheries. These survey programs have been used for over a decade and include the MRFSS and the LPS. A vessel issued an HMS Angling permit for a fishing year shall not be issued an HMS Charter/Headboat permit or an Atlantic Tunas permit in any category for that same fishing year, regardless of a change in the vessel's ownership.

3.5.4 Dealer Permits

Dealer permits are required for commercial receipt of Atlantic tuna, swordfish, and sharks, and are described in further detail in the 1999 FMP for Atlantic Tunas, Swordfish, and Sharks. Shark dealers are also required to attend shark identification workshops as of December 31, 2007, and in an upcoming proposed rule, NMFS is proposing new shark identification workshop requirements. Dealer permits are not limited access. Fishermen caught selling HMS

to unpermitted dealers and persons without a dealer permit buying HMS from fishermen could be subject to enforcement action. Similarly, persons caught buying HMS from non-commercial fishermen could also be subject to enforcement action. All dealer permit holders are required to submit reports detailing the nature of their business. For swordfish and shark permit holders (including those who *only* import swordfish), dealers must submit bi-weekly dealer reports on all HMS they purchase. Tuna dealers must submit, within 24 hours of the receipt of a bluefin tuna, a landing report for each bluefin purchased from U.S. fishermen. Dealers must also submit bi-weekly reports that include additional information on tunas that they purchase. To facilitate quota monitoring "negative reports" for shark and swordfish are also required from dealers when no purchases are made (*i.e.*, NMFS can determine who has not purchased fish versus who has neglected to report). As of October 1, 2007, there are 269 permitted shark dealers (Table 3.34). NMFS continues to automate and improve its permitting and dealer reporting systems and plans to make additional permit applications and renewals available online in the near future.

Table 3.34 **Number of shark dealer permits and other permits held by shark dealers by state or country as of Oct. 1, 2007.** The actual number of permits per may change as permit holders move or sell their businesses.

State	Sharks	Domestic Swordfish	Dolphin/ Wahoo	Reef Fish	Rock Shrimp	Snapper/ Grouper	Golden Crab	Wreckfish	Total # of Permits
AL	4	1	2	4	1	2	1	1	16
CA	11	11	2		2	2			28
FL	102	76	37	79	21	65	18	15	413
GA	1	1	1		1	1		1	6
HI	16	16				4			36
LA	12	10	6	11	1	8		1	49
MA	14	14	10	2	1	3	1	1	46
MD	2	2	2						6
MO	1		1	1		1			4
MS	1			1					2
NC	23	15	22	4	2	23		7	96
NJ	15	15	7	1	2	4	1	1	46
NY	17	17	15	10	2	5	2	2	70
PA	1	1	1	1	1	1	1	1	8
PR	1	1							2
RI	6	6	6			1	1	1	21
SC	21	8	15			15		3	62
TX	17	10	3	15	2	4			51
VA	4	2	2			2		1	11
Totals (2007)	**269**	**206**	**132**	**129**	**36**	**141**	**25**	**35**	**973**

3.5.5 Exempted Fishing Permits (EFPs), Display Permits, Chartering Permits, and Scientific Research Permits (SRPs)

EFPs, display permits, and SRPs are requested and issued under the authority of the Magnuson-Stevens Act (16 U.S.C. 1801 *et seq*.) and/or the ATCA (16 U.S.C. 971 *et seq*.). EFPs are issued to individuals interested in being exempted from regulations for the purpose of conducting research or other fishing activities using private (non-NOAA) vessels, whereas an SRP would be issued to agency scientists who are using NOAA vessels as their research platform. Display permits are issued to individuals who are fishing for, catching, and then transporting HMS to certified aquariums for public display. Regulations at 50 CFR 600.745 and 50 CFR 635.32 govern scientific research activity, exempted fishing, and exempted educational activity with respect to Atlantic HMS. Amendment 1 to the 1999 FMP for Atlantic Tunas, Swordfish, and Sharks implemented and created a separate display permitting system, which operates apart from the exempted fishing activities that are focusing on scientific research. However, the application process for display permits is similar to that required for EFPs and SRPs. The quota is 60 mt ww for all sharks collected under EFPs.

Issuance of EFPs, display permits, and SRPs may be necessary because possession of certain shark (and other HMS) species are prohibited. These EFPs, SRPs, and display permits would authorize collections of sharks and other HMS species from Federal waters in the Atlantic Ocean and Gulf of Mexico for the purposes of scientific data collection and public display. In addition, NMFS regulations at 50 CFR 635.32 regarding implantation or attachment of archival tags in Atlantic HMS require prior authorization and a report on implantation activities.

In order to implement the chartering recommendations of ICCAT, NMFS published a rule on December 6, 2004 (69 FR 70396), requiring U.S. vessel owners with HMS permits to apply for and obtain a chartering permit before fishing under a chartering arrangement outside U.S. waters. These permits are issued in a similar manner as other EFPs. Under this final rule and consistent with the ICCAT recommendations, vessels issued a chartering permit are not authorized to use the quota or entitlement of the United States until the chartering permit expires or is terminated. This is because of the fact that under a chartering arrangement it is assumed that vessels have attained temporary authorization to harvest another ICCAT Contracting Parties' quota. Having a chartering permit does not obviate the need to obtain a fishing license, permits, or other authorizations issued by the chartering nation in order to fish in foreign waters, or obtain other authorizations such as a High Seas Fishing Compliance Act Permit, 50 CFR 300.10 *et seq*. Additionally, incidental takes of, or interactions with, protected resources are included against the Incidental Take Statement specified in any relevant BiOps. A U.S. vessel shall not be authorized to fish under more than one chartering arrangement at the same time. NMFS will issue chartering permits only if it determines that the chartering arrangement is in conformance with ICCAT's conservation and management programs. The number of EFPs, display permits, and SRPs issued from 2002 – 2006 by category and species are listed in Table 3.35.

Table 3.35 Number of Exempted Fishing Permits (EFPs), Display Permits, Scientific Research Permits (SRPs), Letters of Acknowledgement (LOAs) issued between 2003 and 2007.

Permit type		2003	2004	2005	2006	2007
EFPs	Sharks for display	8	8	6	7	6
	HMS for display	1	1	1	1	2
	Tunas for display	0	1	0	--	--
	Shark research on a non-scientific vessel	9	6	5	7	4
	Tuna research on a non-scientific vessel	5	11	7	5	4
	HMS research on a non-scientific vessel	18	5	3	4	7
	Billfish research on a non-scientific vessel	0	1	2	3	2
	Shark Fishing	1	0	0	--	--
	HMS Chartering	0	1	0	--	--
	Tuna Fishing	7	2	0	5	--
	TOTAL	**49**	**36**	**24**	**32**	**25**
SRPs	Shark research	1	3	4	2	2
	Tuna research	0	0	0	--	1
	Billfish research	0	0	0	1	--
	HMS (multi-species) research	1	1	4	4	1
	TOTAL	**2**	**4**	**8**	**7**	**4**
LOAs	Shark research	3	2	4	5	7
	TOTAL	**3**	**2**	**4**	**5**	**36**

3.5.6 Atlantic HMS Tournaments

Fishing tournaments are an important component of HMS recreational fisheries. A tournament is defined in the HMS regulations as any fishing competition involving Atlantic HMS in which participants must register or otherwise enter or in which a prize or award is offered for catching or landing HMS. Since 1999, Federal regulations have required that each HMS tournament operator register their tournament with NMFS at least four weeks prior to the commencement of tournament fishing activities. Tournament operators may be selected for reporting and, if selected, must submit tournament results to NMFS within seven days of the conclusion of the tournament.

Tournament registration and reporting is necessary because it provides an important source of information used to assess HMS fish stocks and to estimate the annual catch of Atlantic HMS. The information may be used by NMFS to plan for the assignment of tournament observers to assist in catch/effort data compilation and to obtain biological data and samples from landed fish (length/weight, stomach contents, injuries, parasites, hard and soft tissue samples for age determination, genetic and microconstituent analysis, spawning condition, fecundity, *etc*.). Additionally, with an accurate tournament database, NMFS may better assess the practicality of using tournaments for angler educational outreach efforts including distribution of written informational materials, notification of public hearings, and explanation of HMS regulations. HMS tournament registration and reporting information further allows NMFS, in the course of developing fishery management plans, to evaluate the social and economic impact of tournament angling in relation to other types of angling (*e.g*., commercial, non-tournament recreational) and the relative effect of tournament angling on populations of various regulated HMS. Finally, the information is essential for the U.S. to meet its reporting obligations to ICCAT.

When registering an HMS tournament, the following information is required to be submitted to the HMS Management Division in St. Petersburg, FL: (1) Tournament name; (2) tournament location; (3) name, address, phone number, fax number, and e-mail address of tournament operator; (4) fishing dates; and (5) HMS species for which points or prizes are awarded. If selected for reporting, operators must submit the following information to the SEFSC: (1) Tournament name; (2) tournament dates; (3) tournament location; (4) number of boats fishing; (5) hours fished; 6) recorder's name, phone number, and e-mail address; (7) the number of each species kept; (8) the number of each species lost; (9) the number of each species tagged and released; (10) the number of each species released without a tag; (11) the number of each species released dead; and, (12) the weight and length of all fish boated. This information is routinely collected during tournament operations to award prizes. Generally, 100 percent of all billfish tournaments are selected for reporting, as this information is critical to determining billfish landings. Tournament registration forms are available at: http://www.nmfs.noaa.gov/sfa/hms/linkpages/reporting_forms.htm.

NMFS estimates that approximately 300 – 400 HMS fishing tournaments occur annually along the U.S. Atlantic coast, including the Gulf of Mexico and Caribbean (NMFS, 1999b). These tournaments range from smaller, club member-only events with as few as ten participating boats (40 - 60 anglers) to larger, statewide tournaments with 250 or more participating vessels (1,000 – 1,500 anglers). For the larger tournaments, corporate sponsorship from tackle manufactures, marinas, boat dealers, beverage distributors, resorts, publications, chambers of commerce, restaurants, and others are often involved. Also, some tournaments are components of larger series, including state Governors Cups (North Carolina, South Carolina), the World Billfish Series, and the MTU (Detroit Diesel) Legend Series, among others.

Many HMS fishing tournaments promote strict conservation principles in their rules. For example, minimum sizes for fish that are landed are often larger than state and Federal requirements. Also, some tournaments prohibit treble hooks and may require circle hooks on certain baits. Because tournament participants are often well-respected anglers (*i.e*. highliners),

these conservation trends and ethics likely influence the general angling population in a positive manner. Many HMS fishing tournaments support charitable organizations.

Table 3.36 presents the total number of registered HMS tournaments, by state, between 2001 and 2007. This table indicates that, in 2007, HMS fishing tournaments were conducted most frequently in Florida, Texas, Louisiana, Puerto Rico, North Carolina, New Jersey, New York, South Carolina, Georgia, and Maryland. By far, the largest number of registered HMS tournaments has consistently occurred in the State of Florida.

Table 3.36 Number of Registered HMS Tournaments by State between 2001 and 2007. Source: NMFS Atlantic HMS Tournament Registration Database.

STATE	2001	2002	2003	2004	2005	2006	2007
ME	2	3	3	5	3	5	5
NH	0	0	0	0	0	0	0
MA	7	1	7	10	4	7	10
RI	2	2	3	3	2	2	2
CT	1	0	0	0	1	1	0
NY	5	4	14	14	10	12	13
NJ	11	5	18	17	16	19	17
DE	2	0	0	1	0	0	1
MD	4	2	14	14	14	13	11
VA	5	1	5	4	5	4	6
NC	11	5	15	16	18	17	17
SC	6	3	13	9	9	12	13
GA	6	1	12	3	13	11	11
FL	46	26	66	57	74	83	97
AL	7	7	9	8	7	8	10
MS	3	2	7	2	2	1	1
LA	19	0	20	22	26	20	24
TX	14	1	17	10	17	17	33
PR	16	4	13	17	22	19	20
USVI	9	0	6	1	10	7	7
Bahamas[1]	3	2	1	2	2	1	1
Bermuda[1]	0	0	0	0	1	0	0
Mexico[1]	1	0	0	0	0	0	0
Turks/Caicos[1]	0	0	1	0	0	0	0
TOTAL	**181**	**68**	**244**	**215**	**256**	**259**	**299**

[1]Some foreign tournaments voluntarily registered because the participants were mostly U.S. citizens.

Table 3.37 shows the number and percentage of HMS tournaments awarding points or awards for a particular HMS, based upon 2006 and 2007 tournament registrations. Blue marlin, white marlin, sailfish, and yellowfin tuna have consistently been the predominant target species

in HMS fishing tournaments. Bluefin tuna, swordfish and pelagic sharks are also frequently targeted in HMS tournaments.

From 2006 – 2007, the overall number of registered tournaments increased. Therefore, the number of tournaments identifying most of the HMS as a target species increased, with the exception of pelagic sharks, ridgeback sharks, and non-ridgeback sharks. The number of registered tournaments identifying SCS as a target species increased from six to 10.

Table 3.37 Number and Percent of All 2007 HMS Tournaments Awarding Points or Prizes for a HMS. Source: NMFS Atlantic HMS Tournament Registration Database.

Species	Number of Tournaments		Percent of Tournaments	
	2006	2007	2006	2007
Blue Marlin	173	201	66.8%	67.2%
Sailfish	164	186	63.3%	62.2%
White Marlin	163	184	62.9%	61.5%
Yellowfin Tuna	144	168	55.6%	56.2%
Bluefin Tuna	78	93	30.1%	31.1%
Swordfish	74	83	28.6%	27.8%
Pelagic Sharks	67	59	25.9%	19.7%
Bigeye Tuna	42	53	16.2%	17.7%
Albacore Tuna	20	29	7.7%	9.7%
Ridgeback Sharks	13	21	5.0%	7.0%
Non-Ridgeback Sharks	10	21	3.9%	7.0%
Skipjack Tuna	7	11	2.7%	3.6%
Small Coastal Sharks	6	10	2.3%	3.3%

Table 3.38 through Table 3.40 indicate the percentage and number of 2007 HMS registered tournaments, by state, for pelagic, LCS (ridgeback and non-ridgeback), and SCS, respectively. These tables indicate that the Louisiana/Texas, Florida, New York/New Jersey, and Massachusetts/Maine areas are the primary areas for pelagic shark fishing tournaments. Large coastal and SCS fishing tournaments are conducted less frequently.

Table 3.38 Registered Pelagic Shark Tournaments, 2007. Source: NMFS Atlantic HMS Tournament Registration Database.

State	Number of 2007 Tournaments Awarding Points or Prizes for Pelagic Sharks	Percent of Total 2007 Tournaments Awarding Points or Prizes for Pelagic Sharks
Louisiana	19	32.2%
Texas	2	3.4%
New York	12	20.3%
New Jersey	6	10.2%
Massachusetts	4	6.8%
Maine	4	6.8%
Florida	7	11.9%

State	Number of 2007 Tournaments Awarding Points or Prizes for Pelagic Sharks	Percent of Total 2007 Tournaments Awarding Points or Prizes for Pelagic Sharks
Maryland	2	3.4%
Puerto Rico	2	3.4%
Rhode Island	2	3.4%
South Carolina	1	1.7%
TOTAL	**59**	**100%**

Table 3.39 **Registered Large Coastal Shark (ridgeback and non-ridgeback) Tournaments, 2007**. Source: NMFS Atlantic HMS Tournament Registration Database.

State	Number of 2007 Tournaments Awarding Points or Prizes for Large Coastal Sharks	% of Total 2007 Tournaments Awarding Points or Prizes for Large Coastal Sharks
New York	3	14.3%
Florida	10	47.6%
Maryland	2	9.5%
Alabama	1	4.8%
South Carolina	2	9.5%
Texas	3	14.3%
TOTAL	**21**	**100%**

Table 3.40 Registered Small Coastal Shark Tournaments, 2007. Source: NMFS Atlantic HMS Tournament Registration Database.

State	Number of 2007 Tournaments Awarding Points or Prizes for Small Coastal Sharks	% of Total 2007 Tournaments Awarding Points or Prizes for Small Coastal Sharks
Florida	7	33.3%
South Carolina	1	4.8%
Texas	12	57.1%
New Jersey	1	4.8%
TOTAL	**21**	**100%**

3.6 Economic Status of HMS Shark Fisheries

NMFS' review of each rule, and of HMS fisheries as a whole, is facilitated when there is an economic baseline against which the rule or fishery may be evaluated. In this analysis, as in past SAFE reports, NMFS used 1996 as a baseline. This baseline is appropriate because the Regulatory Flexibility Act (RFA) and Magnuson-Stevens Act were both amended in 1996, NMFS began to collect economic information voluntarily for vessels using the HMS logbook in 1996, and regarding HMS specifically, no rules were implemented in 1996 that were classified as significant under RFA. Additionally, while the 1999 FMP for Atlantic Tunas, Swordfish, and Shark and the Billfish Amendment 1 were finalized in 1999, scoping for these two major documents and its final rule began in 1997. It is possible that anticipation of these documents and any potential changes in their implementing regulations could have begun to impact the decisions made by HMS fishermen and any associated businesses.

In addition to using the 1996 baseline, this FEIS also provides six years of data, when possible, in order to facilitate the analysis of trends. It also should be noted that all dollar figures are reported in nominal dollars (*i.e.,* current dollars). If analysis of real dollar (*i.e.,* constant dollar) trends controlled for inflation is desired, price indexes for 1996 to 2006 are provided in Table 3.41. To determine the real price in base year dollars, divide the base year price index by the current year price index, and then multiply this result by the price that is being adjusted for inflation. From 1996 to 2006, the Consumer Price Index (CPI-U) indicates that prices have risen by 28.5 percent, the Gross Domestic Product (GDP) Implicit Price Deflator indicates that prices have risen 23.7 percent, and the Producer Price Index (PPI) for unprocessed finfish indicates a 80.4 percent rise in prices (Table 3.41). From 2004 to 2005, the CPI, GDP Deflator, and the PPI for unprocessed finfish indicate prices rose by 3.4 percent, 3.0 percent, and 12.9 percent respectively. From 2005 to 2006, the CPI, GDP Deflator, and the PPI for unprocessed finfish indicate prices rose by 3.2 percent, 2.9 percent, and 32.2 percent respectively.

Table 3.41 **Inflation Price Indexes. The CPI-U is the standard Consumer Price Index for all urban consumers (1982-1984=100) produced by U.S. Department of Labor Bureau of Labor Statistics.** The source of the Producer Price Index (PPI) for unprocessed finfish (1982=100) is also the Bureau of Labor Statistics. The Gross Domestic Product Implicit Price Deflator (2000=100) is produced by the U.S. Department of Commerce Bureau of Economic Analysis and obtained from the Federal Reserve Bank of St. Louis (http://www.stlouisfed.org/).

Year	CPI-U	GDP Deflator	PPI Unprocessed Finfish
1996	156.9	93.8	185.5
1997	160.5	95.4	165.7
1998	163	96.5	170.7
1999	166.6	97.9	191.7
2000	172.2	100.0	182.4
2001	177.1	102.4	176.1
2002	179.9	104.2	201.5
2003	184	106.4	195.8
2004	188.9	109.4	224.1
2005	195.3	113.0	253.1
2006	201.6	116.0	334.6

3.6.1 Commercial Fisheries[2]

In 2004, the total commercial shark landings at ports in the 50 states by U.S. fishermen were valued at $7.1 million. In 2005, the total commercial shark landings at ports in the 50 states by U.S. fishermen were valued at ~$6.0 million. The 2005 ex-vessel price indicated that prices for LCS and pelagic sharks have decreased, while prices for SCS and shark fins have increased. For a summary of all pricing, see Table 3.41.

3.6.1.1 Ex-Vessel Prices

The average ex-vessel prices per lb dw for 1996 and 1999 to 2006 by shark species complex and area are summarized in Table 3.42. For both of these tables, prices are reported in nominal dollars. The ex-vessel price depends on a number of factors including the quality of the fish (*e.g.,* freshness, fat content, method of storage), the weight of the fish, the supply of fish, and consumer demand.

Table 3.42 **Average ex-vessel prices per lb for shark by area.**

Species	Area	1996	1999	2000	2001	2002	2003	2004	2005	2006
Non-sandbar LCS*	Gulf of Mexico	$0.21	$0.56	$0.43	$0.44	$0.36	$0.38	$0.37	$0.49	$0.47
	S. Atlantic	$1.02	$1.10	$0.78	$1.12	$1.27	$0.39	$0.44	$0.49	$0.46

[2] All the information and data presented in this section were obtained from NMFS, 1997a and NMFS, 2005b.

Species	Area	1996	1999	2000	2001	2002	2003	2004	2005	2006
	Mid-Atlantic	$0.55	$0.59	$0.53	$1.09	$1.56	$1.62	$1.93	$0.36	$2.14
	N. Atlantic	$0.88	$0.77	$1.01	$1.02	$0.77	$0.72	$0.70	$0.24	$1.02
Pelagic sharks (including porbeagle sharks)	Gulf of Mexico	-	$1.36	$1.31	$1.42	$1.11	$1.13	$1.08	$1.09	$1.21
	S. Atlantic	$0.62	$0.83	$0.76	$0.68	$0.67	$0.71	$0.65	$0.70	$0.72
	Mid-Atlantic	$1.21	$1.23	$1.20	$1.09	$1.17	$1.21	$1.29	$1.39	$1.38
	N. Atlantic	$1.31	$0.81	$1.10	$1.23	$1.00	$1.12	$1.46	$1.43	$1.26
Porbeagle Sharks*	Gulf of Mexico	-	-	-	-	-	-	-	-	-
	S. Atlantic	-	-	-	-	-	-	-	-	-
	Mid-Atlantic	-	-	-	-	-	-	-	-	$1.12
	N. Atlantic	-	-	-	-	-	-	-	-	$0.95
Small coastal sharks	Gulf of Mexico	-	$0.55	$0.52	$0.58	$0.48	$0.40	$0.45	$0.55	-
	S. Atlantic	$0.25	$0.50	$0.48	$0.52	$0.53	$0.51	$0.61	$0.61	$0.53
	Mid-Atlantic	$0.25	$0.47	$0.38	$0.55	$0.48	$0.38	$0.44	$0.42	$0.45
	N. Atlantic	-	-	-	$1.51	$0.58	-	-	$0.50	-
Sandbar sharks*	Gulf of Mexico	-	-	-	-	-	$0.39	$0.40	$0.45	$0.40
	S. Atlantic	-	-	-	-	-	$0.45	$0.35	$0.42	$0.38
	Mid-Atlantic	-	-	-	-	-	-	-	$0.64	$0.91
	N. Atlantic	-	-	-	-	-	-	-	$0.54	-
Shark fins	Gulf of Mexico	-	$14.01	$15.99	$20.90	$22.64	$18.12	$17.93	$20.21	$20.65
	S. Atlantic	$10.74	$11.10	$14.16	$18.43	$17.10	$15.85	$14.57	$15.42	$16.20
	Mid-Atlantic	$4.60	$3.41	$4.90	-	-	-	-	-	-
	N. Atlantic	$2.69	$1.19	$6.83	-	-	-	-	-	-

*Sandbar and porbeagle sharks are broken out of the LCS complex for 2003-2006 to provide baseline information for this proposed Amendment.

The average ex-vessel price for LCS slightly decreased in the Gulf of Mexico in 2006 and South Atlantic. It is important to note that sandbar sharks are taken out of the LCS complex

for 2006, leaving "non-sandbar LCS." Prices for pelagic sharks increased in the Gulf of Mexico and South Atlantic (Table 3.42). The average ex-vessel prices for SCS decreased in the South Atlantic and increased in the Mid-Atlantic (Table 3.42).

3.6.1.2 Revenues

Table 3.43 summarizes the average annual revenues of the shark fisheries based on average ex-vessel prices and the weight reported landed as per the U.S. National Report (NMFS, 2004a, 2005a), the Shark Evaluation Reports (NMFS, 1997b), and information given to ICCAT (Cortés and Neer, 2005). These values indicate that the estimated total annual revenue of shark fisheries has increased from approximately $4.6 million in 1996 to approximately ~$6.0 million in 2005. From 2003 to 2004 especially, the annual revenues from shark decreased by over 21 percent. Removing sandbar sharks from the LCS complex (leaving "non-sandbar LCS"), accounts for the large exaggeration in revenue for 2005 when compared across the years.

Table 3.43 **Estimates of the total ex-vessel annual revenues of Atlantic shark fisheries**. Sources: NMFS, 1997b; NMFS 2004a, 2005a; Cortés, 2003; Cortés and Neer, 2002, 2005; Cortés, pers.comm.

Species		2000	2001	2002	2003	2004	2005	2006
Non-Sandbar Large coastal sharks*	Ex-vessel $/lb dw	$0.68	$0.91	$0.99	$0.78	$0.86	$0.48	$1.02
	Weight lb dw	3,762,000	3,562,546	4,097,363	4,421,249	3,206,377	2,024,106	2,235,324
	Fishery Revenue	$2,560,307	$3,256,955	$4,040,977	$3,437,521	$2,757,484	$971,571	$2,280,030
Pelagic sharks	Ex-vessel $/lb dw	$1.09	$1.11	$0.99	$1.04	$1.12	$1.03	$1.14
	Weight lb dw	215,005	362,925	303,666	616,967	450,833	270,021	186,901
	Fishery Revenue	$233,650	$401,430	$299,487	$643,188	$504,933	$278,122	$213,067
Small coastal sharks	Ex-vessel $/lb dw	$0.46	$0.79	$0.52	$0.43	$0.50	$0.59	$0.49
	Weight lb dw	672245*	719,484	579,441	549,799	677,305	650,202	822,093
	Fishery Revenue	$309,926	$568,441	$299,023	$236,414	$338,653	$383,619	$402,826
Sandbar sharks*	Ex-vessel $/lb dw	-	-	-	-	-	$0.47	$0.56
	Weight lb dw	-	-	-	-	-	1,282,477	1,516,497
	Fishery Revenue	-	-	-	-	-	$602,764	$849,238
Shark fins (weight = 5% of all sharks landed)	Ex-vessel $/lb dw	$10.47	$19.67	$19.87	$17.09	$16.25	$17.94	$18.43
	Weight lb dw	232,462	232,248	249,024	279,401	216,726	211,340	238,041
	Fishery Revenue	$2,434,344	$4,568,937	$4,949,056	$4,774,959	$3,521,793	$3,791,440	$4,387,096
Total sharks	**Fishery Revenue**	**$5,538,227**	**$8,795,763**	**$9,588,545**	**$9,092,082**	**$7,112,863**	**$6,027,516**	**$8,132,257**

Note: Average ex-vessel prices may have some weighting errors.
*Sandbar sharks are broken out of the LCS complex for 2005 and 2006 to provide baseline information for this proposed Amendment. This exaggerates the discrepancy in revenue for LCS in 2005 and 2006 when compared across years.

3.6.1.3 Wholesale Market

Currently, NMFS does not collect wholesale price information from dealers. However, the wholesale price of some fish species is available off the web (http://www.st.nmfs.gov/st1/market_news/index.html). The wholesale prices presented in Table 3.44 are from the annual reports of the Fulton Fish Market. As with ex-vessel prices, wholesale prices depend on a number of factors including the quality of the fish, the weight of the fish, the supply of fish, and consumer demand.

As reported by the Fulton Fish Market, Table 3.44 indicates that the average wholesale price of shark sold in Atlantic and Gulf of Mexico states decreased from 1996 to 2004 for the mako shark. Prices for other shark species have appeared to have rebounded in 2004, when compared to 1996.

Table 3.44 The overall average wholesale price per lb of fresh HMS sold in Atlantic and Gulf of Mexico states as reported by the Fulton Fish Market. Source: NMFS, 2004c.

Species	Description	1996 Price/lb	1999 Price/lb	2000 Price/lb	2001 Price/lb	2002 Price/lb	2003 Price/lb	2004 Price/lb
Blacktip	-	$1.05	$1.04	$1.04	$1.05	$1.00	$1.33	$1.08
Mako	-	$2.77	$2.74	$3.18	$3.00	$2.00	$2.37	$2.24
Thresher	-	$1.00	$0.91	$0.82	$1.25	$1.25	$0.78	$1.24

3.6.2 Recreational Fisheries

Although NMFS believes that recreational fisheries have a large influence on the economies of coastal communities, NMFS has only recently been able to gather additional information on the costs and expenditures of anglers or the businesses that rely on them.

An economic survey done by the U.S. Fish and Wildlife Service[2] in 2001 found that for the entire United States 9.1 million saltwater anglers (including anglers in state waters) went on approximately 72 million fishing trips and spent approximately $8.4 billion (USFWS, 2002). Expenditures included lodging, transportation to and from the coastal community, vessel fees, equipment rental, bait, auxiliary purchases (*e.g.*, binoculars, cameras, film, foul weather clothing, *etc.*), and fishing licenses (USFWS, 2002). Saltwater anglers spent $4.5 billion on trip-related costs and $3.9 billion on equipment (USFWS, 2002). Approximately 76 percent of the saltwater anglers surveyed fished in their home state (USFWS, 2002). Preliminary findings for the USFWS 2006 survey will be available in the spring of 2007 and final reports will be issued beginning in the fall of 2007.

Specific information regarding angler expenditures for trips targeting HMS species was extracted from the recreational fishing expenditure survey add-on (1998 in the Northeast, 1999 – 2000 in the Southeast) to the NMFS' MRFSS. These angler expenditure data were analyzed on a per person per trip-day level and reported in 2003 dollars. The expenditure data include the costs of tackle, food, lodging, bait, ice, boat fuel, processing, transportation, party/charter fees,

[2] This survey interviewed over 77,000 households during phase 1 and approximately 25,070 sports persons during phase 2. The response rate during phase two of the survey was 75 percent.

access/boat launching, and equipment rental. The overall average expenditure on HMS related trips is estimated to be $122 per person per day. Specifically, expenditures are estimated to be $85 per person per day on pelagic shark directed trips, $95 on LCS directed trips, and $81 on SCS.

The American Sportfishing Association (ASA) also has a report listing the 2001 economic impact of sportfishing on specific states. This report states that all sportfishing (in both Federal and state waters) has an overall economic importance of $116 billion dollars (ASA, 2001). Florida, Texas, North Carolina, New York, and Alabama are among the top ten states in terms of overall economic impact for both saltwater and freshwater fishing (ASA, 2001). Florida is also one of the top states in terms of economic impact of saltwater fishing with $2.9 billion in angler expenditures, $5.4 billion in overall economic impact, $1.5 billion in salaries and wages related to fishing, and 59,418 fishing related jobs (ASA, 2001). California followed Florida with $0.8 billion in angler expenditures, $1.7 billion in overall economic impact, $0.4 billion in salaries and wages, and 15,652 jobs (ASA, 2001). Texas and New Jersey were the next highest states in terms of economic impact (ASA, 2001).

At the end of 2004, NMFS began collecting market information regarding advertised charterboat rates. This preliminary analysis of the data collected includes 99 observations of advertised rates on the internet for full day charters. Full day charters vary from six to 14 hours long with a typical trip being 10 hours. Most vessels can accommodate six passengers, but this also varies from two to 12 passengers. Table 3.45 summarizes the average charterboat rate for full day trips on vessels with HMS Charter/Headboat permits. The average price for a full day boat charter was $1,053 in 2004. Sutton *et al.,* (1999) surveyed charterboats throughout Alabama, Mississippi, Louisiana, and Texas in 1998 and found the average charterboat base fee to be $762 for a full day trip. Holland *et al.* (1999) conducted a similar study on charterboats in Florida, Georgia, South Carolina, and North Carolina and found the average fee for full day trips to be $554, $562, $661, and $701, respectively. Comparing these two studies conducted in the late 1990s to the average advertised daily HMS charterboat rate in 2004, it is apparent that there has been a significant gain in charterboat rates.

Table 3.45 **Average Atlantic HMS charterboat rates for day trips.** Source: NMFS searches for advertised daily charter rates of HMS Charter/Headboat permit holders. (Observations=99)

State	2004 Average Daily Charter Rate
AL	$1,783
CT	$1,500
DE	$1,060
FL	$894
LA	$1,050
MA	$777
MD	$1,167
ME	$900
NC	$1,130

State	2004 Average Daily Charter Rate
NJ	$1,298
NY	$1,113
RI	$917
SC	$1,300
TX	$767
VA	$825
Overall Average	**$1,053**

Generally, HMS tournaments last from three to seven days, but lengths can range from one day to an entire fishing season. Similarly, average entry fees can range from approximately $0 to $5,000 per boat (average approximately $500/boat – $1,000/boat), depending largely upon the magnitude of the prize money that is being awarded. The entry fee would pay for a maximum of two to six anglers per team during the course of the tournament. Additional anglers can, in some tournaments, join the team at a reduced rate of between $50 and $450. The team entry fee is not directly proportional to the number of anglers per team, but rather is proportional with the amount of money available for prizes and, possibly, the species being targeted. Prizes may include citations, T-shirts, trophies, fishing tackle, automobiles, boats, or other similar items, but most often consists of cash awards. In general, it appears that billfish and tuna tournaments charge higher entry fees and award more prize money than shark and swordfish tournaments, although all species have a wide range.

Several tournaments target sharks. Many shark tournaments occur in New England, New York, and New Jersey, although other regions hold shark tournaments as well. In 2004, the 24th Annual South Jersey Shark Tournament hosted over 200 boats and awarded over $220,000 in prize money, with an entry fee of $450 per boat. The "Mako Fever" tournament, sponsored by the Jersey Coast Shark Anglers, in 2004 awarded over $55,000 in prizes, with the first place vessel receiving $25,000. In 2004, the 18th Annual Monster Shark Tournament in Martha's Vineyard, Massachusetts was broadcast on ESPN, and featured a new fishing boat valued at over $130,000 awarded to the winner.

In addition to official prize money, many fishing tournaments may also conduct a "calcutta" whereby anglers pay from $200 to $5,000 to win more money than the advertised tournament prizes for a particular fish. Tournament participants do not have to enter calcuttas. Tournaments with calcuttas generally offer different levels depending upon the amount of money an angler is willing to put down. Calcutta prize money is distributed based on the percentage of the total amount entered into that calcutta. Therefore, first place winner of a low level calcutta (entry fee ~$200) could win less than a last place winner in a high level calcutta (entry fee ~$1000). On the tournament websites, it was not always clear if the total amount of prizes distributed by the tournament included prize money from the calcuttas or the estimated price of any equipment. As such, the range of prizes discussed above could be a combination of fish prize money, calcutta prize money, and equipment/trophies.

Fishing tournaments can sometimes generate a substantial amount of money for surrounding communities and local businesses. Besides the entry fee to the tournament and possibly the calcutta, anglers may also pay for marina space and gas (if they have their own vessel), vessel rental (if they do not have their own vessel), meals and awards dinners (if not covered by the entry fee), hotel, fishing equipment, travel costs to and from the tournament, camera equipment, and other miscellaneous expenses. Less direct, but equally important, fishing tournaments may serve to generally promote the local tourist industry in coastal communities. In a survey of participants in the 1999 Pirates Cove Billfish Tournament, Ditton, *et al*. (2000) found that almost 80 percent of tournament anglers were from outside of the tournament's county. For this reason, tourism bureaus, chambers of commerce, resorts, and state and local governments often sponsor fishing tournaments.

3.7 Community and Social Update

According to NS 8, conservation and management measures should, consistent with conservation requirements, "take into account the importance of fishery resources to fishing communities by utilizing economic and social data [based on the best available information] in order to (A) provide for the sustained participation of such communities, (B) to the extent practicable, minimize adverse economic impacts on such communities." The information presented here addresses new data concerning the social and economic well-being of participants in the fishery and considers the impact of significant regulatory measures enacted in the past year.

3.7.1 Overview of Current Information and Rationale

The Magnuson-Stevens Act requires, among other things, that all FMPs include a fishery impact statement intended to assess, specify, and describe the likely effects of the measures on fishermen and fishing communities (§303(a)(9)).

NEPA also requires federal agencies to consider the interactions of natural and human environments by using a "systematic, interdisciplinary approach which will ensure the integrated use of the natural and social sciences...in planning and decision-making" (§102(2)(A)). Moreover, agencies need to address the aesthetic, historic, cultural, economic, social, or health effects, which may be direct, indirect, or cumulative. Consideration of social impacts is a growing concern as fisheries experience increased participation and/or declines in stocks. The consequences of management actions need to be examined to better ascertain and, if necessary and possible, mitigate regulatory impacts on affected constituents.

Social impacts are generally the consequences to human populations resulting from some type of public or private action. Those consequences may include alterations to the ways in which people live, work or play, relate to one another, and organize to meet their needs. In addition, cultural impacts, which may involve changes in values and beliefs that affect people's way of identifying themselves within their occupation, communities, and society in general are included under this interpretation. Social impact analyses help determine the consequences of policy action in advance by comparing the status quo with the projected impacts. Community profiles are an initial step in the social impact assessment process. Although public hearings and scoping meetings provide input from those concerned with a particular action, they do not constitute a full overview of the fishery.

The Magnuson-Stevens Act outlines a set of NSs that apply to all fishery management plans and the implementation of regulations. Specifically, NS 8 notes that:

> "Conservation and management measures, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data that meet the requirements of paragraph (2), in order to: (A) provide for the sustained participation of such communities; and, (B) to the extent practicable, minimize adverse economic impacts on such communities." (§301(a)(8)). See also 50 CFR §600.345 for NS 8 Guidelines.

"Sustained participation" is defined to mean continued access to the fishery within the constraints of the condition of the resource (50 CFR §600.345(b)(4)). It should be clearly noted that NS 8 "does not constitute a basis for allocation of resources to a specific fishing community nor for providing preferential treatment based on residence in a fishing community" (50 CFR §600.345(b)(2). The Magnuson-Stevens Act further defines a "fishing community" as:

> " ... a community that is substantially dependent upon or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, crew, and fish processors that are based in such communities." (§3(16))

NMFS (2001a) guidelines for social impact assessments specify that the following elements are utilized in the development of FMPs and FMP amendments:

1. The size and demographic characteristics of the fishery-related work force residing in the area; these determine demographic, income, and employment effects in relation to the work force as a whole, by community and region.

2. The cultural issues of attitudes, beliefs, and values of fishermen, fishery-related workers, other stakeholders, and their communities.

3. The effects of proposed actions on social structure and organization; that is, on the ability to provide necessary social support and services to families and communities.

4. The non-economic social aspects of the proposed action or policy; these include life-style issues, health and safety issues, and the non-consumptive and recreational use of living marine resources and their habitats.

5. The historical dependence on and participation in the fishery by fishermen and communities, reflected in the structure of fishing practices, income distribution and rights.

The 2006 Consolidated HMS FMP used information from the Wilson *et al*. (1998) study for the 1999 FMP for Atlantic Tunas, Swordfish and Sharks that investigated the social and

cultural characteristics of fishing communities in five states and one U.S. territory: Massachusetts, New Jersey, North Carolina, Florida, Louisiana, and Puerto Rico. These areas were selected because they each had important fishing communities that could be affected by the 1999 FMP and Atlantic Billfish Amendment, and because they are fairly evenly spread along the Atlantic and Gulf coasts and the Caribbean. In addition, the 2006 Consolidated HMS FMP used information gathered under the contract with the Virginia Institute of Marine Science (VIMS) at the College of William and Mary to re-evaluate several of the baseline communities (Kirkley, 2005). The VIMS study gathered a profile of basic sociological information for the principal states involved with the Atlantic shark fishery. From the 255 communities identified as involved in the 2001 commercial fishery, Amendment 1 to the 1999 FMP for Atlantic Tunas, Swordfish and Sharks focused on specific towns based on shark landings data, the size of the shark fishing fleet, the relationship between the geographic communities and the fishing fleets, and the existence of other community studies. While the recreational fishery is an important component in the shark fishery, participation and landings were not documented in a manner that allowed community identification. Wilson, *et al*. (1998), selected only the recreational fisheries found within the commercial fishing communities for a profile due to the lack of community-based data for the sport fishery. A detailed description of additional information used in the community profiles analysis can be found in Section 9.2.2 of the Consolidated HMS FMP. Several other chapters in this document include information that addresses the requirements described in section 9.1. In addition to the community profile information found in the Consolidated HMS FMP, a recent report was completed by MRAG Americas, Inc. and Jepson (2008) titled Updated Profiles for HMS Dependent Fishing Communities (Appendix E). This report includes updated community profiles and new social impacts assessments for HMS fishing communities along the Atlantic and Gulf of Mexico coasts. Please refer to the Economic Evaluation in Chapter 6, the Regulatory Impact Review (RIR) in Chapter 7, and the Final Regulatory Flexibility Analysis (FRFA) in Chapter 8. Furthermore, each of the management alternative suites in Chapter 4 includes an assessment of the potential social and economic impacts associated with the proposed alternatives.

Consistent with its legal obligations, including those under the National Standards (NS) of the Magnuson-Stevens Act, NMFS carefully considered and analyzed the potential economic impacts of this rule. As required by NS 8, NMFS took into account the importance of fishery resources to fishing communities, utilizing the best available economic and social data when selecting the preferred alternative suite 4. The preferred alternative suite 4 would implement quotas and retention limits needed to end overfishing and rebuild overfished shark stocks; it would maximize scientific data collection by implementing a limited research fishery for sandbar sharks with 100 percent observer coverage; and would mitigate some of the significant economic impacts that are expected to result from this action. Thus, this alternative suite would strike a balance between positive ecological benefits that must be achieved to end overfishing and rebuild overfished stocks while minimizing the severity of negative economic impacts that may occur as a result of these measures. Therefore, using the best available information, the preferred alternative suite was selected to minimize economic impacts and provide for the sustained participation of fishing communities, while taking the necessary actions to rebuilds overfished fisheries as required by the Magnuson-Stevens Act. These social and economic analyses for the preferred alternative suite in comparison to the status quo are shown in chapters 4, 6, 7, 8 and 9.

In addition, Appendix E provides the most recent social impact assessment on HMS fishing communities.

3.7.2 Summary of New Social and Economic Data Available

3.7.2.1 2006 Social Science Publications

Scott, T., Kirkley, J. E., Rinaldo, R., & Squires, D. E. (2006). *Assessing Capacity in the U.S. Northwest Atlantic, PLL Fishery for Highly Migratory Species with Undesirable Outputs*. Methodological Workshop on the Management of Tuna Fishing Capacity. La Jolla, CA, USA, May 8 to 12, 2006. 11 pp.

Gilman E. L., Dalzell, P., & Martin, S. (2006) *Fleet communication to abate fisheries bycatch*. Marine Policy 30(4):360-366.

Kirkley, J. E., Ward, J.W., Nance, J., Patella, F., Brewster-Geisz, K., Rogers, C., Thunberg, E., Walden, J., Dasoit, W., Stenberp, B., Freese, S., Hastie, J., Holiman, S., & Travis, M. (2006) *Reducing Capacity in U.S. Managed Fisheries.* U.S. Dep. Commerce, NOAA Tech. Memo. NMFS-FISPO-76, 45p.

National Research Council. (2006) *Review of Recreational Fisheries Survey Methods*. National Academies Press, Washington, D.C., 202 pp.

Bavinck, M., & Monnereau, I. (2007). Assessing the social costs of capture fisheries: An exploratory study. *Social Science Information, 46*(1), 135-152.

Blount, B. G., & Pitchon, A. (2007). An anthropological research protocol for marine protected areas: Creating a niche in a multidisciplinary cultural hierarchy. *Human organization, 66*(2), 103-111.

Christensen, V., Aiken, K. A., & Villanueva, M. C. (2007). Threats to the ocean: On the role of ecosystem approaches to fisheries. *Social Science Information, 46*(1), 67-86.

Doulman, D. J. (2007). Coping with the extended vulnerability of marine ecosystems: Implementing the 1995 FAO code of conduct for responsible fisheries. *Social Science Information, 46*(1), 189-237.

Garcasha-Quijano, C. (2007). The state and small-scale fisheries in Puerto Rico. *American Anthropologist, 109*(2), 407-408.

MRAG Americas, Inc. and M. Jepson. (2008). Updated Profiles for HMS Dependant Fishing Communities (Solicitation Number: DG133F-06-RQ-0381). MRAG America, Inc. 84 pp.

Johnston, R. J., Holland, D. S., Maharaj, V., & Campson, T. W. (2007). Fish harvest tags: An alternative management approach for recreational fisheries in the U.S. Gulf of Mexico. *Marine Policy, 31*(4), 505-516.

Kitts, A., Pinto da Silva, P., & Rountree, B. (2007). The evolution of collaborative management in the northeast USA tilefish fishery. *Marine Policy, 31*(2), 192-200.

Wakeford, R.C., D.J. Agnew, and C.C. Mees. (2007). Review of institutional arrangements and evaluation of factors associated with successful stock recovery plans. CEC 6th Framework Programme No. 022717 UNCOVER. MRAG Report, March 2007. 58pp.

Webster, D. G. (2007). Leveraging competitive advantages: Developing countries' role in international fisheries management. *The Journal of Environment & Development, 16*(1), 8-31.

3.7.2.2 Summary of Social Data and Information

The 2006 Consolidated HMS FMP provides a thorough analysis, by state, of HMS fisheries including the shark fishery for in the Atlantic and Gulf of Mexico states and will not be duplicated here. The MRAG Americas Report, Updated Profiles for HMS Dependent Fisheries, can be found in Appendix E of this document and provides social impact analysis by state of HMS dependent fishing communities.

3.8 International Trade and Fish Processing

Regional fishery management organizations (RFMOs) including ICCAT have taken steps to improve collection of international trade data to further international conservation policy for management of some shark species. While RFMOs cannot re-create information about stock production based on trade data, this information can be used provisionally to estimate landings related to these fisheries, and to identify potential compliance problems with certain ICCAT management measures. In addition, it is important to keep in mind that the ICCAT RFMO collects information only on the pelagic sharks: the shortfin mako and the blue shark, and has also produced some numbers on the porbeagle shark. United States participation in shark and all HMS related international trade programs, as well as a review of trade activity, is discussed in this section. This section also includes a review of the available information on the processing industry for shark species.

3.8.1 Overview of International Trade for Atlantic HMS

3.8.1.1 Trade Monitoring

The United States collects general trade monitoring data through the U.S. Bureau of Customs and Border Protection (CBP; imports) and the U.S. Bureau of the Census (Census Bureau; exports and imports). These programs collect data on the amount and value of imports and exports categorized under the Harmonized Tariff Schedule (HTS). Many HMS have distinct HTS codes, and some species are further subdivided by product (*e.g.* fresh or frozen, fillets, steaks, *etc*.). NMFS provides Census Bureau trade data for all marine fish products online for the public at http://www.st.nmfs.gov/st1/trade/index.html. Shark species are grouped together, which can limit the value of these data for fisheries management when species specific information is needed. These data are further limited since the ocean area of origin for each product is not distinguished.

Trade data for Atlantic HMS, including shark species, are of more use as a conservation tool when they indicate the flag of the harvesting vessel, the ocean of origin, and the species for each transaction. Under the authority of ATCA and the Magnuson-Stevens Act, NMFS collects this information while monitoring international trade of bluefin tuna, swordfish, southern bluefin tuna, and frozen bigeye tuna. These programs implement ICCAT recommendations and support rebuilding efforts by collecting data necessary to identify nations and individuals that may be fishing in a manner that diminishes the effectiveness of ICCAT fishery conservation and management measures. Copies of all trade monitoring documents associated with these programs may be found on the NMFS HMS Management Division webpage at http://www.nmfs.noaa.gov/sfa/hms/. These and several other trade monitoring programs established by NMFS for HMS, including sharks, are described in further detail below.

3.8.2 U.S. Exports of HMS

"Exports" may include merchandise of both domestic and foreign origin. The Census Bureau defines exports of "domestic" merchandise to include commodities which are grown, produced, or manufactured in the United States (*e.g.*, fish caught by U.S. fishermen). For

statistical purposes, domestic exports also include commodities of foreign origin which have been altered in the United States from the form in which they were imported, or which have been enhanced in value by further manufacture in the United States. The value of an export is the f.a.s. (free alongside ship) value defined as the value at the port of export based on a transaction price including inland freight, insurance, and other charges incurred in placing the merchandise alongside the carrier. It excludes the cost of loading the merchandise, freight, insurance, and other charges or transportation costs beyond the port of exportation.

3.8.2.1 Shark Exports

Export data for sharks is gathered by the Census Bureau, and includes trade data for sharks from any ocean area of origin. Shark exports are not categorized down to the species level with the exception of dogfish, and are not identified by specific product code other than fresh or frozen meat and fins. Due to the popular trade in shark fins and their high relative value compared to shark meat, a specific HTS code was assigned to shark fins in 1998. It should be noted that there is no tracking of other shark products besides meat and fins. Therefore, NMFS cannot track trade in shark leather, oil, or shark cartilage products.

Table 3.46 indicates the magnitude and value of shark exports by the United States from 1999 – 2006. The reduction in shark fin exports from 2001 to 2002 and 2003 is of particular note, as is the increase in the unit value of shark fins during this time period. Decreases in shark fin trade are expected to be the result of the Shark Finning Prohibition Act, which was enacted in December of 2000 and implemented by final rule in February 2002.

Table 3.46 Amount and value of U.S. shark product exports from 1999-2006. Source: Census Bureau.

Yr	Shark Fins Dried			Non-specified Fresh Shark			Non-specified Frozen Shark			Total for all Exports	
	MT	US$ (million)	$/KG	MT	US$ (million)	$/KG	MT	US$ (million)	$/KG	MT	US$ (million)
1999	106	.91	8.54	270	.48	1.80	155	.46	2.97	532	1.86
2000	365	3.51	9.62	430	.78	1.82	345	.81	2.35	1140	5.10
2001	335	3.16	9.44	332	.54	1.64	634	2.34	3.69	1301	6.04
2002	123	3.46	28.00	968	1.47	1.52	982	2.34	2.38	2075	7.28
2003	45	4.03	87.79	837	1.31	1.57	592	1.34	2.28	1476	6.70
2004	63	3.02	47.53	536	1.18	2.21	472	.98	2.09	1071	5.18
2005	31	2.37	76.93	377	1.03	2.73	494	1.06	2.15	902	4.46
2006	34	3.17	94.66	816	1.62	1.99	747	1.38	1.85	1597	6.17

Note: Exports may be in whole (ww) or product weight (dw); data are preliminary and subject to change.

3.8.3 U.S. Imports of Atlantic HMS

All import shipments must be reported to the U.S. Bureau of Customs and Border Protection. “General” imports are reported when a commodity enters the country, and "consumption" imports consist of entries into the United States for immediate consumption combined with withdrawals from CBP bonded warehouses. “Consumption” import data reflect the actual entry of commodities originating outside the United States into U.S. channels of

consumption. As discussed previously, CBP data for certain products are provided to NMFS for use in implementing statistical document programs. U.S. Census Bureau import data are used by NMFS as well.

3.8.3.1 Shark Imports

For shark imports, NMFS does not require importers to collect and submit information regarding the ocean area of catch. Shark imports are also not categorized by species, and lack specific product information on imported shark meat such as the proportion of fillets, steaks, or loins. The condition of shark fin imports; *e.g.*, wet, dried, or further processed products such as canned shark fin soup, is also not collected. There is no longer a separate tariff code for shark leather, so its trade is not tracked by CBP or Census Bureau data.

The United States may be an important transshipment port for shark fins, which may be imported wet, processed and then exported dried. It is also probable that U.S.-caught shark fins are exported to Hong Kong or Singapore for processing, and then imported back into the United States for consumption by urban-dwelling Asian Americans (Rose, 1996).

Table 3.47 summarizes Census Bureau data on shark imports for 1999 through 2006. Imports of fresh shark products and shark fins have decreased significantly since 1999. The 2004 and 2006 ICCAT recommendations addressing the practice of shark finning may result in a further reduction of imports in the near future. Over the last 5 years, the overall annual amount and value of shark imports decreased fairly consistently year after year to equal approximately half the 1999 amount and value in 2003, with a slight increase in each product category in 2004.

Table 3.47 U.S. imports of shark products from all ocean areas combined: 1999-2006. Source: Census Bureau data.

Year	Shark Fins Dried		Non-specified Fresh Shark		Non-specified Frozen Shark		Total For All Imports	
	MT	US$ (million)	MT	US$ (million)	MT	US$ (million)	MT	US$ (million)
1999	59	2.10	1,095	2.03	105	.62	1,260	4.76
2000	66	2.35	1,066	1.85	90	.57	1,222	4.79
2001	50	1.08	913	1.38	123	1.78	1,087	4.25
2002	39	1.02	797	1.24	91	1.09	928	3.35
2003	11	0.01	515	0.72	100	0.99	626	1.82
2004	14	0.34	650	1.00	156	2.35	821	3.70
2005	27	0.75	537	1.02	147	2.27	711	4.04
2006	28	1.38	338	0.68	93	1.35	459	3.41

NOTE: Imports may be whole weight (ww) or product weight (dw); data are preliminary and subject to change.

3.9 Bycatch, Incidental Catch, and Protected Species

Bycatch in commercial and recreational fisheries has become an important issue for the fishing industry, resource managers, scientists, and the public. Bycatch can result in death or

injury to the discarded fish, and it is essential that this component of total fishing-related mortality be incorporated into fish stock assessments and evaluation of management measures. Bycatch precludes other more productive uses of fishery resources and decreases the efficiency of fishing operations. Although not all discarded fish die, bycatch can become a large source of mortality, which can slow the rebuilding of overfished stocks. Bycatch imposes direct and indirect costs on fishing operations by increasing sorting time and decreasing the amount of gear available to catch target species. Incidental catch concerns also apply to populations of marine mammals, sea turtles, seabirds, and other components of ecosystems which may be protected under other applicable laws and for which there are no commercial or recreational uses but for which existence values may be high.

In 1998, NMFS developed a national bycatch plan, *Managing the Nation's Bycatch* (NMFS, 1998b), which includes programs, activities, and recommendations for Federally managed fisheries. The national goal of the Agency's bycatch plan activities is to implement conservation and management measures for living marine resources that will minimize, to the extent practicable, bycatch and the mortality of bycatch that cannot be avoided. Inherent in this goal is the need to avoid bycatch, rather than create new ways to utilize bycatch. The plan also established a definition of bycatch as fishery discards, retained incidental catch, and unobserved mortalities resulting from a direct encounter with fishing gear.

3.9.1 Bycatch Reduction and the Magnuson-Stevens Act

The Magnuson-Stevens Act defines bycatch as fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic and regulatory discards. Thus, bycatch does not include fish released alive under a recreational catch and release fishery management program. Fish is defined as finfish, mollusks, crustaceans, sea turtles, and all other forms of marine animal and plant life other than marine mammals and birds. Seabirds and marine mammals are therefore not considered bycatch under the Magnuson-Stevens Act but are examined as incidental catch.

NS 9 of the Magnuson-Stevens Act requires that fishery conservation and management measures shall, to the extent practicable, minimize bycatch and minimize the mortality of bycatch that cannot be avoided. In many fisheries, it is not practicable to eliminate all bycatch and bycatch mortality. Some relevant examples of fish caught in Atlantic HMS fisheries that are included as bycatch or incidental catch are marlin, undersized swordfish and bluefin tuna caught and released by commercial fishing gear; undersized swordfish and tunas in recreational hook and line fisheries; species for which there is little or no market such as blue sharks; and species caught and released in excess of a bag limit.

There are benefits associated with the reduction of bycatch, including the reduction of uncertainty concerning total fishing-related mortality, which improves the ability to assess the status of stocks, to determine the appropriate relevant controls, and to ensure that overfishing levels are not exceeded. It is also important to consider the bycatch of HMS in fisheries that target other species as a source of mortality for HMS and to work with fishery constituents and resource manager partners on an effective bycatch strategy to maintain sustainable fisheries. This strategy may include a combination of management measures in the domestic fishery, and if appropriate, multi-lateral measures recommended by international bodies such as ICCAT or

coordination with Regional Fishery Management Councils or States. The bycatch in each fishery is summarized annually in the SAFE report for Atlantic HMS fisheries. The effectiveness of the bycatch reduction measures is evaluated based on this summary.

A number of options are currently employed (*) or available for bycatch reduction in Atlantic HMS fisheries. These include but are not limited to:

Commercial

1. *Gear Modifications (including hook and bait types)
2. *Circle Hooks
3. *Time/Area Closures
4. Performance Standards
5. *Education/Outreach
6. *Effort Reductions (*i.e.*, Limited Access)
7. Full Retention of Catch
8. *Use of De-hooking Devices (mortality reduction only)

Recreational

1. Use of Circle Hooks (mortality reduction only)
2. Use of De-hooking Devices (mortality reduction only)
3. Full Retention of Catch
4. *Formal Voluntary or Mandatory Catch-and-Release Program for all Fish or Certain Species

There are probably no fisheries in which there is zero bycatch because none of the currently legal fishing gears are perfectly selective for the target of each fishing operation (with the possible exception of the swordfish/tuna harpoon fishery and speargun fishery). Therefore, to totally eliminate bycatch of all non-target species in Atlantic HMS fisheries would be impractical. The goal then is to minimize the amount of bycatch to the extent practicable and minimize the mortality of species caught as bycatch.

3.9.2 Standardized Reporting of Bycatch

Section 303(a)(11) of the Magnuson-Stevens Act requires that a fishery management plan establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery. In 2004, NMFS published a report entitled *"Evaluating Bycatch: A National Approach to Standardized Bycatch Monitoring Programs,"* which described the current status of and guidelines for bycatch monitoring programs (NMFS, 2004d). The data collection and analyses that are used to estimate bycatch in a fishery constitute the "standardized bycatch reporting methodology" (SBRM) for that fishery (NMFS, 2004d). Appendix 5 of the report specifies the protocols for SBRMs established by NMFS throughout the country.

As part of the Agency's National Bycatch Strategy, NMFS established a National Working Group on Bycatch (NWGB) to develop a national approach to standardized bycatch reporting methodologies and monitoring programs. This work is to be the basis for regional teams, established in the National Bycatch Strategy, to make fishery-specific recommendations.

The NWGB reviewed regional issues related to fisheries and bycatch and discussed advantages and disadvantages of various methods for estimating bycatch including: (1) fishery-independent surveys; (2) self-reporting through logbooks, trip reports, dealer reports, port sampling, and recreational surveys; (3) at-sea observation, including observers, digital video cameras, digital observers, and alternative platform and remote monitoring; and (4) stranding networks. All of the methods may contribute to useful bycatch estimation programs, but at-sea observation (observers or electronic monitoring) provides the best mechanism to obtain reliable and accurate bycatch estimates for many fisheries. Often, observer programs also will be the most cost-effective of these alternatives. However, observers are not always the most cost-effective or practicable method for assessing bycatch (NMFS, 2004d).

The effectiveness of any SBRM depends on its ability to generate estimates of the type and quantity of bycatch that are both precise and accurate enough to meet the conservation and management needs of a fishery. The National Bycatch Report (NMFS, 2004d) contains an in-depth examination of the issues of precision and accuracy in estimating bycatch. Accuracy refers to the closeness between the estimated value and the (unknown) true value that the statistic was intended to measure. Precision refers to how closely multiple measurements of the same statistic are to one another when obtained under the same protocol. The precision of an estimate depends on how consistent independent measurements are to one another; the tighter the cluster, or the greater the consistency in independent measurements, the more precise the estimate. The precision of an estimate is often expressed in terms of the coefficient of variation (CV) defined as the standard error of the estimator divided by the estimate. The lower the CV, the more precise the estimate is considered to be. A precise estimate is not necessarily an accurate estimate. The National Bycatch Report (NMFS, 2004d) contains an extensive discussion of how precision relates to sampling and to assessments.

The other important aspect of obtaining bycatch estimates that are useful for management purposes is accuracy. Accuracy is the difference in the mean of the sample and the true value of that property in the sampled universe (NMFS, 2004d). In other words, accuracy refers to how correct the estimate is. Efficient allocation of sampling effort within a stratified survey design improves the precision of the estimate of overall discard rates (Rago *et al.*, 2005). Accuracy of sample estimates can be evaluated by comparing performance measures (*e.g.*, landings, trip duration) between vessels with and without observers present. While there are differences between the terms accuracy and bias they have been used interchangeably. A "biased" estimate is inaccurate while an "accurate" estimate is unbiased (Rago *et al*., 2005).

The NWGB recommended that at-sea sampling designs should be formulated to achieve precision goals for the least amount of observation effort, while also striving to increase accuracy (NMFS, 2004d). This can be accomplished through random sample selection, developing appropriate sampling strata and sampling allocation procedures, and by implementing appropriate tests for bias. Sampling programs will be driven by the precision and accuracy

required by managers to address management needs for estimating management quantities such as allowable catches through a stock assessment, for evaluating bycatch relative to a management standard such as allowable take, and for developing mitigation mechanisms.

The recommended precision goals for estimates of bycatch are defined in terms of the CV of each estimate. For marine mammals and other protected species, including seabirds and sea turtles, the recommended precision goal is a 20 to 30 percent CV for estimates of interactions for each species/stock taken by a fishery. For fishery resources, excluding protected species, caught as bycatch in a fishery, the recommended precision goal is a 20 to 30 percent CV for estimates of total discards (aggregated over all species) for the fishery; or if total catch cannot be divided into discards and retained catch, then the goal is a 20 to 30 percent CV for estimates of total catch (NMFS, 2004d). The report also states that attainment of these goals may not be possible or practical in all fisheries and should be evaluated on a case-by-case basis.

The CV of an estimate can be reduced and the precision increased by increasing sample size. In the case of observer programs, this would entail increasing the number of trips or gear deployments observed. Increasing the number of trips observed increases both the cost in terms of funding, but also the logistical complexities and safety concerns. However, the improvements in precision will decline at a decreasing rate as sample size is increased to a point where it will not be cost-effective to increase sample size any further. This concept is illustrated in Figure 1 of the National Bycatch Report (NMFS, 2004d). As a result of this statistical relationship, fishery managers select observer coverage levels that should achieve the desired or required balance between precision of bycatch estimates and cost.

While the relationship between precision and sample size is relatively well known (NMFS, 2004d), the relationship between sample size and accuracy is not reliable. Observer programs strive to achieve samples that are representative of both fishing effort and catches. Representativeness of the sample is critical not only for obtaining accurate (*i.e.*, unbiased) estimates of bycatch, but also for collecting information about factors that may be important for mitigating bycatch. Bias may be introduced at several levels: when vessels are selected for coverage, when hauls are selected for sampling, or when only a portion of the haul can be sampled (NMFS, 2004d).

Rago *et al.* (2005) examined potential sources of bias in commercial fisheries of the Northeast Atlantic by comparing measures of performance for vessels with and without observers. Bias can arise if the vessels with observers onboard consistently catch more or less than other vessels, if trip durations change, or if vessels fish in different areas. Average catches (pounds landed) for observed and total trips compared favorably and the expected differences of the stratum specific means and standard deviations for both kept weight and trip duration was near zero (Rago *et al.*, 2005). Although mean trip duration was slightly longer on observed trips, the difference was not significantly different from zero. The spatial distribution of trips matched well based on a comparison of VMS data with observed trips (Murawski *et al.*, in press; as cited by Rago *et al.*, 2005). The authors concluded that the level of precision in discard ratios as a whole was high and that there was little evidence of bias. The results of this study indicate that bias may not be as large an issue in self-reported data as has been suggested by Babcock *et al.*

(2003), but additional analyses would need to be conducted to determine the applicability to HMS fisheries.

In general, a simplistic approach in trying to get more accurate bycatch estimates is to increase observer coverage. A report by Babcock *et al.* (2003) suggests that relatively high percentages of observer coverage are necessary to adequately address potential bias in bycatch estimates from observer programs. However, the examples cited by Babcock *et al.* (2003) are successful in reducing bias through high observer coverage levels for fisheries comprised of relatively few vessels, as would be the case for the shark research fishery proposed in this amendment. However, their examples are not representative of the issues facing most observer programs and fishery managers, who must work with limited resources to cover large and diverse fisheries, such as many of the other HMS fisheries. It is also incorrect to assume that simply increasing observer coverage ensures accuracy of the estimates (Rago *et al.*, 2005). Bias due to unrepresentative sampling may not be reduced by increasing sample size due to logistical constraints, such as if certain classes of vessels cannot accommodate observers. Increasing sample size may only result in a larger, but still biased, sample.

Although the precision goals for estimating bycatch are important factors in determining observer coverage levels, other factors are also considered when determining actual coverage levels. These may result in lower or higher levels of coverage than that required to achieve the precision goals for bycatch estimates. In general, factors that may justify lower coverage levels include lack of adequate funding; incremental coverage costs that are disproportionately high compared to benefits; and logistical consideration such as lack of adequate accommodations on a vessel, unsafe conditions, and lack of cooperation by fishermen (NMFS, 2004d).

Factors that may justify higher coverage levels include incremental coverage benefits that are disproportionately high compared to costs and other management focused objectives for observer programs. The latter include total catch monitoring, in-season management of total catch or bycatch, monitoring bycatch by species, monitoring compliance with fishing regulations, monitoring requirements associated with the granting of Experimental Fishery Permits, or monitoring the effectiveness of gear modifications or fishing strategies to reduce bycatch. In some cases, management may require one or even two observers to be deployed on every fishing trip. Increased levels of coverage may also be desirable to minimize bias associated with monitoring "rare" events with particularly significant consequences (such as takes of protected species), or to encourage the introduction of new "standard operating procedures" for the industry that decrease bycatch or increase the ease with which bias can be monitored (NMFS, 2004d).

NMFS utilizes self-reported logbook data (Fisheries Logbook System or FLS, and the supplemental discard report form in the reef fish/snapper-grouper/king and Spanish mackerel/shark logbook program), at-sea observer data, and survey data (recreational fishery dockside intercept and telephone surveys) to produce bycatch estimates in HMS fisheries. The number and location of discarded fish are recorded, as is the disposition of the fish (*i.e.*, released alive vs. released dead). Post-release mortality of HMS can be accounted for in stock assessments to the extent that the data allow.

The fishery logbook systems in place are mandatory programs, and it is expected that the reporting rates are generally high (Garrison, 2005). Due to the management focus on HMS fisheries, there has been close monitoring of reporting rates, and observed trips can be directly linked to reported effort. In general, the gear characteristics and amount of observed effort is consistent with reported effort. However, under-reporting is possible, which can lead to a negative bias in bycatch estimates. Cramer (2000) compared dead discards of undersized swordfish, sailfish, white and blue marlin, and pelagic sharks from HMS logbook and POP data in the U.S. Atlantic PLL fishery. Cramer (2000) provided the ratio of catch estimated from the POP data divided by the reported catch in the HMS logbooks. The ratio indicated the amount of underreporting for each species in a given area. However, the data analyzed by Cramer (2000), was based on J-hook data from 1997 – 1999 and that gear is now illegal. In some instances, logbooks are used to provide effort information against which bycatch rates obtained from observers are multiplied to estimate bycatch. In other sectors/fisheries, self-reporting provides the primary method of reporting bycatch because of limited funding, priorities, *etc*.

The following section provides a review of the bycatch reporting methodologies for all shark fisheries: the U.S. PLL fishery, the shark BLL fishery, the shark gillnet fishery, and the recreational handgear fishery. Future adjustments may be implemented based on evaluation of the results of studies developed as part of the HMS Bycatch Reduction Implementation Plan, or as needed due to changing conditions in the fisheries. In addition, NMFS is in the process of developing a National Bycatch Report which may provide additional insight and guidance on areas to be addressed for each fishery. Further analyses of bycatch in the various HMS fisheries may be conducted as time, resources, and priorities allow.

3.9.2.1 U.S. Atlantic Pelagic Longline Fishery

NMFS utilizes both self-reported data (mandatory logbooks for all vessels) and observer data to monitor bycatch in the PLL fishery. The observer program has been in place since 1992 to document finfish bycatch, characterize fishery behavior, and quantify interactions with protected species (Beerkircher *et al.*, 2002). The program is mandatory for those vessels selected, and all vessels with directed and indirect swordfish permits are selected. The program had a target coverage level of five percent of the U.S. fleet within the North Atlantic (waters north of 5^{o} N. latitude), as was agreed to by the United States at ICCAT. Actual coverage levels achieved from 1992 – 2003 ranged from two to nine percent depending on quarter and year. Observer coverage was 100 percent for vessels participating in the NED experimental fishery during 2001 – 2003. Overall observer coverage in 2003 was 11.5 percent of the total sets made, including the NED experiment. The program began requiring an eight percent coverage rate due to the requirements of the 2004 BiOp for Atlantic PLL Fishery for HMS (NMFS, 2004f). Observer coverage in 2007 ranged from 8.5 – 24.1 percent per quarter. Since 1992, data collection priorities have been to collect catch and effort data of the U.S. Atlantic PLL fleet on highly migratory fish species, although information is also collected on bycatch of protected species.

Fishery observer effort is allocated among eleven large geographic areas and calendar quarter based upon the historical fishing range of the fleet (Walsh and Garrison, 2006). The target annual coverage is eight percent of the total reported sets, and observer coverage is randomly allocated based upon reported fishing effort during the previous fishing year/quarter/statistical reporting area (Beerkircher *et al.*, 2002). Bycatch rates of protected

species (catch per 1,000 hooks) are quantified based upon observer data by year, fishing area, and quarter (Garrison, 2005). The estimated bycatch rate is then multiplied by the fishing effort (number of hooks) in each area and quarter reported to the FLS program to obtain estimates of total interactions for each species of marine mammal and sea turtle (Garrison, 2005).

3.9.2.2 Shark Bottom Longline Fishery

Vessels participating in the BLL fishery for sharks are required to submit snapper/grouper/reef fish/shark logbooks to report their catch and effort, including bycatch species. All vessels having Shark Limited Access Permits are required to report. The CSFOP has monitored the shark BLL fishery since 1994. Since 2005, the program has been administered through the SEFSC out of the Panama City, Florida laboratory. The program has been mandatory for vessels selected to carry observers beginning in 2002. Prior to that, it was a voluntary program relying on cooperating vessels/captains to take observers. From 2002 – 2005, the objective of the vessel selection was to achieve a representative five percent level of coverage of the total fishing effort in each fishing area (North Atlantic, South Atlantic, and Gulf of Mexico) and during each fishing season of that year (Smith *et al*., 2006). In 2006, target coverage level has been 3.9 percent of the total fishing effort. In 2007, target coverage level of 4-6 percent of the total fishing effort. This level was estimated to attain a sample size needed to provide estimates of sea turtle, smalltooth sawfish, or marine mammal interactions with an expected CV of 0.3 (Carlson, unpubl., as cited in Smith *et al*., 2006).

Effective August 1, 2001, selected Federal permit holders that report on the Gulf of Mexico reef fish, South Atlantic snapper-grouper, king and Spanish mackerel, and shark fisheries logbook must report all species and quantities of discarded (alive and dead) sea turtles, marine mammals, birds, and finfish on a supplemental discard form. A randomly selected sample of 20 percent of the vessels with active permits in the above fisheries is selected each year. The selection process is stratified across geographic area (Gulf of Mexico and South Atlantic), gear (handline, longline, troll, gillnet, and trap), and number of fishing trips (ten or less trips and more than 11 trips). Of the 3,498 vessels with Federal permits in these fisheries in 2006, a total of 512 vessels were selected to report. Of the 3,491 vessels with Federal permits in these fisheries in 2007, 449 were selected to report. Shark fishermen can use the PLL logbook or the northeast vessel trip reports depending on the permits held by the vessel. If they use either the PLL logbook or vessel trip reports (VTR), they need to report all of the catch and effort, as well as all the bycatch or incidental catch.

3.9.2.3 Shark Gillnet Fishery

Vessels participating in the gillnet fishery for sharks are required to submit logbooks to report their catch and effort, including bycatch species. An observer program for the directed shark gillnet fishery has been in place from 1993 – 1995 and from 1998 to the present. The objectives of this program are to obtain estimates of catch and bycatch and bycatch mortality rates of protected species, juvenile sharks, and other fish species. Catch and bycatch estimates are produced to meet the mandates of the ALWTRP and the October 2003 BiOp. Additional recommendations may be made in the BiOp anticipated for this rulemaking in Spring 2008.

NMFS implemented the final rule on June 25, 2007 (72 FR 34632), that prohibits gillnet fishing, including shark gillnet fishing, from November 15 to April 15, between the NC/SC border and 29° 00' N. The action was taken to prevent the significant risk to the wellbeing of endangered right whales from entanglement in gillnet gear in the core right whale calving area during calving season. Limited exemptions to the fishing prohibitions are provided for gillnet fishing for sharks and for Spanish mackerel south of 29°00' N. lat. Shark gillnet vessels fishing between 29° 00' N and 26° 46.5' N have certain requirements as outlined 50 CFR § 229.32 from December 1 through March 31 of each year.. These include vessel operators contacting the SEFSC Panama City Laboratory at least 48 hours prior to departure of a fishing trip in order to arrange for an observer.

In addition, a recent rule (October 5, 2007, 72 FR 57104) amends restrictions in the Southeast U.S. Monitoring Area from December 1 through March 31. In that area no person may fish with or possess gillnet gear for sharks with webbing of 5" or greater stretched mesh unless the operator of the vessel is in compliance with the VMS requirements found in 50 CFR 635.69. The Southeast U.S. Monitoring Area is from 27°51' N. (near Sebastian Inlet, FL) south to 26°46.5' N. (near West Palm Beach, FL), extending from the shoreline or exemption line eastward to 80°00' W. In addition, NMFS may select any shark gillnet vessel regulated under the ALWTRP to carry an observer. When selected, the vessels are required to take observers on a mandatory basis in compliance with the requirements for at-sea observer coverage found in 50 CFR 229.7. Any vessel that fails to carry an observer once selected is prohibited from fishing pursuant to 50 CFR § 635. There are additional gear marking requirements that can be found at 50 CFR § 229.32.

Starting in 2005, a pilot observer program began to include all vessels that have an active directed shark permit and fish with sink gillnet gear (Carlson and Bethea, 2006). These vessels were not subject to observer coverage because they were either targeting non-highly migratory species or were not fishing gillnets in a drift or strike fashion. These vessels were selected for observer coverage in an effort to determine their impact on finetooth shark landings and their overall impact on shark resources when not targeting sharks.

3.9.2.4 Recreational Handgear Fishery

NMFS collects recreational catch-and-release data from dockside surveys (the Large Pelagics Survey (LPS) and the Marine Recreational Fishery Statistics Survey (MRFSS)) for the rod and reel fishery and uses these data to estimate total landings and discards of bycatch or incidental catch. Statistical problems associated with small sample size remain an obstacle to estimating bycatch reliably in the rod and reel fishery. CVs can be high for many HMS (rare event species in the MRFSS) and the LPS does not cover all times/geographic areas for non-bluefin tuna species. New survey methodologies are being developed, however, especially for the Charter/headboat sector of the rod and reel fishery, which should help to address some of the problems in estimating bycatch for this fishery. In addition, selecting recreational vessels for voluntary logbook reporting may be an option for collecting bycatch information for this sector of the HMS fishery.

NMFS has the authority to use observers to voluntarily collect bycatch information from vessels with HMS Charter/Headboat or Angling category permits. Many of the charter/headboat

vessels are required to complete Federal and/or state logbooks (*e.g.*, the NMFS Northeast Region VTR Program), in which they are required to report all fishing information, including that for HMS and bycatch. NMFS is currently evaluating various alternatives to increase logbook coverage of vessels fishing for HMS, such as selecting additional HMS vessels to report in logbooks or be selected for observer coverage, and is investigating alternatives for electronic reporting.

The National Academy of Sciences (NAS) assembled a committee to review current marine recreational fishing surveys at the request of NMFS (NAS, 2006). The committee was tasked with developing recommendations for improvements to current surveys and to recommend the implementation of possible alternative approaches. The committee's final report was published in April 2006, and NMFS is in the process of evaluating the recommendations. At the present time, no other alternative approach is available.

3.9.3 Bycatch Reduction in HMS Fisheries

The NMFS HMS bycatch reduction program includes an evaluation of current data collection programs, implementation of bycatch reduction measures such as gear modifications and time/area closures, and continued support of data collection and research relating to bycatch. Additional details on bycatch and bycatch reduction measures can be found in Section 3.5 of the 1999 FMP for Atlantic Tunas, Swordfish and Sharks (NMFS, 1999a), in Regulatory Amendment 1 to the 1999 FMP for Atlantic Tunas, Swordfish and Sharks (NMFS, 2000), in Regulatory Adjustment 2 to the 1999 FMP for Atlantic Tunas, Swordfish and Sharks (NMFS, 2002), in Amendment 1 to the 1999 FMP for Atlantic Tunas, Swordfish and Sharks (NMFS, 2003a), the June 2004 Final Rule for Reduction of Sea Turtle Bycatch and Bycatch Mortality in the Atlantic PLL Fishery (69 FR 40734), the Consolidated HMS FMP, and Section 3.9 of this chapter. In addition, an HMS Bycatch Reduction Implementation Plan was developed in late 2003 which identify priority issues to be addressed in the following areas: 1) monitoring, 2) research, 3) management, and 4) education/outreach. Individual activities in each of these areas were identified and new activities may be added or removed as they are addressed or identified.

3.10 Evaluation and Monitoring of Bycatch

The identification of bycatch in Atlantic HMS fisheries is the first step in reducing bycatch and bycatch mortality. The Magnuson-Stevens Act requires the amount and type of bycatch to be summarized in the annual SAFE reports.

PLL dead discards of LCS and pelagic sharks are estimated using data from NMFS observer reports and pelagic logbook reports. Shark BLL and shark gillnet discards can be estimated using logbook data and observer reports as well. Shark gillnet discards have also been estimated using logbook data when observer coverage is equal to 100 percent.

3.10.1 Bycatch Mortality

3.10.1.1 Introduction

The reduction of bycatch mortality is an important component of NS 9. Physical injuries may not be apparent to the fisherman who is quickly releasing a fish because there may be injuries associated with the stress of being hooked or caught in a net. Little is known about the mortality rates of many shark species but there are some data for certain species. Information on bycatch mortality should continue to be collected, and in the future, could be used to estimate bycatch mortality in stock assessments. For a summary of bycatch species in BLL and gillnet fisheries, please refer to Table 3.48. For all other fisheries, please refer to Table 3.107 in the Consolidated HMS FMP.

NMFS submits annual data (Task I) to ICCAT on mortality estimates (dead discards). These data are included in the SAFE Reports and National Reports to ICCAT to evaluate bycatch trends in HMS fisheries.

Table 3.48 **Summary of bycatch species in BLL and gillnet fisheries, MMPA category, ESA requirements, data collection, and management measures by fishery/gear type.** (Excerpted from HMS Bycatch Priorities and Implementation Plan and updated through May 2006)

Fishery/Gear Type	Bycatch Species	MMPA Category	ESA Requirements	Bycatch Data Collection	Management Measures
Shark BLL	Prohibited shark species Target species after closure Sea turtles Smalltooth sawfish Non-target finfish	Category III	ITS, Terms & Conditions, RPMs	Permit requirement (1993); logbook requirement (1993); observer coverage (1994)	Quotas (1993); trip limit (1994); gear marking (1999); handling & release guidelines (2001); line clippers, dipnets, corrodible hooks, de-hooking devices, move 1 nm after an interaction (2004); South Atlantic closure, VMS (2005); additional dehooking equipment (2007); shark identification workshops for dealers (2007)
Shark Gillnet	Prohibited shark species Sea turtles Marine mammals Non-target finfish Smalltooth sawfish	Category II	ITS, Terms & Conditions, RPMs	Permit requirement (1993); logbook requirement (1993); observer coverage (1994)	Quotas (1993); trip limit (1994); gear marking (1999); deployment restrictions (1999); 30-day closure for leatherbacks (2001); handling & release guidelines (2001); net checks (2002); whale sighting (2002); VMS (2004); closure for right whale mortality (2006); expanded closure for right whale mortality (2007); shark identification workshops for dealers (2007)

3.10.1.2 Mortality by Fishery

Bottom Longline Fishery

The shark BLL fishery has relatively low observed bycatch rates. Historically, finfish bycatch has averaged approximately 6.4 percent in the Gulf of Mexico region and 2.3 percent in the Atlantic region for the BLL fishery. Observed protected species bycatch (sea turtles) has typically been much lower, less than 0.01 percent of the total observed catch. See Section 3.4.1.2 for more information. Disposition of discards is recorded by observers and can be used to estimate discard mortality.

Shark Gillnet Fishery

The shark gillnet fishery has relatively low observed bycatch rates. Finfish bycatch during the 2007 fishery ranged from 1.7 to 13.3 percent of the total catch. Observed protected species bycatch (sea turtles and marine mammals) was very low, less than 0.1 percent. See Section 3.4.2.2 for more information. Disposition of discards is recorded by observers and can be used to estimate discard mortality.

For PLL and recreational handgear mortality summaries, please refer to Section 3.9.8.2 of the Consolidated HMS FMP.

3.10.1.3 Code of Angling Ethics

NMFS developed a Code of Angling Ethics as part of implementing Executive Order 12962 – Recreational Fisheries. NMFS implemented a national plan to support, develop, and implement programs that were designed to enhance public awareness and understanding of marine conservation issues relevant to the wellbeing of fishery resources in the context of marine recreational fishing. This code is consistent with NS 9, minimizing bycatch and bycatch mortality. These guidelines are discretionary, not mandatory, and are intended to inform the angling public of NMFS views regarding what constitutes ethical angling behavior. Part of the code covers catch-and-release fishing and is directed towards minimizing bycatch mortality. For a detailed description of the code, please refer to Section 3.9.8.3 of the 2006 Consolidated HMS FMP.

3.10.2 HMS Fishing Gears with Protected Species

This section examines how the proposed actions in this Amendment may affect protected species. As a point of clarification, interactions are different than bycatch. Interactions take place between fishing gears and marine mammals and seabirds while bycatch consists of discards of fish and sea turtles. Following a brief review of the three acts (MMPA, ESA, and Migratory Bird Treaty Act) affecting protected species, the interactions between shark fishery HMS gears and each species is examined. Additionally, the interaction of seabirds and longline fisheries are considered under the auspices of the United States "National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries" (NPOA – Seabirds).

3.10.2.1 Interactions and the MMPA

The MMPA of 1972 as amended is one of the principal Federal statutes that guides marine mammal species protection and conservation policy. In the 1994 amendments, section 118 established the goal that the incidental mortality or serious injury of marine mammals occurring during the course of commercial fishing operations be reduced to insignificant levels approaching a zero mortality rate goal (ZMRG) and serious injury rate within seven years of enactment (*i.e*,. April 30, 2001). In addition, the amendments established a three-part strategy to govern interactions between marine mammals and commercial fishing operations. These include the preparation of marine mammal stock assessment reports, a registration and marine mammal mortality monitoring program for certain commercial fisheries (Category I and II), and the preparation and implementation of take reduction plans (TRP).

NMFS relies on both fishery-dependent and fishery-independent data to produce stock assessments for marine mammals in the Atlantic Ocean, Gulf of Mexico, and the Caribbean Sea. Draft stock assessment reports are typically published in January and final reports are typically published in the fall. Final 2006 and draft 2007 stock assessment reports are available and can be obtained on the web at: http://www.nmfs.noaa.gov/pr/sars/species.htm.

The following list of species outlines the marine mammal species that occur off the Atlantic and Gulf Coasts that are or could be of concern with respect to potential interactions with HMS fisheries.

Common Name	**Scientific Name**
Atlantic spotted dolphin	*Stenella frontalis*
Blue whale	*Balaenoptera musculus*
Bottlenose dolphin	*Tursiops truncatus*
Common dolphin	*Delphinis delphis*
Fin whale	*Balaenoptera physalus*
Harbor porpoise	*Phocoena phocoena*
Humpback whale	*Megaptera novaeangliae*
Killer whale	*Orcinus orca*
Long-finned pilot whale	*Globicephela melas*
Minke whale	*Balaenoptera acutorostrata*
Northern bottlenose whale	*Hyperoodon ampullatus*
Northern right whale	*Eubalaena glacialis*
Pantropical spotted dolphin	*Stenella attenuata*
Pygmy sperm whale	*Kogia breviceps*
Risso's dolphin	*Grampus griseus*
Sei whale	*Balaenoptera borealis*
Short-beaked spinner dolphin	*Stenella clymene*
Short-finned pilot whale	*Globicephela macrorhynchus*
Sperm whale	*Physeter macrocephalus*
Spinner dolphin	*Stenella longirostris*
Striped dolphin	*Stenella coeruleoalba*
White-sided dolphin	*Lagenorhynchus acutus*

Under MMPA requirements, NMFS produces an annual list of fisheries (LOF) that classifies domestic commercial fisheries, by gear type, relative to their rates of incidental mortality or serious injury of marine mammals. The LOF includes three classifications:

1. Category I fisheries are those with frequent serious injury or incidental mortality to marine mammals;
2. Category II fisheries are those with occasional serious injury or incidental mortality; and
3. Category III fisheries are those with remote likelihood of serious injury or known incidental mortality to marine mammals.

The proposed 2008 MMPA LOF was published on June 28, 2007 (72 FR 35393). The southeastern Atlantic shark gillnet fishery is classified as Category II (occasional serious injuries and mortalities). The South Atlantic and Gulf of Mexico shark BLL fishery is classified as Category III (remote likelihood or no known serious injuries or mortalities). For additional information on the fisheries categories and how other fisheries are classified, see http://www.nmfs.noaa.gov/pr/interactions/lof/.

Fishermen participating in Category I or II fisheries are required to register under the MMPA and to accommodate an observer aboard their vessels if requested. Vessel owners or operators, or fishermen, in Category I, II, or III fisheries must report all incidental mortalities and serious injuries of marine mammals during the course of commercial fishing operations to NMFS. There are currently no regulations requiring recreational fishermen to report takes, nor are they authorized to have incidental takes (*i.e.*, they are illegal).

NMFS continues to investigate serious injuries to marine mammals as they are released from fishing gear. In April 1999, NMFS held a joint meeting of the three regional scientific review groups to further discuss the issue. NMFS is continuing to develop marine mammal serious injury guidelines and until these are published, NMFS will apply the criteria listed by the review groups to make determinations for specific fisheries. The current BiOps for Atlantic HMS fisheries have concluded the fisheries are not likely to adversely affect ESA-listed marine mammals. However, a Pelagic Longline Take Reduction Team (PLTRT) met on June 29-30, 2005. The PLTRT replaces the disbanded Atlantic Offshore Cetacean Take Reduction Team (AOCTRT). The PLTRT must develop a TRP for pilot whales within 11 months. The Draft TRP has been transmitted to NMFS and was published June 8, 2006. The 1999 FMP implemented several of the recommendations of the AOCTRT including: 1) a requirement that vessels fishing for HMS move one nautical mile (nm) after an entanglement with protected species; 2) limiting the length of the mainline to 24 nm in the MAB from August 1, 1999 through November 30, 2000; 3) voluntary vessel operator education workshops for HMS PLL vessels; 4) handling and release guidelines; and 5) limited access for swordfish, shark and tuna longline permits.

3.10.2.2 Interactions and the ESA

The ESA of 1973 as amended (16 U.S.C. 1531 *et seq.*) provides for the conservation and recovery of endangered and threatened species of fish, wildlife, and plants. The listing of a

species is based on the status of the species throughout its range or in a specific portion of its range in some instances. Threatened species are those likely to become endangered in the foreseeable future [16 U.S.C. §1532(20)] if no action is taken to stop the decline of the species. Endangered species are those in danger of becoming extinct throughout all or a significant portion of their range [16 U.S.C. §1532(20)]. Species can be listed as endangered without first being listed as threatened. The Secretary of Commerce, acting through NMFS, is authorized to list marine and anadromous fish species, marine mammals (except for walrus and sea otter), marine reptiles (such as sea turtles), and marine plants. The Secretary of the Interior, acting through the USFWS, is authorized to list walrus and sea otter, seabirds, terrestrial plants and wildlife, and freshwater fish and plant species, among other species.

In addition to listing species under the ESA, the service agency (NMFS or USFWS) generally must designate critical habitat for listed species concurrently with the listing decision to the "maximum extent prudent and determinable" [16 U.S.C. §1533(a)(3)]. The ESA defines critical habitat as those specific areas that are occupied by the species at the time it is listed that are essential to the conservation of a listed species and that may be in need of special consideration, as well as those specific areas that are not occupied by the species that are essential to their conservation. Federal agencies are prohibited from undertaking actions that are likely to destroy or adversely modify designated critical habitat. The following is a list of endangered or threatened species that have critical habitat listed within the proposed action area.

Marine Mammals	**Status**
Blue whale *(Balaenoptera musculus)*	Endangered
Fin whale *(Balaenoptera physalus)*	Endangered
Humpback whale *(Megaptera novaeangliae)*	Endangered
Northern right whale *(Eubalaena glacialis)*	Endangered
Sei whale *(Balaenoptera borealis)*	Endangered
Sperm whale *(Physeter macrocephalus)*	Endangered
Sea Turtles	
Green turtle *(Chelonia mydas)*	*Endangered/Threatened
Hawksbill sea turtle *(Eretmochelys imbricata)*	Endangered
Kemp's ridley sea turtle *(Lepidochelys kempii)*	Endangered
Leatherback sea turtle *(Dermochelys coriacea)*	Endangered
Loggerhead sea turtle *(Caretta caretta)*	Threatened
Olive ridley sea turtle *(Lepidochelys olivacea)*	Threatened
Critical Habitat	
Northern right whale	Endangered
Finfish	
Smalltooth sawfish *(Pristis pectinata)*†	Endangered

*Green sea turtles in U.S. waters are listed as threatened except for the Florida breeding population, which is listed as endangered. Due to the inability to distinguish between the populations away from the nesting beaches, green sea turtles are considered endangered wherever they occur in U.S. waters.

†U.S. Distinct Population Segment

Sea Turtles

NMFS has taken important steps in the past few years to reduce sea turtle bycatch and bycatch mortality in domestic longline fisheries. On March 30, 2001, NMFS implemented via interim final rule requirements for U.S. flagged vessels with PLL gear on board to have line clippers and dipnets to remove gear on incidentally captured sea turtles (66 FR 17370). Specific handling and release guidelines designed to minimize injury to sea turtles were also implemented. NMFS published a final report which provides the detailed guidelines and protocols (Epperly *et al*., 2004) and a copy can be found at http://www.nmfs.noaa.gov/sfa/hms/Protected%20Resources/TM_524.pdf.

A BiOp completed on June 14, 2001, found that the actions of the PLL fishery jeopardized the continued existence of loggerhead and leatherback sea turtles. This document reported that the PLL fishery interacted with an estimated 991 loggerhead and 1,012 leatherback sea turtles in 1999. The estimated take levels for 2000 were 1,256 loggerhead and 769 leatherback sea turtles (Yeung, 2001).

On July 13, 2001 (66 FR 36711), NMFS published an emergency rule that closed the NED area to PLL fishing (effective July 15, 2001), modified how PLL gear may be deployed effective August 1, 2001, and required that all longline vessels (pelagic and bottom) post safe handling guidelines for sea turtles in the wheelhouse. On December 13, 2001 (66 FR 64378), NMFS extended the emergency rule for 180 days through July 8, 2002. On July 9, 2002, NMFS published a final rule (67 FR 45393) that closed the NED to PLL fishing. As part of the Reasonable and Prudent Alternative, the BiOp required NMFS to conduct an experiment with commercial fishing vessels to test fishery-specific gear modifications to reduce sea turtle bycatch and mortality. This rule also required the length of any gangions to be 10 percent longer than the length of any floatline on vessels where the length of both is less than 100 meters; prohibited stainless steel hooks; and required gillnet vessel operators and observers to report any whale sightings and required gillnets to be checked every 0.5 to 2 hours.

The experimental program required in the BiOp was initiated in the NED area in 2001 in cooperation with the U.S. PLL fleet that historically fished on the Grand Banks fishing grounds. The goal of the experiment was to test and develop gear modifications that might prove useful in reducing the incidental catch and post-release mortality of sea turtles captured by PLL gear while striving to minimize the loss of target catch. The experimental fishery had a three-year duration and utilized 100 percent observer coverage to assess the effectiveness of the measures. The gear modifications tested in 2001 included blue-dyed squid and moving gangions away from floatlines. In 2002, the NED experimental fishery examined the effectiveness of whole mackerel bait, squid bait, circle and "J" hooks, and reduced daylight soak time in reducing the capture of sea turtles. The experiment tested various hook and bait type combinations in 2003 to verify the results of the 2002 experiment.

On November 28, 2003, based on the conclusion of the three-year NED experiment, and preliminary data that indicated that the Atlantic PLL fishery may have exceeded the Incidental Take Statement in the June 14, 2001 BiOp, NMFS published a Notice of Intent to prepare an SEIS to assess the potential effects on the human environment of proposed alternatives and actions under a proposed rule to reduce sea turtle bycatch (68 FR 66783). A new BiOp for the

Atlantic PLL fishery was completed on June 1, 2004 (NMFS, 2004f). The BiOp concluded that long-term continued operation of the Atlantic PLL fishery, authorized under the 1999 FMP, was not likely to jeopardize the continued existence of loggerhead, green, hawksbill, Kemp's ridley, or olive ridley sea turtles; and was likely to jeopardize the continued existence of leatherback sea turtles.

On July 6, 2004, NMFS implemented additional regulations for the Atlantic PLL fishery to further reduce the mortality of incidentally caught sea turtles (69 FR 40734). These measures include requirements on hook type, hook size, bait type, dipnets, line clippers, and safe handling guidelines for the release of incidentally caught sea turtles. These requirements were developed based on the results of the 2001 – 2003 NED experiment (Watson *et al*., 2003; Watson *et al*., 2004; Shah *et al*., 2004). These requirements are predicted to decrease the number of total interactions, as well as the number of mortalities, of both leatherback and loggerhead sea turtles (NMFS, 2004e). Post-release mortality rates are expected to decline due to a decrease in the number of turtles that swallow hooks which engage in the gut or throat, a decrease in the number of turtles that are foul-hooked and improved handling and gear removal protocols. NMFS is working to export this new technology to PLL fleets of other nations to reduce global sea turtle bycatch and bycatch mortality. U.S gear experts have presented this bycatch reduction technology and data from research activities at approximately 15 international events that included fishing communities and resource managers between 2002 and mid-2005 (NMFS, 2005a).

On February 7, 2007, NMFS published a rule that required BLL vessels to carry the same dehooking equipment as the PLL vessels. To date, all bottom and PLL vessels with commercial shark permits are required to have NMFS-approved sea turtle dehooking equipment onboard (PLL: July 6, 2004, 69 FR 40734; BLL: February 7, 2007, 72 FR 5639).

The Southeast Regional Office of Protected Resources Division is preparing a new BiOp regarding management measures under Amendment 2 to the Consolidated HMS FMP, which is expected to be completed by Spring of 2008 and before the release of the final rule for this action. The last consultation on HMS shark fisheries resulted in an October 29, 2003 BiOp, which concluded the continued authorization of the fishery was likely to adversely affect, but not likely to jeopardize the continued existence of, green, Kemp's ridley, leatherback, and loggerhead sea turtles and smalltooth sawfish. The opinion also concluded that marine mammals, the Gulf of Maine Atlantic salmon DPS, shortnose sturgeon, Gulf sturgeon, and right whale critical habitat were not likely to be adversely affected by the action.

Consultation has been reinitiated because of new information regarding interactions between ESA listed species and the fishery, and to evaluate the proposed changes to the fishery under Amendment 2 to the Consolidated HMS FMP. Information on the likelihood of post-release mortality has also been updated since the 2003 BiOp. Incidental take authorized for gillnet gear in the 2003 BiOp was specified only for drift gillnets. This was because: (1) Sink gillnets were not known to be used in this fishery so were not analyzed or authorized take, and (2) the strike-netting technique was analyzed in the opinion, but was not expected to result in any adverse effects on listed species. However, through NMFS shark gillnet observer program, NMFS has discovered that sink gillnetting is used to target sharks and does occasionally interact

with sea turtles, and sea turtles are occasionally caught in strike-net sets. Also, although the total number of estimated sea turtle and smalltooth sawfish takes in BLL gear is below the authorized level, incidental take mortality for smalltooth sawfish has been exceeded by one member of the species. The fishery continues to be in compliance with the terms and conditions of the ITS in the 2003 BiOp, and consultation has been reinitiated. The proposed changes under Amendment 2 are expected to reduce fishing effort and reduce the fishery's impacts on ESA-listed species in the action area. Additional management measures may result based on the 2008 BiOp expected this Spring.

Internationally, the United States is pursuing sea turtle conservation through international, regional, and bilateral organizations such as ICCAT, the Asia Pacific Fishery Commission, and FAO Committee on Fisheries (COFI). The United States intends to provide a summary report to FAO for distribution to its members on bycatch of sea turtles in U.S. longline fisheries and the research findings as well as recommendations to address the issue. At the 24th session of COFI held in 2001, the United States distributed a concept paper for an international technical experts meeting to evaluate existing information on turtle bycatch, to facilitate and standardize collection of data, to exchange information on research, and to identify and consider solutions to reduce turtle bycatch. COFI agreed that an international technical meeting could be useful despite the lack of agreement on the specific scope of that meeting. The United States has developed a prospectus for a technical workshop to address sea turtle bycatch in longline fisheries as a first step. Other gear-specific international workshops may be considered in the future.

Smalltooth sawfish

On April 1, 2003, NMFS listed smalltooth sawfish as an endangered species (68 FR 15674) under the ESA. After reviewing the best scientific data and commercial fisheries information, the status review team determined that the U.S. DPS (Distinct Population Segment) of smalltooth sawfish is in danger of extinction throughout all or a significant portion of its range from a combination of the following four listing factors: the present or threatened destruction, modification, or curtailment of habitat or range; over utilization for commercial, recreational, scientific, or educational purposes; inadequacy of existing regulatory mechanisms; and other natural or manmade factors affecting its continued existence. NMFS is working on designating critical habitat for smalltooth sawfish.

NMFS believes that smalltooth sawfish takes in the shark gillnet fishery are rare given the high rate of observer coverage. The fact that there were no smalltooth sawfish caught during 2001, when 100 percent of the fishing effort was observed, indicates that smalltooth sawfish takes (observed or total) most likely do not occur on an annual basis. Based on this information, the 2003 BiOp estimates that one incidental capture of a sawfish (released alive) would occur from 2004 to 2008 as a result of the use of gillnets in this fishery (NMFS, 2003b). The 2008 BiOp, expected in Spring 2008, may require additional, related management measures.

From 1994 through 2006, 12 smalltooth sawfish interactions have been observed (11 released alive, and one released in unknown condition) in shark BLL fisheries (Morgan pers. comm.; Burgess and Morgan, 2004; Hale and Carlson, 2007; Hale *et al*., 2007). In 2007, there were three smalltooth sawfish interactions with shark BLL gear (based on SEFSC data). Two were released alive, and one released dead. All three interactions occurred in the South Atlantic

region. Based on extrapolated takes for 2004 through 2006, 60 smalltooth sawfish have taken in the BLL fisheries (NMFS, 2007b). No mortalities were extrapolated; however, one mortality occurred in 2007. Although the total number of estimated smalltooth sawfish takes in BLL gear is below the authorized level, take in 2007 exceeded the incidental take mortality for smalltooth sawfish in the BLL fishery by one member of the species. However, the fishery continues to be in compliance with the terms and conditions of the ITS in the 2003 BiOp. The proposed changes under Amendment 2 are expected to reduce fishing effort and reduce the fishery's impacts on ESA-listed species in the action area. The new BiOp, expected in Spring 2008, may require additional, related management measures.

3.10.2.3 Interactions with Seabirds

Observer data from 1992 through 2005 indicate that seabird bycatch is relatively low in the U.S. Atlantic PLL fishery. Since 1992, a total of 129 seabird interactions have been observed, with 95 observed killed (73.6 percent). In 2005, there were 110 active U.S. PLL vessels fishing for swordfish in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea that reportedly set approximately 5.9 million hooks. A total of four seabirds were observed taken.

The NPOA for Reducing the Incidental Catch of Seabirds in Longline Fisheries was released in February 2001. The NPOA for Seabirds calls for detailed assessments of longline fisheries, and, if a problem is found to exist within a longline fishery, for measures to reduce seabird bycatch within two years. NMFS, in collaboration with the appropriate Councils and in consultation with the U.S. Fish and Wildlife Service, will prepare an annual report on the status of seabird mortality for each longline fishery. The United States is committed to pursuing international cooperation, through the Department of State, NMFS, and U.S. Fish and Wildlife Service, to advocate the development of National Plans of Action within relevant international fora. NMFS intends to meet with longline fishery participants and other members of the public in the future to discuss possibilities for complying with the intent of the plan of action. Because interactions appear to be relatively low in Atlantic HMS fisheries, the adoption of immediate measures is unlikely.

Bycatch of seabirds in the shark BLL fishery has been virtually non-existent. A single pelican has been observed killed from 1994 through 2005. No expanded estimates of seabird bycatch or catch rates for the BLL fishery have been made due to the rarity of seabird takes.

3.10.3 Measures to Address Protected Species Concerns

NMFS has taken a number of actions designed to reduce interactions with protected species over the last few years. Bycatch reduction measures have been implemented through the 1999 FMP for Atlantic Tunas, Swordfish and Sharks (NMFS, 1999a), in Regulatory Amendment 1 to the 1999 FMP for Atlantic Tunas, Swordfish and Sharks (NMFS, 2000), in Regulatory Adjustment 2 to the 1999 FMP for Atlantic Tunas, Swordfish and Sharks (NMFS, 2002), in Amendment 1 to the 1999 FMP for Atlantic Tunas, Swordfish and Sharks (NMFS, 2003a), and in the June 2004 Final Rule for Reduction of Sea Turtle Bycatch and Bycatch Mortality in the Atlantic PLL Fishery (69 FR 40734), the Consolidated HMS FMP, and in Amendment 2 to the Consolidated HMS FMP. NMFS closed the Southeast U.S. Restricted Area to gillnet fisheries from February 15, 2006, to March 31, 2006, as a result of an entanglement and subsequent

mortality of a right whale with gillnet gear (71 FR 8223). NMFS also implemented two additional rules to help protected Atlantic right whales (June 25, 2007, 72 FR 34632; October 5, 2007, 72 FR 57104). NMFS continues to monitor observed interactions with marine mammals, smalltooth sawfish, and sea turtles on a quarterly basis and reviews data for appropriate action, if any, as necessary.

3.10.4 Bycatch of HMS in Other Fisheries

NMFS is concerned about bycatch mortality of Atlantic HMS in any Federal or state-managed fishery which captures them. NMFS plans to address bycatch of these species in the appropriate FMPs through coordination with the responsible management body. For a complete review of bycatch of HMS in other fisheries, please refer to Section 3.9.11 in the Consolidated HMS FMP.

3.10.5 Evaluation of Other Bycatch Reduction Measures

NMFS continues to monitor and evaluate bycatch in HMS fisheries through direct enumeration (pelagic and BLL observer programs, shark gillnet observer program), evaluation of management measures (closed areas, trip limits, gear modifications, *etc*.), and VMS.

The following section provides a review of additional management measures or issues that may address bycatch reduction:

ALWTRP regulations

Observers were placed on shark gillnet vessels during 2005-06 and covered 84 strikenet, 35 driftnet and 249 sink gillnet sets during and outside of right whale calving season (Carlson and Bethea, 2007). Protected species interactions occurred with all three types of gear. No marine mammals or smalltooth sawfish were observed caught in either year. From 2005 through 2007, a total of 13 sea turtles (12 loggerheads, one leatherback) were observed caught. Section 3.4.2 gives a breakdown on interactions by gear type. NMFS implemented the final rule on June 25, 2007 (72 FR 34632), that prohibits gillnet fishing, including shark gillnet fishing, from November 15 to April 15, between the NC/SC border and 29° 00' N. Shark gillnet vessels fishing between 29° 00' N and 26° 46.5' N have certain requirements as outlined 50 CFR § 229.32 from December 1 through March 31 of each year.. These include vessel operators contacting the SEFSC Panama City Laboratory at least 48 hours prior to departure of a fishing trip in order to arrange for an observer. In addition, a recent rule (October 5, 2007, 72 FR 57104) amends restrictions in the Southeast U.S. Monitoring Area from December 1 through March 31 for shark gillnet vessels.

Atlantic Bottlenose Dolphin Take Reduction Team

Due to the observed takes of Atlantic bottlenose dolphin in the shark drift gillnet fishery, representatives of the fishery have been included in the Atlantic Bottlenose Dolphin Take Reduction Team. The Team held seven meetings during 2001 – 2003 and developed a set of recommendations which formed the basis for a TRP. NMFS published a final rule regarding this action on April 26, 2006 (71 FR 24776). Included in the final rule are: 1) effort reduction measures; 2) gear proximity rules; 3) gear or gear deployment modifications; 4) fishermen

training; and 5) outreach and education measures to reduce dolphin bycatch below the stock's potential biological removal level. The final rule also includes time/area closures and size restrictions on large mesh fisheries to reduce incidental takes of endangered and threatened sea turtles as well as to reduce dolphin bycatch.

MMPA List of Fisheries Update/Stock Assessment

NMFS continues to update the MMPA List of Fisheries and the 2008 (72 FR 35393) proposed list is available at http://www.nmfs.noaa.gov/pr/pdfs/fr/fr72-35393.pdf. Marine mammal stock assessment reports are also available at http://www.nmfs.noaa.gov/pr/sars/.

AOCTRT

NMFS has disbanded the AOCTRT due to the fact that two of the three fisheries addressed by the AOCTRT were closed by fishery management actions, leaving only the PLL fishery in operation. This fishery has been the subject of recent fishery management actions and increased observer coverage related to bycatch. As discussed below, a take reduction team specific to the PLL fishery has been formed.

PLTRT

NMFS appointed a PLTRT in June 2005, to address marine mammal interactions in the longline fishery, specifically pilot whales. As required by the MMPA, the PLTRT must develop a TRP within eleven months. The PLTRT has met four times since and a draft TRP should be available shortly. A proposed rule is in development and may be published in early 2008. NMFS intends to continue reviewing the fishery and any marine mammal interactions to determine if additional take reduction measures are necessary.

VMS in the PLL fishery

NMFS adopted fleet-wide VMS requirements in the Atlantic PLL fishery in May 1999, but was subsequently sued by an industry group. By order dated September 25, 2000, the U.S. District Court for the District of Columbia prevented any immediate implementation of VMS in the Atlantic PLL fishery, and instructed to "undertake further consideration of the scope of the [VMS] requirements in light of any attendant relevant conservation benefits." On October 15, 2002, the court issued a final order that denied plaintiff's objections to the VMS regulations. Based on this ruling, NMFS implemented the VMS requirement in September 2003.

VMS in other HMS fisheries

Starting in 2004, gillnet vessels with a directed shark permit and gillnet gear onboard were required to install and operate a VMS unit during the Right Whale Calving Season (November 15 – March 31). In an attempt to better quantify bycatch, NMFS will require all vessels with Limited Access Shark Permits to participate in the Directed Shark Gillnet Observer program. Directed shark BLL vessels located between 33^{o} N and 36^{o} 30' N need to install and operate a VMS unit from January through July.

Chapter 3 References

Arocha, F. 1996. Taken from Hoey and Moore's Captains Report: Multi-species catch characteristics for the U.S. Atlantic pelagic longline fishery. August 1999.

ASA. 2001. The economic importance of sport fishing. Funded by the International Association of Fish and Wildlife Agencies through the U.S. Fish and Wildlife Service under Cooperative Grant Agreement No. VA M-3-EO.

Babcock, E.A., E.K. Pikitch, and C.G. Hudson. 2003. How much observer coverage is enough to adequately estimate bycatch? Report of the Pew Institute for Ocean Science, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Miami, FL. 36 pp. On-line version: http://www.oceana.org/uploads/BabcockPikitchGray2003FinalReport.pdf

Baremore, I. E., Murie, D. J., and Carlson, J. K. 2006. Trophic dynamics of the Atlantic angel Shark in the northern Gulf of Mexico. Abstract: American Society of Ichthyologists and Herpetologists/American Elasmobranch Society Annual meeting.

Baremore, I.E., J.K. Carlson, L.D. Hollensead, and D.M. Bethea. 2007. Catch and Bycatch in the U.S. Southeast Gillnet Fisheries: 2007. NOAA Technical Memorandum NMFS-SEFSC-565, 19 p.

Beck, M. W., Heck, K. L., Able, K., Childers, D., Eggleston, D., Gillanders, B. M., Halpern, B. Hays C., Hoshino, K., Minello, T., Orth, R., Sheridan, P., and Weinstein, M. 2001. The Identification, Conservation, and Management of Estuarine and Marine Nurseries for Fish and Invertebrates. Bioscience. 51:633-641.

Beerkircher, L.R., C.J. Brown, and D.W. Lee. 2002. SEFSC Pelagic Observer Program Data Summary for 1992-2000. NOAA Tech. Mem. NMFS-SEFSC-486. 26 pp.

Beerkircher, L.R., E. Cortés, and M. Shivji. 2004. Characteristics of shark bycatch observed on pelagic longlines off the southeastern United States, 1992 – 2002. Marine Fisheries Review. 64 (4) 40 – 49.

Bethea, D.M., and Hale, L. 2006. Diet of the roundel skate *Raja texana* from the northern Gulf of Mexico. Abstract: American Society of Ichthyologists and Herpetologists/American Elasmobranch Society Annual meeting.

Bethea, D. M., Carlson, J. K., Buckel, J. A., and Satterwhite, M. 2006. Ontogenetic and Site-Related Trends in the Diet of the Atlantic Sharpnose Shark *Rhizoprionodon terraenovae* From the Northeast Gulf of Mexico. Bulletin of Marine Science. 78(2):287-307.

Branstetter, S. and R. Stiles. 1987. Age and growth estimates of the bull shark, *Carcharhinus leucas*, from the northern Gulf of Mexico. Environ. Biol. Fishes 20(3): 169-181.

Brown, C.A. and S.H. Gruber. 1988. Age assessment of the lemon shark, *Negaprion brevirostris*, using tetracycline validated vertebral centra. Copeia 1988(3): 747-753.

Burgess, G.H. and A. Morgan. 2002. Commercial shark fishery observer program; support for an observer program monitoring the directed commercial shark fishery in the eastern Gulf of Mexico and Atlantic Ocean. Final report to Highly Migratory Species Division, National Marine Fisheries Service. Award No. NA06FM0194.

Burgess, G.H. and A. Morgan. 2003. Commercial shark fishery observer program: Support for an observer program monitoring the directed commercial shark fishery in the eastern Gulf of Mexico and Atlantic Ocean. Final report to the Highly Migratory Species Division, NMFS, Award No. NA06FM0194. 87 pp.

Burgess, G.H. and A. Morgan. 2004. Commercial shark fishery observer program; an observer program report on the monitoring of the directed commercial shark fishery in the eastern Gulf of Mexico and South Atlantic 2003(2) fishing season. Final report to Highly Migratory Species Division, National Marine Fisheries Service. Award No. NA03NMF4540075.

Canadian Science Advisory Secretariat. 2005. Recovery Assessment Report on NAFO Subareas 3-6 Porbeagle Shark, Science Advisory Report 2005/043, 11 pp.

Carlson, J.K. 2000. Progress report on the directed shark gillnet fishery: right whale season, 2002. NOAA, National Marine Fisheries Service, Southeast Fisheries Science Center, Panama City, FL. Sustainable Fisheries Division Contribution SFD-99/00-90. 12 pp.

Carlson, J. and I. Baremore. 2001. The directed shark gillnet fishery: non-right whale season, 2000 and 2001. SFD Contribution PCB-01/02-002. Panama City, FL. 8pp.

Carlson, J.K. and I.E. Baremore. 2002a. The Directed Shark Gillnet Fishery: Non-Right Whale Season, 2002 (catch, bycatch and estimates of sample size). National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Fisheries Science Center, Panama City, FL. Sustainable Fisheries Division Contribution PCB-02/12. 10pp.

Carlson, J.K. and I. Baremore. 2002b. The directed shark gillnet fishery: right whale season, 2002. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Fisheries Science Center, Panama City, FL. Sustainable Fisheries Division Contribution PCB-02/13. 8pp.

Carlson, J. K. and I. Baremore. 2003. The directed shark gillnet fishery: catch and bycatch, 2003. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Fisheries Science Center, Panama City, FL. Sustainable Fisheries Division Contribution PCB-03/07. 8pp.

Carlson, J.K. and D.M Bethea. 2006. The Directed Shark Gillnet Fishery: Catch and Bycatch, 2005. NOAA, NMFS, Southeast Fisheries Science Center, Panama City, FL. Panama City Lab.-Contribution 06-01.

Carlson, J.K., J.R. Sulikowski, and I.E. Baremore. 2006. Do differences in life history exist for blacktip sharks, *Carcharhinus limbatus*, from the United States South Atlantic Bight and Eastern Gulf of Mexico? Environmental Biology of Fishes 77: 279-292.

Carlson, J. K. 2007. Modeling the Role of Sharks in the Trophic Dynamics of Apalachicola Bay, Florida. p. 281-300. In, Camilla T. McCandless, Nancy E. Kohler and Harold L. Pratt Jr., Eds., Shark Nursery Grounds of the Gulf of Mexico and the East Coast Waters of the United States. American Fisheries Society, Bethesda, MD. 390 p. American Fisheries Society Symposium no. 50

Carlson, J.K. and D. M. Bethea. 2007. Catch and bycatch in the shark gillnet fishery: 2005-2006. NOAA Technical Memorandum NMFS-SEFSC-552, 26 p.

Casey, J.G., F.J. Mather, J.M. Mason, and J. Hoenig. 1978. Offshore fisheries of the Middle Atlantic Bight. *In*: Marine recreational fisheries. IGFA, NCMG, and SFI. Washington, DC: pp. 107-129.

Casey, J.G. and J.J. Hoey. 1985. Estimated catch of large shark by U.S. recreational fishermen in the Atlantic and Gulf of Mexico. *In*: Shark catches from selected fisheries off the U.S. east coast. U.S. Dept of Commerce, NOAA Tech Report NMFS 31, July: 15-19.

Cortés, E. 2002. Stock Assessment of Small Coastal Sharks in the U.S. Atlantic and Gulf of Mexico. National Marine Fisheries Service, Southeast Fisheries Science Center, Panama City Laboratory. Panama City, FL.

Cortés, E. and J. Neer. 2002. Updated catches of sharks. NOAA Fisheries, SEFSC, Panama City Lab. Document SB/02/15 of the 2002 Shark Evaluation Workshop. Panama City, FL, June 24-28, 2002. 62 p.

Cortés, E., L. Brooks, and G. Scott. 2002. Stock Assessment of Large Coastal Sharks in the U.S. Atlantic and Gulf of Mexico: Final Meeting Report of the 2002 Shark Evaluation Workshop. National Marine Fisheries Service, Southeast Fisheries Science Center, Panama City Laboratory. Panama City, FL.

Cortés, E. 2003. Updated catches of Atlantic sharks. SFD Contribution 2003-0031. NMFS, Southeast Fisheries Science Center, Panama City, Florida. 75 p.

Cortés, E. and J.A. Neer. 2005. Updated catches of Atlantic sharks. LCS05/06-DW-16. NMFS, Southeast Fisheries Science Center, Panama City, Florida. 58 p.

Cortés, E., P. Brooks, P. Apostolaki, and C.A. Brown. 2006. Stock assessment of Dusky shark in the U.S. Atlantic and Gulf of Mexico. NMFS Panama City Laboratory, Sustainable Fisheries Division Contribution SFD-2006-014, pp. 155.

Cortés, E., and J.A. Neer. 2007. Updated Catches of Atlantic Small Coastal Sharks. 2007 SEDAR 13-DW-15, 64 pp.

COSEWIC. 2004. COSEWIC assessment and status report on the porbeagle shark *Lamna Nasus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. viii + 43 pp. http://www.sararegistry.gc.ca/status/status_e.cfm

Cramer, J. and H. Adams. 2000. Large Pelagic Logbook Newsletter: 1998. NOAA Tech. Memo. NMFS-SEFSC - 433. 25 pp.

Ditton, R.B., D.K. Anderson, J.F. Thigpen III, B.L. Bohnsack, and S.G. Sutton. 2000. 1999 Pirates Cove Big Game Tournaments: Participants' Characteristics, Participation in Fishing, Attitudes, Expenditures, and Economic Impacts. Human Dimensions of Fisheries Laboratory Report #HD-615, Texas A & M University, College Station, TX. 126 pp.

Epperly, S., L. Stokes, and S. Dick. 2004. Careful Release Protocols for Sea Turtle Release with Minimal Injury. NOAA Tech. Mem. NMFS-SEFSC-524.

Garrison, L. 2003a. Protected species interactions with the directed shark gillnet fishery of Florida and Georgia from 1999-2002. NOAA, NMFS, Southeast Fisheries Science Center, Miami, FL. 10 pp.

Garrison, L.P. 2003b. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2001 - 2002. National Oceanic and Atmospheric Administration Technical Memorandum. NMFS-SEFSC-515. 52 pp.

Garrison, L.P. and P.M. Richards. 2004. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2003. National Oceanic and Atmospheric Administration Technical Memorandum. NMFS-SEFSC-527. 57 pp.

Garrison, L.P. 2005. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2004. National Oceanic and Atmospheric Administration Technical Memorandum. NMFS-SEFSC-531. 52 pp.

Garrison, L.P. 2007. Estimated Marine Mammal and Turtle Bycatch in Shark Gillnet Fisheries Along the Southeast U.S. Atlantic Coast: 2000-2006. PRD Contribution: #PRD-07/08-02. 22 p.

Gibson, A.J.F., and S.E. Campana. 2005. Status and Recovery Potential of Porbeagle Shark in the Northwest Atlantic, DFO, CSAS, Research Document 2005/053, 79 pp.

Hale, L.F., J.V. Dudgeon, A.Z. Mason, and C. G. Lowe. 2006. Elemental signatures in the vertebral cartilage of the round stingray, *Urobatis halleri*, from Seal Beach, California, Environmental Biology of Fishes 77:317-325.

Hale, L.F. and J.K. Carlson. 2007. Characterization of the Shark Bottom Longline Fishery: 2005-2006. National Oceanic and Atmospheric Administration Technical Memorandum. NMFS-SEFSC-554. 25pp.

Hale, L.F., L.D. Hollensead, and J. K. Carlson. 2007. Characterization of the shark bottom longline fishery: 2007. NOAA Technical Memorandum NMFS-SEFSC 564, 25 p.

Heist, E.J., J.E. Graves, and J.A. Musick. 1995. Population genetics of the sandbar shark, Carcharhinus plumbeus, in the Gulf of Mexico and Mid-Atlantic Bight. Copeia 1995(3): 555-562.

Holland, S. M., A. J. Fedler, and J. W. Milon. 1999. The operations and economics of the charter and head boat fleets of the Eastern Gulf of Mexico and South Atlantic Coasts. Memo NOAA Fisheries - F/SPO-38.

Kirkley, J.E. 2005. The Communities of the Atlantic Highly Migratory Species (HMS) Fishery: An Overview of Change Associated with the HMS Fishery Management Plan. Department of Coastal and Ocean Policy, School of Marine Science, Virginia Institute of Marine Science, College of William and Mary, Gloucester Point, Virginia. (NOAA-NMFS-HMS contract report).

McHugh, R.J. and T.J. Murry. 1997. An analysis of the demand for, and supply of shark. Marine Fisheries Initiative Grant No., NA57FF0052, Univ. of South Florida and Georgia State Univ.

MRAG, Americas, Inc., and M. Jepson. 2008. Updated Profiles for HMS Dependant Fishing Communities: Social Impact Assessment Services for HMS Fishing Communities. Solicitation Number: DG133F06RQ0381, 84, pp.

NAS. 2006. Review of Recreational Fisheries Survey Methods. Committee on the Review of Recreational Fisheries Survey Methods, National Research Council. ISBN: 0-309-10193-X, 130 p.

NMFS. 1993. Fishery Management Plan for Sharks of the Atlantic Ocean. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Sustainable Fisheries, Highly Migratory Species Management Division, Silver Spring, MD. Public Document.

NMFS. 1997a. Fisheries of the United States: 1996. B.K. O'Brannon, Editor. Office of Science and Technology, Fisheries Statistics and Economics Division, NOAA, U.S. Department of Commerce. Silver Spring, MD. 169 p.

NMFS. 1997b. 1997 Shark Evaluation Report. NOAA, Southeast Fisheries Science Center, Miami, FL. 12 p.

NMFS. 1998a. 1998 Report of the Shark Evaluation Workshop. NOAA, NMFS, Panama City Laboratory, FL. 109 p.

NMFS. 1998b. Managing the Nation's Bycatch: Programs, Activities, and Recommendations for the National Marine Fisheries Service. 174 pp.

NMFS. 1999a. Fishery Management Plan for Atlantic Tunas, Swordfish and Sharks. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Sustainable Fisheries, Highly Migratory Species Management Division, Silver Spring, MD. Public Document.

NMFS. 1999b. Amendment 1 to the Atlantic Billfish Fishery Management Plan. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Sustainable Fisheries, Highly Migratory Species Management Division, Silver Spring, MD. Public Document.

NMFS. 2000. Regulatory Amendment One to the 1999 HMS FMP. Reduction of Bycatch, Bycatch Mortality, and Incidental Catch in the Atlantic Pelagic Longline Fishery, June 14, 2000. NOAA, NMFS, HMS Management Division.

NMFS. 2001a. NMFS Operational Guidelines – Fishery Management Process: Appendix 2(g)**:** Guidelines for Assessment of the Social Impact of Fishery Management Actions. Silver Spring, MD: U.S. Department of Commerce, National Marine Fisheries Service.

NMFS. 2001b. Stock Assessments of Loggerhead and Leatherback Sea Turtles and an Assessment of the Impact of the Pelagic Longline fishery on the Loggerhead and Leatherback Sea Turtles of the Western North Atlantic. U.S. Department of Commerce, National Marine Fisheries Service, Miami, FL, SEFSC Contribution PRD-00/01-08.

NMFS. 2002. Regulatory Adjustment 2 to the Atlantic Tunas, Swordfish, and Sharks Fishery Management Plan. NOAA, NMFS, Highly Migratory Species Management Division, 174 pp.

NMFS. 2003a. Final Amendment 1 to the Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks, and Highly Migratory. NOAA, National Marine Fisheries Service, Highly Migratory Species Management Division, Silver Spring, MD. Public Document.

NMFS. 2003b. Endangered Species Act Section 7 Consultation: Biological Opinion on the continued operation of Atlantic shark fisheries (commercial shark bottom longline and drift gillnet fisheries and recreational shark fisheries) under the Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks (HMS FMP) and the proposed Rule for Draft Amendment 1 to the HMS FMP, July 2003. NMFS, Southeast Regional Office, Protected Resources Division, I.D. No. F/SER/2003/00953. 65 pp. + apps.

NMFS. 2004a. National Report of the United States (to ICCAT): 2004. NOAA, U.S. Department of Commerce, Silver Spring, MD. NAT/03/06.

NMFS. 2004b. Fisheries of the United States: 2004. E.S. Pritchard, Editor. Office of Science and Technology, Fisheries Statistics and Economics Division, NOAA, U.S. Department of Commerce, Silver Spring, MD.

NMFS. 2004c. Fresh Prices at Fulton Fish Market: 2004. National Marine Fisheries Service, NOAA, U.S. Department of Commerce, New York, NY. http://www.st.nmfs.noaa.gov/st1/publications.html

NMFS. 2004d. Evaluating Bycatch: A National Approach to Standardized Bycatch Monitoring Programs. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/SPO-66, 108 p.

NMFS. 2004e. Final Supplemental Environmental Impact Statement. Reduction of Sea Turtle Bycatch and Bycatch Mortality in the Atlantic Pelagic Longline Fishery. NOAA, National Marine Fisheries Service, HMS Management Division, Silver Spring, MD.

NMFS. 2004f. Endangered Species Act-Section 7 Re-initiation of Consultation on the Atlantic Pelagic Longline Fishery for Highly Migratory Species. Biological Opinion, June1, 2004. 154 pp.

NMFS. 2005a. United States National Report to ICCAT, 2005. NAT-038.

NMFS. 2005b. Fisheries of the United States: 2005. E.S. Pritchard, Editor. Office of Science and Technology, Fisheries Statistics and Economics Division, NOAA, U.S. Department of Commerce, Silver Spring, MD.

NMFS. 2006a. Final Consolidated Atlantic Highly Migratory Species Fishery Management Plan. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Sustainable Fisheries, Highly Migratory Species Management Division, 1315 East West Highway, Silver Spring, MD. Public Document. pp. 1600.

NMFS. 2006b. SEDAR 11 Stock Assessment Report: Large Coastal Shark Complex, Blacktip and Sandbar Shark. Highly Migratory Species Management Division, 1315 East West Highway, Silver Spring, MD 20910. 257 pp.

NMFS. 2006c. Stock status of porbeagle sharks by the Northeast and Southeast Fisheries Science Center, 5 pp.

NMFS. 2007a. SEDAR 13 Stock Assessment Report: Small Coastal Sharks, Atlantic Sharpnose, Blacknose, Bonnethead, and Finetooth Shark. Highly Migratory Species Management Division, 1315 East West Highway, Silver Spring, MD 20910. 375 pp.

NMFS. 2007b. Estimated Takes of Protected Species in the Commercial Directed Shark bottom Longline Fishery 2006. NMFS Southeast Fisheries Science Contribution PRBD 07/08-05. 15 p.

Piercy, A. N., Carlson, J. K., Sulikowski, J. A., and Burgess, G. H. 2007. Age and Growth of the Scalloped Hammerhead Shark, *Sphyrna lewini*, in the North-West Atlantic Ocean and Gulf of Mexico. Marine and Freshwater Research. 58(1):34-40.

Rae, B.B. 1962. Porbeagle sharks. Scot. Fish. Bull. 18:17-19.

Rago, P.J., S.E. Wigley, and M.J. Fogarty. 2005. NEFSC Bycatch Estimation Methodology: Allocation, Precision, and Accuracy. NOAA, NMFS, NEFSC Ref. Doc. 05-09.

Restrepo, V.R., G.G. Thompson, P.M. Mace, W.L. Gabriel, L.L. Low, A.D. MacCall, D. Methot, J.E. Powers, B.L. Taylor, P.R. Wade, J.F. Witzig, 1998. Technical guidance on the use of precautionary approaches to implementing National Standard 1 of the Magnuson-Stevens Fishery Conservation and Management Act. NOAA Tech Memo NMFS-S/SPO, 54 pp.

Richards, P. 2007. Estimated takes of protected species in the commercial directed shark bottom longline fishery 2003, 2004, and 2005. NMFS Southeast Fisheries Science Contribution PRD 06/07-08. 21 p.

Rose, D. 1996. An Overview of World Trade in Sharks. TRAFFIC International. 105 p.

SAFMC. 1988. Fishery Management Plan, Final Environmental Impact Statement, Regulatory Impact Review, and Initial Regulatory Flexibility Analysis for the Atlantic Billfishes. Charleston, SC.

SCRS. 2004a. Report of the 2004 Inter-Sessional Meeting of the ICCAT Sub-Committee On Bycatches: Shark Stock Assessment. June 14-18, Tokyo, Japan. SCRS/2004/014.

SCRS 2004b. Report of the Standing Committee on Research and Statistics, ICCAT SCRS, Madrid, Spain, October 4 to 8, 2004.

SCRS. 2005. Report of the Standing Committee on Research and Statistics, ICCAT Standing Committee on Research and Statistics, October 3 - October 7, 2005.

SCRS. 2007. Report of the Standing Committee on Research and Statistics, ICCAT SCRS, Madrid, Spain, October 1 - October 5, 2007, 216 pp.

Shah, A., J.W., Watson, D. Foster, and S. Epperly. 2004. Experiments in the Western Atlantic Northeast Distant Waters to Evaluate Sea Turtle Mitigation Measures in the Pelagic

Longline Fishery – Summary of Statistical Analysis. NOAA, NMFS, SEFSC, Pascagoula, MS. Unpublished Report.

Simpfendorfer, C.A. and G.H. Burgess. 2002. Assessment of the status of the Small Coastal Sharks in U.S. Waters using an Age-structured Model. Mote Marine Laboratory Technical Report No. 836. Sarasota, FL.

Sminkey, T.R. and J.A. Musick. 1995. Age and growth of the sandbar sharks, *Carcharhinus plumbeus*, before and after population depletion. Copeia 1995(4): 871-83.

Smith, P.C., L.F. Hale, and J.K. Carlson. 2006. The Directed Shark Longline Fishery: Catch and Bycatch, 2005. NMFS Panama City Laboratory Contr. 06-04. 14 pp.

Sulikowski, J. A., Driggers III, W. B., Ford, T. S., Boonstra, R. K., and Carlson, J. K. 2007. Reproductive Cycle of the Blacknose Shark *Carcharhinus acronotus* in the Gulf of Mexico. Journal of Fish Biology. 70(2):428-440.

Sutton, S.G., R.B. Ditton, J.R. Stoll, and J.W. Milon. 1999. A cross-sectional study and longitudinal perspective on the social and economic characteristics of the charter and party boat fishing industry of Alabama, Mississippi, Louisiana, and Texas. Report prepared for the National Marine Fisheries Service with MARFIN funding support (Grant Number NA 77FF0551.) Human Dimensions of Fisheries Research Laboratory Report #HD-612. Texas A&M University, College Station. 198p.

USFWS. 2002. 2001 National Survey of Fishing, Hunting, and Wildlife Associated Recreation. U.S. Department of Interior, U.S. Department of Commerce, Bureau of the Census.

Wagner, M.H. 1966. Shark fishing gear: a historical review. Circular 238, U.S. Dept. of Interior, Fish and Wildlife Service. Washington, D.C.

Walsh, C.F. and L.P. Garrison. 2006. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2005. National Oceanic and Atmospheric Administration Technical Memorandum. NMFS-SEFSC-539. 51 pp.

Walsh, C.F. and L.P. Garrison. 2007. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2006. National Oceanic and Atmospheric Administration Technical Memorandum. NMFS-SEFSC-560. 53 pp.

Watson, J.W., D.G. Foster, S. Epperly, and A. Shah. 2003. Experiments in the Western Atlantic Northeast Distant Waters to Evaluate Sea Turtle Mitigation Measures in the Pelagic Longline Fishery – Summary of Statistical Analysis. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Fisheries Science Center, Pascagoula, MS. Unpublished report.

Watson, J.W., D.G. Foster, S. Epperly, and A. Shah. 2004. Experiments in the Western Atlantic Northeast Distant Waters to Evaluate Sea Turtle Mitigation Measures in the Pelagic

Longline Fishery: Report on experiments conducted in 2001–2003. February 4, 2004. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Fisheries Science Center, Pascagoula, MS. 123 pp.

Wilson, D., B.J. McCay, D. Estler, M. Perez-Lugo, J. LaMargue, S. Seminski, and A. Tomczuk. 1998. Social and Cultural Impact Assessment of the Highly Migratory Species Fishery Management Plan and the Amendment to the Atlantic Billfish Fisheries Management Plan. The Ecopolicy Center for Agriculture, Environmental, and Resource Issues, New Jersey Agricultural Experiment Station, Cook College, Rutgers, the State University of New Jersey (NOAA-NMFS-HMS contract report).

Yeung, C. 2001. Estimates of marine mammal and marine turtle bycatch by the U.S. Atlantic pelagic longline fleet in 1999 - 2000. NOAA Technical Memorandum NMFS-SEFSC-467. 43 pp.

CHAPTER 4 TABLE OF CONTENTS

CHAPTER 4 LIST OF TABLES

CHAPTER 4 LIST OF FIGURES

4.0 ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES

The National Marine Fisheries Service (NMFS) considered five alternative suites ranging from maintaining the status quo for the commercial and recreational Atlantic shark fisheries to prohibiting the retention of all Atlantic sharks by commercial and recreational fishermen. NMFS assessed the impacts of the alternative suites, which are comprised of seven key topics including: quotas; species complexes; commercial retention limits; time/area closures; reporting requirements; seasons; regions; and recreational measures. Instead of analyzing a range of alternatives under individual topics, this document analyzes a number of alternative suites that pull from a range of alternatives under all the topics (see Chapter 2 for a more detailed description). Alternative suite 1 would maintain the current Atlantic shark fishery (status quo). Alternative suite 2 would allow only directed shark permit holders to land sharks whereas alternative suite 3 would allow directed and incidental shark permit holders to retain sandbar and non–sandbar large coastal sharks (LCS) as well as small coastal sharks (SCS) and pelagic sharks. Alternative suite 4 would establish a program where vessels with directed or incidental shark permits could participate in a research fishery for sandbar sharks. Only vessels participating in this program would be authorized to land sandbar sharks. Vessels not participating in the research program could land non-sandbar LCS, SCS, and pelagic sharks. Finally, alternative suite 5 would close the commercial Atlantic shark fishery and only allow a catch and release recreational shark fishery (see overview Table 2.1).

NMFS also analyzed several alternatives that were outside the scope of the five alternative suites. Alternatives 6 and 7 pertain to the timing of shark stock assessment whereas alternatives 8 and 9 pertain to the timing of the publication of the Stock Assessment and Fishery Evaluate (SAFE) report every year. These alternatives are mainly administrative in nature and are anticipated to have minimal associated ecological, social, and economic impacts.

Data sources

NMFS collects fishery-dependent data on sharks from a number of different sources. The following is a brief description of the data sources available to NMFS and NMFS' rationale for choosing particular data sources as the best available data for this Environmental Impact Statement (EIS) and rulemaking.

NMFS uses two logbooks to collect information from shark permit holders: the Coastal Fisheries logbook and the Highly Migratory Species (HMS) logbook. In general, the Coastal Fisheries logbook is used by directed and incidental shark permit holders fishing with bottom longline (BLL) and gillnet gear that may also be targeting or retaining reef fish or other coastal species, whereas the HMS logbook is used by fishermen targeting tunas and swordfish with pelagic longline (PLL) gear. Fishermen report landings by species in both logbooks as well as discard information by species in the HMS logbook. Fishermen also record effort data and fishing location for each trip (in the Coastal Fisheries logbook) or set (in the HMS logbook). Logbooks are submitted to NMFS by individual fishermen, and hence include effort data by permit type. NMFS also collects data on shark landings and discards through the shark BLL and shark gillnet observer programs. More detailed information on landings (average size, weight, *etc*.) and discards is available through the observer reports than through the logbooks. In

addition, through the observer program, NMFS gathers data on fishing trips that do not target sharks (*i.e.*, target other species such as the snapper-grouper complex or Spanish mackerel). However, observers are only present on a portion of the shark BLL and gillnet fleet. On the other hand, the Coastal Fisheries and HMS logbooks contain data from the entire HMS fishing fleet with Federal permits. However, since only Federally-permitted shark fishermen are required to submit Federal logbooks and are selected to carry observers, logbook data and observer program data do not encapsulate state landings or effort data, and are not normally used for quota monitoring purposes.

NMFS uses dealer reports to monitor shark landings for quota monitoring and stock assessment purposes. The dealer reports come from state shark dealers as well as from Federal shark dealers through the Federal quota monitoring system. Thus, dealer reports include shark landings in both Federal and state waters. NMFS then cross-checks these different sources to ensure double-reporting does not take place between Federal and state dealers, and submits regular shark landings updates from these reports. In addition, the shark dealer reports are used to incorporate commercial fishery landings into stock assessments. However, shark dealer reports do not have detailed effort information that is included in logbook data, such as landings or trip data by different permit holders.

Because effort data is obtained through logbooks, but state and Federal landings are obtained through dealer reports, NMFS used a combination of both logbook and dealer reports to obtain the necessary information for analyses in the Final EIS (FEIS). NMFS used logbook data to estimate effort in terms of number of trips taken by permit type in different regions. NMFS used landings data from shark dealer reports to determine historical landings of each shark species to determine the non-sandbar LCS quota as well as baseline information under the status quo, alternative suite 1. NMFS updated the baseline information regarding shark landings based on shark dealer reports in alternative suite 1 so that the non-sandbar LCS quota in the preferred alternative suite 4 could be compared to shark landings under the status quo; such a comparison is needed to determine the ecological and socioeconomic impacts of the preferred alternative suite compared to the status quo, therefore, shark landings should be from the same data source for an appropriate comparison. NMFS made this is change from the DEIS, where NMFS used logbook data to estimate landings by shark species and permit type, for the following reasons. First, NMFS compared BLL observer landings with landings recorded in shark dealer reports and Coastal Fisheries and HMS logbooks. NMFS found that BLL observer landings and shark dealer reports, in terms of percent species composition, corresponded with one another, whereas logbook data did not correspond to either. Second, both BLL observer data and shark dealer reports indicated more non-sandbar LCS, in aggregate, were landed compared to overall sandbar shark landings. Logbook data indicated more sandbar sharks were landed overall compared to the non-sandbar LCS landings in aggregate. While the reason for the differences between logbook data and BLL observer program data and shark dealer reports is unclear, given the similar results between the observer program data and shark dealer reports, NMFS believes that the shark dealer reports are the most reflective of landings within the shark fishery. Therefore, shark dealer reports are used in the FEIS to update the baseline information under alternative suite 1 and landings information under alternative suite 4.

Time series

NMFS used 2003 to 2005 data from the Coastal Fisheries and HMS logbooks and shark dealer reports to analyze the ecological and economic analyses impacts of the alternatives. NMFS chose this time series of data for the Draft EIS (DEIS) and FEIS for a number of reasons. First, the latest shark stock assessments for the LCS complex, sandbar, blacktip and dusky sharks were conducted with data through 2004. The Canadian porbeagle stock assessment was conducted with data up through 2005. In 2003, management changes were implemented under Amendment 1 to the Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks. Therefore, NMFS decided 2003 to 2005 most accurately reflected the shark fishery based on the latest stock assessments and new management measures and provided three years of data for the time series. NMFS did not use 2006 data to determine the non-sandbar LCS quota because they represent more recent data than what was included in the latest stock assessments. Therefore, these data are not indicative of the stocks that were assessed, and including 2006 landings could change the non-sandbar LCS quota in a way that is not consistent with the latest assessments; while 2005 data is more recent than what was used in the LCS assessment, it is closer to the time series used in the LCS assessment than 2006 and allows three years of data to be averaged in the time series instead of only two if just 2003-2004 was used. However, NMFS did analyze 2006 logbook data to evaluate if an increase in fishing effort could have caused the dramatic overharvests that began in 2006. See Section 3.1.1.6 in Chapter 3 for this analysis.

NMFS estimated discards and bycatch in the commercial shark fishery based on data from the shark BLL observer program from 2005 to 2006. In addition, NMFS used 2006 ex-vessel prices and 2007 permit information from NMFS' Southeast Regional Office. Based on these data, NMFS analyzed the ecological, social, and economic impacts associated with the different alternative suites and alternatives described below. The alternative suites and alternatives considered for shark management measures are:

Alternative Suite 1	Maintain the Existing Atlantic Commercial and Recreational Shark Fisheries (Status Quo)
Alternative Suite 2	Shark Fishery for Directed, HMS Angling, and HMS Charter/Headboat Permit Holders Only
Alternative Suite 3	Shark Fishery for Directed, Incidental, HMS Angling, and HMS Charter/Headboat Permit Holders
Alternative Suite 4	*Establish a Research Fishery for Sandbar Sharks; Shark Fishery for Directed, Incidental, HMS Angling, and HMS Charter/Headboat Permit Holders – Preferred Alternative*
Alternative Suite 5	Close Atlantic Shark Fisheries
Alternative 6	Stock Assessments for Sharks Every 2-3 Years (Status Quo)
Alternative 7	*Stock Assessments for Sharks At Least Every 5 years - Preferred Alternative*

Alternative 8 SAFE Report published in January or February of every year (Status Quo)

Alternative 9 SAFE Report Published in the Fall of Every Year – Preferred Alternative

In addition to the five alterative suites analyzed, the proposed action also includes two administrative topics, one related to the timing of stock assessments and the other to the timing of SAFE reports. The five alternative suites regarding different shark management measures are analyzed and alternative suite 4 is identified as the preferred alternative suite (Section 4.4) in the FEIS. Two alternatives (alternatives 6 and 7) for the timing of stock assessments are analyzed and two alternatives for the timing of SAFE reports (alternatives 8 and 9) are analyzed. Alternative 7 regarding the timing of stock assessments and alternative 9 regarding the timing of the SAFE reports have been identified as the preferred alternatives in the FEIS. Thus, the complete action under consideration is comprised of one preferred alternative suite (alternative suite 4) selected from suites 1 through 5 (Sections 4.1 through 4.5), plus the preferred alternative 7 from alternatives 6 or 7 (Sections 4.6 and 4.7), and the preferred alternative 9 from alternatives 8 or 9 (Sections 4.8 and 4.9). These alternatives were also preferred in the DEIS.

4.1 Alternative Suite 1: Maintain the Existing Atlantic Commercial and Recreational Shark Fisheries (Status Quo)

Overall Summary

Alternative suite 1 (status quo) would not change current management of the Atlantic shark fishery. Base quotas would be as follows: LCS Complex (11 species, includes sandbar sharks) = 1,017 mt (metric ton) dw (dressed weight); SCS complex = 454 mt dw; Blue Sharks = 273 mt dw; Pelagic Sharks (Other than Blue and Porbeagle Sharks) = 488 mt dw; Porbeagle Sharks = 92 mt dw; and Display and Scientific Research = 60 mt ww (whole weight). The adjusted quota process would deduct overharvests from, and apply underharvests to, the next year's corresponding regional trimester quota to develop adjusted quotas.

Retention limits would be a 4,000 lb dw LCS trip limit for directed permit holders and 5 LCS for incidental permit holders; no retention limit for SCS or pelagic sharks for directed permit holders and 16 SCS and pelagic sharks combined for incidental permit holders; and fishermen may land sharks with fins removed except for the anal and 2nd dorsal fins. The total quantity of fins may not exceed 5 percent of the total dressed carcass weight of sharks on board.

All current BLL and PLL time/area closures including Caribbean closures to BLL for essential fish habitat (EFH) would remain in place. Dealer reports would have to be postmarked by the dealer within 10 days of the 1st and 15th of every month, and commercial fishermen would have to report in the appropriate logbook within 7 days of offloading any sharks. There would be three trimesters (January – April; May – August; and, September – December) for LCS, SCS, and pelagic sharks, and three regions (Gulf of Mexico, South Atlantic, and North Atlantic) for SCS and LCS and no regions for pelagic sharks. Finally, recreational fishermen could land bonnethead, bull, blacktip, nurse, tiger, lemon, sandbar, Atlantic sharpnose, porbeagle, finetooth, smooth hammerhead, great hammerhead, scalloped hammerhead, blacknose, shortfin mako, common thresher, oceanic whitetip, blue, spinner, and silky sharks. There would be a possession

limit of 1 shark > 54" FL (fork length) per vessel per trip, and 1 Atlantic sharpnose and 1 bonnethead per person per trip with no minimum size requirements for recreational fishermen.

Ecological Impacts

4.1.1 Quotas/Species Complexes

The current annual LCS complex quota is 1,017 mt dw and includes eleven species of LCS, including sandbar sharks. Maintaining the LCS quota at 1,017 mt dw would have negative ecological impacts for sandbar sharks, based on the most recent stock assessments. According to the 2005/2006 LCS stock assessment, NMFS determined that sandbar sharks are overfished and overfishing is occurring. The stock assessment recommended a total allowable catch (TAC) of 158.3 mt dw for sandbar sharks for a 70 percent probability of rebuilding by 2070. From 2003 to 2005, the average yearly commercial LCS landings were 1,313.4 mt dw and the average yearly commercial LCS discards were 162.9 mt dw (Table 4.1 and Table 4.2). Of these, 594.4 mt dw were average yearly commercial sandbar shark landings and average yearly commercial sandbar discards of 9.6 mt dw (Table 4.1 and Table 4.2). Thus, the existing 1,017 mt dw commercial LCS quota would allow more than the recommended 158.3 mt dw TAC for sandbar sharks to be harvested. Given the current level of fishing effort, an LCS quota of 1,017 mt dw would not be in compliance with the 2005/2006 LCS stock assessment recommendation and would lead to further overfishing and depletion of sandbar sharks.

The current annual LCS complex quota of 1,017 mt dw could also lead to negative ecological impacts for dusky sharks due to continuing bycatch and dead discards of this prohibited species. Despite its prohibited status, from 2003-2005, the average annual landings and discards for dusky sharks was 33.1 mt dw, the majority of which were discarded dead on BLL (Table 4.1). The 2006 dusky shark assessment determined that this species is overfished and overfishing is occurring and stated that rebuilding could require 100 to 400 years. Under alternatives suite 1, current fishing effort in the LCS fishery would be maintained without modifications to the LCS complex quota, resulting in continued, excessive mortality rates for dusky sharks which would prevent rebuilding of this species and allow overfishing to continue.

The continued harvest of porbeagle sharks could lead to negative ecological impacts for this species. The 2005 Canadian stock assessment determined that porbeagle sharks are overfished, with a 70 percent probability of recovery in approximately 100 years. The current annual quota for porbeagle sharks is 92 mt dw. Commercial landings of porbeagle sharks between 2003 to 2006 ranged from 1.1 – 2.6 mt dw per year. In addition, data indicate that there has been nominal recreational harvest of this species since 1998 (Tables 3.24 and 3.26). If landings were to increase in the future, this could lead to overfishing and further depletion of porbeagle shark stocks.

The ecological impacts of maintaining the current LCS quota would be neutral for blacktip sharks. According to the 2005/2006 LCS stock assessment, the Gulf of Mexico blacktip shark population is healthy, whereas the status of the Atlantic population is unknown. However, the assessment recommended that catch levels of blacktip sharks should not increase in the Gulf of Mexico region and should not change in the Atlantic region.

The status quo alternative would implement existing quotas for the SCS complex of 454 mt dw/year and could have neutral ecological impacts on the SCS complex. This complex is currently being assessed. Preliminary results from most recent assessment workshop (May 7-11, 2007) indicate that blacknose sharks may be overfished with overfishing occurring. The final results of the SCS assessment are now available (72 FR 63888, November 13, 2007). The other species in the complex (finetooth, Atlantic sharpnose, and bonnethead) were also assessed during this workshop, and preliminary results indicate that none of these species are overfished or experiencing overfishing. Based on the results of the review workshop, NMFS is currently working on the formal determination of stock status for the species within the SCS complex and would take additional action, as necessary. Therefore, depending on the determination of stock status for blacknose sharks, implementing the 454 mt dw/year SCS quota could have negative ecological impacts on blacknose sharks; a reduction in the SCS quota may be warranted to rebuild the blacknose shark stock in the future.

Currently, the base quotas for LCS and SCS are adjusted for overharvests and underharvests for each trimester. Overharvests would continue to be deducted from, and underharvests added to, the next year's corresponding regional trimester's base quota to develop the adjusted quotas under the status quo alternative. While overharvests are deducted from the pelagic shark quota in the subsequent year, underharvest of pelagic sharks is not carried over to the next season. These adjustments would have neutral ecological impacts as it is the current practice under the status quo.

The status quo alternative would maintain the 60 mt ww (43.2 mt dw) allocation for the collection of sharks for public display, exempted fishing permits, and scientific research. This quota represents less than four percent of the current commercial shark quota. Maintaining this 60 mt ww quota would result in neutral ecological impacts because the quota has never been met in the past and NMFS can regulate the number and species of sharks authorized for research and public display. In addition, the scientific permitting and required interim and annual reporting ensure compliance with authorized activities and quota levels.

Other non-target species/bycatch species (*i.e.*, teleosts, batoids, and prohibited sharks) could experience negative ecological impacts as a result of maintaining the annual LCS complex quota at 1,017 mt dw. According to the 2007 BLL observer report (Hale *et al*., 2007), fish from the grouper family made up 36 percent, by number (*i.e.*, 21 out of 59 fish), of the 2 percent of teleost species caught on BLL on trips targeting sharks in the South Atlantic region. In the Gulf of Mexico region, of the 4 percent of bycatch of teleost species, the grouper family made up 85 percent of the teleosts species. Landings of prohibited shark species, such as night sharks and Caribbean reef sharks, were also observed during BLL trips targeting sharks. Therefore, maintaining the status quo would result in continued interactions of these species in the shark fisheries.

4.1.2 Retention Limits

The current LCS directed shark permit trip limit is 4,000 lb dw per trip and the incidental permit trip limit is five LCS. Maintaining these trip limits, in conjunction with the existing LCS quota, could have negative ecological impacts on sandbar and dusky sharks. The retention limit of 4,000 lb dw, for the directed shark permit holders was put into place to limit derby-style

fishing and lengthen the period of time the LCS quota remained available. The 2006 BLL observer report indicates that 70 percent of sharks caught in the South Atlantic region were sandbar sharks. Assuming an average weight of 40.5 lb dw (Cortés and Neer, 2005), this percent equates to approximately 69 sandbar sharks caught per trip in the South Atlantic region (4,000 lb dw x 70 percent = 2800 lb dw: 2800 lb dw / 40.5 lb dw [average weight of a sandbar shark] = 69 sandbar sharks). In the Gulf of Mexico region, 30 percent of sharks caught were sandbar sharks, which translates to approximately 30 sandbar sharks per trip (4000 lb dw x 30 percent = 1,200 lb dw: 1200lb dw / 40.5 lb dw [average weight of a sandbar shark] = 30 sandbar sharks). Based on the recommended TAC for sandbar sharks (158.3 mt dw), retention limits would need to be drastically reduced relative to current levels. Therefore, maintaining the retention limit of 4,000 lb dw of LCS per trip could result in fishing mortality of sandbar in excess of that recommended by the LCS stock assessments.

According to the latest BLL observer report (Hale and Carlson, 2007), approximately 24.5 mt dw of dusky sharks are discarded during directed shark BLL trips. In addition, the majority of dusky discards occur in the directed shark fishery (Table 4.1). Given these trips are conducted under the 4,000 lb dw LCS directed shark trip limit, reducing the retention limits/trip limits could also reduce dusky shark discards. Therefore, given the overfished/overfishing status of this species, negative ecological impacts would occur if the status quo were continued.

Currently, there is no trip limit for pelagic sharks, including porbeagle sharks. Therefore, given the overfished status of this species, maintaining the status quo could have negative ecological impacts for this species.

Table 4.1 Discards of sandbar sharks, non-sandbar LCS, and dusky sharks for the different alternative suites (CF=Coastal Fisheries).

Alternative Suite	Estimated dead discards by vessels within research fishery (mt dw)	Estimated dead discards on shark BLL gear from HMS and CF logbooks (mt dw)	Estimated dead discards on PLL gear from HMS logbook (mt dw)	Total gillnet discards from observer program (mt dw)	Extrapolated discards from snapper-grouper & tilefish BLL fisheries from observer program (mt dw)	Discards (based on average historical landings) by incidental permit holders in the CF logbook (mt dw)	Discards (based on average historical landings) by non-HMS permit holders in CF logbook (mt dw)	Total discards in South Atlantic region due to non-sandbar LCS retention limit	Total discards (mt dw)	Percent change in discards compared to status quo
Sandbar										
1	-	7.5	2.1	0	0	0	0	-	9.6	
2	-	0	4.3	0	0	2.3	6.1	30.5	43.2	↑450%
3	-	0.1	2.1	0	0	0	6.1	15.2	23.5	↑240%
4[1]	0.4	0	4.3	0	0	2.3	6.1	-	13.1	↑36%
4[2]	0.3	0	4.3	0	0	2.3	6.1	-	13.0	↑35%
5	-	0	4.3	0	0	2.3	6.1	-	12.7	↑32%
Non-sandbar LCS										
1	-	117.4	12.6	19.9	3.5	0	0	-	153.3	
2	-	0	12.6	19.9	3.5	16.3	15.1	0	67.3	↓56%
3	-	0.7	12.6	19.9	3.5	0	15.1	0	51.7	↓66%
4[1]	5.6	0	12.6	19.9	3.5	0	15.1	-	56.6	↓63%
4[2]	4.0	0	12.6	19.9	3.5	0	15.1	-	55.1	↓64%
5	-	0	16.5	0.4[*]	3.5	16.3	15.1	-	51.7	↓66%
Dusky[β]										
1	-	24.5	3.6	0.5	0	1.2	0.1	-	33.2[†]	
2	-	0	3.5	0.5	0	1.2	0.1	-	8.6[†]	↓74%
3	-	11.8	3.5	0.5	0	1.2	0.1	-	20.4[†]	↓38%
4[1]	0.6	0	3.5	0.5	0	1.2	0.1	-	9.2[†]	↓72%
4[2]	0.5	0	3.5	0.5	0	1.2	0.1	-	9.1[†]	↓73%
5	-	0	3.5	0	0	1.2	0.1	-	8.1[†]	↓76%

[1] under the base sandbar quota of 116.6 mt dw (92 trips); [2] under the adjusted sandbar quota of 87.9 mt dw (69 trips)

[*] non-shark gillnet discards

[β] total mortality (includes discards and landings of dusky sharks); [†] includes 3.3 mt dw of recreational landings

4.1.3 Time/Area Closures

The status quo alternative would maintain the existing time/area closures relevant to the commercial shark fishery and would not implement any new time/area closures. Maintaining the current time/area closures, as described in Chapter 2, would have positive ecological impacts on target and non-target species as well as protected species, marine mammals and EFH. The time/area closures that have been implemented in recent years have been effective at reducing the bycatch of prohibited, protected and non-target HMS species (see NMFS, 2006 time/area analysis). The mid-Atlantic closed area, which is closed to BLL gear from January through July of each year, was implemented to reduce bycatch of dusky sharks, and neonate and juvenile sandbar sharks. According to the 2003 Amendment 1 to the 1999 FMP for Atlantic Tunas, Swordfish, and Sharks, 79 percent of the dusky sharks observed caught in the Atlantic from 1994 to 2002 were caught in the time/area closure. Of these, 92 percent were neonate or juvenile dusky sharks. Therefore, without redistribution of effort, it was estimated that total catch of dusky sharks from January through July would be reduced by 79 percent. When NMFS examined a shorter time period of data (the time when dusky sharks were prohibited: 2001-2002), it was estimated that catch of dusky sharks would be reduced by 62 percent with the closure in place from January through July (and no redistribution of effort). Dusky shark catches peaked during the months of January and March (59 dusky sharks in January and March compared to the total 68 dusky sharks caught year-round). Similarly, approximately 54 percent of all sandbar sharks observed caught in the Atlantic from 1994 to 2002 were taken from January through July in the closed area. Neonate or juvenile sandbar sharks comprised 61 percent of the observed catch in the closed area during January through July. When compared to the rest of the Atlantic and Gulf of Mexico, 24 percent of adults, 81 percent of juveniles, and 100 percent of neonate sandbars were caught inside the time/area closure. The highest catches of sandbar sharks occurred in January (33 percent), followed by March (31.7 percent) and July (18.2 percent).

Comparing landings reported in the Coastal Fisheries logbook from the South Atlantic region between 2002-2004 (without closed area) with 2005 (with closed area) indicates that landings of LCS decreased by 22.3 percent after implementation of the mid-Atlantic shark closed area. Landings of sandbar sharks in the South Atlantic region decreased by 26.7 percent in 2005 compared to 2002-2004, which could have been a result of the mid-Atlantic shark closed area. In addition, observer data from 1994 to 2004 (*i.e.,* before the implementation of the closed area) indicate that there have been 5 loggerhead sea turtles observed caught on BLL gear in the vicinity of the mid-Atlantic shark closed area, two of which were released alive. Therefore, maintaining the mid-Atlantic closed area may reduce sea turtle interactions with sea turtles and BLL gear (see Section 4.1.8), and therefore, has positive ecological impacts for protected resources.

A BLL survey was conducted by the NMFS APEX Predator Program in April through May of 2007 from the research vessel, the Delaware II. To control for sampling bias, NMFS compared CPUE inside and outside the closed area. NMFS found higher sandbar and dusky shark CPUEs inside the closed area compared to outside the closed area during the survey (Figure 4.1 and Figure 4.2, respectively), indicating that sandbar and dusky sharks are caught more often in the closed area compared to outside the closed area.

NMFS also analyzed the size ranges of sandbar and dusky sharks caught inside and outside the closed area during this survey. Of the 72 sandbar sharks caught outside the closed area, the average sandbar size was 174.7 cm total length (TL), ranging from 105.7 cm TL to 214.6 cm TL. Given the size of maturity for sandbar sharks is 147 cm TL (NMFS, 2006), 8 sandbar sharks (11 percent) of the sandbar sharks measured outside the closed area were immature whereas 64 sandbar sharks (89 percent) were mature. This is contrasted with the 117 sandbar sharks that were caught in the closed area. The average size of sandbar sharks inside the closed area was 147.1 cm TL, ranging from 111.8 cm TL to 205.4 cm TL. Of these, 65 sandbar sharks (56 percent) were immature and 52 were mature (44 percent). Therefore, more immature sandbar sharks were caught inside the closed area compared to outside the closed area.

Of the 11 dusky sharks that were caught outside the closed area during this survey, the average dusky shark size was 174.9 cm TL, ranging from 100.3 cm TL to 299.2 cm TL. Given the size of maturity for dusky sharks is 290 cm TL for males and 300 cm TL for females (NMFS, 2006), only 1 dusky shark (9 percent) outside the closed area would have been close to maturity. Of the 20 dusky sharks measured in the closed area, the average size of dusky sharks was 146.6 cm TL, ranging from 101.5 cm TL to 208.7 cm TL. Of these, 100 percent were below the size at maturity. Given the higher number of smaller, less mature sharks in the closed area, these data indicate, at least preliminarily, that the basis for the closure is justified. Therefore, maintaining the mid-Atlantic closed area would continue to reduce the number of interactions of BLL gear with sandbar and dusky sharks as well as reduce the number of interactions with immature sandbar and dusky sharks. This would provide positive ecological benefits for both of these overfished shark stocks.

Maintaining the current BLL closures in the Caribbean that were implemented February 7, 2007 (72 FR 5633), to minimize adverse impacts to EFH and to reduce fishing mortality on mutton snapper, red hind, and other reef-dwelling species could have positive ecological impacts. In addition, the current gillnet gear restrictions that limit gillnet fishing in the Atlantic Ocean during certain times of the year to prevent endangered right whales from entanglement in gillnet gear in right whale calving areas would have positive ecological impacts if maintained. The effectiveness of the other closed areas specific to PLL gear have been analyzed in Section 4.1.2 of the Consolidated HMS FMP (NMFS, 2006), and these time/area closures would be maintained under alternative suite 1.

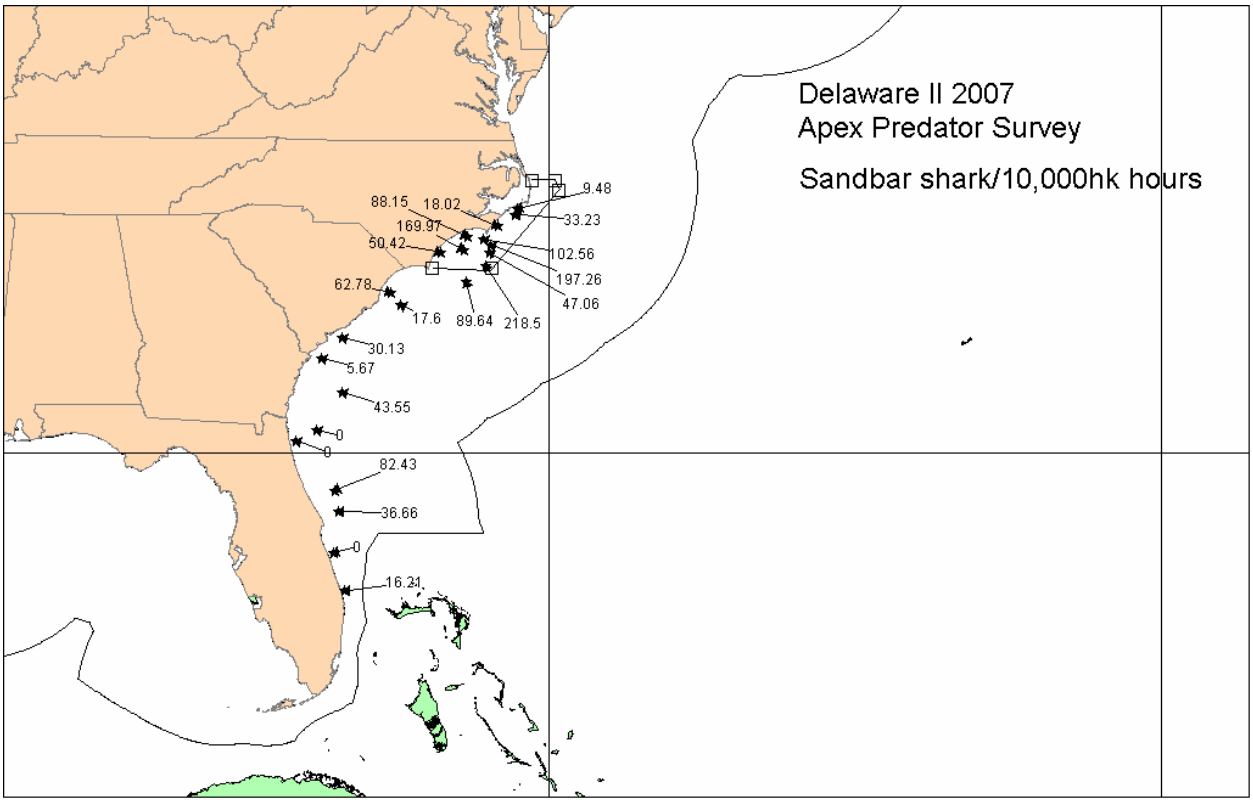

Figure 4.1 **CPUE of sandbar sharks during the APEX Predator Program BLL survey on the research vessel, the Delaware II, during April through May, 2007. Black stars are the placement of BLL sets. The mid-Atlantic closed area and Economic Exclusive Zone (EEZ) are outlined. The numbers represent the number of sharks caught per 10,000 hooks.**

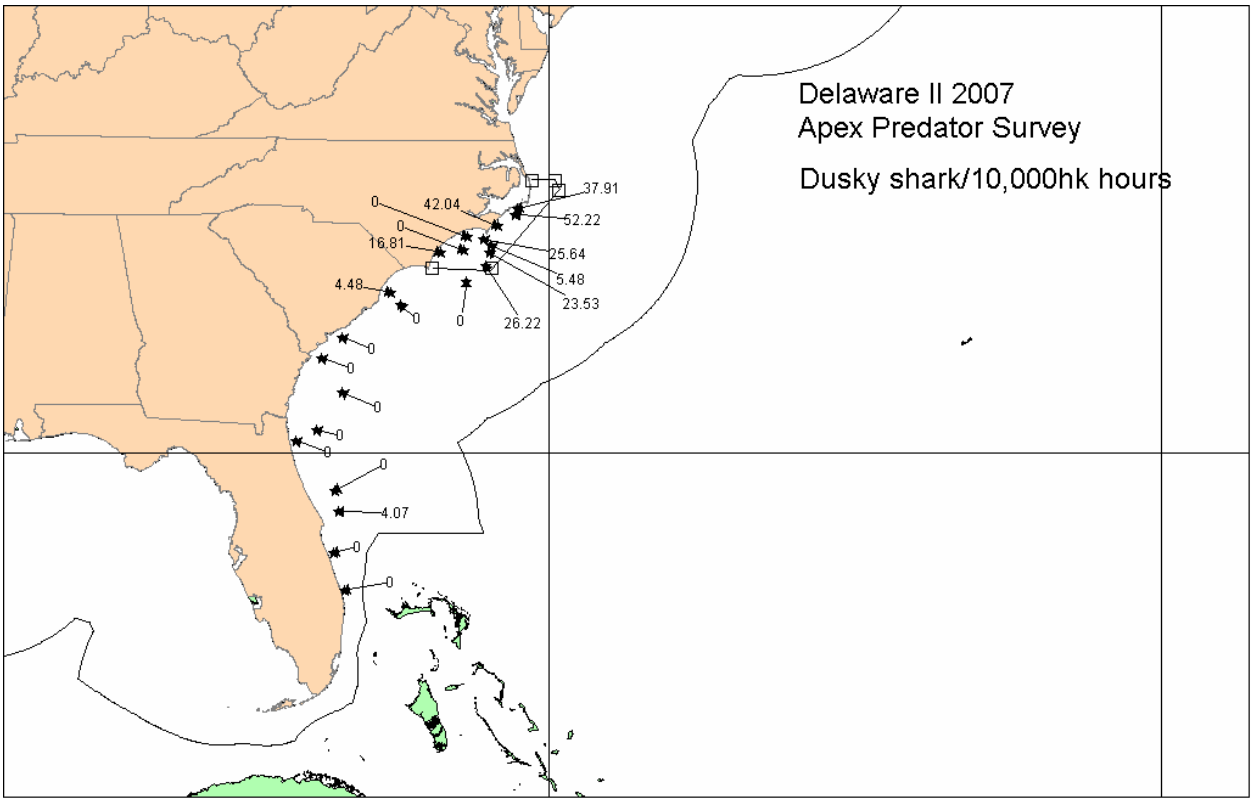

Figure 4.2 **CPUE of dusky sharks during the APEX Predator Program BLL survey on the research vessel, the Delaware II, during April through May, 2007. Black stars are the placement of BLL sets. The mid-Atlantic closed area and Economic Exclusive Zone (EEZ) are outlined. The numbers represent the number of sharks caught per 10,000 hooks.**

4.1.4 Reporting

The current Federal shark dealer reporting requirements state that dealers must report all sharks to NMFS that are purchased from U.S. vessels via bimonthly reports that must be postmarked within 10 days of the end of each biweekly period (*i.e.*, by the 25th and 10th of each month). Reports are often received late or not at all, which makes it difficult for NMFS to accurately monitor the shark fishery and take corrective action if quotas are exceeded. It is often difficult to track when a report was postmarked (*i.e.*, was an envelope saved with a report) to assess if fishermen are in compliance, and reports that are faxed or e-mailed do not receive a postmark. As evidenced during the comment period on the proposed rule to establish the 2007 first trimester season quota, non-reporting and late reports had a deleterious impact on the quotas that were originally proposed. These quotas had to be modified after the proposed rule had been published and the quantity of unreported landings resulted in a drastically shorter season for LCS in the Gulf of Mexico region. For example, during the proposed rule for the 2007 first trimester, the Gulf of Mexico was proposed to be open for the entire first trimester. However, due to overharvests, in part due to late reports, the Gulf of Mexico region ended up being open for only two weeks during the first trimester. However, maintaining the bimonthly Federal shark dealer reporting requirements could have neutral ecological impacts provided that the dealers report when required and in a timely fashion.

Unclassified or unidentified sharks that are reported by shark dealers are currently counted as LCS for quota monitoring. This may have negative ecological impacts since it does not allow NMFS to track landings of specific species for stock assessments and compromises NMFS' ability to provide accurate estimates of the species of sharks being landed for quota monitoring. This in turn may affect stock assessments, quota monitoring, and analysis of logbooks as all these are contingent upon accurate data reflecting the type and quantity of sharks being landed. Inaccurate reporting or reporting unclassified sharks for the sake of convenience may also lead to over/under harvests that could have been circumvented if shark dealer reports were more accurate. Furthermore, if shark dealer reports do not accurately reflect what vessel captains are submitting in their logbooks as being landed, this may compromise the utility of either of these fishery-dependent data sources.

4.1.5 Seasons

The LCS, SCS, and pelagic shark fishing seasons are currently managed on a trimester basis to provide fishing opportunities throughout the year and to reduce fishing effort during months critical for shark pupping. The second trimester for LCS has been delayed until July to minimize interactions with pups and pregnant females. The ecological impacts of managing the fishing seasons on a trimester basis may be neutral, slightly positive, or negative depending on the region and season considered.

4.1.6 Regions

Currently, LCS and SCS are managed by regions. The three regions include the Gulf of Mexico, South Atlantic, and North Atlantic. There are no regions for pelagic sharks. The purpose of the three regions is to provide flexibility to adjust regional quotas to reduce mortality of juvenile and reproductive female sharks, provide fishing opportunities when sharks are present in various regions, and account for differences between species' utilization of various pupping grounds. Maintaining the three regions could have neutral or slightly positive ecological impacts depending on the region considered. The 2005/2006 blacktip shark stock assessment found that this species is rebuilt in the Gulf of Mexico, whereas their status in the South Atlantic region is unknown. Maintaining distinct regions for the Gulf of Mexico and South Atlantic would be consistent with the blacktip stock assessment, allowing NMFS to continue to monitor blacktip sharks on a regional basis.

4.1.7 Recreational Measures

The current bag limit for HMS Angling permit holders is one shark greater than 54 inches (fork length) per vessel per trip as well as one Atlantic sharpnose and one bonnethead shark (both of which are in the SCS complex) per person per trip. According to recreational landings from 2003 to 2005, average annual landings of LCS, including sandbar sharks, were 340.1 mt dw. The average annual sandbar specific landings from 2003 to 2005 were 27 mt dw, and despite its prohibited status, the average annual dusky shark landings were 3.3 mt dw. Therefore, negative ecological impacts to sandbar and dusky sharks could occur if the current recreational measures stay in place. To implement the recommended TAC for sandbar sharks and to reduce the current level of fishing mortality on dusky sharks, reductions in the landings of

sandbar and dusky sharks would need to be reduced in both the recreational and commercial fishing sectors.

4.1.8 Protected Resources and Essential Fish Habitat

From 1994-2007, the shark BLL observer program reported 79 sea turtles takes (6 leatherback, 64 loggerheads, and 9 other sea turtles). Fifteen smalltooth sawfish and four delphinids were also observed by NMFS observers as being caught in the BLL fishery during the same time period. In the gillnet fishery, between 1994 through 2007, there were16 sea turtles takes,15 loggerheads takes, and 1 leatherback takes observed by NMFS observers. There has been one smalltooth sawfish observed by NMFS observers in the gillnet fishery which occurred in 2003. From 1999 – 2007, observed takes in the gillnet fishery of marine mammals totaled 12 bottlenose dolphins and four spotted dolphins.

The status quo alternative suite could continue to have negative ecological impacts on protected resources and marine mammals if the current LCS quota is maintained at 1,017 mt dw. The BLL and gillnet fishing effort is not likely to decrease and therefore interactions with protected resources and marine mammals would not likely decrease, leading to continued negative impacts on sea turtles, sawfish, and marine mammals.

The status quo alternative could have negative ecological impacts for EFH because the primary gear deployed in the commercial shark fishery is BLL gear. As described in the Consolidated HMS FMP, this gear type may have potentially adverse effects on HMS and non-HMS EFH, depending on the type of bottom habitat. BLL gear principally targets LCS in the Exclusive Economic Zone (EEZ) between Texas and Maine. Typically, sets are made in sandy and muddy bottom habitats where expected impacts would be minimal to low (Barnette, 2001). The 1999 NMFS EFH Workshop categorized the impact of BLL gear on mud, sand, and hard-bottom as low (Barnette, 2001). BLL gear may have some negative impact if gear is set in more complex habitats, such as hard bottom or coral reefs in the Caribbean or areas with gorgonians, or soft corals and sponges in the Gulf of Mexico (Barnette, 2001, NREFHSC, 2002; Morgan and Chuenpagdee, 2003). BLL gear set with cable groundline or heavy monofilament with weights could damage hard or soft corals and potentially become entangled in coral reefs upon retrieval, resulting in coral breakage due to line entanglement. However, the extent to which BLL gear is fished in areas with coral reef habitat has not been determined. This gear type is similar to that employed in fisheries targeting reef fish in the Gulf of Mexico and South Atlantic regions.

Social and Economic Impacts

4.1.9 Quotas/Species Complexes and Retention limits

The status quo alternative could lead to neutral socioeconomic impacts if the current LCS quota of 1,017 mt dw, in conjunction with the 4,000 lb LCS directed shark permit trip limit, is maintained. Under this alternative, the current fishing effort would not likely change, which could maintain economic benefits to fishermen and associated communities in the short term. Of all Atlantic HMS, sharks bring in the lowest total gross revenues (a total of ~$6.0 million in 2005). If gross revenues for directed and incidental permit holders is averaged across the approximately 298 active directed and incidental shark permit holders, then the average annual

gross revenues per shark fishing vessel is just over $20,000 (this includes revenues for SCS, pelagic sharks, LCS, prohibited species, and unclassified sharks). However, long term, negative economic impacts could occur if current fishing mortality of sandbar sharks, an economically important species, is not decreased as recommended by the LCS stock assessment, and this species continues to be overfished. This could lead to more restrictive management measures being implemented in the directed and incidental shark fisheries.

Adjusting base quotas for underharvests of LCS and SCS or for overharvests of LCS, SCS, and pelagic sharks to develop the adjusted quotas in the next year could have neutral socioeconomic impacts to fishermen, depending on the amount of overharvest or underharvest, as this is the current practice under the status quo. Deductions of large overharvests, or the possible closure of shark fisheries for LCS, SCS, and pelagic sharks, could result in negative socioeconomic impacts for fishermen during that trimester. However, the application of large underharvests to LCS and SCS quotas in subsequent trimesters could result in positive socioeconomic impacts for fishermen in that trimester.

4.1.10 Time/Area Closures

The status quo alternative would maintain the existing closures and would not add any new closures. This could have neutral economic impacts, primarily because activities related to fishing and market availability, consistent with the current closures, would remain the same. However, given the continued requests by fishermen to re-open the mid-Atlantic closed area for sharks, fishermen may still be adjusting to the closed area.

4.1.11 Reporting

Currently, Federal shark dealers are required to report on a bimonthly basis and the economic impacts of reporting would not change under the status quo alternative because activities related to the reporting timeframe would remain the same. However, negative economic impacts could occur if shark dealers do not report when required or in a timely fashion, making it difficult for NMFS to monitor the quota and prevent overfishing of economically important species.

Unclassified or unidentified landings of sharks reported in shark dealer reports are currently counted as LCS when monitoring the quota. This may have neutral or slightly negative economic impacts. While listing sharks as unclassified may save shark dealers time in the short-term by alleviating the need to properly identify individual sharks purchased, inaccurate reporting may lead to inaccurate quota monitoring. Shark dealer reports form the basis of quota monitoring for sharks and if the reports submitted by shark dealers do not accurately reflect what species of sharks are being landed, seasons may close earlier than necessary; overharvests may occur impacting future seasons, and poor data used in stock assessments may lead to further restrictions.

4.1.12 Seasons

Maintaining the trimester seasons under the status quo alternative, which provides fishermen and shark dealers with more open seasons, would likely have neutral economic

impacts. With an annual LCS quota of 1,017 mt dw, spreading the seasons out over the calendar year could potentially result in greater economic stability for fishermen and associated communities. However, if base quotas are reduced to comply with the recommendations from the LCS stock assessment, trimester seasons could become less economically stable for fishermen and shark dealers because of the reduced amount of quota and fishing effort during the calendar year; reduced quota would result in shorter trimesters, which could lead to derby-style fishing.

4.1.13 Regions

The economic impacts of maintaining three management regions under the status quo alternative would likely be neutral. The three regions would likely continue to enhance equity amongst regional user groups since the North Atlantic region only has sharks present in their waters during certain months. No significant economic impacts are anticipated as this alternative seeks to maintain historical regional catches, which would be inconsistent with stock assessment recommendations and could lead to negative socioeconomic impacts due to depleted shark stocks in the future.

4.1.14 Recreational Measures

Neutral social and economic benefits would occur if the current bag limit for HMS Angling, HMS Charter/Headboat, and Atlantic Tuna General Category permit holders (when participating in a tournament) is maintained at one shark greater than 54 inches FL per vessel per trip as well as one Atlantic sharpnose and one bonnethead shark (both of which are in the SCS complex) per person per trip. Recreational fishing and charter trips targeting sharks are important to coastal communities and shark fishing tournaments can sometimes generate a substantial amount of money for surrounding communities and local businesses especially in the northeastern United States where shark fishing is most prevalent. In 2005 and 2006, there were 60 tournaments per year with prize categories for pelagic sharks. Under the status quo, the positive socioeconomic benefits would continue.

Conclusion

The 2005 Canadian porbeagle shark stock assessment, the 2006 dusky shark assessment, and the 2005/2006 LCS stock assessment determined that porbeagle, dusky, and sandbar sharks are overfished. Overall, the status quo alternative, which would maintain the current annual LCS quota of 1,017 mt dw, in conjunction with the management measures mentioned above, would have negative ecological impacts on sandbar, dusky and porbeagle sharks, as well as protected resources and marine mammals. The social and economic impacts would likely be neutral because current fishing effort would remain the same in the short term. In the long term, as stocks continue to decline, profits may decrease as costs associated with finding and catching these depleted stocks increases. Management measures are needed to rebuild overfished stocks and prevent overfishing consistent with the mandates of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). Therefore, maintaining the LCS quota of 1,017 mt dw would be inconsistent with the Magnuson-Stevens Act and the recent LCS stock assessment that recommended a TAC of 158.3 mt dw for sandbar sharks in order for this species to rebuild by 2070. Current fishing effort, under the status quo alternative, would lead to

continued overfishing of sandbar, porbeagle and dusky sharks, which would prevent these species from rebuilding in the recommended timeframe. As a result, NMFS does not prefer this alternative.

4.2 Alternative Suite 2: Shark Fishery for Directed, HMS Angling, and HMS Charter/Headboat Permit Holders Only

Overall Summary

Under alternative suite 2, NMFS would remove the sandbar shark from the LCS complex and establish a separate sandbar shark quota and a non-sandbar LCS quota (LCS complex minus sandbar sharks). Base quotas would be as follows: Sandbar = 116.6 mt dw; non-sandbar LCS = 541.2 mt dw; SCS = 454 mt dw; Blue Sharks = 273 mt dw; Pelagic Sharks (Other than Blue Sharks) = 488 mt dw; Porbeagle Sharks = Prohibited (0 mt dw quota); and Display and Scientific Research = 60 mt ww (Sandbar = 2.8 mt ww (2 mt dw); and all other shark species (except dusky sharks) = 57.2 mt ww (41.2 mt dw). The adjusted quota process under this alternative suite would deduct the entire overharvest from the next season's quota, to the extent that sufficient quota is available. Any additional overharvest that needs to be accounted for would be deducted the following year. Underharvests for species that are healthy or rebuilt would be transferred to the next season's quota, up to 50 percent of the base quota. For species/complexes whose status is unknown (such as non-sandbar LCS), overfished (such as sandbar sharks or porbeagle sharks), or experiencing overfishing (such as sandbar sharks or porbeagle sharks), underharvests would not be transferred to the next season's quota.

The existing BLL and PLL time/area closures, including the Caribbean BLL closures for EFH, would remain in place. In addition, NMFS would implement the 8 marine protected areas (MPAs) off North Carolina to Florida being preferred in South Atlantic Fishery Management Council's (SAFMC) Amendment 14. Retention limits would be as follows: 8 sandbar per vessel per trip and 21 non-sandbar LCS per vessel per trip for directed permit holders only; no retention limit for SCS and pelagic sharks (except porbeagle sharks) for directed permit holders; no retention of any sharks by incidental permit holders; no sandbar sharks retained with PLL onboard; no retention of porbeagle sharks by commercial or recreational fishermen; and all sharks landed with fins attached.

Dealer reports must be received by NMFS within 24 hours of sale of shark, and logbook and observer requirements would be maintained. In addition, all unclassified sharks reported would be categorized as sandbar sharks. There would be one season starting on January 1 of each year and one region. The sandbar and non-sandbar LCS fishery would close when landings of either reach 80 percent of the available quota with a five day notice, and SCS and pelagic shark fisheries would close when SCS and pelagic shark landings reach 80 percent of their respective quotas. Finally, recreational fishermen could land bonnethead, nurse, tiger, lemon, hammerheads, Atlantic sharpnose, shortfin mako, common thresher, oceanic whitetip, and blue sharks. The recreational possession limit would be 1 shark > 54" FL per vessel per trip, and 1 Atlantic sharpnose and 1 bonnethead per person per trip with no minimum size requirements.

Ecological Impacts

4.2.1 Quotas and Species Complexes

Adjusted Quota Process

Overharvests of quota for each category would be removed from the next season's quota (or fishing year). The carryover of underharvests for species that are not overfished or are not experiencing overfishing would be added to the base quota the following year and capped at 50 percent of the base quota. However, there would be no carryover of underharvests for species that are unknown, overfished, or experiencing overfishing. Not accounting for underharvests of overfished species would have positive ecological impacts by reducing harvest and allowing these stocks to rebuild at a faster rate. Limiting the amount of underharvest accounted for healthy species should have positive ecological impacts for healthy stocks by preventing the stockpiling of quota. Under this alternative suite, NMFS would restructure the LCS complex and associated quotas as outlined below.

Sandbar sharks

The 2005/2006 LCS assessment assessed sandbars separately and recommended a sandbar specific TAC of 158.3 mt dw. Based on this recommendation, NMFS has removed sandbar sharks from the LCS complex for alternative suites 2 through 4. Removing them from the complex allows sandbar sharks to be managed separately and gives NMFS the ability to track this separate quota more efficiently, which is critical given the status of sandbar sharks. To determine the proportion of the sandbar 158.3 mt dw TAC that would be available for the commercial fishery, NMFS accounted for mortality of sandbar sharks in all sectors of recreational and commercial fisheries. This included recreational landings, discards in the PLL fishery and non-HM fisheries (*e.g.*, the snapper-grouper complex and tilefish fisheries) as well as landings recorded in the Coastal Fisheries Logbook by fishermen who did not have valid or current HMS shark permits. Based on these landings and discards, the commercial sandbar base quota was determined to be 116.6 mt dw (or 6,347 sandbar sharks; see Appendix A and Table A.1). This quota, combined with sandbar shark mortality in other HMS, recreational, and non-HMS fisheries, is predicted to be under the 158.3 mt dw sandbar shark TAC; therefore, this quota would be consistent with the rebuilding plan for this species and should have positive ecological impacts for sandbar sharks. A more detailed analysis of the ecological impacts of the sandbar quota under alternative suite 2 is outlined in the next section under retention limits.

Non-sandbar LCS

The 2005/2006 LCS assessment also assessed blacktip sharks separately and recommended that the catch of Atlantic and Gulf of Mexico blacktip populations not change or increase, respectively, given the unknown status for the Atlantic blacktip population and the relatively healthy status for the Gulf of Mexico population. Based on this LCS assessment, NMFS also determined that the status of the LCS complex is unknown. Given these results, NMFS established a non-sandbar LCS complex that has sandbar sharks removed from the complex (non-sandbar LCS complex = silky, tiger, blacktip, spinner, bull, lemon, nurse, scalloped hammerhead, great hammerhead, and smooth hammerhead sharks). The non-sandbar

LCS base quota of 541.2 mt dw is based on the average catch of these species from 2003 to 2005, as recommended by the most recent LCS stock assessment (see Appendix A and Table A.3a). A TAC was established for non-sandbar LCS based on total catch and discards from all sectors of the LCS fishery (see Appendix A and Table A.3b). Given the unknown or healthy status of these species and the larger available quota relative to the sandbar quota, alternatives 2 through 4 base management for these species on a new complex, renamed "non-sandbar LCS." Given the recommendations of the most recent LCS stock assessment, establishing quotas for these species based on past catches would have positive ecological impacts. The new non-sandbar LCS quota would maintain future catches at past catch rates, and should maintain the healthy status of the Gulf of Mexico blacktip population. In addition, setting the quota based on past catch rates would follow the recommendations of the stock assessment for the Atlantic blacktip population and the LCS complex, which were determined to have an unknown status. The non-sandbar LCS quota should result in neutral to possible positive ecological impacts for these species. A more detailed analysis of the ecological impacts of the non-sandbar LCS quota under alternative suite 2 is outlined in the next section under retention limits.

Porbeagle sharks

Under alternative suites 2 and 3, porbeagle sharks would be added to the prohibited list for commercial and recreational fishing, resulting in a 0 mt dw commercial quota and catch and release only fishery for recreational fishermen. Sharks may be added to the prohibited list if they meet at least two of the following criteria: (1) there is sufficient biological information to indicate the stock warrants protections, such as indications of depletion or low reproductive potential or the species is on the Endangered Species Act (ESA) candidate list, (2) the species is rarely encountered or observed caught in HMS fisheries, (3) the species is not commonly encountered or observed caught as bycatch in fishing operations, or (4) the species is difficult to distinguish from other prohibited species (*i.e*., look-alike issue). Porbeagle sharks were determined to be overfished based on the 2005 Canadian stock assessment. In addition, porbeagle sharks often look similar to other prohibited species (*i.e*., white sharks). Therefore, placing porbeagle sharks on the prohibited species list would prohibit landings and help rebuild this overfished species. It would also stop commercial and recreational landings of other look-alike shark species, such as white sharks which are also prohibited. A more detailed analysis of the ecological impacts of establishing a 0 mt dw commercial porbeagle shark quota is discussed in the next section under retention limits.

Exempted fishing program quota

This alternative suite would partition the 60 mt ww (43.2 mt dw) quota for exempted fishing permits (EFPs), display permits, scientific research permits (SRPs), and letters of acknowledgement (LOA) to place more stringent limits on the quantity of sandbar and dusky sharks authorized for these purposes. However, the overall 60 mt ww quota would not be modified. Under the exempted fishing program, NMFS requires that all permittees submit interim and annual reports. Interim reports include the disposition of all animals caught and discarded (*i.e.*, both alive and dead discards) under a permit. NMFS then monitors total mortality associated with the exempted fishing program by counting all animals that are either retained or discarded dead against the 60 mt ww quota. The sandbar shark quota authorized for research and public display would be limited to 2 mt dw (1 mt dw for research under EFPs, 1 mt

dw for display). The remaining quota for exempted fishing permits (41.2 mt dw or 57.2 mt ww) would be authorized for all other shark species, besides dusky and sandbar sharks, under the exempted fishing program. Maintaining this quota could result in neutral ecological impacts because NMFS reduced the commercial quota by 2 mt dw to accommodate the sandbar quota authorized for research and public display. NMFS also reduced the non-sandbar LCS commercial quota by 41.2 mt dw to accommodate the collection of other species besides sandbars collected under the exempted fishing program. Therefore, total landings of sandbars would still be under the 158.3 mt dw TAC (Table A.1), and total landings of non-sandbar LCS would not exceed the 1,045.5 mt dw TAC for non-sandbar LCS (Table A.3).

In addition, given the severity of the overfished and overfishing status of dusky sharks, dusky sharks would not be allowed to be collected for public display. However, based on research needs and objectives, NMFS would review the allocation of dusky sharks for research under EFPs on a case by case basis and any associated mortality would be deducted from the shark research and display quota. Therefore, reducing the amount of dusky and sandbar sharks and maintaining the number of non-sandbar LCS authorized for these purposes would result in neutral or slightly positive ecological impacts for these species.

4.2.2 Retention Limits

Fishery-wide Landings

Under alternative suites 2 through 4, NMFS would require that shark fins, including the tail, would remain attached to the shark through offloading. At that point, the fins could be removed either by the fisherman or the shark dealer. The shark could still be headed, gutted, and bled while at sea. To ensure the sharks are stored in a manner that would maximize the value and quality of the sharks, the fins could be sliced as long as they are not removed completely from the shark (*i.e.*, they could remain attached to the shark via a small amount of uncut skin). This would reduce the likelihood of misidentifying the shark or the fins and would help with species-specific reporting by fishermen and shark dealers to improve data for future stock assessments. Additionally, because fishermen would no longer be able to bypass the regulations by keeping only the fins of shark that are not landed (*i.e.*, keeping more desirable sandbar shark fins and discarding the carcass), fishing mortality of sharks overall could be reduced. This would help with the rebuilding of overfished species of sharks, such as sandbar sharks.

On average, annual sandbar landings of 1,310,449 lb dw and non-sandbar LCS landings of 1,585,671 lb dw were reported from 2003 to 2005 according to Federal and state shark dealer reports (Table 4.9). Based on recommendations from the most recent LCS stock assessment, the base commercial quota would be reduced to 116.6 mt dw and 541.2 mt dw for non-sandbar LCS (see Appendix A and Tables A.1 and A.3). However, to balance the number of sandbar discards in the South Atlantic with uncaught sandbar quota in the Gulf of Mexico, only 86.1 mt dw of sandbar sharks and 253.6 mt dw of non-sandbar LCS would be landed under alternative suite 2 (see discussion below and in Appendix A under "*Non-sandbar quota and retention limits"* and Table A.4 and Table 4.2). This is a 65-percent reduction in landings for sandbar sharks and a 56-percent reduction in landings for non-sandbar LCS compared to the status quo, alternative suite 1 (see Table 4.2).

Table 4.2 Landings of sandbar sharks and non-sandbar LCS for the different alternative suites.

Alternative Suite	Estimated Landings by Vessels Within Research Fishery (mt dw)	Estimated Landings by Shark Permit Holders Outside of Research Fishery (mt dw)	Estimated Landings by Directed Shark Permit Holders (mt dw)	Estimated Landings by Incidental Shark Permit Holders (mt dw)	Estimated Landings by non-HMS Shark Permit Holders in the Coastal Fisheries Logbook (mt dw)	Total Landings (mt dw)	Percent Change in Landings Compared to Status Quo
Sandbar							
1	-	-	583.5	5.9	5.0	594.4	-
2	-	-	86.1	0	†	86.1	↓86%
3	-	-	83.0*	22.9*	†	105.9	↓82%
4[1]	116.6	0	-	-	†	116.6	↓80%
4[2]	87.9	0	-	-	†	87.9	↓85%
5	-	-	-	-	†	0	↓100%
Non-sandbar LCS							
1	-	-	679.5	21	18.7	719	-
2	-	-	253.6	0	†	253.6	↓65%
3	-	-	179.7*	49.5*	†	229.2	↓68%
4[1]	50	627.8	-	-	†	677.8	↓6%
4[2]	37.5	578.3	-	-	†	615.8	↓14%
5	-	-	0	0	†	0	↓100%

[1] under the sandbar shark base quota and 92 trips in the research fishery;[2] under the adjusted quotas and 69 trips in the shark research fishery.

* See Table 4.11 for this calculation.

† Landings by non-HMS permit holders were counted as discards based on historical landings (see Table 4.1).

Landings on a trip basis

Based on the reduced base quotas, the retention limit for alternative suite 2 would be 8 sandbar sharks per vessel per trip and 21 non-sandbar LCS per vessel per trip (~1,032 lb dw per trip for sandbar and non-sandbar LCS) for directed shark permit holders only (incidental permit holders would not be allowed to retain any shark species) (Tables 2.1, A.2, and A.4). Currently, directed shark permit holders are subject to a 4,000 lb dw LCS trip limit. The average number of sandbar and non-sandbar LCS landed per trip was 35 sandbars and 32 non-sandbar LCS for all gear types reported in the Coastal Fisheries and HMS Logbooks. Therefore, the retention limits under alternative suite 2 would be a 77-percent reduction for sandbar sharks and a 34-percent reduction in non-sandbar LCS on a trip basis compared to the status quo. There would be no change to the trip limit for SCS and pelagic sharks for directed shark permit holders (*i.e.*, no trip limit for SCS and pelagic sharks).

Catch composition of sandbar sharks and non-sandbar LCS differed for BLL trips that directed on sharks (Hale and Carlson, 2007). Based on BLL observer program data in 2005 and 2006, on average, 69 sandbar sharks and 35 non-sandbar LCS were caught in the South Atlantic region and 30 sandbar sharks and 83 non-sandbar LCS in the Gulf of Mexico region were caught per trip (Hale and Carlson, 2007). Therefore, depending on the region and gear used, the retention limit in alternative suite 2 could result in a 73 to 88-percent reduction in sandbars kept and a 40 to 75-percent reduction in non-sandbar LCS kept on a trip basis.

Sandbar and non-sandbar LCS discards

The reduction in landings must also be balanced by any potential increase in discards. Since the non-sandbar LCS quota is higher than the sandbar quota, the retention limit for non-sandbar LCS is higher than the retention limit for sandbar sharks (Tables A.2 and A.4). As a result, sandbar sharks could be discarded as fishermen reach their sandbar shark retention limit but continue to fish to fulfill their non-sandbar LCS retention limit. To limit these discards, NMFS based the non-sandbar LCS retention limit on an average ratio of sandbars to non-sandbar LCS caught in the South Atlantic and Gulf of Mexico regions (1:2.7; Table A.4). In doing so, NMFS established a retention limit (21 non-sandbar LCS; Table A.4) that minimized the sandbar discards that could occur in the South Atlantic region while maximizing the sandbar landings that could be caught in the Gulf of Mexico region (since the sandbar to non-sandbar LCS ratio is higher in the Gulf of Mexico region than the South Atlantic region, no sandbar discards are expected in the Gulf of Mexico region given the non-sandbar LCS retention limit).

For instance, the catch ratio of sandbars to non-sandbar LCS in the Gulf of Mexico is 1:4. A non-sandbar LCS retention limit based on this ratio would be 32 non-sandbar LCS per trip with an 8 sandbar shark retention limit per trip (8 sandbars x 4 = 32 non-sandbar LCS). However, given the 1:1.4 ratio in the South Atlantic, an 8 sandbar shark retention limit/trip would equal a 11 non-sandbar LCS retention limit in the South Atlantic (8 sandbar sharks x 1.4 = 11.2 non-sandbar LCS). Therefore, setting one retention limit based on the Gulf of Mexico's catch ratio would result in excessive sandbar sharks discards.

To determine the number of sandbar discards that would occur in the South Atlantic with a non-sandbar LCS retention limit based on the Gulf of Mexico catch composition, NMFS first determined the difference in the retention limits for non-sandbar LCS based on the respective

ratios in the two regions. It should be noted that setting a non-sandbar LCS retention limit using the South Atlantic ratio would result in no sandbar discards; any non-sandbar LCS retention limit above that threshold (*i.e.*, above the sandbar shark x 1.4 threshold) would result in sandbar discards, but the number of discards would depend on the difference between the two retention limits divided by South Atlantic's non-sandbar LCS ratio to sandbar sharks (*i.e.*, 1.4):

- Gulf of Mexico non-sandbar LCS retention limit = 8 sandbars x 4 = 32 non-sandbar LCS
- South Atlantic non-sandbar LCS retention limit = 8 sandbar sharks x 1.4 = 11.2 non-sandbar LCS (or 11 non-sandbar LCS)
- 32 non-sandbar LCS retention limit based on Gulf of Mexico ratio - 11 non-sandbar LCS retention limit based on South Atlantic = 21 non-sandbar LCS;
- 21 non-sandbar LCS/1.4 = 15 sandbar sharks discarded per trip in South Atlantic;
- 15 sandbar sharks x 237 South Atlantic trips = 3,555 sandbar sharks discarded in the South Atlantic; and
- 3,555 sandbar sharks x 40.5 lb dw [average commercial sandbar weight] = 143,977.565.3 lb dw or 65.3 mt dw.

Therefore, setting a non-sandbar LCS retention limit in the South Atlantic region based on the Gulf of Mexico region's catch ratio would result in approximately 65.3 mt dw of sandbar shark discards. These discards would occur as fishermen meet their sandbar retention limit and continue to fish to fulfill their non-sandbar LCS retention limit in the South Atlantic.

An alternate approach would be to implement a non-sandbar LCS retention limit based on the South Atlantic catch composition. However, this would translate into approximately only 163.2 mt dw of the 541.2 mt dw of the non-sandbar LCS being harvested (116.6 mt dw sandbar quota x 1.4 = 163.2 mt dw). Another alternative would be to set separate retention limits for the Atlantic and Gulf of Mexico regions. However, as discussed in the Region section below (Section 4.2.6), under alternative suite 2, NMFS would only implement one region due to reduced quotas and to simplify quota monitoring. In addition, there could be difficulty in enforcing different regional retention limits. Therefore, NMFS would establish one retention limit that is applied everywhere. To balance the harvest of as much of the non-sandbar LCS quota as possible while limiting sandbar shark discards, NMFS chose to establish the non-sandbar LCS retention limit based on an average regional catch composition.

However, basing the non-sandbar LCS retention limit on the average regional catch composition still results in a non-sandbar LCS retention limit (*i.e.*, 21 non-sandbar LCS/trip) that is higher than the sandbar to non-sandbar LCS ratio for the South Atlantic (11 non-sandbar LCS/trip), which could result in sandbar shark discards in the South Atlantic (~30.5 mt dw; Table A.4). While this results in total discards that are 4.5 times higher than the number of sandbar discards occurring under the status quo (Table 4.1), these discards are balanced out by the amount of sandbar quota not caught in the Gulf of Mexico region based on the 21 non-sandbar LCS trip limit (~30.5 mt dw; Table A.4). This ultimately results in only 86.1 mt dw of the sandbar sharks being harvested under alternative suite 2 (*i.e.*, based on the 1:4 ratio in the Gulf of Mexico region, 21 non-sandbar LCS retention limit / 4 = 5 sandbar sharks caught per trip in the Gulf of Mexico region when the non-sandbar LCS retention limit/trip is filled. This is

three less than the 8 sandbar shark per trip limit under alternative suite 2, resulting in approximately ~30.5 mt dw of sandbar shark quota uncaught in the Gulf of Mexico region). Furthermore, overall fishing effort is expected to decline compared to the status quo given the reduction in the retention limit of 73 to 88 percent for sandbars and 40 to 75 percent for non-sandbar LCS, depending on the region.

Overall, total landings and discards of sandbar sharks under alternative suite 2 are expected to be 80-percent less (474.4 mt dw) than the total landings and discards under alternative suite 1 (status quo) (Table 4.1 and Table 4.2):

- status quo: 594.4 mt dw in landings + 9.6 mt dw in discards = 604 mt dw total;
- alternative suite 2: 86.1 mt dw in landings + 43.2 mt dw in discards = 129.3 mt dw;
- 129.3 mt dw/ 604 mt dw = 20 percent or 80-percent reduction in landings and discards.

Under alternative suite 2, the total landings and discards plus an estimated 27 mt dw of recreational landings (156.3 mt dw total) is still below the 158.3 mt dw sandbar TAC. Therefore, quotas and retention limits under alternative suite 2 would meet the rebuilding plan for sandbar sharks and would have positive ecological impacts on this stock.

Based on the non-sandbar LCS retention limit under alternative suite 2, landings for this complex would be below the proposed 541.2 mt dw non-sandbar LCS quota (253.6 mt dw of the 541.2 mt dw quota could be caught; Table 4.2 and A.4). Total harvest is anticipated to be below the non-sandbar LCS quota because of the approach taken to set non-sandbar LCS retention limits to limit the number of sandbar shark discards. The only way fishermen could potentially harvest the entire non-sandbar LCS quota would be to reduce sandbar shark landings (*i.e.*, even lower than 86.1 mt dw) to accommodate for presumably more sandbar shark discards with a higher non-sandbar LCS retention limit. Therefore, to balance landings with regulatory discards, NMFS is selecting a ratio approach for setting non-sandbar LCS retention limits, at this time. This retention limit would also decrease non-sandbar LCS discards by an estimated 56 percent under this alternative suite (Table 4.1). This is mainly due to the assumption that the lowered retention limits for sandbars and non-sandbar LCS may result in fishermen not directing on sharks with the same level of effort as they have been in the past. Therefore, non-sandbar LCS discards by shark directed BLL trips may decrease (Table 4.1). If these assumptions reflect actual changes in the fishery, then alternative suite 2 would have positive ecological impacts for non-sandbar LCS.

Dusky shark discards

NMFS also assumes that the reduction in fishing effort due to the reduced sandbar and non-sandbar LCS quotas under alternative suite 2 could result in a decrease of dead discards of dusky sharks, resulting in positive ecological impacts for this stock. Dusky sharks have been prohibited since 2000; however, they are still being landed or discarded dead as reported in the Coastal Fisheries and HMS Logbooks. Landings are also occurring in recreational fisheries. Under alternative suite 1 (status quo), NMFS estimates that, on average, 33.2 mt dw of dusky sharks have been landed or discarded dead (this includes recreational harvest) from 2003 to 2005

(Table 4.1). The majority of the discards under the status quo came from shark directed BLL sets (which include BLL sets fished by PLL vessels) (Table 4.1). However, mortality of dusky sharks would still be realized by other parts of the commercial and recreational fishing sector (Table 4.1). As with non-sandbar LCS, NMFS assumes that since retention limits for sandbars and non-sandbar LCS have been reduced, fishermen would not be directing their effort on shark as they have in the past. This is particularly pertinent for alternative suite 2, which would prohibit landings of sandbar sharks when PLL gear is onboard a vessel. Therefore, NMFS assumes that PLL vessels would not set BLL gear for sharks as a result of this prohibition. Given this assumption and the reduced fishing effort for sandbar and non-sandbar LCS, NMFS estimates that alternative suite 2 may reduce dusky shark discards and landings by 74 percent (Table 4.1).

Porbeagle shark discards

Finally, under alternative suite 2, porbeagle sharks would be prohibited in the commercial and recreational sectors. This is expected to have neutral or slightly positive ecological impacts for this stock. The United States has minimal landings of this species in state and Federal waters. Based on HMS Logbook data from 2003 to 2005, 1,685 porbeagle sharks were reported discarded alive, 484 were reported as discarded dead, and 31 were reported as being retained over those 3 years. Based on the number of porbeagle sharks retained from 2003 to 2005, U.S. fishermen have not been targeting porbeagle sharks. Since only 7 percent of the porbeagle sharks caught per year were discarded dead (1,685 discarded alive + 484 discarded dead + 31 kept = 2,200 total porbeagle sharks caught; 484 discarded dead /2,200 total catch = 22 percent; 22 percent / 3 = 7 percent discarded dead per year), prohibiting the retention of porbeagle sharks is not expected to result in large numbers of dead discards. In fact, dead discards of porbeagle sharks may only increase by 0.7 porbeagle sharks per year (7 percent x 31 porbeagle sharks kept = 2 porbeagle sharks discarded dead under alternative 2; 2 porbeagle sharks /3 years = 0.7 porbeagle per year). Given this stock is overfished, prohibiting the retention of this species would eliminate any future fishery from developing while not increasing dead discards. This may result in slightly positive ecological impacts for this stock. In addition, since most porbeagle sharks are caught on PLL gear, reductions in fishing effort associated with BLL gear are not anticipated to have significant ecological benefits for this species.

4.2.3 Time/Area Closures

Under alternative suite 2, NMFS would maintain the mid-Atlantic shark closed area and the current BLL closures in the Caribbean that were implemented in February 2007, (72 FR 5633). Therefore, the ecological impacts associated with the closures would be the same as described under alternative suite 1.

However, under alternative suite 2, NMFS would also implement the SAFMC's MPAs. The SAFMC has proposed a number of Type II MPAs from North Carolina to the Florida Keys in Amendment 14 to the Snapper-Grouper FMP (Figure 4.3). Type II MPAs are closures throughout the year to most gear types except some fishing such as trolling for HMS and other coastal pelagic species that is allowed. Recent stock assessments indicate that snowy grouper, black seabass, and red porgy are overfished and snowy grouper, golden tilefish, vermilion snapper, and black sea bass are experiencing overfishing. The primary purpose of Amendment

14 is to protect the population and habitat of slow growing, long-lived deepwater snapper grouper species (speckled hind, snowy grouper, Warsaw grouper, yellowedge grouper, misty grouper, golden tilefish, and blueline tilefish) from directed fishing pressure to achieve a more natural sex ratio, age, and size structure within the proposed MPAs while minimizing adverse social and economic impacts. A total of 19 MPAs were initially considered in Amendment 14, and 8 of the MPAs were preferred in the SAFMC's final actions in June 2007. The only HMS authorized gear that has the potential to interact with the species that are subject of the SAFMC's Amendment 14 is BLL gear. HMS permitted vessels that fish with BLL gear normally target LCS, but small coastal, pelagic and dogfish species are also caught. Bycatch may include groupers, tilefishes, wahoo, skates, rays, and other species (Table 4.3).

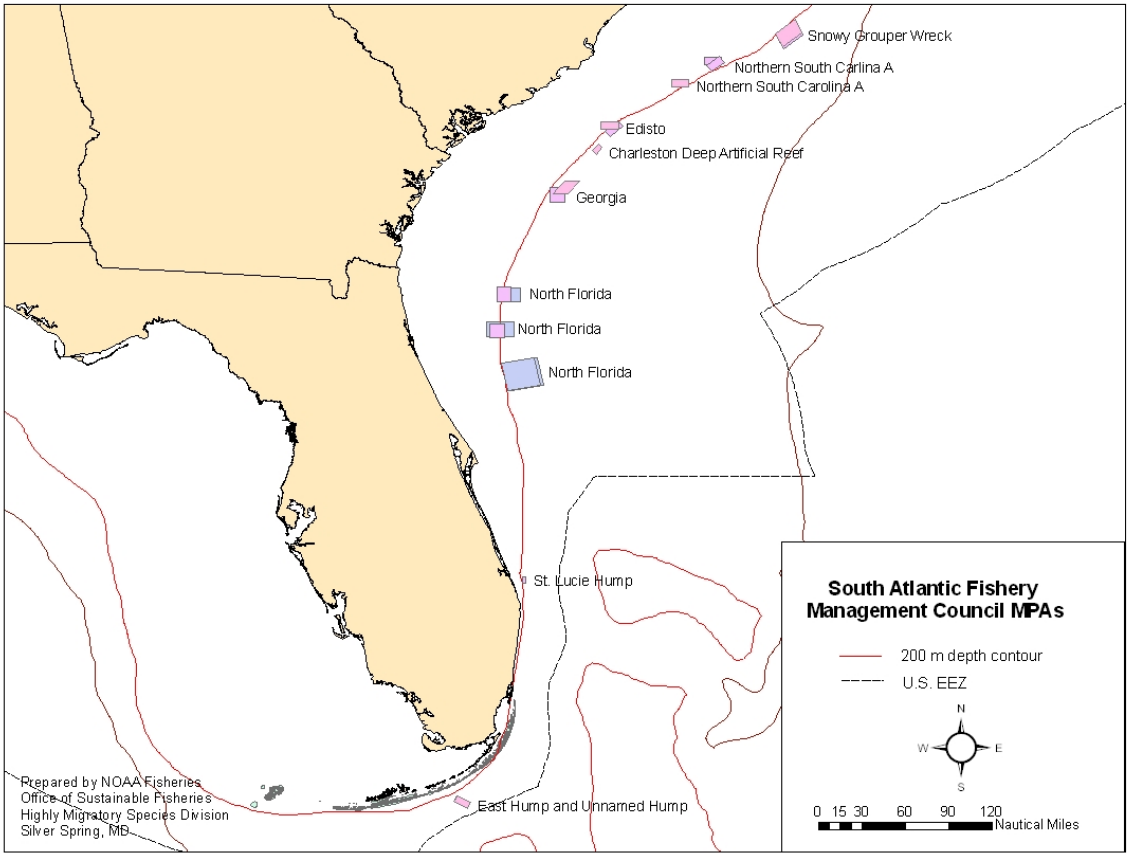

Figure 4.3 **Map showing all MPAs considered by the SAFMC in Amendment 14. Several of the MPAs represent a number of different alternatives with the same name that overlap slightly.**

Table 4.3 **Bycatch species (number and percentage of total) caught on observed shark BLL sets from 1994-2006 in all the MPAs in comparison to observed bycatch in the rest of the Atlantic. Groupers are highlighted and total provided separately. Source: Shark BLL Observer Program, NMFS.**

Common Name	Number Caught in All MPAs	Number Caught in Atlantic	Percent In MPAs
almaco jack	1	7	14.3%
basket star	1	1	100.0%
black sea bass	0	11	0.0%
box crab	2	6	33.3%
brittle star	4	13	30.8%
clearnose skate	2	76	2.6%
cobia	2	121	1.7%
conger eel	1	8	12.5%
gag grouper	18	74	24.3%
grouper	1	121	0.8%
leopard toadfish	2	2	100.0%
mahi	3	8	37.5%
red grouper	6	186	3.2%
reticulate moray	1	1	100.0%
sharksucker	3	66	4.6%
skate	1	55	1.8%
smalltooth sawfish	1	10	10.0%
snowy grouper	2	40	5.0%
starfish	1	52	1.9%
stingray	5	168	2.9%
tilefish	0	605	0.0%
wahoo	3	6	50.0%
warsaw grouper	1	8	12.5%
yellowfin grouper	1	3	33.3%
Grand Total	**62**	**1,648**	**3.8%**
Total Groupers	**29***	**1,048**	**2.8%**

***** based on the sum of gag grouper, grouper, red grouper, snowy grouper, warsaw grouper, and yellowfin grouper

In the DEIS for Amendment 14 the eight preferred MPAs include one off North Carolina, three off South Carolina, one off Georgia, and three off the east coast of Florida with specific locations described below (Figure 4.4). Sizes of the MPAs would range from approximately 5 by 10 nautical miles (nm) to approximately 22 by 23 nm. The two most southern MPAs would be approximately 9 and 13 nm offshore, respectively, and the others at least 38 nm offshore.

1) Snowy Grouper Wreck off North Carolina is bounded by rhumb lines connecting, in order, the following coordinates:

Point	**North Lat**.	**West long.**
A	33°25'	77°04.75'
B	33°34.75'	76°51.3'
C	33°25.5'	76°46.5'
D	33°15.75'	77°00.0'
A	33°25'	77°04.75'

2) Northern South Carolina MPA is bounded by rhumb lines connecting, in order, the following coordinates:

Point	**North Lat**.	**West long.**
A	32°53.5'	78°16.75'
B	32°53.5'	78°4.75'
C	32°48.5'	78°4.75'
D	32°48.5'	78°16.75'
A	32°53.5'	78°16.75'

3) Edisto MPA is bounded by rhumb lines connecting, in order, the following coordinates:

Point	**North Lat**.	**West long.**
A	32°24'	79°6'
B	32°24'	78°54'
C	32°18.5'	79°54'
D	32°18.5'	78°6'
A	32°24'	79°6'

4) Charleston Deep Artificial Reef MPA is bounded by rhumb lines connecting, in order, the following coordinates:

Point	**North Lat**.	**West long.**
A	32°04’	79°12’
B	32°08.5’	79°07.5’
C	32°06’	79°05’
D	32°01.5’	79°09.3’
A	32°04’	79°12’

5) Georgia MPA is bounded by rhumb lines connecting, in order, the following coordinates:

Point	**North Lat**.	**West long.**
A	31°43'	79°31'
B	31°43'	79°21'
C	31°34'	79°29'
D	31°34'	79°39'
A	31°43'	79°31'

6) North Florida MPA is bounded by rhumb lines connecting, in order, the following coordinates:

Point	**North Lat**.	**West long.**
A	30°29'	80°14'
B	30°29'	80°2'
C	30°19'	80°2'
D	30°19'	80°14'
A	30°29'	80°14'

7) St. Lucie Hump MPA is bounded by rhumb lines connecting, in order, the following coordinates:

Point	**North Lat**.	**West long.**
A	27°8'	80°0.0’
B	27°8'	79°58'
C	27°4'	79°58'
D	27°4'	80°0.0’
A	27°8'	80°0.0’

8) East Hump/Un-named Hump MPA is bounded by rhumb lines connecting, in order, the following coordinates:

Point	**North Lat**.	**West long.**
A	24°36.5’	80°45.5’
B	24°32’	80°36’
C	24°27.5’	80°38.5’
D	24°32.5’	80°48’
A	24°36.5’	80°45.5’

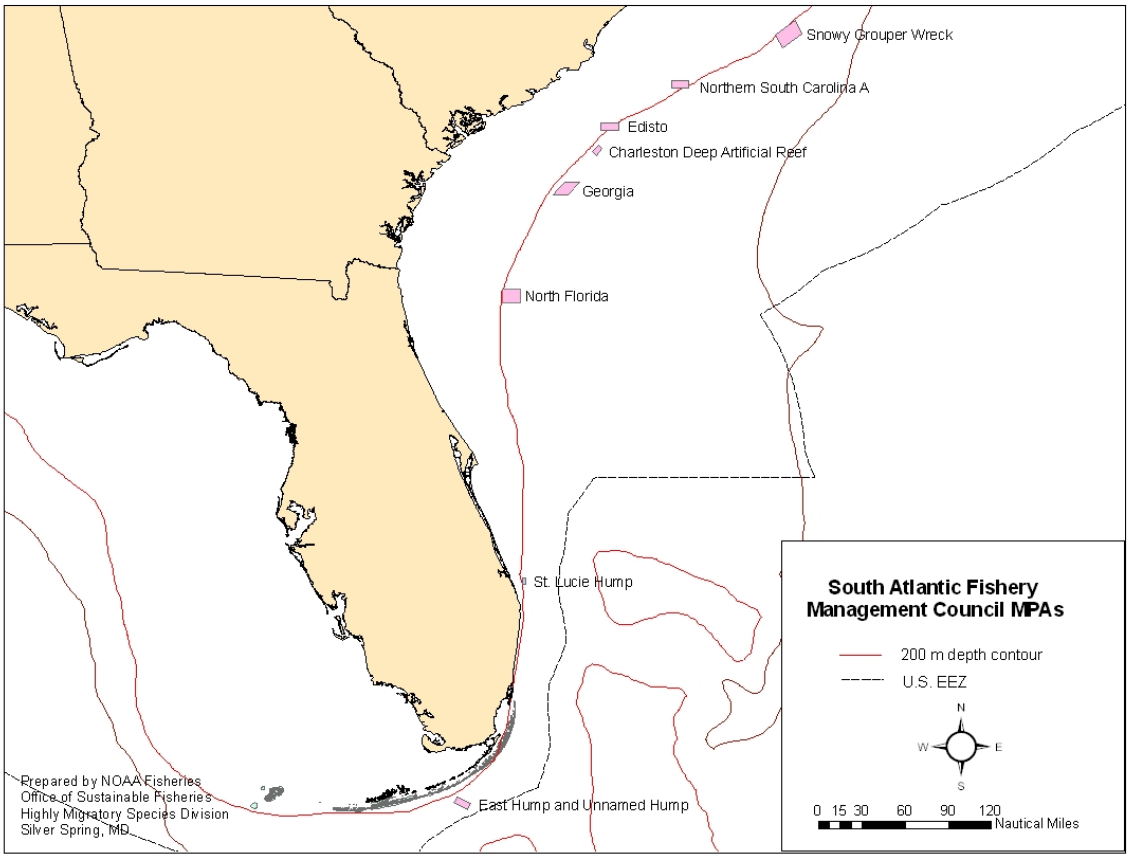

Figure 4.4 Map showing only the preferred SAFMC MPAs. A total of eight MPAs were preferred in SAFMC's final action for Amendment 14.

NMFS coordinated with the SAFMC to analyze the ecological and socio-economic impacts of the MPAs on HMS fisheries in Amendment 2 and to consider rulemaking to prohibit shark BLL gear in the preferred MPAs. This approach should result in implementation of measures consistent with the SAFMC process and the current timeline for Amendment 14. NMFS has addressed a number of actions in a similar way by developing complementary regulations for the Gulf of Mexico Fishery Management Council's Madison-Swanson Steamboat Lumps closures and the Caribbean Fishery Management Council's SFA Amendment closures.

As described below, the ecological impact of shark BLL gear on the snapper-grouper complex is considered to be minimal, and catches of sharks in the area are also low compared to other areas of the South Atlantic. Thus, the ecological consequences of closing the eight preferred MPAs are considered to be minimal. Under alternative suite 2, NMFS would close the preferred MPAs to shark BLL gear based on enforceability concerns raised by the SAFMC.

NMFS used shark BLL observer program data from 1994 to 2006 to evaluate the impact of the shark BLL fishery on the snapper-grouper complex within the proposed MPAs. Using a Geographic Information System (GIS), NMFS plotted the locations of all observed sets on the proposed MPAs originally considered in the South Atlantic region (Figure 4.5 and Figure 4.6). The figures provide an overview of the number and locations of sets that intersected all the MPAs originally considered. The northernmost areas are shown in Figure 4.5and the

southernmost areas are shown in Figure 4.6. The points on the maps indicate the beginning and ending locations (reported as degrees and minutes of latitude and longitude by observers) of the sets connected by a line between the two points. Since most of the proposed MPAs are relatively small (<10 nautical miles in diameter), the sets tend to either start or end outside of the MPAs. In most cases, only a portion of the set intersected with an MPA and few, if any sets, were entirely within the MPAs (Figure 4.7). However, if a set intersected any portion of an MPA, then all bycatch reported on that set was counted as occurring in the MPA regardless of where on the set it occurred. NMFS used this approach because it was not possible to determine where on a set the bycatch actually occurred. Of the sets that intersected the MPAs, a large portion of each set actually occurred primarily outside the MPAs. As a result, the number of bycatch species reported as occurring in the MPAs is most likely an overestimate.

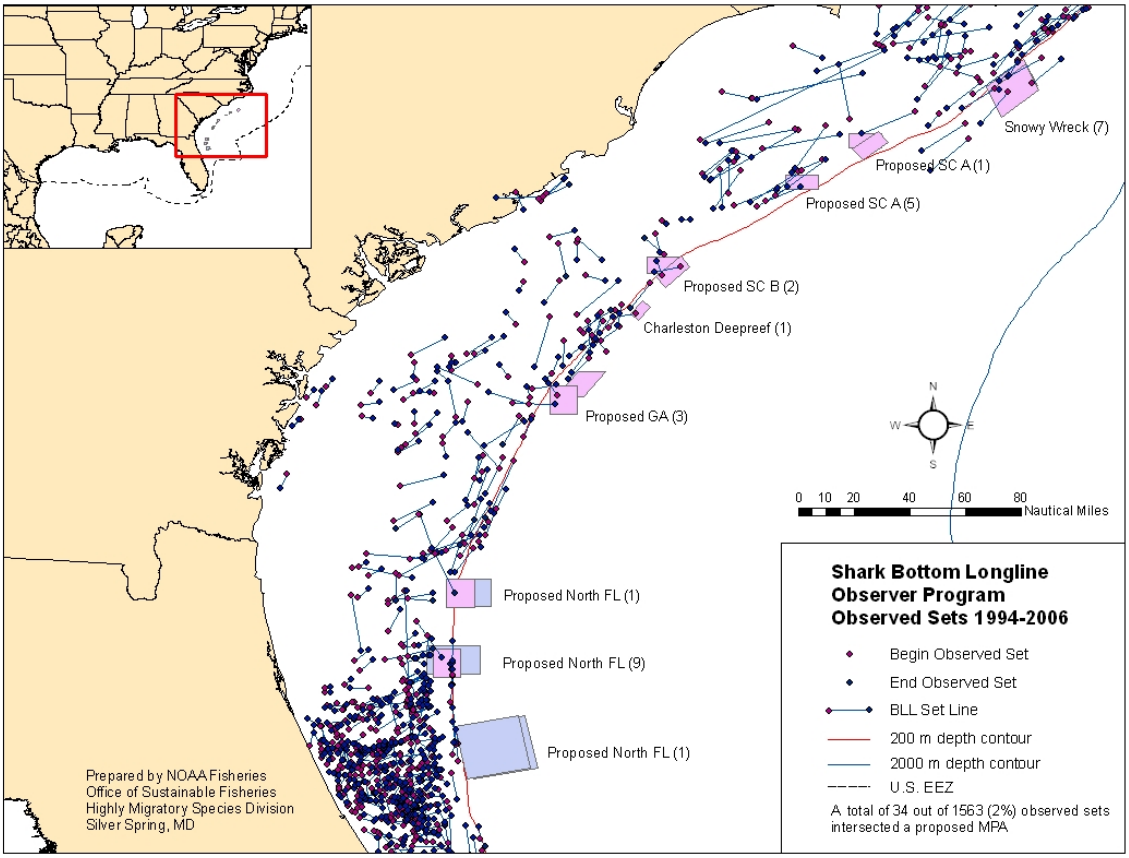

Figure 4.5 **All shark BLL sets observed from 1994-2006 overlaid on the MPAs originally considered for the northern zone. A total (both northern and southern zones) of 34 out of 1,563 (2%) of observed sets intersected the considered MPAs. Note that most sets are shoreward of the 200 m depth contour. Source: Shark BLL Observer Program, NMFS.**

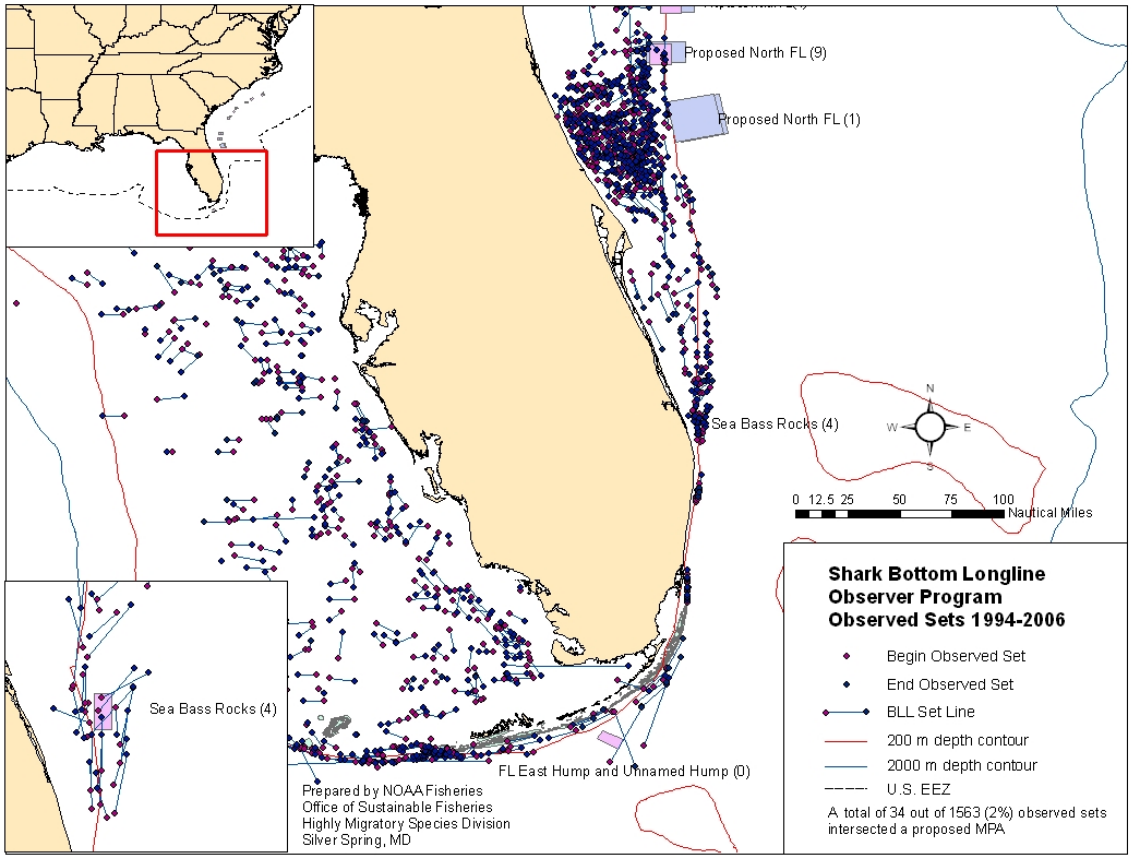

Figure 4.6 **All shark BLL sets observed from 1994-2006 overlaid on the MPAs originally considered for the southern zone. Source: Shark BLL Observer Program, NMFS.**

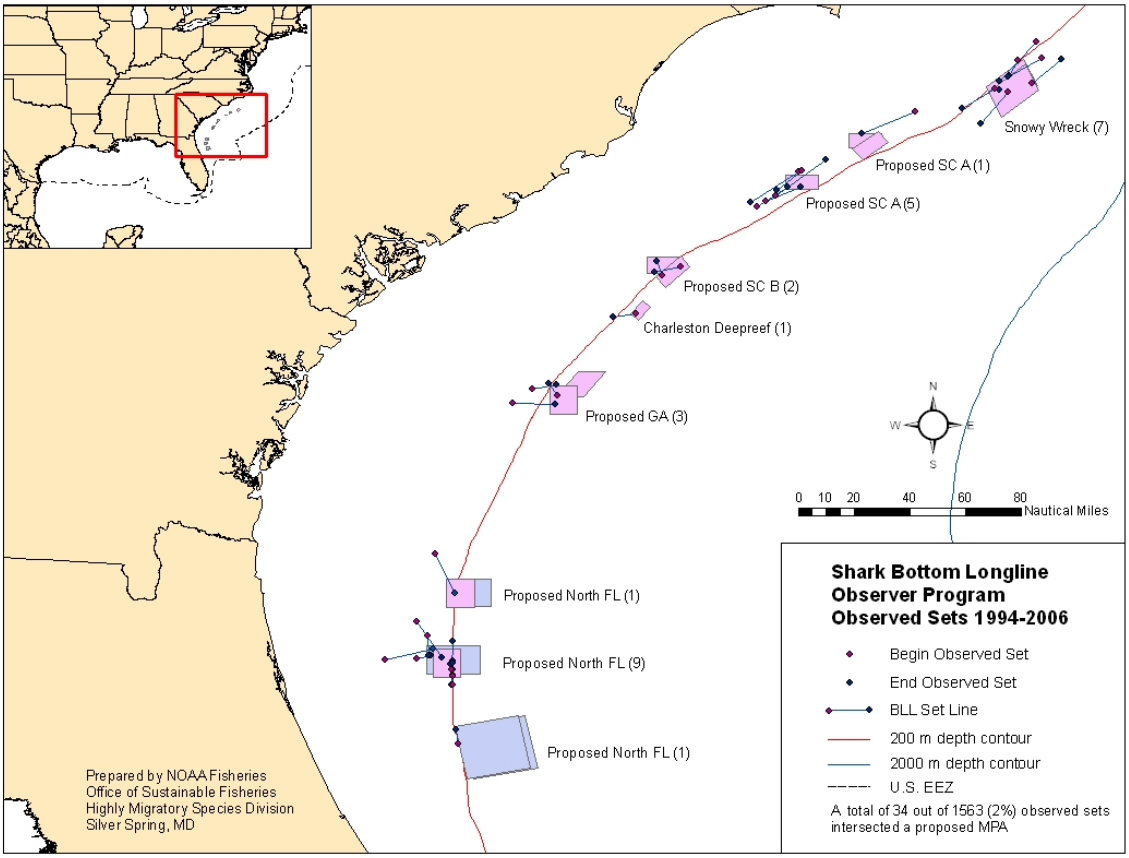

Figure 4.7 **Observed shark BLL sets that intersected MPAs originally considered in the northern zone. Source: Shark BLL Observer Program, NMFS.**

Of the 1,563 observed sets over the approximately twelve-year period, a total of 34 sets intersected the proposed MPAs that were originally considered by the SAFMC (Figure 4.7 and Table 4.3). Of those, only two sets occurred entirely within the boundary of the MPAs (one in Snowy Grouper Wreck and one in North Florida MPA). A concentration of observed sets is apparent in the areas north of Cape Canaveral. The remaining sets tend to be more widely spaced and although observer coverage is not necessarily uniform, the level of observer coverage was based on the level of fishing effort in the different areas. Each MPA has a number next to it in parentheses that indicates the number of observed sets that intersected the MPA.

Figure 4.8 and Figure 4.9 show only those sets that intersected the MPAs that were originally considered. The Snowy Grouper Wreck MPA had the highest number of observed sets with seven (Figure 4.7 and Figure 4.8). The middle sites for North Florida had nine sets. Most of them had one, two, or fewer than three sets in any given MPA. Table 4.3 and Table 4.4 show all of the bycatch and all of the sharks, respectively, that were caught on sets that may have intersected an MPA. As evident from Figures 4.5 and 4.6, few sets occurred in the MPAs because they are located on the edge of the shelf in deeper water where currents are strong and gear may be lost. Most BLL sets occur shoreward of the 200 m depth contour with the exception of the Snowy Grouper Wreck MPA (Figure 4.7). The few sets that did occur in the MPAs should not be considered representative of overall shark fishing effort, and may in fact be considered anomalous based on the low number of observed sets that occurred in these areas.

Only 34 sets (2 percent) of the 1,563 observed sets occurred in the MPAs that were originally considered by the SAFMC. The fact that very few sets occurred in the MPAs supports the argument that there is very little shark fishing effort and associated bycatch in the MPAs, and hence, supports the overall conclusion of minimal ecological impacts.

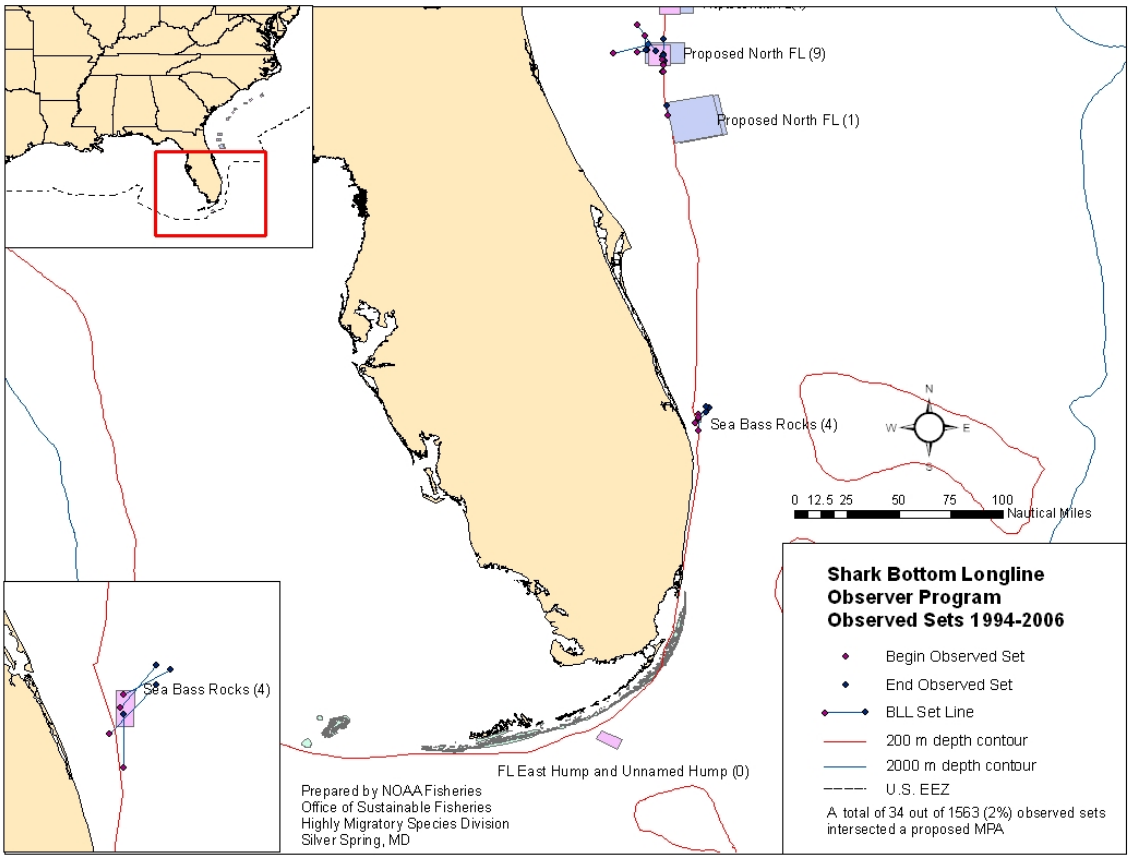

Figure 4.8 Observed shark BLL sets that intersected MPAs originally considered in the southern zone. Source: Shark BLL Observer Program, NMFS.

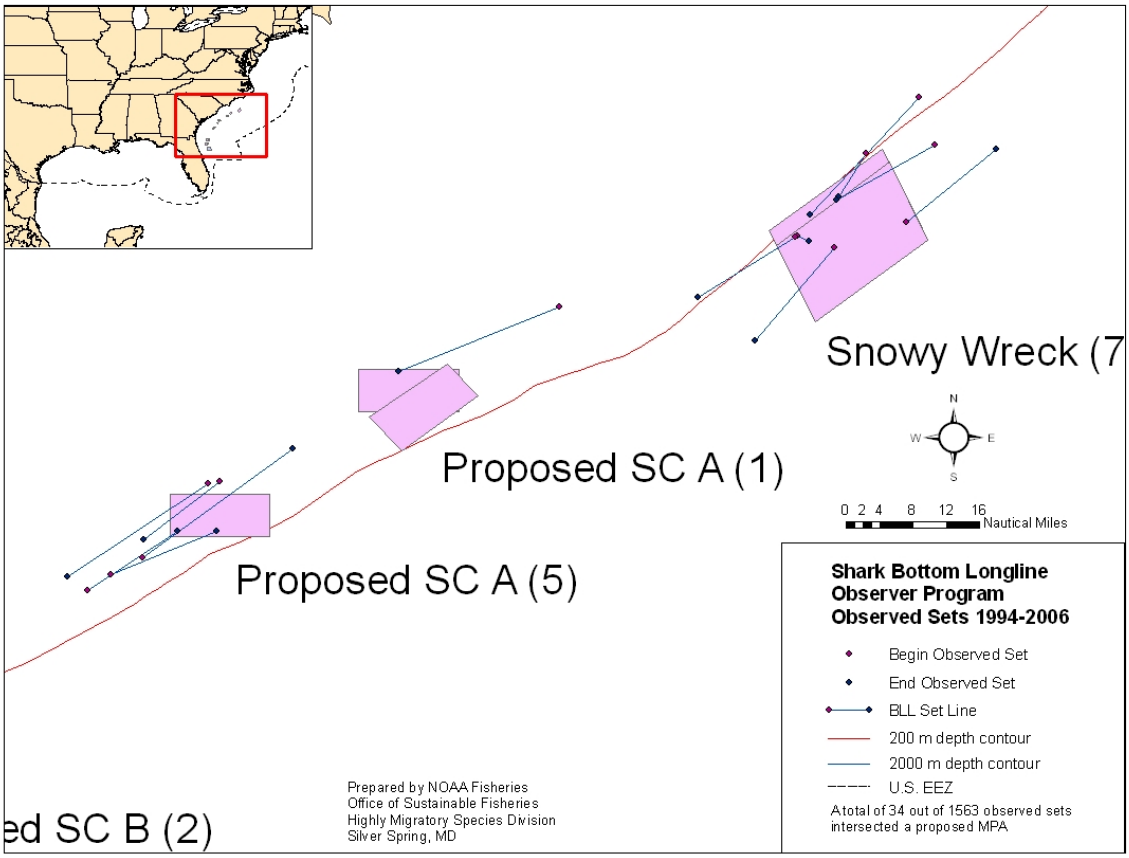

Figure 4.9 **Close-up showing the extent of overlap of sets with the MPAs. The number of sets that intersected the MPAs is in parentheses. Since at least one end of each set intersected the MPAs, all bycatch on the sets was considered to have occurred inside the MPAs. Source: Shark BLL Observer Program, NMFS.**

Table 4.4 **Shark species (number and percentage of total) caught on observed shark BLL sets from 1994-2006 in all the MPAs in comparison to observed shark catch during the same period in the rest of the Atlantic. Source: Shark BLL Observer Program, NMFS.**

Species	Number Caught in All MPAs	Number Caught in Atlantic	Percent of Total
Atlantic sharpnose	75	14,836	0.5%
bigeye thresher	12	21	57.1%
blacknose	47	1,116	4.2%
bull	5	194	2.6%
Carcharhinus spp	1	13	7.7%
dusky	32	1,736	1.8%
great hammerhead	6	251	2.4%
lemon	2	98	2.0%
night	2	145	1.4%
nurse	4	945	0.4%
sand tiger	1	410	0.2%
sandbar	1,012	19,849	5.1%
scalloped hammerhead	29	61	47.5%
shortfin mako	5	105	4.8%
silky	30	544	5.5%
sixgill	1	6	16.7%
smooth dogfish	1	538	0.2%
spinner	2	220	0.0%
tiger	549	6,929	7.9%
unidentified	1	11	9.1%
Grand Total	**1,817**	**48,028**	**3.8%**

NMFS attempted to estimate the total bycatch within the proposed MPAs (Siegfried *et al.,* 2006a). NMFS also expanded coastal shark catches to obtain overall estimates of sharks caught within the proposed MPAs (Siegfried *et al.,* 2006b). NMFS used the observed bycatch in the MPAs and fishing effort reported in the Coastal Fisheries Logbook to provide expanded take estimates (Siegfried *et al*., 2006a). The proposed MPA total areas were calculated as proportions of each grid used to report fishing effort in the Coastal Fisheries Logbook. NMFS then calculated the proportion of sets with bycatch using a generalized linear model (GLM). Thus, the bycatch estimates reflect a subset of the actual shark BLL effort in these areas, as opposed to all effort in the Atlantic. Only one MPA, Snowy Wreck, had sufficient data to produce expanded bycatch estimates. Low sample sizes prohibited estimating the impact of the shark BLL fishery on bycatch in other MPAs in a statistically robust fashion (Siegfried *et al*., 2006a). A similar approach was used to estimate total shark catches in the MPAs (Siegfried *et al*., 2006b).

Due to the small amount of bycatch that occurred in the MPAs, it was not possible to calculate expanded estimates for most MPAs. Based on the low estimate of total expanded bycatch, it is likely the shark BLL fishery has minimal impact on the proposed MPAs. If

additional data become available, expanded take estimates could be calculated for those MPAs for which NMFS was unable to provide estimates in the current analysis. It should be noted that the shark observer program is one of the most comprehensive, long-term, and well documented datasets available. Similar observer program data are not available for the snapper-grouper fishery. Although data from the Coastal Fisheries Logbook were used to derive expanded take estimates, they do not provide specific latitude and longitude coordinates of set locations to determine the exact bycatch that occurred in MPAs. Siegfried *et al*. (2006b) used a similar approach to estimate expanded catches of sharks. Sharks catches were considerably higher than snapper-grouper bycatch and data were thus sufficient to produce expanded estimates.

Given that only 34 out of 1,563 observed trips (2 percent) intersected the MPAs that were originally considered, the impact of shark longline vessels on the snapper-grouper complex in the MPAs is expected to be minimal. Taking all 34 sets that occurred in the MPAs into account, only 28 grouper were observed caught over a 12 year period (Table 4.3). Of these, only one species that was observed caught (snowy grouper) is from a stock that is considered overfished with overfishing occurring. Two individuals of this species were caught (Table 4.3). As described above, NMFS attempted to calculate the expanded bycatch of snapper-grouper in the MPAs but was able to do so for only one MPA (Snowy Grouper Wreck). For Snowy Grouper Wreck MPA, NMFS estimated that 0.0061 snapper-grouper for grid 3376 per thousand hooks and 0.0586 per thousand hooks for grid 3377 would be caught.

A total of 1,816 sharks, or 2.6 percent of the total number of sharks observed, were observed caught on sets that intersected the MPAs originally considered by the SAFMC (Table 4.4). Based on expanded catch estimates, a total of 25,395 sharks were estimated to be caught in the MPAs each year (Table 4.5). If the MPAs were closed to BLL gear, this could have a positive impact on shark populations by reducing overall mortality and landings of sharks in the South Atlantic. The total number of sharks caught annually in the MPAs is likely an overestimate because most of the catch recorded on the sets did not occur entirely within the MPA as described above. Thus, the actual number of sharks caught in the MPAs may be lower.

For the eight preferred MPAs (Figure 4.4), only 21 fish (4.8 percent of total) were reported as bycatch, and of those, only 13 individuals were comprised of grouper species (Table 4.6). No snowy grouper were observed caught in the preferred MPAs. For sharks, 818 sharks were observed caught in the preferred eight MPAs (1.6 percent of total) with the majority of the catch comprised of sandbar shark (Table 4.7).

Table 4.5 Expanded take estimates for sharks by number per year for proposed MPAs. Source Siegfried *et al.*, 2006b.

Grid	MPA Included	Percent of Grid Area for Each MPA	Estimated Number of Sharks Caught Per Year
2480	East Hump / Unnamed Hump	1.45	840
2779	St Lucie Hump	0.22	93
2979	North Florida	6.65	583
	North Florida	5.29	463
2980	North Florida	0.00	0
	North Florida	5.68	7144
	North Florida	1.39	1751
	North Florida	7.04	8856
3080	North Florida	2.78	817
	North Florida	1.38	406
	North Florida	3.34	980
	North Florida	1.39	407
3179	Georgia	2.50	298
	Georgia	2.78	331
3277	Northern South Carolina	0.05	1
3278	Edisto	0.92	456
	Edisto	1.37	683
	Northern South Carolina	1.66	825
3279	Edisto	0.92	284
	Edisto	0.24	73
3376	Snowy	3.92	24
	Snowy	4.17	26
3476	Charleston artificial reef	0.18	54
	Total		**25,395**

Table 4.6 **Bycatch species (number and percentage of total) observed caught on shark BLL sets in the preferred MPAs in comparison to observed bycatch in the rest of the Atlantic. Groupers are highlighted and total provided separately. Source: Shark BLL Observer Program, NMFS.**

Common Name	Number Caught in Preferred MPAs	Number Caught in Atlantic	Percent of Total
brittle star	1	13	7.7%
cobia	1	121	0.8%
conger eel	1	8	12.5%
gag grouper	8	74	10.8%
mahi	1	8	12.5%
red grouper	3	186	1.6%
reticulate moray	1	1	100.0%
skate	1	55	1.8%
stingray	1	168	0.6%
wahoo	1	6	16.7%
warsaw grouper	1	8	0.0%
yellowfin grouper	1	4	25.0%
Grand Total	**21**	**652**	**4.8%**
Total Groupers	**13**	**272**	**4.8%**

Table 4.7 Shark species (number and percentage of total) caught on observed shark BLL sets in the preferred MPAs. Source: Shark BLL Observer Program, NMFS.

Species	Number Caught in Preferred MPAs	Number Caught in Atlantic	Percent of Total
Atlantic sharpnose	17	14,836	0.1%
bigeye thresher	12	21	57.1%
blacktip	43	2,716	1.6%
bull	3	194	1.5%
Carcharhinus spp	1	13	7.7%
dusky	27	1,736	1.6%
great hammerhead	2	251	0.8%
lemon	2	98	2.0%
night	2	145	1.4%
nurse	1	945	0.1%
sand tiger	1	410	0.2%
sandbar	530	19,849	2.7%
scalloped hammerhead	27	61	44.3%
shortfin mako	4	105	3.8%
silky	14	544	2.6%
smooth dogfish	1	538	0.2%
spinner	2	220	0.9%
tiger	128	6,929	1.8%
unidentified	1	11	9.1%
Grand Total	**818**	**49,622**	**1.6%**

The SAFMC has expressed concern about habitat impacts of shark BLL gear in the MPAs. In the Consolidated HMS FMP, NMFS completed a review of all HMS gears (and other state and Federally managed gears) that may have an impact on HMS EFH. In addition, NMFS considered the impact of HMS gears on EFH for other Federally managed species. NMFS concluded that BLL gear was the only gear that has the potential to impact EFH, specifically benthic habitat types. However, the degree to which the gear would impact EFH also depends on the substrate that makes up the EFH. Certain substrates, such as complex coral reef habitat, would be more susceptible to damage than would mud and sand substrates because of the extended time for habitat recovery. The impact of shark BLL gear on benthic habitat has not been rigorously studied and conclusions are mixed. For example, the 1999 NMFS EFH Workshop categorized the impact of BLL gear on mud, sand, and hard-bottom as low (Barnette 2001). BLL gear may have some negative impact if gear is set in more complex habitats, such as sponges or coral reefs, however only small portions of some of the MPAs are characterized as being comprised of hard bottom and none of the areas are considered to have sponge or coral habitat. BLL gear in the shark fishery is primarily used in sandy and/or mud habitats where NMFS expects it to have minimal impacts.

On November 7, 2006, NMFS published a Notice of Intent (71 FR 65088) to prepare an Environmental Impact Statement to examine management alternatives for revising existing HMS EFH, consider additional Habitat Areas of Particular Concern (HAPCs), and to identify ways to avoid or minimize, to the extent practicable, adverse fishing impacts on EFH consistent with the

Magnuson-Stevens Reauthorization Act and other relevant Federal laws. In the amendment, NMFS would consider the impact of BLL gear on EFH. Depending on the outcome of the analysis, NMFS may consider alternatives to minimize fishing impacts of BLL gear if it is found to have more than a minimal and not temporary impact on EFH. Factors that NMFS would consider include the overlap of BLL gear with EFH, the duration and extent of the impact, and the susceptibility of the habitat to damage from BLL gear consistent with previous guidance issued by NMFS.

The SAFMC has also expressed concerns about the enforceability of prohibiting only snapper-grouper BLL gear and not shark BLL gear in the MPAs. Since the gears are virtually indistinguishable, and many fishermen hold both types of permits, prohibiting only one type of gear could create an enforcement loophole. Thus, based on enforcement concerns, NMFS would close the preferred MPAs to shark BLL gear under alternative suite 2.

4.2.4 Reporting

This alternative suite would increase shark dealer reporting frequency, resulting in positive ecological impacts. Shark dealer reports are the basis for monitoring commercial shark quotas. Increasing the reporting frequency for shark dealers from bimonthly, to reports *received* within 24 hours of when shark products were purchased would provide the Agency with more "real-time" data on the quantity of sharks being landed relative to their respective quotas. Quotas for sandbar sharks would be much lower than in the past, therefore, increased reporting frequency would enhance the Agency's ability to provide landings updates and possibly close fisheries, if necessary, to prevent overharvests. Effectiveness of increased reporting requirements for shark dealers would be contingent upon shark dealers understanding their responsibilities and submitting data in a timely manner. Reporting requirements for shark dealers would be closely linked with fishing seasons. Shark fisheries for sandbar and non-sandbar LCS would *both* be closed once the fishery lands 80 percent of *either* quota; therefore, getting this information as soon as possible would reduce the likelihood of allowing fishing to take place after a quota has been met. Other reporting requirements, including the need to take an observer if selected and submission of vessel logbooks, would remain the same.

This alternative suite would also modify how unclassified sharks are accounted for by the Agency regarding quota monitoring. Currently, all sharks that are listed on shark dealer reports as unclassified are counted against the LCS quota. Alternative suites 2 and 3 would modify this procedure to ensure that shark dealers do not intentionally mis-report and take the time to properly identify what species of sharks they are purchasing from fishermen. These suites would change the regulations to count all unclassified sharks against the sandbar shark quota. This is the smallest commercial quota for any species complex and these sharks are also the most valuable because of their fins. By counting all unclassified sharks as sandbar sharks, positive ecological impacts are expected. This change may reduce the likelihood of exceeding the sandbar and/or non-sandbar LCS quota and might encourage shark fishermen to properly identify what they are landing without providing the incentive to mis-report in order to keep the sandbar fishery open longer. Mandatory shark identification workshops for shark dealers coupled with the requirements to leave all fins on all sharks is expected to improve species specific reporting for sharks which may improve quota monitoring, stock assessments, and the utility of data attained from shark dealers and vessel owners.

4.2.5 Seasons

This alternative suite would open all shark fisheries when this amendment becomes effective in 2008. On January 1, 2008, until the effective date of this amendment all of the Atlantic shark fisheries would be closed. Atlantic shark fisheries would open on January 1 in 2009 and thereafter, depending upon available quota. Seasons would be closed within five days notice (*i.e.*, within five days of filing with the Federal Register) of any quota being 80 percent filled in effort to prevent overfishing. Seasons for non-sandbar LCS and sandbar sharks would both close when either quota reaches 80 percent of their respective quota because of concerns regarding sandbar shark bycatch that might occur if the non-sandbar LCS fishery were kept open after the sandbar quota had been filled. The Agency wants to prevent individuals from mis-labeling sandbar sharks as non-sandbar LCS in order to keep the sandbar shark fishery open longer. Furthermore, all shark dealer reports listing unclassified sharks would be counted as sandbar sharks to encourage shark dealers to properly identify what sharks they are purchasing. Seasons for SCS and pelagic sharks would be closed individually upon achieving 80 percent of their respective quotas. Upon achieving 80 percent of landings, fishermen would be given 5 days notice from the date of filing with the Office of the Federal Register prior to the closure. Official notice would be made via the Federal Register, however, the public would also be informed simultaneously via the HMS website and email notice listserve when the notice filed in the Federal Register. Fishing effort might increase as a result of providing this five-day advance notice as fishermen and shark dealers would know that the season is ending; however, they would still be bound by the retention limits for individual trips as described in Section 4.2.1.

Commercial shark fisheries have been managed on a trimester basis since 2003 because they provide a higher degree of resolution on which to manage seasonal fisheries. Furthermore, trimesters may reduce fishing mortality during peak pupping seasons and may be used to address other bycatch concerns. As described above, this alternative suite would implement reduced quotas and retention limits for sandbar sharks, which is one of the most valuable sharks in commercial fisheries because of its fin value. NMFS estimates that the reductions in fishing effort as a result of these reduced retention limits and quotas could provide ecological benefits to all shark species. Ecological benefits of minimizing fishing mortality during peak pupping seasons or having a higher degree of resolution on which to manage fisheries seasonally could be replaced by the fact that this alternative suite would implement a reduction in the quota for sandbar sharks and reduced retention limits for both sandbar sharks and non-sandbar LCS. The ecological benefits of the timing of when fishing mortality occurs would be neutral or slightly negative whereas the reduction in overall fishing mortality and effort for sharks is expected to have positive ecological impacts.

4.2.6 Regions

This alternative suite would implement one region for commercial Atlantic shark fisheries. The ecological impacts are expected to be neutral. The regions were implemented in 2004 to address regional differences in fisheries, seasonal variation in shark pupping, and to provide fishing opportunities for regions that do not have sharks present throughout the year. Given the reduction in quotas and retention limits under this alternative suite, spreading the available quota amongst regions could result in shorter seasons and derby-style fishing; derby-style fishing could reduce the ability of fishermen to release bycatch alive, resulting in more dead

discards. In addition, having one region and season simplifies quota monitoring and would relieve confusion, especially around bordering regions, between fishermen and shark dealers in different regions regarding when shark dealers can accept shark products. Under the status quo, shark dealers cannot accept shark products after a region has closed for a given season, even if the sharks were caught in another region that was open at the same time. Under alternative suite 2, the shark fishing season would close everywhere at the same time, simplifying this entire process. Therefore, managing the fishery based on one region given the reduced quotas is not expected to result in negative ecological impacts for Atlantic sharks, protected resources, or other bycatch.

4.2.7 Recreational Measures

This suite would restrict the species of Atlantic sharks that could be possessed by anglers in possession of a HMS Charter/Headboat permit, HMS Angling permit, or Atlantic Tuna General Category permit (if participating in a registered HMS tournament). NMFS is attempting to restrict landings of sharks to those species that are relatively simple to identify. Restricting the shark species that could be retained by recreational anglers could result in positive ecological impacts. Tables 3.22 to 3.26 describe recreational landings of sharks by species from 1999 to 2006. SCS comprise the majority of recreationally landed sharks (by number), followed by LCS, and pelagic sharks. The only shark species that these permit holders would be authorized to possess under this alternative suite include: bonnethead, nurse, tiger, great hammerhead, smooth hammerhead, scalloped hammerhead, lemon, Atlantic sharpnose, shortfin mako, common thresher, oceanic whitetip, and blue sharks (Table 4.8). These sharks are easier to identify than other shark species and are less likely to be confused with dusky or sandbar sharks.

Table 4.8 List of recreational sharks that could be harvested under alternatives suites 2 & 3.

Species Currently Authorized (Alternative Suite 1) for Harvest in Recreational Fisheries ***Italicized species would no longer be authorized for retention(Alternative Suites 2 & 3)***	**Species Authorized for Harvest in Recreational Fisheries as Stated in Alternative Suites 2 & 3**
LCS: *sandbar*, *blacktip, bull*, smooth hammerhead, scalloped hammerhead, great hammerhead, *silky*, *spinner*, nurse, lemon, and tiger **SCS**: *finetooth*, Atlantic sharpnose, *blacknose*, and bonnethead **Pelagics**: common thresher, shortfin mako, blue, oceanic whitetip, and *porbeagle*	**No retention of sandbar sharks** **Non-sandbar LCS**: smooth hammerhead, scalloped hammerhead, great hammerhead, nurse, lemon, and tiger **SCS**: Atlantic sharpnose, and bonnethead **Pelagics**: common thresher, shortfin mako, blue, and oceanic whitetip

Species that were previously authorized, but would no longer be allowed to be possessed in recreational fisheries include: sandbar, bull, blacktip, spinner, silky, porbeagle, blacknose, and finetooth sharks. Average landings (in numbers) of sandbar, bull, blacktip, spinner, silky, porbeagle, blacknose, and finetooth sharks from 2002 to 2006 were 4,235; 3,164; 37,517; 3,345; 1,943; 0; 10,065; and 1,637, respectively (see Tables 3.23-3.25 in Chapter 3). Ecological benefits of no longer allowing these species to be landed are variable depending upon the species. The Agency is most concerned about recreational anglers landing sandbar and dusky sharks. This action would reduce the likelihood that these sharks could be mistakenly identified

and then landed. Between 2002 to 2006, there was an average of 4,235 sandbar sharks per year landed in recreational fisheries per year. Considering the stock status of sandbar sharks, ecological impacts would likely be positive as it would reduce the number of sandbar sharks landed and/or confused with species that look similar. Ecological impacts of prohibiting sandbar sharks would likely be positive for dusky sharks as well because they are frequently mistaken for sandbar sharks. Silky sharks are easily confused with dusky and sandbar sharks; therefore, prohibiting the retention of silky sharks could result in fewer dusky and sandbar sharks landed. In addition, NMFS is prohibiting the recreational landing of blacknose sharks depending on the results of the latest SCS assessment. Preliminary results from the SCS Assessment Workshop indicate that this species may be overfished with overfishing occurring. Despite the fact that these recreational measures could result in positive ecological impacts, there would likely continue to be landings of sandbar sharks illegally, and/or some level of post-release mortality for fish that are caught and released. Outreach efforts to provide recreational anglers with updated regulations and tips for proper identification of shark species that are authorized to be possessed may improve compliance with these measures.

4.2.8 Ecological Impacts of Alternative Suite 2 on Protected Resources and EFH

This alternative suite would have positive impacts on protected resources, including sea turtles, marine mammals, and smalltooth sawfish as NMFS expects that this alternative suite would reduce fishing effort with gillnet and BLL gear significantly. The protected resources section of alternative suite 1 and Section 3.4 discuss current interactions with protected resources in the shark BLL and gillnet fisheries. The quotas and retention limits for sandbar and non-sandbar LCS sharks would likely reduce overall fishing effort and the number and duration of trips sandbar sharks and non-sandbar LCS with BLL and/or gillnet gear. Furthermore, soak time might also be reduced as directed permit holders would know that they would only be allowed to possess 8 sandbar sharks per vessel per trip. Fishing effort would decrease the most in the BLL fishery as this gear is most effective for targeting sandbar and most non-sandbar LCS species. Fishing effort in the gillnet fishery would likely decrease less as this fishery mainly targets SCS and blacktip sharks. There is the possibility that some of the current fishing effort in the BLL fishery would transfer to the gillnet fishery to target species that have more liberal retention limits (*i.e.*, SCS and blacktip sharks). Furthermore, this alternative suite would limit the participants in the shark fishery to only those who possess a directed shark permit. This would reduce the number of trips setting gillnet or longline gear for sharks, and in turn, reduce the likelihood of an interaction with any protected resources. It is difficult to predict how overall fishing effort in longline and gillnet fisheries would change as a result of this alternative suite.

Ecological impacts to EFH would likely be positive as a result of this alternative suite compared to the status quo given the reduction in BLL effort as a result of reduced shark quotas. BLL gear is generally regarded as the HMS gear type most likely to potentially impact EFH of HMS and/or non-HMS. BLL gear may have some negative impact if gear is set in more complex habitats, such as hard bottom or coral reefs in the Caribbean or areas with gorgonians, or soft corals and sponges in the Gulf of Mexico (Barnette, 2001, NREFHSC, 2002; Morgan and Chuenpagdee, 2003). BLL gear set with cable groundline or heavy monofilament with weights could damage hard or soft corals and potentially become entangled in coral reefs upon retrieval, resulting in coral breakage due to line entanglement. However, the extent to which BLL gear is fished in areas with coral reef habitat targeting sharks has not been determined.

This alternative suite would reduce the number of sets with BLL gear targeting sandbar sharks and non-sandbar LCS because retention limits for sandbar sharks and non-sandbar LCS would be much less than current retention limits. Furthermore, fishermen might also minimize their soak time or shorten the length of longline they deploy, knowing they could only possess eight sandbar sharks and 21 non-sandbar LCS/trip.

Social and Economic Impacts

4.2.9 Species Complexes

Sandbar sharks

Placing sandbar sharks in their own management category should have neutral economic and social impacts for fishermen. Establishing a separate category for sandbar sharks from the LCS complex is mainly administrative in nature and would affect how the Agency monitors the sandbar shark quota. The establishment of a separate sandbar category would not impact fishermen, as they already record shark interactions to the species level in their logbooks. However, the economic and social impacts of reducing the sandbar quota and retention limits would have significant economic impacts and are discussed in the next section.

Non-sandbar LCS

Establishing a non-sandbar LCS complex should also have neutral economic and social impacts on shark fishermen. The non-sandbar LCS complex is similar to how the LCS complex has been managed in the past. The new complex would be established to help avoid confusion with the past LCS complex. In addition, while the Agency has managed sharks on a complex basis, fishermen have recorded shark interactions on a species basis in the logbooks, so there should be no negative impacts to fishermen by the restructuring of the LCS complex. However, the non-sandbar LCS quota reduction could have negative economic and social impacts. These impacts are discussed in the next section in combination with retention limits.

Porbeagle Sharks

Placing porbeagle sharks on the prohibited list for commercial and recreational fishing would result in no commercial or recreational landings of this species. This would have neutral economic and social impacts. This species is not targeted by U.S. fishermen, and is predominately caught, and discarded alive, in the U.S. swordfish and tuna PLL fishery. In addition, most recreational fishermen target mako, blue, and threshers sharks from the pelagic management unit (Table 3.24), therefore catch and release of porbeagle sharks is not expected to have much, if any, negative economic and social impacts on recreational fishermen. Porbeagle sharks are usually caught in the Northeast Distant area by commercial fishermen and a few recreational catches have been reported from Maine through Virginia (Table 3.26); therefore, fishermen in the North Atlantic would not be affected the most by placing porbeagle sharks on the prohibited species list. A more detailed analysis of the economic impacts of establishing a 0 mt dw commercial porbeagle shark quota is discussed in the next section under quota and retention limits.

4.2.10 Quotas and Retention Limits

Alternative suite 2 would only allow sharks to be retained by shark directed permit holders. As of 2007, there were 231 shark directed, 296 shark incidental, and 269 shark dealers permit holders. 143 vessels with directed shark permits and 155 vessels with shark incidental permits reported landings in the Coastal Fisheries Logbook from 2003 to 2005 and could be considered active. In addition, shark dealers could also be negatively impacted due to the reduction in the sandbar and other LCS quotas and retention limits, which would reduce the overall amount of sharks being landed.

Alternative suite 2 would also maintain the 60 mt ww (43.2 mt dw) shark display and research quota. However, 2 mt dw would be allocated specifically for sandbar sharks, the remaining 41.2 mt dw would be allocated for all species besides sandbars, and dusky sharks would not be allowed to be collected for display. This is expected to have minimal impacts on collectors of sharks for public display and shark researchers. On average, 2 mt dw of sandbar sharks per year have been collected under the exempted research program from 2000 to 2006. Therefore, there would not be an appreciable decrease in sandbar allocation compared to what was collected in past years. Thus, minimal negative economic impacts are anticipated. Ninety-four dusky sharks have been collected under the exempted fishing program from 2000 to 2006 (or 13 dusky sharks per year). Due to the prohibition of dusky shark collection under alternative suite 2 for public display, this could have a negative economic impact on a few collectors, although the majority of dusky shark collections have been for shark research under EFPs. Collectors and researchers would still have the majority of the shark display and research quota (41.2 mt dw or 57.2 mt ww) available for all non-sandbar LCS beside dusky sharks.

Fishery level impacts

Of all Atlantic HMS, sharks bring in the lowest total gross revenues (in total ~$6.0 million in 2005; Table 3.43 [these revenues include SCS, pelagic sharks, LCS, prohibited species, and unclassified sharks]). On average, total annual sandbar landings of 1,310,449 lb dw and total annual non-sandbar LCS landings of 1,585,671 lb dw were reported from 2003 to 2005 in Federal and state shark dealer reports. In 2006 ex-vessel prices, this is equivalent to $4,903,001 (Table 4.9). Under this alternative suite, the commercial base quotas would be reduced to 116.6 mt dw and 541.2 mt dw for non-sandbar LCS; however, to balance discards of sandbar sharks in the South Atlantic with uncaught sandbar quota in the Gulf of Mexico, the non-sandbar LCS retention limit was lowered such that only 86.1 mt dw of sandbar sharks and 253.6 of non-sandbar LCS could be landed under alternative 2 (see discussion in Appendix A under "*Non-sandbar quota and retention limits"* and Table 4.2). In 2006 prices, assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight, this is equivalent to $1,333,417 (Table 4.10). This is an overall 73-percent reduction compared to the current gross revenues under alternative suite 1 (Table 4.10).

On average, 1.7 mt dw (3,867 lb dw) of porbeagle sharks were commercially landed between 2003 and 2006. Based on 2006 ex-vessel prices, this is equivalent to $7,378 fishery-wide (assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight) (Table 4.9). However, since porbeagle sharks would be placed on the prohibited list

under alternative suite 2, there would an estimated reduction in gross revenues of $7,378 to the fishery by prohibiting porbeagle shark landings.

Table 4.9 Gross revenues under alternative suite 1, status quo. Fin weight was estimated to be 5 percent of total landings. Carcass weight was estimated to be 95 percent of total landings.

Alternative Suite 1	Landings (lb dw)	2006 Ex-Vessel Price (per lb dw)	Gross Revenues	Total Gross Revenues
Fishery-Wide (directed and incidental permit holders)				
Avg. sandbar shark landings	1,310,449			
Avg. non-sandbar LCS landings	1,585,671			
Sandbar shark fins	65,522	$18.43	$1,208,123	
Sandbar shark carcass	1,244,926	$0.56	$697,159	
				$1,905,282
Non-sandbar LCS fins	79,284	$18.43	$1,461,204	
Non-sandbar LCS carcass	1,506,387	$1.02	$1,536,515	
				$2,997,719
Total shark fishery				**$4,903,001**
Avg. porbeagle shark landings	3,867			
Porbeagle shark fins	193	$18.43	$3,557	
Porbeagle shark carcass	3,674	$1.04	$3,821	
				$7,378
Directed Permit Holders				
Avg. sandbar shark landings	1,286,447			
Avg. non-sandbar LCS landings	1,498,111			
Sandbar shark fins	64,322	$18.43	$1,185,454	
Sandbar shark carcass	1,222,125	$0.56	$684,390	
				$1,869,844
Non-sandbar LCS fins	74,906	$18.43	$1,380,518	
Non-sandbar LCS carcass	1,423,205	$1.02	$1,451,669	
				$2,832,187
Total revenues from sharks based on directed permit holders' landings				**$4,702,031**
Incidental Permit Holders				
Avg. sandbar shark landings	12,994			
Avg. non-sandbar LCS landings	46,333			
Sandbar shark fins	650	$18.43	$11,980	
Sandbar shark carcass	12,344	$0.56	$6,913	
				$18,893
Non-sandbar LCS fins	2,317	$18.43	$42,702	
Non-sandbar LCS carcass	44,016	$1.02	$44,896	
				$87,598
Total revenues from sharks based on incidental permit holders' landings				**$106,491**

Adjusted Quota Process

In alternative suite 2, overharvests of quota for each category would be removed from the next season's quota. While this process is currently done under the status quo, since the base quotas under alternative suite 2 would be reduced compared to the status quo, removal of overharvests could result in even smaller quotas and negative socioeconomic impacts. Underharvests for species that are not overfished or are not experiencing overfishing would be capped at 50 percent carryover of the base quota applied to the next season's quota. If the underharvest exceeds 50 percent of the baseline quota, then only 50 percent of the baseline quota could be carried over to the same season of the subsequent year. Currently, all of the underharvest for a given complex has been applied to the next year, same trimester's base quota. This has been most significant for SCS, which, on average from 2004 through the first season of 2006, had only had 55 percent of the SCS quota filled. Since nearly full harvests or overharvests have typically occurred for the LCS complex, application of underharvest to LCS base quota to future seasons has not been an issue. The economic impact of reducing the amount of underharvest that could be carried over would depend on the amount of the underharvest, but would most likely have the largest economic effects for SCS. In addition, since there would be one regions or seasons under alternative suite 2, the amount of SCS underharvests expected from a full year of fishing in all regions is unknown at this time.

However, unlike the status quo, underharvests for species that are unknown, overfished, or experiencing overfishing would not be carried over to the same season of the following year. This could have a negative economic impact depending on the quota. For instance, the overfished/overfishing status of sandbar sharks and the unknown status of the LCS complex would preclude any underharvest of the sandbar or non-sandbar LCS quota from being applied to the following season's base quota. However, given the reduced sandbar quota and since the non-sandbar LCS quota is based on current catches of LCS species (except sandbar sharks), underharvests of sandbar sharks or non-sandbar LCS are not anticipated. Therefore, this may not result in negative socioeconomic impacts. In addition, underharvest carry-overs are currently not applied for pelagic sharks. Since the status of all pelagic sharks are either unknown or overfished, this would not change compared to the status quo.

Fins Attached

Finally, alternative suite 2 would require that all shark fins (dorsal, second dorsal, pectoral, pelvic, anal, and caudal fins) remain attached to the shark through offloading. In the short-term, this alternative could change the foundation of the U.S. Atlantic shark fin market. At this time and since the fishery began in the 1980s, most shark fins sold in the United States are landed separately from the shark. In 1993, shark fins were required to be removed from the vessel at the first port of landing. This prevented fishermen from drying shark fins onboard their vessel over time in order to increase the value of the fin. Under alternative suite 2, shark fishermen would not be allowed to remove the fins from the shark until sharks are landed. Costa Rica has implemented a similar regulation that allows fishermen to cut the fins mostly off the shark, as long as a small piece of skin keeps the fins naturally attached to the shark until landing. According to a discussion on the Elasmo-L listserve, this practice has allowed fishermen to receive the expected revenues from both fins and meat because the fins could be fully removed from the shark at the dock without thawing the shark. However, the removal of fins at the time

of offloading could still increase offloading time. The vessel owner/operator would need to decide whether the benefit of selling the fins separately from the shark outweighs the cost of having the crew remove the fins during offloading. While the fins would likely still be of high quality once dried, it is possible that the ex-vessel price of fins packed in ice with the rest of the shark would not be as high as fins that had begun drying. Additionally, if the shark cannot be packed in ice properly due to maintaining the fins on the shark, the quality of the meat, and therefore its value, could also decrease. The social impact of requiring sharks to be landed with their fins on may be realized as the market adjusts itself to processing wet fins. However, the overall socioeconomic impact of this measure could be significant given the reductions in the overall sandbar quota, which is the most lucrative shark due to the value of its fins.

Directed permit holder impacts

On average, directed permit holders landed 1,286,447 lb dw of sandbar sharks and 1,498,111 of non-sandbar LCS from 2003 to 2005 based on Federal and state shark dealer reports (landings by permit type were based on percentage of total landings by permit type in the Coastal Fisheries and HMS logbooks). In 2006 ex-vessel prices, this is equivalent to gross revenues of $4,702,031 (assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight) (Table 4.9). If gross revenues for directed permit holders are averaged across the approximately 143 active directed shark permit holders, then the average annual gross revenues per shark fishing vessel is just under $33,000 from shark revenues. Under alternative suite 2, average annual gross revenues for directed permit holders would be estimated to be $1,333,417 (Table 4.10). This is a 72-percent reduction in average annual gross revenues for directed permit holders compared to 2003 to 2005 (Table 4.10). These reduced gross revenues averaged across the 143 active directed permit holders are just over $9,000 per directed shark fishing vessel. Since the states of Florida, New Jersey, and North Carolina have the most directed shark permits (Table 3.32), these states would be most negatively impacted by alternative suite 2.

Table 4.10 Gross revenues under alternative suite 2. Fin weight was estimated to be 5 percent of total quota. Carcass weight was estimated to be 95 percent of total quota.

Alternative Suite 2	Quota (mt dw)	Quota (lb dw)	2006 Ex-Vessel Price (per lb dw)	Gross Revenues	Total Gross Revenue	% Reduction from Status Quo
Fishery-Wide & Directed Permit Holder Impacts						
Sandbar shark	86.1	189,816				
Non-sandbar LCS	253.6	559,087				
Sandbar shark fins		9,480	$18.43	$174,716		
Sandbar shark carcass		180,336	$0.56	$100,988		
					$275,704	

Alternative Suite 2	Quota (mt dw)	Quota (lb dw)	2006 Ex-Vessel Price (per lb dw)	Gross Revenues	Total Gross Revenue	% Reduction from Status Quo
Non-sandbar LCS fins		27,998	$18.43	$516,003		
Non-sandbar LCS carcass		531,088	$1.02	$541,710		
					$1,057,713	
Total revenues from sandbar and non-sandbar LCS landings					**$1,333,417**	**↓72%**
Status quo revenues based on directed permit holders' landings of sandbar and non-sandbar LCS					**$4,702,031**	

In addition, retention of sandbar sharks on PLL gear would be prohibited under alternative suite 2. On average, 80,825 lb dw of sandbar sharks were reported landed on PLL gear by directed shark permit holders from 2003 to 2005 (HMS logbook data). In 2006 ex-vessel prices, this is equivalent to $117,510 in gross revenues. Given an average of 16.7 vessels landed sandbar sharks with PLL gear from 2003 to 2005, prohibition of sandbar sharks on PLL gear could result in a loss of gross revenues of $7,037 per vessel ($117,510 / 16.7 vessels = $7,037 per vessel).

Gross revenues under the status quo were based on a 4,000 lb dw LCS trip limit for directed shark permit holders. These revenues were estimated from landings using all gear types, averaged across all regions. Given this, the average number of sandbars and non-sandbar LCS landed per trip was 35 sandbars and 32 non-sandbar LCS averaged as reported in the Coastal Fisheries and HMS Logbooks. Based on 2006 ex-vessel prices, this is equivalent to $4,101 per trip (Table 4.11). However, regional gross revenues may vary based on gear type and catch composition. For instance, regional trip revenue estimates were made based on species catch composition from the BLL observer program data (Hale and Carlson, 2007). These estimates were made because BLL trips targeting sharks can have very different species catch compositions than gillnet or rod and reel trips, and the species catch composition may also vary from region to region. Therefore, gross revenues and economic impact to fishermen may vary, depending on the gear type employed and area fished. Observer data indicate that between 2005 and 2006, 69 sandbar sharks and 35 non-sandbar LCS were caught per trip in the South Atlantic region, and 30 sandbar sharks and 83 non-sandbar LCS were caught per trip in the Gulf of Mexico region (Hale and Carlson, 2007). Therefore, based on these numbers and 2006 ex-vessel prices, South Atlantic trips averaged $4,743 per trip and Gulf of Mexico trips averaged $5,853

per trip (Table 4.11) (whereas the overall averaged gross revenues for directed shark permit holders was estimated as $4,101 per trip; Table 4.11).

Table 4.11 Gross revenues on a trip basis in the South Atlantic (SA) and Gulf of Mexico (GOM) under alternative suite 1, status quo.

Alternative Suite 1	Average Number of Sharks	Average Number of Trips	Landings (lb dw)*	Fin Weight (5% of landings per trip)	Fin 2006 Ex-Vessel Price (lb dw)	Fin Revenues Per Trip	Carcass Weight (95% of landings per trip)	Carcass 2006 Ex-Vessel Price (lb dw)	Carcass Revenues Per Trip	Total Gross Revenues Per Trip
Trips by Directed Permit Holders										
Avg. sandbar sharks per trip	35	1,108	1,416	71	$18.43	$1,308	1,347	$0.56	$754	$2,062
Avg. non-sandbar LCS per trip	32	1,108	1,078	54	$18.43	$995	1,024	$1.02	$1,044	$2,039
Trip total revenues from sharks										**$4,101**
Trips by Incidental Permit Holders										
Avg. sandbar sharks per trip	2	305	81	4	$18.43	$74	77	$0.56	$43	$117
Avg. non-sandbar LCS per trip	3	347	101	5	$18.43	$92	96	$1.02	$98	$190
Trip total revenues from sharks										**$307**
Regionally based BLL trips (Directed Permit Holders)										
Avg. sandbar sharks per trip in SA	69		2,795	140	$16.20	$2,264	2,655	$0.38	$1,009	$3,272
Avg. sandbar sharks per trip in GOM	30		1,215	61	$20.65	$1,255	1,154	$0.40	$462	$1,716
Avg. non-sandbar LCS per trip in SA	35		1,180	59	$16.20	$955	1,121	$0.46	$515	$1,471
Avg. non-sandbar LCS per trip in GOM	83		2,797	140	$20.65	$2,888	2,657	$0.47	$1,249	$4,137
Total SA trip revenues from sharks										**$4,743**

Alternative Suite 1	Average Number of Sharks	Average Number of Trips	Landings (lb dw)*	Fin Weight (5% of landings per trip)	Fin 2006 Ex-Vessel Price (lb dw)	Fin Revenues Per Trip	Carcass Weight (95% of landings per trip)	Carcass 2006 Ex-Vessel Price (lb dw)	Carcass Revenues Per Trip	Total Gross Revenues Per Trip
Total GOM trip revenues from sharks										**$5,853**

*Average sandbar shark weight = 40.5 lb dw and average non-sandbar LCS weight = 33.7 lb dw (Cortés and Neer, 2005).

Under alternative suite 2, the retention limits are 8 sandbars per trip and 21 non-sandbar LCS per trip. Non-sandbar LCS retention limits are based on the average ratio of sandbars to non-sandbar LCS caught in the South Atlantic and Gulf of Mexico regions to limit sandbar shark discards by fishermen deploying non-selective gear (Hale and Carlson, 2007). In the Gulf of Mexico, the ratio of sandbars to other LCS caught is 1:4, which, based on an 8 sandbar per trip retention limit, would equal 32 non-sandbar LCS per trip. However, such a high non-sandbar LCS retention limit would result in a sandbar discards in the South Atlantic (~65.3 mt dw). Therefore, a 21 non-sandbar LCS per trip retention limit was set to balance discards versus catch in the two regions (see Table A.4). This results in approximately 5 sandbar sharks being caught in the Gulf of Mexico region when the non-sandbar LCS retention limit per trip is filled (and therefore, only 86.1 mt dw of sandbar sharks would be landed). Therefore, gross revenues on a trip basis are estimated to be $1,262 of gross revenue per trip in the South Atlantic and $1,333 of gross revenue per trip in the Gulf of Mexico (Table 4.12). Thus, alternative suite 2 could result in a 73-percent reduction in gross revenues for fishermen using BLL gear in the South Atlantic and a 77-percent reduction in gross revenues for fishermen using BLL gear in the Gulf of Mexico. Overall, from 2003 to 2005, there were 124 vessels that averaged more than 324 lb dw (or 8 sandbar sharks) of sandbar per trip (Figure A.3). NMFS estimates that these vessels would be most negatively affected by retention limits under alternative suite 2.

Table 4.12 Gross revenues on a trip basis in the South Atlantic (SA) and Gulf of Mexico (GOM) under alternative suite 2.

Alternative Suite 2	Number of Sharks	Landings (lb dw)*	Fin Weight (5% of landings per trip)	Fin 2006 ex-vessel price (lb dw)	Fin Revenues	Carcass Weight (95% of landings per trip)	Carcass 2006 Ex-Vessel Price (lb dw)	Carcass Revenues	Total Gross Revenues
Regionally based BLL trips									
Total sandbar sharks per trip in SA	8	324	16	$16.20	262	308	$0.38	$117	$379
Total sandbar sharks per trip in GOM	5	203	10	$20.65	209	192	$0.40	$77	$286
Total non-sandbar LCS per trip in SA	21	708	35	$16.20	573	672	$0.46	$309	$883
Total non-sandbar LCS per trip in GOM	21	708	35	$20.65	731	672	$0.47	$316	$1,047
SA trip total revenues from sharks									**$1,262**
GOM trip total revenues from sharks									**$1,333**

*Average sandbar shark weight = 40.5 lb dw and average non-sandbar LCS weight = 33.7 lb dw (Cortés and Neer, 2005).

Incidental permit holder impacts

On average, 66 incidental permit holders landed 12,994 lb dw per year of sandbar sharks and 46,333 lb dw per year of non-sandbar LCS from 2003 to 2005 based on Federal and state shark dealer reports and Coastal Fisheries and HMS logbook data. Using 2006 ex-vessel prices, this is equivalent to gross revenues of $106,491 (assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight) (Table 4.9). Gross revenues averaged across the 66 vessels with incidental permits landing sharks were $1,614 per vessel. Since incidental permit holders would not be able to land any sharks under alternative suite 2, the 66 active vessels would be most negatively affected by this alternative suite. The states of Florida, Louisiana, New Jersey, and North Carolina had the most incidental shark permit holders as of 2007 (144, 37, 20, and 16, respectively; Table 3.32); therefore, these states would be most negatively impacted by alternative suite 2.

4.2.11 Time/Area Closures

Under alternative suite 2, NMFS would maintain the mid-Atlantic shark closed area and the current BLL closures in the Caribbean that were implemented in February 2007 (72 FR 5633). Therefore, the economic impacts associated with the closures would be the same as described under alternative suite 1.

However, under alternative suite 2, NMFS would implement the eight MPAs preferred in the SAFMC's Amendment 14. Based on observer program data, the number of sets and targeted catch in the preferred MPAs is considered to be minimal. The preferred MPAs are generally small (< 10 miles wide) and vessels should be able to make minor adjustments to fishing locations to avoid the MPAs. Most of the observed shark BLL sets occurred shoreward of the MPAs. Affected vessels would forego some revenue from the reduced bycatch of grouper and other species caught on shark BLL sets in the proposed MPAs, however, these losses are expected to be minimal. Based on the expanded catch estimates (Siegfried *et al*., 2006b), the total shark catches for the proposed MPAs were 25,395 and this equates to approximately $1,512,227 in gross revenues on shark landings based on 2006 ex-vessel prices for shark (assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight) (Table 3.42 in Chapter 3). However, this may be an overestimate if all the catches did not occur in the MPAs. Since there are approximately 285 shark limited access permits in Florida, this would amount to a loss of revenue of approximately $3,722 per vessel per year in Florida.

4.2.12 Reporting

Reporting burden would be increased significantly for Atlantic shark dealers as a result of this alternative suite resulting in negative economic impacts. Currently, shark dealer reports must be submitted bimonthly, regardless of whether or not the shark dealer actually purchased any shark products. Reporting frequency would be increased to 24 hours of when shark products were purchased. Thus, shark dealer landings reports would need to be received within 24 hours of the product being purchased. While the increased reporting burden would not impact shark dealer expenditures per se, it would result in more time spent submitting shark dealer reports, which represents an opportunity cost for shark dealers since that would be time they could not

spend conducting other activities related to their business. Furthermore, in order to comply with the requirement that shark dealer reports must be *received* by the Agency within 24 hours, NMFS assumes that shark dealers would have to submit shark dealer reports electronically or via facsimile. Shark dealers that do not currently possess a computer or fax machine would have to purchase one of these items. The increased reporting burden implemented in this alternative suite would be subject to approval under the Paperwork Reduction Act. Reporting requirements for shark vessel permit holders, including the need to take an observer if selected and the need to submit vessel logbooks within seven days of completing a fishing trip would not be modified, resulting in neutral economic impacts.

Alternative suites 2 and 3 would modify the procedure for accounting for sharks that are reported by shark dealers as unclassified or unidentified. Currently, these sharks are counted against the LCS quota. This would be modified such that these sharks would be classified as sandbar sharks. As a result of the proposed measures, sandbar sharks would have the lowest commercial quota. However, sandbar sharks have the highest commercial value of any Atlantic shark because of their fin. This requirement would improve the accuracy of shark dealer reports and number of shark dealer reports that include species-specific information on all sharks that are purchased. These data form the basis of quota monitoring and stock assessments. Furthermore, if shark dealers are provided with an incentive to mis-identify the species of shark being purchased in order to keep the sandbar shark season open longer, this may result in overharvests. While the short-term impacts of this measure may be negative because it requires more of the shark dealer's time to properly identify sharks, long-term effects may be positive. Potential overharvests or inappropriately short seasons coupled with potentially inaccurate stock assessments results could occur as a result of mis-identified or unidentified landings included in shark dealer reports. This measure coupled with mandatory shark identification workshops for shark dealers and the proposed requirement for fishermen to leave all shark fins could improve the accuracy of shark dealer reports.

4.2.13 Seasons

Coupled with the measures included under regions (Section 4.2.5), this alternative suite would likely have negative economic impacts on vessels and shark dealers in the North Atlantic. Opening seasons on the effective date of this amendment in 2008 in all regions and then on January 1 in 2009 and thereafter, depending on available quota, would provide an advantage to vessels participating in shark fisheries in the South Atlantic and Gulf of Mexico regions as these regions have a wider variety of LCS and SCS sharks present year-round. Participants in the North Atlantic region could experience negative impacts relative to the status quo as they would likely not be able to fish for sharks starting January 1, unless they moved to fish in another region; historically, these participants have only had significant landings of LCS and pelagic sharks. Furthermore, closing both the sandbar and non-sandbar LCS fisheries, regardless of which quota is filled first, to minimize bycatch and dead discards of sandbar sharks could exacerbate the negative economic impacts in all regions. Landings in the North Atlantic regions have averaged 48.2 mt dw per year for LCS (including sandbar sharks) between 2003 and 2006. The majority of these LCS were landed between April and June in the North Atlantic region. Assuming that the entire quota is filled, and seasons for sandbar and non-sandbar LCS are closed before April, this could result in losses in gross revenues of approximately $108,387 for vessels in the North Atlantic, based on 2005 ex-vessel prices (LCS = $1.02 per lb dw in the North

Atlantic; $1.02 lb dw x 106,262 lb dw = $108,387; no price information is available for fins in the North Atlantic; Table 3.42). There are 107 directed and incidental shark permit holders in the states that comprise the North Atlantic region; therefore, losses are anticipated to be around $1,013 in gross revenues per vessel ($108,387 total gross revenues / 107 vessels = $1,013 per vessel). However, depending on their past involvement in the shark fishery, economic impacts to individual vessel owners would vary.

Vessels and shark dealers in the South Atlantic and Gulf of Mexico regions would experience a comparative advantage over vessels in the North Atlantic, however, reduced quotas and retention limits for sandbar sharks and non-sandbar LCS sharks would result in negative economic impacts for vessels and shark dealers in all locales. There is a possibility that the reduced retention limits for sandbar and non-sandbar LCS sharks, coupled with the increased reporting frequency for shark dealers may result in minor positive economic impacts by keeping shark fishing seasons for LCS and sandbar sharks open for an extended portion of the year. In 2006, shark seasons for LCS were open a total of 4, 19, and 18 weeks in the North Atlantic, South Atlantic, and Gulf of Mexico, respectively. The first trimester was excluded from the North Atlantic calculation as landings for LCS are almost zero during these months (January – April). In 2007, shark seasons for LCS were 3, 4, and 5 weeks for the North Atlantic, South Atlantic, and Gulf of Mexico, respectively. Extensive over harvests in 2006 were responsible for short seasons in 2007. This alternative suite may result in longer shark seasons, which could have some minor economic impacts as it may provide for a longer portion of the year when vessels could land and sell shark products.

As mentioned in Section 4.2.5, the Agency anticipates that providing five days notice once 80 percent of the quota has been harvested would reduce the likelihood of an overharvest and provide a buffer for landings that may occur outside of NMFS jurisdiction after a season has closed. Further, this would implement necessary accountability measures under the Magnuson-Stevens Act. However, the Agency sought specific comments on the potential economic impacts of choosing 80 percent as the threshold to close a specific shark fishery with five days notice.

4.2.14 Regions

As stated in Section 4.2.4, this alternative suite would likely have negative economic impacts on regions that do not have sharks present year round. The North Atlantic region would be disadvantaged as a result of reverting back to one region, versus three, because the quota would likely be harvested in southern regions before sharks are present in the North Atlantic. Vessels could either move to southern areas to participate in the shark fishery in areas where sharks are present year-round or redistribute fishing effort to other fisheries. Shark dealers in the North Atlantic region would also be affected, possibly even more so than vessel owners, as the likelihood of having a consistent and predictable source of shark products would be decreased.

4.2.15 Recreational Measures

Participants in recreational shark fisheries would experience negative economic impacts as a result of reducing the species of sharks that could be legally landed (Table 4.8). Charter/Headboat operators would be most affected as a result of these measures as they may see a reduction in the number of charters that customers are willing to hire. Since retention of

blacktip sharks would be prohibited in the recreational fishery, these impacts may be most pronounced in areas where blacktip sharks are frequently encountered, including the South Atlantic and Gulf of Mexico regions. Recreational landings data indicates that there are more landings of blacktip sharks than any other species that could no longer be possessed as a result of this alternative suite. NMFS presumes that blacktip sharks are kept more than any other LCS because of the higher quality of their flesh and the fact that they are more abundant than other LCS in coastal waters. Charter/Headboat operators specializing in sharks may see the number of charters decline because some fishermen insist on keeping a blacktip or sandbar sharks. Prohibiting the other species (finetooth, silky, bull, spinner, blacknose, and porbeagle) is not expected to have adverse impacts as these species are not as frequently encountered in recreational fisheries for sharks.

Tournaments offering prize categories for sharks may also experience negative economic impacts as a result of prohibiting six additional species of sharks for retention in recreational fisheries. The majority of tournaments specializing in sharks are in the North Atlantic region, specifically Rhode Island, New York, and Massachusetts. In 2007, there were 59 tournaments/year with prize categories for pelagic sharks (Table 3.38, Chapter 3). Species most commonly targeted in these tournaments including common thresher, oceanic whitetip, blue, shortfin mako, and porbeagle. Of these, only porbeagle would be prohibited from retention as stocks are overfished. Tournaments are generally won by shortfin mako or common thresher, therefore, significant economic impacts as a result of prohibiting porbeagle retention in shark fishing tournaments are not anticipated.

Conclusions

This alternative suite could have positive ecological impacts for most species of sharks, bycatch, and protected resources as a result of significantly reduced retention limits and quotas for sandbar sharks and reduced retention limits for non-sandbar LCS. Interactions with protected resources may decrease as a result of reduced BLL and gillnet fishing effort targeting sandbar sharks and non-sandbar LCS; however, NMFS assumes that some of this fishing effort would be displaced to other gillnet and BLL fisheries in which participants are permitted, which may interact with protected resources. In addition, alternative suite 2 would require that sharks be landed with their fins still attached; this requirement could prevent fishermen from keeping the fins from sharks that are not landed, resulting in a reduction of overall shark mortality. This, combined with a retention limit of only 8 sandbar sharks for directed permit holders, would likely considerably reduce directed fishing effort for sharks.

The shark fishery for incidental permit holders would be closed; therefore, sharks caught in pursuit of other species with BLL gear or gillnet gear by incidental permit holders would be discarded, possibly dead. This is particularly true for sandbar shark discards based on how retention limits for sandbar and non-sandbar LCS would be established (see Section 4.2.2). However, despite the possible increase in discards of sharks, the reduced fishing effort and landings could still result in positive ecological impacts for sandbar and dusky shark (see Section 4.2.2). In addition, this suite represents an increase in reporting burden for shark dealers (24 hours versus bimonthly reporting) that would result in negative economic impacts but positive ecological impacts as it would enable the Agency to better monitor shark quotas, reducing the likelihood of overharvest. Under alternative suite 2, NMFS would maintain the current time/area

closures and implement eight MPAs that are being preferred in the SAFMC's Amendment 14. NMFS proposed these MPAs due to enforceability issues where the gears for different fisheries (*i.e.*, shark BLL gear and snapper-grouper BLL gear) are virtually indistinguishable, and many fishermen hold both types of permits. Therefore, prohibiting only one type of gear could create an enforcement loophole.

Directed shark permit holders would have a slightly higher retention limit for sandbar and non-sandbar LCS compared to alternative suites 3 and 5; however, economic benefits derived from shark products would be limited to directed permit holders and would still represent an estimated 72-percent reduction in gross revenues compared to the status quo (Table 4.10). These losses in gross revenues may be exacerbated by the requirement to land shark with their fins attached. In addition, establishing one region and season represents an economic disadvantage to the North Atlantic region as sharks are not present in these waters year-round, meaning the quota may be caught in some years before sharks are present in these areas. The elimination of seasons and regions combined with limiting underharvest carry-overs may have negative economic impacts on fishermen, especially for regions that consistently had underharvests of species like SCS. Given the lowered retention limits for sandbar and non-sandbar LCS, NMFS anticipates that there may not be a directed shark fishery as a result of alternative suite 2. While an observer program would still operate under alternative suite 2, without a directed shark fishery, NMFS anticipates that the fishery dependent data collection would be limited, which could compromise data collection for future stock assessments. In comparison, alternative suite 4 would accomplish reduced quotas and retention limits to rebuild depleted shark stocks as well as the collection of fishery-dependent data for future stock assessments and biological samples for shark research. In addition, it would afford a small universe of shark fishermen to continue to fish and make gross revenues on shark landings as they have in the past. Therefore, alternative suite 2 is not preferred because concerns of data collection, economic impacts to shark fishermen, and because of additional reporting burden on shark dealers.

4.3 Alternative Suite 3: Shark Fishery for Directed, Incidental, HMS Angling, and HMS Charter/Headboat Permit Holders

Overall Summary

Under alternative suite 3, NMFS would remove the sandbar shark from the LCS complex and establish a separate sandbar shark quota and a non-sandbar LCS quota (LCS complex minus sandbar sharks). Base quotas would be as follows: Sandbar = 116.6 mt dw; non-sandbar LCS = 541.2 mt dw; SCS = 454 mt dw; Blue Sharks = 273 mt dw; Pelagic Sharks (Other than Blue Sharks) = 488 mt dw; Porbeagle Sharks = Prohibited (0 mt dw quota); and Display and Scientific Research = 60 mt ww (Sandbar = 2.8 mt ww (2 mt dw); and all other shark species (except dusky sharks) = 57.2 mt ww (41.2 mt dw). The adjusted quota process would deduct the entire overharvest from the next season's quota, to the extent that quota is available. Additional deductions, to the extent needed to account for the overharvest, would be deducted the following year. Underharvests for species that are healthy or rebuilt would be transferred to the next season's quota, up to 50 percent of the base quota. For species/complexes whose status is unknown, overfished, or experiencing overfishing, underharvests would not be transferred to the next season's quota.

The existing BLL and PLL time/area closures, including the Caribbean BLL closures for EFH, would remain in place. In addition, NMFS would implement the 8 MPAs off North Carolina to Florida as requested by the SAFMC. Retention limits would be as follows: 4 sandbar per vessel per trip and 10 non-sandbar LCS per vessel per trip for directed and incidental permit holders; no retention limit for SCS and pelagic sharks (except porbeagle sharks) for directed permit holders; 16 SCS and pelagic sharks (except porbeagle sharks) combined for incidental permit holders; no retention of porbeagle sharks by commercial or recreational fishermen; and all sharks landed with fins attached.

Shark dealer reports must be received by NMFS within 10 days of the end of the bimonthly reporting period, and logbook and observer requirements would be maintained. In addition, all unclassified sharks reported would be categorized as sandbar sharks. There would be one season starting on January 1 of each year and one region. The sandbar and non-sandbar LCS fishery would close when landings of either reach 80 percent of the available quota with a five day notice, and SCS and pelagic shark fisheries would close when SCS and pelagic shark landings reach 80 percent of their respective quotas. Finally, recreational fishermen could land bonnethead, nurse, tiger, lemon, hammerheads, Atlantic sharpnose, shortfin mako, common thresher, oceanic whitetip, and blue sharks. The recreational possession limit would be 1 shark > 54" FL per vessel per trip, and 1 Atlantic sharpnose and 1 bonnethead per person per trip with no minimum size requirements.

Ecological Impacts

4.3.1 Quotas/Species Complexes

Adjusted Quota Process

As with alternative suite 2, overharvests of quota for each category would be removed from the next season's quota. Underharvests for species that are not overfished or are not experiencing overfishing would be capped at 50 percent carryover of the base quota applied to the next season's quota. However, underharvests for species that are unknown, overfished, or experiencing overfishing would not be carried over to the next season's quota. This is anticipated to have positive ecological impacts for species that are not overfished and no overfishing is occurring by preventing stockpiling of quota. This would also have positive ecological impacts for species that are unknown, overfished, or experiencing overfishing by allowing these stocks to rebuild at a faster rate.

Species complexes

Under alternative suite 3, NMFS would structure quotas and species complexes as they are outlined for alternative suite 2. Therefore, the ecological impacts associated with the species complexes would be the same as described in alternative suite 2. A more detailed analysis of the ecological impacts of the quotas under alternative suite 3 is outlined in the next section under retention limits.

Exempted fishing program

Finally, as with alternative suite 2, alternative suite 3 would partition the 60 mt ww (43.2 mt dw) quota for exempted fishing permits, display permits, scientific research permits, and letters of acknowledgement to place more stringent limits on the quantity of sandbar and dusky sharks authorized for these purposes. Therefore, the ecological impacts of the 60 mt ww quota for exempted fishing permits would have the same ecological impacts as outlined under alternative suite 2.

4.3.2 Retention Limits

Fishery-wide landings

As with alternative suite 2, alternative suite 3 would require that shark fins remain naturally attached to the shark through offloading. The fins could be removed either by the fisherman or the shark dealer after landing. The shark could still be headed, gutted, and bled while at sea. To ensure the sharks are stored in a manner that would maximize the value and quality of the sharks, the fins could be sliced as long as they are not removed completely from the shark (*i.e.*, they could remain attached to the shark via a small amount of uncut skin). This would result in less of a chance of misidentifying the shark or the fins, which would help with species-specific reporting by fishermen and shark dealers and improve data for future stock assessments. Additionally, because fishermen would no longer be able to bypass the regulations by keeping the fins of shark that are not landed, fishing mortality of sharks overall could be reduced. This would help with the rebuilding of overfished species of sharks, such as sandbar sharks.

Overall commercial base quotas under alternative suite 3 would be reduced to 116.6 mt dw and 541.2 mt dw for sandbar and non-sandbar LCS (see Appendix A and Tables A.1 and A.3). However, to balance discards of sandbar sharks in the South Atlantic with uncaught sandbar quota in the Gulf of Mexico, the non-sandbar LCS retention limit was lowered such that only 105.9 mt dw of sandbar sharks and 229.2 mt dw of non-sandbar LCS would potentially be landed under alternative suite 3 (see discussion below and in Appendix A under "*Non-sandbar quota and retention limits"* and Tables A.4 and Table 4.2). These landings (105.9 mt dw of sandbar sharks and 229.2 mt dw non-sandbar LCS; Table 4.13) would be spread out over directed and incidental permit holders' past effort or a total of 1,143 trips (Table A.2). Based on this past effort, it was assumed 1,108 trips would be made by directed permit holders (see Table A.2; 790 trips+80 trips+237.7 trips = 1,108 trips). This directed fishing effort of 1,108 trips is 78 percent of the total expected fishing effort (*i.e.*, 1,108 trips / 1,143 trips = 78 percent; Table 4.14). Based on this estimated effort, NMFS anticipates that approximately 83 mt dw (183,073 lb dw) of sandbar sharks (78 percent x 105.9 mt dw = 83 mt dw) and 180 mt dw (396,225 lb dw) of the non-sandbar LCS (78 percent x 229.2 mt dw = 180 mt dw) would be landed by directed permit holders (Table 4.2 and Table 4.14). Based on the status quo, this is an 86-percent reduction in sandbar landings and a 74-percent reduction in non-sandbar LCS landings for directed permit holders (Table 4.9).

Similarly, based on past effort, it was assumed 305 trips could be made by incidental permit holders (see Table A.2; 49.7 trips + 255.3 trips = 305 trips). This is 22 percent of the

expected fishing effort (305 trips / 1,413 trips = 22 percent; Table A.2 and Table 4.14). Based on this estimate effort, NMFS anticipates that approximately 23 mt dw (50,395 lb dw) of sandbar sharks (22 percent x 105.9 mt dw = 23 mt dw) and 50 mt dw (109,069 lb dw) of the non-sandbar LCS (22 percent x 229.2 mt dw = 50 mt dw) would be landed by incidental permit holders (Table 4.2 and Table 4.14). This equates to almost four times more landings of sandbar sharks and almost 2 times more landings of non-sandbar LCS for incidental permit holders than what is landed under the status quo (Table 4.2). Despite this increase for incidental permit holder, total sandbar landings of 105.9 mt dw would be an 82-percent reduction in landings for sandbar sharks fishery-wide compared to the status quo (Table 4.2). Total 229.2 mt dw non-sandbar LCS landings would be a 68-percent reduction in landings for non-sandbar LCS fishery-wide compared to the status quo (see Table 4.2).

Table 4.13 Gross revenues under alternative suite 3. Fin weight was estimated to be 5 percent of total quota. Carcass weight was estimated to be 95 percent of total quota.

Alternative Suite 3	Quota (mt dw)	Quota (lb dw)	2006 ex-vessel price (per lb dw)	Gross Revenues	Total Gross Revenue	Percent Reduction from Status Quo
Fishery-Wide Impacts						
Sandbar shark	105.9	233,467				
Non-sandbar LCS	229.2	505,294				
Sandbar shark fins		11,673	$18.43	$215,133		
Sandbar shark carcass		221,794	$0.56	$124,205		
					$339,338	
Non-sandbar LCS fins		25,265	$18.43	$465,634		
Non-sandbar LCS carcass		480,030	$1.02	$489,631		
					$955,265	
Total revenues from sandbar and non-sandbar LCS landings					**$1,294,603**	**↓74%**
Status quo revenues based on directed & incidental permit holders' landings of sandbar and non-sandbar LCS					**$4,903,001**	

Table 4.14 Gross revenues for directed and incidental permit holders under alternative suite 3.

Alternative Suite 3	Predicted # of Trips	Trip Limit	Quota (lb dw)	Total Trips (directed and incidental permit holder trips)	Percent of Fishing Effort	Amount of Quota (lb dw) (Quota x % of Fishing Effort)	Fin Weight (5% of landings per trip)	Fin 2006 ex-vessel price (lb dw)	Fin Revenues	Carcass Weight (95% of landings per trip)	Carcass 2006 ex-vessel price (lb dw)	Carcass Revenues	Total Gross Revenues
Impacts On Directed Permit Holders													
Sandbar sharks	1,108	4	233,467	1,143	78%	183,073 (83 mt dw)	9,154	$18.43	$168,708	173,919	$0.56	$97,395	$266,103
Non-sandbar LCS	1,108	10	505,294	1,143	78%	396,225 (180 mt dw)	19,811	$18.43	$365,117	376,414	$1.02	$383,942	$749,059
Total revenues from sandbar and non-sandbar LCS landings													**$1,015,162**
Status quo revenues based on directed permit holders' landings of sandbar and non-sandbar LCS													**$4,702,031**
Impacts On Incidental Permit Holders													
Sandbar sharks	305	4	233,467	1,413	22%	50,395 (23 mt dw)	2,520	$18.43	$46,444	47,875	$0.56	$26,810	$73,254
Non-sandbar LCS	305	10	505,294	1,413	22%	109,069 (50 mt dw)	5,453	$18.43	$100,499	103,616	$1.02	$105,688	$206,187
Total revenues from sandbar and non-sandbar LCS landings													**$279,441**

Alternative Suite 3	Predicted # of Trips	Trip Limit	Quota (lb dw)	Total Trips (directed and incidental permit holder trips)	Percent of Fishing Effort	Amount of Quota (lb dw) (Quota x % of Fishing Effort)	Fin Weight (5% of landings per trip)	Fin 2006 ex-vessel price (lb dw)	Fin Revenues	Carcass Weight (95% of landings per trip)	Carcass 2006 ex-vessel price (lb dw)	Carcass Revenues	Total Gross Revenues
Status quo revenues based on incidental permit holders' landings of sandbar and non-sandbar LCS													**$106,491**

Landings on a trip basis

The retention limits for alternative suite 3 would be 4 sandbar sharks and 10 non-sandbar LCS per vessel per trip (compared to 8 sandbar sharks and 21 non-sandbar LCS per vessel per trip under alternative suite 2) for directed and incidental shark permit holders. Thus, under alternative suite 3, retention limits for sandbar sharks and non-sandbar sharks would be the same for directed and incidental permit holders (see below and Appendix A). Given the reduction in sandbar shark quota and for ease of enforcement, NMFS has removed the distinction between the two classes of permits in terms of sandbar and non-sandbar LCS under alternative suite 3. In addition, the status quo retention limits for SCS and pelagic sharks would still apply (*i.e.*, no trip limit for directed shark permit holders; 16 SCS and pelagic sharks combined for incidental permit holders). Currently, there is a 4,000 lb dw LCS trip limit for directed shark permit holders and five LCS trip limit for incidental permit holders. The average number of sandbars and non-sandbar LCS landed per trip for directed permit holders was 35 sandbars and 32 non-sandbar LCS and 2 sandbar sharks and 3 non-sandbar LCS for incidental permit holders from 2003 to 2005 (Table 4.11). Therefore, the retention limits under alternative suite 3 would be a 91-percent reduction for sandbar sharks and a 69-percent reduction in non-sandbar LCS for directed permit holders. However, for incidental permit holders, the retention limits of 4 sandbar sharks and 10 non-sandbar sharks would represent an increase compared to what is landed in the incidental fishery under the status quo. For sandbar sharks, the proposed retention limits would represent twice as many sandbar sharks than what is landed under the status quo (*i.e.*, 2 sandbar sharks per trip) and approximately 3 times as many non-sandbar LCS than what is landed under the status quo (*i.e.*, 3 non-sandbar LCS per trip).

However, catch composition of sandbar sharks and non-sandbar LCS differed for BLL trips that directed on sharks (Hale and Carlson, 2007). Based on BLL observer program data, on average, 69 sandbar sharks and 35 non-sandbar LCS were caught in the South Atlantic region and 30 sandbar sharks and 83 non-sandbar LCS in the Gulf of Mexico region per trip (Hale and Carlson, 2007; Table 4.11). Therefore, depending on the region and gear used, the retention limit in alternative suite 3 could result in an 84 to 97-percent reduction in sandbars kept and a 71 to 90-percent reduction in non-sandbar LCS kept on a per trip basis.

Sandbar and non-Sandbar LCS discards

The reduction in landings must also be balanced by any potential increase in discards. As with alternative suite 2, in order to reduce the number of sandbar discards that would occur as fishermen fulfill their non-sandbar LCS retention limit, NMFS based the retention limit of non-sandbar LCS on an average ratio of sandbars to non-sandbar LCS caught in the South Atlantic and Gulf of Mexico regions (1:2.7; Table A.4). In doing so, NMFS set a retention limit (10 non-sandbar LCS per trip; Table A.4) that minimized the sandbar discards that would occur in the South Atlantic region while maximizing the sandbar landings in the Gulf of Mexico region (since the sandbar to non-sandbar LCS ratio is higher in the Gulf of Mexico region than in the South Atlantic region, no sandbar discards are expected in the Gulf of Mexico region given the non-sandbar LCS retention limit).

For instance, the catch ratio of sandbars to non-sandbar LCS in the Gulf of Mexico region is 1:4. A non-sandbar LCS retention limit based on this ratio would result in a 16 non-sandbar LCS retention limit with a 4 sandbar shark retention limit per trip (4 sandbars x 4 = 16 non-sandbar LCS). However, given the 1:1.4 ratio in the South Atlantic, a 4 sandbar shark retention limit per trip would equal a 6 non-sandbar LCS retention limit in the South Atlantic region (4 sandbar sharks x 1.4 = 5.6 non-sandbar LCS). Therefore, setting one retention limit based on the Gulf of Mexico's catch ratio would result in excessive sandbar sharks discards in the South Atlantic region.

To determine the number of sandbar discards that would occur in the South Atlantic with a non-sandbar LCS retention limit based on the Gulf of Mexico catch composition, NMFS first determined the difference in the retention limits for non-sandbar LCS based on the respective ratios in the two regions. It should be noted that setting a non-sandbar LCS retention limit using the South Atlantic ratio would result in no sandbar discards; any non-sandbar LCS retention limit above that threshold (*i.e.*, above the sandbar shark x 1.4 threshold) would result in sandbar discards, but the number of discards would depend on the difference between the two retention limits divided by the South Atlantic's non-sandbar LCS ratio to sandbar sharks (*i.e.*, 1.4):

- Gulf of Mexico non-sandbar LCS retention limit = 4 sandbars x 4 = 16 non-sandbar LCS
- South Atlantic non-sandbar LCS retention limit = 4 sandbar sharks x 1.4 = 5.6 non-sandbar LCS (or 6 non-sandbar LCS)
- 16 non-sandbar LCS retention limit based on Gulf of Mexico 1:4 ratio - 6 non-sandbar LCS retention limit based on South Atlantic 1:1.4 ratio = 10 non-sandbar LCS;
- 10 non-sandbar LCS /1.4 = 7 sandbar sharks discarded per trip;
- 7 sandbar sharks x 290 South Atlantic trips = 2,071 sandbar sharks discarded in the South Atlantic; and
- 2,071 sandbar sharks x 40.5 lb dw [average commercial sandbar weight] = 83,875.5 lb dw or 38 mt dw.

Therefore, setting a non-sandbar LCS retention limit in the South Atlantic based on the Gulf of Mexico's catch ratio could result in approximately 38 mt dw of sandbar shark discards. These discards would occur as fishermen meet their sandbar retention limit but continue to fish to fulfill their non-sandbar LCS retention limit in the South Atlantic.

An alternate approach would be to implement a non-sandbar LCS retention limit based on the South Atlantic catch composition. However, this would translate into approximately only 163.2 mt dw of the 541.2 mt dw of the non-sandbar LCS being harvested (116.6 mt dw sandbar quota x 1.4 = 163.2 mt dw). Another alternative would be to set separate retention limits for the Atlantic and Gulf of Mexico regions. However, as discussed in the Regions section below (Section 4.3.6), under alternative 3, NMFS would only implement one region due to reduced quotas and to simplify quota monitoring. In addition, there could be difficulty in enforcing different regional retention limits. Therefore, NMFS would establish one retention limit that is applied everywhere. To balance the harvest of as much of the non-sandbar LCS quota as

possible while limiting sandbar shark discards, NMFS chose to establish non-sandbar LCS retention limits based on an average regional catch composition.

However, basing the non-sandbar LCS retention limit on the average regional catch composition still results in a non-sandbar LCS retention limit under alternative suite 3 (10 non-sandbar LCS per trip) that is higher than the sandbars to non-sandbar LCS ratio for the South Atlantic (6 non-sandbar LCS per trip), which could result in sandbar shark discards in the South Atlantic (~15.4 mt dw; Table A.4). While this results in total discards that are 2.5 times higher than sandbar discards under the status quo (Table 4.1), these discards are offset by the amount of sandbar landings not caught in the Gulf of Mexico region based on the 10 non-sandbar LCS trip limit (~10.7 mt dw; Table A.4). This ultimately could result in only 105.9 mt dw of the 116.6 mt dw sandbar quota being harvested under alternative suite 3 (*i.e.*, based on the 1:4 ratio in the Gulf of Mexico, 10 non-sandbar LCS retention limit / 4 = 3 sandbar sharks caught per trip in the Gulf of Mexico region when the non-sandbar LCS retention limit is filled. This is one less than the four sandbar shark trip limit under alternative suite 3, resulting in approximately ~10.7 mt dw of sandbar shark quota being uncaught in the Gulf of Mexico region).

Overall total landings and discards of sandbar sharks under alternative suite 3 is 79-percent less (474.6 mt dw) than the total landings and discards under alternative suite 1, the status quo (Table 4.1 and Table 4.2):

- status quo: 594.4 mt dw in landings + 9.6 mt dw in discards = 604 mt dw total;
- alternative suite 3: 105.9 mt dw in landings + 23.5 mt dw in discards = 129.4 mt dw;
- 129.4 mt dw / 604 mt dw = 21 percent or a 79-percent reduction in landings and discards.

Under alternative suite 3, the total commercial landings and discards plus an estimated 27 mt dw of recreational landings (156.4 mt dw total) is still below the 158.3 mt dw sandbar TAC. Therefore, quotas and retention limits under alternative suite 3 would meet the rebuilding plan for sandbar sharks and would have positive ecological impacts on this stock.

Based on the LCS retention limit under alternative suite 3, non-sandbar LCS landings would be below the non-sandbar LCS quota (229.2 mt dw of the 541.2 mt dw quota are estimated to be caught; Table 4.2). This is due to the ratio approach taken under alternative suite 3 to limit the number of sandbar shark discards. The only way fishermen could potentially harvest the entire non-sandbar LCS quota would be to reduce sandbar shark landings (*i.e.*, even lower than 105.9 mt dw) to accommodate for presumably more sandbar shark discards with a higher non-sandbar LCS retention limit. Therefore, to balance sandbar landings with regulatory discards, NMFS proposed a ratio approach for setting non-sandbar LCS retention limits under this alternative suite. In addition, this retention limit would decrease non-sandbar LCS discards by an estimated 66 percent compared to the status quo (Table 4.1). Under the status quo, fishermen would continue to direct on sharks with a 4,000 lb dw directed LCS trip limit. This resulted in 117.4 non-sandbar LCS in the past (Table 4.1). However, under alternative suite 3, fishermen would only be able to retain a total of 14 sandbar and non-sandbar LCS per trip or an approximate 500 lb dw combined sandbar and non-sandbar LCS trip limit. This is an 86 percent

reduction in the retention limit compared to the status quo. Therefore, NMFS assumes that fishermen would no longer be able to direct on sandbar and non-sandbar LCS as they have in the past. Rather, they would catch sharks incidentally as they target other species. Fisheries that target other fish and incidentally catch sharks tend to be lower in their discards of sharks (Carlson and Bethea, 2007; Hale and Carlson, 2007). However, since sandbar sharks could be retained on PLL gear under alternative suite 3, NMFS assumes that PLL vessels may set some BLL gear to catch sharks resulting in some discards of non-sandbar LCS on BLL gear set by PLL fishermen (Table 4.1). Finally, because the retention limit of non-sandbar LCS (*i.e.*, 10 non-sandbar LCS per trip) would be above the average number of non-sandbar LCS that incidental permit holders have retained in the past (*i.e.*, 3 non-sandbar LCS per trip; Table 4.11), NMFS assumes that incidental permit holders would not discard non-sandbar LCS. If these assumptions hold true, then alternative suite 3 would have positive ecological impacts for non-sandbar LCS.

Dusky shark discards

NMFS also assumes that any reduction in fishing effort due to the reduced sandbar and non-sandbar LCS quotas under alternative suite 3 could result in a slight decrease of dead discards of dusky sharks, resulting in some positive ecological impacts for this stock. As mentioned in alternative suite 2, NMFS estimates that, on average, 33.2 mt dw of dusky sharks have been landed or discarded dead (this includes recreational harvest) from 2003 to 2005 (Table 4.1). The majority of the discards under the status quo came from shark directed BLL sets (which include BLL sets fished by PLL vessels) (Table 4.1). As with non-sandbar LCS, NMFS assumes that since retention limits for sandbars and non-sandbar LCS have been reduced, fishermen would not be directing their effort on shark as they have in the past. However, sandbar sharks could be retained on PLL gear under alternative suite 3; therefore, NMFS assumes that PLL vessels may set BLL gear to catch sharks, resulting in discards of dusky sharks on BLL gear set by PLL fishermen (Table 4.1). In addition, mortality of dusky sharks would still be realized by other parts of the commercial and recreational fishing sector (Table 4.1). Therefore, NMFS estimates that alternative suite 3 may reduce dusky shark discards and landings by only 38 percent (Table 4.1).

Porbeagle shark discards

Under alternative suite 3, porbeagle sharks would also be prohibited in the commercial and recreational sectors. As with alternative suite 2, based on HMS Logbook data from 2003 to 2005, 1,685 porbeagle sharks were reported discarded alive, 484 were reported as discarded dead, and 31 were reported as being kept over those 3 years. Therefore, the prohibition is expected to have neutral to slightly positive ecological impacts for this stock since the United States makes minimal landings of this species. As described in alternative suite 2, prohibiting the retention of porbeagle sharks is anticipated to increase dead discards by approximately 0.7 porbeagle sharks per year. Prohibition of porbeagle sharks would prevent any potential increase in fishing effort for this species, and increase the likelihood that porbeagle sharks would rebuild in the timeframe recommended by the stock assessment (100 years).

4.3.3 Time/Area Closures

Under alternative suite 3, NMFS would maintain the mid-Atlantic shark closed area to BLL gear and the current BLL closures in the Caribbean that were implemented in February 2007, (72 FR 5633). Therefore, the ecological impacts associated with these closures would be the same as described under alternative suite 1. In addition, under alternative suite 3, NMFS would implement the eight MPAs being preferred in the SAFMC's Amendment 14 as described under alternative suite 2. Therefore, the ecological impacts associated with the MPAs would be the same as described in alternative suite 2.

4.3.4 Reporting

This alternative suite would modify the reporting frequency for shark dealers and could result in positive ecological impacts. The requirement for shark dealer reports to be post-marked within 10 days after each reporting period (1st through 15th and 16th through last day of month), would be modified to state that shark dealer reports must be *received* by NMFS not later than 10 days after each reporting period (*i.e.*, 25th and 10th of each month). Shark dealers would have to submit these reports in advance of the 10th and 25th of each month to ensure time for delivery, depending on the means employed for report submission. Requiring that all shark dealer reports are actually received by the Agency in a more timely fashion would help enforce cases against shark dealers who are not in compliance with the bimonthly reporting requirement. Timely bimonthly report would allow the Agency to better assess quantities of sharks landed and whether or not a closure or other management measures are warranted to prevent overharvests. This could decrease the likelihood that extensive overharvests of sharks would occur. Shark dealers would still be required to submit reports indicating that no sharks, swordfish, or tuna were purchased during inactive periods. Requirements for vessel logbooks and observer coverage would remain unchanged.

As described in alternative suite 2, sharks reported as unclassified on shark dealer reports would be counted as sandbar sharks. This is expected to result in ecological benefits as it may decrease the likelihood of overharvests, improve the accuracy of shark dealer reports by providing the incentive to report accurately to keep the sandbar shark fishery open as long as possible, and improve the utility of these data for future stock assessments. However, if dealers continue to report sharks as unclassified, this could reduce the accuracy of data collection and data used in the stock assessments, resulting in negative ecological impacts.

4.3.5 Seasons

This alternative suite would implement the same measures as alternative suite 2 for seasons. The fishing season would open for all shark species/complexes when this amendment becomes effective in 2008, and then on January 1 in 2009 and thereafter, depending upon available quota. Upon reaching 80 percent of a species/complexes quota, NMFS would take action to close that fishery within five days of filing with the Federal Register. Closing the fishery at 80 percent would provide a buffer that may account for landings that occur outside of NMFS' jurisdiction (*i.e.*, state waters). NMFS would establish one season based on how the retention limits were determined; NMFS anticipates that the lowered retention limits under alternative suite 3 would allow the fishery to stay open longer than what was historically

experienced under a 4,000 lb dw LCS directed trip limit. Sandbar and non-sandbar LCS would both close if landings for either species/complex reach 80 percent of the quota. Positive ecological impacts could be expected as a result of implementing these measures because, coupled with conservative retention limits, these seasons are expected to decrease the likelihood of overharvesting a species/complex quota. Therefore, the ecological impacts are expected to be the same as under alternative suite 2.

As stated in alternative suite 2, NMFS sought public comment specific to the establishment closing the fishery with five days notice when landings reach 80 percent of any given quota.

4.3.6 Regions

This alternative suite would implement the same measures as alternative suite 2 for regions. Sharks would no longer be managed on a regional basis in the North Atlantic, South Atlantic, and Gulf of Mexico due to reduced quotas, retention limits, and to simplify quota monitoring. Rather, there would be one region with fisheries opening at the same time for all locales subject to available quota. Therefore, the ecological impacts are expected to be the same as under alternative suite 2. The ecological impacts associated with setting one retention limit for non-sandbar LCS based on one average regional retention limit is discussed above in Section 4.3.2.

4.3.7 Recreational Measures

Recreational measures would be the same as those outlined for alternative suite 2. Recreational Anglers (HMS Angling, HMS Charter Headboat, and Atlantic Tuna General Category permit holders participating in a registered HMS tournament) would only be able to possess species of shark that are easy to identify. Participants would no longer be able to possess: finetooth, blacktip, sandbar, bull, silky, porbeagle, spinner, and blacknose sharks. Reducing the likelihood that sandbar, dusky, and porbeagle are landed in recreational fisheries could have positive ecological impacts because all of these species are overfished and both sandbar and dusky sharks are experiencing overfishing. Therefore, the ecological impacts are expected to be the same as under alternative suite 2.

4.3.8 Ecological Impacts of Alternative Suite 3 on Protected Resources and EFH

This alternative suite would have positive impacts on protected resources, including sea turtles, marine mammals, and smalltooth sawfish as NMFS expects this alternative suite to reduce fishing effort with gillnet and BLL gear significantly. The protected resources section of alternative suite 1 and Section 3.4 discuss current interactions with protected resources in the shark BLL and shark gillnet fisheries. As outlined under alternative suite 2, the reduced quotas and retention limits for sandbar and non-sandbar LCS would likely reduce the number and duration of trips targeting sandbar sharks and non-sandbar LCS with BLL and/or gillnet gear and the associated interactions with protected resources. However, as with alternative suite 2, it is difficult to assess how the overall reduction in effort associated with decreased quotas and retention limits would translate into quantitative numbers of reduced interactions with protected resources. Consequently, the ecological impacts of alternative suite 3 on protected resources and

EFH would be the same as described under alternative suite 2. One difference between alternative suite 2 and 3 is sandbar sharks would be allowed to be retained on PLL gear under alternative suite 3, whereas retention of sandbar sharks on PLL gear is prohibited under alternative suite 2. Because sandbar sharks could be retained on PLL gear, PLL fishermen may set BLL gear to catch sharks. Therefore, there may be more interactions with protected resources and prohibited species, such as dusky sharks, on BLL gear set by PLL fishermen under alternative suite 3 compared to alternative suite 2 (approximately 11.8 mt dw, Table 4.1).

Social and Economic Impacts

4.3.9 Species Complexes

Under alternative suite 3, NMFS would structure species complexes as they are outlined for alternative suite 2. Therefore, the economic impacts of species complexes would be the same as described in alternative suite 2. The associated economic impacts of the reduced quotas for sandbar sharks, non-sandbar LCS, and porbeagle sharks are discussed in combination with the next section on retention limits.

4.3.10 Quotas and Retention Limits

Alternative suite 3 would allow sharks to be retained by shark directed and incidental permit holders. Therefore, the available sandbar and non-sandbar LCS quota would be spread over a larger universe of commercial permit holders. However, unlike the status quo or alternative suite 2, the retention limits for sandbar sharks and non-sandbar LCS would be the same for both directed and incidental permit holders. Due to the reduced sandbar shark quota and for ease of enforcement, NMFS proposed to remove the distinction between the two classes of permit in terms of retention limits for sandbar sharks and non-sandbar LCS. Since directed permit holders presumably make a greater percentage of their gross revenues from shark landings, they are expected to have larger negative socioeconomic impacts compared to incidental permit holders. Since the states of Florida, New Jersey, and North Carolina have the most directed permit holders, NMFS anticipates that these states would have the largest negative socioeconomic impacts under alternative suite 3 (Table 3.32). As with alternative suite 2, shark dealers could also experience negative impacts due to the reduction in the sandbar and non-sandbar LCS quotas and retention limits, which would reduce the overall amount of sharks being landed.

As with alternative suite 2, NMFS would also maintain the 60 mt ww (43.2 mt dw) shark display and research quota under alternative suite 3. Therefore, the socioeconomic impacts associated with the 60 mt ww shark display and research quota would be the same as described under alternative suite 2.

Fishery level impacts

Under alternative suite 3, the commercial quotas would be reduced to 116.6 mt dw and 541.2 mt dw for non-sandbar LCS. However, to balance discards of sandbar sharks in the South Atlantic with uncaught sandbar quota in the Gulf of Mexico, the non-sandbar LCS retention limit was lowered such that only 105.9 mt dw (233,467 lb dw) of sandbar sharks and 229.2 mt dw

(505,294 lb dw) of non-sandbar LCS would be landed under alternative suite 3 (see discussion in Appendix A under "*Non-sandbar quota and retention limits"* and Table A.4 and Table 4.2). Based on 2006 ex-vessel prices, assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight, this is equivalent to $1,294,603 (Table 4.13). This is a reduction of about 74 percent compared to the current gross revenues under alternative suite 1 ($4,903,001; Table 4.9).

As with alternative suite 2, porbeagle sharks would be placed on the prohibited list under alternative suite 3. Based on the average porbeagle shark landings from 2003 to 2006 (1.7 mt dw or 3,867 lb dw) and 2006 ex-vessel prices, this is equivalent to a $7,378 gross revenue loss in porbeagle shark landings under alternative suite 3 (Table 4.9).

Adjusted Quota Process

In alternative suite 3, under and overharvests of quota for each category would be removed from the next season's quota, as described under alternative suite 3. Therefore, the socioeconomic impacts associated with the application of under and overharvests would be the same as described under alternative suite 2.

Fins Attached

Finally, alternative suite 3 would require that shark fins remain attached to the shark through the first port of landing. As described under alternative suite 2, the overall socioeconomic impact of this could be significant given the reductions in the overall sandbar quota, which are the most lucrative shark due to the value of its fins. Therefore, the impacts of requiring that shark fins remain attached to the shark during the first port of landing are anticipated to be the same as described under alternative suite 2.

Directed permit holder impacts

As stated under alternative suite 2, on average, directed permit holders landed 1,286,447 lb dw of sandbar sharks per year and 1,498,111 of non-sandbar LCS per year from 2003 to 2005 based on Federal and state shark dealer reports and logbook data. In 2006 ex-vessel prices, this is equivalent to gross revenues of $4,702,031 (assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight) (Table 4.9). However, given the retention limits for non-sandbar LCS (see Appendix A), NMFS anticipates that only 105.9 mt dw (233,467 lb dw) of the sandbar sharks and 229.2 mt dw (505,294 lb dw) of non-sandbar LCS would be landed under alternative suite 3. These landings would be spread over directed and incidental permit holders' past effort or a total of 1,143 trips (Table A.2). Based on this past effort, it was assumed 1,108 trips would be made by directed permit holders (see Table A.2; 790 trips+80 trips+237.7 trips = 1,108 trips). This directed fishing effort of 1,108 trips is 78 percent of the total expected fishing effort (*i.e.*, 1,108 trips / 1,143 trips = 78 percent; Table 4.14). Using this estimated effort, NMFS anticipates that approximately 83 mt dw (183,073 lb dw) of sandbar sharks (78 percent x 105.9 mt dw = 83 mt dw) and 180 mt dw (396,225 lb dw) of non-sandbar LCS (78 percent x 229.2 mt dw = 180 mt dw) would be landed by directed permit holders (Table 4.14). Based on 2006 ex-

vessel prices, this is equivalent to $1,015,162 gross revenues for directed permit holders. This is a 78-percent overall reduction in gross revenues compared to 2003 to 2005 (gross revenues based on current directed permit holders' landings were $4,702,031; Table 4.9). Again, since the states of Florida, New Jersey, and North Carolina have the most directed permit holders, NMFS anticipates that these states would experience the largest negative socioeconomic impacts under alternative suite 3 (Table 3.32).

As stated in alternative 2, the status quo revenue was based on a 4,000 lb dw LCS trip limit for directed shark permit holders with average South Atlantic trips at $4,743 per trip and average Gulf of Mexico trips at $5,853 per trip (Table 4.11). Under alternative suite 3, the retention limits would be 4 sandbars per trip and 10 non-sandbar LCS per trip. However, since the ratio of sandbars to non-sandbar LCS caught in the Gulf of Mexico is 1:4, only approximately 3 sandbar sharks would be caught in the Gulf of Mexico region when the 10 non-sandbar LCS retention limit per trip is filled (10 non-sandbar LCS / 4 = 2.5 sandbar sharks). Therefore, gross revenues on a trip basis are estimated to be $610 per trip in the South Atlantic and $670 per trip in the Gulf of Mexico (Table 4.15). From 2003 to 2005, there were 128 vessels that averaged more than 163 lb dw (or 4 sandbar sharks) of sandbar per trip (Figure A.3). Therefore, these vessels would be most negatively affected by retention limits under alternative suite 3.

Table 4.15 Gross revenues on a trip basis in the South Atlantic (SA) and Gulf of Mexico (GOM) under alternative suite 3.

Alternative Suite 3	Number of Sharks	Landings (lb dw)*	Fin Weight (5% of landings per trip)	Fin 2006 ex-vessel price (lb dw)	Fin revenue	Carcass Weight (95% of landings per trip)	Carcass 2006 ex-vessel price (lb dw)	Carcass Revenue	Total gross revenue
Regionally based BLL trips (Directed and Incidental Permit Holders)									
Total sandbar sharks per trip in SA	4	162	8	$16.20	$131	154	$0.38	$58	$190
Total sandbar sharks per trip in GOM	3	122	6	$20.65	$125	115	$0.40	$46	$172
Total non-sandbar LCS per trip in SA	10	337	17	$16.20	$273	320	$0.46	$147	$420
Total non-sandbar LCS per trip in GOM	10	337	17	$20.65	$348	320	$0.47	$150	$498
SA trip total revenues from sharks									**$610**
GOM trip total revenues from sharks									**$670**

Incidental permit holder impacts

On average, incidental permit holders landed 12,994 lb dw of sandbar sharks and 46,333 lb dw of non-sandbar LCS based on Federal and state shark dealer reports and logbook data. In 2006 ex-vessel prices, this is equivalent to gross revenues of $106,491 (assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight) (Table 4.9). Again, based on the non-sandbar LCS retention limits, NMFS predicts that 105.9 mt dw of sandbar sharks would be landed and 229.2 mt dw of non-sandbar LCS would be landed under alternative suite 3. This was averaged over directed and incidental permit holders' past effort or 1,413 trips (Table A.2). Based on past effort, it was assumed 305 trips could be made by incidental permit holders (see Table A.2; 49.7 trips + 255.3 trips = 305 trips). This is 22 percent of the expected fishing effort (305 trips / 1,413 trips = 22 percent; Table A.2 and Table 4.14). Based on this estimate effort, NMFS anticipates that approximately 23 mt dw (50,395 lb dw) of sandbar sharks (22 percent x 105.9 mt dw = 23 mt dw) and 50 mt dw (109,069 lb dw) of the non-sandbar LCS (22 percent x 229.2 mt dw = 50 mt dw) are anticipated to be landed by incidental permit holders (Table 4.14). Based on 2006 ex-vessel prices, this is equivalent to $279,441 gross revenues for incidental permit holders (Table 4.14). This would result in gross revenues that are 2.6 times higher compared to 2003 to 2005 (gross revenues based on current incidental permit holders' landings were $106,491; Table 4.9).

This increase in gross revenues is due to the increase in retention limits for incidental permit holders. Under the status quo, incidental permit holders can retain 5 sharks from the LCS complex. However, under alternative suite 3, incidental permit holders would be able to retain 4 sandbars and 10 non-sandbar LCS or 14 LCS total. This retention limit is almost 3 times higher than what is currently allowed under the status quo. On average, incidental permit holders have been landing 2 sandbar sharks and 3 non-sandbar LCS per trip. Based on 2006 ex-vessel prices, this is equivalent to $307 per trip (Table 4.11). However, under alternative suite 3, incidental permit holders would potentially make equivalent gross revenues per trip as directed permit holders: $610 per trip in the South Atlantic and $670 per trip in the Gulf of Mexico (Table 4.15). This would result in gross revenues for incidental permit holders that are 2 to 3 times higher than gross revenues in 2003 to 2005 depending on future fishing effort and catch composition. Therefore, there would be positive economic impacts for incidental permit holders under alternative suite 3. Since approximately 66 vessels with incidental permit holders landed sandbar sharks or non-sandbar LCS from 2003 to 2005 in the Coastal Fisheries and HMS Logbooks, these 66 vessels would have the largest economic benefits under alternative suite 3. However, if sharks become profitable for incidental permit holders under alternative suite 3, then more vessels with incidental permits may actively land sandbars and non-sandbar LCS in the future. Finally, the states of Florida, Louisiana, New Jersey, and North Carolina had the most incidental shark permit holders in 2007 (Table 3.32). Therefore, these states would see the largest socioeconomic benefits under alternative suite 3.

4.3.11 Time/Area Closures

Under alternative suite 3, NMFS would maintain the mid-Atlantic shark closed area to BLL gear and the current BLL closures in the Caribbean that were implemented in February 2007, (72 FR 5633). Therefore, the economic impacts associated with these closures would be

the same as described under alternative suite 1. In addition, under alternative suite 3, NMFS would implement the eight MPAs being preferred in the SAFMC's Amendment 14 as described under alternative suite 2. Therefore, the economic impacts associated with the MPAs would be the same as described in alternative suite 2.

4.3.12 Reporting

This alternative suite could result in neutral economic impacts. Shark dealers would still be required to submit landings data twice a month, however, they would need to ensure that it is actually *received* by the Agency within 10 days of a bimonthly reporting period ending. Currently, shark dealers simply have to ensure that the landings reports submitted to NMFS are *post-marked* within 10 days of the end of a reporting period. Additional burden is not expected as a result of modifying the regulations to ensure that shark dealer reports are actually received. Furthermore, more timely reporting and receipt of information by the Agency may result in a decreased likelihood that quotas would be exceeded and overharvests removed from forthcoming shark seasons resulting in neutral or slightly positive economic impacts.

As described in alternative suite 2, this suite would change how sharks listed as unclassified on shark dealer reports are accounted for under quota monitoring. Unclassified sharks would be counted as sandbar sharks, and not as LCS, which is the current procedure under quota monitoring. Properly identifying sharks may result in negative economic impacts in the short-term because it may take slightly more time. Submission of accurate shark dealer data may result in positive economic impacts in the long-term as it would improve quota monitoring, decrease the likelihood of extensive overharvests and subsequent closures, and improve the results from stock assessments by ensuring data is more accurate and includes species specific information.

4.3.13 Seasons

Under alternative suite 3, NMFS would establish one season that would open when this amendment becomes effective in 2008, and then on January 1 in 2009 and thereafter, depending on available quota. Based on how the retention limits were determined (*i.e.*, NMFS accounted for mortality in all other fisheries, and then spread the available quota over the number of historical trips taken by directed and incidental permit holders; see Appendix A), NMFS anticipates that the lowered retention limits under alternative suite 3 would allow the fishery to stay open longer than what was historically experienced under a 4,000 lb dw LCS directed trip limit. However, as described above, when coupled with the measures included under regions (Section 4.2.5), this alternative suite could have negative economic impacts on vessels and shark dealers in the North Atlantic, depending on when shark quotas were filled throughout the year. Thus, this alternative suite is expected to similar socioeconomic impacts due to establishing one season as discussed under alternative suite 2.

As mentioned in Section 4.2.5, the Agency anticipates that providing five days notice once 80 percent of the quota has been harvested would reduce the likelihood of an overharvest, account for landings that may occur outside of NMFS jurisdiction after a season had been closed, and would implement the necessary accountability measures under the Magnuson-Stevens Act.

However, the Agency sought specific comments on the potential economic impacts of choosing 80 percent as the threshold to close a specific shark fishery with five days notice.

4.3.14 Regions

Similar to alternative suite 2, establishing one region would likely have negative economic impacts on regions that do not have sharks present year round. The North Atlantic region would be disadvantaged as a result of reverting back to one region, versus three, as they would not have a secure regional trimester quota to ensure they would have a shark fishery in adjacent waters when sharks are present. Vessels could either move to southern areas to participate in the shark fishery in areas where sharks are present year-round or redistribute fishing effort to other fisheries. Shark dealers in the North Atlantic region would also be affected, possibly even more so than vessels, as the likelihood of having shark products consistently would be decreased.

4.3.15 Recreational Measures

As under alternative suite 2, this suite would restrict the species of Atlantic sharks that could be possessed by anglers in possession of a HMS Charter/Headboat permit, HMS Angling permit, or a Atlantic Tuna General Category permit (if participating in a registered HMS tournament). The Agency would restrict landings of sharks to those species that are relatively simple to identify. Therefore, recreational shark fisheries would experience similar negative economic impacts as under alternative suite 2 as a result of reducing the number of shark species that could be legally landed (Table 4.8).

Conclusions

This alternative suite could have similar positive ecological impacts for most species of sharks, bycatch, and protected resources as a result of significantly reduced retention limits and quotas for sandbar sharks and reduced retention limits for non-sandbar LCS as under alternative suite 2. Alternative suite 3 would require that sharks be landed with their fins still attached, similar to alternative suite 3; this requirement could prevent fishermen from keeping the fins from sharks that are not landed, resulting in a reduction of overall shark mortality. These positive ecological impacts would likely be more pronounced for some species under alternative suite 3 compared to alternative suite 2 because retention limits, and subsequent discards, would be lower under alternative suite 3 (Table 4.1). Since this alternative suite would allow directed and incidental permit holders to retain sharks, fewer discards of sandbar sharks are anticipated (Table 4.1).

Under alternative suite 3, NMFS would maintain the current time/area closures and implement eight MPAs that are being preferred in the SAFMC's Amendment 14. This is due to enforceability issues where the gears for different fisheries (*i.e.*, shark BLL gear and snapper-grouper BLL gear) are virtually indistinguishable, and many fishermen hold both types of permits. However, despite these time/area closures, alternative suite 3 would have a smaller reduction in dead discards of dusky sharks compared to alternative suite 2 since sandbar sharks would be allowed to be retained on PLL gear under alternative suite 3 (Table 4.1).

While most ecological impacts are positive under alternative suite 3, overall, economic impacts would vary depending on permit type. For instance, the retention limits under alternative suite 3 are higher than retention limits for incidental permit holders under the status quo, possibly resulting in positive economic impacts for incidental shark permit holders (Table 4.9 and Table 4.14). However, negative economic impacts are expected for directed permit holders (78-percent reduction in gross revenues compared to the status quo; Table 4.9 and Table 4.14). These losses in gross revenues may be exacerbated by the requirement to land shark with their fins attached. In addition, establishing one region and season would represent an economic disadvantage to the North Atlantic region as sharks are not present in these waters year-round, meaning the quota may be filled in some years before sharks are present in these areas. The elimination of seasons and regions combined with limiting underharvest carry-overs may have negative economic impacts on fishermen, especially for regions that consistently had underharvests of species like SCS.

NMFS would also rely on shark dealer reports on a biweekly basis to monitor the sandbar, non-sandbar LCS, SCS, and pelagic shark quotas. If shark dealers fail to report in a timely fashion, overharvests could occur, especially for the much reduced 116.6 mt dw sandbar quota. Finally, given the retention limits for sandbar and non-sandbar LCS are significantly lower than what is under the status quo (91 and 69-percent reduction in sandbar and non-sandbar LCS retention limits, respectively for directed permit holders), NMFS anticipates that there would be no directed shark fishery as a result of alternative suite 3. While an observer program would still operate under alternative suite 3, without a directed shark fishery, NMFS anticipates that the fishery dependent data collection would be limited, which could compromise data collection for future stock assessments. Alternative suite 4 would likely accomplish the necessary reductions in quota, retention limits, and fishing effort to prevent overfishing and allow stocks to rebuild while collecting valuable scientific data for the Agency. Therefore, due to concerns over dusky discards, quota monitoring, and data collection, NMFS does not prefer alternative suite 3 at this time.

4.4 Alternative Suite 4: Establish a Research Fishery for Sandbar Sharks; Shark Fishery for Directed, Incidental, HMS Angling, and HMS Charter/Headboat Permit Holders – Preferred Alternative

Overall Summary

As with alternative suites 2 and 3, under alternative suite 4, NMFS would remove the sandbar shark from the LCS complex and establish a separate sandbar shark quota and a non-sandbar LCS quota (LCS complex minus sandbar sharks). Base quotas would be as follows: Sandbar research quota = 116.6 mt dw; non-sandbar LCS research quota = 50 mt dw; Gulf of Mexico non-sandbar LCS = 439.5 mt dw; Atlantic non-sandbar LCS = 188.3 mt dw; SCS = 454 mt dw; Blue Sharks = 273 mt dw; Pelagic Sharks (Other than Blue Sharks) = 488 mt dw; Porbeagle Sharks = 1.7 mt dw; and Display and Scientific Research = 60 mt ww (Sandbar = 2.8 mt ww (2 mt dw); and all other shark species (except dusky sharks) = 57.2 mt ww (41.2 mt dw). The adjusted quota process would deduct overharvests from the next season's quota, or depending on the level of overharvest, would remove them over a number of subsequent years until the entire overharvest has been accounted for. Underharvests for species that are healthy or rebuilt would be transferred to the next season's quota, up to 50 percent of the base quota. For

species/complexes whose status is unknown, overfished, or experiencing overfishing, underharvests would not be transferred to the next season's quota.

Based on overharvests of the LCS complex during 2007, under this alternative NMFS would implement adjusted annual quotas for five years (from 2008 through the end of 2012) for sandbar sharks and non-sandbar LCS. By spreading out the overharvest over several years, NMFS would allow for a small fishery to occur while accounting for overharvests through the end of 2012. If NMFS accounted for the total overharvests within one year, it would result in no shark fishery or data collection for at least a year due to the extent of the overharvests in 2007 (see Appendix C for more details). These adjusted quotas are as follows: Sandbar research quota = 87.9 mt dw; non-sandbar LCS research quota = 37.5 mt dw; Gulf of Mexico non-sandbar LCS = 390.5 mt dw; and Atlantic non-sandbar LCS = 187.8 mt dw. Any additional overharvests that occurred during each year between 2008 and 2012 would be deducted from these adjusted quotas.

Alternative suite 4 would establish a small research fishery that would harvest the adjusted sandbar quota (from 2008 until December 31, 2012) or base sandbar quota (from January 1, 2013, until new management measures are in place). Vessels within the research fishery could also retain non-sandbar LCS, SCS, and pelagic sharks (except prohibited sharks). Vessels with commercial shark permits outside of the research fishery could only retain non-sandbar LCS as well as SCS and pelagic sharks (except prohibited sharks) (see Table 2.1). The existing BLL and PLL time/area closures, including the Caribbean BLL closures for EFH, would remain in place. In addition, NMFS would implement the eight MPAs off North Carolina to Florida as requested by the SAFMC.

Retention limits for sandbar sharks and non-sandbar LCS in the research fishery would be based upon research objectives within the designated quota; no sandbar sharks may be landed outside of the research program. Under the base non-sandbar LCS regional quotas, there would be a retention limit of 36 non-sandbar LCS per vessel per trip for directed permit holders and 3 non-sandbar LCS per vessel per trip for incidental permit holders not participating in research program. Under the adjusted non-sandbar LCS regional quotas, there would be a retention limit of 33 non-sandbar LCS per vessel per trip for directed permit holders and 3 non-sandbar LCS per vessel per trip for incidental permit holders. For either quota, there would be no trip limit for SCS or pelagic sharks for directed permit holders, and 16 SCS and pelagic sharks combined for incidental permit holders. Finally, all sharks would have to be landed with their fins naturally attached.

Shark dealer reports must be received by NMFS within 10 days after the end of the bimonthly reporting period, and there would be 100 percent observer coverage for vessels participating in the shark research fishery. Other logbook and observer requirements would be maintained for vessels not participating in research program. NMFS would monitor the species composition of sharks landed outside the research fishery through scientific observers and shark dealer reports. The observed species composition from observer reports and shark dealer reports would be applied to unclassified sharks and deducted from the appropriate sandbar, non-sandbar LCS, SCS, and pelagic shark quotas. There would be one season starting on January 1 of each year and one region for SCS, sandbar, and pelagic sharks, and two regions (an Atlantic and a Gulf of Mexico region) for non-sandbar LCS. Since NMFS would create a separate non-sandbar

LCS quota for the shark research fishery, the sandbar, non-sandbar LCS, SCS, and pelagic shark fisheries would close when landings for each species/complex reach 80 percent of their respective quotas with a five-day notice upon filing within the Federal Register. Finally, recreational fishermen would be able to land all non-ridgeback LCS (except prohibited species) plus tiger sharks as well as SCS and pelagic sharks (see Table 4.17). The recreational possession limit would be 1 shark > 54" FL per vessel per trip, and 1 Atlantic sharpnose and 1 bonnethead per person per trip with no minimum size requirements for these two species.

Ecological Impacts

4.4.1 Quotas/Species Complexes

Under alternative suite 4, NMFS would structure species complexes as they are outlined for alternative suite 2. The ecological impacts associated with these species complexes are anticipated to be the same as under alternative suite 2. The only difference would be that porbeagle sharks would not be placed on the prohibited species list. Instead, NMFS would establish a reduced TAC for porbeagle sharks based on current landings and discards (see porbeagle shark discussion below).

Sandbar Sharks

The commercial sandbar shark base quota would remain at 116.6 mt dw, which is consistent with the sandbar shark rebuilding plan outlined in Chapter 1. NMFS determined this quota by accounting for sandbar shark mortality that occurs in recreational and non-HMS fisheries, including discards by fishermen targeting other species. This quota would be allocated to a shark research fishery and retention of sandbar sharks would be prohibited outside the research fishery.

However, in order to account for overharvests in 2007, NMFS must lower the base quota for sandbar sharks. This lowered quota would be termed "adjusted quota." Typically NMFS establishes new base quotas within a FMP or FMP amendment, and under- and overharvests are adjusted through subsequent proposed and final rulemaking. However, due to the timing of this amendment and its associated final rule with the overharvests experienced by the fishery in 2007, NMFS is analyzing the impacts of both the base and adjusted quotas in this amendment to examine the impacts of the different quotas. Once this amendment is in place and the quota for the next five years is established, any further under- or overharvests in each subsequent year would be adjusted through annual proposed and final rulemaking, depending on the magnitude of adjustment needed based on the level of overharvest.

NMFS evaluated adjusted quotas that would account for the overharvests in 2007 over one to five years (see Appendix C for more details). For example, if NMFS deducted the entire overharvest from 2007 from the sandbar shark base quota in one year, when considering two regions, the end result would be -27 mt dw of adjusted sandbar shark quota available in 2008 (116.6 mt dw – (36.8 mt dw + 106.8 mt dw) = -27 mt dw; Table C.1). The remaining 27 mt dw overharvest would then be deducted in the next calendar year. However, accounting for the overharvests in the shortest time period (*i.e.*, one year plus 27 mt dw in the next calendar year) would preclude any sandbar shark research during that time. Thus, NMFS also evaluated the

resulting sandbar quota if the overharvest was spread over two, three, four, and five years. The resulting sandbar quota would be 44.8 mt dw, 68.8 mt dw, 80.7 mt dw, or 87.9 mt dw per year, respectively. Based on projections run by the SEFSC, accounting for the entire overharvest in one year (and the remaining 27 mt dw in the next calendar year) or accounting for the overharvest over five years would result in similar outcomes for the stock, with the same rebuilding timeframe resulting for either scenario. In either case, this rebuilding timeframe for sandbar sharks would be shorter than if the 2007 overharvests were not accounted for in this amendment.

Given accounting for the 2007 overharvests in one year (up to that year's sandbar shark quota for the research fishery or 116.6 mt dw) and then in subsequent years until the entire overharvest has been accounted for would preclude a shark research fishery for at least one year, and sandbar sharks would rebuild within the same timeframe if NMFS spread out the 2007 overharvest over one or five years, in alternative suite 4 NMFS prefers to spread the sandbar overharvest over five years to allow for a much-needed research to occur; smaller quotas would jeopardize NMFS' abilities to accomplish shark research objectives and could disrupt the collection of fishery dependent data. In addition, it is likely that there will be a new assessment within the next five years. That assessment will need the data collected from the shark research fishery and could result in new shark management measures. For this reason, NMFS chose not to spread out the 2007 overharvest beyond five years. Thus, the adjusted sandbar quota for the shark research fishery would be 87.9 mt dw per year through the end of 2012 (Table 4.16). However, any additional overharvests that occurred during each year between 2008 and 2012 would be deducted from this adjusted quota in the following year, or depending on the level of overharvest, over multiple years until the entire overharvest was accounted for. If additional overharvests do occur, this may result in a reduced sandbar shark quota that may preclude a shark research fishery in future years. This would result in the loss of fishery dependent data for future stock assessments; however, since the shark research fishery would be monitored through scientific observer reports, NMFS anticipates that the sandbar shark quota would be monitored in an almost real-time manner that would help prevent future overharvests.

Table 4.16 Overview of quotas and retention limits under the base and adjusted quotas for the preferred alternative suite 4.

	Sandbar Quota (mt dw)	Non-sandbar LCS Quota Inside the Shark Research Fishery (mt dw)	Non-sandbar LCS Quota Outside the Research Fishery (mt dw)	Retention Limits for Directed Permit Holders (Outside the Shark Research Fishery)	Retention Limits for Incidental Permit Holders (Outside the Shark Research Fishery)
Base Quotas (as of January 1, 2013)					
Atlantic	116.6	50	188.3	36 non-sandbar LCS/vessel/trip	3 non-sandbar LCS/vessel/trip
Gulf of Mexico			439.5		
Adjusted Quotas (from 2008 through December 31, 2012)					
Atlantic	87.9	37.5	187.8	33 non-sandbar LCS/vessel/trip	3 non-sandbar LCS/vessel/trip
Gulf of Mexico			390.5		

Thus, fishermen within the research fishery are anticipated to land 87.9 mt dw per year (193,784 lb dw) under the adjusted quota from 2008-2012 and 116.6 mt dw per year (257,056 lb dw) under the base quota as of January 1, 2013 (Table 4.16). Compared to the current average sandbar landings of 594.4 mt dw per year (1,310,449 lb dw) that were reported from 2003 to 2005 in Federal and state shark dealer reports (Table 4.9), this would be an 85-percent reduction under the adjusted quota of 87.9 mt dw/year (Table 4.2) and an 80-percent decrease in sandbar landings under the base quota of 116.6 mt dw. This reduction in fishing effort is expected to have positive ecological impacts for sandbar sharks.

The 2005/2006 LCS stock assessment did not include the 2007 overharvests when the assessment scientists determined the rebuilding timeframe for sandbar sharks since those overharvests occurred after the conclusion of the assessment and before NMFS could conduct another assessment before completion of the FEIS. However, the SEFSC conducted *ad hoc* projections to evaluate how the overharvests in 2007 would affect the overall rebuilding timeframe from the original 2005/2006 LCS stock assessment. In addition, the SEFSC evaluated how accounting for the overharvests in one year (up to that year's sandbar shark quota for the research fishery or 116.6 mt dw) and then in subsequent years until the entire overharvest has been accounted for or accounting for them over five years would affect the rebuilding timeframe for sandbar sharks. The SEFSC found that when the actual level of harvest in 2007 was accounted for in their projections, there was no significant change in the rebuilding timeframe for sandbar sharks compared to the original sandbar shark assessment. In addition, the SEFSC found that accounting for the entire overharvest in one year (and the remaining 27 mt dw in the next calendar year) or accounting for the overhavest over five years would result in similar outcomes for the stock, with the same rebuilding timeframe resulting from either scenario. This is most likely the case because of the longevity of the species and the ratio of immature to mature individuals in the catches. Overall, the SEFSC found that reducing the commercial quota to account for overharvests in 2007 would have positive ecological impacts on the stock by lowering overall mortality, which could allow the stock to rebuild more quickly than projected in the 2005/2006 assessment.

Non-Sandbar LCS

Based on public comment, NMFS would establish regional non-sandbar LCS quotas as well as a set aside non-sandbar LCS quota for the shark research fishery. This is different from the DEIS in which a single region with a single non-sandbar LCS quota was proposed, and no set aside for the research fishery was considered. NMFS would establish a separate non-sandbar LCS quota of 50 mt dw for the shark research fishery so that each shark fishery would close when its quota was 80 percent fulfilled (see Appendix C for how this set-aside was determined). This one overall quota would apply to both regions as would the sandbar quota within the research fishery. This would allow the shark research fishery to continue even if the non-sandbar LCS quota outside the research fishery is fulfilled. The research fishery itself would continue until both the sandbar and non-sandbar LCS quota established for the research fishery were 80 percent filled (*i.e.*, if the non-sandbar LCS quota within the research fishery reached 80 percent, non-sandbar LCS retention in the research fishery would end, but sandbar sharks could continue to be retained until that sandbar quota reached 80 percent). However, if such a non-sandbar LCS

quota is not adequate for the research fishery, NMFS would adjust the quota through a framework action.

In addition, based on recommendations from the SEFSC, NMFS would use shark dealer reports to estimate past landings of all non-sandbar LCS and set the non-sandbar LCS quota (see Appendix C for more details). In the DEIS, NMFS used logbook data to estimate shark landings for all alternative suites. However, NMFS uses shark dealer reports to monitor shark landings for quota monitoring and stock assessment purposes. In addition, the shark dealer reports come from state shark dealers as well as from Federal shark dealers through the Federal quota monitoring system. Thus, shark dealer reports include shark landings in both Federal and state waters whereas logbooks only capture landings from Federal permit holders. Therefore, NMFS determined that shark dealer data provide the best estimate of shark landings and used shark dealer reports to set the non-sandbar LCS quota for alternative suite 4 as well as to calculate landings under the status quo, or alternative suite 1. However, since shark dealer reports do not have detailed effort information that is included in logbook data, such as landings or trip data by different permit holders, NMFS used a combination of both logbook and shark dealer reports to obtain the necessary information for alternative suites 1 and 4.

As a result, the base non-sandbar LCS quota would be 439.5 mt dw in the Gulf of Mexico region, and 188.3 mt dw in the Atlantic region (Table 4.16; see Appendix C for how these quotas were determined). These regional quotas are expected to have positive ecological impacts because they would allow for more non-sandbar LCS quota to be harvested in the Gulf of Mexico region where blacktip sharks are more prevalent and the stock is healthy compared to the Atlantic region. The regional quotas would also allow for a smaller non-sandbar LCS quota in the Atlantic where the status of blacktip sharks is unknown and sandbar and dusky sharks are more prevalent. In addition, despite the overall increase in the non-sandbar LCS quota (when based on shark dealer reports compared to the quota based on logbook data), the shark dealer reports represent the same data that is used for stock assessment and quota monitoring purposes. Therefore, using shark dealer data to establish the non-sandbar LCS quotas is consistent with recommendations from the most recent shark stock assessment, and their use in calculating LCS quotas would have positive ecological impacts for non-sandbar LCS shark species.

In addition, based on overharvests of the LCS complex in 2007, NMFS would implement adjusted annual quotas for five years (through the end of 2012) for non-sandbar LCS (see Appendix C for more details). Spreading the non-sandbar LCS overharvest over five years was chosen to complement the approach used for sandbar sharks. The adjusted non-sandbar LCS quota for the shark research fishery would be 37.5 mt dw (Table 4.16; see Appendix C for how this was calculated). As stated above, if such a non-sandbar LCS quota is not adequate for the research fishery, NMFS would adjust the quota through additional rulemaking. In the Gulf of Mexico region, the adjusted quota would be 390.5 mt dw, and the adjusted non-sandbar LCS quota for the Atlantic region would be 187.8 mt dw (Table 4.16). Any additional overharvests that occurred during each year between 2008 and 2012 would be deducted from these adjusted quotas. Reducing the base quotas to account for overharvests in 2007 is expected to have positive ecological impacts on non-sandbar LCS.

Shark fishermen inside and outside the shark research fishery are anticipated to land 677.8 mt dw (1,494,278 lb dw) of non-sandbar LCS under the base quotas. In addition, 41.2 mt

dw of sharks (not including sandbar and dusky sharks) are anticipated to be landed in the exempted fishing program, for a total of 719 mt dw (1,585,671 lb dw) of non-sandbar LCS landings per year. Average landings for non-sandbar LCS from 2003 to 2005 were also 719 mt dw according to Federal and state shark dealer reports. Therefore, neutral impacts are anticipated with this overall quota; however, the overall commercial quota for non-sandbar LCS follows the recommendations from the latest shark assessments. Therefore, this level of exploitation should be sustainable. Under the adjusted commercial quota of 616.6 mt dw (390.5 mt dw in the Gulf of Mexico region and 187.8 mt dw in the Atlantic region) and 41.2 mt dw in the exempted fishing program, fishermen would land a total of 657.8 mt dw (1,450,186 lb dw) of non-sandbar LCS per year, which is a 9-percent reduction in landings compared to the average landings from 2003 through 2005. This could result in positive ecological impacts for non-sandbar LCS.

Porbeagle Sharks

NMFS had proposed prohibiting porbeagle landings in commercial and recreational fisheries in the DEIS for Amendment 2 to the Consolidated HMS FMP. Commercial landings of porbeagle sharks are well below the 92 mt dw/year quota allocated for this sector as there is no directed fishing for porbeagle sharks in the United States. Recreational landings generally only occur in a small number of tournaments in the Northeastern United States (NMFS, 2006). Furthermore, the United States does not contribute to a significant proportion of Atlantic-wide fishing mortality of porbeagle sharks, porbeagle sharks are not currently experiencing overfishing, and a prohibition may simply lead to an increase in the number of dead discards of porbeagle sharks. Thus, the Agency prefers to implement a reduced TAC for porbeagle sharks to cap porbeagle mortality at its current level while allowing possession of porbeagle sharks in recreational and commercial fisheries.

The 2005 Canadian porbeagle stock assessment incorporated U.S. commercial landings in their assessment. Based on their assessment, if fishing mortality for porbeagle sharks is kept at or below its current level ($F = 0.04$), then porbeagle sharks have a 70-percent probability of rebuilding within 100 years (Gibson and Campana, 2005). Because porbeagle sharks are not currently experiencing overfishing, the rate of fishing mortality does not need to be reduced in order for rebuilding to occur. As mentioned above, even if F were below its current level (or equal to zero) the same rebuilding timeframe would still be required because of the status and biology of the species. Therefore, NMFS will set a TAC of 11.3 mt dw based on current commercial landings of 1.7 mt dw, current commercial discards of 9.5 mt dw, and current recreational landings of 0.1 mt dw. This will result in a commercial quota of 1.7 mt dw, which would likely allow porbeagle sharks to rebuild within 100 years. If the TAC is exceeded, the Agency may explore additional accountability measures, including reducing the TAC or other management measures, as necessary. In addition, NMFS will encourage the release of all live porbeagles to maximize their chances of post-release survival.

Exempted Fishing Program Quota

As with alternative suites 2 and 3, alternative suite 4 would partition the 60 mt ww (43.2 mt dw) quota for exempted fishing permits, display permits, scientific research permits, and letters of acknowledgement and place more stringent limits on the quantity of sandbar and dusky

sharks authorized for these purposes. Specifically, 2 mt dw (2.8 mt ww) would be allocated for sandbar sharks and 41.2 mt dw (57.2 mt ww) would be allocated for all non-sandbar LCS species (except dusky sharks). This quota would be separate from the commercial quotas explained above. Therefore, the ecological impacts associated with the 60 mt ww quota would be the same ecological impacts as those under alternative suite 2.

Adjusted Quota Process

Finally, overharvests would be removed from the next fishing season or removed over a number of subsequent years, depending on the level of overharvest. Accounting for the overharvests within the shortest amount of time would most likely have the largest ecological benefit to the stock. However, if overharvests are large enough to preclude the shark research fishery entirely within a given year, then NMFS would not be able to collect fishery dependent data for future assessments. Thus, NMFS would consider accounting for overharvests over one to a maximum of five years, depending on the level of overharvest and the amount of the resulting quota, which would affect NMFS' ability to conduct shark research. NMFS' maximum timeframe for accounting for overharvests within five years is based on the timing of stock assessments; according to NMFS' policies, stock assessments are required to be conducted at least once every five years. Therefore, NMFS would anticipate a new stock assessment would be conducted and associated management measures would be implemented after five years, which could change the underlying base quota. The ecological impacts of the application of underharvest would be the same as outlined in alternative suite 2. NMFS would cap the application of underharvest for healthy stocks to 50 percent of the base quota, and such carryovers would be applied to the next fishing season. NMFS' decision to limit the amount of underharvest carried over for healthy stocks within a given year should have positive ecological impacts by preventing the stockpiling of quota. As with alternative suite 2, there would be no carryover of underharvest for species that are unknown, overfished, or experiencing overfishing. Not accounting for underharvests of overfished species would have positive ecological impacts by reducing harvest and allowing these stocks to rebuild at a faster rate.

4.4.2 Retention Limits

As with alternative suites 2 and 3, alternative suite 4 would require that shark fins remain on the shark until the first port of landing, and therefore, is expected to have similar ecological benefits as described for alternative suites 2 and 3.

Shark Research Fishery

Research objectives and selection of vessels

Alternative suite 4 would establish a program whereby fishermen could apply to participate in the shark research fishery. Participation by different permit categories (*i.e.*, directed and incidental shark permits) would depend on the research objectives for the year. Only vessels participating in this program would be able to land sandbar sharks. Vessels not participating in the research program would still be able to land non-sandbar LCS, SCS, and pelagic sharks subject to the available quota and retention limits described below and in Chapter 2 and Appendix C.

Each year, NMFS would publish a Federal Register notice that outlines the shark research objectives for the year. In the notice, NMFS would request applications from commercial shark fishermen who wish to participate in the shark research fishery. The research objectives would be developed by a shark board, which is comprised of representatives within NMFS. The shark board would include representatives from the SEFSC Panama City Laboratory, NEFSC Narragansett Laboratory, the Southeast Regional Office of Protected Resources, and the Highly Migratory Species (HMS) Management Division.

For 2008, the research objectives would be based on research needs identified at SEDAR 11, which were developed with input from non-governmental organizations, industry representatives, fishery managers, and academics present during the stock assessment workshops. In addition, the shark board identified additional needs for tagging studies, collection of genetic material, and controlled BLL experiments to assess the impact of hook changes. Specifically, these research recommendations include:

- Collection of reproductive and age data from sandbar sharks throughout the calendar year to assess the current (2005-present) life history of sandbar sharks. In particular, age and maturity ogive schedules will be reassessed and well as fecundity and reproductive periodicity.
- Collection of reproductive and age data for Gulf of Mexico blacktip sharks for determination of the reproductive cycle (*i.e.*, annual or biennial frequency).
- Collection of reproductive and age data from all species of sharks for additional species-specific assessments.
- Monitor size distribution of sandbar sharks and other species captured in the fishery.
- Continue on-going tagging programs for identification of migration corridors and stock structure.
- Maintain time-series of abundance from previously derived indices for shark BLL observer program.
- Fin-clip sampling of all species for genetic analysis.
- Application of satellite archival tags to endangered smalltooth sawfish to provide information on critical habitat and preferred depth which my help reduce further fishery interactions.
- Application of satellite archival tags to prohibited dusky sharks to provide information on daily and seasonal movement patterns, and preferred depth which may help reduce further fishery interactions.
- Controlled longline experiments to evaluate the effects of any hook change to prohibited species interactions and fishery yields.

Fishermen who are interested in participating in the shark research fishery would need to fill out a Federal HMS Exempted Fishing and Shark Research Permit Application. Based on the applications received, and the research objectives and available quota for a given year, NMFS would select a few vessels (*e.g.*, 5-10 vessels) each year to conduct the prescribed research. Selection criteria of vessels could include (but are not limited to): the ability of the vessels to meet NMFS' annual research objectives; flexibility to fish in the regions and seasons required;

the ability to meet the requirements to carry a NMFS-approved observer; the vessel's history of participation with the observer program; and past HMS-related enforcement violations. The selected vessels would work with NMFS to conduct shark research and would be subject to 100 percent observer coverage. However, fishermen in the shark research fishery would be authorized higher trip limits and could sell their catch, including sandbar sharks, compared to vessels outside the research fishery. Specific details of the selection criteria and selection process will be discussed in further detail in the Federal Register notice. This research fishery would allow the collection of fishery-dependent data for future stock assessments while allowing NMFS and fishermen to conduct cooperative research to meet the shark research objectives for the Agency.

Sandbar and non-sandbar LCS landings

Vessels operating within the research fishery would be allowed to harvest sandbar sharks. Retention limits for sandbar sharks and non-sandbar LCS would depend on the research objectives for the year. As long as the shark research fishery does not exceed the adjusted sandbar quota during the first five years of the fishery or the base quota thereafter, sandbar sharks should rebuild according to their rebuilding plan. In addition, sustainable harvest of non-sandbar LCS within the research fishery would occur as long as the non-sandbar LCS adjusted and base quotas within the shark research fishery are maintained. Since NMFS would have 100 percent observer coverage in the shark research fishery, the sandbar and non-sandbar LCS quotas are not expected to be exceeded.

Outside the Shark Research Fishery

Non-sandbar LCS landings

Regional non-sandbar LCS base quotas outside the research fishery would be 439.5 mt dw in the Gulf of Mexico region, and 188.3 mt dw in the Atlantic region (Table 4.16; see Appendix C for how these quotas were determined). The adjusted Gulf of Mexico non-sandbar LCS quota would be 390.5 mt dw and the adjusted Atlantic non-sandbar LCS quota would be 187.8 mt dw (Table 4.16). However, despite the regional quotas, retention limits would be the same in all regions. Under the base quotas, directed shark permit holders operating outside the research fishery could retain up to 36 non-sandbar LCS per trip, and incidental permit holders could retain 3 non-sandbar LCS per trip (Table 4.16). Under the adjusted quotas, directed shark permit holders operating outside the research fishery could retain up to 33 non-sandbar LCS per trip, and incidental permit holders could retain 3 non-sandbar LCS per trip (Table 4.16).

NMFS considered multiple ways to determine retention limits. Both of these approaches as fully described in Appendix C (see the section on "*Retention Limits*" and Tables C.5 and C.6) and briefly summarized here. One approach, the ratio approach, calculated retention limits based on the catch composition as reported in observer program data when fishermen were targeting sharks under past retention limits (4,000 lb dw LCS/vessel/trip). This approach was used to calculate the retention limits for alternative suites 2 and 3. Under this approach, NMFS determined the number of sandbar sharks that could be retained by directed and incidental fishermen according to the commercial quota. Based on the retention limit for sandbar sharks, NMFS would then set the retention for non-sandbar LCS based on the ratio of sandbar sharks to

non-sandbar LCS encountered in the different regions according to shark observer program reports. For instance, in the Gulf of Mexico region, the ratio was 1:4 (1 sandbar for 4 non-sandbar LCS), and in the Atlantic region, it was 1:1.4. So, for every sandbar shark, fishermen could retain 4 non-sandbar LCS in the Gulf of Mexico and one non-sandbar LCS in the Atlantic. However, under alternative suite 4, fishermen operating outside the research fishery would not be able to retain sandbar sharks. Therefore, using this approach, NMFS would have to set a low enough retention limit for non-sandbar LCS to minimize sandbar sharks from being caught and discarded. This would result in a retention limit of 3 non-sandbar LCS in the Gulf of Mexico region and 1 non-sandbar LCS in the Atlantic region. Therefore, this approach would severely limit fishermen's ability to harvest the available non-sandbar LCS quota. As such, NMFS evaluated and chose a different approach to determine retention limits for alternative suite 4.

NMFS chose to establish retention limits by dividing the available quota among the average number of trips per year that were reported in the HMS and Coastal Fisheries logbooks from 2003 to 2005 (see Appendix C for more details). NMFS projected the number of future trips that could be taken by directed and incidental permit holders based on average past fishing effort. NMFS chose to average effort from 2003 to 2005 to remove any anomalies within a given year. The decision to use a time series of 2003 to 2005 is discussed at the beginning of this chapter. NMFS acknowledges that this level of effort may not be achieved in the future given the reduced retention limits and prohibition of sandbar sharks outside the research fishery; therefore, retention limits could be changed, as necessary, via framework actions based on quota monitoring and achieved fishing effort. In addition, such retention limits should keep overall non-sandbar LCS mortality consistent with exploitation rates in the past, which is in accordance with the latest shark stock assessment recommendations. For instance, the Coastal Fisheries and HMS Logbooks from 2003 to 2005 showed that, on average, directed permit holders landed 32 non-sandbar LCS per trip and incidental permit holders landed 3 non-sandbar LCS per trip (Table 4.11). Thus, these retention limits are not expected to increase mortality for non-sandbar LCS, and therefore, allow for their sustainable harvest.

Setting the same retention limits for all regions would also help with enforcement. In addition, since NMFS is unsure how effort would be allocated to different regions in response to new management measures, NMFS divided the total available quota for directed permit holders by the average number of total trips taken by directed permit holders from 2003 to 2005. Finally, because the non-sandbar LCS quota is higher in the Gulf of Mexico region, based on historically higher landings on non-sandbar LCS in this region, regional retention limits could result in high retention limits in the Gulf of Mexico region (see Table C.4 in Appendix C). Such retention limits could result in fishermen targeting non-sandbar LCS, resulting in excessive discards of sandbar sharks. NMFS assumes that since sandbar sharks would be prohibited outside the shark research fishery, and given the reduced retention limits compared to the status quo, shark fishermen would no longer target non-sandbar LCS. For instance, a trip limit of 33 or 36 non-sandbar LCS is approximately 1,112 lb dw to 1,213 lb dw of shark per trip. This is approximately a quarter of the current trip limit under the status quo. Given this reduction, NMFS assumes shark fishermen would no longer conduct trips specifically to target non-sandbar LCS; instead they would incidentally catch non-sandbar LCS as they target other species. Based on shark observer program data, shark fishermen with directed shark permit targeting other species such as snapper-grouper, on average, catch 12 sharks per trip. The 33 or 36 non-sandbar

LCS trip limit would allow fishermen to keep all legal sharks (except sandbar sharks) while targeting other non-shark species without creating excessive discards. Accordingly, there should be positive ecological impacts associated with the directed and incidental trip limits.

Sandbar and non-sandbar LCS discards

Given that shark fishermen outside the research fishery would not be able to retain sandbar sharks, NMFS assumes that fishermen outside the shark research fishery would no longer target non-sandbar LCS. Since most of the sharks discards have historically occurred within the directed shark fishery (see Table 4.1), this alternative suite should reduce the number of discards of many shark species. NMFS does not expect large numbers of dead sandbar discards or non-sandbar LCS to occur if fishermen are targeting non-shark species. For instance, BLL observer program data suggest that on average, directed shark permit holders targeting non-shark species caught only one sandbar shark and 12 non-sandbar LCS per trip. In addition, soak times associated with these trips not targeting sharks are typically much shorter than soak times on shark trips (Hale and Carlson, 2007; Hale *et al*., 2007). Therefore, NMFS anticipates that sandbar sharks could be released alive instead of being discarded dead by fishermen outside the research fishery. In addition, a 33 or 36 non-sandbar LCS trip limit for directed shark permit holders would allow fishermen targeting other species to retain all legal shark species (except sandbar sharks), preventing discards (see Appendix C for more details). Such measures should result in positive ecological impacts for sandbar sharks and non-sandbar LCS. However, if realized fishing effort results in fishermen targeting non-sandbar LCS with a trip limit of 33 non-sandbar LCS, NMFS would take additional steps, such as reducing trip limits, if sandbar sharks discards result in the fishery exceeding the sandbar TAC.

NMFS determined discards of sandbar sharks and non-sandbar LCS that would occur in different sectors of the commercial shark fishery (BLL fishery, PLL fishery, *etc*.) as well as mortality that could occur in other commercial non-shark fisheries, such as snapper-grouper and tilefish fisheries. NMFS used both shark BLL and gillnet observer data, and Coastal Fisheries and HMS logbook data to estimate discards. For example, NMFS anticipates that most PLL vessels would discard sandbar sharks since most would be operating outside the research fishery (resulting in approximately 4.3 mt dw of sandbar shark discards; Table 4.1). Shark discards in the research fishery are anticipated to occur as they have during directed shark trips in the past (approximately 0.4 mt dw of sandbar sharks under the base quota and 0.3 mt dw under the adjusted quota; Table 4.1). Since fishermen outside the research fishery would not be allowed to retain sandbar sharks, assuming they target non-shark species and only incidentally catch sharks, NMFS anticipates they would discard approximately 2.3 mt dw of sandbar discards per year (Table 4.1). Therefore, under alternative suite 4, discards of sandbar sharks could increase by 36 percent compared to the status quo (Table 4.1), however, overall commercial landings and discards would be reduced by 79-percent or 83-percent under the base and adjusted quota, respectively, compared to the status quo (Table 4.1, Table 4.2, and C.4). These reductions are shown below:

Base Sandbar Quota

- status quo: 594.4 mt dw in landings + 9.6 mt dw in discards = 604 mt dw in total landings and discards;

- alternative suite 4: 116.6 mt dw in landings + 13.1 mt dw in discards = 129.7 mt dw in total landings and discards; and
- 129.7 mt dw / 604 mt dw = 21 percent or 79-percent reduction in total landings and discards.

Adjusted Sandbar Quota

- status quo: 594.4 mt dw in landings + 9.6 mt dw in discards = 604 mt dw in total landings and discards;
- alternative suite 4: 87.9 mt dw in landings + 13.0 mt dw in discards = 100.9 mt dw in total landings and discards; and
- 100.9 mt dw / 604 mt dw = 17 percent or 83-percent reduction in total landings and discards.

Under alternative suite 4, the total commercial landings and discards of sandbar sharks plus an estimated 27 mt dw of recreational landings of sandbar sharks would still be below the 158.3 mt dw sandbar TAC (total sandbar mortality: 156.7 mt dw for the base quota and 128.1 for the adjusted quota). Therefore, quotas and retention limits under alternative suite 4 would meet the rebuilding plan for sandbar sharks and would have positive ecological impacts on this stock.

Overall, discards of non-sandbar LCS are expected to decrease under alternative suite 4 as well. This is because NMFS assumes shark fishermen would no longer target non-sandbar LCS outside the research fishery (Table 4.1). Under the base non-sandbar LCS total quotas, non-sandbar LCS discards are anticipated to be 56.6 mt dw, which is a 63-percent reduction compared to the status quo (Table 4.1). Under the adjusted non-sandbar LCS quota, discards are estimated to be 55.1 mt dw, which is a 64-percent reduction compared to the status quo (Table 4.1).

Dusky discards

A limited number of dusky discards would continue to occur within, and outside of, the shark research fishery. The universe of vessels and the number of sets deployed in the research fishery would be limited, further limiting the number of interactions with dusky sharks (approximately 0.6 mt dw of dusky discards based on 92 trips and 0.5 mt dw of discards under 69 trips; Table 4.1). These sets would all be subject to 100 percent observer coverage, which would provide the Agency with additional information on oceanographic conditions or other factors that might correspond to increased dusky shark abundance. Outside of the research fishery, the limited retention limit for non-sandbar LCS is expected to reduce fishing effort, thereby reducing the likelihood of interactions with dusky sharks on BLL gear. In addition, since shark fishermen would likely no longer direct on sharks due to the reduced trip limits and prohibition of sandbar sharks, they would most likely target other species that would result in shorter soak times for BLL gear; this could increase the likelihood that any dusky sharks could be released alive. Dusky sharks are also caught by PLL vessels that set BLL gear for sharks or other HMS. Assuming PLL vessels are not in the research fishery, PLL vessels would no longer be able to retain sandbar sharks. Thus, NMFS assumes that PLL fishermen would no longer set BLL to harvest sharks, since sandbar sharks are the most lucrative of the shark species. This would reduce the overall dead discards of dusky sharks. By calculating the number of dusky

discards that are anticipated to still occur based on past landings and discards reported in the Coastal Fisheries and HMS Logbooks (*i.e.*, landings and discards in the PLL fishery and other fisheries using gillnet and BLL gear; see Table 4.1), NMFS anticipates that dusky discards would decrease by 72 to 73 percent under alternative suite 4, resulting in positive ecological impacts for this stock.

4.4.3 Time/Area Closures

Under alternative suite 4, NMFS would maintain the mid-Atlantic shark closed area and the current BLL closures in the Caribbean that were implemented in February 2007, (72 FR 5633). Therefore, the ecological impacts associated with these closures would be the same as described under alternative suite 1. In addition, under alternative suite 4, NMFS would consider implementing the eight MPAs being preferred in SAFMC's Amendment 14 as described under alternative suite 2. Therefore, the ecological impacts associated with the MPAs would be the same as described in alternative suite 2.

4.4.4 Reporting

Reporting requirements for shark dealers would be the same as described in alternative suite 3 (Section 4.3.4) and could have neutral ecological impacts. Participants selected to participate in the shark research program would be subject to 100 percent observer coverage as a requirement for eligibility to participate in the program. Increasing observer coverage for vessels participating in this program would result in positive ecological impacts because observer reports could be used to monitor landings, bycatch, and interactions with protected resources in near "real-time." Vessels outside the shark research program would still be required to carry an observer if selected and all vessels would still be required to complete logbooks within 48 hours of fishing activity and then submit the logbooks to NMFS within seven days.

Under alternative suite 4, NMFS would change how sharks listed as unclassified on shark dealer reports are accounted for under quota monitoring. NMFS would monitor the species composition of sharks landed outside the research fishery through scientific observers and/or shark dealer reports. The species composition of shark landings recorded in shark dealer landings and/or as documented by scientific observers outside the research fishery would be applied to landings reported as unclassified sharks and deducted from the appropriate sandbar, non-sandbar LCS, SCS, and pelagic shark quotas. NMFS takes a similar approach for designating unclassified sharks to different quotas for shark stock assessments. Since unclassified sharks are most likely a combination of several shark species, NMFS believes this is a more accurate way to account for unclassified shark landings rather than assuming all unclassifieds belong to one particular quota (*i.e.*, sandbar sharks). As such, this approach should improve the overall accuracy of shark landings. In addition, it could increase the quality of data used in stock assessments by ensuring shark dealer reports more accurately reflect the species composition of landed sharks, resulting in positive ecological impacts.

4.4.5 Seasons

Seasons would be the same as described for alternative suites 2 and 3, however, since all sandbar sharks would be landed by a limited number of vessels participating in a shark research

program and all shark landings in the shark research fishery would be monitored via scientific reports, the Agency would have more information concerning when the sandbar shark quota is expected to be reached. This may result in positive ecological impacts because it may reduce the likelihood of overharvests within the research fishery. The Agency is interested in collecting biological samples from sandbar and non-sandbar LCS throughout the year, therefore, the Agency would determine when the research vessels would fish to ensure adequate spatial and temporal sampling throughout the year. Non-sandbar LCS, SCS, and pelagic shark landings would be monitored via biweekly shark dealer reports outside the research fishery; sandbar discards outside the research fishery would be monitored via the shark observer program, as funds allow. In addition, NMFS would establish a separate non-sandbar LCS quota for the shark research fishery and would close the sandbar, non-sandbar LCS, SCS, and pelagic shark fisheries with a five day notice when each quota reached 80 percent. Closing the fishery with a five day notice upon achieving 80 percent of a respective quota would provide a buffer for landings that may occur outside of NMFS' jurisdiction (*i.e.*, state waters) after a season has been closed. Closing each fishery separately would also allow for research to continue if the non-sandbar LCS quota outside the research fishery became filled. The research fishery itself would continue until both the sandbar and non-sandbar LCS quota established for the research fishery were 80 percent filled (*i.e.*, if the non-sandbar LCS quota within the research fishery reached 80 percent, non-sandbar LCS retention in the research fishery would end, but sandbar sharks could continue to be retained until that sandbar quota reached 80 percent). This would help collect needed life history information for sandbar and non-sandbar LCS, which should improve stock assessments. In addition, retention limits were designed to help ensure that the shark fishing season stays open longer than it has in previous years. This would most likely be the result of shark fishermen no longer targeting non-sandbar LCS, therefore, shark populations would not be heavily harvested during certain times of the year. Instead, shark fishermen would most likely target other species and would keep non-sandbar LCS that they incidentally catch throughout the year. This would decrease discards of sharks and discourage a directed shark fishery, which would have positive ecological benefits.

4.4.6 Regions

NMFS evaluated quotas, retention limits, and the effect of overharvests under the scenario of one region as well as two regions (an Atlantic and Gulf of Mexico region) in Appendix C. The resulting quotas and retention limits for one region versus two regions while accounting for the 2007 overharvests are shown Tables C.1 through C.5. Based on this analysis, NMFS would establish two regions for non-sandbar LCS. This is a change from the DEIS in which only one region was proposed for a non-sandbar LCS quota. NMFS has decided to establish two regions based on public comments, further analysis, and because two regions more closely follows the recommendations from the blacktip shark assessments and would allow for more equitable accounting of overharvests among regions. In addition, regional non-sandbar LCS quotas provide greater flexibility when NMFS is dealing with the Atlantic States Marine Fisheries Commission (ASMFC) interstate shark plan, which would only affect states along the eastern seaboard (*e.g.*, NMFS could work with the ASMFC to adjust quotas along the eastern seaboard separately without affecting the Gulf of Mexico where such adjustments may not be warranted). These are all expected to result in positive ecological impacts. However, since the sandbar shark quota would be taken within the research fishery and would be conducted in such a manner as to ensure adequate sampling over space and time, the base and adjusted sandbar and

non-sandbar quotas within the research fishery would not be split among regions. In addition, the SCS and pelagic shark quotas would also not be split among two regions. Therefore, the ecological impacts associated with one region for the sandbar quota and non-sandbar LCS quota harvested within the research fishery, SCS, and pelagic shark quotas under alternative suite 4 would be the same as the ecological impacts outlined for alternative suite 2.

4.4.7 Recreational Measures

Under alternative suite 4, recreational anglers (HMS Angling, HMS Charter Headboat, and Atlantic Tuna General Category permit holders participating in a registered HMS tournament) would be able to possess non-ridgeback LCS and tiger sharks (Table 4.17). The allowable nonridgeback species would include blacktip, spinner, bull, lemon, nurse, great hammerhead, smooth hammerhead, and scalloped hammerhead sharks. In addition, they would be allowed to retain the current legal SCS and pelagic species. Recreational anglers would not be allowed to retain sandbar or silky sharks (and any currently prohibited species). This delineation of authorized species is based on a recognizable characteristic: the lack of an interdorsal ridge between the first and second dorsal fins. In addition, tiger sharks (which do have an interdorsal ridge) are easily recognized by their color markings. Creating such a list of easily identifiable species should reduce landings of either prohibited species (dusky, bignose, and night sharks) or landings of species that are overfished or that are experiencing overfishing (sandbar sharks). Silky sharks would be prohibited for recreational fisherman because they have an interdorsal ridge, and they are commonly mistaken as either sandbar or dusky sharks. Reducing the likelihood that sandbar and dusky sharks are landed in recreational fisheries would have positive ecological impacts by reducing mortality on these overfished populations that are also experiencing overfishing.

Table 4.17 List of sharks that could be harvested by recreational anglers under the preferred alternatives suite 4. Italicized species are prohibited species for recreational anglers under alternative suite 4 that are currently legal under the status quo.

Complex	Species Authorized to be Harvested by Recreational Anglers Under Alternative Suite 4
LCS (nonridgeback species + tiger sharks)	Blacktip, spinner, bull, lemon, nurse, great hammerhead, smooth hammerhead, scalloped hammerhead, and tigers sharks
SCS	Bonnethead, blacknose, finetooth, and Atlantic sharpnose sharks
Pelagics	Porbeagle, common thresher, shortfin mako, oceanic whitetip, and blue sharks
Prohibited Species	*Sandbar, silky*, sand tiger, bigeye sand tiger, whale, basking, white, dusky, bignose, Galapagos, night, Caribbean reef, narrowtooth, Caribbean sharpnose, smalltail, Atlantic angel, longfin mako, bigeye thresher, sevengill, sixgill, and bigeye sixgill sharks

4.4.8 Ecological Impacts of Alternative Suite 4 on Protected Resources and EFH

This alternative suite would have positive impacts on protected resources, including sea turtles, marine mammals, and smalltooth sawfish as NMFS expects it would reduce overall fishing effort targeting non-sandbar LCS with gillnet and BLL gear while increasing the level of observer coverage on a limited number of vessels participating in a shark research program. The protected resources section of alternative suite 1 and Section 3.4 discuss current interactions with

protected resources in the shark BLL and shark gillnet fisheries. This alternative would implement the same quota for sandbar sharks, but modified regional quotas for non-sandbar LCS. These modified quotas are still expected to reduce overall fishing effort, prevent overfishing, and rebuild overfished stocks. In addition, the regional non-sandbar LCS quotas are consistent with recommendations from the blacktip shark assessment, and would allow for more equitable accounting of overharvests among regions. In addition, they would provide greater flexibility for the Agency to work with the ASMFC shark interstate plan, which would only apply to states along the eastern seaboard. In addition, NMFS would account for overharvests of the LCS complex that occurred during 2007. This would result in quota reductions over five years to account for overharvests, which would further reduce fishing effort and interactions with protected resources compared to the base quotas.

Retention limits for non-sandbar LCS would also be reduced significantly for vessels with shark permits outside the shark research program. While vessels in the shark research program would fish under the trip limits dictated by the research objectives in a given year, there would be a significant reduction in the number of trips directing on sharks because the quota for sandbar sharks would be significantly reduced. In addition, all of these trips would be subject to 100 percent observer coverage. Furthermore, the Agency would determine when these trips would take place throughout the year to ensure regional and seasonal sampling by scientific observers. This shark research program may also provide additional documentation and additional opportunities for data collection on interactions with protected resources via observer reports.

In addition, due to the reduction in trip limits and prohibition of sandbar shark retention outside the research fishery, NMFS anticipates that shark fishermen would no longer be targeting non-sandbar LCS. Rather, NMFS anticipates that fishermen would target other species and incidentally keep non-sandbar LCS they catch. Often, these other fisheries have much shorter soak times compared to directed shark trips (Hale and Carlson, 2007; Hale *et al*. 2007). Therefore, there would be a greater probability that any protected resources caught during these fishing trips would be released alive. Finally, ecological impacts to EFH would likely be positive and similar as those outlined under alternative suite 2.

Social and Economic Impacts

4.4.9 Species Complexes

Under alternative suite 4, NMFS would structure species complexes as they are outlined for alternative suites 2 and 3. Therefore, the economic impacts associated with species complexes would be the same as described in alternative suite 2. The associated economic impacts of the quota reductions for sandbar sharks and non-sandbar LCS and the division of those quotas among vessels inside and outside of a research fishery are described in the next section in combination with retention limits. The only difference between alternatives 2 and 3 and alternative 4 is that porbeagle sharks would no longer be included on the prohibited species list under alternative suite 4. NMFS would allow recreational and commercial fishermen to land this species. NMFS would implement a reduced TAC for porbeagle sharks based on current landings and discards. The associated economic impacts of this are discussed below under quotas and retention limits.

4.4.10 Quotas and Retention Limits

Alternative suite 4 would establish a shark research fishery for sandbar sharks. Fishermen would apply each year, and selection would be based on the research objectives of a given year. Vessels not participating in the research program would still be able to land non-sandbar LCS, SCS, and pelagic sharks subject to the retention limits described above in this chapter, Chapter 2 and Appendix C (Tables 4.16, 2.1, and C.4). Based on the limited number of vessels that could fish for sandbar sharks under a research fishery, most current directed and incidental permit holders would not be allowed to land sandbar sharks, resulting in significant negative socioeconomic impacts for these permit holders. Since Florida, New Jersey, North Carolina, and Louisiana have the most directed and incidental shark incidental permit holders, NMFS anticipates that these states would have the largest negative socioeconomic impacts as a result of the reduced non-sandbar LCS retention limits (Table 3.32). As with alternative suites 2 and 3, shark dealers could also experience negative impacts due to the reduction in the sandbar and other LCS quotas and retention limits, which would reduce the overall amount of sharks being landed.

Under the preferred alternative suite 4, porbeagle sharks would be authorized in the recreational and commercial fisheries, but under a reduced TAC of 11.3 mt dw. Currently the commercial quota for porbeagle sharks is 92 mt dw per year, however, this commercial quota has never been met. NMFS would set a new TAC for porbeagle sharks that would cap effort at current levels. Based on quota monitoring (which includes vessel trip reports) from 2003 to 2006, on average, 3,867 lb dw of porbeagle sharks were landed per year. Based on 2006 ex-vessel prices, this is equivalent to $7,378 in gross revenues for the entire commercial fishery (Table 4.9). Since commercial fishermen would be allowed to continue to land porbeagle sharks at this level, there are no anticipated economic impacts of implementing the TAC. In addition, recreational anglers would still be allowed to land porbeagle sharks. Therefore, there are no identifiable negative economic impacts for recreational fishermen associated with the TAC.

As with alternative suites 2 and 3, NMFS would also maintain the 60 mt ww (43.2 mt dw) shark display and research quota under alternative suite 4. Therefore, the socioeconomic impacts associated with the 60 mt ww shark display and research quota would be the same as described for alternative suites 2 and 3.

Adjusted Quota Process

In alternative suite 4, overharvests would be applied to the next season or over multiple years, depending on the level of overharvest. Under the status quo, overharvests are accounted for in the next fishing season. Spreading overharvests out over multiple years would allow NMFS to maintain a much-needed research fishery and may benefit fishermen economically as it could lead to larger quotas and higher gross revenues within a given year, depending on the level of overharvest. The number of years over which NMFS spreads overharvests would depend on the level of overharvest and the amount of quota needed for NMFS to conduct shark research. The maximum timeframe for accounting for overharvests would be five years due to the timing of new stock assessments at least once every five years. Fishermen would gain the most socioeconomic benefits from spreading out overharvests over five years since this would result in the largest quotas compared to accounting for overharvests within one year. The least

socioeconomic benefit would result from accounting for overharvests within one year. However, the application of underharvest for healthy stocks would occur during the next fishing season and would be capped at 50 percent of the base quota for healthy stocks. Therefore, the socioeconomic impact of the application of underharvests would be the same as described for alternative suite 2.

Fins Attached

In addition, alternative suite 4 would require that shark fins remain on the shark through the first port of landing. As with alternative suites 2 and 3, the overall socioeconomic impact of this could be significant given the reduction in the sandbar quota, which is the most lucrative shark due to the value of its fins. Therefore, the socioeconomic impacts associated with landing sharks with their fins on would be the same as described for alternative suite 2.

Fishery level impacts

Base Quotas

Shark Research Fishery - Based on public comment, NMFS would establish a separate non-sandbar LCS base quota for the research fishery. In the DEIS, it was determined that while fishermen in the research fishery would harvest the sandbar shark base quota of 116.6 mt dw, they would also harvest approximately 50 mt dw of the non-sandbar LCS quota (see Appendix A). Thus, to allow the research fishery to remain open if the non-sandbar LCS quota is filled outside the research fishery, NMFS would allocate 50 mt dw of non-sandbar LCS base quota to the research fishery. Thus, NMFS would close each shark fishery when each quota reaches 80 percent. The research fishery itself would continue until both the sandbar and non-sandbar LCS quota established for the research fishery were 80 percent filled (*i.e.*, if the non-sandbar LCS quota within the research fishery reached 80 percent, non-sandbar LCS retention in the research fishery would end, but sandbar sharks could continue to be retained until that sandbar quota reached 80 percent). The research fishery would be structured such that trips would be taken in different regions and seasons to allow sampling of sandbar shark and non-sandbar LCS to occur year-round. In addition, fishermen within the research fishery could harvest the sandbar shark base quota of 116.6 mt dw. Given these sandbar and non-sandbar LCS base quotas, based on 2006 ex-vessel prices, fishermen operating within the research fishery could earn $582,034 in gross revenues of sandbar and non-sandbar LCS landings (Table 4.18). Since 5 to 10 vessels are anticipated to participate in the research fishery, the average gross revenues per vessel on sandbar shark and non-sandbar LCS landings would range from $116,407 (*i.e.*, $582,034 / 5 vessels) to $58,203 (*i.e.*, $582,034 / 10 vessels).

Table 4.18 Gross revenues under alternative suite 4.

Alternative Suite 4	Base Quota (mt dw)	Base Quota (lb dw)	Adjusted Quota (mt dw)	Adjusted Quota (lb dw)	2006 Ex-Vessel Price	Total Gross Revenues for Base Quota	Total Gross Revenues for Adjusted Quota
Vessels in the Research Fishery							
Sandbar shark	116.6	257,056	87.9	193,784			
Non-sandbar LCS	50	110,230	37.5	82,673			
Sandbar shark fins		12,853		9,689	$18.43	$236,881	$178,568
Sandbar shark carcass		244,204		184,098	$0.56	$136,754	$103,095
Non-sandbar LCS fins		5,512		4,134	$18.43	$101,586	$76,190
Non-sandbar LCS carcass		104,719		78,539	$1.02	$106,813	$80,110
Total revenues from sandbar and non-sandbar LCS landings						**$582,034**	**$437,963**
Total revenues from sharks per trip (92 trips for base quota; 69 trips with adjusted quota)						$6,329	$6,347
Vessels Outside the Research Fishery							
Atlantic regional non-sandbar LCS quota	188.3	415,126	187.8	414,024			
Gulf of Mexico regional non-sandbar LCS quota	439.5	968,922	390.5	860,896			
Atlantic non-sandbar LCS fins		20,756		20,701	$16.20	$336,247	$335,356
Atlantic non-sandbar LCS carcass		394,370		393,323	$0.46	$181,410	$180,929
Total revenues from Atlantic non-sandbar LCS landings						**$517,657**	**$516,285**

Alternative Suite 4	Base Quota (mt dw)	Base Quota (lb dw)	Adjusted Quota (mt dw)	Adjusted Quota (lb dw)	2006 Ex-Vessel Price	Total Gross Revenues for Base Quota	Total Gross Revenues for Adjusted Quota
Gulf of Mexico non-sandbar LCS fins		48,446		43,045	$20.65	$1,000,410	$888,879
Gulf of Mexico non-sandbar LCS carcass		920,476		817,851	$0.47	$432,624	$384,390
Total revenues from Gulf of Mexico non-sandbar LCS landings						**$1,433,034**	**$1,273,269**
Total revenues under alternative suite 4 from sandbar and non-sandbar LCS landings						**$2,532,725**	**$2,227,517**

Outside the Research Fishery - Vessels operating outside of the research fishery would have a regional non-sandbar LCS base quota of 188.3 mt dw (415,126 lb dw) in the Atlantic region and 439.5 mt dw (968,922 lb dw) in the Gulf of Mexico region. In 2006 ex-vessel prices, this is equivalent to $517,657 in the Atlantic region and $1,433,034 in gross revenues in the Gulf of Mexico region (Table 4.18).

In total, vessels operating within, and outside, of the research fishery are expected to have gross revenues of $2,532,725 in sandbar and non-sandbar LCS landings under the base quotas (Table 4.18). This is a 48-percent reduction in gross revenues from sandbar sharks and non-sandbar LCS under the status quo (gross revenues based on current directed and incidental permit holders' landings were $4,903,001; Table 4.9). However, this is less of a reduction compared to alternative suite 2 and 3 because the entire sandbar and non-sandbar LCS quotas could be harvested under alternative suite 4. Because the States of Florida, Louisiana, New Jersey, and North Carolina have the greatest number of incidental and directed shark permit holders (Table 3.32), NMFS anticipates that these states would have the largest negative socioeconomic impacts as a result of the quota reductions.

Adjusted Quotas

Shark Research Fishery - Based on overharvests of the LCS complex in 2007, NMFS would adjust the base quotas to account for the overharvests (see Appendix C for more details). The adjusted sandbar shark quota within the research fishery would be 87.9 mt dw and the adjusted non-sandbar LCS quota for the shark research fishery would be 37.5 mt dw. For fishermen operating within the research fishery, based on 2006 ex-vessel prices, NMFS estimates that vessels operating in the research fishery could make $437,963 in gross revenues from

sandbar and non-sandbar LCS landings (Table 4.18). Since 5 to 10 vessels are anticipated to participate in the research fishery, NMFS estimates that the average gross revenues per vessel on sandbar shark and non-sandbar LCS landings would range from $87,593 (*i.e.*, $437,963 / 5 vessels) to $43,796 (*i.e.*, $437,963 / 10 vessels).

Outside the Research Fishery - In the Gulf of Mexico region, the adjusted quota would be 390.5 mt dw, and the adjusted non-sandbar LCS quota for the Atlantic region would be 187.8 mt dw. Based on these adjusted quotas, vessels operating outside of the research fishery could expect gross revenues of $516,285 in the Atlantic region and $1,273,269 in the Gulf of Mexico region on non-sandbar LCS landings, based on 2006 ex-vessel prices (Table 4.18).

In total, vessels operating within, and outside, of the research fishery are expected to have gross revenues of $2,227,517 in sandbar and non-sandbar LCS landings (Table 4.18). This is a 55-percent reduction in gross revenues from sandbar sharks and non-sandbar LCS under the status quo (gross revenues based on current directed and incidental permit holders' landings were $4,903,001; Table 4.9).

Directed and Incidental permit holder impacts in the research fishery

Currently, directed permit holders have a 4,000 lb dw LCS trip limit. Vessels operating within a shark research fishery may experience similar trip limits, depending on the research objectives of the fishery. However, the overall base quota for sandbar sharks in the research fishery would be reduced to 116.6 mt dw. Assuming the catch composition is 70 percent sandbar sharks, and there is a 4,000 lb dw trip limit, 92 trips would fulfill the sandbar shark quota (this is assuming that vessels in the research fishery would continue to target sandbar sharks as they have in the past; trips would be distributed among regions and seasons to ensure adequate sampling through time and over space; see Section 4.4.2 and Appendix A, Table A.2). Given this catch composition, 30 percent of 4,000 lb dw trip would be non-sandbar LCS. If 92 trips were made with these trip limits and catch compositions, NMFS estimates that 50 mt dw of non-sandbar LCS would also be caught in the research fishery while harvesting the 116.6 mt dw of sandbar base quota (see Section 4.4.2 and Appendix A, Table A.5). Based on these landings under the base quotas, the research fishery would have estimated overall gross revenues of $582,034 or $6,329 per trip in gross revenues (based on 92 BLL trips; Table 4.18). Similarly, the 87.9 mt dw of sandbar adjusted quota (Appendix C; Table C.2) could be caught in approximately 69 trips (87.9 mt dw = 193,784 lb dw; 93,784 lb dw / 2,800 lb dw = 69 trips). If 69 trips were made to harvest the 87.9 mt dw of sandbar adjusted quota, NMFS estimates that, 37.5 mt dw of non-sandbar LCS quota would also be harvested in the shark research fishery (69 trips x 1,200 lb dw = 82,800 lb dw or 37.5 mt dw) (Table C.3). Based on these landings under the adjusted quotas, the research fishery would have estimated overall gross revenues of $437,963 or $6,347 per trip in gross revenues (based on 69 BLL trips; Table 4.18).

On average, directed permit holders reported 1,108 trips per year (using a combination of gear types) in the Coastal Fisheries and HMS logbooks that landed sandbar sharks and non-sandbar LCS from 2003 to 2005 (Table 4.11). While 92 trips represents a greater than 91-percent reduction in the average number of trips taken by directed permit holders from 2003 to 2005 (and 69 trips would be a 94-percent reduction), these trips would be divided across a much smaller universe of vessels, therefore, minimizing the economic impacts for vessels that are

selected to participate in the research fishery. Since Florida, New Jersey, North Carolina, and Louisiana have the greatest number of directed shark incidental permit holders, NMFS anticipates that these states would have the largest negative socioeconomic impacts as a result of the limited number of vessels that would be able to participate in the research fishery and the restriction on trip limits for vessels operating outside the research fishery.

Incidental permit holders took, on average, 305 trips per year that landed sandbar sharks and 347 trips per year that landed non-sandbar LCS in 2003 to 2005 (Table 4.11). On average, they landed 2 sandbars and 3 non-sandbar LCS per trip for total estimated gross revenues of $307 per trip (Table 4.11). However, under alternative suite 4, if incidental fishermen are selected to participate within the research fishery, then they would have the same retention limits as directed shark permit holders, and therefore, receive the same gross revenues from shark landings as directed shark permit holders. Given gross revenues for directed shark permit holders would be $6,329 per trip under the base quotas (or $6,347 per trip under the adjusted quotas), the same gross revenues for incidental permit holders would be almost 21 times higher than gross revenues under the status quo ($6,329 / $307 = 20.6 times higher). Therefore, positive economic impacts may be realized by the few incidental permit holders that may participate in the research fishery.

Directed permit holders outside the research fishery

On average, directed permit holders landed 35 sandbar sharks and 32 non-sandbar LCS per trip based on the Coastal Fisheries and HMS logbooks (Table 4.11). This translated into gross revenues of $4,101 per trip in sandbar and non-sandbar LCS landings based on 2006 ex-vessel prices (Table 4.11). In total, directed permit holders made $4,702,031 in gross revenues from sandbar and non-sandbar LCS landings under the status quo (Table 4.9). Under the adjusted quota for alternative suite 4, directed permit holders operating outside the research fishery would still be able to retain 33 non-sandbar LCS per trip until the regional non-sandbar LCS quotas were filled. This trip limit translates into an average trip weight of 1,112 lb dw (33 non-sandbar LCS x 33.7 lb dw [average commercial weight of non-sandbar LCS] = 1,112 lb dw). Based on 2006 ex-vessel prices, this translates into $2,101 in gross revenues per trip (assuming 5 percent fin weight and 95 percent carcass weight). Given there were, on average, 1,108 directed trips reported in the Coastal Fisheries and HMS logbooks from 2003 to 2005, this would result in gross revenues of $2,327,908 for directed permit holders from non-sandbar LCS landings based on the adjusted trip limits.

At the end of the five year period over which NMFS would spread out the overharvest amounts from 2007 (at the end of 2012), NMFS would implement the base quotas, which would increase the retention limit for directed permit holders to 36 non-sandbar LCS per trip. These base quotas would result in slightly higher gross revenues; 36 non-sandbar LCS translates into 1,213 lb dw per trip, which is $2,293 per trip in gross revenues from non-sandbar LCS landings based on 2006 ex-vessel prices. Total gross revenues for directed permit holders based on 36 non-sandbar LCS per trip and based on the number of trips made by directed permit holders in the past (1,108 trips) would be $2,540,644. However, gross revenues for directed permit holders from non-sandbar LCS landings on either a trip basis or total gross revenues would still be reduced by over 46-percent based on the trip limits for the adjusted and base non-sandbar LCS

quotas Table 4.9). This is mainly due to the prohibition of sandbar sharks to fishermen operating outside the research fishery.

These reductions in gross revenues on a trip basis may be even larger when examined within a regional context. Under the status quo, shark fishermen made, on average, $4,743 per trip on sandbar and non-sandbar LCS landings in the Atlantic region, and $5,853 per trip in the Gulf of Mexico region (Table 4.11). Based on the trip limits under the adjusted quotas (33 non-sandbar LCS per trip), directed permit holders' gross revenues on non-sandbar LCS would be $887 per trip in the Atlantic region and $1,645 per trip in the Gulf of Mexico. This is an 81-percent reduction in gross revenues per trip in the Atlantic region and 72-percent reduction in the Gulf of Mexico region (Table 4.11). Under the trip limits for the base quota (36 non-sandbar LCS per trip), directed permit holders' gross revenues on non-sandbar LCS would be $1,513 in the Atlantic region and $1,794 in the Gulf of Mexico region. This would be a 68-percent reduction in gross revenues per trip in the Atlantic region and a 69-percent reduction in the Gulf of Mexico region (Table 4.11). As stated above, these reductions in gross revenues are due to the prohibition of sandbar sharks outside the shark research fishery. Since an average of 141 vessels with directed shark permits reported sandbar landings in the Coastal Fisheries and HMS Logbooks from 2003 to 2005 and most directed permit holders are located in Florida, New Jersey, and North Carolina (Table 3.32), NMFS anticipates that these 141 active vessels in these states would be most negatively impacted by alternative suite 4.

Incidental permit holders outside the research fishery

On average, incidental permit holders landed 2 sandbar sharks and 3 non-sandbar LCS per trip based on the Coastal Fisheries and HMS logbooks (Table 4.11). This translated into gross revenues of $307 per trip in sandbar and non-sandbar LCS landings based on 2006 ex-vessel prices (Table 4.11). In total, incidental permit holders made $106,491 in gross revenues from sandbar and non-sandbar LCS landings under the status quo (Table 4.9). Under the adjusted and base quotas for alternative suite 4, incidental permit holders operating outside the research fishery would still be able to retain 3 non-sandbar LCS per trip until the regional non-sandbar LCS quotas were filled. This trip limit translates into an average trip weight of 101 lb dw (3 non-sandbar LCS x 33.7 lb dw [average commercial weight of non-sandbar LCS] = 101 lb dw). Based on 2006 ex-vessel prices, this translates into $190 in gross revenues per trip (assuming 5 percent fin weight and 95 percent carcass weight). Given there were, on average, 347.3 incidental trips reported in the Coastal Fisheries and HMS logbooks from 2003 to 2005, this would result in gross revenues of $65,987 for incidental permit holders from non-sandbar LCS landings. Therefore, gross revenues for incidental permit holders from non-sandbar LCS landings on either a trip basis or total gross revenues would still be reduced by approximately 38-percent based on the trip limits for the adjusted and base non-sandbar LCS quotas (Table 4.11). This is mainly due to the prohibition of sandbar sharks to fishermen operating outside the research fishery. Since most incidental shark permit holders are in the states of Florida, Louisiana, New Jersey, and North Carolina (Table 3.32), these states would be most negatively impacted by alternative suite 4.

4.4.11 Time/Area Closures

Under alternative suite 4, NMFS would maintain the mid-Atlantic shark closed area to BLL gear and the current BLL closures in the Caribbean that were implemented in February 2007, (72 FR 5633). Therefore, the economic impacts associated with these closures would be the same as described under alternative suite 1. In addition, NMFS would also implement the eight MPAs being preferred in the SAFMC's Amendment 14 as described under alternative suite 2. Therefore, the economic impacts associated with the MPAs would be the same as described in alternative suite 2.

4.4.12 Reporting

This alternative suite could result in neutral economic impacts, similar to alternative suite 3. Shark dealers would be still be required to submit landings data twice a month, however, they would need to ensure that it is actually *received* by the Agency within 10 days of a bimonthly reporting period ending. Currently, shark dealers simply have to ensure that the landings reports submitted to NMFS are *post-marked* within 10 days of the end of a reporting period. Additional burden is not expected as a result of modifying the regulations to ensure that shark dealer reports are actually received. Furthermore, timelier reporting and receipt of information by the Agency may result in a decreased likelihood that quotas would be exceeded and overharvests removed from forthcoming shark seasons.

This alternative suite would increase the level of observer coverage for a limited number of vessels that would apply and be selected for participation in a shark research program. One-hundred percent observer coverage would be a requirement for consideration under this program. Vessels outside the shark research program would still be required to take an observer if selected. All vessels would still be required to complete and submit commercial logbooks in the same timeframe.

Under alternative suite 4, NMFS would change how sharks listed as unclassified on shark dealer reports are accounted for under quota monitoring. NMFS would monitor the species composition of sharks landed outside the research fishery through scientific observers and/or shark dealer reports. The species composition of shark landings documented by shark dealer reports and/or scientific observers outside the research fishery would be applied to unclassified sharks and deducted from the appropriate sandbar, non-sandbar LCS, SCS, and pelagic shark quotas. NMFS believes this is the most accurate way to account for unclassified sharks from the different quotas, and should improve the accuracy of shark dealer reporting. However, through shark dealer identification workshops, NMFS believes the number of unclassified sharks in shark dealer reports should decrease over time. Properly identifying sharks may result in negative economic impacts in the short-term because it takes more time than reporting sharks as unclassified. However, submission of accurate shark dealer data may result in positive economic impacts in the long-term as it would improve quota monitoring, decrease the likelihood of extensive overharvests and subsequent closures, and improve the results from stock assessments by ensuring data is more accurate and includes species specific information.

4.4.13 Seasons

The same negative economic impacts for the North Atlantic region described in alternative suites 2 and 3 would exist for alternative suite 4. Furthermore, seasons would be closed within five days notice of any species/complex attaining 80 percent of their quota. The primary difference between alternative suite 4 and the other alternatives would be that there would be a limited number of vessels that would be selected to participate in a shark research program, and would be able to land sandbar, non-sandbar LCS, and other species/complex year-round if quota was available. However, since NMFS established a separate non-sandbar LCS quota for the shark research fishery, sandbar, non-sandbar LCS, SCS, and pelagic shark fisheries would close with five days notice when each fishery achieves 80 percent of their respective species/complex quota. This should allow each fishery to harvest their respective quota and not result in negative economic impacts.

4.4.14 Regions

Based on public comments, further analysis, and to better manage the non-sandbar LCS quota, NMFS has would implement two regions rather than a single region as proposed in the DEIS. NMFS evaluated resulting non-sandbar LCS quotas based on one and two regions in Appendix C. Based on historical landings, two regions would provide the Gulf of Mexico region with a higher non-sandbar LCS quota than compared to the Atlantic region. However, since these quotas are based on historical landings, these quotas are equitable and fair to the two regions. Based on 2006 ex-vessel prices, given base non-sandbar LCS quotas (188.3 mt dw in the Atlantic region and 439.5 mt dw in the Gulf of Mexico region), gross revenues from non-sandbar LCS landings would be $517, 657 in the Atlantic region and $1,433,034 in the Gulf of Mexico region (Table 4.18). Under the adjusted quotas (187.8 mt dw for the Atlantic region and 390.5 mt dw in the Gulf of Mexico region; Table 4.16), gross revenues from non-sandbar LCS landings would be slightly lower with $516, 285 in the Atlantic region and $1,273,269 in the Gulf of Mexico region (Table 4.18). While this may disadvantage the Atlantic region by establishing a smaller Atlantic regional quota, it would allow for regional accounting of overharvests. Given the large overharvests in 2007, particularly in the Gulf of Mexico region (see Appendix C), establishing two regions allowed NMFS to account for overharvests within each region, therefore not penalizing the Atlantic region for overharvests in the Gulf of Mexico. This would also result in positive economic benefits with regional accounting of overharvests to both regions in the future.

Establishing separate regional non-sandbar LCS quotas could still result in negative economic impacts on regions in which sharks are not available year round. The North Atlantic region, for example, would be disadvantaged because non-sandbar LCS are normally present only during the summer months. Trip limits have been designed, in part, to ensure that non-sandbar LCS could be landed for a longer period of time than under the status quo. Therefore, the non-sandbar LCS season should stay open longer than under the status quo, giving the North Atlantic region a greater chance to harvest non-sandbar LCS later on in the season.

Alternative suite 4 would also implement a shark research program that would allow a limited number of vessels to conduct fishing activities in all regions throughout the year. Vessels outside the research fishery could either move to southern areas to participate in the shark fishery

where sharks are present year-round or redistribute fishing effort to other fisheries. The sandbar shark quota, SCS, and pelagic shark quotas would not be separated into two regional quotas. Instead, they would be spread over one region, the Atlantic, Gulf of Mexico, and the Caribbean Sea. Therefore, the impact of this would be similar to the impacts of one region as described under alternative suite 2. Shark dealers in the North Atlantic region would most likely be negatively affected, possibly even more so than vessels, as the likelihood of consistently having shark products would decrease.

4.4.15 Recreational Measures

Under alternative suite 4, recreational fishermen would be allowed to land non-ridgeback LCS and tiger sharks (see Table 4.17). Recreational fishermen would not be able to land sandbar sharks and silky sharks. On average, 4,235 sandbar sharks and 1,943 silky sharks were landed by recreational anglers between 2002 and 2006. Since recreational anglers are not authorized to sell sharks, they should not experience any negative economic impacts from this action. They would still be authorized to catch and release sandbar and silky species. However, Charter/Headboat captains may experience negative economic impacts if customers are not willing to hire charters since they cannot land sandbar or silky sharks. Most Charter/Headboat permits are located in Florida, Massachusetts, New Jersey, and North Carolina (Table 3.33). Therefore, these states may be the most affected by these prohibitions.

Tournaments offering prize categories for LCS may also experience negative economic impacts as a result of prohibiting sandbar and silky sharks. Only 7 percent of HMS tournaments in 2007 awarded points or prizes for ridgeback shark species. The states of New York, Florida, Maryland, Alabama, Puerto Rico, South Carolina, and Texas have registered LCS tournaments, with New York, Florida, Maryland, and Texas having the most tournaments that award points or prizes for LCS (Table 3.39). Therefore, these states may be most affected by recreational anglers not being allowed to land sandbar and silky sharks in tournaments.

Conclusion

NMFS prefers alternative suite 4 because it implements quotas and retention limits needed to end overfishing and rebuild overfished shark stocks; it maximizes scientific data collection by implementing a limited research fishery for sandbar sharks with 100 percent observer coverage; and mitigates some of the significant economic impacts that are expected to result from this action. This alternative suite strikes a balance between positive ecological benefits that must be achieved to end overfishing and rebuild overfished stocks while minimizing the severity of negative economic impacts that may occur as a result of these measures. By allowing a limited number of historical participants to continue to harvest sharks, the Agency ensures that data for stock assessments and life history samples would continue to be collected. This would also allow a small pool of individuals to continue to collect revenues from sharks as they have in the past. Vessels not selected to participate in the shark research program could continue to land non-sandbar LCS outside the research fishery. Trip limits would be based on permit type and quota (36 non-sandbar LCS per trip and 3 non-sandbar LCS per trip for directed and incidental permit holders, respectively, under the base quotas, and 33 non-sandbar LCS per trip and 3 non-sandbar LCS per trip for directed and incidental permit holders, respectively, under the adjusted quotas). NMFS assumes that most shark fishermen outside the research

fishery would no longer target non-sandbar LCS. Rather, fishermen would target other species and keep non-sandbar LCS that were incidentally caught, preventing excessive discards. Recreational anglers would be allowed to retain all the current LCS species except sandbar and silky sharks. Since recreational anglers are not authorized to sell sharks, they should not experience any negative economic impacts from this action. They would still be authorized to catch and release sandbar and silky sharks. However, Charter/Headboat captains may experience negative economic impacts if customers are not willing to hire charters since they cannot land sandbar or silky sharks.

Negative economic impacts would likely occur under alternative suite 4. For instance, fishermen outside the research fishery would not be able to land sandbar sharks and would be subject to a limited non-sandbar LCS quota, resulting in 48-percent reduction in gross revenues compared to the status quo (Table 4.18). These losses in gross revenues may be exacerbated by the requirement to land shark with their fins attached. In addition, establishing one season represents an economic disadvantage to the North Atlantic region as sharks are not present in these waters year-round, and the Atlantic region, which would have a lower overall non-sandbar LCS quota compared to the Gulf of Mexico region. As a result, the quota may be filled in some years before sharks are present in the North Atlantic region or may fill more quickly in the Atlantic region versus the Gulf of Mexico region given the differences in non-sandbar LCS quotas. The elimination of seasons combined with limiting underharvest carry-overs may have negative economic effect on fishermen, especially for regions that consistently have underharvests of species like SCS in the past.

Since only a few vessels are expected to participate in the research fishery, and only a few BLL and gillnet vessels are expected to continue targeting sharks within the research fishery, the number of protected species interactions may also decrease. However, it is likely that some of this fishing effort may be displaced into other fisheries which may result in interactions with protected species. In addition, alternative suite 4 would require that sharks are landed with their fins naturally attached; this action would help stop any illegal finning, resulting in a reduction of overall shark mortality.

Shark landings within the research fishery would be monitored by shark observer reports. These observer reports would be submitted at the conclusion of each fishing trip; therefore allowing near real-time quota monitoring of the sandbar quota as well as other species of sharks landed in the shark fishery. This is critical for the small sandbar and non-sandbar LCS based and adjusted quotas within the research fishery. Non-sandbar LCS, SCS and pelagic sharks caught outside the research fishery would be monitored through biweekly shark dealer reports. Given the reduced trip limit for non-sandbar LCS, if shark dealer reports are submitted on a timely basis, then NMFS anticipates quota monitoring would be improved, reducing the likelihood of overharvests. This would benefit fishermen economically and would have ecological benefits for shark stocks.

4.5 Alternative Suite 5: Close Atlantic Shark Fisheries

Ecological Impacts

4.5.1 Quotas, Species Complexes and Retention Limits

This alternative suite would prohibit the landing of all sharks in commercial and recreational fisheries. This alternative suite could have positive ecological impacts for all shark stocks including sandbar sharks. The 2005/2006 stock assessment for sandbar sharks recommends a total allowable catch of 220 mt ww (158.3 mt dw) per year to rebuild the stock by 2070. A quota of 0 mt dw would expedite the time necessary for rebuilding sandbar sharks stocks. However, even if landings of sandbar sharks were prohibited in Federal waters, there would still continue to be dead discards, illegal landings, and landings in state waters that must be accounted for. Based on landings reported in the Coastal Fisheries Logbook, landings and discards in the HMS Logbook, and discards reported in by the BLL observer program (Hale and Carlson, 2007), NMFS estimates that there would continue to be approximately 12.7 mt dw per year of sandbar sharks landed in state waters, landed illegally or discarded dead in commercial fisheries (Table 4.1) plus approximately 27 mt dw due to potential recreational landings for a total of 39.7 mt dw per year. Given the sandbar shark stock assessment recommended a total TAC of 158.3 mt dw per year, further reducing that mortality to 39.7 mt dw per year could rebuild the stock at a faster rate. Compared to current fishing mortality due to commercial and recreational fisheries as well as discards (631 mt dw per year), implementing this alternative suite could result in a decrease in total landings and discards of sandbar sharks of approximately 94-percent by weight.

Dusky sharks have been a prohibited species since 2000, however, they continue to be landed and/or discarded in longline, gillnet, and recreational fisheries pursuing sharks and other species. This alternative suite could have positive ecological impacts as it would prohibit landings of all shark species. Presumably, this could reduce fishing effort for all sharks in longline, gillnet, and recreational fisheries. Closing Atlantic shark fisheries could reduce the number of dusky sharks that are caught as bycatch and then discarded dead, however, it would not likely affect the number of dusky sharks that are landed illegally by commercial or recreational participants or dusky sharks landed in state waters. Approximately 8.1 mt dw of dusky sharks would likely continue to be landed in state waters, landed illegally, or discarded dead in commercial and recreational fisheries (Table 4.1). This represents a 75-percent reduction in weight (34 percent by number) of dusky sharks that are currently being landed or discarded.

Closing the Atlantic shark fisheries could result in positive ecological impacts for other species in the LCS complex (non-sandbar LCS other than sandbar sharks). In 2005/2006, stock assessments for the LCS complex (including sandbar sharks) and blacktip sharks in the Gulf of Mexico and South Atlantic were conducted. The results of these assessments indicate that it is not appropriate to assess the species included in the LCS complex as a group, so the LCS complex status was declared to be unknown. Blacktip sharks in the Gulf of Mexico are healthy, whereas the status of the South Atlantic stock is unknown. The stock assessment for blacktip sharks recommended maintaining current fishing mortality levels in the Gulf of Mexico region and not increasing landings in the South Atlantic region. Most of the species that comprise the LCS complex, with the exception of sandbar and blacktip sharks, have limited landings data

available and/or are not encountered frequently in commercial fisheries or fisheries surveys. There are limited landings data available for these species but life history studies indicate that these species generally mature later, and have fewer pups, than other sharks landed in commercial and recreational fisheries. Closing the Atlantic shark fisheries would minimize but not eliminate the catch of LCS as these species would still be caught illegally, discarded dead, or landed in state waters. NMFS estimates that 51.7 mt dw per year of non-sandbar LCS sharks would continue to be discarded or landed in state waters (Table 4.1). This represents a 66-percent reduction in landings of non-sandbar LCS, resulting in positive ecological impacts.

This alternative suite would also close the fishery for SCS to further reduce fishing effort and assist in rebuilding of overfished shark species that could be caught when targeting SCS. The ecological impacts of closing the SCS fishery could likely be positive for the SCS complex. The SCS complex, and individual species comprising the complex, are currently being assessed following the SEDAR methodology. Preliminary results from the assessment indicate that blacknose sharks are overfished and experiencing overfishing. Finetooth, bonnethead, Atlantic sharpnose sharks, and the SCS complex are not overfished or experiencing overfishing. The Agency may take additional measures, as necessary, once the final stock determinations are made. On average, recreational SCS fisheries landed 126,285 SCS (including prohibited species) per year between 2003 and 2005. Commercial fisheries landed approximately 247 mt dw per year during the same time period. The majority of commercially landed SCS are caught with gillnet gear. Minimizing gillnet fishing effort may also result in positive ecological impacts for species that are caught incidentally in these fisheries. However, illegal landings of SCS, dead discards, and landings in state waters would continue to occur, despite closing the SCS fishery.

In addition, this alternative suite would close the fishery for pelagic sharks and could likely result in positive impacts for pelagic sharks. As described in Chapter 3, stock assessments have been conducted for blue, shortfin mako, and porbeagle sharks. Stock assessments for blue and shortfin mako shark stocks conducted by the Standing Committee on Research and Statistics (SCRS) of ICCAT in 2005, indicated that results of both these assessments should be considered preliminary due to limitations on quality and quantity of catch data available. These species will be assessed again in 2008 by the SCRS. The stock assessment for porbeagle sharks, conducted by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), indicates that porbeagle are overfished but are not experiencing overfishing. The estimated rebuilding time frame is 100 years. NMFS has reviewed the Canadian stock assessment and deemed it to be the best available science and appropriate for management in U.S. waters. There were 4,885 pelagic sharks landed per year in recreational fisheries from 2003 to 2005 (including prohibited species). During the same time period, commercial fisheries landed 240 mt dw pelagic sharks per year (including prohibited species). The commercial fishery landed an average of 1.7 mt dw per year of porbeagles from 2003-2006. Dead discards and illegal landings of pelagic sharks would continue to occur if landings are prohibited; however, the Agency assumes that these levels of fishing mortality would be significantly less than current levels.

Ecological impacts for prohibited shark species are expected to be positive, despite the fact that it is already illegal to land these sharks. As described above, drastic reductions in fishing effort as a result of closing the Atlantic shark fishery would result in less effort targeting

sharks. Reductions in longline and gillnet effort targeting sharks are expected to reduce bycatch and discards of prohibited sharks.

This alternative suite would partition the 60 mt ww quota for exempted fishing permits, display permits, scientific research permits, and letters of acknowledgement to place more stringent limits on the quantity of sandbar and dusky sharks authorized for these purposes. However, the overall 60 mt ww quota would not be modified. The sandbar shark quota authorized for research and public display would be limited to 2 mt dw (1 mt dw for research, 1 mt dw for display). Dusky sharks would not be allowed for public display due to concerns regarding their stock status and their performance in captivity. However, based on research needs and objectives, NMFS would review the allocation of dusky sharks for research on a case by case basis. The remaining quota for exempted fishing permits (41.2 mt dw or 57.2 mt ww) would be authorized for all other shark species, besides dusky and sandbar sharks, under the exempted fishing program. In total, this quota represents less than five percent of the current commercial quota. Maintaining this quota could result in neutral ecological impacts because the quota has never been met in the past, and the Agency could strictly regulate the number and species of sharks authorized for exempted fishing and public display. Reducing the amount of dusky and sandbar sharks authorized for these purposes could result in neutral or slightly positive ecological impacts for these species. The sandbar sharks harvested under this program have ranged from 57 to 110 sharks per year from 2004 to 2006. Ecological impacts on other species would be neutral.

Closing Atlantic shark fisheries would likely have positive impacts on non-shark species that are incidentally landed with gillnet and BLL gear used to target sharks. Fishermen targeting sharks with BLL gear in the Gulf of Mexico effectively target sharks, as observer reports from 2005-2007 indicate that sharks comprised 94 percent of the total catch; however, there are other species that are caught while targeting sharks, including grouper, king snake eel, red drum, and snapper (various spp.). In the South Atlantic region, sharks comprised a majority (95 percent) of the total catch, however; grouper, snapper, cownose ray, smooth dogfish, mutton snapper, and spiny dogfish were also caught by vessels targeting sharks. Closing the Atlantic shark fishery would significantly reduce shark fishing effort with BLL gear, resulting in positive ecological impacts to some of the species that are landed incidentally by shark fishermen deploying BLL gear. Similar to BLL fisheries targeting sharks, observer reports from the gillnet fishery indicate that non-shark species are also caught with gillnet gear by fishermen targeting sharks.

Observer reports from the gillnet fishery between 2005 and 2007 indicate that non-shark bycatch varies considerably depending on how gillnets are fished. The vast majority of strike gillnets catch is comprised of sharks (99 percent), whereas 79 percent of drift gillnet catch is sharks, and 83 percent of sink gillnet catch is sharks. Non-shark species commonly caught in drift and sink gillnet gear include: little tunny, king and Spanish mackerel, great barracuda, cobia, southern kingfish, guitarfish, sailfish, and gulf flounder. Significant reductions in directed shark gillnet fishing effort as a result of closing shark fisheries could likely result in positive ecological impacts for these species.

Some of the positive ecological impacts from closing the Atlantic shark fishery on other non-shark species may be offset by shark fishermen moving to other BLL and gillnet fisheries.

It is difficult to predict exactly which fisheries would receive the majority of the fishing effort that is redistributed to other fisheries by closing the shark fishery. Currently, the majority of shark fishing effort takes place in the Gulf of Mexico and South Atlantic regions. Judging by the other permits that shark directed and incidental fishermen possess, it seems likely that effort would increase in several other fisheries in the South Atlantic and Gulf of Mexico regions, including: the snapper-grouper complex, reef fish, tilefish, Spanish mackerel, King mackerel, and dolphin/ wahoo. These affects are discussed in more detail in the cumulative impacts in Section 4.14.

4.5.2 Time/Area Closures

The existing seasonal BLL closures affecting the Atlantic shark fishery would no longer be necessary as this alternative suite closes the Atlantic shark fishery and would no longer allow the use of BLL gear by shark permit holders. In isolation, removing the time/area closures could have neutral ecological impacts on sharks and incidentally landed species as the shark fishery would no longer exist. Currently, NMFS prohibits gillnet fishing or gillnet possession during annual restricted periods associated with the right whale calving season. Limited exemptions to the fishing prohibitions are provided for gillnet fishing for sharks and for Spanish mackerel south of 29°00' N. lat. An exemption to the possession prohibition is provided for transiting through the area if gear is stowed in accordance with this final rule. The southeast U.S. restricted area would be expanded north to approximately the border between North and South Carolina and divided into two regions, north and south. North of 29 N, the restricted period would be from Nov. 15- April 15. South of 29 N latitude the restricted area would be in effect from Dec. 1 through March 31 of each year. Positive ecological impacts for right whales, protected resources, and other bycatch could likely occur as a result of maintaining these closures.

4.5.3 Reporting

This alternative suite would have neutral ecological impacts concerning reporting. Shark dealer reports would no longer be submitted by shark dealers twice a month as they would no longer be allowed to purchase sharks. Commercial fishermen with Federal HMS permits would still be required to submit landings data via logbooks within seven days of offloading, however, this data would not include any information concerning sharks as they would no longer be landed. Currently, 20 percent of fishermen who submit data via the Coastal Fisheries Logbook are selected to provide information on any discards that occurred during the fishing trip. The percentage selected would be increased to improve monitoring of sharks that are likely to be landed and discarded in other BLL and gillnet fisheries so that this information could be incorporated into stock assessments in the future. The need to take an observer on directed shark trips would no longer be necessary as this alternative suite would close the Atlantic shark fishery. Furthermore, the Agency would lose a critical source of fishery-dependent information from the BLL and gillnet fisheries as a result of this alternative suite. Closing the Atlantic shark fishery would negate the need to have observer programs for the BLL and gillnet fisheries. Because information attained from these programs is used to monitor protected resource interactions, gather biological samples, conduct stock assessments, and better understand shark fishing practices, this alternative suite is currently not preferred.

4.5.4 Seasons

Seasons for the commercial Atlantic shark fishery would no longer apply as this alternative suite would close the fishery.

4.5.5 Regions

Regions for the commercial Atlantic shark fishery would no longer apply as this alternative suite would close the fishery.

4.5.6 Recreational Measures

Closing the recreational fishery for Atlantic sharks would have positive ecological impacts because recreational landings of sharks would decrease significantly. The level of recreational fishing effort and landings vary by shark species. The most commonly landed species include: blacktip, sandbar, spinner, bull, lemon, nurse, shortfin mako, Atlantic sharpnose, bonnethead, and blacknose sharks. Tables 3.23 to 3.26 show the landings for various shark species from 1999-2006. There would likely be some level of fishing mortality in recreational fisheries despite prohibiting landings of sharks as a result of post-release mortality and/or sharks that are landed illegally. However, NMFS assumes that landings would decrease dramatically since recreational fishing would be catch and release only in Federal waters (except for spiny dogfish which are managed by NEFMC and MAFMC and state waters, depending on state regulations). Directed outreach efforts focusing on the recreational fishing community may help to improve understanding of, and compliance with, shark fishing regulations.

4.5.7 Protected Resources and EFH

Prohibiting use of BLL gear would have positive ecological impacts on protected resources, including sea turtles, smalltooth sawfish, and marine mammals. From 1994-2007, the shark BLL observer program reported interactions with 79 sea turtles (6 leatherback, 64 loggerheads, and 9 other sea turtles). Fifteen smalltooth sawfish and four delphinids were also observed caught in the BLL fishery during the same time period. Interactions with BLL gear and protected resources in fisheries targeting sharks would likely decrease as a result of this alternative suite. BLL effort would still remain and possibly increase in other fisheries that target other species with BLL, including the snapper-grouper complex, reef fish, and tilefish. However, those fisheries are subject to different Biological Opinions and Incidental Take Statements outside the purview of the shark fishery.

Closing the shark gillnet fishery would have positive ecological impacts for protected resources. Between 1994 through 2007, 16 sea turtles were observed; 15 loggerheads, and 1 leatherback. There has been one smalltooth sawfish observed in the gillnet fishery which occurred in 2003. From 1999 – 2007, observed takes in the gillnet fishery of marine mammals totaled 12 bottlenose dolphins and four spotted dolphins.

Closing all Atlantic shark fisheries would have positive ecological impacts for EFH because the primary gear deployed in the commercial shark fishery is BLL gear. This gear type may have potentially adverse effects on HMS and non-HMS EFH. Bottom longlines principally

target LCS in the EEZ between Texas and Maine. Typically they are placed in sandy and muddy bottom habitats where expected impacts would be minimal to low (Barnette, 2001). The 1999 NMFS EFH Workshop categorized the impact of BLL gear on mud, sand, and hard-bottom as low (Barnette, 2001). BLL may have some negative impact if gear is set in more complex habitats, such as hard bottom or coral reefs in the Caribbean or areas with gorgonians, or soft corals and sponges in the Gulf of Mexico (Barnette, 2001, NREFHSC, 2002; Morgan and Chuenpagdee, 2003). BLL set with cable groundline or heavy monofilament with weights could damage hard or soft corals and potentially become entangled in coral reefs upon retrieval, resulting in coral breakage due to line entanglement. However, the extent to which BLL gear is fished in areas with coral reef habitat has not been determined. This gear type is similar to that employed in fisheries targeting reef fish in the Gulf of Mexico and South Atlantic regions.

BLL gear may have a detrimental effect on non-HMS EFH if it is set in coral reefs, hard bottom, or SAV habitats. BLL gear in HMS fisheries is primarily used in sandy and/or muddy habitats where NMFS expects it to have minimal to low impacts. However, this alternative would close shark fisheries and NMFS expects that participants would transfer effort to other BLL fisheries targeting reef fish, and the snapper-grouper complex, which are found at different depths and over different bottom types, which may have negative ecological impacts on non-HMS EFH.

Social and Economic Impacts

4.5.8 Quotas, Species Complexes, and Retention limits

Alternative Suite 5 would have significant economic and social impacts on a variety of small entities, including: commercial shark permit holders, shark dealers, and other secondary industries dependant on the shark fishery such as gear manufacturers, bait and ice suppliers. The level of economic impact would be directly proportional to the amount of revenues that each entity has realized from past participation in the shark fishery. Permit holders would be impacted differently depending on the quantity of sharks landed in the past. Fishermen targeting sharks (directed permit holders) landed an annual average of 1,263 mt dw of LCS, 223 mt dw SCS, and 173 mt dw pelagic sharks per year between 2003 to 2005 based on shark dealer landings and effort data from the Coastal Fisheries and HMS logbooks. The gross revenues based on 2006 ex-vessel prices of these landings are estimated at $4,702,031, $681,880, and $764,512 for LCS, SCS, and pelagic sharks, respectively, based on price information provided in Table 3.42. While NMFS assumes that few directed shark permit holders subsist entirely on revenues attained from the shark fishery, impacts would still be severe for those participants that depend on any income from the directed shark fishery at certain times of the year. Because of the extensive economic impacts to shark directed permit holders as a result of this alternative suite, NMFS assumes that directed permit holders would likely pursue one of the following options as a result of closing the Atlantic shark fishery: (1) transfer fishing effort to other fisheries for which they are already permitted (the snapper-grouper complex, king and Spanish mackerel, tilefish, lobster, dolphin/wahoo, *etc.*), (2) acquire the necessary permits to participate in other fisheries (both open access and/or limited access fisheries), or (3) relinquish all permits and leave the fishing industry. Table 3.32 displays the other permits held by directed shark permit holders as of May 2007.

Incidental permit holders would face negative economic and social impacts as a result of closing the Atlantic shark fishery, however, not as severe as directed permit holders. NMFS assumes that incidental permit holders receive the majority of their fishing income from other fisheries depending on the region and the type of gear predominantly fished (*i.e.*, swordfish, tunas, the snapper-grouper complex, tilefish, dolphin/wahoo, lobster, *etc*.). NMFS estimates that, on average, between 2003 to 2005 incidental permit holders landed 26.9 mt dw LCS, 17.3 mt dw SCS, and 45.5 mt dw pelagics per year based on shark dealer landings and effort data from the Coastal Fisheries and HMS logbooks. This equates in gross revenues based on 2006 ex-vessel prices for these landings of $106,491, $52,882, and $201,061 for the respective species complexes. Incidental permit holders would likely have to increase effort in these other fisheries to replace lost revenues from landing sharks. Table 3.32 shows the other permits possessed by incidental shark permit holders. Furthermore, these vessels may seek other permits (open access or limited access transferred from another vessel) or leave the fishing industry entirely.

This alternative suite would also have negative economic and social impacts for shark dealers as they would no longer be authorized to purchase shark products from Federally permitted shark fishermen Shark dealers would still be able to purchase shark products from state-permitted shark fishermen, depending on state-specific regulations. Shark dealers also maintain permits to purchase other regionally caught fish products. Due to the brevity of the LCS shark fishing season, which is the shark fishery that accounts for the majority of the shark product revenue due to the fin value, many shark dealers also get revenue from purchasing fish products other than sharks. The majority of shark dealers hold permits to purchase other fish products, including swordfish, tunas, the snapper-grouper complex, tilefish, mackerel, lobster, and dolphin/wahoo among others (Table 3.34). It is difficult to assume, on an individual shark dealer basis, the quantity of revenues received exclusively from shark products.

Shark fin dealers specializing in the purchase of shark fins from Federal and state permitted shark dealers would also experience negative social and economic impacts as a result of closing the shark fishery. These shark fin dealers receive virtually all of their income from purchasing shark fins and shipping them to exporters. Exporters then transport the fins to global and domestic markets. This alternative suite would likely force shark fin dealers to leave the industry or focus on purchasing other fishery products, resulting in significant economic impacts to the individuals involved in this trade.

Closing the Atlantic shark fishery would have negative economic impacts on global shark fin markets. As a result of this alternative suite, U.S. flagged vessels would no longer be able to contribute to the global demand for shark fins. This would disadvantage U.S. shark fishermen as global markets would likely purchase their shark fins from other markets. However, the United States is not a significant producer of shark products globally. Based on data from the United Nations Food and Agriculture Organization (FAO), less than one percent of global shark landings occur in the U.S. Atlantic.

It is difficult to estimate the economic and social impacts that would be experienced by various small entities that support the shark fishery, *e.g.*, purveyors of bait, ice, fishing gear, and fishing gear manufactures. However, these impacts would likely be negative. It is difficult to estimate these impacts due to uncertain in knowing whether vessels would redistribute their

fishing effort to other fisheries, or simply cease fishing operations. If the majority of vessels affected by a shark fishery closure simply displace effort to other fisheries, NMFS assumes that they would still be dependant on small entities for their bait, ice, and gear that are essential for targeting any species. Redistributing effort to other fisheries would mitigate negative economic impacts. However, if a significant number of vessels cease fishing operations or scale back considerably, then severe economic consequences would be imparted on these support industries as a result.

4.5.9 Time/Area Closures

Seasonal time area closures for BLL gear would no longer be applicable as a result of this alternative. Currently, NMFS prohibits gillnet fishing or gillnet possession during annual restricted periods associated with the right whale calving season. Limited exemptions to the fishing prohibitions are provided for gillnet fishing for sharks and for Spanish mackerel south of 29°00' N. lat. An exemption to the possession prohibition is provided for transiting through the area if gear is stowed in accordance with this final rule. The southeast U.S. restricted area would be expanded north to approximately the border between North and South Carolina and divided into two regions, north and south. North of 29 N, the restricted period would be from Nov. 15-April 15. South of 29 N latitude the restricted area would be in effect from Dec. 1 through March 31 of each year. Maintaining these closures would likely not result in economic or social impacts to shark gillnet fishermen.

4.5.10 Reporting

This alternative suite would increase the proportion of fishermen selected to report information on fish that are discarded in Coastal Fisheries Logbook. Increasing the number of fishermen who are selected to provide these data is not expected to have economic or social impacts. Currently, 20 percent of the fishermen completing this logbook are selected. This percentage would need to increase in order to maintain the necessary data collection for shark interactions with longline and gillnet gear. This information would be especially useful because sharks could no longer be landed and the existing logbook only requires fishermen to provide data on landed fish. Shark dealers would no longer be required to submit shark dealer reports regarding sharks purchased. Increased reporting burden would be subject to approval under the Paperwork Reduction Act.

4.5.11 Seasons

Seasons for the commercial Atlantic shark fishery would no longer apply as this alternative suite would close the fishery.

4.5.12 Regions

Regions for the commercial Atlantic shark fishery would no longer apply as this alternative suite would close the fishery.

4.5.13 Recreational Measures

Closing the Atlantic recreational shark fishery would have negative economic and social impacts. These impacts would be most pronounced for Charter/Headboat operators who specialize in landing sharks and operators of shark tournaments that have prize categories for landing sharks. It is difficult to estimate the number of Charter/Headboat operators that specialize in shark charters as the permit covers any participant targeting swordfish, sharks, tunas, and billfish. Many Charter/Headboat operators target a variety of species depending on client interests, weather, time of year, and oceanographic conditions. Charter/Headboat operators specializing in shark fishing charters would have to target other HMS or non-HMS species to replace revenues lost as a result of customers not being able to land sharks. However, not all customers necessarily want to land sharks. Charter/Headboat operators would still be able to catch sharks; however, all sharks regardless of species would need to be released in a manner that maximizes their chances of survival. Catering business operations to clientele interested in catch and release fishing for sharks might mitigate some of the negative economic impacts. Shark tournaments that reward prizes for landing sharks would be negatively impacted as a result of this alternative suite. There have been 79 tournaments per year that had a prize category for sharks from 2005-2006. The majority of these tournaments target pelagic sharks and are held in the North Atlantic and Gulf of Mexico regions. These tournaments would either modify their rules to only allow points/prizes for released sharks or these tournaments would cease to exist. Small entities such as restaurants, hotels, gear manufacturers, retail stores selling fishing supplies, and marinas in the vicinity of where these tournaments are held would also experience negative economic impacts.

HMS Angling permit holders would also experience negative impacts, despite the fact that they would still be able to catch and release sharks. Taxidermists that process anglers' catches also may be impacted if the shark fishery is closed and there is no longer a need to provide shark casts or mountings. Landings would not be permitted by any recreational anglers as a result of this alternative suite.

Conclusion

Recent stock assessments for sandbar, dusky, and porbeagle sharks indicate that these species are overfished, and sandbar and dusky sharks are experiencing overfishing. The primary objective of this amendment is to reduce fishing mortality for these species and allow them the opportunity to rebuild. Alternative suite 5 would have the most significant positive ecological impacts for sharks, protected resources, and EFH of the alternative suites considered in this document. However, closing the Atlantic shark fishery would also incur the most significant economic impacts on U.S. shark fishermen, shark dealers, shark tournament operators, and others involved in supporting industries. There are numerous species of shark that are not overfished or experiencing overfishing, and therefore, do not warrant a full closure of the Atlantic shark fishery at this time. Furthermore, by closing the shark fishery, the Agency would lose a valuable source of fishery dependent data (through logbooks and the sharks BLL observer program) that would influence the ability to conduct future shark stock assessments. Other alternative suites contained in this chapter would strike an appropriate balance between preventing overfishing and allowing overfished shark stocks to rebuild, while considering the

economic needs of the shark fishing community by allowing some retention of sharks. Therefore, NMS does not prefer alternative suite 5 at this time.

Alternatives Modifying the Stock Assessment and SAFE Report Schedules

The 1999 FMP established that stock assessments be conducted for each species or species group every two to three years. HMS stock assessments are crucial in order to define stock boundaries, monitor rebuilding plans, improve knowledge of stock dynamics, and incorporate additional data in a timely manner. Since 2000, there have been two stock assessments completed by NMFS for LCS (2002, 2005/2006) and two assessments completed for SCS (May 2002 and 2007). Other assessments have been completed by other entities, including: SCS (August 2002 by Mote Marine Laboratory), two assessments for pelagic sharks (2004 by ICCAT), and the porbeagle assessment completed by Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The Agency is aware of another stock assessment being conducted by the Standing Committee on Research and Statistics (SCRS) of ICCAT for shortfin mako and blue sharks in 2008.

The Agency considered alternatives that would modify the frequency of stock assessments for sharks that are conducted by the Agency as well as the publication of the SAFE report each year. Changing the stock assessment frequency from every 2-3 years to at least every five years would continue to ensure that stock assessments are conducted using the best scientific information available. Currently, the short duration between stock assessments (typically 2-3 years) makes it difficult to determine whether or not management measures that were implemented as a result of past stock assessments have had sufficient time to become effective prior to subsequent assessments. This makes it difficult to ascertain the impacts that management measures may be having on the stock based on the prior assessment. Further, the Agency has adopted the Southeast Data Assessment and Review (SEDAR) process for completing stock assessments, which requires three separate workshops, and generally requires more time to complete than in the past. For example, the most recent stock assessment for LCS was started in 2005 and completed in 2006, employing fisheries data through 2004. Management measures based on this assessment would be implemented in 2008 with the next assessment occurring in 2009 according to the existing stock assessment frequency guidelines. Having management measures in place for only one year prior to the next assessment may not be sufficient time to determine their effectiveness. Changing the stock assessment frequency to at least every five years would allow more time for current management measures to take effect and their results to be detected in the next stock assessment.

National Standard (NS) 2 of the Magnuson-Stevens Act requires that NMFS take into account the best scientific information available in developing FMPs and implementing regulations. For HMS, except sharks, NMFS relies on SCRS analyses. For sharks, NMFS uses the SEDAR process as outlined above. The guidelines for implementation of NS 2 require preparation of an annual SAFE report. The SAFE report would largely rely on SCRS assessments, shark SEDAR stock assessments, and any new fishery information. The guidelines for the SAFE report are outlined in the 1999 FMP (see Section 3.10.2).

The 1999 FMP for Atlantic Tunas, Swordfish and Sharks stated that the HMS Management Division would publish an annual SAFE report for Atlantic tunas, swordfish,

billfish, and sharks every January or February. The SAFE report follows the guidelines specified in NS 2 and are used by NMFS to develop and evaluate regulatory adjustments under the framework procedure or the FMP amendment process. This information provides the basis for determining annual harvest levels from each stock, documenting significant trends or changes in the resource, the bycatch, and the fishery over time, and assessing the relative success of existing state and Federal fishery management programs. In addition, the SAFE report is used to update or expand previous environmental and regulatory impact documents, and ecosystem and habitat requirements, including EFH.

4.6 Alternative 6: Stock Assessments for Sharks Every 2-3 Years (Status Quo)

Rebuilding plans for sharks recommended in recent stock assessments are generally much longer in duration (*i.e.*, 100-400 years for dusky sharks, 70 years for sandbar sharks, and 100 years for porbeagle sharks) than those for other fish species because of shark life history traits. The likelihood of being able to detect if management measures have had any impact on stock status or fishing mortality when only 2-3 years have elapsed between assessments is reduced. Therefore, the Agency proposed to increase the amount of time between shark stock assessments. These alternatives would not modify any stock assessments that are already scheduled and would not affect the frequency of stock assessments conducted for other HMS species (which are dictated by ICCAT). The timing or frequency of stock assessments completed by other management entities, governments, or Regional Fisheries Management Organizations (*i.e.*, ICCAT) would also not be affected by these proposed measures.

Ecological Impacts

Ecological impacts of conducting stock assessments every 2-3 years could be neutral. Assessments have been completed on this timeframe since the 1999 HMS FMP became effective. Since 2000, there have been two stock assessments completed by NMFS for LCS (2002, 2005/2006) and two assessments completed for SCS (May 2002 and 2007). Other assessments have been completed by other entities, including: SCS (August 2002 by Mote Marine Laboratory), two assessments for pelagic sharks (2004 by ICCAT), and the 2005 porbeagle assessment completed by Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The Agency is aware of another stock assessment being conducted by the Standing Committee on Research and Statistics (SCRS) of ICCAT for shortfin mako and blue sharks in 2008. The timing of stock assessments is secondary to the actual management measures that are implemented, if necessary, to address overfishing and overfished stocks as far as potential ecological impacts. For fish species with life history traits such as sharks, having relatively few offspring and reaching sexual maturity at a later age, stock status is not expected to change as drastically on a year to year basis. However, as stock assessment methodologies change it is possible that having more frequent stock assessments may increase the likelihood that scientists could use newer, more statistically robust techniques to incorporate into models designed to estimate stock status.

Social and Economic Impacts

Economic impacts of conducting stock assessments every 2-3 years could be neutral. The timing of the stock assessments does not generally have a direct economic impact, however,

measures that are necessary to prevent overfishing and/or rebuild overfished stocks generally have a negative economic impact on small entities that depend on sharks for their livelihood. If conducting stock assessments more frequently would continue to result in the implementation of measures that require reductions in fishing mortality to maintain consistency with NS 1, then negative economic impacts could occur as a result. Alternatively, if results were positive for certain shark stocks, then assessing shark populations more frequently would have positive economic impacts. As additional data become available, it is difficult to predict the results of forthcoming stock assessments and the economic ramifications of the measures that need to be implemented as a result. However, the Agency has adopted the SEDAR approach to stock assessments which encourages full participation from industry, environmentalists, academics and other parties affected by stock assessments to participate at all workshops.

4.7 Alternative 7: Stock Assessments for Sharks At Least Every 5 Years. Preferred Alternative

Ecological Impacts

Ecological impacts of conducting stock assessments on at least once every five years basis could be neutral or slightly positive. Conducting stock assessments on a more frequent basis allows scientists to revisit past and current methodologies on a more frequent basis to ensure that the appropriate methods are being employed for the assessment of the stock. Generally, more frequent assessments allow managers to assess past management initiatives to ensure that they are consistent with rebuilding plans and the need to prevent overfishing, if necessary. However, because of the duration of time required to complete stock assessments and the subsequent time frame to implement recommended management measures, stock assessments every two to three years may not fully reflect the implemented changes. Recent assessments for sandbar, porbeagle, and dusky sharks indicate that they are all overfished. Management measures to reduce fishing mortality that could lead to rebuilding are being implemented in this rulemaking. Having the next set of assessments in 2010/2011 (five years since the 2005/2006 LCS assessment was conducted) would allow the preferred management measures preferred in this EIS and associated rulemaking to be in place for at least two years before the next assessments take place. This would allow NMFS to assess the effects of the preferred management measures from this rulemaking and more appropriately manage sharks stocks in the future, resulting in positive ecological impacts.

Social and Economic Impacts

Economic impacts of conducting stock assessment could be variable depending on the results of the stock assessment and management measures that are implement as a result of the assessment. Scheduling stock assessments so that there is more time between assessments allows participants in shark fisheries to adapt to management measures implemented in the past. This provides participants with the opportunity to decide if, and to what degree, they may continue to operate in shark fisheries. More frequent stock assessments would have positive economic impacts if information attained from assessments indicated that quota levels and fishing mortality may be increased for certain species because fishermen would be able to harvest more sharks. Furthermore, participants may experience negative economic impacts if the

results change dramatically and additional measures are needed to reduce fishing effort and mortality.

Conclusion

Alternative 7, conducting shark stock assessments by NMFS at least once every five years, is preferred at this time because it increases the interval between stock assessments allowing management measures enough time to be implemented and evaluated. Under the current schedule, SEDAR assessments may take up to one year, and by the time determinations are made and rulemaking is implemented to address these determinations, NMFS is already preparing for another stock assessment (assessments every 2-3 years). The Agency does not anticipate that there would be extensive negative ecological consequences as a result of having less frequent assessments because more frequent stock assessments (*i.e.*, stock assessments every 2 to 3 year) may not be the most indicative of the stock in new management measures were not in place long enough to have any effect on the stock being assessed. Changing the stock assessment frequency to at least every five years would allow more time for current management measures to take effect and their results to be detected in the next subsequent stock assessment. Furthermore, by following the SEDAR process, the Agency would still be able to incorporate new methods into stock assessments because all members of the scientific community and general public are invited to attend and exchange ideas. Economic impacts would be contingent upon the findings of future assessments and the management measures necessary; however, fishermen may expect some benefit from not having to be concerned with a new suite of management measures affecting them every 2-3 years as a result of new assessments for sharks.

4.8 Alternative 8: SAFE Report Published in January or February of Every Year (Status Quo)

Ecological Impacts

There are no specific ecological impacts associated with publishing the SAFE report in January or February of each year, rather this is an administrative deadline set by NMFS. As long as the SAFE report is published each year according to the guidelines of NS 2 (*i.e.*, it summarizes the best available scientific information concerning the past, present, and possible future condition of the stock, marine ecosystems, and fisheries being managed under Federal regulation) such that framework actions and the FMP amendment processes could address management issues appropriately, maintaining the publication date of January or February under the status quo would have neutral ecological impacts. In addition, recently published SAFE reports have been released later in the year.

Social and Economic Impacts

There are no negative social or economic impacts associated with NMFS publishing a safe report each year in either January or February as this deadline is mainly administrative in nature. By publishing the SAFE report annually according to NS 2, framework actions and FMP amendments could base annual harvest levels from each stock, document significant trends or changes in the resource, the bycatch, and the fishery over time, and assess the relative success of existing state and Federal fishery management program. In doing so, management actions could

appropriately address the fishery to minimize negative social and economic impacts to fishermen. However, the timing of the SAFE report within the calendar year would not affect any of these issues, therefore, maintaining the status quo would result in neutral social and economic impacts.

4.9 Alternative 9: SAFE Report Published in the Fall of Every Year

Ecological Impacts

Publishing a SAFE report in the fall of every year would allow NMFS more flexibility to balance other responsibilities throughout the calendar year, as necessary. Under alternative 9, a SAFE report would still be published every year according to NS 2 to help NMFS develop and evaluate regulatory adjustments under the framework procedure or the FMP amendment process. However, as mentioned under alternative 8, the timing of the publication is administrative in nature. Therefore, allowing the SAFE report to be published in the fall (or earlier, if necessary) would have no negative ecological impacts.

Social and Economic Impacts

There are no negative social or economic impacts associated with publishing the SAFE report in the fall of every year. Publishing the SAFE report in the fall would give the Agency more discretionary time to develop a SAFE report each year according to the guidelines under NS 2. However, since a SAFE report would still be published on an annual basis, it would provide the needed information so management actions could appropriately address the fishery to minimize negative social and economic impacts to fishermen. Therefore, publishing a SAFE report each year in the fall would have neutral social and economic impacts.

Conclusion

Both alternative 8, to publish a SAFE report in January or February of each year, and alternative 9, to publish a SAFE report in the fall of each year, would have no ecological, social, or economic impacts on fishermen and related industries. However, NMFS prefers alternative 9 to allow for more discretionary time to develop a SAFE report each year according to the guidelines under NS 2. This would give NMFS more flexibility to balance other responsibilities throughout the calendar year, while still developing a SAFE report year based on the best available science to characterize the different fisheries and marine ecosystems managed under Federal regulations. The annual SAFE report would still be used to develop and evaluate regulatory adjustments under the framework procedure or the FMP amendment process as it currently does under the status quo.

4.10 Impacts on Essential Fish Habitat

The Magnuson-Stevens Act requires NMFS to evaluate the potential adverse effects of fishing activities on EFH. If NMFS determines that fishing gears are having an adverse affect on HMS EFH, or other species' EFH, then NMFS must include management measures that minimize adverse effects to the extent practicable. At this time, there is no evidence to suggest that implementing any of the preferred alternatives suites or alternatives in this amendment would adversely affect EFH to the extent that detrimental effects could be identified on the

habitat or fisheries. Ecological impacts to EFH due to actions in this rulemaking would likely be positive as the preferred alternative suite would reduce shark BLL fishing effort as a result of reduced shark quotas. However, given the Consolidated HMS FMP gave a preliminary determination that BLL gear may be considered to have an adverse affect on EFH, and the Gulf of Mexico and Caribbean Fishery Management Council EFH FEIS' (2004) suggest that BLL gear may have an adverse effect on coral reef habitat, which serves as EFH for certain reef fishes, NMFS will make a determination of shark BLL gear impacts on EFH in Amendment 1 to the Consolidated HMS FMP. In Amendment 1, NMFS will assess whether HMS BLL gear is having a negative effect on EFH, and if so, the intensity, extent, and frequency of such impacts, including any measures to minimize potential impacts. Based on this determination, NMFS would then take any necessary action regarding BLL gear.

4.11 Impacts on Protected Resources

The preferred alternative suite 4 could have positive impacts on protected resources, including sea turtles, marine mammals, smalltooth sawfish, and prohibited shark species, such as dusky sharks, since NMFS expects it to reduce overall fishing effort targeting sandbar sharks and non-sandbar LCS with gillnet and BLL gear. In addition, the preferred alternative suite 4 would increase the level of observer coverage on a limited number of vessels participating in a shark research program. This alternative would implement the quotas for sandbar and non-sandbar LCS, which are expected to reduce fishing effort, prevent overfishing, and rebuild overfished stocks. Such reductions are anticipated to also reduce interactions with prohibited dusky sharks by 72 to 73 percent. Retention limits for non-sandbar LCS would also be reduced significantly for vessels with shark permits outside the shark research program. While trip limits for vessels in the shark research program would be dictated by the research objectives, there would be a significant reduction in the number of trips because the quota for sandbar sharks would be drastically reduced. In addition, all of these trips would be subject to 100 percent observer coverage. Furthermore, the Agency would determine when these trips would take place throughout the year to ensure regional and seasonal sampling by scientific observers. This shark research program may also provide additional documentation and additional opportunities for data collection on interactions with protected resources via observer reports.

The number, duration, and frequency of trips targeting non-sandbar LCS with BLL and/or gillnet gear outside of the shark research fishery would be reduced. Furthermore, soak time might also be reduced given the reduced trip limits for non-sandbar LCS, which may increase post-release survival of any protected resources caught on BLL gear. Fishing effort would most likely decrease the most in the BLL fishery as this gear is the most effective and widely used gear for targeting sandbar sharks and most LCS species. There may not be a pronounced decrease in fishing effort in the gillnet fishery as this fishery mainly targets SCS and blacktip sharks. There is the possibility that some of the current fishing effort in the BLL fishery would transfer to the gillnet fishery to target species that have more liberal retention limits (*i.e.*, SCS for directed permit holders). However, it is difficult to precisely predict how much fishing effort in longline and gillnet fisheries would change as a result of this alternative suite.

The Southeast Regional Office of Protected Resources Division is preparing a new Biological Opinion (BiOp) regarding the actions under Amendment 2 to the Consolidated HMS FMP, which is expected to be completed by Spring of 2008 and before the release of the final

rule. The last consultation on HMS shark fisheries resulted in an October 29, 2003 BiOp, which concluded the continued authorization of the fishery was likely to adversely affect, but not likely to jeopardize the continued existence of, green, Kemp's ridley, leatherback, and loggerhead sea turtles and smalltooth sawfish. The opinion also concluded that marine mammals, the Gulf of Maine Atlantic salmon DPS, shortnose sturgeon, Gulf sturgeon, and right whale critical habitat were not likely to be adversely affected by the action.

Consultation has been reinitiated because of new information regarding interactions between ESA listed species and the fishery, and to evaluate the proposed changes to the fishery under Amendment 2 to the Consolidated HMS FMP. Information on the likelihood of post-release mortality has also been updated since the 2003 BiOp. Incidental take authorized for gillnet gear in the 2003 BiOp was specified only for drift gillnets. This was because: (1) Sink gillnets were not known to be used in this fishery so were not analyzed or authorized take, and (2) the strike-netting technique was analyzed in the opinion, but was not expected to result in any adverse effects on listed species. However, through NMFS' shark gillnet observer program, NMFS has discovered that sink gillnetting is used to target sharks and does occasionally interact with sea turtles, and sea turtles are occasionally caught in strike-net sets. Also, although the total number of estimated sea turtle and smalltooth sawfish takes in BLL gear is below the authorized level, incidental take mortality for smalltooth sawfish has been exceeded by one member of the species. The fishery continues to be in compliance with the terms and conditions of the ITS in the 2003 BiOp, and consultation has been reinitiated. The proposed changes under Amendment 2 are expected to reduce fishing effort and reduce the fishery's impacts on ESA-listed species in the action area. Additional management measures may result based on the 2008 BiOp expected this Spring.

The other preferred alternatives, alternative 7, to conduct stock assessments for sharks every 5-6 years, and alternative 9, to have NMFS publish a SAFE Report in the fall of every calendar year, are not anticipated to have any significant negative ecological impacts on protected resources because they are largely administrative in nature.

4.12 Environmental Justice

Executive Order 12898 requires agencies to identify and address disproportionately high and adverse environmental effects of its regulations on the activities of minority and low-income populations. To determine whether environmental justice concerns exist, the demographics of the affected area should be examined to ascertain whether minority populations and low-income populations are present. If so, a determination must be made as to whether implementation of the alternatives may cause disproportionately high and adverse human health or environmental effects on these populations.

In addition to the community profile information found in the Consolidated HMS FMP, a recent report was completed by MRAG Americas, and Jepson (2008) titled Updated Profiles for HMS Dependent Fishing Communities (Appendix E). This report includes updated community profiles and new social impacts assessments for HMS fishing communities along the Atlantic and Gulf of Mexico coasts. The communities of Dulac, Louisiana and Fort Pierce, Florida have significant populations of Native Americans and African-Americans, respectively. The 2000 Census data indicates that Native Americans made up 39 percent of the Dulac population,

specifically the Houma Indians, which is not a Federally recognized tribe. About 30 percent of the Dulac population was living below poverty level in 2000. In 2000, Black-Americans were about 41 percent of the Fort Pierce, Florida population with about 30 percent of the entire Fort Pierce population living below the poverty line. These two communities also have significant populations of low-income residents. In addition to Dulac and Fort Pierce, there is a diffuse Vietnamese-American population in Louisiana, actively participating in the PLL fishery, and commuting to fishing ports, but not living in "fishing communities" as defined by the Magnuson-Stevens Act and identified in Chapter 9 and Appendix E of this document. Each of the management alternative suites in Chapter 4 includes an assessment of the potential social and economic impacts associated with the proposed alternatives. The preferred alternative suite was selected to minimize economic impacts and provide for the sustained participation of fishing communities, while taking the necessary actions to rebuild overfished fisheries as required by the Magnuson-Stevens Act. More in-depth information about potential social impacts of each preferred alternative suite is briefly described below with detailed information provided earlier in this Chapter. Demographic data indicate that coastal counties with fishing communities are variable in terms of social indicators like income, employment, and race and ethnic composition.

The preferred alternative suite 4, to establish as small shark research fishery, has the potential to have adverse economic and social impacts throughout the fishery. NMFS does not anticipate that these effects would fall disproportionately on minority or low-income populations. Alternative suite 4 was designed to reduce quotas and retention limits necessary to rebuild and end overfishing of several shark species. It would also maximize scientific data collection by implementing a limited research fishery for sandbar sharks to continue with 100 percent observer coverage. In doing so, it would help mitigate some of the significant economic impacts that are necessary and expected under all alternative suites to reduce fishing mortality as prescribed by recent stock assessments. This alternative suite strikes an appropriate balance between positive ecological impacts that must be achieved to rebuild and end overfishing on overfished stocks while minimizing the severity of negative economic impacts that would occur as a result of these measures. By allowing a limited number of historical participants to continue to harvest sharks, the Agency ensures that data for stock assessments and life history samples would continue to be collected. This would also allow a small pool of individuals to continue to collect revenues from sharks as they have in the past. Individuals not selected to participate in the shark research program could still land non-sandbar LCS, which would limit the number of trips targeting non-sandbar LCS sharks and prevent excessive discards. NMFS believes that while this would have negative economic and social impacts in the short-term, these measures are necessary to rebuild several shark stocks and prevent other species of sharks from becoming overfished.

The other preferred alternatives, alternative 7, to conduct stock assessments for sharks at least once every five years, and alternative 9, to have NMFS publish a SAFE Report in the fall of every calendar year, are not anticipated to have any significant negative social or economic impacts on HMS-related communities and are not anticipated to have an impact on minority or low-income population because they are largely administrative in nature.

4.13 Coastal Zone Management Act

The Coastal Zone Management Act (CZMA, 1972, reauthorized 1996) requires that Federal actions be consistent to the extent practicable, with the enforceable policies of all state

coastal zone management programs. NMFS has determined that the preferred alternative suites and alternatives would be implemented in a manner consistent to the maximum extent practicable with the enforceable policies of the coastal states in the Atlantic, Gulf of Mexico, and Caribbean that have Federally approved coastal zone management programs. In July 2007 NMFS provided all coastal states along the eastern seaboard and the Gulf of Mexico (19 states excluding Texas that no longer requires CZM consistency determinations for fish), including Puerto Rico and the U.S. Virgin Islands with a copy of the proposed rule and draft EIS for Amendment 2 to the Consolidated HMS FMP. Under 15 C.F.R. § 930.41, states and/or U.S. territories have 60 days to respond after the receipt of the consistency determination and supporting materials. States can request an extension of up to 15 days. If a response is not received within those time limits, NMFS can presume concurrence (15 C.F.R. § 930.41(a)). Ten states replied within the 60-day response period that the proposed regulations were consistent, to the extent practicable, with the enforceable policies of their coastal zone management programs. Another eight states, in addition to Puerto Rico and the U.S. Virgin Islands, did not respond within the 60-day time period, nor did they request an extension in the comment period; therefore, NMFS presumes their concurrence. The State of Georgia replied on October 10, 2007, that the proposed rule was not consistent with the enforceable policies of Georgia's coastal zone management program.

The State of Georgia objects to the consistency determination due to the continuing operation of the shark gillnet fishery in Federal waters impacting resources shared by adjacent state waters. NMFS shares the State of Georgia's concern regarding the impact of the shark gillnet fishery on threatened and endangered species. However, data currently available indicate relatively low rates of bycatch and bycatch mortality of protected species and other finfish in this fishery compared to other HMS fisheries (see Section 3.4.2). The Southeast Regional Office of Protected Resources Division is preparing a new BiOp regarding the actions under Amendment 2 to the Consolidated HMS FMP, which is expected to be completed by Spring of 2008 and before the release of the final rule. The last consultation on HMS shark fisheries resulted in an October 29, 2003 BiOp, which concluded the continued authorization of the fishery was likely to adversely affect, but not likely to jeopardize the continued existence of, green, Kemp's ridley, leatherback, and loggerhead sea turtles and smalltooth sawfish. The opinion also concluded that marine mammals, the Gulf of Maine Atlantic salmon DPS, shortnose sturgeon, Gulf sturgeon, and right whale critical habitat were not likely to be adversely affected by the action. Therefore, NMFS is not prohibiting the use of this gear at this time. This finding is consistent with NS 2 which requires that management measures be based on the best scientific information available including the BiOp. Currently, all shark gillnet vessels are required to carry VMS and are subject to observer coverage during and outside of the right whale calving season. In addition, more stringent management measures were put in place under a final rule for the Atlantic Large Whale Take Reduction Plan (ALWTRP) (72 FR 34632, June 25, 2007) that prohibits all gillnet fishing from November 15 through April 15 of each year in Federal waters off Georgia. NMFS would continue to work with existing take reduction teams and relevant Fishery Management Councils to examine methods of reducing bycatch. Thus, NMFS finds that the final regulations implemented in the FMP Amendment are consistent with Georgia's Coastal Zone Management Program to the maximum extent practicable.

While NMFS also acknowledges the concern of protected resources interactions with gillnet gear, under the Magnuson-Stevens Act's (16 U.S.C. § 1801 *et seq*.) NSs, the Agency must, among other things, implement conservation and management measures to prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery; base its actions upon the best scientific information available; manage stocks throughout their range to the extent practicable; minimize adverse economic impacts on fishing communities to the extent practicable; and minimize bycatch and bycatch mortality to the extent practicable. 16 U.S.C. §§ 1851(a)(1), (2), (3), (8), and (9).

At this time, there is not sufficient information to support a closure, pursuant to the Magnuson-Stevens Act, of the shark gillnet fishery in Federal waters adjacent to Georgia. Gillnets are the commercial gear that are used to target SCS and blacktip sharks. The SCS complex was just assessed and the determinations for each stock are currently being evaluated. The latest blacktip stock assessment recommended not changing catches of blacktip sharks in the Atlantic. Based on the best scientific information available, this Amendment would manage the fishery for optimum yield by keeping the SCS quota according to the status quo and setting a non-sandbar LCS quota, which includes blacktip sharks, based on historical landings. Given the non-sandbar LCS quota is warranted under the latest blacktip shark assessment, closing the shark gillnet fishery in Federal waters off Georgia would not facilitate achieving, on a continuing basis, the optimum yield from the fishery and managing the stocks throughout their range.

With regard to bycatch, this Amendment minimizes bycatch and bycatch mortality to the extent practicable. Incidental capture of threatened and endangered species is regulated under the ESA. NMFS reinitiated a formal Section 7 consultation under the ESA was initiated for Amendment 2 to the Consolidated HMS FMP because of new information regarding interactions between ESA listed species and the fishery, and to evaluate the proposed changes to the fishery under Amendment 2 to the Consolidated HMS FMP. Information on the likelihood of post-release mortality has also been updated since the 2003 BiOp. Incidental take authorized for gillnet gear in the 2003 BiOp was specified only for drift gillnets. This was because: (1) Sink gillnets were not known to be used in this fishery so were not analyzed or authorized take, and (2) the strike-netting technique was analyzed in the opinion, but was not expected to result in any adverse effects on listed species. However, through NMFS' shark gillnet observer program, NMFS has discovered that sink gillnetting is used to target sharks and does occasionally interact with sea turtles, and sea turtles are occasionally caught in strike-net sets. Also, although the total number of estimated sea turtle and smalltooth sawfish takes in BLL gear is below the authorized level, incidental take mortality for smalltooth sawfish has been exceeded by one member of the species. The fishery continues to be in compliance with the terms and conditions of the ITS in the 2003 BiOp, and consultation has been reinitiated. The proposed changes under Amendment 2 are expected to reduce fishing effort and reduce the fishery's impacts on ESA-listed species in the action area. The Southeast Regional Office of Protected Resources Division is expected to release a new BiOp for Amendment 2 to the Consolidated HMS FMP by Spring of 2008 and before the release of the final rule. Additional management measures may result based on the 2008 BiOp expected this Spring.

NMFS is not prohibiting the use of gillnet gear at this time due to the significant, negative social and economic impacts this would have on the five vessels actively fishing in the

shark gillnet fishery and because currently available data indicate relatively low rates of bycatch and bycatch mortality of protected species and other finfish in this fishery compared to other HMS fisheries. In addition, more stringent management measures have been put in place under a final rule for the ALWTRP (72 FR 34632, June 25, 2007) that prohibits all gillnet fishing from November 15 through April 15 of each year in Federal waters off Georgia. The action was taken to prevent the significant risk to the wellbeing of endangered right whales from entanglement in gillnet gear in the core right whale calving area during calving season. In addition, NMFS has high observer coverage on gillnet vessels, both targeting and not targeting sharks, year-round (Baremore *et al.*, 2007). Thus, NMFS finds that this FMP Amendment is consistent to the maximum extent practicable with Georgia's CZMA program. NMFS would continue to work closely with states in the past and would continue to work with the states to ensure consistency between state and Federal regulations.

4.14 Cumulative Impacts

Cumulative impact is the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR § 1508.7). A cumulative impact includes the total effect on a natural resource, ecosystem, or human community due to past, present, and future activities or actions of Federal, non–Federal, public, and private entities. Cumulative impacts may also include the effects of natural processes and events, depending on the specific resource in question. Cumulative impacts include the total of all impacts to a particular resource that have occurred, are occurring, and will likely occur as a result of any action or influence, including the direct and reasonably foreseeable indirect impacts of a Federal activity. The goal of this section is to describe the cumulative ecological, economic and social impacts of past, present and reasonably foreseeable future actions with regard to the management measures presented in this document. Table 4.19 describes the overall impacts anticipated from each of the alternatives considered.

Table 4.19 Comparison of alternative suites and alternatives considered. (+) denotes positive impact, (-) denotes negative impact, (0) denotes neutral impact.

Alternative	Alternative Description	Ecological Impacts	Social Impacts*	Economic Impacts*
Alternative Suite 1	Maintain the existing Atlantic commercial and recreational shark fisheries (Status Quo)	-	0/-	0/-
Alternative Suite 2	Establish a limited shark fishery for directed permit holders only	+	-	-
Alternative Suite 3	Establish a limited shark fishery for directed and incidental permit holders	+	-	-

Alternative	Alternative Description	Ecological Impacts	Social Impacts*	Economic Impacts*
Alternative Suite 4	*Establish a research shark fishery allowing a small directed LCS fishery*	+	-	-
Alternative Suite 5	Close all Atlantic shark fisheries	++	-	-
Alternative 6	Stock assessments for sharks every 2-3 years	0	0	0
Alternative 7	*Stock assessments for sharks every 5-6 years*	0	0	0
Alternative 8	SAFE report published in January or February of every year	0	0	0
Alternative 9	*SAFE report published in the fall of every year*	0	0	0

*the "0/-" is because social and economic impacts may be neutral at first as current fishing effort would remain the same in the short term. In the long term, as stocks continue to decline, profits may decrease as costs associated with finding and catching these depleted stocks increases.

4.15 Past, Present, and Reasonably Foreseeable Actions

As discussed in Section 3.1, NMFS has taken a number of actions in the past in order to, among other things, rebuild overfished stocks and prevent overfishing of Atlantic sharks. These actions have included FMPs, FMP amendments, and framework actions. The goals and objectives of these past rules are summarized in Section 3.1. NMFS is required to take similar actions in this document, and can reasonably expect to implement regulations in the future to address the management and conservation of Atlantic sharks. The need and objectives of this document are described in earlier sections, particularly Chapter 1, and are not repeated here.

Other recent actions within HMS fisheries that may affect shark fishermen both directly and indirectly include the 2008 first season Atlantic shark rule, which set the fishing seasons and quotas for the first trimester of 2008 (72 FR 67580; November 29, 2007); a rule setting the domestic U.S. swordfish quotas (72 FR 56929; October 5, 2007); a rule that suspended the circle hook requirement for billfish tournaments in 2007 (72 FR 26735; May 7, 2007); a rule modifying the dehooking requirements for BLL fishermen (72 FR 5633; February 7, 2007); and a swordfish rule that allows the swordfish fishery additional opportunities for U.S. vessels to more fully harvest the domestic swordfish quota (72 FR 31688; June 7, 2007). These actions would have mixed impacts on the human environment when considered in conjunction with Amendment 2 to the Consolidated HMS FMP:

- The 2008 first season Atlantic shark rule, which closed the LCS fishing season until implementation of this action, in conjunction with Amendment 2 to the Consolidated HMS FMP would have positive ecological impacts as it accounted for overharvests in 2006 and 2007. However, it would have negative economic and social impacts on fishermen by not allowing fishing for LCS during the first and second seasons of 2008, and because of the sandbar shark prohibition outside

the research fishery and reduced trip limits once Amendment 2 to the Consolidated HMS FMP is implemented. However, fishermen are able to harvest SCS and pelagic sharks under the 2008 first season rule, which could help mitigate some of the negative socioeconomic impacts from reduced LCS fishing opportunities.

- The rule setting the U.S. swordfish quotas is not expected to have any negative ecological or socioeconomic impacts in conjunction with Amendment 2 to the Consolidated HMS FMP as it implements the ICCAT domestic swordfish quotas and should not negatively affect shark fishermen.
- The rule that suspended the circle hook requirement for billfish tournaments was put back into place on January 1, 2008, so the positive ecological benefits from circle hooks would be realized in conjunction with Amendment 2 to the Consolidated HMS FMP.
- The rule to modify the dehooking requirements and safe handling and release gear was already in place and most fishermen already had the required gear before this rule was originally implemented. Therefore, this is not expected to have any additional impacts with the implementation of Amendment 2.
- Finally, the swordfish rule allowing fishermen additional opportunities to harvest the domestic U.S. swordfish quota could result in neutral ecological impacts as the swordfish stock is rebuilt, but could have positive economic and social impacts for fishermen, especially incidental fishermen, by allowing them additional swordfish harvest. Such additional harvest could help mitigate the negative socioeconomic impacts associated with Amendment 2 to the Consolidated HMS FMP.

Reasonable future actions may include: changes to time/area closures; modifications to EFH descriptions; Caribbean specific amendment to address regional issues; modifying handling and release requirements for sea turtles in other HMS fisheries; authorization of green stick fishing gear for Atlantic tunas including bluefin tuna; and, actions taken to reduce protected species interactions in HMS fisheries, particularly in the PLL fishery (*e.g.*, implementation of the Pelagic Longline Take Reduction Plan). These are measures that, while not all directly related to sharks, could be implemented in other rulemakings and affect participants in shark fisheries in conjunction with the preferred alternative suite selected in this amendment and associated rulemaking. Such actions would have mixed effects on shark fishermen; additional actions that reduce fishing opportunity, such as additional time/area closures, additional restrictions on BLL gear to minimize impacts to EFH, or additional restrictions on PLL gear to reduce interactions with protected species, would have negative impacts on shark fishermen in conjunction with Amendment 2 to the Consolidated HMS FMP. However, other actions that allow new gears, such as authorizing greenstick gear, or addressing regional issues in the Caribbean region, could increase fishing opportunities and would have positive impacts on fishermen, which could help mitigate some of the negative socioeconomic impacts under Amendment 2 to the Consolidated HMS FMP.

In general, preferred alternative suite 4 would implement quotas and retention limits necessary to rebuild and stop overfishing of several shark species; it maximizes scientific data collection by implementing a limited research fishery for sandbar sharks to continue with 100

percent observer coverage; and mitigates some of the significant economic impacts that are necessary and expected under all the alternative suites to reduce fishing mortality as prescribed by recent stock assessments. While NMFS has evaluated the cumulative ecological and socioeconomic impacts of this preferred alternative suite below, NMFS also evaluated how other non-HMS fisheries may be impacted by the preferred alternative suite. In particular, NMFS evaluated other fisheries that vessels currently maintain permits for, shark fishermen's ability to enter other fisheries, and the subsequent impacts those fisheries might experience as a result of redirected shark fishing effort.

As part of this analysis, NMFS investigated the different types of commercial permits that directed and incidental shark permit holders currently have in addition to their HMS permits (see Table 3.42). NMFS found that many directed and incidental shark permit holders also have Gulf of Mexico reef fish, dolphin/wahoo, mackerel (including king and Spanish mackerel), and South Atlantic snapper-grouper commercial permits. A few fishermen also have lobster and non-HMS Charter/Headboat permits. NMFS also evaluated the ability of shark fishermen to move into these other fisheries (*i.e.*, Gulf of Mexico reef fish, dolphin/wahoo, mackerel, and South Atlantic snapper-grouper fisheries) as a result of quota and retention limit reductions in the Atlantic shark fishery under preferred alternative suite 4. Shark fishermen may also participate in shark fisheries in state waters or may participate in other HMS fisheries for which they may already possess permits. Table 3.42 includes vessels that possess swordfish permits in addition to commercial shark permits. An overview of each fishery is listed below, and the cumulative ecological and socioeconomic impacts of the preferred alternative, including impacts of any redistributed effort to other fisheries, are discussed below.

Gulf of Mexico Reef Fish Fishery

The Gulf of Mexico Fishery Management Council (Council) originally established the Gulf of Mexico Reef Fish FMP in 1984. Twenty seven amendments have been made to this plan and there are currently four additional amendments under development.

A Gulf of Mexico commercial reef fish vessel permit allows the harvest and sale of all reef fish listed in the Reef Fish FMP under quota (where applicable) and in excess of the bag limits (where applicable), except goliath grouper (all harvest prohibited), Nassau grouper (all harvest prohibited), and red snapper. Fishermen wanting to harvest and sell red snapper must also possess individual fishing quota (IFQ) shares. Issuance of new reef fish permits is under a moratorium. Access to this fishery is limited to existing permits holders. However, existing permits are transferable. In 2007, shark directed and incidental permit holders possessed 153 Gulf of Mexico reef fish permits, which represent 29 percent of all shark permit holders. These Gulf of Mexico reef fish permits held by shark permitted vessels are concentrated in Florida and represent 84 percent of the 153 GOM reef fish permits.

A portion of reef fish permit holders also possess IFQ shares, which allow them to land red snapper in addition to other reef fish. Anyone commercially fishing for red snapper now must possess an IFQ allocation and follow the established reporting protocol. Quota shares are freely transferable to any other reef fish permit holders during the first five years following implementation of the IFQ program and then to anyone thereafter. Shark permit holders that also

possess a reef fish permit, but did not receive an IFQ allocation would likely find that it would be costly to attain such an allocation.

The Gulf of Mexico Reef Fish FMP authorizes the use of longline, hook and line, handline, bandit gear, rod and reel, buoy gear, spear, powerhead, cast net, and trawl. There is a 6,000 lbs gutted weight trip limit for all groupers, deep-water and shallow-water, combined. A 2007 interim rule for red snapper set the commercial quota at 3.315 million pounds (mp) and reduced the commercial size limit to 13 inches. In June 2007, the Council approved Joint Reef Fish Amendment 27/Shrimp Amendment 14. If implemented by NMFS, this amendment would reduce the commercial quota to 2.55 million pounds between 2008 and 2010. The amendment would also reduce the commercial minimum size limit to 13 inches total length, require the use of non-stainless steel circle hooks, venting tools, and dehooking devices when fishing for reef fish, establish a red snapper bycatch mortality reduction goal for the shrimp trawl fishery, and establish, if necessary, shrimp fishery seasonal closures if the reduction target is not met.

The Gulf of Mexico Fishery Management Council is working on other actions including: Reef Fish Amendments 30A and 30B to address overfishing of gag, greater amberjack, and gray triggerfish; Reef Fish Amendment 29 to establish a grouper IFQ program; and a generic aquaculture amendment.

Approximately 30 percent of all shark permit holders already possess the limited access permits necessary to participate in the Gulf of Mexico reef fish fishery. Of these, the Agency did not estimate the number of vessels that were selected to participate in the red snapper fishery since the inception of an IFQ program for that fishery because permits to participate in this fishery are no longer being issued. Since the fishery is limited access and has extensive measures in place to control effort and harvest levels, it is not likely that shark fishermen would be able to compensate all potential losses from reductions in quota and retention limits proposed for sharks solely by transferring effort to the Gulf of Mexico reef fish fishery.

Dolphin/Wahoo Fishery

In the Gulf of Mexico, dolphin is included in the management unit under the Coastal Migratory Pelagic Resources FMP, and a charter/headboat vessel permit is required to fish for or possess dolphin in the Gulf of Mexico. Otherwise, there are no regulations controlling the harvest of these species in the Gulf of Mexico.

In the South Atlantic, historically, the dolphin/wahoo fishery has been a recreational fishery (NMFS, 2003). However, during the 1990s, commercial landings in the Atlantic Ocean increased, due in part to an increasing number of pelagic longliners targeting dolphin (NMFS, 2003). As a result, the SAFMC, in cooperation with Mid-Atlantic and New England Fishery Management Councils, developed a comprehensive FMP for both dolphin and wahoo in the Atlantic Ocean (NMFS, 2003). This FMP was approved in December of 2003. The final rule implementing the regulations in this FMP was published on May 27, 2004 (69 FR 30235). Owing to the significant importance of the dolphin/wahoo fishery to the recreational fishing community in the Atlantic, the overall goal of the FMP was to adopt a precautionary and risk-averse approach to management that set harvest limits based on the status quo at that time, which was average catch and effort levels from 1993 to 1997 (NMFS, 2003). These limits were

implemented to deter shifts in the historical PLL fisheries for sharks, tunas, and swordfish or expansions into nearshore coastal waters to target dolphin, which could create user conflicts and possible localized depletion in abundance (NMFS, 2003).

As such, the dolphin/wahoo fishery is an open access fishery where people can purchase a vessel, shark dealer, or operator permit in the South Atlantic. Operators of commercial vessels, charter vessels, and headboats in the South Atlantic that fish south of 39° North Latitude are required to have a Federal vessel permit for dolphin/wahoo and must have and display operator permits. There is no trip limit for dolphin for a vessel with a commercial Federal vessel permit. However, there is a 500 pound commercial trip limit for wahoo for vessels with such a permit. For commercially permitted vessels fishing north of 39° North Latitude that do not have a Federal commercial vessel permit for dolphin/wahoo, there is a trip limit of 200 pounds of dolphin and wahoo. In addition, there is a 20-inch fork length minimum size limit for dolphin off the coasts of Georgia and Florida with no size restrictions elsewhere, and PLL fishing for dolphin and wahoo is prohibited in areas closed to the use of such gear for HMS. Dolphin and wahoo longline vessels must also comply with sea turtle protection measures. Finally, there is also a non-binding 1.5 million pound (or 13 percent of the total harvest) cap on commercial landings for dolphin. Should the catch exceed this level, the SAFMC would review the data and evaluate the need for additional regulations, which may be established through a framework action.

The recreational dolphin fishery has the same minimum size. In addition, there is a recreational bag limit of 2 wahoo per person per day and 10 dolphin per person per day or 60 dolphin per vessel per day, whichever is less (headboats are excluded from the vessel limit). There is a prohibition on recreational sale of dolphin and wahoo caught under the bag limit unless the seller holds the necessary commercial permits.

The authorized gears for dolphin and wahoo fishery are hook-and-line gear including manual, electric, and hydraulic rods and reels; bandit gear; handlines; longlines; and spearfishing (including powerheads) gear. PLL vessels permitted in the shark and swordfish fisheries are subject to the hook size regulations regarding the HMS fishery, which has impacted their ability to simultaneously fish for dolphin by attaching smaller-hooked gangions directly to their PLL gear. The total 1999 recreational harvest accounted for 91 percent (10,127,970 pounds total recreational harvest and 1,050,090 pounds commercial harvest) of the total U.S. harvest (NMFS, 2003).

The commercial fishery for wahoo appears to be incidental to fishing for dolphin or other pelagic species. Like dolphin, the recreational landings of wahoo account for a larger proportion of the total harvest in the Gulf of Mexico and Atlantic Ocean. In 1999, the total commercial harvest amounted to 99,159 pounds, compared to 1.41 million pounds harvested by recreational anglers (NMFS, 2003).

The dolphin/wahoo fishery is extremely seasonal in nature. This seasonality would influence the number of displaced shark fishermen's ability to direct effort towards dolphin and wahoo. In addition, there have been no formal stock assessments for dolphin or wahoo. The status of wahoo is considered unknown, and time-series data seems to indicate neither a decline

in stock abundance nor a decrease in mean size of individual dolphin fish (SAFMC, 1998). However, a precautionary approach to management was taken in 2003 since the dolphin and wahoo tend to aggregate, they are economically valuable before the age of maturity, and there is high interannual variability in these stocks due to environmental factors. Therefore, the 2003 FMP set harvest limits based on the status quo at that time.

As of 2007, 256 dolphin/wahoo permit holders also have directed and incidental shark permits (Table 3.42). 156 of these dolphin/wahoo permit holders are from the state of Florida (Table 3.42). Since the dolphin/wahoo fishery is an open access fishery, shark permit holders who do not currently have a dolphin/wahoo permit would be able to enter the fishery in the South Atlantic. Fishermen in the Gulf of Mexico could switch to the dolphin/wahoo fishery without trip limits or any permit requirements. However, gear modification may be difficult since dolphin and wahoo are pelagic in nature, and PLL gear requires the use of 18/0 (with an offset not to exceed 10°) or 16/0 non-offset circle hooks. These larger hooks would make it difficult to catch small dolphin and wahoo, thus limiting catch to larger individuals. In addition, because of the seasonal nature of this fishery, directed fishing year-round would be difficult.

Spanish mackerel

In the South Atlantic, fisheries for Spanish mackerel (*Scomberomorus maculatus*) are important for commercial participants who also engage in shark fisheries. Fisheries are managed by the SAFMC and the Gulf of Mexico Fishery Management Council under the FMP for Coastal Migratory Pelagic Resources and its amendments. A stock assessment for Spanish mackerel was completed in 2003/2004. The assessment was done on the Atlantic and Gulf of Mexico population and found that neither population were overfished or experiencing overfishing (SEFSC, 2007).

Authorized gear include for Spanish mackerel in the South Atlantic include automatic reel, bandit gear, rod and reel, cast net, run-around gill nets, and stab nets; in the Gulf of Mexico, all gears are legal except drift and long gillnets and purse seines. However, there is an incidental catch allowance for vessels with purse seines onboard. A minimum size of 3.5" (8.9 cm) stretched mesh is required for all run-around gill nets and soak time is limited to one hour. The fishing year in the South Atlantic is from March 1 through the end of February, The fishing year in the Gulf of Mexico is April 1 through March 31. A federal vessel permit is required for commercial fisheries; however, the fishery is open to new participants who can demonstrate they meet an income requirement.

In the South Atlantic, the fishery is managed in two zones with differing regulations: a northern zone (Georgia to New York) and a southern zone (east coast of FL to Dade-Monroe County). Catch restrictions vary by month and are dependant on the percentage of each zones allocation that is actually harvested. The majority of landings occur off of Florida, where the commercial trip limit from April – November is 3,500 lb/trip. Trip limits are unlimited on weekdays beginning December 1 with a 1,500 lb trip limit on weekends until 75 percent of the quota is reached, and 1,500 lb daily trip limits are established. When 100 percent of the adjusted quota is met, trip limits are reduced to 500 pounds through the end of fishing year (SAFMC 2007a).

Gillnets were the predominant gear type for Spanish mackerel prior to the net ban in Florida. Currently, approximately 60 percent of the overall catch comes from cast nets and approximately 25 percent are caught with gillnets, the remainder being caught with other authorized gears. In Florida, the majority of the effort is still in state waters, where gillnets are not allowed. Some netting occurs in Federal waters; however, the cast net is used more often. Fishing effort follows the fish migrating north to waters off North Carolina in the summer and then following the fish back to Florida during the winter months. Sinknets are the primary gear type off North Carolina.

Shark fishermen could transfer fishing effort to Spanish mackerel fisheries to replace some of the lost revenues as a result of measures in this rulemaking. Many vessels that deploy gillnets for sharks also possess Spanish mackerel permits. Of vessels that possess directed shark permits, 107 also possess Spanish mackerel permits. There are currently 121 Spanish mackerel permits possessed by shark incidental permit holders (Table 3.42). Because the commercial fishery for Spanish mackerel is not limited access, with only an income qualifier restriction and the stocks are healthy, this could be an attractive fishery for participants to engage in, especially those who possess vessels that are already set up for fishing with gillnet or castnet gear.

NMFS recently published a final rule (June 25, 2007, 72 FR 34632) revising regulations implementing the ALWTRP by expanding the Southeast U.S. Restricted Area and modifying regulations pertaining to gillnetting within the Southeast U.S. Restricted Area. NMFS is prohibiting gillnet fishing or gillnet possession during annual restricted periods associated with the right whale calving season. Limited exemptions to the fishing prohibitions are provided for gillnet fishing for sharks and for Spanish mackerel south of 29°00' N. lat. An exemption to the possession prohibition is provided for transiting through the area if gear is stowed in accordance with this final rule. This action is required to meet the goals of the Marine Mammal Protection Act (MMPA) and the ESA. This action is necessary to protect northern right whales from serious injury or mortality from entanglement in gillnet gear in their calving area in Atlantic Ocean waters off the Southeast U.S.

King Mackerel

Commercial fisheries for king mackerel (*Scomberomorus cavalla*) are also an important source of revenue for participants in the Atlantic and Gulf of Mexico regions. A stock assessment was conducted for king mackerel in 2005. The assessment determined that the Atlantic and Gulf of Mexico migratory groups of king mackerel are not overfished or experiencing overfishing. Permits in the commercial fishery are limited access and there is currently a permit moratorium in place. The minimum size for king mackerel is 24" (61 cm); however, vessels may possess up to five percent of the fish on board as undersized fish. In the South Atlantic, the fishing season is March 1 through the end of February, or until the quota is met. In the Gulf of Mexico, the fishing year is July 1 through June 30.

In the South Atlantic, trip limits vary by region and time of year, including:

- From New York to Flagler/Volusia County, Florida from April 1 to March 31, the trip limit is 3,500 pounds;
- From Flagler/Volusia to Volusia/Brevard County lines from April to October 31, the trip limit is 75 fish; and,

- In Monroe County, Florida, from April 1 to October 31, the trip limit is 1,250 pounds.

Authorized gear for king mackerel varies by region, including: rod and reel, bandit gear, handline, automatic reel, gillnets and long gillnets (except north of Cape Lookout, NC); PLL, run-around gillnets (>4.75" (12.1 cm) stretched mesh); and purse seine (no more than 400,000 lbs may be harvested by purse seine) (SAFMC, 2007c).

In the Gulf of Mexico, trip limits are established according to regional sub-divisions, each with their own quota.

- From the Florida/Alabama state boundary through Texas, the trip limit is 3,000 pounds.
- From The Florida/Alabama state boundary to the Lee/Collier County, Florida, boundary, the trip limit is 1,250 pounds.
- From the Lee/Collier County boundary to the Monroe/Miami-Dade County boundaries, from November 1 through March 31, the trip limit is 1,250 pounds.
- From the Monroe/Miami-Dade County boundary to the Broward/Volusia County boundary, from November 1 through March 31, the trip limit is 50 fish until February 1, when it increases to 75 fish if 75 percent of the quota is not taken.

There are 87 king mackerel permits maintained by shark directed permit holders. Incidental shark permit holders possess 117 permits (Table 3.32). The king mackerel fishery is limited access so entry by those who do not currently possess a permit would be more difficult. Because 204 shark fishermen also have king mackerel permits, NMFS anticipates that shark fishermen may increase fishing effort in king mackerel fisheries. Vessels that are already set up to deploy run-around gillnets, PLL, bandit gear, or other gillnets are most likely to increase fishing effort in the king mackerel fishery as they would have the least difficulty reconfiguring their vessel.

South Atlantic Snapper-Grouper Fishery

The SAFMC manages the 73 species that comprise the South Atlantic snapper-grouper fishery management unit (FMU). In 1998, Amendment 8 to the snapper-grouper FMP was implemented initiating a limited access program. Recent stock assessments were conducted for two deepwater snapper-grouper species, snowy grouper and golden tilefish as well as some shallower snapper-grouper species (red porgy, vermilion snapper, and black sea bass). Snowy grouper, black sea bass, and red porgy were found to be overfished. Red porgy and golden tilefish were determined to not be overfished, and the overfished status of vermilion snapper was unknown. Snowy grouper, golden tilefish, black sea bass, and vermilion snapper were determined to be experiencing overfishing.

NMFS implemented the final rule for Amendment 13C to the FMP for the South Atlantic snapper-grouper Fishery on October 23, 2006 (71 FR 55096). The intent of the amendment was to reduce harvests, end overfishing, and achieve optimum yield. The management measures included in the final rule were reductions in annual commercial quotas for snowy grouper and golden tilefish. Quotas were specified for black sea bass, red porgy, and vermilion snapper, and

commercial trip limits were increased for red porgy. Amendment 14 was recently approved for submission to NMFS by the SAFMC during their June 2007 meeting and would establish eight MPAs off South Atlantic states to protect a portion of the population and habitat of deepwater snapper-grouper species from directed fishing pressure. Amendment 14 includes a measure to prohibit use of shark BLL gear in the MPAs. If Amendment 14 is approved by NMFS, harvest would be prohibited for all species in the snapper-grouper complex in these eight MPAs. The proposed rule for Amendment 14 should be available for public comment during the spring of 2008. In this rulemaking, MPAs proposed by the SAFMC are analyzed and included in several of the alternative suites, including the preferred alternative suite.

At its December 2006 Council meeting the SAFMC voted to explore an IFQ program as a possible management tool for the snapper-grouper fishery. An IFQ for the snapper-grouper fishery would eliminate restrictive trip limitations, eliminate discards by requiring 100 percent retention of catch, and fishermen would be required to cover their catch with their quota. The SAFMC is developing Amendment 18 to reduce capacity in this fishery. The SAFMC will conduct scoping hearings during February of 2008 for this amendment. The 114 shark directed and incidental permit holders that already possess limited access permits in the snapper-grouper fishery may benefit from this future IFQ program as it may mitigate the more restrictive management measures that are in place for some of the snapper-grouper species. However, entrance into the snapper-grouper fishery would be difficult due to the need to find two transferable limited access permits available for purchase, the restrictive management measures that are currently in place to reduce harvests and end overfishing and because of the possibility of the change in management structure to an IFQ program.

Currently, 114 shark directed and incidental permit holders also hold permits in the South Atlantic snapper-grouper fishery. Of the 114 permits, 102 of those permit holders possess the transferable snapper-grouper permit with an unlimited trip limit and 12 hold the non-transferable snapper-grouper permit with a 225 lb trip limit. New entrants into the snapper-grouper fishery must obtain two existing snapper-grouper transferable permits and exchange them for one new permit. Allowable commercial gear for the snapper-grouper fishery includes vertical hook and line including bandit gear, black sea bass pots, sink nets (North Carolina only), and BLL. Vessels with BLL gear onboard may only possess snowy grouper, one warsaw grouper, yellowedge grouper, misty grouper, golden tilefish, blueline tilefish, and sand tilefish. No other snapper-grouper species may be possessed or harvested.

4.16 Cumulative Ecological Impacts

Fishing Impacts

The preferred alternative suite 4, which would establish a small research fishery that could harvest the full sandbar quota as well as other shark species and allow vessels outside the research fishery to retain non-sandbar LCS, SCS, and pelagic sharks, would provide positive ecological impacts by allowing overfished sandbar, dusky, and porbeagle sharks to rebuild and stop overfishing of sandbar and dusky sharks. By allowing a limited number of historical participants to continue to target sharks, the Agency would ensure that data for stock assessments and life history samples would continue to be collected, which would help with future management of these stocks. However, the number of trips these participants could make would

be limited by the sandbar quota, thus limiting fishing effort and sandbar mortality and allowing this stock to rebuild. Individuals not selected to participate in the shark research program could still land non-sandbar LCS with reduced trip limits compared to the status quo. The reduced trip limits and prohibition of sandbar sharks outside the research fishery would limit the number of trips targeting non-sandbar LCS sharks, and prevent overfishing of these species. However, this retention limit would still afford the opportunity to keep some sharks that are landed incidentally, preventing excessive discards of these species. In addition, alternative suite 4 would require that sharks be landed with their fins still attached; this requirement could prevent fishermen from keeping the fins from sharks that are not landed, resulting in a reduction of overall shark mortality.

Since only a few vessels would likely be participating in the research fishery, interactions with protected resources may decrease as a result of less BLL and gillnet fishing effort targeting sandbar sharks and non-sandbar LCS. NMFS assumes that some of this fishing effort may be displaced to other gillnet and BLL fisheries in which participants are permitted, which may interact with protected resources. However, other fisheries such as the South Atlantic snapper-grouper and Gulf of Mexico reef fish fisheries are limited access fisheries. If fishermen do not currently hold permits in these fisheries, it would be difficult and expensive for them to enter these fisheries in the future. In addition, for shark fishermen that are currently permitted in these fisheries, strict retention limits and quotas are either in place or about to be implemented, which would protect these stocks from further overfishing and being further overfished by any redirected shark fishing effort. Therefore, redistributed effort is not anticipated to result in a significant increase in bycatch or interactions with protected resources.

Other fisheries that are still open access that shark fishermen could pursue, such as the mackerel fishery and the dolphin/wahoo fishery, generally have few interactions with protected resources and little bycatch compared to directed shark fishing trips (see NMFS, 2003 and Carlson and Bethea, 2007). Therefore, redistributed effort into these fisheries is not anticipated to increase interactions with protected resources or result in significant increases in bycatch. In addition, retention limits, quotas and other effort controls are in place for these fisheries to protect the stocks from overfishing and from being overfished.

In addition to these impacts, cumulative ecological impacts on HMS stocks and fisheries due to actions under consideration by Regional Fishery Management Councils, Interstate Marine Fisheries Commissions, or other management bodies may be slightly positive. NMFS has recently backstopped the Caribbean Fishery Management Council's area closures that could have minor positive benefits for Atlantic HMS (72 FR 5633, February 7, 2007). NMFS also recently published a rule that requires sea turtle handling and release equipment in the shark BLL fishery (72 FR 5633, February 7, 2007). The SAFMC is considering management measures including time/area closures for BLL gear to protect grouper species that may have some impacts on HMS fishermen, particularly the shark fishermen. The Gulf of Mexico Fishery Management Council implemented regulations that would implement similar dehooking requirements to those required in the HMS PLL fishery and to those proposed for the HMS BLL fishery (71 FR 45428, August 9, 2006). New requirements for non-stainless steel circle hooks in the reef fish fishery under Amendment 27 were implemented on January 29, 2008 (73 FR 5117), by the Gulf of Mexico Fishery Management Council. NMFS has also recently implemented workshops for the safe

handling and release and identification of protected resources for all HMS gillnet and longline fishery participants, and identification workshops for shark dealers (71 FR 58058, October 2, 2006). In addition, the ASMFC has developed an interstate shark fishery management plan, which would likely have positive ecological impacts because many shark nursery areas are located in state waters. This plan is out for public comment until March 28, 2008.

The incremental contribution of the actions proposed in Amendment 2 to the Consolidated HMS FMP, when considered in conjunction with the activities listed above, is considered a significant ecological benefit to the ecology of the managed species. The measures listed above were implemented to help reduce interactions with protected species, or increase post-release survival of non-target species and protected species, to help rebuild overfished fish stocks and end overfishing, or to protect EFH for deep water species. In conjunction with Amendment 2 to the Consolidated HMS FMP , which would help rebuild several shark stocks and end overfishing, such measures would help conserve fishery resources in the long-term, which would ultimately have positive ecological impacts.

Non-Fishing Impacts

Other actions that might affect shark populations, such as offshore oil and gas production, and non-fishing activities that may affect EFH are described in Section 10.5 of the Consolidated HMS FMP (NMFS, 2006).

4.17 Cumulative Social and Economic Impacts

The preferred alternative 4 would allow a small pool of vessels to continue to collect reduced revenues from sharks. Significant negative economic impacts would still likely occur under alternative suite 4. For instance, shark fishermen outside the research fishery would not be able to land sandbar sharks and would have their non-sandbar LCS retention limit reduced, resulting in 50 percent reduction in gross revenues compared to the status quo (Table 4.18). These losses in gross revenues may be exacerbated by the requirement to land shark with their fins attached. In addition, establishing one season represents an economic disadvantage to the North Atlantic region as sharks are not present in these waters year-round, meaning the quota may be filled in some years before sharks are present in these areas. Establishing one season combined with limiting underharvest carry-overs may have negative economic impacts on fishermen, especially for regions that consistently had underharvests of species like SCS.

It is unlikely that shark fishermen would be able to recuperate all of the economic losses that are likely with the selected measures for the shark fishery by switching to other southeast fisheries due to quota reductions and/or limited access programs in these other fisheries. The Agency presumes that since some shark fishermen also possess several permits in other fisheries, they do not receive all of their revenues from shark products. At the present time, NMFS estimates that fishermen make decisions about which fisheries to participate in based on the ex-vessel prices they can expect from a given species of fish, seasonality, quotas, trip limits, and other factors. In the past, revenues received from sharks likely comprised a larger share of their overall revenues from fishing activities than is expected in the future. However, it could be difficult for all lost shark revenues to be replaced by transferring more effort to other fisheries in which they have historically participated.

For instance, there are limited-access permit programs in place for the South Atlantic snapper-grouper fishery as well as the Gulf of Mexico reef fish fishery, where no new permits are being issued. Therefore, if shark fishermen do not currently possess a South Atlantic snapper-grouper permit or a Gulf of Mexico reef fish permit, it would be difficult and costly to enter these fisheries in the future. There are also quota reductions proposed for many reef fish species (see above), which would affect current Gulf of Mexico reef fish permit holders. Shark fishermen who have shark and reef fish permits could be experiencing economic hardships in both fisheries.

In addition, there is an IFQ program in place for the Gulf of Mexico red snapper fishery, with limitations on transfers during the first five years (see above), and a new IFQ program would be implemented in the near future for the South Atlantic snapper-grouper fishery. These IFQ programs could benefit current South Atlantic snapper-grouper or Gulf of Mexico red snapper permit holders; however, it would make it difficult and expensive for shark fishermen who do not currently possess these permits to enter these fisheries in the future.

As mentioned above, the dolphin/wahoo fishery is an open access fishery, especially in the Gulf of Mexico. However, redistribution of commercial shark fishing effort into this fishery may result in user conflicts between recreational and commercial fishermen. Additionally, commercial PLL fishermen that currently fish for dolphin and wahoo could suffer economically if a large proportion of the shark fishermen redirect to the dolphin/wahoo fishery, given the 1.5 million pounds commercial landings cap (or 13 percent of total landings, whichever is greater) for the dolphin fishery. If this cap is exceeded, the SAFMC may decide to take more stringent measures in this fishery to reduce overall catch. More importantly, due to the seasonality of the dolphin/wahoo fishery, it would be difficult for commercial fishermen to direct on dolphin/wahoo (S. Branstetter, personal communication). Finally, it would be difficult for shark fishermen using PLL gear to catch smaller dolphin and wahoo due to hook requirements in the PLL fishery (see discussion above). Shark fishermen would have to either target larger fish with larger circle hooks or relinquish their HMS permit(s) so that they could use smaller hook sizes to target smaller dolphin/wahoo. The latter would preclude them from retaining any HMS catch.

It is likely that shark fishermen using gillnet gear for sharks would transfer some fishing effort to the Spanish mackerel fishery. Participants currently using other gears for sharks may consider purchasing the necessary gear (*e.g.*, gillnets, *etc*.) to become involved in this fishery. Since this fishery is not limited access, transferring effort into this fishery would not require paying exorbitant costs to acquire permits from other vessels. Furthermore, since the stock status of Spanish mackerel is healthy, there does not appear to be any significant restrictions on quotas or other effort controls necessary at this time or in the foreseeable future. However, this fishery is seasonal, so year-round revenues from Spanish mackerel may not be realized. Rather, participants in North Carolina would be expected to fish for Spanish mackerel in the summer while participants in Florida could target these fish in the winter.

The commercial fishery for King mackerel is managed via a limited access permit system, and shark fishermen who do not currently possess a King mackerel permit may have a difficult time entering this fishery. However, there are 204 participants in the shark fishery that

currently possess these king mackerel permits. Therefore, effort in this fishery is expected to increase as a result of shark management measures in this rulemaking.

The additional management measures being taken by other Councils and Commissions, such as the eight MPAs being preferred by the SAFMC's Amendment 14, dehooking requirements by the Gulf of Mexico Fishery Management Council, the interstate shark plan being developed by the ASMFC, and the requirement of non-stainless steel, circle hooks in the reef fish fishery as well as the measures that NMFS has backstopped or other rules that NMFS has recently implemented, such as requiring safe handling and release gear on shark BLL and gillnet boats and backstopping closed areas in the Caribbean to protect EFH, would all have negative economic and social impacts on fishermen in the short-term. Therefore, the incremental contribution of the proposed measures in Amendment 2 to the Consolidated HMS FMP, when considered with these other actions, is expected to have a significant socioeconomic impact over the short-term on participants in the shark fishery. There would be increased costs associated with buying additional safe handling and release equipment and the replacement of J hooks with circle hooks, lost revenues due to closed areas, and lost gross revenues from shark products as a result of this current action. However, because these measures were implemented to help reduce interactions with protected species, or increase post-release survival of non-target species and protected species, to help rebuild overfished fish stocks and end overfishing, or to protect EFH for deep-water species, such measures would help conserve fishery resources in the long-term, which would ultimately have positive economic and social impacts for fishermen in the long-term.

Chapter 4 References

Baremore, I.E., J.K. Carlson, L.D. Hollensead, and D.M. Bethea. 2007. Catch and Bycatch in the U.S. Southeast Gillnet Fisheries: 2007. NOAA Technical Memorandum NMFS-SEFSC-565, 19 p.

Barnette, M.C. 2001. A review of the fishing gear utilized within the Southeast Region and their potential impacts on essential fish habitat. NOAA Technical Memorandum NMFSSEFSC-449.

Caribbean Fishery Management Council (CFMC). 2004. Final Environmental Impact Statement for the Generic Essential Fish Habitat Amendment to: Spiny Lobster Fishery Management Plan, Queen Conch Fishery Management Plan, Reef Fish Fishery Management Plan, Coral Fishery Management Plan for the U.S. Caribbean. 497 pp.

Carlson, J.K. and D. M. Bethea. 2007. Catch and bycatch in the shark gillnet fishery: 2005-2006. NOAA Technical Memorandum NMFS-SEFSC-552, 26 p.

Cortés, E. and J. Neer. 2005. Updated Catches of Atlantic Sharks. LCS05/06-DW-16, 58 pp.

Gibson, A.J.F., and S.E. Campana. 2005. Status and Recovery Potential of Porbeagle Shark in the Northwest Atlantic, DFO, CSAS, Research Document 2005/053, 79 pp.

Gulf of Mexico Fishery Management Council (GOMFMC). 2004. Final Environmental Impact Statement for the Generic Essential Fish Habitat Amendment to the following fishery management plans of the Gulf of Mexico (GOM): Shrimp Fishery of the Gulf of Mexico, Red Drum Fishery of the Gulf of Mexico, Reef Fish Fishery of the Gulf of Mexico, Stone Crab Fishery of the Gulf of Mexico, Coral and Coral Reef Fishery of the Gulf of Mexico, Spiny Lobster Fishery of the Gulf of Mexico and South Atlantic, Coastal Migratory Pelagic Resources of the Gulf of Mexico and South Atlantic. 682 pp.

Hale, L.F. and J. K. Carlson. 2007. Characterization of the shark bottom longline fishery: 2005-2006. NOAA Technical Memorandum NMFS-SEFSC 554, 28 p.

Hale, L.F., L.D. Hollensead, and J. K. Carlson. 2007. Characterization of the shark bottom longline fishery: 2007. NOAA Technical Memorandum NMFS-SEFSC 564, 25 pp.

Morgan, L.E., and R. Chuenpagdee. 2003. Shifting gears: addressing the collateral impacts of fishing methods in U.S. waters. Island Press, Washington, D.C. 52 pp.

NMFS. 2003. Fishery Management Plan for the Dolphin and Wahoo Fishery of the Atlantic. South Atlantic Fishery Management Council in Cooperation with the New England Fishery Management Council, Mid-Atlantic Fishery Management Council. Charleston, SC, Public Document. 386 pp.

NMFS. 2006. Final Consolidated Atlantic Highly Migratory Species Fishery Management Plan. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Sustainable Fisheries, Highly Migratory Species Management Division, 1315 East West Highway, Silver Spring, MD. Public Document. pp. 1600.

Northeast Region Essential Fish Habitat Steering Committee (NREFHSC). 2002. Workshop on the effects of fishing gear on marine habitats off the northeastern United States, October 23-25, 2001. Northeast Fisheries Science Center Reference Document 02-01. 86 p. National Marine Fisheries Service, NOAA, 166 Water Street, Woods Hole, MA 02543-1026.

Siegfried, K., M. Ribera, L. Hale, and J. Carlson. 2006a. Expanded take estimates of snapper-grouper from the shark bottom longline fishery within proposed Type II Marine Protected Areas in the South Atlantic Fishery Management Council's Amendment 14 to the Snapper-Grouper Fishery Management Plan. National Marine Fisheries Service Southeast Fisheries Science Center Panama City Laboratory 3500 Delwood Beach Road Panama City, FL 32408. 11p.

Siegfried, K., M. Ribera, L. Hale, and J. Carlson. 2006b. Expanded take estimates of coastal shark from the shark bottom longline fishery within proposed Type II Marine Protected Areas in the South Atlantic Fishery Management Council's Amendment 14 to the Snapper-Grouper Fishery Management Plan. National Marine Fisheries Service Southeast Fisheries Science Center Panama City Laboratory 3500 Delwood Beach Road Panama City, FL 32408. 9p.

South Atlantic Fishery Management Council (SAFMC). 1998. Dolphin/Wahoo Workshop Report. Prepared by the South Atlantic Fishery Management Council, May 1998. Available from: SAFMC, 1 Southpark Circle, Suite 306, Charleston, South Carolina 29407-4699.

SAFMC. 2007a. South Atlantic Fishery Management Council, Regulations by Species – Spanish Mackerel. June 18, 2007. http://www.safmc.net/FishIDandRegs/FishGallery/SpanishMackerel/tabid/329/Default.aspx.

SAFMC. 2007b. Amendment 18 to the Coastal Migratory Pelagics Fishery Management Plan to Revise the South Atlantic Migratory Group King and Spanish Mackerel TACs and Spanish Mackerel Trip Limits. Public Hearing Draft. June 18, 2007. http://www.safmc.net/Portals/6/Meetings/Council/BriefingBook/March%202007/Attach%201.%20Draft%20Mackerel%20Am18%20BBook%202-26-07.pdf

SAFMC. 2007c. South Atlantic Fishery Management Council, Regulations by Species – King Mackerel. June 18, 2007. http://www.safmc.net/FishIDandRegs/FishGallery/KingMackerel/tabid/297/Default.aspx

SEFSC. 2007. Southeast Fisheries Science Center – SEDAR homepage. June 19, 2007. http://www.sefsc.noaa.gov/sedar/Sedar_Workshops.jsp?WorkshopNum=05

CHAPTER 5 TABLE OF CONTENTS

5.0 MITIGATION AND UNAVOIDABLE IMPACTS

Ecological Impacts Summary of the Preferred Alternatives

The management measures in preferred alternative suite 4: *Research Set Aside Allowing Small Directed LCS Fishery*, are not likely to have significant adverse ecological impacts to target and non-target species. All issues considered are either predicted to result in neutral or positive ecological impacts. The preferred alternative suite would reduce mortality of shark species based on the results of previous shark assessments (for a thorough description of the most recent assessments, please refer to Chapter 3). The preferred alternative suite would also reduce mortality of sea turtles and other protected species.

In alternative suite 4, the *Quotas/Species Complexes* measure would have positive ecological impacts on all shark species. Establishing the quotas and species complexes as described in alternative suite 4 would maintain a level of fishing effort that would allow sandbar shark stocks to rebuild, end overfishing of this stock, and maintain the current status of blacktip sharks which are not overfished. Allocating the sandbar quota solely among vessels operating within a research fishery while allowing non-sandbar large coastal sharks (LCS) to be caught by vessels operating within and outside a research fishery, was constructed to maintain proper quota levels in order to rebuild these species based on recommendations from the most recent LCS stock assessment. Structuring the fishery in this way would continue to provide valuable data on these shark stocks necessary for the effective management of these species while still allowing a limited number of vessels to remain active in the fishery.

In alternative suite 4, the *Retention Limits* measure would have positive ecological impacts on sandbar and dusky sharks. Only vessels participating in the research fishery would be allowed to land sandbar sharks. This reduction in fishing effort is anticipated to result in a more than 80-percent decrease in sandbar landings. Even though discards of sandbar sharks could occur after the sandbar quota is reached and non-sandbar LCS are still being caught, the sandbar shark quota reduction of over 80 percent compared to the status quo, would keep all landings plus discards of sandbar sharks below the recommended sandbar total allowable catch (TAC) of 158.3 mt dw. Since the vessels participating in the research fishery would be targeting sharks, it is assumed that discards of dusky sharks would also occur. However, the number of pelagic longline (PLL) vessels that can land sandbar sharks would be limited by the research fishery, so it is anticipated that the PLL vessels would not set bottom longline (BLL) gear for sharks, leading to an anticipated 72 percent decrease of dusky shark discards compared to the status quo.

The *Retention Limits* measure would have also have positive ecological impacts for non-sandbar LCS. Since vessels with directed shark permits are expected to target non-sandbar LCS because of the reduced retention limits compared to the status quo, it is anticipated that a 6-percent decrease in non-sandbar LCS landings will occur. Retention limits of non-sandbar LCS for incidental permit holders would stay the same compared to current retention limits. Therefore, discards of non-sandbar LCS are not anticipated to increase for incidental permit holders, leading at least a 60-percent decrease in non-sandbar LCS discards. Possession and

landing of porbeagle sharks would continue to be authorized in commercial and recreational sectors, however, the quota would be reduced for this species. The current quota for porbeagle sharks is 92 mt dw/year, whereas, the preferred alternative would reduce the overall TAC for commercial and recreational fisheries to 11.3 mt dw/year. This would result in a commercial quota of 1.7 mt dw. This revised TAC is not expected to alter existing fishing effort because the existing quota has never been met. However, it may reduce fishing effort in the future due to a considerable reduction in commercial quota. Porbeagle sharks are primarily caught on PLL gear and the United States has had minimal landings of this species.

In alternative suite 4, the *Time/Area Closures* measure would have positive ecological impacts on target and non-target species as well as protected species, marine mammals, and essential fish habitat. Maintaining the time/area closures as they have been implemented in recent years would further the positive ecological effects that have been observed such as the reduction of bycatch of prohibited, non-prohibited, and non-target HMS species. The closure areas specific to BLL gear have also been effective in reducing dusky and neonate and juvenile sandbar shark interactions and, in the Caribbean, could have positive ecological impacts to essential fish habitat (EFH), mutton snapper, red hind, and other reef-dwelling species (see Section 4.1.3). In addition, maintaining current gillnet restrictions could have positive ecological impacts on endangered right whales. Marine Protected Areas (MPAs) being implemented by the South Atlantic Fishery Management Council (SAFMC) and included in the preferred alternative suite may also have positive ecological impacts by limiting fishing effort with BLL gear in areas that are habitat for species included in the snapper grouper fishery management plan.

In alternative suite 4, the *Reporting* measure would have positive and/or neutral ecological impacts. Increasing observer coverage in the shark research fishery would have positive ecological impacts because it would improve the quantity and quality of data obtained from the commercial shark fishery. These data would be used to monitor landings, bycatch, and interactions with protected resources in near "real-time." Requiring that all shark dealer reports are actually *received* by the Agency in a more timely fashion would provide more frequent reports of shark landings in order to better assess quantities of sharks landed and whether or not a closure or other management measures are warranted to prevent overfishing. This may decrease the likelihood that extensive overharvests of sharks would occur, resulting in neutral or slightly positive ecological impacts.

In alternative suite 4, the *Seasons* measure would result in neutral ecological impacts. Coupled with more restrictive retention limits, this measure may spread shark fishing effort across a larger portion of the calendar year. Since all sandbar sharks and most of the non-sandbar LCS would be landed by a limited number of vessels participating in the research fishery, NMFS would have more information regarding when sandbar and non-sandbar LCS quotas would likely be reached. The *Regions* measure would result in positive ecological impacts. Implementing two regions for non-sandbar LCS in the final amendment was chosen over maintaining three regions or implementing one region because the two regions scheme would account for overharvests more equitably, account for the unique species composition in the Gulf of Mexico and Atlantic regions, maintain consistency with the blacktip shark stock assessment, and provide flexibility to make modifications when an interstate Coastal Shark Management plan is adopted by states adjacent to the Atlantic Ocean. Maintaining two regions is not likely to

provide any significant ecological benefits for shark species, bycatch, or protected resources because having two regions does not directly impact fishing effort. Quotas, retention limits, and authorized species are the primary means of affecting fishing effort. However, it would give the Agency the flexibility to implement more specific regulations in individual regions that are better suited to the fishery within each region.

In the preferred alternative suite, the *Recreational Measures* would result in positive ecological impacts. Allowing recreational anglers to possess species that are easy to identify, while prohibiting retention of species that are frequently misidentified with sandbar and dusky sharks (*i.e.*, silky sharks), would remove the possibility that a recreational angler might misidentify and actually land a species that is overfished or experiencing overfishing. This would decrease the possibility that sandbar and dusky sharks are landed, as they are sometimes mistaken for species that are not overfished or experiencing overfishing.

Alternative suite 4 would result in positive ecological impacts to protected resources and EFH. The *Quotas/Species Complexes* and *Retention Limits* measures would significantly reduce the number of trips, thus reducing fishing effort. These measures, in combination with other measures such as *Reporting* and increasing observer coverage for the research fishery, may result in increased data collection on protected resources and EFH. In addition, the reduction in usage of BLL gear would reduce impacts to complex habitats, such as coral reefs in the Caribbean or areas with soft corals in the Gulf of Mexico.

Ecological impacts of conducting stock assessments at least every five years could be neutral or slightly positive (Alternative 7). Releasing the annual SAFE report in the fall every year is not expected to have any ecological impacts (Alternative 9).

Social and Economic Impacts Summary of the Preferred Alternatives

All management measures in preferred alternative suite 4: *Research Set Aside Allowing Small Directed LCS Fishery*, are likely to have negative economic impacts on fishermen and the associated communities because retention limits would be decreased, only vessels participating in the shark research fishery would be allowed to land sandbar sharks, and quotas would be reduced. However, NMFS believes that alternative suite 4 strikes a balance between the positive ecological impacts that must be achieved in order to rebuild stocks and end overfishing while minimizing the severity of economic impacts that will occur as a result.

In alternative suite 4, the *Quotas/Species Complexes* and *Retention Limits* measures would have negative economic consequences for fishermen. Based on the limited number of boats that could fish for sandbar sharks in the research shark fishery, most current directed and incidental permit holders would be prohibited from landing sandbar sharks. However, directed and incidental permit holders outside the research fishery would still be able to land non-sandbar LCS, small coastal sharks (SCS), and pelagic shark species. From 2008 until December 31, 2012, directed permit holders would be allowed to retain 33 non-sandbar LCS per vessel per trip with no trip limits for SCS or pelagic sharks. Incidental permit holders would be allowed to retain 3 non-sandbar LCS and 16 SCS and pelagic sharks combined per vessel per trip. As of January 1, 2013, the non-sandbar LCS trip limit from directed permit holders would increase to

36 non-sandbar LCS per vessel per trip. Trip limits for incidental permit holders would stay the same. The reduced retention limits coupled with the fact that only vessels selected to participate in the shark research fishery would be able to land sandbar sharks is expected to curtail the directed shark fishery. However, commercial shark permit holders outside the research fishery could possess a reduced number of sharks while pursuing other species with longline or gillnet gear.

The *Time/Area Closures* measure in the preferred alternative suite would have neutral to negative economic consequences. This measure would maintain the status quo in addition to implementing 8 additional MPA closures in the South Atlantic. These additional 8 MPAs would be closed to BLL gear which could have negative economic impacts. However, the overall impact of these closures in comparison to other measures being preferred by this alternative, such as reduced quotas and retention limits, is anticipated to be minor.

In alternative suite 4, the *Reporting* measures would have neutral economic impacts. Shark dealers would still be required to submit landings reports twice a month. Additional burden is not expected as a result of changing the pertinent date of post-marking to receipt by the Agency.

The, *Seasons* and *Regions* measures in alternative suite 4 would result in negative economic impacts to fishermen and dealers in the North Atlantic region. Opening the seasons on January 1 in all regions would provide benefits to vessels in the South Atlantic and Gulf of Mexico regions as a larger variety of LCS and SCS are present there year-round. The North Atlantic fishermen may have to redistribute effort to another region which may not be cost effective with reduced quotas and retention limits for sandbar and non-sandbar LCS.

The *Recreational Measures* would result in negative economic impacts. Recreational fishermen may not be as willing to go shark fishing if the number of species that can be retained is reduced and Charter/Headboat operators may see a reduction in the amount of charters that customers are willing to hire. The preferred alternative would allow recreational anglers to land tiger, blacktip, spinner, bull, lemon, nurse, great hammerhead, smooth hammerhead, and scalloped hammerhead sharks as well finetooth, blacknose, Atlantic sharpnose, and bonnethead sharks and pelagic sharks (porbeagle, oceanic whitetip, blue, common thresher, and shortfin makos). This is expected to mitigate economic impacts compared to the proposed measures which would have prevented recreational fishermen from retaining blacktip, spinner, bull, finetooth, blacknose, and porbeagle sharks.

Measures contained in alternative 7 to modify the timing of stock assessments would result in variable economic impacts depending on the results of forthcoming stock assessments. Alternative 9, concerning the timing of the release of the annual Stock Assessment and Fishery Evaluation report (SAFE report) would not have any economic impacts.

5.1 Mitigation Measures

No mitigation measures were specifically considered for the preferred alternative suite, Alternative suite 4, and its corresponding management measures regarding *Quotas/Species Complexes, Retention Limits, Time/Area Closures, Reporting, Seasons, Regions, Recreational*

Measures, and *Protected Resources and EFH*. This is because the preferred alternative suite was specifically selected to mitigate potential adverse impacts. As a result, mitigation was explicitly addressed in the analyses conducted for selecting the preferred alternative suite in other sections of this FEIS including Chapters 4, 6, 7, 8, and 9. NMFS would monitor the impacts of the management measures in the preferred alternative suite and would consider other mitigation measures in the future as necessary.

As stated above, mitigation measures were explicitly addressed in the analyses conducted for selecting the management measures in the preferred alternative suite. For example, in analyzing possible quotas and retention limits, the preferred research fishery approach was selected because it balances the need to end overfishing based on recent assessments, while allowing a limited number of vessels to direct on sharks and provide scientific data on the status of shark stocks for future management actions. To mitigate some of these impacts, directed and incidental permit holders outside of the research fishery would still be allowed to land non-sandbar LCS, SCS, and pelagic sharks. The quotas and retention limits in the preferred alternative suite complies with the mandate to end overfishing, while still providing a reasonable opportunity to target sharks and harvest the allocated quota. It also provides additional information on shark species, bycatch, protected resources, and EFH which are all necessary for management of the fishery.

Similarly, for time/area closures, other than implementing the 8 MPAs at the request of the SAFMC, NMFS is maintaining the current time/area closures and has opted not to implement additional large closures that were considered as an option to reduce overall fishing mortality.

For dealer reporting, requiring all dealer reports to be *received* by the Agency within ten days of the end of the reporting period would provide clarity and eliminate ambiguities regarding late reporting, without imposing additional, more stringent reporting requirements that were also considered as an option in other alternative suites.

For seasons, the preferred measure to open on January 1 and close within 5 days notice of quotas being 80 percent filled should balance the need to predict landings for non-research vessels with the security of knowing what the research vessels are landing. In addition, implementing two regions is preferred over maintaining three regions because it follows the recommendation of the blactkip shark assessments, it allows for equitable accounting of overharvests, and will allow for better coordination with the interstate shark plan that is being developed by the Atlantic States Marine Fisheries Commission (ASMFC). Finally, requiring recreational anglers to land species that are easily identifiable would balance the need to end overfishing with the needs of the recreational constituency.

In summary, while many of the actions taken in this amendment impose additional restrictions on the shark fishery, NMFS specifically selected alternatives that minimize economic impacts while accomplishing the mandate to end overfishing and implement a rebuilding plan for overfished shark stocks.

5.2 Unavoidable Adverse Impacts

In general, there are no unavoidable adverse impacts expected as a result of the preferred alternative suite and corresponding management measures of *Time/Area Closures, Reporting, Seasons, Regions, Recreational Measures*, and *Protected Resources and EFH*. NMFS would continue to monitor the impact of the management measures in the preferred alternative suite and would propose additional management measures, as necessary, to avoid any unanticipated adverse impacts. No unavoidable adverse impacts are expected as a result of stock assessment frequency or SAFE report release as described in alternatives 7 and 9, respectively. Economic impacts may vary depending on the findings of future stock assessments, but these are not considered unavoidable adverse effects of Alternative 7.

However, there are unavoidable adverse socioeconomic impacts as a result of the preferred alternative suite and corresponding management measures of *Quotas/Species Complexes* and *Retention Limits.* NMFS must administer and operate under the National Standards of the Magnuson-Stevens Act which includes a mandate to prevent overfishing and rebuild overfished stocks. In trying to maintain shark stocks and meet the Magnuson-Stevens Act mandate of ending overfishing, NMFS would significantly reduce fishing effort under the preferred alternative suite. This might result in directed and incidental shark permit holders and dealers redirecting to other fisheries and/or leaving the fishing industry due to lowered quotas, thus decreasing effort and landings. Participants in recreational shark fisheries may experience negative economic impacts as a result of reducing the number of sharks that could be legally landed. Charter/Headboat operators would be most affected as a result of these measures as they may see a reduction in the number of charters that customers are willing to hire. In addition, reporting burden would be increased significantly for Atlantic shark dealers as a result of this alternative suite resulting in negative economic impacts. While the increased reporting burden would not impact shark dealer expenditures per se, it would result in more time spent submitting dealer reports, which represents an opportunity cost for fishermen since that would be time they could not spend conducting other activities related to their business. In the analyses for selecting the preferred alternative suite, NMFS had determined that the management measures in alternative suite 4 are necessary in order to comply with the Magnuson-Stevens Act mandate to end overfishing. In addition, the preferred alternative suite has been determined to be the most feasible alternative to rebuild shark stocks according to the most recent assessments.

As described above, in aggregate, the preferred alternative suite and its corresponding management measures are expected to have positive or neutral conservation benefits for shark species, bycatch species, and protected resources. This is because the preferred alternative suite was specifically selected to mitigate any potential adverse impacts. Any resulting economic or social impacts, beyond those described above, are unavoidable.

5.3 Irreversible and Irretrievable Commitment of Resources

The management measures in the preferred alternative suite would not result in any irreversible and irretrievable commitment of resources. There are expected to be positive ecological impacts because of reduced trip limits and commercial sandbar quota for the Atlantic shark fishery. Because of this, the Agency expects fishing effort and bycatch levels to decrease. The preferred alternative suite could increase observer coverage levels, depending on available

funding, and provide more documentation of interactions with bycatch and protected resources. These data would assist the Agency in developing additional management measures in the future that may further reduce any deleterious impacts from shark fisheries on bycatch and protected resources.

CHAPTER 6 TABLE OF CONTENTS

CHAPTER 6 LIST OF TABLES

6.0 ECONOMIC EVALUATION

This section assesses the economic impacts of the alternatives presented in this document. Additional economic and social considerations and information are discussed in Chapters 3, 4, 7, 8, and 9 of this document.

6.1 Number of Vessel and Dealer Permit Holders

In order to examine the baseline universe of entities potentially affected by the preferred alternatives, NMFS analyzed the number of permits that were issued as of May 2007 in conjunction with HMS fishing activities.

As of October 1, 2007, there were a total of 527 commercial permit holders in the Atlantic shark fishery (231 directed and 296 incidental permits). Table 6.1 provides a summary of these permit holders by region. Further detail regarding commercial permit holders is provided in Chapter 3 and the Consolidated HMS FMP.

Table 6.1 **Distribution of Shark Limited Access Permits (by address of permit) holder between 2001 and 2007.** Data for 2001-2005 are as of October 1 for each year. (NAT: North Atlantic, SAT: South Atlantic, FL: Florida, GOM: Gulf of Mexico)

Region/State	# Directed Shark	# Incidental Shark
NAT	49	67
SAT	29	28
FL	132	137
GOM	13	50
Other	1	
No Vessel ID	7	14
2007	231	296
2006	240	312
2005	235	320
2004	241	348
2003	251	359
2002	251	376

* Number of permit holders in each category, and state, is subject to change as permits are renewed or expire.

As of October 1, 2007, there were a total of 269 Atlantic shark dealer permit holders. Table 6.2 provides a summary of shark dealer permit holders by region. Further detail regarding shark dealer permits holders is provided in the Final Consolidated HMS FMP. All dealer permit holders are required to submit reports detailing the nature of their business. For shark permit

holders, dealers must submit bi-weekly dealer reports on all HMS they purchase. To facilitate quota monitoring "negative reports" for shark are also required from dealers when no purchases are made (*i.e.*, NMFS can determine who has not purchased fish versus who has neglected to report).

Table 6.2 Number of shark dealer permits issued in each state as of October 2002-2007. The actual number of permits per region may change as permit holders move or sell their businesses.

Region/State/Country	Atlantic shark dealers
NAT	58
SAT	45
FL	102
GOM	34
Other	30
Totals 2007	269
2006	336
2005	228
2004	230
2003	254
2002	267

6.2 Gross Revenue of the Commercial Shark Fishermen

NMFS calculated gross revenues by combining current Federal permit holders with their reported landings from logbooks and shark dealer reports averaged from 2003 to 2005. These landings were multiplied by 2006 ex-vessel prices (by region) for LCS flesh, LCS fins, and SCS flesh obtained from dealer reporting.

Table 6.3 **Estimates of the total ex-vessel annual revenues of Atlantic Shark HMS fisheries.** Sources: NMFS, 1997; NMFS 2004, 2005; Cortés, 2003; Cortés and Neer, 2002, 2005; Cortés, pers.comm.

Species		2000	2001	2002	2003	2004	2005	2006
Non-Sandbar Large coastal sharks*	Ex-vessel $/lb dw	$0.68	$0.91	$0.99	$0.78	$0.86	$0.48	$1.02
	Weight lb dw	3,762,000	3,562,546	4,097,363	4,421,249	3,206,377	2,024,106	2,235,324
	Fishery Revenue	$2,560,307	$3,256,955	$4,040,977	$3,437,521	$2,757,484	$971,571	$2,280,030
Pelagic sharks	Ex-vessel $/lb dw	$1.09	$1.11	$0.99	$1.04	$1.12	$1.03	$1.14
	Weight lb dw	215,005	362,925	303,666	616,967	450,833	270,021	186,901
	Fishery Revenue	$233,650	$401,430	$299,487	$643,188	$504,933	$278,122	$213,067
Small coastal sharks	Ex-vessel $/lb dw	$0.46	$0.79	$0.52	$0.43	$0.50	$0.59	$0.49
	Weight lb dw	672245*	719,484	579,441	549,799	677,305	650,202	822,093
	Fishery Revenue	$309,926	$568,441	$299,023	$236,414	$338,653	$383,619	$402,826
Sandbar sharks*	Ex-vessel $/lb dw	-	-	-	-	-	$0.47	$0.56
	Weight lb dw	-	-	-	-	-	1,282,477	1,516,497
	Fishery Revenue	-	-	-	-	-	$602,764	$849,238
Shark fins (weight = 5% of all sharks landed)	Ex-vessel $/lb dw	$10.47	$19.67	$19.87	$17.09	$16.25	$17.94	$18.43
	Weight lb dw	232,462	232,248	249,024	279,401	216,726	211,340	238,041
	Fishery Revenue	$2,434,344	$4,568,937	$4,949,056	$4,774,959	$3,521,793	$3,791,440	$4,387,096
Total sharks	**Fishery Revenue**	**$5,538,227**	**$8,795,763**	**$9,588,545**	**$9,092,082**	**$7,112,863**	**$6,027,516**	**$8,132,257**

Note: Average ex-vessel prices may have some weighting errors. Landing estimates include prohibited as well as unclassified landings for each complex.
*Sandbar sharks are broken out of the large coastal shark complex for 2005 and 2006 to provide baseline information for this proposed Amendment. This exaggerates the discrepancy in revenue for LCS in 2005 and 2006 when compared across years

Of all Atlantic HMS, sharks bring in the lowest total gross revenues (~$8.1 million total in 2006). If gross revenues for directed permit holders is averaged across the approximately 143 active directed shark permit holders, then the average annual gross revenues per shark fishing vessel is just over $33,000.

Table 6.4 provides data on the prices shark fishermen received at the dock. The average values for ex-vessel prices from the Southeast Science Center's Accumulative Landings System (ALS) and dealer reports from the Northeast were used to construct the table. Table 6.4 reports ex-vessel prices by region, shark complex, and year.

The ex-vessel price data indicates somewhat stable ex-vessel prices since 2003. The ex-vessel prices for sandbar shark have been broken out from the large coastal shark complex in order to analyze the proposed new sandbar and LCS other quota categories. However, in 2006 sandbar ex-vessel prices declined somewhat in both the South Atlantic and Gulf of Mexico regions. The non-sandbar LCS ex-vessel prices have followed a very similar trend pattern. Pelagic shark prices appear to have been higher in the North Atlantic and Gulf of Mexico versus the South Atlantic from 2003 to 2006. Small coastal shark ex-vessel prices have been steadily trending upward in all regions since 2003. Finally, shark fin ex-vessel prices have been fluctuating in the $14 to $20 range since 2003.

Table 6.4 Ex-vessel price per pound dw by region, shark complex and year. Source: Accumulative Landings System maintained by the Southeast Fisheries Science Center.

Species	Area	1996	1999	2000	2001	2002	2003	2004	2005	2006
Non-sandbar large coastal sharks*	Gulf of Mexico	$0.21	$0.56	$0.43	$0.44	$0.36	$0.38	$0.37	$0.49	$0.47
	S. Atlantic	$1.02	$1.10	$0.78	$1.12	$1.27	$0.39	$0.44	$0.49	$0.46
	Mid-Atlantic	$0.55	$0.59	$0.53	$1.09	$1.56	$1.62	$1.93	$0.36	$2.14
	N. Atlantic	$0.88	$0.77	$1.01	$1.02	$0.77	$0.72	$0.70	$0.24	$1.02
Pelagic sharks (including porbeagle sharks)	Gulf of Mexico	-	$1.36	$1.31	$1.42	$1.11	$1.13	$1.08	$1.09	$1.21
	S. Atlantic	$0.62	$0.83	$0.76	$0.68	$0.67	$0.71	$0.65	$0.70	$0.72
	Mid-Atlantic	$1.21	$1.23	$1.20	$1.09	$1.17	$1.21	$1.29	$1.39	$1.38
	N. Atlantic	$1.31	$0.81	$1.10	$1.23	$1.00	$1.12	$1.46	$1.43	$1.26
Porbeagle Sharks*	Gulf of Mexico	-	-	-	-	-	-	-	-	-
	S. Atlantic	-	-	-	-	-	-	-	-	-
	Mid-Atlantic	-	-	-	-	-	-	-	-	$1.12

Species	Area	1996	1999	2000	2001	2002	2003	2004	2005	2006
	N. Atlantic	-	-	-	-	-	-	-	-	$0.95
Small coastal sharks	Gulf of Mexico	-	$0.55	$0.52	$0.58	$0.48	$0.40	$0.45	$0.55	-
	S. Atlantic	$0.25	$0.50	$0.48	$0.52	$0.53	$0.51	$0.61	$0.61	$0.53
	Mid-Atlantic	$0.25	$0.47	$0.38	$0.55	$0.48	$0.38	$0.44	$0.42	$0.45
	N. Atlantic	-	-	-	$1.51	$0.58	-	-	$0.50	-
Sandbar sharks*	Gulf of Mexico	-	-	-	-	-	$0.39	$0.40	$0.45	$0.40
	S. Atlantic	-	-	-	-	-	$0.45	$0.35	$0.42	$0.38
	Mid-Atlantic	-	-	-	-	-	-	-	$0.64	$0.91
	N. Atlantic	-	-	-	-	-	-	-	$0.54	-
Shark fins	Gulf of Mexico	-	$14.01	$15.99	$20.90	$22.64	$18.12	$17.93	$20.21	$20.65
	S. Atlantic	$10.74	$11.10	$14.16	$18.43	$17.10	$15.85	$14.57	$15.42	$16.20
	Mid-Atlantic	$4.60	$3.41	$4.90	-	-	-	-	-	-
	N. Atlantic	$2.69	$1.19	$6.83	-	-	-	-	-	-

*Sandbar sharks are broken out of the large coastal shark complex for 2005 in the North Atlantic to provide baseline information for this proposed Amendment. This exaggerates the discrepancy in revenue for LCS in 2005 in the North Atlantic when compared across years.

6.3 Variable Costs and Net Revenues of Commercial Shark Fishermen

In 2003, NMFS initiated mandatory cost-earnings reporting for selected vessels to improve the economic data available for all HMS fisheries. In the past, most of the studies regarding PLL variable costs and net revenues available to NMFS analyzed data from 1996 and 1997. The Consolidated HMS FMP provides a summary of several past studies on the variable costs and net revenues of longline fleets.

An analysis of the 2004 HMS logbook cost-earnings data provides updated information regarding the costs and revenue of a cross section of vessels operating in the HMS fisheries. The data contains a total of 579 trips taken by 51 different vessels. As described in Larkin *et al*. (2000), median values are reported. Median gross revenues per trip for 2004 were approximately $12,112. Median total costs per trip were $4,345 (compared to $3,320 in the Larkin *et al*. (2000) study), with fuel costs making up $567 (13 percent) of those costs. Median net revenue in this sample was $6,728 per trip (compared to $8,624 in the Larkin *et al*. (2000) study). The typical trip was nine days long and involved six sets. The median number of crew was three, and the average share paid to crew was 11 percent of net revenue ($740 per trip). The captain share of net

revenue was 20 percent ($1,346) and the owner share was reported to be 50 percent ($3,364). The 2004 cost earnings information is similar to the findings of the 1996 study, but gross revenues appear to be lower than the Porter *et al.* (2001) study of 1997 operations.

6.4 Expected Economic Impacts of the Alternative Suites

In this rulemaking, NMFS considered five alternative suites to address shark management measures that will meet the objectives of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (MSRA) and the Consolidated HMS FMP. The expected economic impacts of the five alternative suites considered and analyzed are discussed below. An overview of the five alternative suites is presented in Table 2.1.

6.4.1 Alternative Suite 1: Maintaining the Existing Atlantic Commercial and Recreational Shark Fisheries (Status Quo)

Quotas/Species Complexes and Retention limits

The status quo alternative could lead to neutral socioeconomic impacts if the current LCS quota of 1,017 mt dw, in conjunction with the 4,000 lb LCS directed shark permit trip limit, is maintained. Under this alternative the current fishing effort would not likely change, which could lead to economic benefits to fishermen and associated communities in the short term. Of all Atlantic HMS, sharks bring in the lowest total gross revenues (~$8.1 million total in 2006). If gross revenues for directed and incidental permit holders is averaged across the approximately 298 active directed and incidental shark permit holders, then the average annual gross revenues per shark fishing vessel is just over $20,000. However, long term, negative economic impacts could occur if current fishing mortality of sandbar sharks, an economically important species, is not decreased as recommended by the LCS stock assessment, and this species continues to be overfished. This could lead to more restrictive management measures being implemented in the directed and incidental shark fisheries. This is particularly important given the LCS overharvests under the status quo in 2006 in the South Atlantic and Gulf of Mexico regions and in the Gulf of Mexico region during 2007.

Time/Area Closures

The status quo alternative would maintain the existing closures and would not add any new closures. This could have neutral economic impacts, primarily because activities related to fishing and market availability, consistent with the current closures, would remain the same.

Reporting

Currently, Federal shark dealers are required to report on a bimonthly basis and the economic impacts of reporting would not change under the status quo alternative because activities related to the reporting timeframe would remain the same. However, negative economic impacts could occur if shark dealers do not report when required or in

a timely fashion, making it difficult for NMFS to monitor the quota and prevent overfishing of economically important species.

Unclassified or unidentified landings of sharks reported in shark dealers reports are currently counted as LCS by the Agency. This may have neutral or slightly negative economic impacts. While listing sharks as unclassified may save shark dealers time in the short-term by alleviating the need to properly identify individual sharks purchased, inaccurate reporting may lead to inaccurate quota monitoring. Shark dealer reports form the basis of quota monitoring for sharks and if the reports submitted by dealers do not accurately reflect what species of sharks are being landed, seasons may close earlier than necessary, overharvests may occur impacting future seasons, and data used in stock assessments may lead to further restrictions on fishing effort as a result of assessments models that are run with data that is incorrect or does not provide information on specific species landed.

Seasons

Maintaining the trimester seasons under the status quo alternative, which provides fishermen and dealers with more open seasons, would likely have neutral economic impacts. With an annual LCS quota of 1,017 mt dw, spreading the seasons out over the calendar year could potentially result in greater economic stability for fishermen and associated communities. However, if quotas are reduced to comply with the recommendations from the LCS stock assessment, trimester seasons could become less economically stable for fishermen and dealers because of the reduced amount of quota and fishing effort during the calendar year.

Regions

The economic impacts of maintaining three management regions under the status quo alternative would likely be neutral. The three regions would likely continue to enhance equity amongst regional user groups, provided that the North Atlantic region only has sharks present in their waters during certain months. No significant economic impacts are anticipated as this alternative seeks to maintain historical regional catches.

Recreational Measures

Neutral social and economic benefits would occur if the current bag limit for HMS Angling permit holders is maintained at one shark greater than 54 inches per vessel per trip as well as one Atlantic sharpnose and one bonnethead shark (both of which are in the SCS complex) per person per trip. Recreational fishing and charter trips targeting sharks are very important to coastal communities and shark fishing tournaments can generate a substantial amount of money for surrounding communities and local businesses especially in the northeastern United States where shark fishing is most prevalent. In 2007, there were 59 tournaments with prize categories for pelagic sharks and 42 (combined) tournaments for LCS and SCS.

6.4.2 Alternative Suite 2: Shark Fishery for Directed, HMS Angling, and HMS Charter/Headboat Permit Holders Only

Species Complexes

Sandbar sharks

Placing sandbar sharks in their own management category should have neutral economic and social impacts for fishermen. Establishing a separate category for sandbar sharks from the LCS complex is mainly administrative in nature and would affect how the Agency monitors the sandbar shark quota. The establishment of a separate sandbar category would not impact fishermen, as they already record shark interactions to the species level in their logbooks. However, the economic and social impacts of reducing the sandbar quota and retention limits would have significant economic impacts and are discussed in the next section.

Non-sandbar LCS

Establishing a non-sandbar LCS complex should also have neutral economic and social impacts on shark fishermen. The non-sandbar LCS complex is similar to how the LCS complex has been managed in the past. The new complex would be established to help the Agency distinguish between sandbar and non-sandbar LCS landings. In addition, while the Agency has managed sharks on a complex basis, fishermen have recorded shark interactions on a species basis in the logbooks, so there should be no negative impacts to fishermen by the restructuring of the LCS complex. However, the non-sandbar LCS quota reduction could have negative economic and social impacts. These impacts are discussed in the next section in combination with retention limits.

Porbeagle Sharks

Placing porbeagle sharks on the prohibited list for commercial and recreational fishing would result in no commercial or recreational landings of this species. This would have neutral economic and social impacts. This species is not targeted by U.S. fishermen, and is predominately caught, and discarded alive, in the U.S. swordfish and tuna PLL fishery. In addition, most recreational fishermen target mako, blue, and threshers sharks from the pelagic management unit (Table 3.24), therefore catch and release of porbeagle sharks is not expected to have much, if any, negative economic and social impacts on recreational fishermen. However, there are some porbeagle sharks caught in tournaments in the northeast, so prohibiting their retention could have some economic impact on these events. Porbeagle sharks are usually caught in the Northeast Distant area by commercial fishermen and a few recreational catches have been reported from Maine through Virginia (Table 3.26); therefore, fishermen in the North Atlantic would be affected the most by placing porbeagle sharks on the prohibited species list. A more detailed analysis of the economic impacts of establishing a 0 mt dw commercial porbeagle shark quota is discussed in the next section under quota and retention limits.

Quotas and Retention Limits

Alternative suite 2 would only allow sharks to be retained by shark directed permit holders. Therefore, incidental permit holders would be affected by alternative suite 2. Since the majority of incidental shark permit holders are in the states of Florida, Louisiana, New Jersey, and North Carolina as of 2007 (Table 3.32), these states would be most negatively impacted by alternative suite 2. As of 2007, there were 231 shark directed, 296 shark incidental, and 269 shark dealers permit holders. One hundred forty-three vessels with directed shark permits and 155 vessels with shark incidental permits reported landings in the Coastal Fisheries Logbook from 2003 to 2005 and could be considered active. In addition, shark dealers could also be negatively impacted due to the reduction in the sandbar and other LCS quotas and retention limits, which would reduce the overall amount of sharks being landed.

Alternative suite 2 would also maintain the 60 mt ww (43.2 mt dw) shark display and research quota. However, 2 mt dw would be allocated specifically for sandbar sharks, the remaining 41.2 mt dw would be allocated for all species besides sandbars, and dusky sharks would not be allowed to be collected for display. This is expected to have minimal impacts on collectors of sharks for public display and shark researchers. On average, 2 mt dw of sandbar sharks per year have been collected under the exempted research program from 2000 to 2006. Therefore, there would not be an appreciable decrease in sandbar allocation compared to what was collected in past years. Thus, minimal negative economic impacts are anticipated. Ninety-four dusky sharks have been collected under the exempted fishing program from 2000 to 2006 (or 13 dusky sharks per year). Due to the prohibition of dusky shark collection under alternative suite 2 for public display, this could have a negative economic impact on a few collectors, although the majority of dusky shark collections have been for shark research. Collectors and researchers would still have the majority of the shark display and research quota (41.2 mt dw or 57.2 mt ww) available for all non-sandbar LCS beside dusky sharks.

Fishery level impacts

Of all Atlantic HMS, sharks bring in the lowest total gross revenues (in total ~$6.0 million total in 2005; Table 3.43). On average, total sandbar landings of 1,310,449 lb dw and total annual non-sandbar LCS landings of 1,585,671 lb dw were reported from Federal and state shark dealer reports. In 2006 ex-vessel prices, this is equivalent to $4,903,001 (Table 4.9). Under this alternative suite, the commercial quotas would be reduced to 116.6 mt dw for sandbar sharks and 541.2 mt dw for non-sandbar LCS; however, to balance discards of sandbar sharks in the South Atlantic with uncaught sandbar quota in the Gulf of Mexico, the non-sandbar LCS retention limit was lowered such that only 86.1 mt dw of sandbar sharks and 253.6 of non-sandbar LCS could be landed under alternative suite 2 (see discussion in Appendix A under "*Non-sandbar quota and retention limits"* and Table 4.2). In 2006 prices, assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight, this is equivalent to $1,333,417 (Table 4.10). This is an overall 73-percent reduction compared to the current gross revenues under alternative suite 1 (Table 4.10).

On average, 1.7 mt dw (3,867 lb dw) of porbeagle sharks were commercially landed between 2003 and 2006. Based on 2006 ex-vessel prices, this is equivalent to $7,378 fishery-wide (assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight) (Table 4.9). However, since porbeagle sharks would be placed on the prohibited list under alternative suite 2, there would an estimated reduction in gross revenues of $7,378 to the fishery by prohibiting porbeagle shark landings.

In alternative suite 2, overharvests of quota for each category would be removed from the next season's quota. This is currently done under the status quo; therefore, it is not anticipated to result in any more negative economic impacts than what fishermen currently experience under the status quo regulations. Underharvests for species that are not overfished or are not experiencing overfishing would have up to 50 percent of the base quota applied to the next season's quota. Currently all of the underharvest for a given complex has been applied to the next year, same trimester's base quota. This has been most significant for small coastal sharks (SCS), which, on average from 2004 through the first season of 2006, had only had 55 percent of the SCS quota filled. Since nearly full harvests or overharvests have typically occurred for the LCS complex, application of underharvest to LCS base quota to future seasons has not been an issue. The economic impact of reducing the amount of underharvest that could be applied to the base quota would depend on the amount of the underharvest, but would most likely have the largest economic effects for SCS. In addition, since there would be no regions or seasons under alternative suite 2, the amount of SCS underharvests expected from a full year of fishing in all regions is unknown at this time.

However, unlike the status quo, underharvests for species where the status of the species is unknown, overfished, or experiencing overfishing would not be transferred to the next season's quota. This could have a negative economic impact depending on the quota. For instance, the overfished/overfishing status of sandbar sharks and the unknown status of the LCS complex would preclude any carryover of underharvest of the sandbar or non-sandbar LCS quota. However, given the reduced sandbar quota and since the non-sandbar LCS quota is based on current catches of LCS species (except sandbar sharks), underharvests of sandbar sharks or non-sandbar LCS are not anticipated. Therefore, this may not result in negative socioeconomic impacts. In addition, underharvest carry-overs are currently not applied for pelagic sharks. Since the status of all pelagic sharks are either unknown or overfished, this would not change compared to the status quo.

Finally, alternative suite 2 would require that all shark fins (dorsal, second dorsal, pectoral, pelvic, anal, and caudal fins) remain naturally attached to the shark through landing. In the short-term, this alternative could change the foundation of the U.S. Atlantic shark fin market. At this time and since the fishery began in the 1980s, most shark fins sold in the United States are landed separately from the shark. In 1993, shark fins were required to be removed from the vessel at the first port of landing. This prevented fishermen from drying shark fins onboard their vessel over time in order to increase the value of the fin. Under alternative suite 2, shark fishermen would not be allowed to remove the fins from the shark until sharks are landed. Costa Rica has implemented a similar regulation that allows fishermen to cut the fins mostly off the

shark, as long as a small piece of skin keeps the fins attached to the shark until landing. According to a discussion on the Elasmo-L listserve, this practice has allowed fishermen to receive the expected revenues for both the fin and the meat because the fin could be fully removed from the shark at the dock without thawing the shark. The vessel owner/operator would need to decide whether the benefit of selling the fins separate from the shark outweighs the cost of having the crew remove the fins at landing. While the fins would likely still be of high quality once dry, it is unlikely that the ex-vessel price of fins packed in ice with the rest of the shark would be as high as fins that had begun drying. Additionally, if the shark cannot be packed in ice properly due to maintaining the fins on the shark, the quality of the meat, and therefore its value, could also decrease. The social impact of requiring sharks be landed with their fins on may be realized as the market adjust itself to accepting all wet fins. However, the overall socioeconomic impact of this could be significant given the reductions in the overall sandbar quota, which are the most lucrative shark due to the value of its fins.

Directed permit holder impacts

On average, directed permit holders landed 1,286,447 lb dw of sandbar sharks and 1,498,111 of non-sandbar LCS from 2003 to 2005 based on Federal and state shark dealer reports (landings by permit type were based on percentage of total landings by permit type in the Coastal Fisheries and HMS logbooks). In 2006 ex-vessel prices, this is equivalent to annual gross revenues of $4,702,031 (assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight) (Table 4.9). If gross revenues for directed permit holders are averaged across the approximately 143 active directed shark permit holders, then the average annual gross revenues per shark fishing vessel is just over $33,000 from shark revenues. Under alternative suite 2, gross revenues for directed permit holders would be estimated to be $1,333,417 (Table 4.10). This is a 72-percent overall reduction in gross revenues compared to 2003 to 2005 (Table 4.10). These reduced gross revenues averaged across the 143 active directed permit holders are just over $9,000 per directed shark fishing vessel. Since the states of Florida, New Jersey, and North Carolina have the most directed shark permits (Table 3.32), these states would be most negatively impacted by alternative suite 2.

In addition, retention of sandbar sharks on PLL gear would be prohibited under alternative suite 2. On average, 80,825 lb dw of sandbar sharks were reported landed on PLL gear by directed shark permit holders from 2003 to 2005 (HMS logbook data). In 2006 ex-vessel prices, this is equivalent to $117,510 in gross revenues. Given an average of 16.7 vessels landed sandbar sharks with PLL gear from 2003 to 2005, prohibition of sandbar sharks on PLL gear could result in a loss of gross revenues of $7,037 per vessel ($117,510 / 16.7 vessels = $7,037 per vessel).

Gross revenues under the status quo revenue were based on a 4,000 lb dw LCS trip limit for directed shark permit holders. The average number of sandbars and non-sandbar LCS landed per trip was 35 sandbars and 32 non-sandbar LCS for all gear types reported in the Coastal Fisheries and HMS Logbooks. Based on 2006 ex-vessel prices, this is equivalent to $4,101 per trip (Table 4.11). Revenue estimates on a regional trip basis were also based on species composition data attained from the BLL observer

program data (Hale and Carlson, 2007). Observer data indicate that between 2005 and 2006, 69 sandbar sharks and 35 non-sandbar LCS were caught per trip in the South Atlantic region, and 30 sandbar sharks and 83 non-sandbar LCS were caught per trip in the Gulf of Mexico region (Hale and Carlson, 2007). Based on these numbers and 2006 ex-vessel prices, South Atlantic trips averaged $4,743/trip and Gulf of Mexico trips averaged $5,853/trip (Table 4.11) (whereas the overall averaged gross revenues for directed shark permit holders was estimated as $4,101 per trip; Table 4.11).

Under alternative suite 2, the retention limits are 8 sandbars/trip and 21 non-sandbar LCS/trip. Non-sandbar LCS retention limits are based on the average ratio of sandbars to non-sandbar LCS caught in the South Atlantic and Gulf of Mexico regions to limit sandbar shark discards by fishermen deploying non-selective gear (Hale and Carlson, 2007). In the Gulf of Mexico, the ratio of sandbars to other LCS caught is 1:4, which based on an 8 sandbar/trip retention limit, would equal 32 non-sandbar LCS/trip. However, such a high non-sandbar LCS retention limit would result in a sandbar discards in the South Atlantic (~65.3 mt dw). A 21 non-sandbar LCS/trip retention limit was set to balance discards versus catch in the two regions (see Table A.4). This results in approximately 5 sandbar sharks being caught in the Gulf of Mexico region when the non-sandbar LCS retention limit/trip is filled (and therefore, only 86.1 mt dw of the sandbar quota would be filled). Therefore, gross revenues (including fins) on a trip basis are estimated to be $1,262 of gross revenue per trip in the South Atlantic and $1,333 of gross revenue per trip in the Gulf of Mexico (Table 4.12). From 2003 to 2005, there were 124 vessels that averaged more than 324 lb dw (or 8 sandbar sharks) of sandbar/trip (Figure A.3). Therefore, these vessels would be most negatively affected by retention limits under alternative suite 2.

Incidental permit holder impacts

On average, 66 incidental permit holders landed 12,994 lb dw per year of sandbar sharks and 46,333 lb dw per year of non-sandbar LCS from 2003 to 2005 based Federal and state shark dealer reports and Coastal Fisheries and HMS logbook data. Using 2006 ex-vessel prices, this is equivalent to gross revenues of $106,491 (assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight) (Table 4.9). Gross revenues averaged across the 66 vessels with incidental permits landing sharks were $1,614 per vessel. Since incidental permit holders would not be able to land any sharks under alternative suite 2, the 66 active vessels would be most negatively affected by this alternative suite. The states of Florida, Louisiana, New Jersey, and North Carolina had the most incidental shark permit holders as of 2007 (144, 37, 20, and 16, respectively; Table 3.32); therefore, these states would be most negatively impacted by alternative suite 2.

Time/Area Closures

Under alternative suite 2, NMFS would maintain the mid-Atlantic shark closed area and the current BLL closures in the Caribbean that were implemented in February 2007, (72 FR 5633). Therefore, the economic impacts associated with the closures would be the same as described under alternative suite 1.

However, under alternative suite 2, NMFS would consider implementing the South Atlantic Fishery Management Council's marine protected areas (MPAs). Based on observer program data, the number of sets and targeted catch in the preferred MPAs is considered to be minimal. The preferred MPAs are generally small (< 10 miles wide) and vessels should be able to make minor adjustments to fishing locations to avoid the MPAs. Most of the observed shark BLL sets occurred shoreward of the MPAs. Affected vessels would forego some loss of revenue from the reduced bycatch of grouper and other species caught on shark BLL sets in the proposed MPAs, however, these losses are expected to be minimal. Based on the expanded catch estimates (Siegfried et al., 2006b), the total numbers of shark catches for the proposed MPAs were 25,395 and this equates to approximately $1,512,227 based on 2006 ex-vessel prices for shark (assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight) (Table 3.42). However, this may be an overestimate if all the catches did not occur in the MPAs. Since there are approximately 285 shark limited access permits in Florida, this would amount to a loss of revenue of approximately $3,722 per vessel per year in Florida.

Reporting

The reporting burden would be increased significantly for Atlantic shark dealers as a result of this alternative suite resulting in negative economic impacts. Currently, shark dealer reports must be submitted bimonthly, regardless of whether or not the dealer actually purchased any shark products. Reporting frequency would be increased to 24 hours of when shark products were purchased. While the increased reporting burden would not impact shark dealer expenditures per se, it would result in more time spent submitting dealer reports, which represents an opportunity cost for dealers since that would be time they could not spend conducting other activities related to their business. Furthermore, in order to comply with the requirement that dealer reports must be *received* by the Agency within 24 hours, it is assumed that dealers would have to submit dealer reports electronically or via facsimile. Dealers that do not currently possess a computer or fax machine would have to purchase one of these items. The increased reporting burden implemented in this alternative suite would be subject to authorization under the Paperwork Reduction Act. Reporting requirements for shark vessel permit holders, including the need to take an observer if selected and the need to submit vessel logbooks within seven days of completing a fishing trip would not be modified, resulting in neutral economic impacts.

Alternative suite 2 and 3 would modify the procedure for accounting for sharks that are reported by dealers as unclassified or unidentified. Currently, these sharks are counted against the LCS quota. This would be modified such that these sharks would be classified as sandbar sharks. As a result of the proposed measures, sandbar sharks would have the lowest commercial quota. However, sandbars have the highest commercial value of any Atlantic shark because of their fin. The intent of this requirement is to improve the accuracy of dealer reports and number of dealer reports that include species specific information on all sharks that are purchased. These data form the basis of quota monitoring and stock assessments. Furthermore, if shark dealers mis-identify the species

of shark being purchased in order to keep the sandbar shark season open longer, this may result in overharvests. While the short-term impacts of this measure may be negative as it would require more of the dealer's time to properly identify sharks, long-term effects may be positive. Potential overharvests or inappropriately short seasons coupled with potentially inaccurate stock assessments results could occur as a result of mis-identified or unidentified landings included in dealer reports. This measure coupled with mandatory shark identification workshops for shark dealers and the proposed requirement for fishermen to leave all shark fins attached to sharks at first point of landing could improve the accuracy of shark dealer reports.

Seasons

Coupled with the measures included under regions (Section 4.2.6), this alternative suite would likely have negative economic impacts on vessels and dealers in the North Atlantic. Opening seasons simultaneously in all regions would provide an advantage to vessels participating in shark fisheries in the South Atlantic and Gulf of Mexico regions as these regions have higher numbers and a wider variety of LCS and SCS sharks present year-round. Participants in the North Atlantic region would suffer as they would not be able to fish for sharks starting January 1 (since sharks would not have migrated north at this time), unless they moved to fish in another region. Moving to other regions to fish may not be cost effective with reduced quotas and retention limits for sandbar and non-sandbar LCS. Historically, these participants have only had significant landings of LCS and pelagic sharks. There is a possibility that the quota could be filled and the season closed for sandbar and non-sandbar LCS before participants in the North Atlantic have had the opportunity to land these sharks once they became available in this region. Furthermore, the fact that sandbar and non-sandbar LCS would both close regardless of which quota is filled, to minimize bycatch and dead discards of sandbar sharks, would exacerbate the negative economic impacts. Landings in the North Atlantic regions have averaged 48.2 mt dw per year for LCS (including sandbar sharks) between 2003 and 2006. The majority of these LCS were landed between April and June in the North Atlantic region. Assuming that the entire quota is filled, and seasons for sandbar and non-sandbar LCS are closed before April, this could result in losses in gross revenues of approximately $108,387 for vessels in the North Atlantic, based on 2005 ex-vessel prices (LCS = $1.02 per lb dw in the North Atlantic; $1.02 lb dw x 106,262 lb dw = $108,387; no price information is available for fins in the North Atlantic; Table 3.42). There are 107 directed and incidental shark permit holders in the states that comprise the North Atlantic region; therefore, losses are anticipated to be around $1,013 in gross revenues per vessel ($108,387 total gross revenues / 107 vessels = $1,013 per vessel). However, depending on their past involvement in the shark fishery, economic impacts to individual vessel owners would vary.

Vessels and dealers in the South Atlantic and Gulf of Mexico regions could experience a comparative advantage over vessels in the North Atlantic, however, reduced quotas and retention limits for sandbar sharks and non-sandbar LCS sharks would result in negative economic impacts for vessels and dealers in all locales. Furthermore, closing both non-sandbar LCS and sandbar sharks to minimize bycatch and dead discards of sandbar sharks on BLL gear would also result in negative economic impacts as this may

result in a portion of either quota being unutilized. There is a possibility that the reduced retention limits for sandbar and non-sandbar LCS sharks, coupled with the increased reporting frequency for dealers may result in minor positive economic impacts by keeping shark fishing seasons for LCS and sandbar sharks open for an extended portion of the year. In 2006, shark seasons for LCS were open a total of 4, 19, and 18 weeks in the North Atlantic, South Atlantic, and Gulf of Mexico, respectively. The first trimester was excluded from the North Atlantic calculation as landings for LCS are almost zero during these months (January – April). In 2007, shark seasons for LCS were 3, 4, and 5 weeks for the North Atlantic, South Atlantic, and Gulf of Mexico, respectively. Extensive over harvests in 2006 were responsible for short seasons in 2007. The retention limits associated with this alternative suite should result in longer shark seasons, which may have some minor economic impacts as it may provide for a greater proportion of the year when vessels could land and sell shark products.

Regions

As stated in Section 4.2.6, this alternative suite would likely have negative economic impacts on regions that do not have sharks present year round. The North Atlantic region could be disadvantaged as a result of reverting back to one region, versus three, as they would not have a secure regional trimester quota which increased the likelihood that they would have a shark fishery in adjacent waters when sharks are present. Vessels could either move to southern areas to participate in the shark fishery in areas where sharks are present year-round or redistribute fishing effort to other fisheries. Dealers in all regions, but particularly in the North Atlantic region, would also be affected, possibly even more so than vessels, as the likelihood of having shark products consistently would be decreased.

Recreational Measures

Participants in recreational shark fisheries may experience negative economic impacts as a result of reducing the number of sharks that could be legally landed (Table 4.8). Charter/Headboat operators would be most affected as a result of these measures as they may see a reduction in the number of charters that customers are willing to hire. These impacts may be most pronounced in areas where blacktip sharks are frequently encountered, including the South Atlantic and Gulf of Mexico regions. Recreational landings data indicate that there are more landings of blacktip sharks than any other species that could no longer be possessed as a result of this alternative suite. It is presumed that blacktip sharks are kept more than any other LCS because of the higher quality of their flesh and the fact that they are more abundant than other LCS in coastal waters. Charter/Headboat operators specializing in sharks may see the number of charters decline because some fishermen insist on keeping blacktip or sandbar sharks. Prohibiting the other species (finetooth, silky, bull, blacknose, and porbeagle) is not expected to have adverse impacts as these species are not as frequently encountered in recreational fisheries for sharks.

Tournaments offering prize categories for sharks may also experience negative economic impacts as a result of prohibiting six additional species of sharks for retention

in recreational fisheries. The majority of tournaments specializing in sharks are in the North Atlantic region: specifically Rhode Island, New York, and Massachusetts. In 2007, there were 59 tournaments/year with prize categories for pelagic sharks (Table 3.38, Chapter 3). Species most commonly targeted in these tournaments including common thresher, oceanic whitetip, blue, shortfin mako, and porbeagle. Of these, only porbeagle would be prohibited from retention as stocks are overfished. Tournaments are generally won by shortfin mako or common thresher, therefore, significant economic impacts as a result of prohibiting porbeagle retention in shark fishing tournaments are not anticipated.

6.4.3 Alternative Suite 3: Shark Fishery for Directed, Incidental, HMS Angling, and HMS Charter/Headboat Permit Holders

Species Complexes

Under alternative suite 3, NMFS would structure species complexes as they are outlined for alternative suite 2. Therefore, the economic impacts of species complexes would be the same as described in alternative suite 2. The associated economic impacts of the reduced quotas for sandbar sharks and non-sandbar LCS are discussed in combination with the next section on retention limits.

Quotas and Retention Limits

Alternative suite 3 would allow sharks to be retained by shark directed and incidental permit holders. Therefore, the available sandbar and non-sandbar LCS quota would be spread over a larger universe of commercial permit holders. However, unlike the status quo or alternative suite 2, the retention limits for sandbar sharks and non-sandbar LCS would be the same for both directed and incidental permit holders. Due to the reduced sandbar shark quota and for ease of enforcement, NMFS proposed to remove the distinction between the two classes of permit in terms of retention limits for sandbar sharks and non-sandbar LCS. Since directed permit holders presumably make a greater percentage of their gross revenues from shark landings, they are expected to have larger negative socioeconomic impacts compared to incidental permit holders. Since the states of Florida, New Jersey, and North Carolina have the most directed permit holders it is anticipated that these states would have the largest negative socioeconomic impacts under alternative suite 3 (Table 3.32). As with alternative suite 2, shark dealers could also experience negative impacts due to the reduction in the sandbar and non-sandbar LCS quotas and retention limits, which would reduce the overall amount of sharks being landed.

As with alternative suite 2, NMFS would also maintain the 60 mt ww (43.2 mt dw) shark display and research quota under alternative suite 3. The economic impacts of this quota are the same as those discussed in Section 6.4.2.

Fishery level impacts

Under alternative suite 3, the commercial quotas would be reduced to 116.6 mt dw for sandbar sharks and 541.2 mt dw for non-sandbar LCS. However, given the non-sandbar LCS retention limit, only 105.9 mt dw (233,467 lb dw) of the sandbar quota and 229.2 mt dw (505,294 lb dw) of non-sandbar LCS quota would be landed under alternative suite 3 to balance discards of sandbar sharks in the South Atlantic with uncaught sandbar quota in the Gulf of Mexico (see discussion in Appendix A under "*Non-sandbar quota and retention limits"* and Tables A.4 and 4.2). Based on 2006 ex-vessel prices, assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight, this is equivalent to $1,294,603 (Table 4.13). This is a reduction of about 74 percent compared to the current gross revenues under alternative suite 1 ($4,903,001; Table 4.9).

As with alternative suite 2, porbeagle sharks would be placed on the prohibited list under alternative suite 3. Based on the average porbeagle shark landings from 2003 to 2006 (1.7 mt dw or 3,867 lb dw) and 2006 ex-vessel prices, this is equivalent to a $7,378 gross revenue loss in porbeagle shark landings under alternative suite 3 (Table 4.9).

In alternative suite 3, under and overharvests of quota for each category would be removed from the next season's quota. Therefore, the socioeconomic impacts associated with the application of under and overharvests would be the same as described under alternative suite 2.

Finally, alternative suite 3 would require that shark fins remain attached to the shark through the first port of landing. As described under alternative suite 2, the overall socioeconomic impact of this could be significant given the reductions in the overall sandbar quota, which are the most lucrative shark due to the value of its fins. Therefore, the impacts of requiring that shark fins remain attached to the shark during the first port of landing are anticipated to be the same as described under alternative suite 2.

Directed permit holder impacts

As stated under alternative suite 2, on average, directed permit holders landed 1,286,447 lb dw of sandbar sharks per year and 1,498,111 lb dw of non-sandbar LCS per year from 2003 to 2005 based on Federal and state shark dealer reports and logbook data. In 2006 ex-vessel prices, this is equivalent to gross revenues of $4,702,031 (assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight) (Table 4.9). However, under alternative 3, the available sandbar and non-sandbar LCS quota would be spread over directed and incidental permit holders. Based on past effort, it was assumed 1,108 trips could be made by directed permit holders (Table 4.14). This is 78 percent of the total expected fishing effort (Table 4.14). Therefore, given 105.9 mt dw (233,467 lb dw) of sandbar and 229.2 mt dw (505,294 lb dw) of non-sandbar LCS that could be landed under alternative suite 3, approximately 83 mt dw (183,073 lb dw) of sandbar quota and 180 mt dw (396,225 lb dw) of the non-sandbar LCS quota are anticipated to be landed by directed permit holders (Table 4.14). Based on 2006 ex-

vessel prices, this is equivalent to $1,015,162 gross revenues for directed permit holders. This is a 78-percent overall reduction in gross revenues compared to 2003 to 2005 (gross revenues based on current directed permit holders' landings were $4,702,031; Table 4.9). Again, since the states of Florida, New Jersey, and North Carolina have the most directed permit holders it is anticipated that these states would experience the largest negative socioeconomic impacts under alternative suite 3 (Table 3.32).

As stated in alternative 2, the status quo revenue was based on a 4,000 lb dw LCS trip limit for directed shark permit holders with average South Atlantic trips at $4,743/trip and average Gulf of Mexico trips at $5,853/trip (Table 4.11). Under alternative suite 3, the retention limits are 4 sandbars/trip and 10 non-sandbar LCS/trip. However, since the ratio of sandbars to non-sandbar LCS caught in the Gulf of Mexico is 1:4, only ~ 3 sandbar sharks would be caught in the Gulf of Mexico region when the 10 non-sandbar LCS retention limit/trip is filled (10 non-sandbar LCS / 4 = 2.5 sandbar sharks). Therefore, gross revenues on a trip basis are estimated to be $610 per trip in the South Atlantic and $670 per trip in the Gulf of Mexico (Table 4.15). From 2003 to 2005, there were 128 vessels that averaged more than 163 lb dw (or 4 sandbar sharks) of sandbar/trip (Figure A.3). Therefore, these vessels would be most negatively affected by retention limits under alternative suite 3.

Incidental permit holder impacts

On average, incidental permit holders landed 12,994 lb dw of sandbar sharks and 46,333 lb dw of non-sandbar LCS based on Federal and state shark dealer reports and logbook data. In 2006 ex-vessel prices, this is equivalent to gross revenues of $106,491 (assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight) (Table 4.9). The available sandbar and non-sandbar LCS quotas were averaged over directed and incidental permit holders under alternative suite 3. Based on past effort, it was assumed 305 trips could be made by incidental permit holders (Table 4.14). This is 22 percent of the expected fishing effort (Table 4.14). Therefore, given the 105.9 mt dw (233,467 lb dw) of the sandbar quota and 229.2 mt dw (505,294 lb dw) of the non-sandbar LCS quota that could be landed under alternative suite 3, approximately 23 mt dw (50,395 lb dw) of sandbar quota and 50 mt dw (109,069 lb dw) of the non-sandbar LCS quota are anticipated to be landed by incidental permit holders (Table 4.14). Based on 2006 ex-vessel prices, this is equivalent to $279,441 gross revenues for incidental permit holders (Table 4.14). This would result in gross revenues that are 2.6 times higher compared to 2003 to 2005 (gross revenues based on current incidental permit holders' landings were $106,491; Table 4.9).

This increase in gross revenues is due to the increase in retention limits for incidental permit holders. Under the status quo, incidental permit holders can retain 5 sharks from the LCS complex. However, under alternative suite 3, incidental permit holders would be able to retain 4 sandbars and 10 non-sandbar LCS or 14 LCS total. This retention limit is almost 3 times higher than what is currently allowed under the status quo. On average, incidental permit holders have been landing 2 sandbar sharks and 3 non-sandbar LCS per trip. Based on 2006 ex-vessel prices, this is equivalent to $307 per trip (Table 4.11). However, under alternative suite 3, incidental permit holders would

make equivalent gross revenues per trip as directed permit holders: $610 per trip in the South Atlantic and $670 per trip in the Gulf of Mexico (Table 4.15). This would result in gross revenues for incidental permit holders that are 2 to 3 times higher than gross revenues in 2003 to 2005 depending on future fishing effort and catch composition. Therefore, there would be positive economic impacts for incidental permit holders under alternative suite 3. Since approximately 66 vessels with incidental permit holders landed sandbar sharks or non-sandbar LCS in 2003 to 2005 in the Coastal Fisheries and HMS Logbooks, these 66 vessels would have the largest economic benefits under alternative suite 3. However, if sharks become profitable for incidental permit holders under alternative suite 3, then more vessels with incidental permits may actively land sandbars and non-sandbar LCS in the future. Finally, the states of Florida, Louisiana, New Jersey, and North Carolina had the most incidental shark permit holders in 2007 (Table 3.32). Therefore, these states would see the largest socioeconomic benefits under alternative suite 3.

Time/Area Closures

Under alternative suite 3, NMFS would maintain the mid-Atlantic shark closed area to BLL gear and the current BLL closures in the Caribbean that were implemented in February 2007, (72 FR 5633). Therefore, the economic impacts associated with these closures would be the same as described under alternative suite 1. In addition, under alternative suite 3 NMFS would implement the South Atlantic Fishery Management Council MPAs as described under alternative suite 2. Therefore, the economic impacts associated with the MPAs would be the same as described in alternative suite 2.

Reporting

This alternative suite could result in neutral economic impacts. Shark dealers would still be required to submit landings data twice a month, however, they would need to ensure that it is actually *received* by the Agency within 10 days of a bimonthly reporting period ending. Currently, shark dealers simply have to ensure that the landings reports submitted to NMFS are *post-marked* within 10 days of the end of a reporting period. Additional burden is not expected as a result of modifying the regulations to ensure that dealer reports are actually received. Furthermore, more timely reporting and receipt of information by the Agency may result in a decreased likelihood that quotas would be exceeded and overharvests removed from forthcoming shark seasons resulting in neutral or slightly positive economic impacts.

As described in alternative suite 2, this suite would change how sharks listed as unclassified on shark dealer reports are accounted for. Unclassified sharks would be counted as sandbar sharks, and not as LCS, which is the current procedure. Properly identifying sharks would result in negative economic impacts in the short-term because it takes more time. Submission of accurate shark dealer data may result in positive economic impacts in the long-term as it would improve quota monitoring, decrease the likelihood of extensive overharvests and subsequent closures, and improve the results from stock assessments by ensuring data is more accurate and includes species specific information.

Seasons

When coupled with the measures included under regions (Section 4.2.5), this alternative suite would likely have negative economic impacts on vessels and dealers in the North Atlantic. Opening seasons on January 1, in all regions, would provide an advantage to vessels participating in shark fisheries in the South Atlantic and Gulf of Mexico regions as these regions have large numbers and a wider variety of LCS and SCS sharks present year-round. Participants in the North Atlantic region would suffer as they would not be able to fish for sharks starting January 1 (since sharks would not have migrated north at this time), unless they moved to fish in another region. This is not likely as a result of the reduced quotas and retention limits for sandbar and non-sandbar LCS sharks. Historically, these participants have only had significant landings of LCS and pelagic sharks. There is a possibility that the quota could be filled and the season closed for sandbar and non-sandbar LCS before participants in the North Atlantic have had the opportunity to land these sharks once they became available in this region. Furthermore, the fact that sandbar and non-sandbar LCS would both close regardless of which quota is filled to minimize bycatch and dead discards of sandbar sharks would exacerbate the negative economic impacts. Landings in the North Atlantic regions have averaged 62.3 mt dw/year for LCS (including sandbar sharks) between 2004-2006. The majority of LCS are landed in the second trimester in the North Atlantic region. Assuming that the entire quota is filled, and seasons for sandbar and non-sandbar LCS are closed before these sharks migrate to the North Atlantic region this would result in losses in gross revenues of approximately $32,963 in 2005 ex-vessel prices (Table 3.42). There are 107 directed and incidental shark permit holders in the states that comprise the North Atlantic region; therefore, losses are anticipated to be around $308 in gross revenues per vessel ($32,963 total gross revenues / 107 vessels = $308 per vessel). However, depending on their past involvement in the shark fishery, economic impacts to individual vessel owners would vary.

Vessels and dealers in the South Atlantic and Gulf of Mexico regions would experience a comparative advantage over vessels in the North Atlantic, however, reduced quotas and retention limits for sandbar sharks and non-sandbar LCS sharks would result in negative economic impacts for vessels and dealers in all locales. Furthermore, closing both non-sandbar LCS and sandbar sharks to minimize bycatch and dead discards of sandbar sharks on BLL gear would also result in negative economic impacts as this may result in a portion of either quota being unutilized. There is a possibility that the reduced retention limits for sandbar and non-sandbar LCS sharks may result in minor positive economic impacts by keeping shark fishing seasons for LCS and sandbar sharks open for an extended portion of the year. In 2006, shark seasons for LCS were open a total of 4, 19, and 18 weeks in the North Atlantic, South Atlantic, and Gulf of Mexico, respectively. The first trimester was excluded from the North Atlantic calculation as landings for LCS are almost zero during these months (January – April). In 2007, shark seasons for LCS were 3, 4, and 5 weeks for the North Atlantic, South Atlantic, and Gulf of Mexico, respectively. Extensive over harvests in 2006 were responsible for short seasons in 2007. This alternative suite may result in longer shark seasons which may have some minor economic impacts as it may provide for a greater proportion of the year when vessels could land and sell shark products.

Regions

Similar to alternative suite 2, establishing one region would likely have negative economic impacts on regions that do not have sharks present year round. The North Atlantic region would be disadvantaged as a result of reverting back to one region, versus three, as they would not have a secure regional trimester quota which increased the likelihood that they would have a shark fishery in adjacent waters when sharks are present. Vessels could either move to southern areas to participate in the shark fishery in areas where sharks are present year-round or redistribute fishing effort to other fisheries. Dealers in the North Atlantic region would also be affected, possibly even more so than vessels, as the likelihood of having shark products consistently would be decreased.

Recreational Measures

As described under alternative suite 2, participants in recreational shark fisheries would experience negative economic impacts as a result of reducing the number of sharks that could be legally landed (Table 4.8). Charter/Headboat operators would be most affected as a result of these measures as they may see a reduction in the number of charters that customers are willing to hire. These impacts may be most pronounced in areas where blacktip sharks are frequently encountered, including the South Atlantic and Gulf of Mexico regions. Recreational landings data indicates that there are more landings of blacktip sharks than any other species. It is presumed that blacktip sharks are kept more than any other LCS because of the higher quality of their flesh and the fact that they are more abundant than other LCS in coastal waters. Charter/Headboat operators specializing in sharks may see the number of charters decline because some fishermen may not want to pay for a fishing trip if they are not allowed to retain blacktip or sandbar sharks. Prohibiting the other species (finetooth, silky, bull, blacknose, and porbeagle) is not expected to have adverse impacts as these species are not as frequently encountered in recreational fisheries for sharks.

Tournaments offering prize categories for sharks may also experience negative economic impacts as a result of prohibiting six additional species of sharks for retention in recreational fisheries. The majority of tournaments specializing in sharks are in the North Atlantic region, specifically Rhode Island, New York, and Massachusetts. In 2007, there were 59 tournaments/year with prize categories for pelagic sharks (Table 3.38, Chapter 3). Species most commonly targeted in these tournaments include common thresher, oceanic whitetip, blue, shortfin mako, and porbeagle. Of these, only porbeagle would be prohibited from retention as stocks are overfished. Tournaments are generally won by shortfin mako or common thresher, therefore, significant economic impacts as a result of prohibiting porbeagle retention in shark fishing tournaments are not anticipated.

6.4.4 Alternative Suite 4: Establish a Research Fishery for Sandbar Sharks; Shark Fishery for Directed, Incidental, HMS Angling, and HMS Charter/Headboat Permit Holders – Preferred Alternative

Species Complexes

Under alternative suite 4, NMFS would structure species complexes as they are outlined for alternative suites 2 and 3. Therefore, the economic impacts associated with species complexes would be the same as described in alternative suite 2. The associated economic impacts of the quota reductions for sandbar sharks and non-sandbar LCS and the division of those quotas among vessels inside and outside of a research fishery are described in the next section in combination with retention limits. A primary difference between the measures proposed under alternative suite 4 in the DEIS and the final measures in the FEIS is that porbeagle sharks would no longer be placed on the prohibited species list. These species would be authorized in commercial and recreational fisheries; however, there would be a reduced TAC for these species based on current landings and discards. The associated economic impacts of this are discussed below under quotas and retention limits.

Quotas and Retention Limits

Alternative suite 4 would establish a shark research fishery for sandbar sharks (See Section 4.4 and "*Fishery level impacts*" in this section for additional information). Only incidental or directed permit holders that apply and are selected to participate in this program could land sandbar sharks. If the dealer infrastructure is impacted by business closures, participants in the research fishery may have difficulty marketing their catch. Vessels not participating in the research program would still be able to land non-sandbar LCS, SCS, and pelagic sharks subject to the retention limits described in Chapter 2 and Appendix C (Table 2.1 and C.4). Based on the limited number of vessels that would be in the shark research fishery, most current directed and incidental permit holders would not be allowed to land sandbar sharks, resulting in negative socioeconomic impacts for these permit holders. In addition, given the reduced non-sandbar LCS trip limit for vessels outside the research fishery and since directed permit holders presumably make a larger percentage of their gross revenues from shark landings, it is anticipated that there would be greater negative socioeconomic impacts on directed permit holders outside the research fishery compared to incidental permit holders. Since Florida, New Jersey, and North Carolina have the most directed and incidental shark incidental permit holders, it is anticipated that these states would have the largest negative socioeconomic impacts resulting from the reduced non-sandbar LCS retention limits (Table 3.32). As with alternative suites 2 and 3, shark dealers could also experience negative impacts due to the reduction in the sandbar and other LCS quotas and retention limits, which would reduce the overall amount of sharks being landed. Furthermore, there may be some acute regional impacts on dealers in areas not covered by the limited research fishery, despite the fact that NMFS would try to allocate fishing effort throughout the regions.

Under the preferred alternative suite 4, porbeagle sharks would be authorized in recreational and commercial fisheries, but under a reduced TAC of 11.3 mt dw. Of this, a

commercial quota of 1.7 mt dw would be established for the commercial fishery. Currently the commercial quota for porbeagle sharks is 92 mt dw per year, however, this commercial quota has never been met. NMFS would set a new TAC for porbeagle sharks that would cap effort at its present level. Based on quota monitoring (which includes vessel trip reports) from 2003 to 2006, on average, 3,867 lb dw of porbeagle sharks were landed per year. Based on 2006 ex-vessel prices, this is equivalent to $7,378 in gross revenues (Table 4.9). Since commercial fishermen would be allowed to continue to land porbeagle sharks at this level, there are no anticipated immediate economic impacts of implementing the TAC. However, a reduction of the commercial quota from 92 mt dw to 1.7 mt dw would limit the porbeagle shark fishery's ability to expand in the future. The loss of this expansion option results in an economic opportunity cost associated with this forgone future opportunity. It should also be noted that ICCAT Recommendation 07-06 requests that participating countries limit directed fisheries for porbeagle and reduce fishing mortality for porbeagle sharks, thus also limiting the future expansion of this fishery. In addition, recreational anglers would still be allowed to land porbeagle sharks. Therefore, there are no negative economic impacts for recreational fishermen associated with the TAC.

As with alternative suites 2 and 3, NMFS would also maintain the 60 mt ww (43.2 mt dw) shark display and research quota under alternative suite 4. Therefore, the socioeconomic impacts associated with the 60 mt ww shark display and research quota would be the same as described for alternative suites 2 and 3.

In alternative suite 4, under and overharvests would be applied to the next season or over multiple years. Therefore, NMFS anticipates that the socioeconomic impacts of the application of under and overharvests would be similar as described for alternatives suites 2 and 3. In addition, alternative suite 4 would require that shark fins remain on the shark through the point of offloading. As with alternative suites 2 and 3, the overall socioeconomic impact of this could be significant given the reduction in the sandbar quota, which is the most lucrative shark due to the value of its fins in comparison with other sharks. Therefore, the socioeconomic impacts associated with landing sharks with their fins on would be the same as described for alternative suite 2.

Fishery level impacts

Base Quotas

Shark Research Fishery - Based on public comment, NMFS would establish a separate non-sandbar LCS base quota for the research fishery. In the DEIS, it was determined that while fishermen in the research fishery harvested the sandbar shark base quota of 116.6 mt dw, they would also harvest approximately 50 mt dw of the non-sandbar LCS quota (see Appendix A). Thus, to allow the research fishery to remain open if the non-sandbar LCS quota is filled outside the research fishery, NMFS would formally allocate 50 mt dw of non-sandbar LCS base quota to the research fishery. Thus, NMFS would close the sandbar shark research fishery when the quota reaches 80 percent (*i.e.*, if the non-sandbar LCS quota with the research fishery reached 80 percent, non-sandbar LCS retention in the research fishery would end, but sandbar sharks could continue to be

retained until that sandbar quota reached 80 percent). This should allow for the research fishery to continue year-round. In addition, fishermen within the research fishery could harvest the entire sandbar shark base quota of 116.6 mt dw. Given these sandbar and non-sandbar LCS base quotas, fishermen operating within the research fishery, based on 2006 ex-vessel prices, could make $582,034 in gross revenues of sandbar and non-sandbar LCS landings (Table 4.18). Since 5 to 10 vessels are anticipated to participate in the research fishery, NMFS estimates that a vessel could make between $116,407 (*i.e.*, 5 boats) to $58,203 (*i.e.*, 10 boats) in gross revenues on sandbar shark and non-sandbar LCS landings.

Outside the Research Fishery - Vessels operating outside of the research fishery would have a regional non-sandbar LCS base quota of 188.3 mt dw (415,126 lb dw) in the Atlantic region and 439.5 mt dw (968,922 lb dw) in the Gulf of Mexico region. In 2006 ex-vessel prices, this is equivalent to $517,657 in the Atlantic region and $1,433,034 in gross revenues in the Gulf of Mexico region (Table 4.18).

In total, vessels operating within, and outside, of the research fishery are expected to have gross revenues of $2,532,725 in sandbar and non-sandbar LCS landings under the base quotas (Table 4.18). This is a 48-percent reduction in gross revenues from sandbar sharks and non-sandbar LCS under the status quo (gross revenues based on current directed and incidental permit holders' landings were $4,903,001; Table 4.9). However, this is less of a reduction compared to alternative suites 2 and 3 because the entire sandbar and non-sandbar LCS quotas could be harvested under alternative suite 4. Because the States of Florida, Louisiana, New Jersey, and North Carolina have the most incidental and directed shark permit holders (Table 3.32), NMFS anticipates that these states would have the largest negative socioeconomic impact by these reductions in quotas of different shark species.

Adjusted Quotas

Shark Research Fishery - Based on overharvests of the LCS complex in 2007, NMFS would adjust the base quotas to account for the overharvests (see Appendix C for more details). These overharvests would be spread over five years to allow the research fishery to begin in 2008. The adjusted sandbar shark quota within the research fishery would be 87.9 mt dw and the adjusted non-sandbar LCS quota for the shark research fishery would be 37.5 mt dw. For fishermen operating within the research fishery, based on 2006 ex-vessel prices, NMFS estimates that vessels operating in the research fishery could make $437,963 in gross revenues from sandbar and non-sandbar LCS landings (Table 4.18). Since 5 to 10 vessels are anticipated to participate in the research fishery, NMFS estimates that an individual vessel could make between $87,593 (*i.e.*, 5 boats) to $43,796 (*i.e.*, 10 boats) in gross revenues on sandbar shark and non-sandbar LCS landings.

Outside the Research Fishery - In the Gulf of Mexico region, the adjusted quota would be 390.5 mt dw, and the adjusted non-sandbar LCS quota for the Atlantic region would be 187.8 mt dw. Based on these adjusted quotas, vessels operating outside of the research fishery could expect gross revenues of $516,285 in the Atlantic region and

$1,273,269 in the Gulf of Mexico region on non-sandbar LCS landings, based on 2006 ex-vessel prices (Table 4.18).

In total, vessels operating within, and outside, of the research fishery are expected to have gross revenues of $2,227,517 in sandbar and non-sandbar LCS landings (Table 4.18). This is a 55-percent reduction in gross revenues from sandbar sharks and non-sandbar LCS under the status quo (gross revenues based on current directed and incidental permit holders' landings were $4,903,001; Table 4.9).

Directed and Incidental permit holder impacts in the research fishery

Currently, directed permit holders have a 4,000 lb dw LCS trip limit. Vessels operating within a shark research fishery may experience similar trip limits, depending on the research objectives of the fishery. However, the overall base quota for sandbar sharks in the research fishery would be reduced to 116.6 mt dw. Assuming the catch composition is 70 percent sandbar sharks, and there is a 4,000 lb dw trip limit, 92 trips would fulfill the sandbar shark quota (see Section 4.4.2 and Appendix A, Table A.2). Given this catch composition, 30 percent of 4,000 lb dw trip would be non-sandbar LCS. If 92 trips were made with these trip limits and catch compositions, NMFS estimates that 50 mt dw of non-sandbar LCS would also be caught in the research fishery while harvesting the 116.6 mt dw of sandbar base quota (see Section 4.4.2 and Appendix A, Table A.5). Based on these landings under the base quotas, the research fishery would have estimated overall gross revenues of $582,034 or $6,329 per trip (Table 4.18). Similarly, the 87.9 mt dw of sandbar adjusted quota (Appendix C; Table C.2a) could be caught in approximately 69 trips (87.9 mt dw = 193,784 lb dw; 93,784 lb dw / 2,800 lb dw = 69 trips). If 69 trips were made to harvest the 87.9 mt dw of sandbar adjusted quota, NMFS estimates that, 37.5 mt dw of non-sandbar LCS quota would also be harvested in the shark research fishery (69 trips x 1,200 lb dw = 82,800 lb dw or 37.5 mt dw) (Table C.3). Based on these landings under the adjusted quotas, the research fishery would have estimated overall gross revenues of $437,963 or $6,347 per trip in gross revenues (assuming these are BLL trips; Table 4.18).

On average, directed permit holders reported 1,108 trips per year (using a combination of gear types) in the Coastal Fisheries and HMS logbooks that landed sandbar sharks and non-sandbar LCS from 2003 to 2005 (Table 4.11). While 92 trips represents a greater than 91-percent reduction in the average number of trips taken by directed permit holders from 2003 to 2005 (and 69 trips would be a 94-percent reduction), these trips would be divided across a much smaller universe of vessels, therefore, minimizing the economic impacts for vessels that are selected to participate in the research fishery. Since Florida, New Jersey, North Carolina, and Louisiana have the most directed shark incidental permit holders, NMFS anticipates that these states would have the largest negative socioeconomic impacts given the limitation of only a few vessels inside the research fishery being able to maintain higher trip limits than those vessels operating outside the research fishery.

Incidental permit holders took, on average, 305 trips per year that landed sandbar sharks and 347 trips per year that landed non-sandbar LCS in 2003 to 2005 (Table 4.11).

On average, they landed 2 sandbars and 3 non-sandbar LCS per trip for total estimated gross revenues of $307 per trip (Table 4.11). However, under alternative suite 4, if incidental fishermen are selected to participate within the research fishery, then they would have the same retention limits as directed shark permit holders, and therefore, receive the same gross revenues from shark landings as directed shark permit holders. Given gross revenues for directed shark permit holders would be $6,329 per trip under the base quotas (or $6,347 per trip under the adjusted quotas), the same gross revenues for incidental permit holders would be almost 21 times higher than gross revenues under the status quo ($6,329 /$307 = 20.6 times higher). Therefore, positive economic impacts may be realized by the few incidental permit holders that may participate in the research fishery.

Directed permit holders outside the research fishery

On average, directed permit holders landed 35 sandbar sharks and 32 non-sandbar LCS per trip based on the Coastal Fisheries and HMS logbooks (Table 4.11). This translated into gross revenues of $4,101 per trip in sandbar and non-sandbar LCS landings based on 2006 ex-vessel prices (Table 4.11). In total, directed permit holders made $4,702,031 in gross revenues from sandbar and non-sandbar LCS landings under the status quo (Table 4.9). Under the adjusted quota for alternative suite 4, directed permit holders operating outside the research fishery would still be able to retain 33 non-sandbar LCS per trip until the regional non-sandbar LCS quotas were filled. This trip limit translates into an average trip weight of 1,112 lb dw (33 non-sandbar LCS x 33.7 lb dw [average commercial weight of non-sandbar LCS] = 1,112 lb dw). Based on 2006 ex-vessel prices, this translates into $2,101 in gross revenues per trip (assuming 5 percent fin weight and 95 percent carcass weight). Given there were, on average, 1,108 directed trips reported in the Coastal Fisheries and HMS logbooks from 2003 to 2005, this would result in gross revenues of $2,327,908 for directed permit holders from non-sandbar LCS landings based on the adjusted trip limits.

After the overharvests have been accounted for in 5 years (at the end of 2012), NMFS would implement the base quotas, which would increase the retention limit for directed permit holders to 36 non-sandbar LCS per trip. These base quotas would result in slightly higher gross revenues; 36 non-sandbar LCS translates into 1,213 lb dw per trip, which is $2,293 per trip in gross revenues from non-sandbar LCS landings based on 2006 ex-vessel prices. Total gross revenues for directed permit holders based on 36 non-sandbar LCS per trip and 1,108 trips would be $2,540,644. However, gross revenues for directed permit holders from non-sandbar LCS landings on either a trip basis or total gross revenues would still be reduced by over 46-percent based on the trip limits for the adjusted and base non-sandbar LCS quotas Table 4.9). This is mainly due to the prohibition of sandbar sharks to fishermen operating outside the research fishery.

These reductions in gross revenues on a trip basis may be even larger when examined within a regional context. Under the status quo, shark fishermen made, on average, $4,743 per trip on sandbar and non-sandbar LCS landings in the Atlantic region, and $5,853 per trip in the Gulf of Mexico region (Table 4.11). Based on the trip limits under the adjusted quotas (33 non-sandbar LCS per trip), directed permit holders' gross

revenues on non-sandbar LCS would be $887 per trip in the Atlantic region and $1,645 per trip in the Gulf of Mexico. This is an 81-percent reduction in gross revenues per trip in the Atlantic region and 72-percent reduction in the Gulf of Mexico region (Table 4.11). Under the trip limits for the base quota (36 non-sandbar LCS per trip), directed permit holders' gross revenues on non-sandbar LCS would be $1,513 in the Atlantic region and $1,794 in the Gulf of Mexico region. This would be a 68-percent reduction in gross revenues per trip in the Atlantic region and a 69-percent reduction in the Gulf of Mexico region (Table 4.11). As stated above, these reductions in gross revenues are due to the prohibition of sandbar sharks outside the shark research fishery. Since an average of 141 vessels with directed shark permits reported sandbar landings in the Coastal Fisheries and HMS Logbooks from 2003 to 2005 and most directed permit holders are located in Florida, New Jersey, and North Carolina (Table 3.32), NMFS anticipates that active vessels in these states would be most negatively impacted by alternative suite 4.

Incidental permit holders outside the research fishery

On average, incidental permit holders landed 2 sandbar sharks and 3 non-sandbar LCS per trip based on the Coastal Fisheries and HMS logbooks (Table 4.11). This translated into gross revenues of $307 per trip in sandbar and non-sandbar LCS landings based on 2006 ex-vessel prices (Table 4.11). In total, incidental permit holders made $106,491 in gross revenues from sandbar and non-sandbar LCS landings under the status quo (Table 4.9). Under the adjusted and base quotas for alternative suite 4, incidental permit holders operating outside the research fishery would still be able to retain 3 non-sandbar LCS per trip until the regional non-sandbar LCS quotas were filled. This trip limit translates into an average trip weight of 101 lb dw (3 non-sandbar LCS x 33.7 lb dw [average commercial weight of non-sandbar LCS] = 101 lb dw). Based on 2006 ex-vessel prices, this translates into $190 in gross revenues per trip (assuming 5 percent fin weight and 95 percent carcass weight). Given there were, on average, 347.3 incidental trips reported in the Coastal Fisheries and HMS logbooks from 2003 to 2005, this would result in gross revenues of $65,987 for incidental permit holders from non-sandbar LCS landings. Therefore, gross revenues for incidental permit holders from non-sandbar LCS landings on either a trip basis or total gross revenues would still be reduced by approximately 38-percent based on the trip limits for the adjusted and base non-sandbar LCS quotas (Table 4.11). This is mainly due to the prohibition of sandbar sharks to fishermen operating outside the research fishery. Since most incidental shark permit holders are in the states of Florida, Louisiana, New Jersey, and North Carolina (Table 3.32), these states would be most negatively impacted by alternative suite 4.

Time/Area Closures

Under alternative suite 4, NMFS would maintain the mid-Atlantic shark closed area to BLL gear and the current BLL closures in the Caribbean that were implemented in February of 2007 (72 FR 5633). Therefore, the economic impacts associated with these closures would be the same as described under alternative suite 1. In addition, NMFS would also implement the South Atlantic Fishery Management Council MPAs as described under alternative suite 2. Therefore, the economic impacts associated with the MPAs would be the same as described in alternative suite 2.

Reporting

This alternative suite could result in neutral economic impacts. Shark dealers would be still be required to submit landings data twice a month, however, they would need to ensure that it is actually *received* by the Agency within 10 days of a bimonthly reporting period ending. Currently, shark dealers simply have to ensure that the landings reports submitted to NMFS are *post-marked* within 10 days of the end of a reporting period. Additional burden is not expected as a result of modifying the regulations to ensure that dealer reports are actually received. Furthermore, timelier reporting and receipt of information by the Agency may result in a decreased likelihood that quotas would be exceeded and overharvests removed from forthcoming shark seasons.

This alternative suite would increase the level of observer coverage for a limited number of vessels that would apply and be selected for participation in a shark research program. One-hundred percent observer coverage would be required for all vessels participating in this program. Vessels outside the shark research program would still be required to take an observer if selected. All vessels would still be required to complete and submit commercial logbooks in the same timeframe.

Under alternative suite 4, NMFS would change how sharks listed as unclassified on shark dealer reports are accounted for under quota monitoring. NMFS would monitor the species composition of sharks landed outside the research fishery through scientific observers and/or dealer reports. The species composition of shark landings by dealer reports and/or scientific observers outside the research fishery would be applied to unclassified sharks and deducted from the appropriate sandbar, LCS, non-sandbar LCS, SCS, and pelagic shark quotas. NMFS believes this is the most accurate way to account for unclassified sharks from the different quotas, and should improve the accuracy of shark dealer reporting. However, through shark dealer identification workshops, NMFS believes the number of unclassified sharks in dealer reports should decrease over time. Properly identifying sharks may result in negative economic impacts in the short-term because it takes more time. However, submission of accurate shark dealer data may result in positive economic impacts in the long-term as it would improve quota monitoring, decrease the likelihood of extensive overharvests and subsequent closures, and improve the results from stock assessments by ensuring data is more accurate and includes species specific information.

Seasons

The same negative economic impacts for the North Atlantic region described in alternative suites 2 and 3 would exist for alternative suite 4. Furthermore, seasons would be closed within five days notice of any species/complex attaining 80 percent of their quota. The primary difference between alternative suite 4 and the other alternatives would be that there would be a limited number of vessels that would be selected to participate in a shark research program, and would be able to land sandbar, non-sandbar LCS, and other species/complex year-round if quota was available. However, since NMFS established a separate non-sandbar LCS quota for the shark research fishery, sandbar, LCS, non-sandbar LCS, SCS, and pelagic shark fisheries would close with five

days notice when each fishery achieves 80 percent of their respective species/complex quota. This should allow each fishery to harvest their respective quota and not result in negative economic impacts.

Regions

Based on public comments, NMFS has analyzed the impact of two regions regarding non-sandbar LCS quotas (see Appendix C). This would afford the Gulf of Mexico region a higher non-sandbar LCS quota, based on historical landings, than the Atlantic. Based on 2006 ex-vessel prices, given base non-sandbar LCS quotas (188.3 mt dw in the Atlantic region and 439.5 mt dw in the Gulf of Mexico region), gross revenues from non-sandbar LCS landings would be $517, 657 in the Atlantic region and $1,433,034 in the Gulf of Mexico region (Table 4.18). Under the adjusted quotas (187.8 mt dw for the Atlantic region and 390.5 mt dw in the Gulf of Mexico region), gross revenues from non-sandbar LCS landings would be slightly lower with $516,285 in the Atlantic region and $1,273,269 in the Gulf of Mexico region (Table 4.18). While this may disadvantage the Atlantic region by establishing a smaller Atlantic regional quota, it would allow for regional accounting of overharvests. Given the large overharvests in 2007, particularly in the Gulf of Mexico region (see Appendix C), establishing two regions allowed NMFS to account for overharvests within each region, therefore not penalizing the Atlantic region for overharvests in the Gulf of Mexico. This would also result in positive economic benefits with regional accounting of overharvests to both regions in the future.

Two regions could still result in negative economic impacts on regions that do not have sharks present year-round. The North Atlantic region would be disadvantaged as a result of two regions versus three under the status quo, because sharks do not normally migrate north until the summer months. Thus, southern states would have a higher likelihood of harvesting the quota before sharks became available in the North Atlantic region. However, the trip limits have been established to ensure that the shark seasons would be open for a longer period of time than under the status quo, thus helping to offset some of the negative impacts of the two region approach. As a result, the shark season should stay open longer than under the status quo, giving the North Atlantic region a greater chance to harvest sharks later in the shark season. This alternative suite would also implement a shark research program that would allow a limited number of vessels to conduct fishing activities in all regions throughout the year. Vessels outside the research fishery could either move to southern areas to participate in the shark fishery in areas where sharks are present year-round or redistribute fishing effort to other fisheries. The decrease in year-round availability of shark product may have a more negative effect on dealers in the North Atlantic region than vessel owners, since vessel owners have the opportunity to move south to fish.

Recreational Measures

Under alternative suite 4, recreational fishermen would be allowed to land non-ridgeback LCS and tiger sharks. Recreational fishermen would not be able to land sandbar sharks and silky sharks. On average, 4,235 sandbar sharks and 1,943 silky

sharks were landed annually by recreational anglers between 2002 and 2006. Recreational anglers could still catch and release these species. However, Charter/Headboat captains may experience negative economic impacts if customers are not willing to hire charters since they cannot land sandbar or silky sharks. Most Charter/Headboat permits are located in Florida, Massachusetts, New Jersey, and North Carolina (Table 3-33). Therefore, these states may be the most affected by these prohibitions.

Tournaments offering prize categories for large coastal shark may also experience negative economic impacts as a result of prohibiting sandbar and silky sharks. Only 7 percent of tournaments in 2007 awarded points or prizes for ridgeback shark species. The States of New York, Florida, Maryland, Alabama, Puerto Rico, South Carolina, and Texas have registered LCS tournaments, with New York, Florida, Maryland, and Texas having the most tournaments that award points or prizes for LCS (Table 3-39). Therefore, these states may be most affected by recreational anglers not being allowed to land sandbar and silky sharks in tournaments. The economic impacts could include unquantified reductions in participation in the affected tournaments and potential decrease in enjoyment by participants and audiences if these tournaments either eliminate prize categories for the species prohibited by this alternative or switch to a catch-and-release format.

6.4.5 Alternative Suite 5: Close Atlantic Shark Fisheries

Quotas, Species Complexes, and Retention limits

Alternative Suite 5 would have significant economic and social impacts on a variety of small entities, including: commercial shark permit holders, shark dealers, gear manufacturers, bait and ice suppliers, and other secondary industries dependent on the shark fishery. The level of economic impact would be directly proportional to the amount of revenues that each entity has realized from past participation in the shark fishery. Permit holders would be impacted differently depending on the quantity of sharks landed in the past. Vessels targeting sharks (directed permit holders) landed an annual average of 1,263 mt dw of LCS, 223 mt dw SCS, and 173 mt dw pelagic sharks per year between 2003 to 2005 based on shark dealer landings and effort data from the Coastal Fisheries and HMS logbooks. The gross revenues based on 2006 ex-vessel prices of these landings are estimated at $4,702,031, $681,880, and $764,512 for LCS, SCS, and pelagic sharks, respectively, based on price information provided in Table 3.42. While it is unlikely that many directed shark fishermen subsist entirely on revenues from the shark fishery, impacts would still be severe for those participants that depend on any income from shark fishing at certain times of the year. Because of the extensive economic impacts to shark directed permit holders as a result of this alternative suite, it is assumed that directed permit holders would likely pursue one of the following options as a result of closing the Atlantic shark fishery: (1) move fishing effort to other fisheries for which they are already permitted (snapper grouper, king and Spanish mackerel, tilefish, lobster, dolphin/wahoo, *etc*.), (2) acquire the necessary permits to participate in other fisheries (both open access and/or limited access fisheries), or (3) relinquish all permits and leave

the fishing industry. Table 3.32 displays the other permits held by directed shark permit holders as of May 2007.

Incidental permit holders would face negative economic and social impacts as a result of closing the Atlantic shark fishery, however, not as severe as directed permit holders. It is assumed that incidental permit holders receive the majority of their fishing income from other fisheries, depending on the region and the type of gear predominantly fished (*i.e.*, swordfish, tunas, snapper grouper, tilefish, dolphin/wahoo, lobster, *etc*.). NMFS estimates that, on average, between 2003 to 2005 incidental permit holders landed 26.9 mt dw LCS, 17.3 mt dw SCS, and 45.5 mt dw pelagics per year based on shark dealer landings and effort data from the Coastal Fisheries and HMS logbooks. Based on 2006 ex-vessel prices, this equates to gross revenues of $106,491, $52,882, and $201,061 for the LCS, SCS, and pelagic species complexes, respectively. Incidental permit holders would likely have to increase effort in these other fisheries to replace lost revenues from landing sharks. Furthermore, these vessels may seek other permits (open access or limited access transferred from another vessel) or leave the fishing industry entirely.

This alternative suite could also have negative economic and social impacts for shark dealers as they would no longer be authorized to purchase shark products from Federally permitted shark fishermen. Shark dealers also maintain permits to purchase other regionally caught fish products. Due to the brevity of the LCS shark fishing season, which is the shark fishery that accounts for the majority of the shark product revenue due to the fin value, many dealers also get revenue from purchasing fish products other than sharks. The majority of shark dealers hold permits to purchase other fish products, including swordfish, tunas, snapper grouper, tilefish, mackerel, lobster, and dolphin/wahoo among others. It is difficult to estimate, at the individual dealer level, the quantity of revenues received exclusively from shark products.

Shark fin dealers, specializing in the purchase of shark fins from Federal and state permitted dealers, would also experience negative social and economic impacts as a result of closing the shark fishery. These dealers receive virtually all of their income from purchasing shark fins and shipping them to exporters. Exporters then transport the fins to global and domestic markets. This alternative suite would likely force shark fin dealers to leave the industry or focus on purchasing other fishery products, resulting in significant economic impacts to the individuals involved in this trade.

It is difficult to estimate the indirect economic and social impacts that would be experienced by various small entities that support the shark fishery, *e.g.*, purveyors of bait, ice, fishing gear, and fishing gear manufactures. However, these impacts would likely be negative. It is difficult to estimate these impacts as it is uncertain to what extent vessels that were fishing for sharks would redistribute their fishing effort to other fisheries, or simply cease fishing operations. If the majority of vessels affected by a shark fishery closure simply displace effort to other fisheries it is assumed that they would still be dependent on small entities for their bait, ice, and gear as these are products are essential for fishing excursions targeting any species. Redistributing effort to other fisheries would mitigate negative economic impacts. However, if a significant number of

vessels simply cease fishing operations or scale back considerably, then severe economic consequences would be imparted on these support industries as a result.

Time/Area Closures

Seasonal time area closures for BLL gear would no longer be applicable as a result of this alternative. Measures that affect the shark gillnet fishermen during the right whale calving season (November 15 – March 31 every year) are administered by the Atlantic Large Whale Take Reduction Team and these measures would still apply to fishermen who possess a commercial shark permit and fish in the calving area between the months of November through April. These measures are specific to the mesh size of gillnets that are being deployed, therefore, these measures would continue to apply to shark permit holders regardless of which species they are pursuing during these months in this area. Negative economic and social impacts would likely occur as a result of maintaining these closures.

Reporting

This alternative suite would increase the proportion of fishermen completing the Coastal Fisheries Logbook who are selected to report information on fish that are discarded. Currently, 20 percent of the fishermen completing this logbook are selected. This percentage would be increased to facilitate improved data available for shark interactions with longline and gillnet gear. This information would be especially useful because sharks could no longer be landed and the existing Coastal Fisheries logbook only requires fishermen to provide data on landed fish. Increasing the number of fishermen who are selected to provide this data would result in negative economic and social impacts because it would require additional paperwork to be filled out. Increased reporting burden would be subject to authorization under the Paperwork Reduction Act. It is unlikely that fishermen would keep their shark permits under this alternative and there would no longer be required to take an observer. Shark dealers would no longer be required to submit federal dealer reports regarding sharks purchased – dealer reporting may still be required by individual states.

Seasons

Seasons for the commercial Atlantic shark fishery would no longer apply as this alternative suite would close the fishery.

Regions

Regions for the commercial Atlantic shark fishery would no longer apply as this alternative suite would close the fishery.

Recreational Measures

Closing the Atlantic recreational shark fishery would have negative economic and social impacts. These impacts would be most pronounced for Charter/Headboat operators whom specialize in landing sharks and operators of shark tournaments that have

prize categories for landing sharks. It is difficult to estimate the number of Charter/Headboat operators that specialize in shark charters as the permit covers any participant targeting swordfish, sharks, tunas, and billfish. Many Charter/Headboat operators target a variety of species depending on client interests, weather, time of year, and oceanographic conditions. Charter/Headboat operators specializing in shark fishing charters would have to target other HMS or non HMS species to replace revenues lost as a result of customers not being able to land sharks. However, not all customers necessarily want to land sharks. Charter/Headboat operators would still be able to catch sharks, however, all sharks regardless of species would need to be released in a manner that maximizes their chances of survival. Catering business operations to clientele interested in catch and release fishing for sharks might mitigate some of the negative economic impacts.

Shark tournaments that award prizes for landing sharks would be negatively impacted as a result of this alternative suite. There have been 79 tournaments/year that had a prize category for sharks from 2005-2006. The majority of these tournaments target pelagic sharks and are held in the North Atlantic and Gulf of Mexico regions. These tournaments would either modify their rules to only allow points/prizes for released sharks or these tournaments would cease to exist. Economic impacts on small entities such as restaurants, hotels, gear manufacturers, retail stores selling fishing supplies, and marinas in the vicinity of where these tournaments are held would also experience negative economic impacts.

HMS Angling permit holders would also experience negative impacts, despite the fact that they would still be able to catch and release sharks. Landings would not be permitted by any recreational anglers as a result of this alternative suite.

Closing the Atlantic shark fishery would have negative economic impacts on global shark fin markets. As a result of this alternative suite, U.S. flagged vessels would no longer be able to contribute to the global demand for shark fins. This would disadvantage U.S. shark fishermen as global markets would likely need to purchase their shark fins from other markets. However, the U.S. is not a significant producer of shark products globally. Based on data from the United Nations Food and Agriculture Organization (FAO), less than one percent of global shark landings occur in the U.S. Atlantic.

6.4.6 Alternative 6: Stock assessments for Sharks Every 2-3 Years (Status Quo)

Economic impacts of conducting stock assessments every 2-3 years could be neutral. The timing of the stock assessments does not generally have a direct economic impact, however, measures that are necessary to prevent overfishing and/or rebuild overfished stocks generally have a negative economic impact on small entities that depend on landings sharks for their livelihood. If conducting stock assessments more frequently would continue to result in the implementation of measures that require reductions in fishing mortality to maintain consistency with National Standard 1, then negative economic impacts could occur as a result. Alternatively, if results were positive

for certain shark stocks, then assessing shark populations more frequently would have positive economic impacts. As additional data become available, it is difficult to predict the results of forthcoming stock assessments and the economic ramifications of the measures that need to be implemented as a result. However, the Agency has adopted the SEDAR approach to stock assessments which encourages full participation from industry, environmentalists, academics and other parties affected by stock assessments to participate at all workshops.

6.4.7 Alternative 7: Stock assessments for Sharks At Least Every 5 Years - Preferred Alternative

Economic impacts of conducting stock assessment could be variable depending on the results of the stock assessment and management measures necessary. Scheduling stock assessments so that there is more time between assessments allows participants in shark fisheries to adapt to management measures implemented in the past. This provides participants with the opportunity to decide if, and to what degree, they may continue to stay engaged in shark fisheries. More frequent stock assessments would have positive economic impacts if information attained from assessments indicated that quota levels and fishing mortality may be increased for certain species because fishermen would be able to harvest more sharks. Furthermore, participants may experience negative economic impacts if the results change dramatically and additional measures are needed to reduce fishing effort and mortality.

6.4.8 Alternative 8: SAFE Report Published in January or February of Every Year (Status Quo)

There are no negative social or economic impacts associated with NMFS publishing a safe report each year in either January or February as this deadline is mainly administration in nature. By publishing the SAFE report annually according to NS 2, framework actions and FMP amendments could base annual harvest levels from each stock, document significant trends or changes in the resource, the bycatch, and the fishery over time, and assess the relative success of existing state and Federal fishery management program. In doing so, management actions could appropriately address the fishery to minimize negative social and economic impacts to fishermen. However, the timing of the SAFE report within the calendar year would not affect any of these issues, therefore, maintaining the status quo would result in neutral social and economic impacts.

6.4.9 Alternative 9: SAFE Report Published in the Fall of Every Year

There are no negative social or economic impacts associated with publishing the SAFE report in the fall of every year. Publishing the SAFE report in the fall would give the Agency more discretionary time to develop a SAFE report each year according to the guidelines under NS 2. However, since a SAFE report would still be published on an annual basis, it would provide the needed information so management actions could appropriately address the fishery to minimize negative social and economic impacts to fishermen. Therefore, publishing a SAFE report each year in the fall would have neutral social and economic impacts.

Chapter 6 References

Cortés, E. and J. Neer. 2002. Updated catches of sharks. NOAA Fisheries, SEFSC, Panama City Lab. Document SB/02/15 of the 2002 Shark Evaluation Workshop. Panama City, FL, June 24-28, 2002. 62 p.

Cortés, E. 2003. Updated catches of Atlantic sharks. SFD Contribution 2003-0031. NMFS, Southeast Fisheries Science Center, Panama City, Florida. 75 p.

Cortés, E. and J.A. Neer. 2005. Updated catches of Atlantic sharks. LCS05/06-DW-16. NMFS, Southeast Fisheries Science Center, Panama City, Florida. 58 p.

Larkin, S.L., C.M. Adams, and D.J. Lee. 2000. Reported trip costs, gross revenues, and net returns for U.S. Atlantic pelagic longline vessels. Marine Fisheries Review 62(2): 49-60.

NMFS. 1997. 1997 Shark Evaluation Report. NOAA, Southeast Fisheries Science Center, Miami, FL. 12 p.

NMFS. 2004. National Report of the United States (to ICCAT): 2004. NOAA, U.S. Department of Commerce, Silver Spring, MD. NAT/03/06.

NMFS. 2005. United States National Report to ICCAT, 2005. NAT-038.

Porter, R.M., M. Wendt, M.D. Travis, and I. Strand. 2001. Cost-earnings study of the Atlantic-based U.S. pelagic longline fleet. Pelagic Fisheries Research Program. SOEST 01-02; JIMAR contribution 01-337. 102pp.

CHAPTER 7 TABLE OF CONTENTS

CHAPTER 7 LIST OF TABLES

7.0 REGULATORY IMPACT REVIEW

The Regulatory Impact Review (RIR) is conducted to comply with Executive Order 12866 (E.O. 12866) and provides analyses of the economic benefits and costs of each alternative to the nation and the fishery as a whole. Certain elements required in an RIR are also required as part of an environmental impact statement (EIS). Thus, this section should be considered only part of the RIR; the rest of the RIR can be found throughout this document.

7.1 Description of the Management Objectives

Please see Chapter 1 for a description of the management objectives associated with these management actions.

7.2 Description of the Fishery

Please see Chapter 3 for a description of the fisheries that could be affected by these management actions.

7.3 Statement of the Problem

Please see Chapter 1 for a description of the problem and need for these management actions.

7.4 Description of Each Alternative

Please see Chapter 2 for a summary of each alternative and Chapter 4 for a complete description of each alternative and its expected ecological, social, and economic impacts. Chapters 6 and 8 provide additional information related to the economic impacts of the alternatives.

7.5 Economic Analysis of Expected Effects of Each Alternative Relative to the Baseline

Table 7.1 Net Economic Benefits and Costs of Alternatives

Alternatives	Net Economic Benefits	Net Economic Costs
Alternative Suite 1 Status Quo	Maintains current economic activity associated with shark landing levels in the short term.	In the long term, there would be economic costs associated with continued overfishing of sandbar sharks, including population decline and associated reduced revenue from landings. Current quota levels for the LCS complex would also result in costs associated with negative ecological impacts on dusky sharks. Continued fishing of porbeagle sharks could result in costs associated with potential ecological impacts on this species.

Alternatives	Net Economic Benefits	Net Economic Costs
Alternative Suite 2 Limited shark fishery for directed permit holders only.	There would be unquantified benefits to the public associated with reducing the landings and discards of overfished shark species including sandbar, dusky, and porbeagle sharks as well as ecological benefits to non-sandbar LCS complex. These benefits include passive use values, such as shark viewing trips, and nonuse values including knowing that shark species remain for future generations (bequest value) and values placed on knowing shark species will continue to survive (existence value). Potentially longer seasons might improve the efficiency of domestic shark markets. Improved quota tracking resulting from the increased dealer reporting frequency may help to avoid market disruptions associated with quota overharvests.	There would be an estimated reduction of $3,569,584 in gross revenues from sandbar and non-sandbar LCS resulting from the proposed quota reductions. Prohibiting the retention of sandbar sharks on pelagic longline gear would potentially reduce gross revenues by $117,510. Reducing the retention limit to 8 sandbar/trip and 21 LCS other/trip may reduce the profitability of each trip. In addition, prohibiting the retention of sandbar and non-sandbar LCS by incidental permit holders, could also reduce the profitability of their trips as a result of forgoing an estimated $106,491 in total annual gross revenues. There would also be an estimated gross revenue loss of $7,378 resulting from prohibiting porbeagle shark landings. The proposed MPAs could displace $1.51 million in BLL shark landings and result in redistributed fishing effort in less profitable areas. The costs of dealer reporting would increase as a result of increasing the reporting frequency. This includes increased costs associated with acquiring fax or computer equipment and increased labor required for the more frequent reporting. Negative economic costs resulting from the reduced number of sharks that can be legally landed by recreational anglers, particularly pronounced in areas where blacktip sharks are frequently encountered. Tournaments offering prize categories for sharks may also experience negative economic impacts as a result of allowing fewer species to be retained in recreational fisheries.

Alternatives	Net Economic Benefits	Net Economic Costs
Alternative Suite 3 Limited shark fishery for directed and incidental permit holders (all gears).	There would be unquantified benefits to the public associated with reducing the landings and discards of overfished shark species including sandbar, dusky and porbeagle sharks as well as ecological benefits to non-sandbar LCS complex. These benefits include passive use values, such as shark viewing trips, and nonuse values including knowing that shark species remain for future generations (bequest value) and values placed on knowing shark species will continue to survive (existence value). Potentially longer seasons might improve the efficiency of domestic shark markets.	There would be an estimated reduction of $3,608,398 in gross revenues from sandbar and non-sandbar LCS resulting from the proposed quota reductions. There would also be an estimated gross revenue loss of $7,378 resulting from prohibiting porbeagle shark landings. The proposed MPAs could displace $1.51 million in BLL shark landings and result in redistributed fishing effort in less profitable areas. Negative economic costs resulting from the reduced number of sharks that can be legally landed by recreational anglers, particularly pronounced in areas where blacktip sharks are frequently encountered. Tournaments offering prize categories for sharks may also experience negative economic impacts as a result of allowing fewer species to be retained in recreational fisheries.

Alternatives	Net Economic Benefits	Net Economic Costs
Alternative Suite 4 Research set aside; allows for very small directed fishery for LCS (Preferred Alternative).	There would be unquantified benefits to the public associated with reducing the landings and discards of overfished shark species including sandbar and dusky sharks as well as ecological benefits to non-sandbar LCS complex. These benefits include passive use values, such as shark viewing trips, and nonuse values including knowing that shark species remain for future generations (bequest value) and values placed on knowing shark species will continue to survive (existence value). Increased incidental retention limits could reduce the inefficiencies associated with discarding incidentally caught sandbar and non-sandbar LCS. Potentially longer seasons might improve the efficiency of domestic shark markets. Potential benefits associated with revenues from sandbar sharks for the limited number of vessels participating in the research fishery. In long term, the research fishery could generate benefits if the research helps stock assessments.	There would be an estimated reduction of $ 2,370,276 in gross revenues annually from sandbar and non-sandbar LCS resulting from the proposed base quota reductions. However, the adjusted quota for the 2007 overharvests would result in an estimated reduction of $2,675,484 in gross revenues from sandbar and non-sandbar LCS. The proposed MPAs could displace $1.51 million in BLL shark landings and result in redistributed fishing effort in less profitable areas. Negative economic costs could result from the reduced number of sharks that can be legally landed by recreational anglers to only tiger sharks and non-ridgeback species. However, by allowing recreational fishermen to retain these species, the list of species that can be retained becomes longer than the list under alternatives 2 and 3. Tournaments offering prize categories for large coastal shark may also experience negative economic impacts as a result of prohibiting sandbar and silky sharks. There could also be costs associated with the business disruptions and uncertainty associated with getting in the research fishery in one year and not another.

Alternatives	Net Economic Benefits	Net Economic Costs
Alternative Suite 5 Close Atlantic shark fishery.	Significant unquantified benefits to the public would like be achieved for the LCS, SCS, and pelagic shark complexes. These benefits include passive use values, such as shark viewing trips, and nonuse values including knowing that shark species remain for future generations (bequest value) and values placed on knowing shark species will continue to survive (existence value). Reduced reporting burden on shark dealers. Potential improvements in shark catch and release recreational fishing.	There would be the loss of annual revenues from fishing for LCS, SCS, and pelagic sharks estimated to be $4,808,522, $734,762, and $965,573, respectively. Increased reporting burden on fishermen reporting discards in the Coastal Fisheries Logbook. Dealers that have handled significant quantities of shark in the past would experience domestic supply issues and likely economic losses. Shark fin dealers, specializing in the purchase of shark fins from Federal and state permitted dealers, would also experience negative social and economic impacts as a result of closing the shark fishery. Negative economic costs resulting from the reduced number of sharks that can be legally landed by recreational anglers, thus potentially decreasing willingness to pay for shark fishing. These impacts would be most pronounced for Charter/Headboat operators whom specialize in landing sharks and operators of shark tournaments that have prize categories for landing sharks. The 79 shark tournaments that have had reward prizes for landing sharks would be negatively impacted as a result of this alternative suite.
Alternative 6 Stock Assessments for Sharks Every 2-3 Years (Status Quo)	No change	No change
Alternative 7 Stock Assessments for Sharks At Least Every 5 Years. Preferred Alternative (Preferred Alternative).	Scheduling stock assessments so that there is more time between assessments allows participants in shark fisheries to adapt to management measures implemented in the past. This provides participants with the opportunity to decide if, and to what degree, they may continue to stay engaged in shark fisheries.	Shark fishery participants may experience negative economic impacts if the results change dramatically and additional measures are needed to reduce fishing effort and mortality.

Alternatives	Net Economic Benefits	Net Economic Costs
Alternative 8 SAFE Report Published in January or February of Every Year (Status Quo).	No change	No change
Alternative 9 SAFE Report Published in the Fall of Every Year (Preferred Alternative).	No change	No change

7.6 Conclusions

Under E.O. 12866, a regulation is a "significant regulatory action" if it is likely to: (1) have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities; (2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; and (3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the legal mandates, the President's priorities, or the principles set forth in the Executive Order. The preferred alternatives described in this document do not meet the above criteria. The proposed measures would have an annual effect on the economy less than $100 million and would not adversely affect the aforementioned parameters. Proposed measures would also not create an inconsistency or interfere with an action taken by another agency. Furthermore, proposed measures would not materially alter the budgetary impact of entitlements, grants, user fees, the President's priorities, or the principles set forth in E.O. 12866. Therefore, under E.O. 12866, the preferred alternatives described in this document have been determined to be not significant for the purposes of E.O. 12866. A summary of the expected net economic benefits and costs of each alternative, which are based on supporting text in Chapters 4 and 6, can be found in Table 7.1.

CHAPTER 8 TABLE OF CONTENTS

8.0 FINAL REGULATORY FLEXIBILITY ANALYSIS

The Final Regulatory Flexibility Analysis (FRFA) is conducted to comply with the Regulatory Flexibility Act (5 USC 601 et. seq.) and provides a description of the economic impacts of the various alternatives on small entities. Certain elements required in a FRFA are also required as part of an environmental impact statement (EIS). Therefore, the FRFA incorporates the economic impacts identified in the EIS. The Initial Regulatory Flexibility Analysis was included in the draft EIS and is also contained in the proposed rule.

8.1 Statement of the Need for and Objectives of this Final Rule

Please see Chapter 1 for a description of the objective of the final rule.

8.2 A Summary of the Significant Issues Raised By the Public Comments in Response to the Initial Regulatory Flexibility Analysis, a Summary of the Assessment of the Agency of Such Issues, and a Statement of Any Changes Made in the Rule as a Result of Such Comments.

NMFS received many comments on the proposed rule and draft EIS during the public comment period. A summary of these comments and the Agency's responses are included in Appendix D of this document and will be included in the final rule. The specific economic concerns raised in comments are also summarized here.

NMFS received a comment that the Agency should consider an alternative suite that incorporates a "phase out" of the commercial shark industry. NMFS did consider such an alternative in the Draft EIS that would have ended Atlantic commercial shark fishing, Alternative Suite 5. Under this proposed alternative, shark landings would have been limited to research and the collection for public display via the HMS Exempted Fishing Program. Recreational fisheries would have been catch and release only. However, after careful consideration of the other alternatives, this alternative suite was not preferred due to the economic costs associated with a complete closure as discussed in Chapter 6.

NMFS received several comments regarding an industry buyout/buyback. NMFS recognizes that some participants of the Atlantic shark fishery expressed interest in reducing fishing capacity for sharks via some form of buyout program. Buyouts can occur via one of three mechanisms, including: through an industry fee, via appropriations from the United States Congress, and/or provided from any State or other public sources or private or non-profit organizations. A buyout plan is not proposed in this rulemaking, despite requests for consideration from the HMS Advisory Panel and other affected constituents, because the Agency is unable to implement a buyout as a management option. Buyouts must be initiated via one of the aforementioned mechanisms. The shark fishery did develop an industry "business plan" that examined options for a buyout, which is further described in Chapter 1 of the Draft EIS.

NMFS received several comments concerning the potential for severe economic impacts associated with all of the alternatives considered (other than status quo). Comments indicated a concern that many fishermen may not be able to survive economically until the next stock assessment. NMFS has estimated that the alternatives considered, including the no action alternative, would result in economic consequences to the shark fishery. The severity of the economic consequences varies by alternative suite, with Alternative Suite 5, the complete closure of the Atlantic shark fishery, having the greatest economic impact.

It was also suggested that NMFS should include analysis of the negative economic impacts associated with prohibiting porbeagle sharks in shark tournaments, especially in New England. NMFS appreciates this additional information regarding the importance of porbeagle sharks in tournament fisheries. Additional information has been incorporated into the final EIS for Amendment 2 to further address the potential economic impacts that a prohibition of porbeagle landings. However, based on strong support from the public not to prohibit retention of porbeagle sharks and NMFS' recognition of the negative impacts of such a prohibition, NMFS is choosing to not prohibit the recreational retention of porbeagle sharks.

Comments indicated recreational impacts would be significant if sandbar, bull, and blacktip sharks were prohibited in the recreational fishery. Comments indicated that the negative economic impacts resulting from the reduced number of sharks that could be legally landed by recreational anglers would be particularly pronounced in areas where blacktip sharks are frequently encountered. In addition, tournaments offering prize categories for sharks could also experience negative economic impacts as a result of not allowing six additional species to be retained in recreational fisheries. Due to a lack of information regarding the relative preferences of shark fishermen to retain shark species over practicing catch-and-release shark fishing, the Agency was unable to quantitatively estimate the economic impacts of the proposed recreational measures restricting the authorized list of species that could be retained. In part to mitigate these impacts, the final preferred alternative suite would allow recreational anglers to retain blacktip, finetooth, blacknose, bull, spinner, and porbeagle sharks.

Comments also indicated a concern that dealers will not likely be interested in continuing to buy shark products when the proposed measures go into place. NMFS acknowledges that some dealers may opt to no longer participate in the shark fishery due to the decrease in volume of shark product that is anticipated under the reduced quotas. The handling of low volumes of shark product may not be profitable for some dealers. However, the information available to the Agency indicates that several shark dealers already handle small quantities of shark products, and therefore, changes in the shark fishery are unlikely to cause them to change their business practices. Reduced domestic harvest of sandbar sharks could potentially increase the value of shark product in the future due to reduced supplies. Furthermore, having the season open for a longer period of time each year, subject to reduced retention limits, may enhance the domestic shark meat market and increase prices.

Several comments suggested NMFS should implement a retraining program for fishermen and families that are displaced by this action. Others suggested fishermen reconfigure their businesses towards providing tourism services. NMFS has worked with a number of other agencies/departments to explore programs that are available to fishermen and other businesses affected by fishery management measures. Some of these include retraining programs and financial assistance and would mitigate some of the economic impacts of this rule. These programs are further discussed in Appendix D.

Commenters also suggested that NMFS consider giving shark fishermen swordfish handgear permits in order to help offset negative economic impacts, while also increasing swordfish landings. NMFS did not propose changes to the permit system, however, the Agency will take this suggestion under consideration for future actions. The Agency notes that the swordfish handgear permit is a limited access permit. Therefore, issuing new swordfish handgear permits may result in negative economic impacts to current holders of swordfish handgear permits. In addition, NMFS recently issued new regulations to revitalize the swordfish fishery and may consider additional measures in the future depending on the outcome of the current regulatory changes.

NMFS received a comment questioning whether shark permits will still be worth anything after the proposed management changes take place. It is difficult to predict the value of shark directed and incidental permits before management measures associated with this Amendment are implemented. It is likely that the value of shark permits may be decreased as a result of quota reductions and reduced retention limits. However, there will still be some demand for shark permits by new entrants into the commercial swordfish and tuna fisheries that require all three HMS permits to go fishing.

NMFS received comments indicating that requiring fishermen to land sharks with fins on will change the entire pricing of shark product. NMFS could be changing the whole valuation process here by requiring that sharks have their fins on. The requirement to land sharks with their fins attached would allow fishermen to leave the fins attached by just a small piece of skin so that the shark could be packed efficiently on ice at sea efficiently. Shark fins could then be quickly removed at the dock without having to thaw the shark. Sharks may be eviscerated, bled and the head removed from the carcass at sea. These measures should prevent any excessive amounts of waste at the dock, since dressing (except removing the fins) the shark can be performed while at sea. While this will result in some changes to the way fishermen process sharks at sea, the transfer of shark product to dealers could remain relatively unchanged because the fins can be removed quickly once the shark has been offloaded. NMFS expects that the market will continue to receive sharks in their log form. While there may be some changes in the way sharks are marketed and priced, it is unlikely that the total ex-vessel value of sharks will change significantly due to the requirement to land sharks with their fins attached.

8.3 Description and Estimate of the Number of Small Entities to Which the Final Rule Would Apply

NMFS considers all HMS commercial permit holders to be small entities because they either had average annual receipts less than $4.0 million for fish-harvesting, average

annual receipts less than $6.5 million for charter/party boats, 100 or fewer employees for wholesale dealers, or 500 or fewer employees for seafood processors. These are the Small Business Administration (SBA) size standards for defining a small versus large business entity in this industry.

The proposed rule would apply to the 527 commercial shark permit holders in the Atlantic shark fishery based on an analysis of permit holders on October 1, 2007. Of these permit holders, 231 have directed shark permits and 296 hold incidental shark permits. Not all permit holders are active in the fishery in any given year. NMFS estimates that there are 143 vessels with directed shark permits and 155 vessels with shark incidental permits that could be considered actively engaged in fishing, since they reported landing at least one shark in the Coastal Fisheries Logbook from 2003 to 2005. A further breakdown of these permit holders is provided in Table 3.32.

In addition, the reporting requirements in the proposed alternatives would also apply to Federal shark dealers. As of October 1, 2007, there were a total of 269 Atlantic shark dealer permit holders. Based on NMFS understanding of HMS dealers, the Agency assumes that each of these dealers would be considered a small business with 100 or fewer employees.

The proposed measures being considered may also impact the types of services HMS CHB permit holders may provide. As of October 1, 2007, there were 4,899 HMS CHB permit holders. It is unknown what portion of these permit holders actively participate in shark fishing or market shark fishing services for recreational anglers.

In addition, some businesses, such as marinas or specialized tournament organizers that hold tournaments may be considered small entities. HMS tournaments are required to register with NMFS. As such, NMFS has estimates on the number of HMS tournaments. However, NMFS may not necessarily know the number of businesses behind the tournament name and contact. Tournaments offering prize categories for sharks may also experience negative economic impacts as a result of prohibiting two additional species of sharks for retention in recreational fisheries in alternatives suites 2 through 4, as well as alternative suite 5 which would allow no possession of any sharks and only allow catch and release fishing. The majority of tournaments specializing in sharks are in the North Atlantic region, specifically Rhode Island, New York, and Massachusetts. In 2007, there were 59 tournaments with prize categories for pelagic sharks and 42 (combined) tournaments for LCS and SCS.

More information regarding the description of the fisheries affected, and the categories and number of permit holders can be found in Chapter 3.

8.4 Description of the Projected Reporting, Record-keeping, and Other Compliance Requirements of the Final Rule, Including an Estimate of the Classes of Small Entities Which Would Be Subject to the Requirements of the Report or Record

The preferred alternative would require modifying existing reporting and record-keeping requirements. The research program component in this proposed rule would require modifications to the existing Exempted Fishing Permit (EFP) program and dealer reporting requirements.

The final rule would modify the reporting frequency for dealers. The current requirement for dealer reports to be post-marked within 10 days after each reporting period (1st through 15th and 16th through last day of month), would be modified to state that dealer reports must be received by NMFS not later than 10 days after each reporting period (*i.e.*, 25th and 10th of each month). Shark, swordfish, and tuna dealers would have to submit these reports in advance of the 10th and 25th of each month to ensure adequate time for delivery, depending on the means employed for report submission. Requiring that all dealer reports are actually received by the Agency in a more timely fashion would provide more frequent reports of shark landings in order to better assess quantities of sharks landed and whether or not a closure or other management measures are warranted to prevent overfishing. Dealers would still be required to submit reports indicating that no sharks were purchased during inactive periods. Requirements for vessel logbooks and observer coverage would remain unchanged. Additional burden is not expected as a result of modifying the regulations to ensure that dealer reports are actually received within 10 days.

The final rule would also create a limited shark research program that would result in changes to existing reporting requirements. Entry into the shark research program would require vessels to submit an application, which would add to the reporting burden for those vessels wishing to apply. Applicants selected to participate in the shark research program under this alternative would also be subject to 100 percent observer coverage as a requirement for eligibility to participate in the program. In addition, selected vessels would continue to report in their normal logbook in addition to the observer program. Vessels in the shark research program, however, would not need to report in a similar way as the other holders of EFPs even though they are being issued permits under the EFP program. For example, vessels in the research fishery would not be required to submit interim or annual reports describing their fishing activities. Rather, they would only be required to submit logbook per current regulations. Vessels outside the shark research program would still be required to carry an observer if selected and all vessels would still be required complete logbooks within 48 hours of fishing activity and then submit the logbooks to NMFS within seven days.

8.5 Description of the Steps the Agency Has Taken to Minimize the Significant Economic Impact on Small Entities Consistent with the Stated Objectives of Applicable Statutes, Including a Statement of the Factual, Policy, and Legal Reasons for Selecting the Alternative Adopted in the Final Rule and the Reason That Each One of the Other Significant Alternatives to the Rule Considered by the Agency Which Affect Small Entities Was Rejected

One of the requirements of a FRFA is to describe any alternatives to the proposed rule which accomplish the stated objectives and which minimize any significant economic impacts. These impacts are discussed below and in Chapters 4 and 6 of this document. Additionally, the Regulatory Flexibility Act (5 U.S.C. § 603 (c) (1)-(4)) lists four general categories of "significant" alternatives that would assist an agency in the development of significant alternatives. These categories of alternatives are:

1. Establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;
2. Clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;
3. Use of performance rather than design standards; and,
4. Exemptions from coverage of the rule for small entities.

In order to meet the objectives of this proposed rule, consistent with Magnuson-Stevens Act and the Endangered Species Act (ESA), NMFS cannot exempt small entities or change the reporting requirements only for small entities because all the entities affected are considered small entities. Thus, there are no alternatives discussed that fall under the first and fourth categories described above. NMFS does not know of any performance or design standards that would satisfy the aforementioned objectives of this rulemaking while, concurrently, complying with the Magnuson-Stevens Act. Thus, there are no alternatives considered under the third category. As described below, NMFS analyzed seven different alternatives in this proposed rulemaking and provides justification for selection of the preferred alternative to achieve the desired objective.

The alternatives considered and analyzed have been grouped into five alternative suites. Alternative suite 1 would maintain the current Atlantic shark fishery (no action). Alternative suite 2 would allow only directed shark permit holders to land sharks. Alternative suite 3 would allow directed and incidental shark permit holders to land sandbar and non–sandbar LCS as well as SCS and pelagic sharks. Alternative suite 4 would establish a program where vessels with directed or incidental shark permits could participate in a research fishery for sandbar sharks. Only vessels participating in this program could land sandbar sharks. Vessels not participating in the research program could land non-sandbar LCS, SCS, and pelagic sharks. Finally, alternative suite 5 would shut down the commercial Atlantic shark fishery and only allow a catch and release recreational shark fishery. The preferred alternative is suite 4, which would establish a program where a limited number of vessels with directed or incidental shark permits could participate in a research fishery for sharks dependent on the research needs of NMFS.

8.5.1 Alternative Suite 1

Alternative suite 1, the status quo alternative, would not likely result in any significant new economic impacts to small businesses in the HMS Atlantic shark fishery if the current LCS quota of 1,017 mt dw, in conjunction with the 4,000 lb LCS directed shark permit trip limit, is maintained. Under this alternative, the current fishing effort would not likely change which could lead to economic benefits from reduced market uncertainty for fishermen and related businesses in the short term. If gross revenues for directed and incidental permit holders is averaged across the approximately 298 active directed and incidental shark permit holders, then the average annual gross revenues per shark fishing vessel is just over $20,000. However, long term, negative economic impacts could occur if current fishing mortality of sandbar sharks, an economically important species, is not decreased as recommended by the LCS stock assessment, and this species continues to be overfished.

The status quo alternative would maintain the existing closures and would not add any new closures. The three management regions would also remain unchanged. There would also be no additional reporting requirements. Alternative suite 1 would also maintain the trimester seasons, which provides fishermen and dealers with more open seasons. With an annual LCS quota of 1,017 mt dw, spreading the seasons out over the calendar year could potentially result in greater economic stability for fishermen and associated communities. However, if quotas are reduced to comply with the recommendations from the LCS stock assessment, trimester seasons could become less economically stable for fishermen and dealers because of the reduced amount of quota and fishing effort during the calendar year. Maintaining existing closures, reporting requirements, and management regions would likely have little to no economic impacts on effected small businesses.

Alternative suite 1 would also maintain the current bag limit for HMS Angling permit holders at one shark greater than 54 inches per vessel per trip as well as one sharpnose and one bonnethead shark(both of which are in the SCS complex) per person per trip. This would likely result in no new economic impacts for businesses operating recreational fishing charter trips targeting sharks and shark fishing tournaments in the short term.

Overall, alternative suite 1 would likely have the lowest economic impact on small businesses. However, this alternative would likely not meet the objectives of this action. Maintaining the LCS quota of 1,017 mt dw, would be inconsistent with the Magnuson-Stevens Act and the recent LCS stock assessment that recommended a TAC of 158.3 mt dw for sandbar sharks for this species to rebuild by 2070. Current fishing effort, under the status quo alternative, could lead to continued overfishing of sandbar, porbeagle and dusky sharks, which could potentially prevent these species from rebuilding in the recommended timeframe. As a result, this alternative was not selected.

8.5.2 Alternative Suite 2

Alternative suite 2 would allow only directed shark permit holders to land sharks. In addition, this alternative would remove sandbar sharks from the LCS complex and establish a separate category for sandbar sharks from the LCS complex. Incidental shark permit holders would be most affected by alternative suite 2. As of 2007, there were 231 shark directed; 296 shark incidental; 269 shark dealers permit holders. One hundred forty-three vessels with directed shark permits and 155 vessels with shark incidental permits reported landing at least one shark in the Coastal Fisheries Logbook from 2003 to 2005 and could be considered active.

On average, directed permit holders landed 1,286,447 lb dw of sandbar sharks and 1,498,111 of non-sandbar LCS from 2003 to 2005 based on Federal and state shark dealer reports (landings by permit type were based on percentage of total landings by permit type in the Coastal Fisheries and HMS logbooks). In 2006 ex-vessel prices, this is equivalent to gross revenues of $4,702,031 (assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight) (Table 4.9). If gross revenues for directed permit holders are averaged across the approximately 143 active directed shark permit holders, then the average annual gross revenues per shark fishing vessel is just under $33,000 from shark revenues. Under alternative suite 2, gross revenues for directed permit holders would be estimated to be $1,333,417 (Table 4.10). This is a 72-percent overall reduction in gross revenues compared to 2003 to 2005 (Table 4.10). These reduced gross revenues averaged across the 143 active directed permit holders are just over $9,000 per directed shark fishing vessel. This estimated reduction in revenue from shark landings could affect the profitability and even viability of some marginal operations. Operations that have permits in other fisheries and can easily diversify are less likely to be as affected as those marginal operations. Nevertheless, the profitability of all directed shark fishing vessels would likely by reduced. Because the states of Florida, New Jersey, and North Carolina have the most directed shark permits (Table 3.32), these states would be most negatively impacted by alternative suite 2.

In addition, retention of sandbar sharks on pelagic longline (PLL) gear would be prohibited under alternative suite 2. On average, 80,825 lb dw of sandbar sharks were reported landed on PLL gear by directed shark permit holders from 2003 to 2005 (HMS logbook data). In 2006 ex-vessel prices, this is equivalent to $117,510 in gross revenues. Given an average of 16.7 vessels landed sandbar sharks with PLL gear from 2003 to 2005, prohibition of sandbar sharks on PLL gear could result in a loss of gross revenues of $7,037 per vessel.

Gross revenues under the status quo alternative were based on a 4,000 lb dw LCS trip limit for directed shark permit holders. The average number of sandbars and non-sandbar LCS landed per trip was 35 sandbars and 32 non-sandbar LCS for all gear types reported in the Coastal Fisheries and HMS Logbooks. Based on 2006 ex-vessel prices, this is equivalent to $4,101 per trip (Table 4.11). Revenue estimates on a regional trip basis were also based on species composition data attained from the BLL observer program data (Hale and Carlson, 2007). Observer data indicate that between 2005 and 2006, 69 sandbar sharks and 35 non-sandbar LCS were caught per trip in the South

Atlantic region, and 30 sandbar sharks and 83 non-sandbar LCS were caught per trip in the Gulf of Mexico region (Hale and Carlson, 2007). Based on these numbers and 2006 ex-vessel prices, South Atlantic trips averaged $4,743/trip and Gulf of Mexico trips averaged $4,101 per trip (Table 4.11).

Under alternative suite 2, the retention limits would be 8 sandbars/trip and 21 non-sandbar LCS/trip. Non-sandbar LCS retention limits are based on the average ratio of sandbars to non-sandbar LCS caught in the South Atlantic and Gulf of Mexico regions to limit sandbar shark discards by fishermen deploying non-selective gear (Hale and Carlson, 2007). In the Gulf of Mexico, the ratio of sandbars to other LCS caught is 1:4, which based on an 8 sandbar/trip retention limit, would equal 32 non-sandbar LCS/trip. However, such a high non-sandbar LCS retention limit would result in a sandbar discards in the South Atlantic (~65.3 mt dw). Therefore, a 21 non-sandbar LCS/trip retention limit was set to balance discards versus catch in the two regions (see Table A.4). This results in approximately 5 sandbar sharks being caught in the Gulf of Mexico region when the non-sandbar LCS retention limit/trip is filled (and therefore, only 86.1 mt dw of the sandbar quota would be filled). Therefore, gross revenues on a trip basis are estimated to be $1,262 of gross revenue per trip in the South Atlantic and $1,333 of gross revenue per trip in the Gulf of Mexico (Table 4.12). From 2003 to 2005, there were 124 vessels that averaged more than 324 lb dw (or 8 sandbar sharks) of sandbar/trip (Figure A.3). Therefore, these vessels would be most negatively affected by retention limits under alternative suite 2.

On average, 66 incidental permit holders landed 12,994 lb dw per year of sandbar sharks and 46,333 lb dw per year of non-sandbar LCS from 2003 to 2005 based Federal and state shark dealer reports and Coastal Fisheries and HMS logbook data. Using 2006 ex-vessel prices, this is equivalent to gross revenues of $106,491 (assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight) (Table 4.9). Gross revenues averaged across the 66 vessels with incidental permits landing sharks were $1,614 per vessel. Since incidental permit holders would not be able to land any sharks under alternative suite 2, the 66 active vessels would be most negatively affected by this alternative suite. The states of Florida, Louisiana, New Jersey, and North Carolina had the most incidental shark permit holders as of 2007 (144, 37, 20, and 16, respectively; Table 3.32); therefore, these states would be most negatively impacted by alternative suite 2.

Alternative suite 2 would also require dealers to submit reports within 24 hours of shark products being purchased. There could be negative economic impacts to Atlantic shark dealers as a result of the increased reporting requirement associated with this alternative. Currently, shark dealer reports are required to submit bimonthly reports, regardless of whether the dealer actually purchased any shark products. Reporting frequency would be increased to 24 hours of when shark products were purchased. While the increased reporting burden would not result in direct costs to the shark dealer, it would result in additional time spent submitting dealer reports. This represents an opportunity cost for dealers since that time could have been spent conducting other activities related to their business. Furthermore, since submitting the reports via regular

mail would no longer be feasible, in order to comply with the requirement that dealer reports must be *received* by the Agency within 24 hours, it is assumed that dealers would have to submit dealer reports electronically or via facsimile. Dealers that do not currently possess a computer or fax machine would have to purchase one of these items. The increased reporting burden implemented in this alternative suite would be subject to approval under the Paperwork Reduction Act. Reporting requirements for shark vessel permit holders, including the need to carry an observer if selected and the need to submit vessel logbooks within seven days of completing a fishing trip would not be modified, resulting in neutral economic impacts.

The other provisions of alternative suite 2 are the same as in alternative suite 4, which is the preferred alternative for this proposed rule. These provisions include: maintaining the 60 mt shark display and research quota; placement of porbeagle sharks on the prohibited list; quota carryover limited to 50 percent of base quota for species not overfished; no carryover for overfished, overfishing or unknown species; sharks fins must remain on the shark; removal of regions and seasons; and limiting the shark species that can be landed recreationally.

This alternative suite was not selected for two primary reasons. First, this alternative does not address the impacts of continuing to catch sandbar sharks incidentally. These vessels will likely continue to incidentally catch sandbar sharks, but then under this alternative those sharks would be required to be discarded. These discards would reduce potential revenues and possibly operating efficiency of vessels possessing incidental shark permits. Regulatory discards would likely lead to increases in mortality and slow efforts to end overfishing. Second, the 24 hour dealer reporting that would be required to effectively manage quotas would result in a significant increase in reporting burden for dealers. This alternative would therefore not minimize the economic cost to dealers in comparison to the preferred alternative.

8.5.3 Alternative Suite 3

Alternative suite 3 would allow directed and incidental shark permit holders to land sandbar and non-sandbar LCS as well as SCS and pelagic sharks. Therefore, the available sandbar and non-sandbar LCS quota would be spread over a larger universe of commercial permit holders. However, unlike the status quo or alternative suite 2, the retention limits for sandbar sharks and non-sandbar LCS would be the same for both directed and incidental permit holders. Since directed permit holders presumably make a greater percentage of their gross revenues from shark landings, they are expected to have larger negative socioeconomic impacts compared to incidental permit holders. Since the states of Florida, New Jersey, and North Carolina have the most directed permit holders, NMFS anticipates that these states would have the largest negative socioeconomic impacts under alternative suite 3 (Table 3.32). As with alternative suite 2, shark dealers could also experience negative impacts due to the reduction in the sandbar and other LCS quotas and retention limits, which would reduce the overall amount of sharks being landed.

As stated under alternative suite 2, on average, directed permit holders landed 1,286,447 lb dw of sandbar sharks per year and 1,498,111 of non-sandbar LCS per year from 2003 to 2005 based on Federal and state shark dealer reports and logbook data. In 2006 ex-vessel prices, this is equivalent to gross revenues of $4,702,031 (assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight) (Table 4.9). However, under alternative 3, the available sandbar and non-sandbar LCS quota would be spread over directed and incidental permit holders. Based on past effort, it was assumed 1,108 trips could be made by directed permit holders (Table 4.14). This is 78 percent of the total expected fishing effort (Table 4.14). Therefore, given 105.9 mt dw (233,467 lb dw) of the sandbar quota and 229.2 mt dw (505,294 lb dw) of the non-sandbar LCS quota that could be landed under alternative suite 3, approximately 83 mt dw (183,073 lb dw) of sandbar quota and 180 mt dw (396,225 lb dw) of the non-sandbar LCS quota are anticipated to be landed by directed permit holders (Table 4.14). Based on 2006 ex-vessel prices, this is equivalent to $1,015,162 gross revenues for directed permit holders. These gross revenues indicate a 78 percent overall reduction compared to 2003 to 2005 (gross revenues based on current directed permit holders' landings were $4,702,031; Table 4.9). Again, since the states of Florida, New Jersey, and North Carolina have the most directed permit holders, NMFS anticipates that these states would experience the largest negative socioeconomic impacts under alternative suite 3 (Table 3.32).

As stated in alternative 2, the status quo revenue was based on a 4,000 lb dw LCS trip limit for directed shark permit holders with average South Atlantic trips at $4,743 per trip and average Gulf of Mexico trips at $5,853 per trip (Table 4.11). Under alternative suite 3, the retention limits would be 4 sandbars per trip and 10 non-sandbar LCS per trip. However, since the ratio of sandbars to non-sandbar LCS caught in the Gulf of Mexico is 1:4, NMFS estimates that approximately 3 sandbar sharks would be caught in the Gulf of Mexico region when the 10 non-sandbar LCS retention limit/trip is filled (10 non-sandbar LCS / 4 = 2.5 sandbar sharks). Therefore, gross revenues on a trip basis are estimated to be $610 per trip in the South Atlantic and $670 per trip in the Gulf of Mexico (Table 4.15). From 2003 to 2005, there were 128 vessels that averaged more than 163 lb dw (or 4 sandbar sharks) of sandbar/trip (Figure A.3). Therefore, these vessels would be most negatively affected by retention limits under alternative suite 3.

On average, incidental permit holders landed 12,994 lb dw of sandbar sharks and 46,333 lb dw of non-sandbar LCS based on Federal and state shark dealer reports and logbook data. In 2006 ex-vessel prices, this is equivalent to gross revenues of $106,491 (assuming 5 percent of the landings are fins and 95 percent of the landings are carcass weight) (Table 4.9). The available sandbar and non-sandbar LCS quotas would be averaged over directed and incidental permit holders under alternative suite 3. Based on past effort, it was assumed 305 trips could be made by incidental permit holders (Table 4.14). This is 22 percent of the expected fishing effort (Table 4.14). Therefore, given the 105.9 mt dw (233,467 lb dw) of the sandbar quota and 229.2 mt dw (505,294 lb dw) of the non-sandbar LCS quota that could be landed under alternative suite 3, approximately 23 mt dw (50,395 lb dw) of sandbar quota and 50 mt dw (109,069 lb dw) of the non-sandbar LCS quota are anticipated to be landed by incidental permit holders (Table 4.14).

Based on 2006 ex-vessel prices, this is equivalent to $279,441 gross revenues for incidental permit holders (Table 4.14). This would result in gross revenues that are 2.7 times higher compared to 2003 to 2005 (gross revenues based on current incidental permit holders' landings were $106,491; Table 4.9).

This increase in gross revenues is due to the increase in retention limits for incidental permit holders. Under the status quo, incidental permit holders can retain 5 sharks from the LCS complex. However, under alternative suite 3, incidental permit holders would be able to retain 4 sandbars and 10 non-sandbar LCS or 14 LCS total. This retention limit is almost 3 times higher than what is currently allowed under the status quo. On average, incidental permit holders have been landing 2 sandbar sharks and 3 non-sandbar LCS per trip. Based on 2006 ex-vessel prices, this is equivalent to $307 per trip (Table 4.11). However, under alternative suite 3, incidental permit holders would make equivalent gross revenues per trip as directed permit holders: $610 per trip in the South Atlantic and $670 per trip in the Gulf of Mexico (Table 4.15). This would result in gross revenues for incidental permit holders that are 2 to 3 times higher than gross revenues in 2003 to 2005 depending on future fishing effort and catch composition. Therefore, there would be positive economic impacts for incidental permit holders under alternative suite 3. Since approximately 66 vessels with incidental permit holders landed sandbar sharks or non-sandbar LCS in 2003 to 2005 in the Coastal Fisheries and HMS Logbooks, these 66 vessels would have the largest economic benefits under alternative suite 3. However, if sharks become profitable for incidental permit holders under alternative suite 3, then more vessels with incidental permits may actively land sandbars and non-sandbar LCS in the future. Finally, the states of Florida, Louisiana, New Jersey, and North Carolina had the most incidental shark permit holders in 2007 (Table 3.32). Therefore, these states would see the largest socioeconomic benefits for incidental permit holders under alternative suite 3.

The other provisions of alternative suite 3 are the same as alternative suite 4, which is the preferred alternative for this proposed rule. These provisions include maintaining the 60 mt shark display and research quote; placement of porbeagle sharks on the prohibited list; quota carryover limited to 50 percent of base quota for species not overfished; no carryover for overfished, overfishing or unknown species; sharks fins must remain on the shark; dealer reports received within 10 days of purchase; removal of regions and seasons; and limiting the shark species that can be landed recreationally.

This alternative suite was not selected as the preferred alternative primarily based on the economic impacts and because it does not meet the ecological objectives of this rule. Despite the time/area closures, alternative suite 3 would have a smaller reduction in dead discards of dusky sharks compared to alternative suite 2 since sandbar sharks would be allowed to be retained on PLL gear under alternative suite 3.

Negative economic impacts under alternative suite 3 are expected for directed permit holders (78-percent reduction in gross revenues compared to the status quo) as a result of the four sandbar per vessel per trip retention limits. Given the retention limits for sandbar and non-sandbar LCS are significantly lower than the limit under the status

quo (91 and 69-percent reduction in sandbar and non-sandbar LCS retention limits, respectively for directed permit holders), it is anticipated that there would be no directed shark fishery as a result of alternative suite 3. While an observer program would still operate under alternative suite 3, without a directed shark fishery, it is anticipated that the fishery dependent data collection would be limited, which could compromise data collection for future stock assessments. Alternative suite 4 would likely accomplish the necessary reductions in quota, retention limits, and fishing effort to prevent overfishing and allow stocks to rebuild while collecting valuable scientific data for the Agency. Therefore, due to concerns over dusky discards, quota monitoring, and data collection, NMFS is not preferring alternative suite 3 at this time.

8.5.4 Alternative Suite 4

Alternative suite 4, the preferred alternative, would establish a program where vessels with directed or incidental shark permits could participate in a small research fishery for sandbar sharks that would harvest the entire 116.6 mt dw sandbar quota. There would be 100 percent observer coverage on each research vessel, and only vessels participating in this program could land sandbar sharks. Vessels not participating in the research program could land non-sandbar LCS, SCS, and pelagic sharks.

Alternative suite 4 was selected as the preferred alternative because it meets the objectives of this proposed rule while minimizing some of the economic impacts. Those objectives include: implement rebuilding plans for sandbar, dusky, and porbeagle sharks; provide an opportunity for the sustainable harvest of blacktip sharks and other sharks, as appropriate; prevent overfishing of Atlantic sharks; analyze bottom longline time/area closures and take necessary action, as appropriate; and improve, to the extent practicable, data collections or data collection programs. As detailed in the economic analysis in chapters 4 and 6, it is estimated that vessel in the shark research fishery could make $437,963 in gross revenues of sandbar and non-sandbar LCS landings under the adjusted quota. Since 5 to 10 vessels are anticipated to participate in the research fishery, NMFS estimates that an individual vessel could make between $87,593 (*i.e.*, 5 boats) to $43,796 (*i.e.*, 10 boats) in gross revenues on sandbar shark and non-sandbar LCS landings. However, the vessels operating outside of the research fishery would have an adjusted regional non-sandbar LCS base quota of 187.8 mt dw in the Atlantic region and 390.5 mt dw in the Gulf of Mexico region. In 2006 ex-vessel prices, this is equivalent to $516,285 in the Atlantic region and $1,273,269 in gross revenues in the Gulf of Mexico region. Divided by the remaining vessels it is estimated that the average gross revenues from shark per vessel would be just over $2,000 per trip.

In addition, under the preferred alternative suite 4, porbeagle sharks would be authorized in recreational and commercial fisheries, but under a reduced TAC of 11.3 mt dw. Of the TAC, 1.7 mt dw would be available for harvest in commercial fisheries. Currently the commercial quota for porbeagle sharks is 92 mt dw per year, however, this commercial quota has never been met. NMFS set new TAC and commercial quotas for porbeagle sharks based on present effort levels. Based on quota monitoring (which includes vessel trip reports) from 2003 to 2006, on average, 3,867 lb dw of porbeagle sharks were landed per year. Based on 2006 ex-vessel prices, this is equivalent to a

$7,378 gross revenues. Since commercial fishermen would be allowed to continue to land porbeagle sharks at this level, there are no anticipated economic impacts of implementing the TAC. In addition, recreational anglers would still be allowed to land porbeagle sharks. Therefore, there are no negative economic impacts for recreational fishermen associated with the TAC.

In the no action alternative, it was estimated that if gross revenues for directed and incidental permit holders is averaged across the approximately 296 active directed and incidental shark permit holders, then the average annual gross revenues per shark fishing vessel is just over $20,000. Using the average landing for directed permit holder from 2003 to 2005, it is estimated that the 143 active directed permit holders generated average annual gross shark revenues of just under $33,000 from sharks. Under alternative 2, the reduced gross revenues averaged across the 143 active directed permit holders are estimated to be just over $9,000 per directed shark fishing vessel and just $1,221 per vessel per year for incidental permit holders that land sharks. Under alternative 3 this is reduced further to approximately $7,000 ($1,015,162 gross revenues/143 vessel) per directed shark fishing vessel per year.

Comparing these revenues to those in alternative 4 indicates that the preferred alternative maintains the annual gross revenues per vessel for vessels operating in the research fishery, while allowing other vessels outside of the research fishery to generate revenues at reduced levels. Alternative suite 4 has less economic impact on shark fishermen than alternative 5, but has greater impacts in the short-run than the status quo alternative. By allowing a limited number of historical participants to continue to harvest sharks under the research fishery, the Agency ensures that data for stock assessments and life history samples would continue to be collected. Alternative suite 4 also has a lower reporting burden for dealers than alternative suite 2. Alternative suite 4 is the alternative that best meets the objectives of this rule while minimizing the economic impacts to shark permit holders.

8.5.5 Alternative Suite 5

Alternative Suite 5 would have significant economic and social impacts on a variety of small entities, including: commercial shark permit holders, shark dealers, gear manufacturers, bait and ice suppliers, and other secondary industries dependent on the shark fishery. The level of economic impact would be directly proportional to the amount of revenues that each entity has realized from past participation in the shark fishery. Permit holders would be impacted differently depending on the quantity of sharks landed in the past. Vessels targeting sharks (directed permit holders) landed an annual average of 1,263 mt dw of LCS, 223 mt dw SCS, and 173 mt dw pelagic sharks per year between 2003 to 2005 based on shark dealer landings and effort data from the Coastal Fisheries and HMS logbooks. The gross revenues based on 2006 ex-vessel prices of these landings are estimated at $4,702,031, $681,880, and $764,512 for LCS, SCS, and pelagic sharks, respectively, based on price information provided in Table 3.42. While it is assumed that few directed shark permit holders subsist entirely on revenues attained from the shark fishery, impacts would still be severe for those participants that depend on any income from participating in the directed shark fishery at certain times of the year.

Because of the extensive economic impacts to shark directed permit holders as a result of this alternative suite, it is assumed that directed permit holders would likely pursue one of the following options as a result of closing the Atlantic shark fishery: (1) transfer fishing effort to other fisheries for which they are already permitted (snapper grouper, king and Spanish mackerel, tilefish, lobster, dolphin/wahoo, *etc*.), (2) acquire the necessary permits to participate in other fisheries (both open access and/or limited access fisheries), or (3) relinquish all permits and leave the fishing industry. Table 3.32 displays the other permits held by directed shark permit holders as of May 2007.

Incidental permit holders would face negative economic and social impacts as a result of closing the Atlantic shark fishery; however, these impacts would not be as severe as those experienced by directed permit holders. It is assumed that incidental permit holders receive the majority of their fishing income from participating in other fisheries depending on the region and the type of gear predominantly fished (*i.e*., swordfish, tunas, snapper grouper, tilefish, dolphin/wahoo, lobster, *etc*.). NMFS estimates that, on average, between 2003 to 2005 incidental permit holders landed 26.9 mt dw LCS, 17.3 mt dw SCS, and 45.5 mt dw pelagics per year based on shark dealer landings and effort data from the Coastal Fisheries and HMS logbooks. This equates in gross revenues based on 2006 ex-vessel prices for these landings of $106,491, $52,882, and $201,061 for the respective species complexes. Incidental permit holders would likely have to increase effort in these other fisheries to replace lost revenues from landing sharks. Furthermore, these vessels may seek other permits (open access or limited access transferred from another vessel) or leave the fishing industry entirely.

This alternative suite could also have negative economic and social impacts for shark dealers as they would no longer be authorized to purchase shark products from Federally permitted shark fishermen. Shark dealers also maintain permits to purchase other regionally caught fish products. Due to the brevity of the LCS shark fishing season, which is the shark fishery that accounts for the majority of the shark product revenue due to the fin value, many dealers also get revenue from purchasing fish products other than sharks. The majority of shark dealer permit holders hold permits to purchase other fish products, including swordfish, tunas, snapper grouper, tilefish, mackerel, lobster, and dolphin/wahoo among others. It is difficult to assume, on an individual dealer basis, the quantity of revenues received exclusively from shark products.

Shark fin dealers, specializing in the purchase of shark fins from Federal and state permitted dealers, would also experience negative social and economic impacts as a result of closing the shark fishery. These dealers receive virtually all of their income from purchasing shark fins and shipping them to exporters. Exporters then transport the fins to global and domestic markets. This alternative suite would likely force shark fin dealers to leave the industry or focus on purchasing other fishery products, resulting in significant economic impacts to the individuals involved in this trade.

It is difficult to estimate the economic and social impacts that would be experienced by various small entities that support the shark fishery, *e.g*., purveyors of bait, ice, fishing gear, and fishing gear manufactures. However, these impacts would

likely be negative. It is difficult to estimate these impacts as it is uncertain to what extent vessels that were fishing for sharks would redistribute their fishing effort to other fisheries, or simply cease fishing operations. If the majority of vessels affected by a shark fishery closure simply displace effort to other fisheries, it is assumed that they would still be dependant on small entities for their bait, ice, and gear as these are products essential for fishing excursions targeting any species. Redistributing effort to other fisheries would mitigate negative economic impacts. However, if a significant number of vessels simply cease fishing operations or scale back considerably, then severe economic consequences would be imparted on these support industries as a result.

This alternative suite would increase the proportion of fishermen completing the Coastal Fisheries Logbook who are then selected to report information on fish that are discarded. Currently, 20 percent of the fishermen completing this logbook are selected. This percentage would be increased to facilitate improved data available for shark interactions with longline and gillnet gear. This information would be especially useful because sharks could no longer be landed and the existing logbook only requires fishermen to provide data on landed fish. Increasing the number of fishermen who are selected to provide this data would result in negative economic and social impacts because it would require additional paperwork to be filled out. Increased reporting burden would be subject to approval under the Paperwork Reduction Act. Vessels would no longer be required to take an observer. Shark dealers would no longer be required to submit dealer reports regarding sharks purchased.

Seasons and regions for the commercial Atlantic shark fishery would no longer apply as this alternative suite would close the fishery.

Closing the Atlantic recreational shark fishery would have negative economic and social impacts. These impacts would be most pronounced for Charter/Headboat operators who specialize in landing sharks and operators of shark tournaments that have prize categories for landing sharks. It is difficult to estimate the number of Charter/Headboat operators that specialize in shark charters as the permit covers any participant targeting swordfish, sharks, tunas, and billfish. Many Charter/Headboat operators target a variety of species depending on client interests, weather, time of year, and oceanographic conditions. Charter/Headboat operators specializing in shark fishing charters would have to target other HMS or non HMS species to replace revenues lost as a result of customers not being able to land sharks. However, not all customers necessarily want to land sharks. Charter/Headboat operators would still be able to catch sharks, however, all sharks regardless of species would need to be released in a manner that maximizes their chances of survival. Catering business operations to clientele interested in catch and release fishing for sharks might mitigate some of the negative economic impacts. Shark tournaments that reward prizes for landing sharks would be negatively impacted as a result of this alternative suite. In 2007, there were 59 tournaments with prize categories for pelagic sharks and 42 (combined) tournaments for LCS and SCS. The majority of these tournaments target pelagic sharks and are held in the North Atlantic and Gulf of Mexico regions. These tournaments would either modify their rules to only allow points/prizes for released sharks or these tournaments would

cease to exist. Economic impacts on small entities such as restaurants, hotels, gear manufacturers, retail stores selling fishing supplies, and marinas in the vicinity of where these tournaments are held would also experience negative economic impacts.

HMS Angling permit holders would also experience negative impacts, despite the fact that they would still be able to catch and release sharks. Landings would not be permitted by any recreational anglers as a result of this alternative suite.

Closing the Atlantic shark fishery would have negative economic impacts on global shark fin markets. As a result of this alternative suite, U.S. flagged vessels would no longer be able to contribute to the global demand for shark fins. This would disadvantage U.S. shark fishermen as global markets would likely need to purchase their shark fins from other markets. However, the United States is not a significant producer of shark products globally. Based on data from the United Nations Food and Agriculture Organization (FAO), less than one percent of global shark landings occur in the U.S. Atlantic Ocean.

While alternative suite 5 would meet the objectives of this rule, it would have the highest negative economic impacts of the alternatives considered. There would be significant reductions in revenues for shark dealers and fishing vessels involved with the shark fishery. Some small businesses dependent on commercial shark fishing may cease operating as a result of prohibiting the commercial harvest of shark species. Therefore, this alternative was not selected.

CHAPTER 9 TABLE OF CONTENTS

9.0 COMMUNITY PROFILES

9.1 Introduction

The Magnuson-Stevens Fishery Conservation and Conservation Act (Magnuson-Stevens Act) requires, among other things, that all Fishery Management Plans (FMPs) include a fishery impact statement intended to assess, specify, and describe the likely effects of the measures on fishermen and fishing communities (§303(a)(9)).

The National Environmental Policy Act (NEPA) also requires federal agencies to consider the interactions of natural and human environments by using a "systematic, interdisciplinary approach which will ensure the integrated use of the natural and social sciences...in planning and decision-making" (§102(2)(A)). Moreover, agencies need to address the aesthetic, historic, cultural, economic, social, or health effects, which may be direct, indirect, or cumulative. Consideration of social impacts is a growing concern as fisheries experience increased participation and/or declines in stocks. The consequences of management actions need to be examined to better ascertain and, if necessary and possible, mitigate regulatory impacts on affected constituents.

Social impacts are generally the consequences to human populations resulting from some type of public or private action. Those consequences may include alterations to the ways in which people live, work or play, relate to one another, and organize to meet their needs. In addition, cultural impacts, which may involve changes in values and beliefs that affect people's way of identifying themselves within their occupation, communities, and society in general are included under this interpretation. Social impact analyses help determine the consequences of policy action in advance by comparing the status quo with the projected impacts. Community profiles are an initial step in the social impact assessment process. Although public hearings and scoping meetings provide input from those concerned with a particular action, they do not constitute a full overview of the fishery.

The Magnuson-Stevens Act outlines a set of National Standards (NS) that apply to all fishery management plans and the implementation of regulations. Specifically, NS 8 notes that:

> "Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to: (1) provide for the sustained participation of such communities; and, (2) to the extent practicable, minimize adverse economic impacts on such communities." (§301(a)(8)). See also 50 CFR §600.345 for NS 8 Guidelines.

"Sustained participation" is defined to mean continued access to the fishery within the constraints of the condition of the resource (50 CFR §600.345(b)(4)). It should be clearly noted that NS 8 "does not constitute a basis for allocation of resources to a specific fishing community nor for providing preferential treatment based on residence in a fishing community" (50 CFR §600.345(b)(2). The Magnuson-Stevens Act further defines a "fishing community" as:

" ...a community that is substantially dependent upon or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, crew, and fish processors that are based in such communities." (§3(16))

NMFS (2001) guidelines for social impact assessments specify that the following elements are utilized in the development of FMPs and FMP amendments:

1. The size and demographic characteristics of the fishery-related work force residing in the area; these determine demographic, income, and employment effects in relation to the work force as a whole, by community and region.

2. The cultural issues of attitudes, beliefs, and values of fishermen, fishery-related workers, other stakeholders, and their communities.

3. The effects of proposed actions on social structure and organization; that is, on the ability to provide necessary social support and services to families and communities.

4. The non-economic social aspects of the proposed action or policy; these include life-style issues, health and safety issues, and the non-consumptive and recreational use of living marine resources and their habitats.

5. The historical dependence on and participation in the fishery by fishermen and communities, reflected in the structure of fishing practices, income distribution and rights.

9.2 Methodology

9.2.1 Previous community profiles and assessments

The 2006 Consolidated HMS FMP used information from the Wilson *et al*. (1998) study for the 1999 FMP for Atlantic Tunas, Swordfish and Sharks that investigated the social and cultural characteristics of fishing communities in five states and one U.S. territory: Massachusetts, New Jersey, North Carolina, Florida, Louisiana, and Puerto Rico. These areas were selected because they each had important fishing communities that could be affected by the 1999 FMP and Atlantic Billfish Amendment, and because they are fairly evenly spread along the Atlantic and Gulf coasts and the Caribbean. In addition, the 2006 Consolidated HMS FMP used information gathered under the contract with the Virginia Institute of Marine Science (VIMS) at the College of William and Mary to re-evaluate several of the baseline communities (Kirkley, 2005). The VIMS study gathered a profile of basic sociological information for the principal states involved with the Atlantic shark fishery. From the 255 communities identified as involved in the 2001 commercial fishery, Amendment 1 to the 1999 FMP for Atlantic Tunas, Swordfish and Sharks focused on specific towns based on shark landings data, the size of the shark fishing fleet, the relationship between the geographic communities and the fishing fleets, and the existence of other community studies. While the recreational fishery is an important component in the shark fishery, participation and landings were not documented in a manner that allowed community identification. Wilson, *et al*. (1998) selected only the recreational fisheries found

within the commercial fishing communities for a profile due to the lack of community-based data for the sport fishery. A detailed description of additional information used in the community profiles analysis can be found in Section 9.2.2 of the Consolidated HMS FMP. In addition to the community profile information found in the Consolidated HMS FMP, a recent report was completed by MRAG Americas, Inc. and Jepson (2008) titled Updated Profiles for HMS Dependent Fishing Communities. This report is included in Appendix E of this document. This report includes updated community profiles and new social impacts assessments for HMS fishing communities along the Atlantic and Gulf of Mexico coasts. Several other chapters in this document include information that addresses the requirements described in section 9.1. Please refer to the Description of the Affected Environment in Chapter 3, Environmental Justice analysis in Chapter 4, the Economic Evaluation in Chapter 6, the Regulatory Impact Review (RIR) in Chapter 7, and the Final Regulatory Flexibility Analysis (FRFA) in Chapter 8. Furthermore, each of the management alternative suites in Chapter 4 includes an assessment of the potential social and economic impacts associated with the proposed alternatives. The preferred alternative suite was selected to minimize economic impacts and provide for the sustained participation of fishing communities, while taking the necessary actions to rebuild overfished fisheries as required by the Magnuson-Stevens Act.

9.3 Overview of the Shark Fishery

The shark fisheries of the Atlantic and Gulf of Mexico extend from Maine to Texas, and include Puerto Rico and the U.S. Virgin Islands. The geographic extent of the shark directed and incidental commercial permit holders is large, but is currently concentrated in the waters off four states; Florida (51 percent of shark permits), New Jersey (10 percent of shark permits), Louisiana (7 percent of shark permits), and North Carolina (6 percent of shark permits). The shark fishery is notable for the degree of flexibility of the commercial fishing fleet. Of the 527 vessels in the 2007 fleet, 231 vessels (44 percent) held directed shark fishery permits. The remaining 56 percent (296 vessels) held incidental catch permits that target species other than sharks. Vessels which engage in the directed shark fishery do so on a seasonal basis, depending on area and the length of the fishing season, and fish for other species at other times of the year.

Shark directed and incidental permit holders also possess permits in other HMS and non-HMS fisheries (Table 3.32). Currently, there are 269 Federally permitted shark dealers, the majority of which are located in Florida (38 percent). Table 3.34 shows the number of shark dealers permitted in each state in 2007. Dealers that possess shark permits also hold dealer permits for other species such as swordfish, dolphin/wahoo, reef fish and snapper/grouper. The additional permits that the commercial shark fishermen and dealers possess may help mitigate economic and social impacts of the preferred management measures.

9.4 State and Community Profiles

The 2006 Consolidated HMS FMP provides a thorough analysis, by state, of HMS fisheries including the shark fishery for in the Atlantic and Gulf of Mexico states and will not be duplicated here. The MRAG Americas, Inc. and Jepson (2008) report, Updated Profiles for HMS Dependent Fisheries, can be found in Appendix E of this document and provides social impact analysis by state of HMS dependent fishing communities.

Chapter 9 References

Kirkley, J.E. 2005. The communities of the Atlantic Highly Migratory Species (HMS) Fishery: An overview of change associated with the HMS Fishery Management Plan. Department of Coastal and Ocean Policy, School of Marine Science, Virginia Institute of Marine Science, College of William and Mary, Gloucester Point, Virginia (NOAA-NMFS-HMS contract report).

MRAG, Americas, Inc., and M. Jepson. 2008. Updated Profiles for HMS Dependant Fishing Communities: Social Impact Assessment Services for HMS Fishing Communities. Solicitation Number: DG133F06RQ0381, 84, pp.

NMFS. 2001. NMFS Operational Guidelines – Fishery Management Process: Appendix 2(g)**:** Guidelines for Assessment of the Social Impact of Fishery Management Actions. Silver Spring, MD: U.S. Department of Commerce, National Marine Fisheries Service.

Wilson, D., B.J. McCay, D. Estler, M. Perez-Lugo, J. LaMargue, S. Seminski, and A. Tomczuk. 1998. Social and Cultural Impact Assessment of the Highly Migratory Species Fishery Management Plan and the Amendment to the Atlantic Billfish Fisheries Management Plan. The Ecopolicy Center for Agriculture, Environmental, and Resource Issues, New Jersey Agricultural Experiment Station, Cook College, Rutgers, the State University of New Jersey (NOAA-NMFS-HMS contract report).

CHAPTER 10 TABLE OF CONTENTS

10.0 OTHER CONSIDERATIONS

10.1 National Standards

The analyses in this document are consistent with the National Standard (NS) guidelines set forth in the 50 CFR part 600 regulations. The following descriptions are a summary of how the preferred alternatives are consistent. More information can be found in earlier chapters.

NS 1 requires the National Marine Fisheries Service (NMFS) to prevent overfishing while achieving, on a continuing basis, the Optimum Yield (OY) from each fishery for the U.S. fishing industry. As summarized in other chapters, over the past several years, NMFS has undertaken numerous management actions, including the 1999 FMP, Amendment 1 to the 1999 FMP, and Amendment 1 to the Billfish FMP, to address overfishing and to rebuild HMS stocks. The preferred alternative suite in this Final Environmental Impact Statement (EIS) is consistent with ongoing management efforts to rebuild, manage, and conserve target species and with the NS 1 guidelines.

- The preferred alternative suite is consistent with NS1 because it implements the recommended quotas and retention limits that will greatly reduce fishing effort to allow overfished shark stocks to rebuild, stop overfishing, and provide the opportunity for the sustainable harvest of shark stocks that are healthy and not currently overfished.
- The time/area closure measures in the preferred alternative suite maintains the current closures as well as adds new closures to backstop measures being proposed by the South Atlantic Fishery Management Council. This is consistent with NS 1 because these time/area closures will support efforts aimed at achieving OY for sharks while helping to prevent overfishing of target and non-target species.
- In addition to maintaining the current reporting measures, the preferred alternative suite includes 100 percent observer coverage for those who participate in the shark research fishery. Maintaining the current dealer and logbook reporting as well as increasing observer coverage would greatly increase NMFS' ability to monitor landings, bycatch and interactions with protected resources, thereby helping to prevent overfishing and maintain consistency with the Standardized Bycatch Reporting Methodology.
- Under the preferred alternative suite, the seasons for sandbar sharks and non-sandbar large coastal sharks (LCS) would open on January 1 and would close within five days notice of each quota being 80 percent filled. This management measure is consistent with NS 1 because it assists NMFS in preventing further overfishing of overfished shark stocks.
- The preferred recreational management measures would only allow HMS recreational anglers to possess easily identifiable shark species that are less likely to be confused with dusky or sandbar sharks. This management measure is consistent with NS 1 because it helps to prevent overfishing of currently overfished shark stocks while still allowing possession of certain shark species in the recreational fishing sector.

NS 2 requires that conservation and management measures be based on the best scientific information available. The preferred alternatives in this Final EIS are consistent with NS 2

guidelines.

- The preferred alternative suite is consistent with NS 2 because the analyses of the management measures in the preferred alternatives are based on the 2005/2006 LCS stock assessment, the 2006 dusky stock assessment, the 2005 Canadian porbeagle stock assessment, as well as up-to-date logbook and observer data which constitute the best available scientific information.
- One of the goals of the preferred alternative suite and the development of the shark research fishery is to maximize scientific data acquisition by continuing a limited shark research fishery for sandbar sharks with 100 percent observer coverage which should ensure the best scientific information is maintained.
- Changing the stock assessment frequency from every 2-3 years to at least every five years would continue to ensure that stock assessments are conducted using the best scientific information available. Currently, the frequency of stock assessments makes it difficult to discern whether or not management measures that are implemented as a result of past stock assessments have been effective prior to subsequent assessments. This makes it difficult to ascertain the impacts that management measures from the prior assessment may be having on the stock. Further, the Agency has adopted the Southeast Data and Review (SEDAR) process for completing stock assessments, which includes three separate workshops, and generally requires more time to complete a stock assessment than past stock assessment methods. For example, the most recent stock assessment for LCS was started in 2005 and completed in 2006, employing fisheries data through 2004. Management measures based on this assessment will be implemented in 2008. However, based on existing stock assessment frequency guidelines, the next scheduled assessment will occur 2009, allowing only one year of management measures based on the 2005-2006 assessment. Thus, results from a 2009 stock assessment may not be representative of the effectiveness of management measures in the past. A 2009 stock assessment may provide the most up-to-date stock data, yet this assessment may not be representative of the best available science. By changing the stock assessment frequency to at least every five years, current management measures would have more time to take effect and this may increase the likelihood that the results management measures would be detected in the following stock assessment.

NS 3 requires that, to the extent practicable, an individual stock of fish be managed as a unit throughout its range, and interrelated stocks of fish be managed as a unit or in close coordination. The preferred alternative suite in this Final EIS is consistent with this NS.

- The preferred alternative suite would to remove sandbar sharks from the LCS complex. The 2005/2006 LCS assessment assessed sandbars separately and recommended a sandbar specific total allowable catch (TAC) of 158.3 mt dw. Based on this recommendation, NMFS would remove sandbar sharks from the LCS complex. This allows sandbars to be managed separately and gives NMFS the ability to track this separate quota more efficiently, which is critical given the overfished and overfishing status of sandbar sharks.

- The 2005/2006 LCS assessment assessed blacktip sharks as having two separate stocks in

the Atlantic and Gulf of Mexico. This delineation was based on tag and recapture data, which indicated a lack of mixing between these populations. The status of blacktip sharks in the Gulf of Mexico was found to be healthy, while their status in the Atlantic was unknown. The assessment recommended that landings in the Gulf of Mexico should not be increased, and recommended that landings in Atlantic remain the same. The Agency is maintaining consistency with stock assessment recommendations by basing the quota for non-sandbar LCS (including blacktips) on average landings reported by Federal and state shark dealers from 2003 to 2005. As such, fishing effort and subsequent landings would not be increased in either region for blacktip sharks. Furthermore, the Agency would manage blacktip sharks as a unit throughout their range which is consistent with NS 3.

NS 4 requires that conservation and management measures do not discriminate between residents of different states. Furthermore, if it becomes necessary to allocate or assign fishing privileges among various U.S. fishermen, such allocation should be fair and equitable to all fishermen; be reasonably calculated to promote conservation; and, should be carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges. The preferred alternative suite in this Final EIS is consistent with this NS.

- The preferred alternative suite and the shark research fishery apply to residents of all states. This alternative would establish a program where vessels with directed shark permits could participate in a research fishery for sandbar sharks. Only vessels participating in this program could land sandbar sharks. Participation in this fishery would be subject to vessels meeting specific criteria designed to meet research objectives while allowing fishermen to earn revenue from selling sharks. These criteria may include, but are not limited to: possession of a commercial shark permit, past involvement in the HMS observer programs, seasonal flexibility with regard to trips targeting sandbar sharks, willingness to take an observer on 100 percent of fishing trips and collect biological samples from landed and released sharks, and past involvement in the Atlantic shark fishery. Vessels not participating in the research program would still be able to land non-sandbar LCS, SCS, and pelagic sharks subject to the respective retention limits. The preferred alternative suite is consistent with NS 4 because current permit holders could apply to participate in the shark research fishery, and shark fishermen not participating in the shark research fishery could still land other shark species in the non-sandbar LCS, SCS and pelagic shark species groups subject to the same regulations. The selection criteria for the shark research fishery would be announced in the Federal Register each year and NMFS would select participants consistent with the research objectives, and the selection criteria.
- While maintaining the mid-Atlantic shark closed area may disadvantage shark fishermen living in adjacent areas because they would have to travel to an open area, it is not a direct allocation of fishing privileges nor does it discriminate between residents of different states. The closure is applicable to individuals from any state. Furthermore, maintaining this closure is warranted under NS4 as a conservation measure to reduce bycatch of neonate and juvenile dusky and sandbar sharks in a known nursery area with no discriminatory intent. Both of these species are overfished and experiencing overfishing, so maintaining this closed area is warranted in light of recent stock assessments.
- Adding new time-area closures consistent with the closures preferred in the South Atlantic Fishery Management Council's (SAFMC) Amendment 14 will ensure that regulations

pertaining to participants fishing with bottom longline gear are consistent between the snapper/grouper and shark fisheries.

- Quotas and retention limits for non-sandbar LCS are based on average effort reported in Coastal Fisheries and HMS Logbooks between 2003 to 2005 and average landings reported in Federal and state shark dealer reports from 2003 to 2005. These landings include trips and landings made by vessels in all regions. Thus, past effort from all regions has been accounted for when NMFS established quotas and retention limits. Removing the regions is not expected to discriminate against participants in the North Atlantic region since fishermen from the North Atlantic region would still have the opportunity to travel to areas where there are more sharks present during the winter months, consistent with how the fishery is currently managed. However, if North Atlantic fishermen traveled to other areas they could incur increased costs. In addition, fishermen in the North Atlantic would be able to land their sharks in any region, since all regions would open and close on the same time schedule. Reduced retention limits for all participants are expected to result in seasons that stay open throughout the year, resulting in fishing opportunities for participants in the North Atlantic region in the summer months when sharks migrate north.
- The authorized recreational species list has been modified from the originally proposed list in the Draft Environmental Impact Statement (DEIS). This amended list more closely aligns with the authorized species in the commercial fishery. NMFS would continue to prohibit sandbar and silky sharks in the recreational fishery due to concerns of misidentification with dusky sharks and because of the overfished status of sandbar sharks. However, most of the commercial shark fishing sector would not be able to retain sandbar sharks unless fishermen are participating in the shark research fishery.

NS 5 requires that conservation and management measures should, where practicable, consider efficiency in the utilization of fishery resources with the exception that no such measure shall have economic allocation as its sole purpose. The preferred alternative suite in this Final EIS is consistent with this NS.

- The preferred alternative suite would not impact the efficiency in the utilization of the fishery resource. The purpose of the shark research fishery in the preferred alternative suite is to implement quotas and retention limits necessary to allow rebuilding and prevent overfishing of shark species while maximizing scientific data acquisition by continuing a limited research fishery for sandbar sharks. By allowing a limited number of historical participants to continue to land sandbar and other species of sharks in a manner resembling how the fishery has traditionally been executed, NMFS can ensure that data for stock assessments and life history samples continue to be collected while allowing a small pool of individuals to continue to collect revenue from sharks.
- NMFS considered shark catch efficiency when calculating retention limits for non-sandbar LCS in the preferred alternative suite by using catch ratios of sandbar to non-sandbar LCS in the Gulf of Mexico and South Atlantic regions.
- NMFS considered the efficiency of the rod and reel recreational fishery because participants can practice catch and release of sharks therefore minimizing mortality of overfished species such as sandbar and dusky sharks.
- Implementing the Marine Protected Areas preferred by the SAFMC is not expected to affect efficiency in the utilization of fishery resources due to the low levels of shark fishing

effort that has occurred in these small areas in the past. Furthermore, enforcement problems could result if fishermen, who use the same to gear, have different regulations apply depending on whether they were targeting sharks or participating in Council-managed fisheries.

NS 6 states that conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches. The preferred alternative suite for this Final EIS is consistent with this NS.

- The preferred alternative suite for the management of the shark fishing season allows NMFS to account for variations in the fishery and catches because NMFS would close the sandbar and non-sandbar LCS shark fisheries individually within five days when the respective quota is at 80 percent, thus helping to prevent overfishing.
- The preferred alternative suite would allow vessels in the shark research program to fish under existing trip limits with 100 percent observer coverage, however NMFS would maintain some control over when these trips take place to ensure continuity of the program throughout the year and to encompass regional and seasonal variability among biological samples collected.
- NMFS also provides framework methods, which allows the Agency to change quotas based on over and under harvests, retention limits, and trip limits depending on how the fishery operates as a result of changes and by considering all the different variations between fisheries and regions.
- Modifying the assessment frequency from 2-3 years to at least every five years would still provide NMFS the flexibility to incorporate additional stock assessment methodologies or data while balancing the need to discern whether past management measures have been effective at achieving rebuilding target thresholds and preventing overfishing.

NS 7 states that conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication. The preferred alternative suite in this Final EIS is consistent with this NS.

- The costs associated with the preferred alternative suite are minimal as there would be no fee to participate in the shark research fishery. When analyzing the ecological and socioeconomic benefits in Chapter 4, NMFS determined that the preferred alternatives maximizes scientific data acquisition while mitigating significant economic impacts that are necessary to reduce fishing mortality and effort as recommended by the recent stock assessments. The severity of the negative economic impacts are minimized in the preferred alternatives compared to alternative suites 2, 3, and 5 since the preferred alternatives allow a small pool of individuals to continue to collect revenue from sharks. The preferred alternative suite would also avoid unnecessary duplication because reporting requirements will not change significantly.

NS 8 states that conservation and management measures shall, consistent with the conservation requirements of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to

provide for the sustained participation of such communities, and to the extent practicable, minimize adverse economic impacts on such communities. The preferred alternative suite for this Final EIS is consistent with this NS.

- The preferred alternative suite implements quotas and retention limits necessary to allow rebuilding and prevent overfishing of shark species consistent with NS 1, and maximizes scientific data acquisition by continuing a limited research fishery for sandbar sharks to continue with 100 percent observer coverage. There are significant economic impacts associated with all alternative suites, as a result of the management measures needed to reduce fishing mortality and effort as prescribed by recent stock assessments. NMFS considered a range of alternatives with varying environmental, economic, and social impacts but only certain alternatives would accomplish the goals to rebuild overfished shark species and prevent overfishing. This alternative suite strikes an appropriate balance between positive ecological impacts that must be achieved to rebuild and prevent overfishing on depleted stocks while minimizing; to the extent practicable, the severity of negative economic impacts that will occur as a result. By allowing a limited number of historical participants to continue to land sandbar and other species of sharks in a manner resembling how the fishery has traditionally been executed, the Agency ensures that data for stock assessments and life history samples continue to be collected while allowing a small pool of individuals to continue to collect revenues from sharks. Directed permit holders not selected to participate in the shark research program could still land SCS, pelagic sharks and 33 non-sandbar LCS/vessel/trip which would limit the number of trips targeting non-sandbar LCS sharks, however, would still afford the opportunity to keep some sharks that are landed incidentally, preventing excessive discards.
- Communities may be negatively affected by the need to reduce quotas and retention limits consistent with NS1; however the management measures in the preferred alternative suite would ensure that certain communities would not be disproportionately affected.
- NMFS considered the importance of the recreational fishery to communities and has modified the authorized recreational species list from the originally proposed list in the DEIS. This amended list more closely aligns with the authorized species in the commercial fishery. NMFS would continue to prohibit sandbar and silky sharks in the recreational fishery due to concerns of misidentification with dusky sharks and because of the overfished status of sandbar sharks. However, most of the commercial shark fishing sector would not be able to retain sandbar sharks unless fishermen are participating in the shark research fishery

NS 9 states that conservation and management measures shall, to the extent practicable, minimize bycatch, and to the extent that bycatch cannot be avoided, minimize the mortality of such bycatch. The preferred alternative suite for this Final EIS is consistent with this NS.

- The preferred alternative suite would minimize bycatch as it is expected to reduce overall fishing effort targeting sharks with gillnets and BLL gear while increasing the level of observer coverage on a limited number of vessels participating in the shark research fishery.
- The time/area closure measures in the preferred alternative suite would maintain current

closures as well as add new time/area closures consistent with SAFMC Amendment 14. The time/area closures that have been implemented in recent years have been effective in reducing the bycatch of prohibited, protected and non-target HMS species.

- In addition, the current gillnet gear restrictions that limit gillnet fishing in the Atlantic Ocean during certain times of the year to prevent endangered right whales from entanglement in gillnet gear in core right whale calving areas would not change as a result of this amendment.
- The requirement for longline and gillnet fishermen to attend the protected species safe handling, release, and identification workshops which will educate them on safe handling and release of entangled and/or hooked sea turtles, marine mammals and smalltooth sawfish in order to reduce the post release mortality of bycatch will not change as a result of this amendment.
- Limiting the species of shark that can be possessed by recreational anglers to those that are non-ridgeback species plus tiger sharks that are easy to identify is expected to reduce bycatch of prohibited shark species by reducing the number of prohibited sharks that are mis-identified or mistaken for species that can be legally landed. The Agency is especially concerned about reducing landings of dusky sharks. Thus, landings of silky and sandbar sharks, which look very similar to dusky sharks, would be prohibited in order to reduce bycatch due to misidentification.

NS 10 states that conservation and management measures shall, to the extent practicable, promote the safety of human life at sea. The preferred alternative suite in the Final EIS is consistent with this NS.

- No impact to safety of life at sea is anticipated to result from the preferred alternative suite. The management measures in the preferred alternative suite would not require fishermen to travel greater distances, fish in bad weather, or otherwise fish in an unsafe manner.

10.2 Consideration of Magnuson-Stevens Section 304(g) Measures

Section 304(g) of the Magnuson-Stevens Act sets forth requirements specific to the preparation and implementation of an FMP or FMP amendment for Highly Migratory Species (HMS). See 16 U.S.C. 1854(g) for full text. The summary of the requirements of Section 304(g) and an explanation of how NMFS is consistent with these requirements are below. The impacts of the preferred alternatives and how it meets these requirements are described in more detail in Chapters 2 and 4 of the draft EIS. This section provides only a summary of how each of the requirements is met.

1. *Consult with and consider the views of affected Councils, Commissioners, and advisory groups*

NMFS published a Notice of Intent on November 7, 2006 (71 FR 65086) announcing the intent to initiate an amendment to the Consolidated HMS FMP. On January 3, 2007 (72 FR 123), NMFS published a Notice of Availability to inform the public of the issues and options presentation that was available on the HMS website. This Notice also announced NMFS intent to hold seven public scoping meetings to discuss and collect comments on issues described in the presentation. A Predraft of the amendment to the Consolidated HMS FMP was developed and

released to consulting parties and HMS Advisory panel (AP) members in March 2007. NMFS presented the Predraft to the HMS AP members at the March 2007 AP meeting to discuss and receive comments. Written comments received on the issues and options presentation, during the scoping meetings, and at the HMS AP meeting were considered at all stages when preparing this draft EIS. NMFS would send the draft EIS to consulting parties including all five of the Atlantic Regional Fishery Management Councils, both the Atlantic and Gulf States Marine Fisheries Commissions, and the HMS AP. NMFS also presented the draft EIS, during the public comment period, at the meetings of the Atlantic Regional Fishery Management Councils, and the Atlantic and Gulf States Marine Fisheries Commissions.

2. Establish an advisory panel for each FMP

As part of the Final Consolidated HMS FMP, NMFS combined the Atlantic Billfish and HMS APs into one panel. This combined HMS AP provided representation from the commercial and recreational fishing industry, academia, non-governmental organizations, state representatives, representatives from the Regional Fishery Management Councils, and the Atlantic and Gulf States Marine Fisheries Commissions. This amendment will not change the HMS AP and NMFS convened a meeting of the HMS AP during the public comment period of the proposed rule to discuss and collect comments on the draft EIS and proposed shark management measures.

3. Evaluate the likely effects, if any, of conservation and management measures on participants in the affected fisheries and minimize, to the extent practicable, any disadvantage to U. S. fishermen in relation to foreign competitors.

Throughout this document, NMFS has described the effects of the management measures and any impacts on U. S. fishermen. The preferred alternative suite in the Final EIS is necessary to meet Magnuson-Stevens Act mandates to rebuild overfished stocks and prevent overfishing which in the long-term is not expected to disadvantage U.S. fishermen in relation to foreign competitors. NMFS acknowledges that the LCS that are caught by U.S. fishermen are also caught by Mexican and Bahamian fishermen and incorporates this information into stock assessments. Canada has a porbeagle shark fishery and conducts stock assessments for this species. The United States has minimal landings of porbeagle sharks and provides the landings information to Canada so that they can incorporate this information into their stock assessments. NMFS also uses results from the Canadian stock assessments to manage porbeagle sharks in the U.S. Exclusive Economic Zone (EEZ).

4. With respect to HMS for which the United States is authorized to harvest an allocation, quota, of fishing mortality level under a relevant international fishery agreement, provide fishing vessels with a reasonable opportunity to harvest such allocation, quota, or at such fishing mortality level.

There is currently no international agreement on shark quotas, allocations, or fishing mortality levels. Therefore, this requirement is not applicable.

5. Review on a continuing basis, and revise as appropriate, the conservation and management measures included in the FMP.

NMFS continues to review the need for any revisions to the existing regulations for HMS. The Amendment 2 to the Consolidated HMS FMP is the culmination of one of those reviews.

6. Diligently pursue, through international entities, comparable international fishery management measures with respect to HMS.

NMFS continues to work with the International Commission for the Conservation of Atlantic Tunas (ICCAT) and other international entities such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), to implement comparable international fishery management measures. To the extent that some of the management measures in this Amendment are exportable, NMFS works to provide foreign nations with the techniques and scientific knowledge to implement similar management measures.

7. Ensure that conservation and management measures under this subsection:

a. Promote international conservation of the affected fishery;

b. Take into consideration traditional fishing patterns of fishing vessels of the United States and the operating requirements of the fisheries;

c. Are fair and equitable in allocating fishing privileges among United States fishermen and do not have economic allocation as the sole purpose; and

d. Promote, to the extent practicable, implementation of scientific research programs that include the tagging and release of Atlantic HMS.

All of the objectives of the Final EIS indicate how NMFS promotes the international conservation of the affected fisheries in order to obtain optimum yield while maintaining traditional fisheries and fishing gear and minimizing economic impacts on U.S. fishermen. The management measures in the preferred alternative suite in this Final EIS are expected to meet these goals.

CHAPTER 11 TABLE OF CONTENTS

11.0 LIST OF PREPARERS

The development of this rulemaking involved input from many people within National Marine Fisheries Service (NMFS), NMFS contractors and input from constituent groups including the Highly Migratory Species (HMS) Advisory Panel. Staff and contractors from the HMS Management Division, in alphabetical order, who worked on this document include:

Heather Balchowsky
Jess Beck
Karyl Brewster-Geisz
Mike Clark
Joe Desfosse
Heather Halter
Chris Rilling
Margo Schulze-Haugen
George Silva
Robert Smith
LeAnn Southward-Hogan
Jackie Wilson

The development of this document also involved considerable input from other staff members and Offices throughout NOAA including, but not limited to:

- Other Divisions within the Office of Sustainable Fisheries (Alan Risenhoover);
- The Southeast Fisheries Science Center (Heather Balchowsky, John Carlson, Enric Cortés, Katie Siegfried, Steve Turner, Alex Chester, Bonnie Ponwith);
- The Northeast Fisheries Science Center (Nancy Kohler, Cami McCandless, Lisa Natanson);
- The Southeast Regional Office (David Bernhart, Julie Weeder, Steve Branstetter, Jennifer Lee, Andrew Herndon, Cheryl Scannell);
- The Office of Law Enforcement (Mike Henry, Jeff Radonski, Paul Raymond)
- NOAA General Counsel (Meggan Engelke-Ros, Mark Hodor, Adam Issenberg, Caroline Park, Megan Walline, Frank Sprtel); and
- NMFS NEPA staff (Aileen Smith, Steve Kokkinakas, Cristi Reid).

11.1 List of Agencies, Organizations, and Persons Consulted and to Whom Copies of the EIS Will Be Sent

Under 304(g)(1)(A) of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), NMFS is required to consult with affected Fishery Management Councils, International Commission for the Conservation of Atlantic Tunas (ICCAT) Commissioners and advisory groups, and the Advisory Panels

(APs) established under the Magnuson-Stevens Act regarding amendments to the HMS Fishery Management Plan (FMP). As described below, NMFS provided documents and met with the consulting parties and to the Atlantic and Gulf States Marine Fisheries Commissions at various stages throughout the process. Hard copies and/or CDs of these documents were also provided to anyone who requested copies.

NMFS announced its intent to prepare an Environmental Impact Statement (EIS) on November 7, 2006 (71 FR 65086). In this notice, NMFS asked for comments on existing commercial and recreational shark management measures that would assist the Agency in determining options for conservation and management of Atlantic sharks consistent with relevant Federal statutes. On January 3, 2007 (72 FR 123), NMFS announced the availability of a scoping document and details of seven scoping meetings to be held during the month of January. During the scoping meetings, NMFS described the results of recent stock assessments, issues that need to be addressed concerning shark management, and options or alternatives that may be implemented to achieve objectives.

In March 2007, NMFS released a Predraft of Amendment 2 to the Consolidated HMS FMP and a summary of the scoping comments to the HMS consulting parties and presented the document to the HMS AP. NMFS requested that the AP and consulting parties (Atlantic, Gulf, and Caribbean Fishery Management Councils, Marine Fisheries Commissions, U.S. Coast Guard, and other State and Federal Agency representatives) submit comments by March 31, 2007, on the Predraft. While some of the options changed between the Predraft and draft stages of Amendment 2 to the Consolidated HMS FMP, the overall list of issues to be addressed has not changed. A summary of the comments received during scoping (November 7, 2006 – February 5, 2007) can be found on the HMS website: http://www.nmfs.noaa.gov/sfa/hms/sharks/2007/Comment_Summary_for_Shark_Amendment_2NOI.pdf. A summary and the transcripts of the March 2007 AP meeting can also be found on the HMS website at http://www.nmfs.noaa.gov/sfa/hms/.

On July 27, 2007, NMFS released the draft Amendment 2 to the Consolidated HMS FMP and its proposed rule (72 FR 41325; 72 FR 41392). The public comment period was originally slated to end on October 10, 2007, however, it was subsequently extended (October 3, 2007, 72 FR 56330) and reopened until December 17, 2007 (72 FR 64186), to provide Regional Fishery Management Councils, the Inter State Marine Fisheries Commissions, and the general public additional opportunities to submit comments. To collect comments on the proposed rule and draft Amendment 2 to the Consolidated HMS FMP, NMFS attended five Fishery Management Council meetings (New England, Mid-Atlantic, South Atlantic, Gulf of Mexico, and Caribbean), attended an Atlantic States Marine Fisheries Commission meeting, held ten public hearings between Texas and New Hampshire, held one HMS Advisory Panel meeting, and accepted public comments throughout the comment periods. The summary of the comments and NMFS' responses is provided in Appendix D of this document and will also be in the final rule.

All comments were considered when finalizing this document. NMFS also received comments from the Environmental Protection Agency (EPA) regarding the DEIS (March 31, 2006, 71 FR 16301). The DEIS received a rating of "LO," meaning that EPA did not object to the proposed action. NMFS responds to EPA's specific comments in Appendix D with the other public comments received. Copies of this final document will be sent to the EPA regional offices, the HMS consulting parties (the affected Regional Fishery Management Councils, ICCAT Commissioners and advisory groups, and the Advisory Panels), the Atlantic and Gulf States Marine Fisheries Commissions, and other interested parties. An electronic version will also be placed on the HMS Management Division's webpage at http://www.nmfs.noaa.gov/sfa/hms/.

APPENDIX A TABLE OF CONTENTS

APPENDIX A LIST OF TABLES

APPENDIX A LIST OF FIGURES

A. APPENDIX: SPECIES COMPLEXES, QUOTAS, AND RETENTION LIMIT CALCULATIONS

For alternative suites 2 through 4 in the Draft Environmental Impact Statement (DEIS), the National Marine Fisheries Service (NMFS) calculated quotas and retention limits based on total allowable catches (TAC) recommended in the 2005 and 2006 stock assessments; fishing effort and landings reported from 2003 to 2005 in the Highly Migratory Species (HMS) Logbook and Coastal Fisheries Logbook; and discards from the bottom longline (BLL) and gillnet 2005 to 2006 observer reports. In all cases, NMFS accounted for total mortality from all fishing sectors (*e.g.*, commercial and recreational), including landings and discards. By reducing the quota below this TAC, NMFS should reduce fishing mortality below the level that would cause overfishing. The quotas and retention limits in this rulemaking are specific to the 2005/2006 LCS stock assessment, the 2006 dusky assessment, and the 2005 porbeagle shark stock assessment, but NMFS anticipates changing these quotas and retention limits via framework actions in the future, as necessary. In subsequent rulemakings, NMFS would determine quotas and retention limits, based on the recommendations from the most recent stock assessments and/or estimates of landings, discards, and effort in fisheries that interact with sharks using the same process used in this rulemaking as outlined below. In addition, shark landings estimates in the Final Environmental Impact Statement (FEIS) for alternative suites 1 and 4 have been updated according to landings reported in Federal and state shark dealer reports. This is discussed in Appendix C of this document.

A.1 Sandbar quota and retention limit

The 2005/2006 LCS assessment assessed sandbars separately and recommended a sandbar specific TAC of 158.3 mt dw (220 mt ww). The assessment stated that this TAC provides a 70-percent chance of rebuilding sandbar sharks by the year 2070. Based on this recommendation, NMFS is proposing to remove sandbar sharks from the LCS complex. This would allow sandbar sharks to be managed separately and gives NMFS the ability to track this separate quota more efficiently, which is critical given the overfished and overfishing status of sandbar sharks.

To determine the proportion of the 158.3 mt dw TAC for sandbar that would be available for the commercial fishery, NMFS accounted for mortality of sandbar sharks in all sectors of recreational and commercial fisheries. NMFS first determined the commercial TAC by subtracting the average number of recreational sandbar shark landings (27 mt dw) per year from the 158.3 mt dw TAC, resulting in a commercial TAC of 131.3 mt dw (Table A.1). NMFS then determined the available commercial quota by subtracting discards in the HMS pelagic longline (PLL) fishery and non-HMS fisheries (*e.g.*, the snapper-grouper and tilefish fisheries) as well as the set-aside for display and research quota (see below under discussion of alternative suite 2). NMFS also accounted for landings recorded in the Coastal Fisheries Logbook by fishermen who did not have valid or current HMS shark permits. NMFS subtracted dead discards/landings from non-permit holders and recreational fishermen because it is assumed that mortality will continue regardless of directed fishery management measures. The total landings and discards from each of these data sources can be found in Table A.1. By removing these landings and/or mortalities

from the commercial TAC (131.3 mt dw; Table A.1), NMFS has determined that the available commercial sandbar quota is 116.6 mt dw (or 6,347 sandbar sharks, which is 116.6 mt dw / average commercial sandbar weight of 40.5 lb dw (Cortés and Neer, 2005)).

Table A.1 Calculation of sandbar quota.

	mt dw
Total sandbar shark TAC	158.3
Average Annual Recreational Landings	27
Resultant Commercial TAC (158.3 mt dw – 27 mt dw)	**131.3 (7,147.3* sandbar sharks)**
Average annual number of sandbars landed/discarded by non-HMS permit holders in Coastal Fisheries Logbook	6.1
Average annual number of sandbars discarded by incidental permit holders in Coastal Fisheries Logbook	2.3
Average annual number of dead discards on PLL gear in the HMS Logbook	4.3
Public display quota	1
Research quota	1
All gillnet discards	0.018
Extrapolated number of discards in snapper-grouper and tilefish BLL fishery based on BLL observer program	0
Total discards	*14.7*
Resultant sandbar shark quota (131.3 mt dw – 14.7 mt dw)	**116.6 (6,346.9* sandbar sharks)**

* assumes an average commercial sandbar shark weight of 40.5 lb dw (Cortés and Neer, 2005)

To determine sandbar retention limits for the different alternative suites, NMFS projected the number of trips that could be taken by directed and incidental permit holders based on past fishing effort. However, this level of effort may not be realized in the future given the reduced sandbar TAC; therefore, retention limits could be changed as necessary via proposed rule or framework actions based on quota monitoring and realized fishing effort.

The sandbar retention limit is dependent on which part of the commercial fishery (*i.e.*, directed and/or incidental permit holders) is allowed to retain sandbar sharks. For instance, alternative suite 2 would allow only directed shark permit holders to retain any shark species, and there would be no retention of sandbar sharks with PLL gear. Therefore, the 116.6 mt dw of sandbar quota was averaged over the average annual number of directed shark permit holder trips reported in the Coastal Fisheries Logbook from 2003 through 2005. This would result in a sandbar trip limit of 8 sandbar sharks for directed permit holders (Table A.2).

Table A.2 Calculation of sandbar retention limit for alternative suites 2 through 4.

Alternative Suite	Average annual trips taken by directed permit holder that landed sharks in the Coastal Fisheries Logbook	Average annual trips taken by incidental permit holder that landed sharks in the Coastal Fisheries Logbook	Average annual BLL, directed permit holder trips taken in the HMS Logbook landing sharks	Average annual PLL trips, directed permit holder trips in the HMS Logbook landing sharks	Average annual PLL, incidental permit holder trips in the HMS Logbook landing sharks	Total Trips	Retention Limit (6,346.9 sandbars / total trips)
2[*]	790	[*]	[†]	[β]		790	8 sharks/trip
3	790	49.7	80	237.7	255.3	1,413	4 sharks/trip
4						92[#]	0 outside research fishery

[*]only directed permit holders would be allowed to land sharks

[β]no retention of sandbar sharks on PLL gear

[†]since sandbar sharks cannot be retained on PLL gear, it is assumed that BLL sets will not be made on PLL vessels; fishermen primarily report PLL sets in HMS Logbook, but some BLL sets may also be reported in the HMS Logbook by PLL vessels.

[#]number of trips with 4,000 lb dw trip limit for sandbar sharks that would fulfill the 116.6 mt dw sandbar shark quota (assuming 2,800 lb dw sandbar sharks/trip)

To help estimate the appropriate number of fishing trips by directed permit holders, NMFS also investigated individual vessel's average annual sandbar landings and trips made that landed sandbar sharks from 2003 through 2005 in the Coastal Fisheries and HMS Logbooks (see Figure A.1 and Figure A.2). In doing so, NMFS investigated whether or not there was a portion of the commercial directed shark fishery that made a majority of the sandbar landings. If a small proportion of the fishermen possessing directed shark permits landed a majority of the sandbar sharks, then the predicted number of directed fishing trips could be based on the number of trips taken by those vessels in the past. This could lower the number of trips by directed shark permit holders and potentially increase the retention limit of sandbar sharks. However, after examining the average annual sandbar landings and average annual number of trips taken that landed sandbar sharks, there was no obvious portion of the directed shark fishery that made a majority of the sandbar landings. Rather, most of the directed shark fishermen had moderate sandbar landings (see Figure A.1) with only a few vessels landing more than 3,000 lb dw of sandbars on an average trip (Figure A.3). Therefore, NMFS averaged the available 116.6 mt dw of sandbar quota over the average annual number of all trips made by directed shark permit holders in the Coastal Fisheries Logbook (Table A.2).

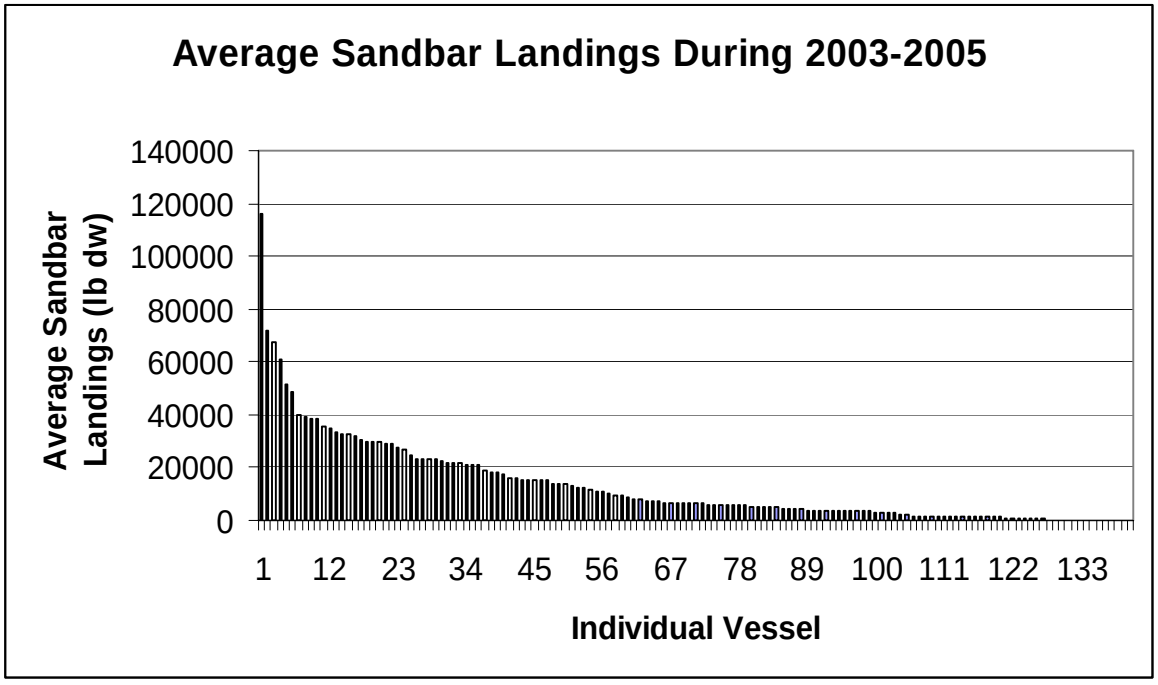

Figure A.1 **Average annual sandbar landings (lb dw) for individual vessels during 2003 to 2005. The average sandbar landings per vessel was 13,150 lb dw per year.** Source: Coastal Fisheries Logbook and HMS Logbook**.**

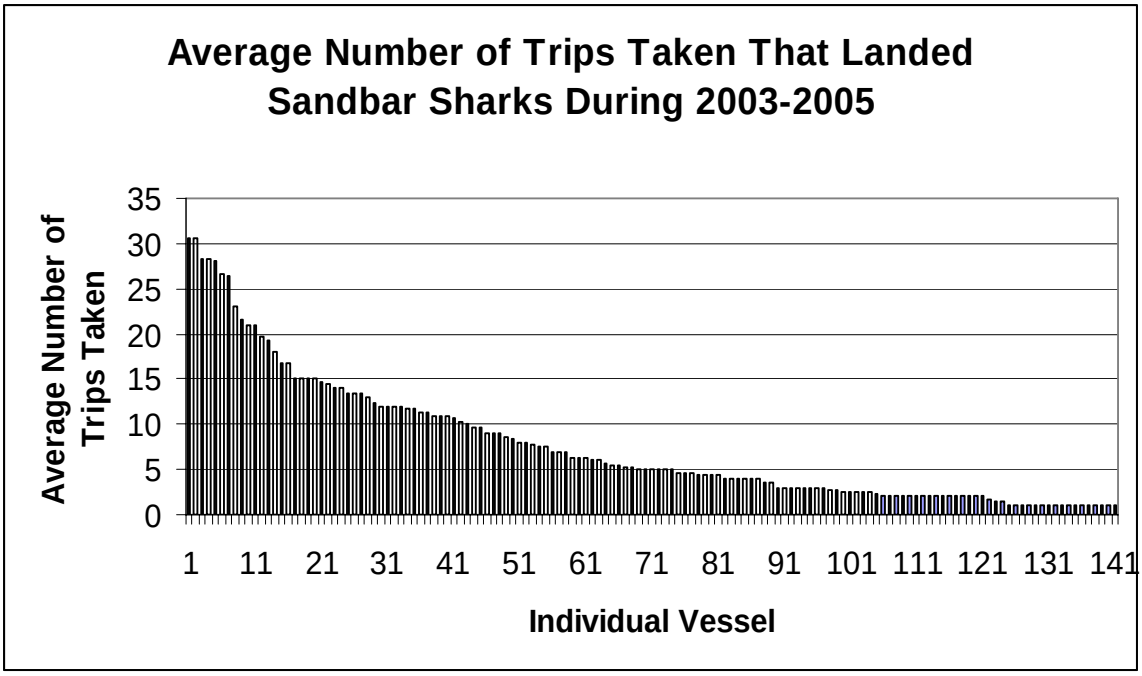

Figure A.2 **Average annual number of trips taken that landed sandbar sharks for individual vessels from 2003 to 2005**. Source: Coastal Fisheries Logbook and HMS Logbook**.**

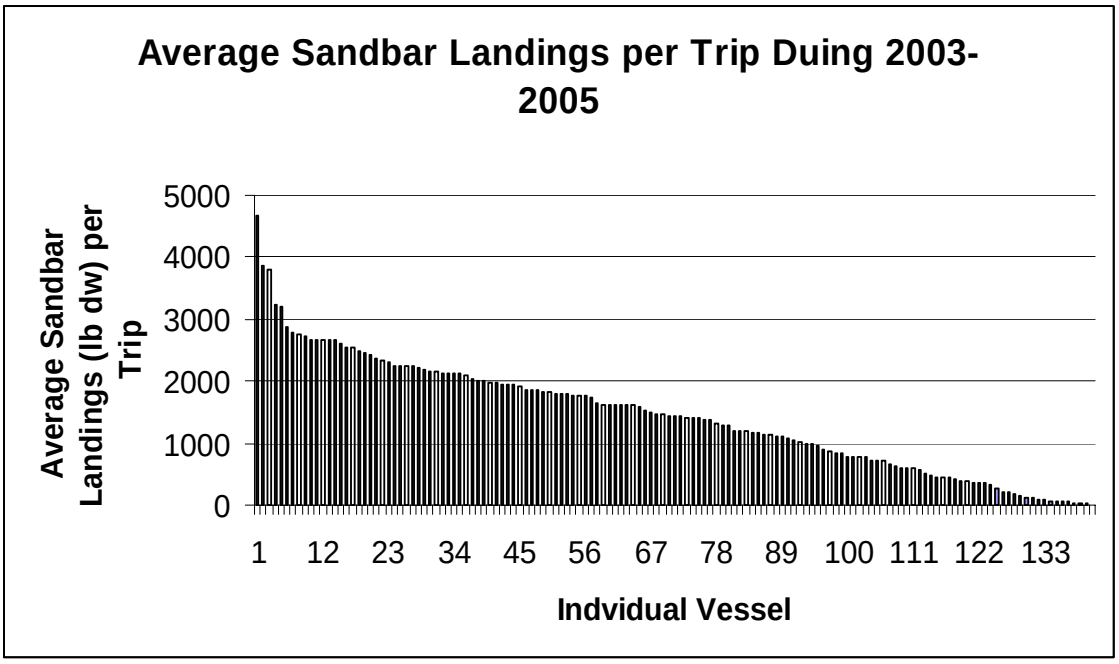

Figure A.3 **Average sandbar landings (lb dw) per trip taken for individual vessels from 2003 to 2005. The average sandbar landings was 1,417.5 lb dw per trip**. Source: Coastal Fisheries Logbook and HMS Logbook**.**

Similarly for alternative suite 3, which would allow sandbar landings by both directed and incidental shark permit holders, NMFS spread the 116.6 mt dw of sandbar quota over the average annual number of trips that made sandbar landings by directed and incidental permit holders recorded in both Coastal Fisheries logbook and the HMS logbook to determine a retention limit of 4 sandbar sharks/trip (Table A.2).

Finally, alternative suite 4 would establish a small research fishery that could harvest the 116.6 mt dw sandbar quota and retain other shark species and would be afforded higher trip limits for sandbar sharks and non-sandbar LCS than vessels operating outside the research fishery. Vessels outside this research fishery would not be allowed to retain sandbar sharks. NMFS first determined the number of trips it would take to land the sandbar quota, assuming a 4,000 lb dw sandbar and non-sandbar LCS trip limit (however, this trip limit would be based on the research objectives for a given year). The number of trips was determined by looking at the catch composition of directed BLL trips reported in the BLL observer program (Hale and Carlson, 2007). The observer program data indicated that 70 percent of the catch on directed shark BLL trips in the South Atlantic region was comprised of sandbar sharks whereas 30 percent of the catch on directed shark BLL trips in the Gulf of Mexico region was comprised of sandbar sharks. By taking a precautionary approach and assuming that 70 percent of a 4,000 lb dw trip limit would be made up of sandbar sharks and that the average sandbar shark is 40.5 lb dw (Cortés and Neer, 2005), the 116.6 mt dw of sandbar quota could be caught in approximately 92 trips (see Table A.2). Therefore, for the purposes of analysis relative to other alternatives, a small universe of vessels in the research program would be able to make approximately 92 trips with a 4,000 lb dw sandbar and non-sandbar LCS trip limit, which would fulfill the sandbar quota. Specifics of the research program, including trip limits, would be determined to meet specific research objectives and may not be structured based on a 4,000 lb dw trip limit. For additional details on the research program, see Chapters 2 and 4.

A.2 Non-sandbar quota and retention limits

The 2005/2006 LCS assessment also assessed blacktip sharks separately and recommended that the catch of Atlantic and Gulf of Mexico blacktip populations not change or increase, respectively, given the unknown status for the Atlantic blacktip population and the relatively healthy status for the Gulf of Mexico population. Based on this LCS assessment, NMFS also determined that the status of the LCS complex is unknown. Given the unknown or healthy status of these species and the larger available quota relative to the sandbar quota, management for these species would be based on a new non-sandbar LCS complex in alternative suites 2 through 4, which has sandbar sharks removed from the complex (non-sandbar LCS complex = silky, tiger, blacktip, spinner, bull, lemon, nurse, scalloped hammerhead, great hammerhead, and smooth hammerhead sharks). The non-sandbar LCS quota is based on the average annual catch of these species from 2003 to 2005, as recommended by the most recent LCS stock assessment (Table A.3a). A TAC was established for non-sandbar LCS based on total catch and discards from all sectors of the LCS fishery (Table A.3b). It should be noted that the TAC for non-sandbar LCS under the preferred alternative suite 4 was updated in the FEIS based on Southeast Fisheries Science Center's (SEFSC) recommendations. This discussion can be found in Appendix C.

Table A.3 Calculation of non-sandbar LCS quota and TAC.

	mt dw
a) *Non-sandbar LCS Quota*	
Average annual number of non-sandbar LCS landed by non-HMS permit holders in Coastal Fisheries Logbook	15.1
Average annual number of non-sandbar LCS landed by incidental permit holders in Coastal Fisheries Logbook	16.3
Average annual number of non-sandbar LCS landed by directed permit holders in Coastal Fisheries Logbook	503
Average annual number of non-sandbar LCS kept on PLL gear in the HMS Logbook	19.9
Average annual number of non-sandbar LCS kept on BLL gear in the HMS Logbook	28.1
total	*582.4*
Research and Public Display Quota	41.2
Resultant Quota (582.4 mt dw – 41.2 mt dw)	**541.2**
b) *Non-sandbar LCS TAC*	
Average Annual Recreational Landings	309.8
Total gillnet discards (both shark and non-directed shark fisheries)	19.9
Extrapolated number of discards in snapper/grouper and tilefish BLL fishery based on BLL observer program	3.5
Extrapolated number of discards in directed shark BLL fishery based on BLL observer program	116.7
Average annual number of dead discards on PLL gear in the HMS Logbook	12.6
Average annual number of dead discards on BLL gear in the HMS Logbook	0.7
Total discards and recreational landings	*463.2*
Total TAC (582.4 mt dw of landings + 463.2 mt dw of discards & recreational landings)	**1,045.6**

Retention limits for non-sandbar LCS were calculated in different ways, depending on the alternative suite being considered. Since the overall quota for non-sandbar LCS is higher than the overall sandbar quota, retention limits are higher for non-sandbar LCS than they are for sandbar sharks. To reduce the number of sandbar sharks that would be discarded as fishermen fulfill their non-sandbar LCS retention limits in alternative suites 2 and 3, the non-sandbar LCS retention limits were based on the ratio of sandbar sharks to non-sandbar LCS caught in the BLL observer program (Hale and Carlson, 2007). However, the ratio of sandbar sharks to non-sandbar LCS caught varied between the Gulf of Mexico and South Atlantic regions. In the Gulf of Mexico region, there was a 1:4 ratio (1 sandbar for 4 non-sandbar LCS) whereas in the South Atlantic region there was a 1:1.4 ratio. In addition, the fishing effort varied among regions, with 2/3 of the BLL effort occurring in the Gulf of Mexico region and 1/3 of the BLL effort occurring in the South Atlantic region (Coastal Fisheries Logbook). Therefore, NMFS had to accommodate for differences in catch composition and fishing effort in the different regions when setting the non-sandbar LCS retention limit for alternative suites 2 and 3.

This balance was important to limit discards of sandbar sharks in the region with the lower sandbar to non-sandbar LCS ratio (*i.e.*, the South Atlantic). For instance, using the 1:4 sandbars to non-sandbar LCS ratio in the Gulf of Mexico to set the retention limit would result in a 32 non-sandbar LCS retention limit with an 8 sandbar shark retention

limit per trip (8 sandbars x 4 = 32 non-sandbar LCS). However, given the 1:1.4 ratio in the South Atlantic, an 8 sandbar shark retention limit/trip would equal a 11 non-sandbar LCS retention limit in the South Atlantic (8 sandbar sharks x 1.4 = 11.2 non-sandbar LCS). Therefore, setting one retention limit based on the Gulf of Mexico's catch ratio would result in excessive sandbar sharks discards. To determine the number of sandbar discards that would occur in the South Atlantic with a Gulf of Mexico's 1:4 ratio, it must first be determined the number of sandbar shark discards that would occur on a South Atlantic trip with a retention limit based on the Gulf of Mexico's catch ratio. This is done by determining the difference in the retention limits for non-sandbar LCS based on the respective ratios in the two regions; setting a non-sandbar LCS retention limit using the South Atlantic ratio would result in no sandbar discards; any non-sandbar LCS retention limit above that threshold would result in sandbar discards, but the number of discards would depend on the difference between the two retention limits divided by sandbar to non-sandbar ratio in the South Atlantic:

- Gulf of Mexico non-sandbar LCS retention limit = 8 sandbars x 4 = 32 non-sandbar LCS
- South Atlantic non-sandbar LCS retention limit = 8 sandbar sharks x 1.4 = 11.2 non-sandbar LCS (or 11 non-sandbar LCS)
- 32 non-sandbar LCS retention limit based on Gulf of Mexico ratio - 11 non-sandbar LCS retention limit based on South Atlantic = 21 non-sandbar LCS;
- 21 non-sandbar LCS/1.4 = 15 sandbar sharks discarded per trip in South Atlantic;
- 15 sandbar sharks x 237 South Atlantic trips = 3,555 sandbar sharks discarded in the South Atlantic; and
- 3,555 sandbar sharks x 40.5 lb dw [average commercial sandbar weight] = 143,977.565.3 lb dw or 65.3 mt dw.

Setting a non-sandbar LCS retention limit in the South Atlantic based on the Gulf of Mexico's catch ratio would therefore result in approximately 65.3 mt dw of sandbar shark discards as fishermen meet their sandbar retention limit and continue to fish for non-sandbar LCS, and discard sandbar sharks, in the South Atlantic.

Therefore, the non-sandbar LCS retention limit was determined by using an average ratio (or 1:2.7) for the two regions. This resulted in a slightly lower non-sandbar LCS retention limit in the Gulf of Mexico compared to its regional ratio (*i.e.*, 21 non-sandbar LCS versus 32 non-sandbar LCS) and a slightly higher non-sandbar LCS retention limit in the South Atlantic compared to its regional ratio (*i.e.*, 21 non-sandbar LCS versus 11 non-sandbar LCS). However, this average ratio balanced the number of sandbar sharks that would be discarded in the South Atlantic with the amount of sandbar quota that would not be harvested in the Gulf of Mexico (Table A.4). Given the lowered non-sandbar LCS retention limit for the Gulf of Mexico region, not all of the 116.6 mt dw of sandbar quota would be harvested under alternative suites 2 and 3 (86.1 mt dw and 105.9 mt dw, respectively). This is to compensate for the discards in the South Atlantic (see Table A.4). In addition, because the non-sandbar LCS retention limit is based on a

ratio approach to limit sandbar discards (*i.e.*, the entire non-sandbar LCS quota was not averaged over the total number of fishing vessels as was done for sandbar sharks), only a portion of the non-sandbar LCS quota would be harvested under alternative suites 2 and 3 (253.6 mt dw and 229.2 mt dw, respectively).

Table A.4 **Calculation of non-sandbar LCS retention limits for alternative suites 2 and 3. Note: these limits assume 237 BLL trips in the South Atlantic (SA) region and 553 trips in the Gulf of Mexico (GOM) region for alternative suite 2, and 290 BLL trips in the SA region and 581 trips in the GOM region for alternative suite 3.**

Alternative Suite	Sandbar Retention Limit	Regional Ratios of Sandbars to Non-Sandbar LCS Caught	Non-Sandbar LCS Retention Limit Based on Regional ratios	Average Sandbar to Non-Sandbar LCS Ratio[1]	Non-Sandbar LCS retention limit based on average ratio	Sandbar Discards in South Atlantic Region (mt dw)[2]	Sandbar quota not caught in the Gulf of Mexico Region (mt dw)[3]	Net Sandbar discards [4]	Resulting Sandbar Quota Harvested (mt dw)	Resulting Non-Sandbar Quota Harvested (mt dw)
2	8	1:4 (GOM)	32	2.7	21	30.5	30.5	0	86.1	253.6
		1:1.4 (SA)	11							
3	4	1:4 (GOM)	16	2.7	10	15.4	10.7	4.7	105.9	229.2
		1:1.4 (SA)	6							

[1]The Gulf of Mexico regional ratio of sandbars to non-sandbar LCS caught is 1:4. The South Atlantic regional ratio of sandbars to non-sandbar LCS caught is 1:1.4. The average ratio is (4 + 1.4)/2 = 2.7 or a combined 1:2.7 ratio.

[2]**Alternative suite 2**: A 21 other LCS trip limit would mean that 7 sandbar discards would occur per South Atlantic regional trip (21 other LCS-11 other LCS=9.8 other LCS/1.4 ratio = 7 sandbar sharks discarded). This equates to 30.5 mt dw of sandbar discards over 237 South Atlantic regional trips (7 sandbars x 237 trips = 1,659 sandbars discarded. 1,659 sandbars x 40.5 [average sandbar weight] = 30.5 mt dw).

Alternative suite 3: A 10 other LCS trip limit would mean 2.9 sandbar discards would occur per South Atlantic regional trip (10 other LCS – 6 other LCS = 4 other LCS/1.4 ratio = 2.9 sandbar discarded). This equates 15.4 mt dw of sandbar discards over 290 South Atlantic regional trips (2.9 sandbars x 290 trips = 841 sandbars discarded. 841 sandbars x 40.5 [average sandbar weight] = 15.4 mt dw).

[3]**Alternative suite 2:** With a 21 non-sandbar LCS trip limit, fishermen in the Gulf of Mexico region would potentially only catch ~5 sandbars per trip. With an 8 sandbar/trip retention limit, this would mean 3 sandbar sharks would not be caught per trip. This equates to approximately 30.5 mt dw of sandbar quota that would not be caught in the Gulf of Mexico region (8 sandbar limit - 5 sandbars caught = 3 sandbars not caught. 3 sandbars not caught x 553 trips = 1,659 total sandbars not caught x 40.5 [average sandbar weight] = 30.5 mt dw of sandbars not caught).

Alternative suite 3: With a 10 non-sandbar LCS retention limit, fishermen in the Gulf of Mexico region would potentially only catch ~3 sandbars per trip. With a 4 sandbar/trip retention limit, this would mean 1 sandbar shark would not be caught per trip. This equates to approximately 10.7 mt dw of sandbar quota that would not be caught in the Gulf of Mexico region (4 sandbar limit - 3 sandbars = 1 sandbar not caught. 1 sandbar not caught x 581 trips = 581 total sandbars not caught x 40.5 [average sandbar weight] = 10.7 mt dw of sandbars not caught)

[4]**Alternative suite 2:** 30.5 mt dw – 30.5 mt dw = 0 mt dw net discards of sandbar sharks

Alternative suite 3: 15.4 mt dw – 10.7 mt dw = 4.7 mt dw net discards of sandbar sharks

Alternative suite 4 would allow vessels outside of a small shark research fishery to retain non-sandbar LCS as well as SCS and pelagic sharks (Table 2.1). However, the available non-sandbar LCS quota and associated retention limit outside the research fishery was based on the amount of non-sandbar LCS quota that could be caught in the research fishery. Based on catch composition in the BLL observer report, NMFS assumed that approximately 92 trips with a 4,000 lb dw trip limit could be taken by a small number of vessels in a shark research fishery to harvest the available sandbar quota of 116.6 mt dw (however, the actual trip limit would be based on the research objectives for a given year). This assumed that the catch composition was 70 percent sandbar sharks and 30 percent non-sandbar LCS (Hale and Carlson, 2007; Table A.2). Based on 92 trips with a catch composition of 30 percent non-sandbar LCS, it is estimated that 50 mt dw of non-sandbar LCS quota would be harvested by vessels within the research fishery (Table A.5). This would leave 491 mt dw of non-sandbar LCS quota available to vessels outside of the research fishery (541.2 mt dw non-sandbar LCS quota – 50 mt dw quota harvested within the research fishery = 491 mt dw quota available outside the research fishery). This quota was averaged over the average annual number of trips that landed non-sandbar LCS by directed and incidental permit holders reported in the Coastal Fisheries logbook and the HMS logbooks. This would result in a 22 non-sandbar LCS retention limit per trip for vessels operating outside of the research fishery (Table A.5). It should be noted that the retention limits for non-sandbar LCS under the preferred alternative suite 4 was updated in the FEIS based on SEFSC's recommendations and public comment. This discussion can be found in Appendix C.

Table A.5 Non-sandbar LCS retention limits for alternative suite 4.

Alternative Suite	Average annual trips taken by directed permit holder that landed sharks in the Coastal Fisheries Logbook	Average annual trips taken by incidental permit holder that landed sharks in the Coastal Fisheries Logbook	Average annual BLL, directed permit holder trips taken in the HMS Logbook landing sharks	Average annual PLL trips, directed permit holder trips in the HMS Logbook landing sharks	Average annual PLL, incidental permit holder trips in the HMS Logbook landing sharks	Total Trips	Non-sandbar LCS quota (mt dw) available outside research fishery 1,200 lb dw non-sandbar LCS/trip x 92 trips = 50.0 mt dw non-sandbar LCS (541.2 mt dw – 50.0 mt dw = 491 mt dw	Retention Limit (non-sandbar LCS quota / total trips)
4	790	92	80	237.7	255.3	1,455	491	22 sharks/trip outside of research fishery

Appendix A References

Cortés, E. and J.A. Neer. 2005. Updated catches of Atlantic sharks. LCS05/06-DW-16. NMFS, Southeast Fisheries Science Center, Panama City, Florida. 58 p.

Hale, L.F. and J.K. Carlson. 2007. Characterization of the Shark Bottom Longline Fishery: 2005-2006. National Oceanic and Atmospheric Administration Technical Memorandum. NMFS-SEFSC-554. 25pp.

APPENDIX B TABLE OF CONTENTS

Report to Directed Shark Fisheries, Inc. on the 2006 SEDAR 11 Assessment for Sandbar Shark

Prepared by

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Directed Shark Fisheries, Inc.

Mark Maunder, PhD
Inter-American Tropical Tuna Commission

Abstract

The Review Panel for SEDAR 11 (Large Coastal Sharks) was held 5–9 June 2006 at Panama City, FL. The panel was conducted by the Center for Independent Experts (CIE) and concluded that:

"The population model and resulting population estimates were the best possible given the data available.

"Stock status was determined from the results of a range of model fits reflecting the Panel's uncertainty about life history parameters. All results indicate that the stock is overfished and that overfishing is occurring. The target year to rebuild the stock is estimated to be 2070."

At the request of Directed Shark Fisheries, Inc., we reviewed the data and modeling of SEDAR 11 upon which the CIE based their conclusions. After review, we concluded that:

- ***The assessment proceeded without using the largest data set available, the BLOP data, which inter alia shows that average age of the catch has not declined over time, as it should if the stock were being overfished.***
- ***The BLOP data also show that the selectivity curve used for the commercial catch is wrong and needs to be re-examined.***
- ***Catch-rates for recent years remain level indicating a population in equilibrium; overfishing is not occurring, whereas the model trajectory indicates a continuing decline in abundance.***
- ***The assessment used several catch-rate series (LPS and NMFS – NE) that were either inappropriate, or did not include the available (but withheld) size and sex data (VA LL).***
- ***The age-at-maturity ogive was derived from a study that is technically flawed.***
- ***The biological parameters used in the model were selected subjectively and there may be some evidence that different values are more appropriate.***

If NMFS relies on this technically flawed assessment to make the formal finding that the stock is overfished and overfishing is occurring a legal process will begin that will require a severe reduction in TAC equivalent to closing the fishery. There is time yet to revisit the assessment before that reduction is in place if NMFS is willing to devote the effort to address the concerns that the CIE raises in their Report and we have raised in ours. Redoing the maturity ogive study may not fit into this period, but the other corrective work could be done a matter of months.

Background.

The Review Panel for SEDAR 11 (**S**outh **E**ast **D**ata and **A**ssessment **R**eview) of Large Coastal Sharks was held 5–9 June 2006 at Panama City, FL. The panel was conducted by the Center for Independent Experts (CIE) and concluded that:

- *The population model and resulting population estimates were the best possible given the data available.*
- *The change in stock status in the 2006 assessment from the more optimistic status in 2002 appears to be mainly attributable to revisions to the life history parameters in the current assessment. The population is assessed to be less productive than was assumed in 2002.*
- *In 2006, the 3-part SEDAR process of data workshop, assessment workshop, and review workshop was adopted for large coastal sharks. This process resulted in a more thorough review at all stages of the process, which was not possible with the previous stock assessments. For this reason and those concerning the life history parameters given above, the Panel is confident that the 2006 assessment gives a more reliable estimate of stock status than obtained from the 2002 and earlier assessments.*
- *Stock status was determined from the results of a range of model fits reflecting the Panel's uncertainty about life history parameters. All results indicate that the stock is overfished and that overfishing is occurring. The target year to rebuild the stock is estimated to be 2070.*

Directed Shark Fisheries, Inc. (DSF) represents several entities involved with the commercial fishery for Atlantic large coastal sharks. The group disagrees with these conclusions, which are at variance with their observations of the fishery. There is no indication of a continuous decline in either catch rate or fish size (average carcass weight) predicted by the modeling. Of particular concern to the fishermen is the determination that the fishery for sandbar shark needs to be closed for a 65-year rebuilding period. Directed Shark Fisheries, Inc. has asked us to review the data and modeling of SEDAR 11 upon which the CIE based their conclusions to attempt to reconcile the two different perceptions of the status of the sandbar stock, report our findings and make such recommendations as may be appropriate.

The Problem

The CIE in reaching their conclusions stopped short of taking the vital but simple step of comparing the model results with actual information from the fishery. A cursory examination would show that the commercial landings and catch rates have remained stable for over a decade, and catch-rate (abundance) indices are mostly flat or trend upward over this period. These observations are inconsistent with the model output, which indicates a steady decline in biomass over the same period. The problem this created is that the CIE and SEDAR are pronounced by NMFS to have provided a peer review approval of this assessment, "…the best possible given the data available." The fishery now likely faces a major reduction in TAC under current law.

The CIE accepted both the data and analyses provided by SEDAR 11 and the conclusion that the stock is overfished and that overfishing is occurring with some caveats, and raised a number of issues for future examination. The issues raised by the CIE are important; so important in fact; that we wonder why the CIE did not express greater concern about the confidence that can be put on the SEDAR 11 assessment and recommend that some issues be addressed before the assessment was accepted.

These concerns might have been more strongly phrased had the CIE been advised that some of the data they highlighted for future work were actually available but not presented at SEDAR 11. We will now make use of additional data to explain some of the inconsistencies between the perception created by the model results and the perception held by the commercial sector.

The Data

The Review Panel qualified their conclusions by stating:

Research recommendations are included in the reports from the Data and Assessment Workshops (and in 2.3 below), so what follows is not intended to replace them but rather to emphasize specific needs for sandbar shark.

Two recommendations in particular are extremely important. These are:

Issue: A number of catch-rate indices were used, and it was not obvious which components of the sandbar population they were monitoring.

- *Using information on the size composition of catches from these indices, if available, would be helpful*
- *Maps of where (and when) the catch-rate series are located, along with the location of the fisheries, would aid in interpreting these series*

Issue: The assessment used an age-structured model, but no age information was used.

- *The predicted age compositions for the population and the catch in the model may provide useful diagnostics for the performance of the model. Research should be directed into developing these diagnostics, including verification with any available data on age composition. One example of a diagnostic indicator is the mean size/age in the catch and population, and from any catch-rate index that may collect size composition data…*

Size, sex, location and other information are contained in two data sets used at SEDAR 11 and this additional information was available to SEDAR 11 and the CIE, but was not presented. One set is the Bottom Longline Observer Program (BLOP)[1], the other the VIMS longline survey (VA LL). The BLOP comprises observed sets during the period from 1994 through 2004 from N. Carolina south and into the eastern Gulf of Mexico and covers all seasons and most of the range of the commercial fishery using a gear (bottom longline) that accounts for nearly 90% of the commercial landings. The latter, the VA LL, comprises sets from an intermittent summer longline survey from 1974 through 2004 confined to a small area off Virginia.

The BLOP data for 1248 observed sets were used to develop a catch-rate index at SEDAR 11, but the size and sex composition of the catch was not made available at SEDAR 11. The VA LL data were presented to SEDAR 11 in summarized form with no detailed information. NMFS standardized the series after the Data Workshop ended using the limited data provided that did not include age, size or sex. Through the cooperation of NMFS and University of Florida, we were provided with extracted BLOP data that includes length and sex and reproductive state information, general location (we were not given precise locations for the sets because of confidentiality concerns) and some environmental information. For the VA LL series, we do not have the data set available to SEDAR 11. The Principal Investigator for the VA LL survey declined to provide age, size or sex information until he has analyzed and published his 30-years of data.

The BLOP data set is useful for several reasons:

1. It is arguably representative of about 90% of the commercial catch of sandbar (but see bullet 3).
2. It provides length and sex information on all sandbar taken including discards (which were few) and should be a reasonably unbiased sample of the commercial catch.
3. It covers the South Atlantic Region and the eastern Gulf of Mexico Region (where most of the sandbar catch occurs). This is most of the range of the fishery. It does not include the North Atlantic Region.
4. It covers all months when fishing is allowed.

The VA LL data set includes information from 637 bottom longline sets beginning in 1973 and running through 2004. No sets were made in some years. The number of sets in any year varied from 3 to 47. There were 371 sets made between 1995 (none in 1994) and 2004, the same period covered by the BLOP data; however, the two areas do not overlap.

The standardized index used in the assessment was done after the Data Workshop and the procedure omitted the years prior to 1981. The index is not size or age specific, but assumes that the selectivity curve used for the commercial fishery should apply.

In addition to the above data sets, we received a copy of the State-Space Age-Structured Production Model (SPASM) from Dr. Liz Brooks, NMFS, and we will refer to several SEDAR 11 documents.

Analyses and Results

1. **BLOP Data**

[1] A.k.a. PLLOP and Commercial Shark Fishery Observer Program (CSFOP).

Length frequency samples.

The BLOP data set contains length measurements on 21,031 individual sandbar sharks. The distribution of the sample lengths by sex is shown below (Fig.1).

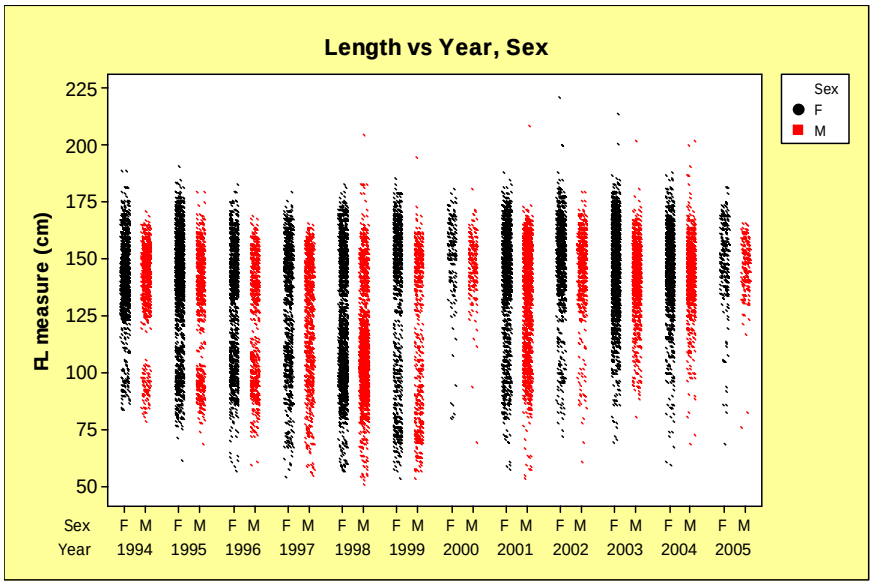

Figure 1. Lengths of individual sandbar sharks taken during Bottom Longline Observer Program trips

These 21,031 length frequency samples are important for two reasons. The allowed us to look for changes in the size (age) composition of the population over 12-years of exploitation, and they provide an indication of the pattern of selectivity of the bottom longline gear.

Change in age composition.

The average age (size) in a population of fish under exploitation is expected to decrease. This is particularly true for populations of long lived fish like sandbar.

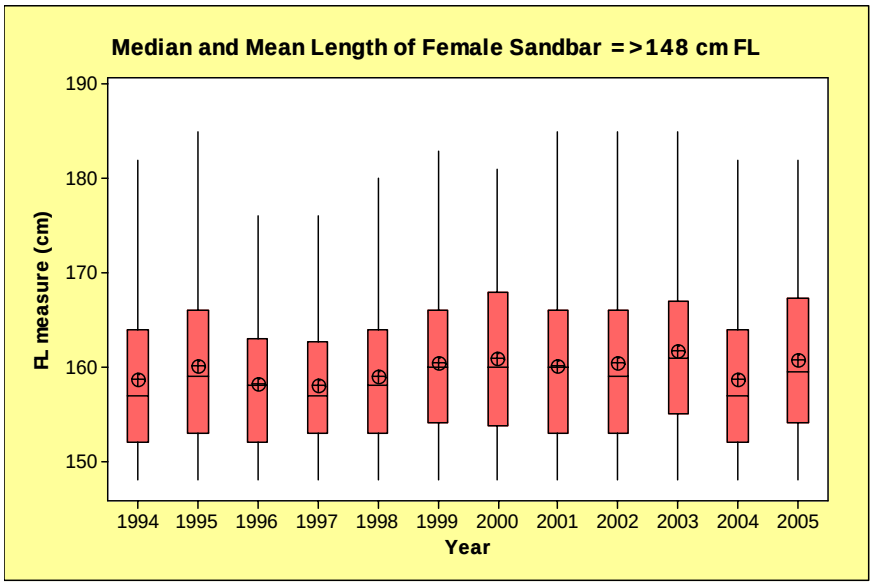

Figure 2. Median length mature females; means are indicated by circled cross symbol

The SPASM Model predicts a 45-percent decline in spawning biomass over these years, which should be reflected by a decrease in the average age of spawners (taken as >148 cm Fork Length). The BLOP data on the other hand indicate a stable size or slight increase in average size (Fig. 2) over the period. How this should be interpreted is arguable, but if size at age is constant as the model assumes the observed data are at variance with the model prediction.

Selectivity.

Converting lengths to ages using a von Bertalanffy equation (Sminkey and Musick, 1995) gives the distribution for the BLOP catches shown in Figure 3.

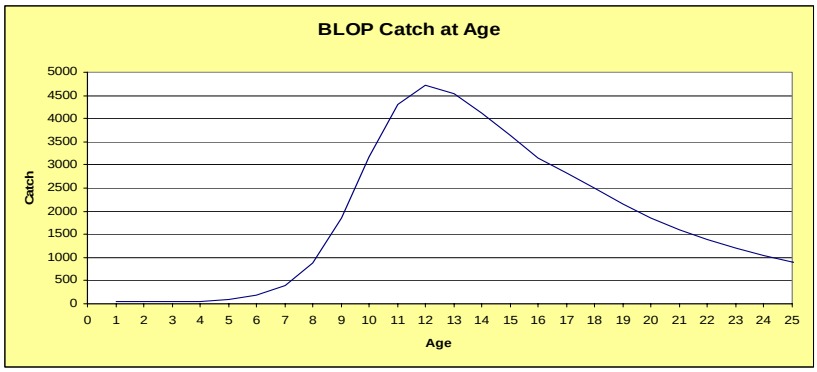

Figure 3. Sandbar catch at age from the observed "commercial" catch.

SEDAR 11 developed a series of curves believed representative of the selectivities in various sectors (fleets) of the fishery. These are reproduced in Figure 4a below. A revised selectivity curve is shown in Figure 4b.

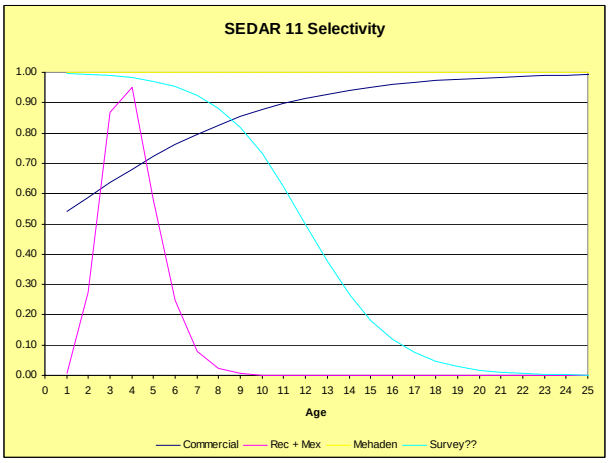

Figure 4a. The four selectivity curves used for the 2006 assessment.

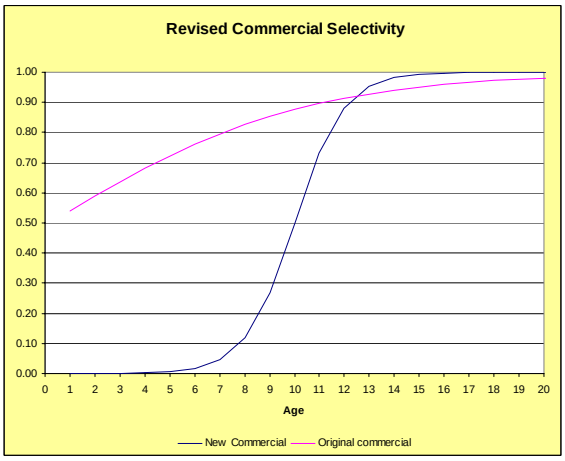

Figure 4b. The SEDAR 11 commercial selectivity curve and the BLOP based commercial curve

The plot indicates that juvenile sandbar sharks are less vulnerable to the commercial gear than was assumed by the SEDAR 11workshop.

Time and area differences.

The catch-at-age and selectivity patterns estimated in Figures 3 and 4b were derived using all BLOP observations combined. For the BLOP program, fishing takes place in three Regions (not the same as the three Regions used by the HMS management plan). The BLOP Mid-Atlantic Bight Region does not extend north into Virginia and there were few sets made north of 37° N. The HMS North Atlantic Region begins off

Virginia, so that the HMS South Atlantic Region comprises both the BLOP Mid-Atlantic Bight Region and the BLOP South Atlantic Region.

The BLOP data set include information by region and date. There are significant differences in average size among regions and seasons. These are shown in Figure 5, suggesting that a single selectivity may not be appropriate for all regions and seasons. In particular, season one in the mid Atlantic bight catches smaller individuals. This region is closest to the area used for the VA LL survey and indicates that the selectivity for the VA LL survey may also be different from the commercial selectivity used in the model.

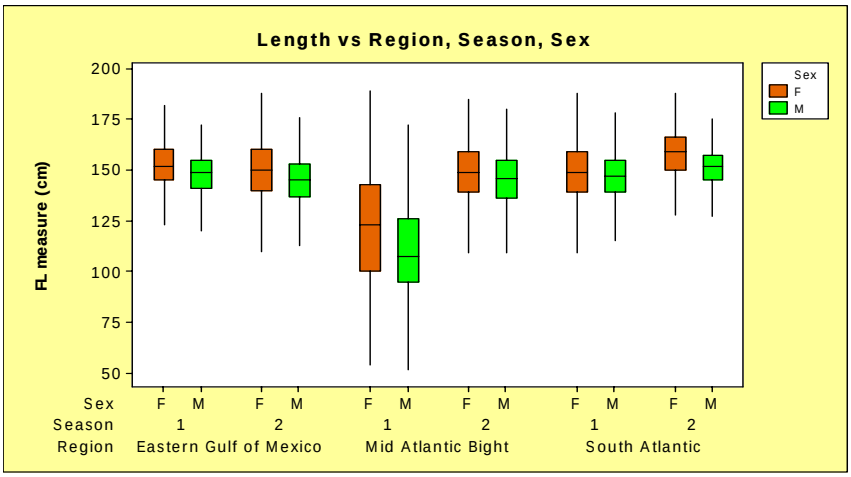

Figure 5. Median size by BLOP Region, Season 1 = Jan-Jun, 2 = July-Dec, and sex

Sex ratio differences.

Figure 6 indicates that bottom longline gear is selective of females. The overall ratio from the BLOP is 1:1.31 male to female. Whether this reflects a true sex ratio difference in the population or a targeting and/or segregation by sex deserves further investigation.

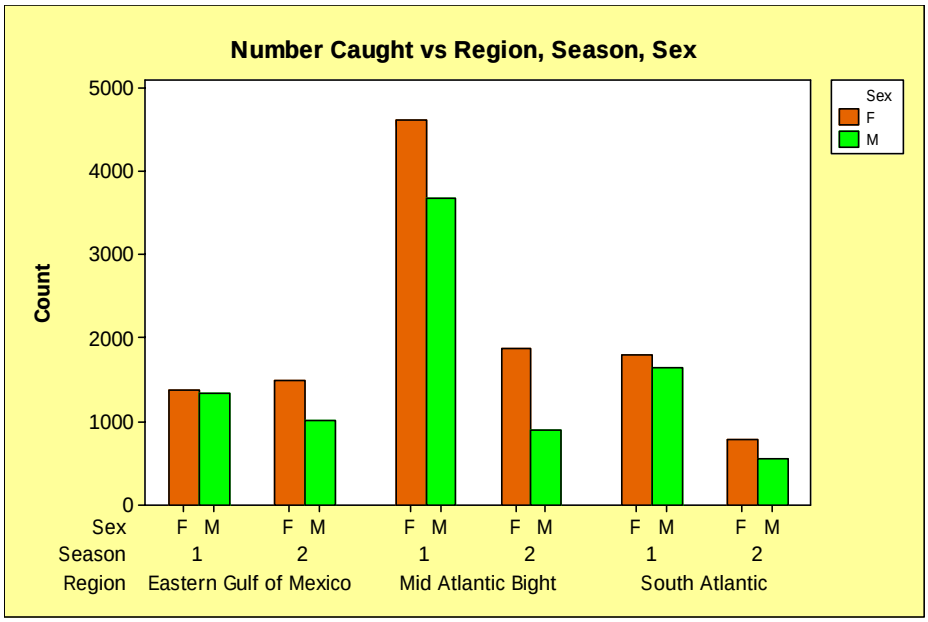

Figure 6. BLOP catches showing a preponderance of females, especially in the Mid-Atlantic Bight

2. SPASM Model

In this section, we will look at the modeling and consider how some changes in the inputs effect the perception of the status of the sandbar stock, as well as look briefly at the model itself. The model of interest for the sandbar assessment is Shark_SPASM.

"This model is [with some modification] the model used in the 2002 Large Coastal Shark was a state space, age structured production model (SSASPM, Porch 2002). Unlike a production model, the SSASPM can incorporate age-specific differences in model parameters such as growth, fecundity, and gear vulnerability (selectivity). In the case of long-lived, late-maturing fish or when there are multiple fisheries that exploit different age classes, having the flexibility to incorporate age-specific information could lead to a better fit to observed data. Age specific vectors for fecundity, maturity, and selectivity are specified by the user, and length and weight at age are calculated within the model based on user-specified growth functions. Natural mortality at age and a stock recruitment function are additional model parameters. The stock recruit function is parameterized in terms of virgin recruitment (R0) and pup survival. To derive the initial age structure for the first year that data is available, the model estimates a level of historic fishing (Fhist) and calculates the corresponding equilibrium population age structure. A historic selectivity vector is specified by the user, which is multiplied by Fhist to arrive at the historic age-specific fishing mortality rate. A historic selectivity vector of 1 for all ages was assumed.

"Continuity Model Inputs

"*Data*
"Data inputted to the model included maturity at age, fecundity at age (pups per mature female), spawning season, catches, indices, and selectivity functions …. Catches were made by the commercial sector, the recreational sector, and the Mexican fishery. In addition, unreported commercial catches were estimated, as were menhaden discards. Because of similar selectivity functions, the commercial and unreported catches were combined, and recreational catches were combined with Mexican catches, yielding a model with 3 distinct "fleets". A total of 13 indices were made available after the data workshop. The "DEL age 0" index was not used, as this model began with age class 1, which means that the stock recruitment relationship governed the number of one year olds to survive from the initial number of pups produced in a given year. Catch data begin in 1981, while the earliest data for the indices is 1975 (VA-LL). The missing catch for years 1975-1980 was treated several ways: the model estimated the missing catch; the missing catch was filled in with either the series-specific average, or series-specific assumptions were made….

"*Parameters*

"Estimated model parameters were pup survival, natural mortality (ages 1+), virgin recruitment (R0), catchabilities associated with catches and indices, and fleet-specific effort. In some models, a level of historic fishing (F_{hist}) was estimated, while other models fixed this parameter at 0 (assumes virgin conditions in 1975)."
(Quoted from SEDAR11-AW-03)

We investigated the sensitivity of the stock assessment model's results to assumptions about 1) the catch data, 2) the indexes, and 3) the mechanics of the model with the assumed biological parameter such as natural mortality (M) and fecundity,. The catches are of two sorts, the level of historical fishing and the estimated catches for which there are data. However, it quickly became apparent that this would be too large a task for this type of report, and instead will highlight a few examples that will indicate where there appear to be problems that need to be addressed.

i. Catch data As set forth in Liz's explanation of Shark_SPASM, the catch data comes in two parts, the historic catch that the model estimates, and the recorded catches starting in 1981. The catch before 1981 was assumed while from 1981 on it was based on estimates (recreational surveys of catch) or from recorded landings (commercial). The historic catch is estimated from the model. The recorded catches are for several sectors: commercial, recreational, scientific, Mexico, menhaden by catch, and discards. Most are estimated from sample data and dealers' reports.

The commercial catches are probably as good as can be had, but the recent discovery that there was major problem with the recording of the dealers' landing reports may result in some modifications of the estimates for the past few years.

There is no reason at this time to expect that adjustments can be made to catches for the other five sectors. The recreational catches are known to be highly uncertain, and should be subjected to more extensive sensitivity runs than has been the case. The other catch estimates are relatively minor in numbers and any changes unlikely to have any significant effect on the assessment.

Although recorded catches are assumed to begin in 1981, the model base case result (Fig. 7) assumes the stock biomass was virgin in 1975 because the first year for which there was an indexing value (the Virginia Longline or VA LL) was said to be 1975. However, when the VA LL index was standardized for SEDAR 11 to use in the model it was found that the earlier years lacked the information needed for the standardization. This complicated the modeling, as the first year having a standardized index now was 1981and, since F_{hist} was assumed to end with 1975, some way had to be found to bridge the gap to 1981.

For modeling the stock from 1975 to 1981, catch information was used from 1975 to 1981. This was estimated assuming that the recreational catches were zero in 1975 and increased linearly from 0 in 1975 to the estimated number in 1981and that the commercial catches were as in 1981. The slow decline in SSB/B0 between 1975 and 1981 shown in Figure 7 results from the recreational catches, which are the only appreciable catches assumed. Catch is the only thing that makes this model decline as there is no annual random variation in recruitment (and no catch-at-age data to estimate it). Recreational catch is believed to target young sharks and therefore some time must elapse before the effect of taking young fish shows up in the biomass of older fish. The commercial fishery, which targets larger fish, begins in the mid-1980's and, combined with the effect of the removals of the younger fish earlier on, is followed by an immediate and more rapid decline in SSB/B0 reaching a depletion level of 0.31 in 2004.

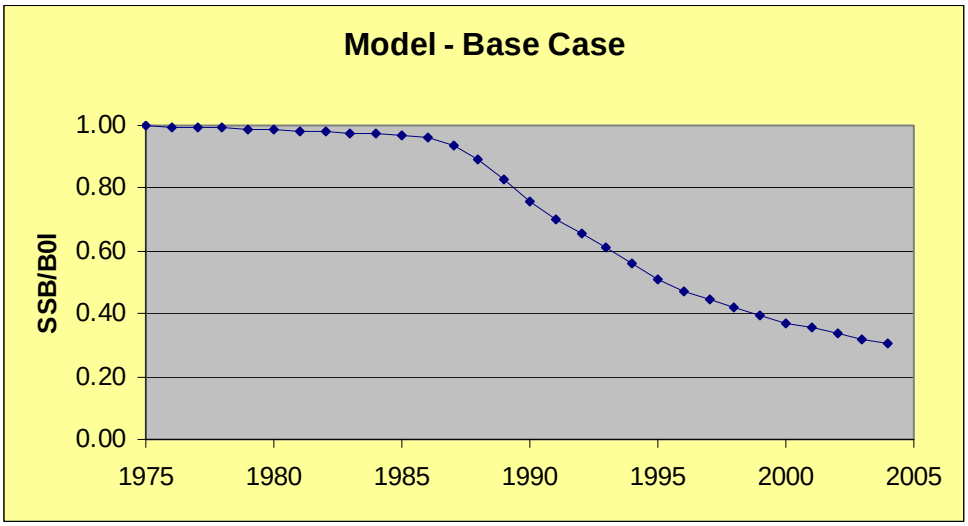

Figure 7. Trajectory for Model Base Case.

ii. Indices The eight indices used in the model are plotted in Figure 8 along with trajectory for the ratio of the Spawning Stock Biomass each year to Virgin Spawning Stock Biomass in 1975 (SSB/B0). The VA LL index, with some years missing, begins with 1981. The second longest time-series index is the Large Pelagic Survey index for recreational catch, which starts in 1985. The other indices start in 1993 when regulations for LCS first were implemented, and include indices from the commercial fishery.

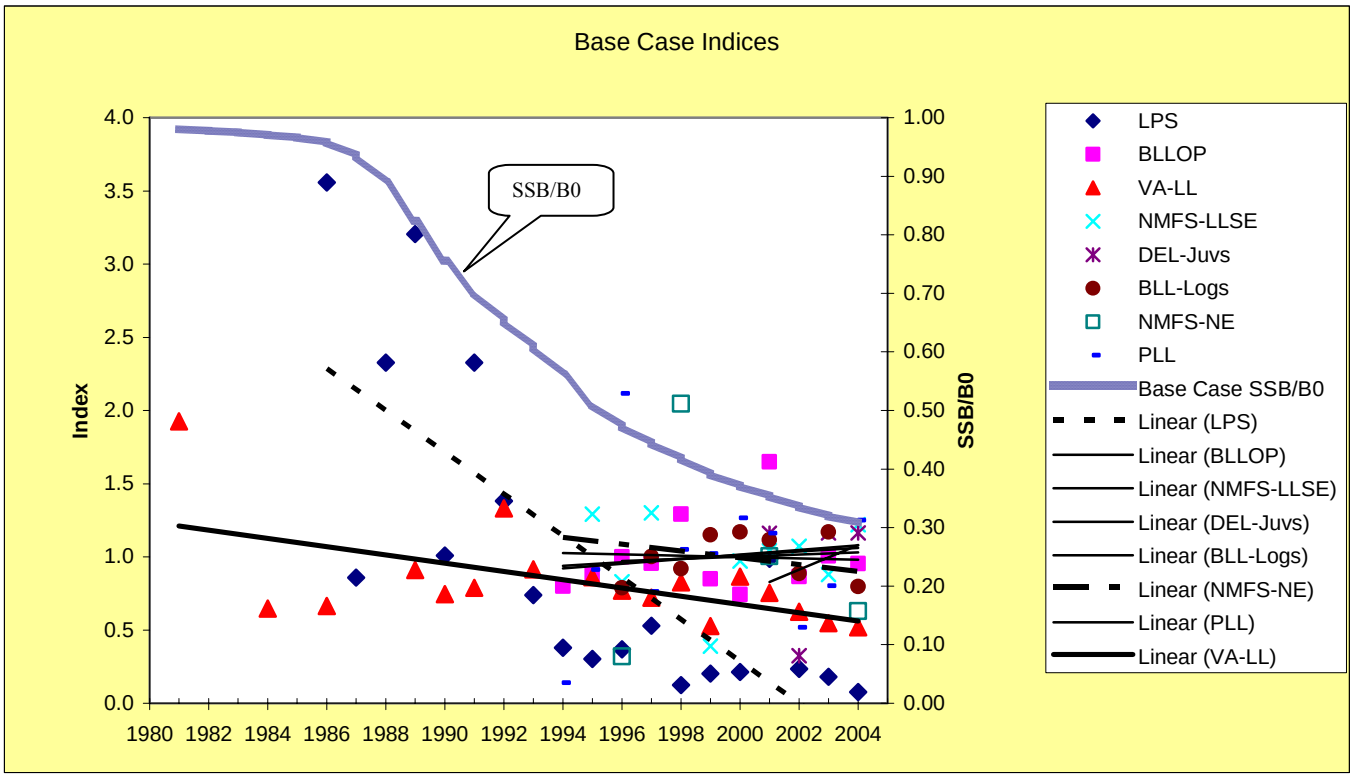

Figure 8. The eight base case indices plotted and showing their liner trends with the trajectory of the ratio of the spawning stock biomass to the virgin spawning stock biomass (SSB/B0) shown for comparison.

For the Base case, all indices are given equal weight in the analysis. This means that any index in which the points may have a trend, even though the variability (CV's or standard deviations) are very large, and the trend or slope is statistically not different from zero, will be seen by the model to be as good as an index that may have a statistically significant slope. The result is that a "bad" index (large CV) such as the LPS or NMFS NE is given equal weight to a "good" index such as the BLL-Logs.

Another problem with some indices is that they are not consistent throughout their lives. The assumption is that an index is proportional to stock abundance over time and that other factors such as fishing methods, area fished, environment, regulations, etc., remain constant or can be controlled in the course of standardizing the index. This may not be true, yet the index may be used even when some factor other than abundance is known to have changed over the course of time, as is the case with the LPS and, perhaps the VA LL.

The nominal trends for the VA LL, the LPS and the NMFS NE indices all are negative and roughly, in agreement with the biomass trajectory, which is not surprising since the trajectory is, in part, determined by the indices. Beginning with the VA LL, figures 9a and 9b show that the series consists of two parts that are essentially without a trend, an early period from 1975 through 1981, and a recent period from 1984 to present. The Index value for the early period 1975-1981 is roughly twice that for the recent period 1984-2004. The index used for SEDAR 11 omits all the years of the early part and begins with the final year 1981. Combining 1981 with the recent years causes the index o develop a negative slope that, though not statistically different from zero (flat), is perceived in the model to indicate a decline in abundance over the entire period 1981 to 2004. Why there is a difference in index level between two periods is unclear. We lack the data on size (age) and sex of the fish that might answer the question.

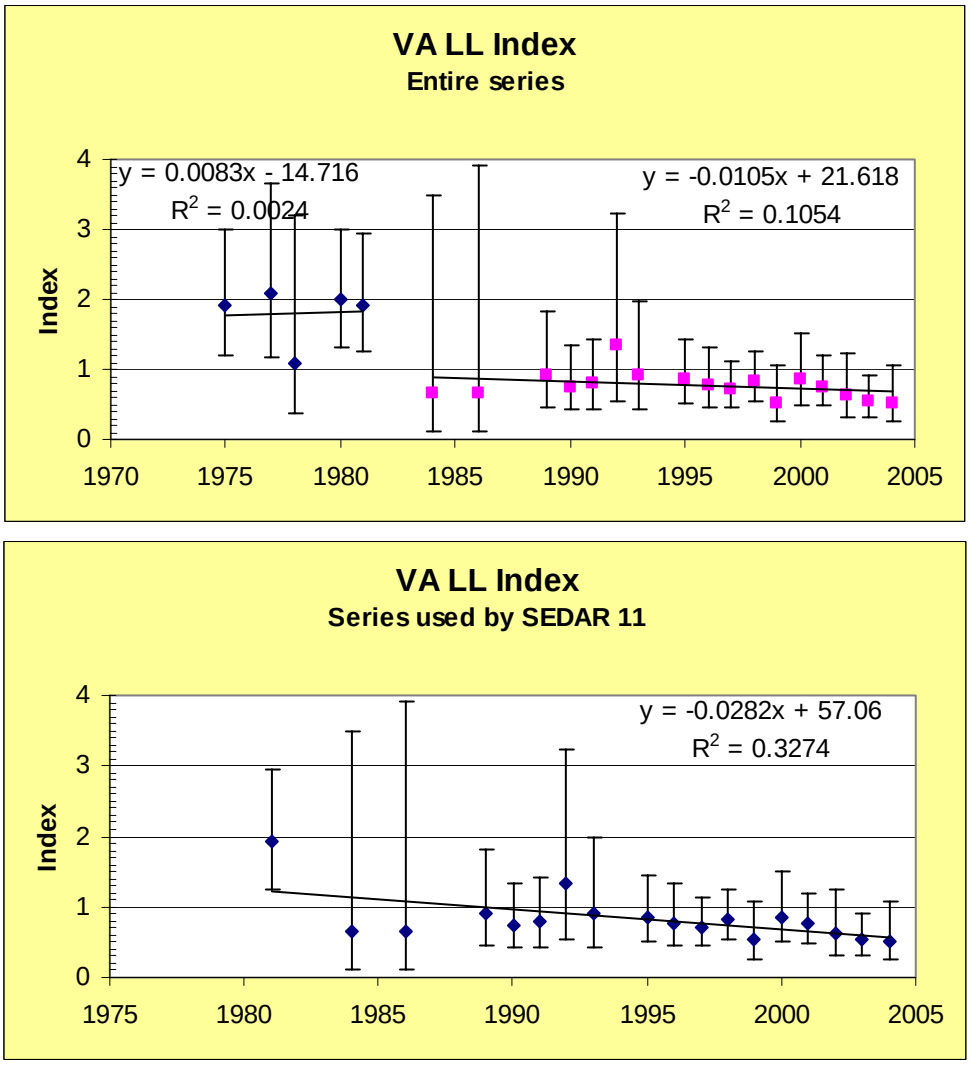

Figure 9a (top) and 9b (below). The Virginia Longline Index with trend line(s) and 95% C.I. None of the trend lines shown has a slope that differs from zero. Note that the full series beginning in 1975 appears to have an early part and a late part. The trend for each part is statistically flat. SEDAR 11, by beginning the series with 1981, produces a combined series with the 1981 point giving a larger (though still not significant) negative slope to the linear trend for the index.

The LPS index (Figure 10) has the same difficulty as the VA LL index in that it consists of two periods with high values in the early period and lower values in the recent period and addition problem that it has a very high degree of uncertainty associated with the second (recent) period. However, in the case of the LPS index we know a bit more about why the early period differs from the recent period. The LPS Index is for recreational catches off the NE Atlantic coast. The selectivity for this index was assumed the same as for the commercial catch, but no age or size information was available to confirm this supposition. This index has been used in previous assessments, but each time it was split into two indices: 1986-92 and 1993 to most recent year available. This was in recognition of the fact that the sportfishing regulations (size and bag limit) that went into effect in 1993 changed the way this fishery operated. One of us argued during SEDAR 11 DW that this should continue to be the case, or the index should not be included in the base case. That argument was dismissed out of hand. **We emphasize here that it is important to note that the LPS index is clearly two essentially flat indexes (slopes do not differ from zero), and to use the entire series to establish a trend that receives equal weighting in the assessment is not scientifically defensible.**

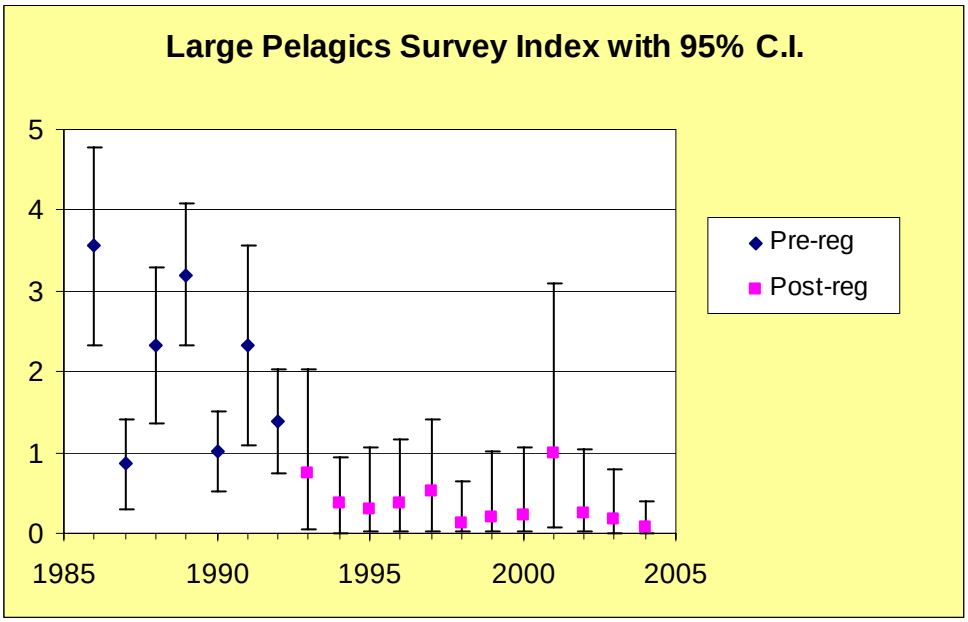

Figure 10. LPS index divided into to periods: Pre- and Post implementation of angling bag limit for Large Coastal Sharks that began in 1993. A reduced bag limit and size restrictions were added in 1999. The trend for the entire combined series is negative and significant, whereas the trends for the two separate periods are not different from zero.

The third index the NMFS-NE is a different matter (Figure 11). It is a puzzle why this index was selected as a Base Case index other than it has a negative slope when given equal weight. It has such enormous coefficients of variation that it is takes a leap of faith to accept that it contains any reliable or useful information about stock abundance. We believe that there is no valid reason to include it even as a sensitivity index.

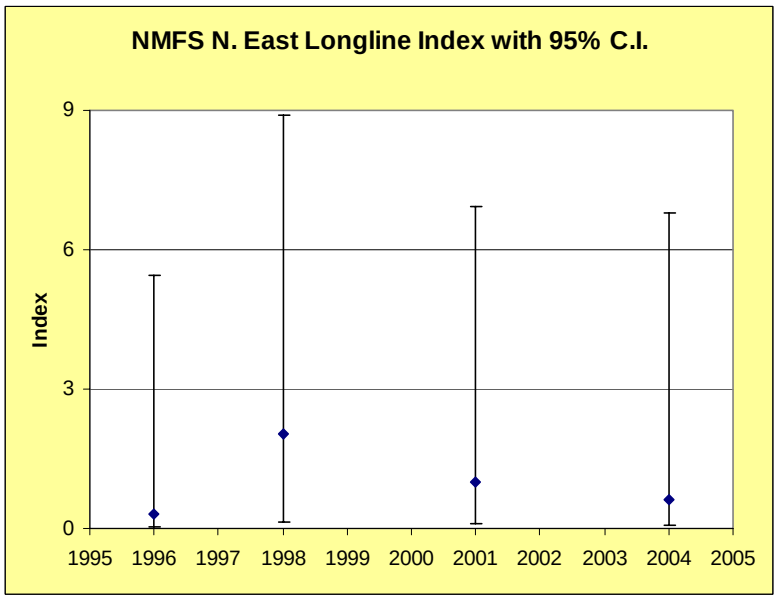

Figure 11. NMFS-NE longline index. The question is why an index with only four points and such an extreme range of uncertainty was included in the Base Case analysis. The index has no statistical trend other than zero, but when given equal weight in the assessment has considerable influence on the outcome. NMFS-NE index should not have been included as a base case index. Aside from the fact that there are only four observations, the enormous CV's should have precluded its use even as a sensitivity index.

The VA LL index may or may not be usable when and if it is properly standardized. As with the LPS and NMFS NE it samples only a fraction of the sandbar stock during the summertime when some fish have moved north to the Atlantic pupping grounds; however, large summer catches occur in waters south of Cape Hatteras and in the Gulf of Mexico at this time, thus these indices sample only a fraction of the population. None of these indices sample the areas where the majority of the fish are located and how representative these samples are of the population needs to be determined. Second, the VA LL index has in the course of sampling collected size and sex information. So far, the author has refused to make this information available. Thus, it impossible to know what size or sex selectivity to apply to the series – what segment of the population it is monitoring – a flaw with the LPS data as well. Until that information is provided, the use of this index should be restricted to a sensitivity run.

The remaining five indices are plotted in Figure 12. Three are from the commercial fishery, sample the entire range of the fishery, and begin when mandated by LCS Fishery Management Plan in 1994. What is of interest is the fact that all five indices are stable or have a positive trend over the ten-year period, whereas the model predicts the spawning stock has declined over 40-percent. **The inconsistency between the model prediction and the stable or increasing trend in abundance indicated by the five indices taken together with the failure for the average age of the catch to decline should have been a red flag to the CIE that the model has a problem that has to be corrected.**

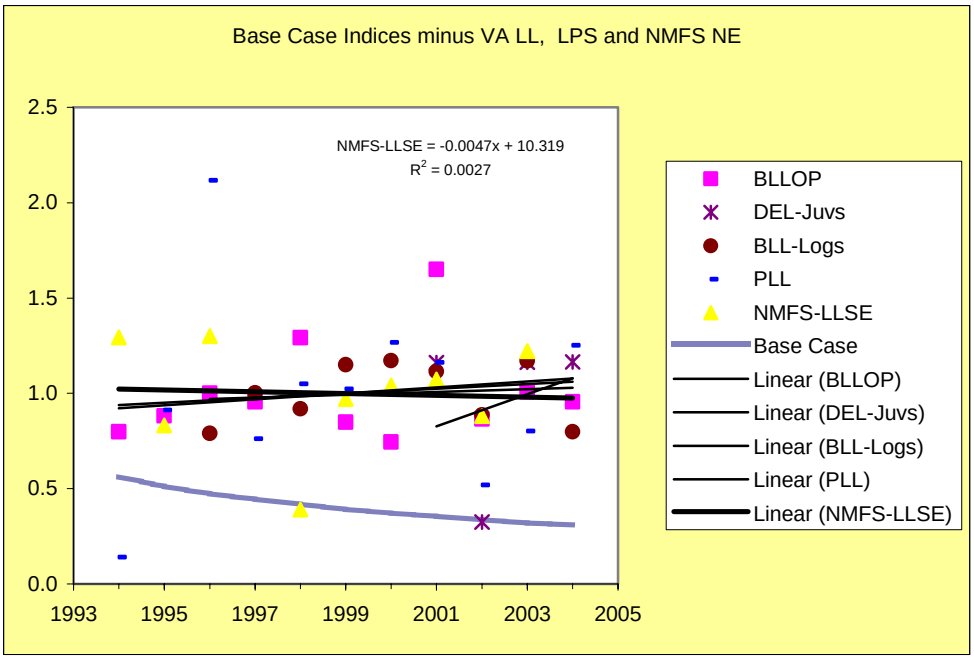

Figure 12. The five base case indices plotted and showing their liner trends with the trajectory of the ratio of the spawning stock biomass to the virgin spawning stock biomass (SSB/B0) shown for comparison. Note that one, NMFS-SE, has a very slight and non-significant negative slope.

ii (a) Testing the indices. In an assessment model, the indices establish a trend in abundance, which together with the catches and the workings in the model estimate the present condition of the stock. How much influence the indices have depends in part on the model. We tried several combinations of the indices to see how the output of the model changed depending on the combinations we selected. The different trajectories for SSB/B0 are shown in Figure 13.

ii (a) (1) Base Case and ii (a) (2) No VA LL The first trajectory to locate is the base case trajectory. If Figure 10 is not in color, the easiest way to identify the different trajectories will be to look at about the year 1995 and move up vertically. The base case is marked only by open square symbols and these are the second set of symbols from the bottom. What makes them difficult is that when we plotted the trajectory with The VA LL index heavily down weighted (the line labeled No VA LL) the trajectories are nearly identical with the base case, and the square symbols appear to be part the No VA LL curve. The final output levels for both trajectories is 31-pecent of the virgin spawning biomass This result was surprising as in past assessments the VA LL index

alone had a major impact on the perception of the status of the stock. However, the re-standardization of the index done this year combined with omitting the years prior to 1981 resulted in a less steep decline than in the past. With this assessment, down weighting this index alone has essentially no effect on the model outcome.

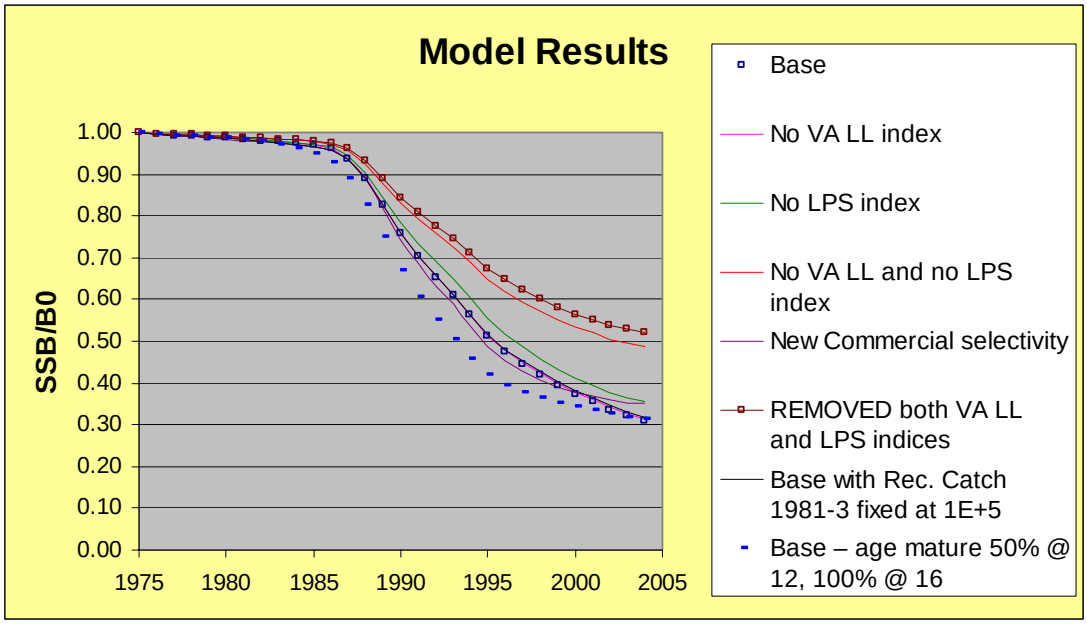

Figure 13. Experiments with the indices. See text for explanation of trajectories.

ii (a) (3) No LPS Our next experiment was to heavily down weight the LPS index. This is about equivalent to using inverse variance weighting for this index. The resulting trajectory appears as the fourth curve up from 1995 as the Base Case and No VA LL appear together as a single line. Down weighting the LPS index results in a more optimistic outcome.

ii (a) (4) No VA LL and No LPS In this experiment, both the VA LL and the LPS indices were heavily down weighted. The resulting curve is the next to the top. The result is much more optimistic, with SSB/B0 near the 50-percnet level although the stock continues to decline. Since the remaining indices are nearly flat in trend, the failure to flatten is likely driven by the biological parameters assumed in the model.

ii (a)(5) remove VA LL and LPS We then re-ran the experiment this time removing these two indices from the data file rather than merely down weighting them. The trajectory is the top curve with the closed square symbols. The final ratio is a bit above the 50-percent level and fishing mortality is less than F_{MSY} – the stock is not overfished and overfishing is not occurring. From a technical standpoint, the difference between this run and run 4 is interesting because it demonstrates that down weighting an index, which is easier to do than removing it form the data input file, is not exactly equivalent to removing it. This is mainly when the index stands alone for the first part of the time series. In the case of the VA LL and LPS they start about a decade before the other indices, therefore the small signal that remains after down weighting the index still affect the model.

ii(a)(6) Base Case using a different selectivity curve The next experiment we tried was to modify the commercial selectivity curve to be closer to what was observed in the BLOP data base. The trajectory is the second curve from the bottom. Using this selectivity curve results in a slightly more optimistic outlook, and more interesting is that here the trajectory flattens out in the recent years instead of continuing to decline as with the other runs so far. Why this happens is worth further investigation.

ii(a)(7) Base with Rec. Catch 1981-3 fixed at 1E+5 Here we chopped the early recreational catches down to a low level to see how sensitive the model is to what is a very uncertain estimate of catches. The trajectory is essentially the same as with runs 1 and 2 and overlies these two runs. This and the next run were done also by SEDAR 11.

ii(a)(8) Base case with age mature 50% @ 12, 100% @ 16 The last run in this series of experiments looks for the effect of using a young age at maturity ogive. A similar run was done by SEDAR 11and in both cases the final depletion level is the same as with the Base Case. However, we need to point out that the trajectory, which was not plotted by SEDAR 11 (this is the bottom line in the figure) shows a steeper decline than the Base Case followed by a leveling off in the last years. As the leveling off implies, fishing mortally is lower (by about half) in the terminal year than in the Base Case.

The resulting reference points for these runs are given in Table 2 along with runs 9 through 12 that are not plotted in Figure 13.

Case	SSB_{2004}/SSB_{virgin}	SSB_{2004}	F_{2004}/F_{MSY}	Pup survival	Steepness
1. Base Case – files received from Liz Brooks	0.31	428,000	3.72	0.62	0.32
2. Base down wt. VA LL	0.31	435,000	3.69	0.62	0.32
3. Base down wt. LPS	0.36	570,000	1.41	0.98	0.42
4. Base down wt. VA LL and LPS	0.49	936,000	0.98	0.97	0.42
5. Base remove both VA LL and LPS	0.52	1,080,000	0.87	0.95	0.42
6. Base with modified commercial selectivity	0.35	796,000	2.46	0.68	0.34
7. Base with Rec. Catch 1981-3 fixed at 1E+5	0.32	424,000	3.52	0.65	0.33
8. Base – age mature 50% @ 12, 100% @ 16	0.31	678,000	1.76	0.57	0.41
9. Base down wt. LPS, NMFS-NE, and VALL	0.67	1,011,000	0.92	0.97	0.42
10. As in 9 with the modified maturity	0.51	1,525,000	0.55	0.93	0.53
11. Base (1) with modified maturity and commercial selectivity	0.45	1,616,000	0.94	0.69	0.46
12. As 10 with modified commercial selectivity	0.58	2,751,000	0.48	0.85	0.51

Table 1. Reference points from experimental runs for Shark_SPASM

Runs 1 through 5 explore the effect the two long time series indices VA LL and LPS have on the model outcome. As noted above, down weighting the VA LL (2) has slight effect on the outcome whereas down weighting LPS (3) results in a more optimistic outcome with the F ratio and SSB being improved considerably, but accompanied by an estimate of pup survival that is quite high, and an increase in the estimate for steepness. Runs 4 and 5 reduce or remove the effect of both VA LL and LPS from the model and, as previously noted, provide a much more optimistic outcome, but again with a very high estimated pup survival and increased steepness.

To conclude our exploration of the negative indices, we made Run 9 that down weighted NMFS-NE as well as VA LL and LPS. As expected, there is further improvement over the optimistic outcome seem for Run 4. Again, pup survival is estimated to be quite high and steepness increases. We did not try actually removing all three indices, but we anticipate that the result would be an improvement over Run 5 with a lower F ratio and slightly lower estimated pup survival. This run has leaves the model with information mainly from indices that cover the period from 1993 through 2004 and are all essentially flat. (The down weighted indices still have a slight effect.) Thus, the outcome is the result of the catch information, the biological assumptions and the selectivity curves combined with indices that indicate stock abundance has been stable in recent years.

Run 6 investigates the Base Case using a modified commercial selectivity that is based on observational data in the BLOP data set. The outcome is similar to what we got by down weighting the LPS index: the F ratio is improved as is stock size, but with the estimate for pup survival much lower and perhaps more realistic than when LPS was down weighted.

Run 7 investigates the Base Case using a modified recreational catch that reduces the large catches in the early years to a perhaps more believable level. The outcome is slightly more optimistic, but because recreational catches are so poorly accounted, any changes to the data base are speculative. Further exploration and sensitivity runs should be done after examining the origin of the estimated catches, but that was not something we could do at this time.

Run 8 investigates the Base Case using a modified maturity ogive that is based on observational data other than the Merson study used by SEDAR 11. As noted by SEDAR 11 when it made this sensitivity run, the outcome is unchanged with respect to the final biomass ratio. However, the spawning biomass is considerably great – as might be expected since the number of mature animals would be increased by the addition of younger fish – and the F ration is much more optimistic. Pup survival and steepness are acceptable.

We then used the modified maturity ogive in Run 10 that also down weighted the negative indices. The result is very optimistic but pup survival is estimated to be high.

For Run 11 we returned to the Base Case inputs but used both the modified maturity ogive and the modified commercial selectivity. The result is optimistic with F_{2004}/F_{MSY} ratio less than 1.0 and pup survival (0.69) believable.

Run 12, the last we did, down weights the negative indices and uses the modified maturity ogive and commercial selectivity. The result is optimistic and pup survival is arguably acceptable. In this run and five other runs the stock is not overfished and/or overfishing is not occurring. In ten of the twelve cases examined, the model estimates that steepness lies outside the bounds (0.2 to 0.4) set by SEDAR 11 but there are no quantitative data to support this range. Density dependence response is presumed to exist for SB, perhaps mediated through a change in age at maturity and a lowering of natural mortality for both adults and pups, and the biological basis for fixing the upper bound for steepness at 0.4 needs to be examined.

iii. The Model

The CIE has this to say about the model: "Ultimately, the methods used for estimating stock status were found to have been much more sensitive to assumptions about life history parameters than the catch and catch-rate data used in the model.

"Size and maturity stage information was reported as being collected from the VIMS longline and some of the other series, but those data were not supplied to the stock assessment scientists. Given that the VIMS survey was a designed fishery-independent survey, it would have been helpful to have the size information to see if the component of the population that it was monitoring had been changing over time.

"An age-structured population model with state-space dynamics for some of the components and prior distributions assigned to some of the parameters was fitted to the data. No age data were used in the model, and the age structure was used mainly to incorporate different natural mortalities- and selectivities-at-age for the different fisheries (i.e. commercial, recreational, bycatch in menhaden fishery). Catch-rate indices were assumed proportional to population size, albeit with series-specific catchabilities and selection curves dependent upon whether they were commercial- or recreational-fishery-dependent, or fishery-independent series.

"The model adequately incorporated the information from the available catch-rate indices and was the best available for the data provided. However, while catch-rate indices can inform on trends, they do not necessarily help generate understanding of the life history patterns that underpin stock status estimation. Pup survival was the only life history parameter to be estimated in the model, and other parameters such as natural mortality-at-age and the prior mode for pup survival had to be adjusted so that the steepness parameter remained within a reasonable range for the species."

We have covered some of these comments above. The CIE comment about the failure to use age data in the model deserves additional comment in that the model in its present form cannot incorporated size data except indirectly[2], and then it got it wrong in the case of the selectivity curve. There are other stock assessment models

[2] Size has to be converted to age, which was done using a von Bertalanffy equation.

available that are able to use size data directly, and it would be useful to employ one or more along with the corrections to the indices and compare results.

The CIE also notes: "Ultimately, the methods used for estimating stock status were found to have been much more sensitive to assumptions about life history parameters than the catch and catch-rate data used in the model." This is a very serious defect. The use of biological parameters in the modeling would be quite useful if these parameters were estimated from data. In practice, only the average number of pups and age at maturity were based on sample data. The former comes from several studies and is consistent with the BLOP data. The age at maturity study, however, is seriously flawed. The animals were not aged, rather length was estimated using a von Bertalanffy equation that may not be correct, and in any event introduces a second source of error that was not accounted for. There is evidence that age at maturity has decreased in recent years. Unfortunately, the study material was discarded, and there is no way to redo the work except collect new specimens.

The other biological parameters used by the model are natural mortality M, pup survival and steepness. Pup survival is estimated by the model, which is a circular process, or fixed by the modeler, which in subjective. The values for M that were decided by SEDAR 11 BW were changed for the final assessment. Steepness was likewise manipulated in order to achieve a credible model output. The fact that these parameters were derived subjectively is disturbing as these are the assumptions the CIE point to as being more influential on the estimate of the status of the stock than are catch and catch-rate data.

3. **Projections**

We did not explore the projections. The future status of the stock is dependent upon the biological parameters, particularly the maturity ogive. Further work needs to be done to include the additional size/age at maturity information and to resolve the inconsistencies in the model results before projections may make sense. In particular, the biological parameters have to be carefully re-examined as they alone control the modeling for the future condition of the stock. Projections need to consider density dependent effects on age (size) at maturity, fecundity and natural mortality. Projections that do not recognize the variability of environmental conditions on growth rate and species interactions such as predation on pups will be misleading over the long term.

4. Conclusions and recommendations

To sum up our conclusions:

- ***The assessment proceeded without using the largest data set available, the BLOP data, which inter alia shows that average age of the catch has not declined over time, as it should if the stock were being overfished.***

- ***The BLOP data also show that the selectivity curve used for the commercial catch is wrong and needs to be re-examined.***

- ***Catch-rates for recent years remain level indicating a population in equilibrium; overfishing is not occurring, whereas the model trajectory indicates a continuing decline in abundance.***

- ***The assessment used several catch-rate series (LPS and NMFS – NE) that were either inappropriate, or did not include the available (but withheld) size and sex data (VA LL).***

- ***The age-at-maturity ogive was derived from a study that is technically flawed.***

- ***The biological parameters used in the model were selected subjectively and there may be some evidence that different values are more appropriate.***

The problem now is that NMFS has used this technically flawed assessment to make the formal finding that the stock is overfished and overfishing is occurring. This starts a legal process that may require a severe reduction in TAC. There is time yet to revisit the assessment before that reduction is in place if NMFS is willing to devote the effort and address most of the concerns the CIE and we have raised. Redoing the maturity ogive study may not fit into this period, but the other work could be done a matter of months.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
1315 East-West Highway
Silver Spring, Maryland 20910

THE DIRECTOR

Mr. Russell Hudson
Directed Shark Fisheries, Inc.
P.O. Box 11604
Daytona Beach, Florida 32120-1604

JUL 13 2007

Dear Mr. Hudson:

Thank you for your report entitled "Report to Directed Shark Fisheries, Inc. on the 2006 SEDAR 11 Assessment for Sandbar Shark." This document was received by NOAA's National Marine Fisheries Service (NMFS) during the scoping period for an Amendment to the Consolidated Highly Migratory Species (HMS) Fishery Management Plan (FMP). This amendment will implement shark management measures consistent with recent stock assessments.

Based on the February 12, 2003, request of the industry, environmentalists, and academics to improve shark stock assessments, NMFS conducted the 2005/2006 Large Coastal Sharks stock assessment under the Southeast Data, Assessment, and Review (SEDAR) process. This is the same process used by the South Atlantic, Gulf of Mexico, and Caribbean Fishery Management Councils. At all stages, industry, environmentalists, and other interested parties were invited to participate in the process. NMFS believes that the latest stock assessment for sandbar sharks constitutes the best available science.

During the review workshop held June 5-9, 2006, the panel selected by the Center for Independent Experts found that the data and the models employed during the data and assessment workshops, respectively, were the best currently available for evaluating the stock status of sandbar sharks. Your specific concerns regarding which data sets were used in the assessment, selectivity curves employed, appropriateness of catch series included, the age-at-maturity ogive for sandbar sharks, and the selection of biological parameters are addressed in greater detail in the enclosure.

The stock assessment continues to represent the best available science as indicated by independent stock assessment specialists. NMFS is developing proposed management measures consistent with the results of the assessment. There will be additional opportunity for public comments when the proposed rule and draft Environmental Impact Statement for Amendment 2 to the Consolidated HMS FMP are released.

I appreciate your continued involvement in shark management.

Sincerely,

William T. Hogarth, Ph.D.

Enclosure

cc: Dr. Frank Hester
Dr. Mark Maunder

THE ASSISTANT ADMINISTRATOR
FOR FISHERIES

SCIENTIFIC REVIEW OF HESTER AND MAUNDER'S "REPORT TO DIRECTED SHARK FISHERIES, INC. ON THE SEDAR 11 ASSESSMENT FOR SANDBAR SHARK" (2007)

In this section, the Agency addresses each of the bulleted points listed in the report by Hester and Maunder entitled "Report to Directed Shark Fisheries, Inc. on the 2006 SEDAR 11 Assessment for Sandbar Shark" (2007).

- ***1. The assessment proceeded without using the largest data set available, the BLLOP data, which inter alia shows that average age of the catch has not declined over time, as it should if the stock were being overfished.***

This is incorrect. The Bottom Longline Observer Program (BLLOP) data was used in several places during the assessment:

1) Annual average weights from the BLLOP were used to transform commercial landed weights into numbers;
2) An index of relative abundance for the period 1994-2004 was produced; and,
3) Along with other datasets, the BLLOP was used to develop the commercial gear selectivity.

Note that only lengths, not ages, are available from the BLLOP. In the Hester and Maunder (2007) report, length is converted to age using a growth curve from Sminkey and Musick (1995). A lack of declining trend in size through time may be attributed to the fact that the directed bottom-longline shark fishery targets large individuals. While the BLLOP samples the directed bottom-longline shark fishery, one must keep in mind several caveats: the program covers approximately five percent of fishing trips, it was voluntary until 2002, and it is not a fishery-independent index. Fishery independent data is more effective at sampling a larger range of size classes and, therefore discerning trends in size, because any animal that is available to the gear has an equal likelihood of being sampled. Fishery dependent data represents fishermen targeting larger specimens for their greater fin value. Furthermore, fishery-independent data samples random or semi-random locations, whereas, fishermen generally only deploy gear where they have a higher likelihood of catching sharks.

The statement that the average age of a population is expected to decrease under exploitation is true only with qualifiers. For instance, if all ages are fully selected, then exploitation removes the same fraction from each age class over time, so that they are still in relatively the same proportion to each other. In the 2006 assessment, the average age in 1975 is 10.91 yr, and it drops to 9.63 yr in 2004. Over the years presented in their size analysis (1994-2005), the assessment results show that the average age decreased from 9.92 to 9.63 yr. As the age change is not appreciable, it is not surprising that Hester and Maunder (2007) do not find a decreasing trend in their analysis of length trends over years.

Hester and Maunder (2007) further state that the reviewers stopped short of "comparing the model results with actual information from the fishery." Fishery information is included in the

assessment in a variety of forms (observer program information, landings, catch), and as such, the model results include fishery information.

Hester and Maunder (2007) indicate that size and sex composition from the BLLOP was not made available at SEDAR 11. This is not entirely correct. The size composition (length-frequency distributions by year and area as well as average length and weight by year) of the catch in the BLLOP was presented in document LCS05/06-DW-16 (Cortes and Neer 2005). Sex information was not presented as the models are not sex-specific. The assessment model assumes males and females are selected by the fishery with equal probability. If there were a sex ratio difference in targeting (biased towards females), this would lead to a greater depletion of mature females than is currently estimated by the model.

Figure 1 in the Hester and Maunder (2007) report, is summarized over all areas, and presumably is intended to support the fact that there was no change in the size composition of the population over the period spanning 1994-2005. However, it is clear from Figures 5 and 6 in the Hester and Maunder report that the size distribution and catch distribution vary by geographic area. Specifically, almost twice as many samples are available from the Mid Atlantic Bight than from the Eastern Gulf of Mexico or the South Atlantic, and the median size and range of sizes is much smaller in the Mid Atlantic Bight. This seems to indicate that the area with the most fishing (Mid Atlantic Bight) has a smaller size composition than areas with less fishing (Eastern Gulf of Mexico, South Atlantic), and likely reflects the impact of fishing on the population.

- ***2. The BLLOP data also show that the selectivity curve used for the commercial catch is wrong and needs to be re-examined.***

As mentioned above, the authors used a growth curve to convert the BLLOP length data to age, and then generated a "catch-at-age" curve for those data. While the BLLOP curve developed differs in shape from what was used in the assessment, the selectivity curve used for the BLLOP was termed "commercial+unreported" catch in the Hester and Maunder (2007) report. It was applied to various gears, not only bottom longline, and was used for a variety of indices (LPS, BLLOP, BLL-logbook, VA LL, PC Gillnet, NMFS LL NE, NMFS LL SE, and Pelagic Logbook). The Catch Working Group at the Data Workshop (in which industry members were represented) decided to reflect the fact that younger age classes can also be retained by (and are available to) various gears. No concerns were raised at that time.

It is interesting to note that, according to Figure 4b in the Hester and Maunder (2007) report, the age of full selectivity developed is actually 5-7 years *earlier* than that of the selectivity used in the 2006 assessment (Figure 4a in the Hester and Maunder report), indicating that more, smaller fish would be available and fully selected by the gear than the current model suggests.

- ***3. Catch-rates for recent years remain level indicating a population in equilibrium; overfishing is not occurring, whereas the model trajectory indicates a continuing decline in abundance.***

The Hester and Maunder (2007) report states that commercial landings and catch rates have remained stable for over a decade, and suggest that this is evidence that the stock assessment results do not reflect reality. It is important to remember that catch rate time series in isolation do not tell the whole story. Most catch rate series show stable or unclear trends in recent years (since the mid-1990s), but the large declines occurred in the late 1970s and 1980s (see VA LL, LPS, and MRFSS). In fact, there has been a commercial quota imposed on the fishery since 1993 (for over a decade); stable landings in the last decade most likely reflect the effect of a commercial quota, not of a stable population. Furthermore, commercial catch declined from 162,000 individuals in 1989 to 72,600 individuals in 1993, prior to implementation of the commercial quota.

Hester and Maunder (2007) also state that the 45% decline in spawning biomass "should be reflected by a decrease in the average age of spawners." However, as clearly pointed out in the Assessment Workshop report (p.86, text following eq. 2), spawning biomass is actually pup production, i.e. $SSB = \sum_a N_a mat_a pup_a$, where mat_a is maturity at age and pup_a is pups produced at age. Thus, the 45% decline in spawning biomass reflects a 45% decline in pups produced, not in weight of spawners. Since all mature sandbar sharks are assumed to produce the same number of pups, the age of the shark is irrelevant in this analysis other than determining whether or not an individual is mature. The 45% decline therefore reflects a decline in abundance (numbers) of mature sharks. The corresponding decline in total abundance for the same period (all ages considered) is 32% (N_{2005}/N_{1994}).

Hester and Maunder (2007) suggest that more extensive sensitivity runs should be made for the recreational catches; however, this point is irrelevant as a catch-free model was also applied to the sandbar shark data (see page 3 in SEDAR11-AW-03) and the same conclusions about stock status were reached.

There is bold text on page 11 of the Hester and Maunder report that discusses the inconsistency between the model predicted decline in SSB (spawning biomass), the lack of decline in average age, and the stable or increasing trend in abundance indices from 1994. As previously pointed out, the model results do not predict a substantial decline in average age, and therefore there is no inconsistency with Hester and Maunder's estimates from the BLLOP data. Eliminating the longer time series disregards critical historical information to help inform the model over the entire history of the fishery. In many cases, trends in relative abundance of sandbar and other sharks have remained relatively stable since the introduction of management in 1993.

- ***4. The assessment used several catch-rate series (LPS and NMFS – NE) that were either inappropriate, or did not include the available (but withheld) size and sex data (VA LL).***

Large Pelagics Survey (LPS)

The Agency does not agree that the inclusion of the LPS data was inappropriate. All decisions to keep or eliminate catch rate series were discussed in detail by the Indices Working Group (in which Dr. Hester participated) during the stock assessment data workshop and a consensus decision was reached. The arguments that the authors make regarding the LPS series (that it has been split in the past due to regulation changes, and that regulations would affect catch) are

incorrect. The index was not split in 2002 and the index includes estimates of discards, so the imposition of size and bag limits is not expected to impact the assessment, as there is no indication that fishers would make significant changes to targeting methodology. Finally, contrary to what is stated: "The LPS index is clearly two essentially flat indexes" is not true, as the 1985-1992 period shows a declining trend.

The text on page 9 of the Hester and Maunder report (2007) referring to the LPS index is inconsistent with earlier statements on page 7. Specifically, on page 7, Hester and Maunder (2007) summarize the model trajectory: "The slow decline in SSB/B0 [sic] between 1975 and 1981 shown in Figure 7 results from the recreational catches, which are the only appreciable catches assumed. Catch is the only thing that makes this model decline as there is no annual random variation in recruitment (and no catch-at-age data to estimate it). Recreational catch is believed to target young sharks and therefore some time must elapse before the effect of taking young fish shows up in the biomass of older fish. The commercial fishery, which targets larger fish, begins in the mid 1980's and, combined with the effect of the removals of the younger fish earlier on, is followed by an immediate and more rapid decline in SSB/B0 [sic] reaching a depletion level of 0.31 in 2004." This is a reasonable summary of the model behavior, yet on page 9, Hester and Maunder (2007) write that "The LPS index (Figure 10 in the Hester and Maunder report) has the same difficulty as the VA LL index in that it consists of two periods with high values in the early period and lower values in the recent period." The Agency questions why this is characterized as a *difficulty* when it is completely consistent with the earlier text describing the catch history and the impact on SSB. Hester and Maunder (2007) state that the index should be split as it had been in the past to reflect the change in regulation (size and bag limit). Two points need to be clarified here: 1) the LPS index was not split in 2002 and 2) the LPS index includes estimates of discards, so the imposition of size and bag limits is not expected to impact the assessment as there is no indication that fishers would make significant changes to targeting methodology.

Virginia Institute of Marine Science Longline Survey (VA LL)

Hester and Maunder (2007) state that the lack of shark age information from the Virginia Institute of Marine Science's longline (VA LL) survey led the Agency to inappropriate size selectivities. While length information from the Virginia Institute of Marine Science's longline (VA LL) survey was not incorporated in the current assessment (only one series containing all sizes was developed), it may not have provided any additional useful catch rate series had it been available. The data would have to have been converted from length to age, and then further separated into the various life stages (neonate, juvenile, adult). Since the entire data set is relatively small, the model may not have been able to standardize the series because of the limited number of samples. Breaking larger data sets into smaller pieces may have resulted in there not being enough information to conduct the analyses required. The various age/stage series used in the 2002 assessment were nominal. It is likely that the assessment participants might not have been able to develop standardized indices by stage because as one partitions a small data set into even smaller parts, one may end up with insufficient observations for all years to conduct the statistical standardization.

Hester and Maunder (2007) also state that the VA LL index omitted data prior to 1981, which is incorrect. The data included years from 1975 to 2004. Furthermore, we note that this index was used without contest in the 2002 assessment. Additionally, Hester and Maunder (2007) state that age data contained within the VA LL data set was not made available. As stated previously, there is no age data for the majority of the time series, just length information; the exception being when directed ageing studies were being undertaken, but these constitute only a very small portion of the total sample.

Hester and Maunder make the statement on page 11 that "The VA LL index may or may not be usable when and if it is properly standardized." The Agency is not sure to what the authors are referring. This index was initially standardized using a general additive model (GAM). Following recommendations of the Indices Working Group, the index was re-standardized for consistency with other indices following the Lo et al. (1992) methodology. Therefore, it was properly standardized, using well established and accepted statistical techniques.

The authors also state that, with regards to the VA LL index, "it is impossible to know what size or sex selectivity to apply to the series" since size or sex data were not provided for review during SEDAR 11. The 2002 assessment used several nominal forms of this index, split by stage/size class. At that time, all sizes/stages were represented, thus a selectivity representing all stages is appropriate for use in the current assessment as all stages/ages would still be represented in the data. Additionally, sex-specific selectivities are not utilized for any index.

National Marine Fisheries Service Northeast Index (NMFS NE)

The text on page 10, in particular in the legend for Figure 11, suggests that the high uncertainty for the NMFS NE index, and the fact that it has only 4 points should have precluded it from being used in the assessment. Giving all indices equal weight or weighting all indices by their CVs resulted in the same conclusion. The statement by Hester and Maunder (2007) that the NMFS NE index "has no statistical trend other than zero, but when given equal weight in the assessment has considerable influence on the outcome" is false. It contributes very little to the objective function (Assessment Workshop Report. page 122, Fig. 4.12).

- ***5. The age-at-maturity ogive was derived from a study that is technically flawed.***

The Agency does not believe this to be the case. Hester and Maunder (2007) state that the study is "technically flawed" since the animals used in the reproductive study were not directly aged, but rather length was converted to age using a von Bertalanffy growth equation. The Agency would like to make several points in this regard:

1) This is commonly the case with reproductive studies, especially when an age and growth study already exists for the species;
2) The impetus for using an existing age and growth study for conversion from length to age is especially strong in this case because the specimens used in the age and growth study (Sminkey and Musick 1995) were collected within approximately 5 years of the reproductive samples, and were collected from the same region; and,

3) Hester and Maunder (2007) used this very same growth curve (Sminkey and Musick 1995) to convert the length information from the BLLOP to age for use in deriving a selectivity curve for those data.

Hester and Maunder (2007) criticize the maturity study as being flawed. "The animals were not aged, rather length was estimated using a von Bertalanffy equation that may not be correct, and in any event introduces a second source of error that was not accounted for" (page 15 of the report). Despite making this comment, Hester and Maunder (2007) begin this subsection by saying "Converting lengths to ages using a von Bertalanffy equation (Sminkey and Musick, 1995) gives the distribution for the BLLOP catches shown in Figure 3" (page 4 of their report). It would seem that Hester and Maunder (2007) are arguing both *for* and *against* using the von Bertalanffy growth equation which is logically inconsistent. By using the same von Bertalanffy equation that Hester and Maunder (2007) criticize, they are also introducing the same "sources of error" that they advise against introducing.

Furthermore, the Sminkey and Musick (1995) growth curve was constructed based on animals caught off the coast of Virginia. Specimens for the maturity ogive (Merson 1998) were also collected from this area within five years of when the specimens for Sminkey and Musick (1995) were collected. Hester and Maunder (2007) state that the BLLOP dataset is "representative of about 90% of the commercial catch of sandbar" but "does not include the North Atlantic Region (which includes Virginia)" (page 2 of their report). Given the difference in geographic coverage between the BLLOP samples compared to the Sminkey and Musick (1995) growth curve they use to convert lengths to age, it would seem that the Merson (1998) and Sminkey and Musick (1995) studies employed in the stock assessment would be more compatible since they both employ animals caught from the same region.

- ***6. The biological parameters used in the model were selected subjectively and there may be some evidence that different values are more appropriate.***

This is incorrect. The values of life history parameters agreed to at the data workshop produced steepness values below the theoretical minimum level. A document produced at the assessment workshop, SEDAR11-AW-10 (Brooks and Cortes, 2006), reflected the range of life history parameters that could be adjusted to raise steepness, and the biological argument that could be made for each change. After much discussion at the Assessment Workshop, the group decided that adjusting the values of M (natural mortality) was the most justifiable action. The Agency has emphasized that steepness was not "manipulated to achieve a credible model output" as Hester and Maunder state. Rather, steepness is a function of all life history parameters (natural mortality, maturity, and fecundity—see SEDAR11-AW-10). None of these parameters were derived subjectively; rather, they were estimated based on ecological principles consistently applied to a variety of species. We are unaware of the "evidence that different parameter values are more appropriate." If this "evidence" exists, it was not provided during SEDAR 11 for discussion. The same logic for modifying the biological parameters was applied to blacktip sharks; however, in that case, the logic was deemed acceptable by Hester and Maunder (2007).

In the 2002 assessment, a similar problem was encountered with steepness estimates falling below the minimum bound. As indicated in the 2002 assessment report, the parameter for pup

production was inflated, yet this approach was not contested during the 2002 assessment. Adjusting pup production was presented as an option this time, but it was rejected by the group in favor of adjusting natural mortality levels.

Hester and Maunder (2007) also mention in the Reviewers comment that "No age data were used in the model." This was due to the fact that catch-at-age data are not available for sandbar sharks. One cannot simply convert length to age based on an age and growth study for use in the model, but must derive catch-at-age data from ageing samples collected from the fishery. This type of data does not currently exist for this or any other species of shark exploited in U.S. waters.

While the authors state that "there is evidence that age at maturity has decreased in recent years", this "evidence" was not presented during SEDAR 11. A chapter in a Ph.D. dissertation by Rebeka Rand Merson (1998) investigates reproduction of sandbar sharks and was reviewed by the Life History Working Group at the Data Workshop and determined to be the best available data. This chapter was included in SEDAR 11-DW-47. Concerns stated by Dr. Hester during the SEDAR data workshop were addressed by Merson in SEDAR 11-AW-09 during the assessment workshop. The Merson study is the only study available which provides a maturity ogive for sandbar sharks in the region of interest.

Hester and Maunder (2007) had further issues with the biological parameters used in the model. They state that "Pup survival is estimated by the model, which is a circular process." The Agency does not believe this to be true. While pup survival is given a prior probability distribution, it is estimated by the model - there is no "circular" process involved.

RESPONSES TO OTHER CONCERNS RAISED IN THE REPORT

This section provides additional detail and discussion of other issues presented in the Hester and Maunder (2007) report.

Indices Employed in the Stock Assessment

The issue of consistency of indices over time was discussed to some extent by the Indices Working Group at the Assessment Workshop. Standardization is used to account for changes in factors, such as introduction of regulations. While regulation changes could affect an index, this is not the case for the VA LL index, which is fishery-independent, and the LPS, where total catch (*i.e.,* not just landings) is recorded. The change from voluntary to mandatory observer coverage in the BLLOP is more of an issue and could have affected the standardization of that index more than the two indices mentioned by Hester and Maunder.

Furthermore, Hester and Maunder (2007) refer to "good" and "bad" indices that were employed, which is a very subjective characterization. Fisheries-independent indices typically have small sample size, which often results in a higher CV than fisheries-dependent indices that are derived from thousands of observations. The base case treated all indices as having equal weight, but a sensitivity model using the CVs for each index was also run, and arrived at the same conclusion that the stock is overfished with overfishing occurring. Hester and Maunder correctly point out

that all factors in a standardized index are assumed to have been constant over time, and that if this is not true, then the resulting index could be biased. This point is equally true for fisheries-dependent indices for instances where catchability has changed over time either through increased skill at finding fish, learning, or gear and technology improvements, etc.

Hester and Maunder (2007) present "trend analyses" for several of the input indices. These fits conducted by the Hester and Maunder report appear to have been done in the EXCEL software. However, their analysis is misleading and misapplied. First, the indices fit within the assessment model assume a lognormal error structure, which was assumed to be the most appropriate error structure to use, while EXCEL fits trendlines assuming normally distributed errors, which could contribute to the differences seen in Figure 1 in this document. A comparison of the model fits versus "trendlines" to the three indices that Hester and Maunder single out (VA LL, LPS, and NMFS NE) is shown in Figure 1. For the VA LL and LPS indices, the trendlines of Hester and Maunder are far more negative than those predicted in the assessment model; the NMFS NE assessment predicted index is fairly similar to the trendline fit. The model fits to the observed index values are shown in the assessment final report, pages 112 - 114, Figure 4.7. From those plots, and from the likelihood contributions of each index (Assessment Workshop report p.122, Fig. 4.12), it is clear that the LPS is poorly fit and that it is not driving model results.

Sensitivity Analyses

From pages 11 to 15 in the Hester and Maunder report, various sensitivity model runs are discussed. Despite earlier comments by Hester and Maunder about "bad indices" and "negative slopes," excluding or down weighting those same indices did not alter model results substantially. In Table 1 of the Hester and Maunder (2007) report, they summarize model results for SSB_{2004}/SSB_0 rather than SSB_{2004}/SSB_{MSY}. Fishery management in the United States has determined the overfished criterion based on MSY reference points and not on relative depletion (we note that they correctly summarize the overfishing statistic as F_{2004}/F_{MSY}). This misunderstanding of reference point seems to be carried even further, as Hester and Maunder appear to believe that 50% of SSB_0 is the benchmark determining whether a stock is overfished or not. This is not the case. The correct benchmark is SSB_{MSY}.

Run 2 (No VA LL): Again, the years prior to 1981 in the VA LL index were not omitted, and the indices used in 2002 were nominal only. In all these sensitivity analyses, it is stated that the index of interest was "heavily down weighted", but there is no explanation of how exactly it was done, other than saying that "this is about equivalent to using variance weighting" (stated under Run 3 (No LPS)). The naming convention used is confusing: "No VA LL index" or "No LPS" implies the index was removed from the run, but that is not the case according to the text provided.

Run 5 (Removing VA LL and LPS): By selectively removing the 2 indices that start earlier in time (1975 and 1986, respectively), the model essentially has no CPUE information prior to 1993, thus showing a much reduced level of depletion since there are no points of comparison prior to 1993.

Run 7 appears to be in agreement with the base case assessment results, although the authors suggest that further sensitivity runs should be made to explore the poorly estimated recreational catches. Again, we note that the catch free model (which does not use any catch) arrived at the same results. The catch free model is discussed in SEDAR11-AW-03 (Brooks 2006).

The Hester and Maunder sensitivity analyses, in most cases, support the original stock status determined by the assessment. The main points that the industry had taken issue with (*i.e.*, the VIMS LL series, the LPS series, the commercial selectivity, and the median age at maturity) made essentially no difference, as demonstrated by Hester and Maunder's (2007) own sensitivity runs. The only difference was obtained when completely removing or down-weighting the 2 long-term CPUE indices (or other extreme scenarios), thus removing critical historical information from the modeling. Also note that for all scenarios (except run #12 where pup survival = 0.85) in which no overfishing ($F_{2004}/F_{MSY}<1$) was found, pup survival was unrealistically high (0.93-0.97).

CONCLUSIONS

While raising important concerns, the Hester and Maunder (2007) report contains numerous factual errors and unsupported statements. For the reasons stated below, none of the 6 initial conclusions (bullets in the abstract) stated in the Hester and Maunder (2007) report are valid:

1) The BLLOP index was used at different steps in the assessment process;
2) The new selectivity created by Hester and Maunder using only BLLOP data ultimately did not have any effect on results;
3) There has been a commercial quota imposed on the fishery since 1993 (for over a decade) and stable landings in recent years most likely reflect the effect of quotas, not of a stable population;
4) The CPUE indices used in the model were appropriate and selected by a group of experts and endorsed by a peer-review panel. Selective use of CPUE series will eventually produce the desired results, however, this could bias the outcome;
5) There is no evidence to suggest that the maturity/reproductive study is technically flawed; on the contrary, it is the best available science, to date; and,
6) The biological parameters used in the model were sensible and biologically defensible, unlike those in the optimistic outcomes produced by the Hester and Maunder (2007) report. There is no evidence to suggest that other more appropriate values are available or should have been used in the assessment.

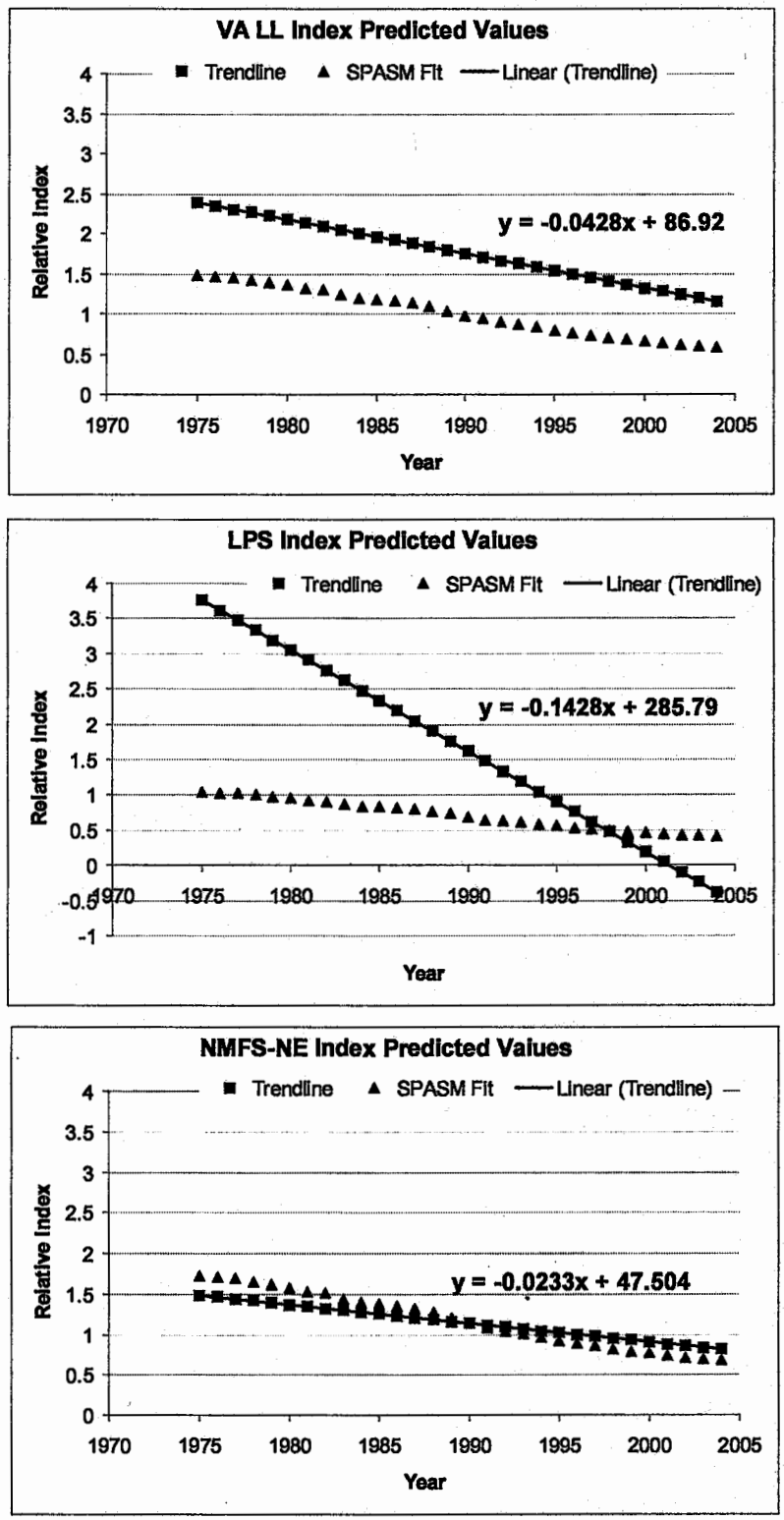

Figure 1. Comparison of model-predicted indices (solid triangles) to the trend lines of Hester and Maunder (solid line with solid square symbols).

APPENDIX C TABLE OF CONTENTS

APPENDIX C LIST OF TABLES

C. APPENDIX: QUOTAS AND RETENTION LIMIT CALCULATIONS FOR FINAL ENVIRONMENTAL IMPACT STATEMENT

Based on public comment, the National Marine Fisheries Service (NMFS) conducted additional analyses to consider a new non-sandbar large coastal shark (LCS) quota, overharvests in 2007, regional quotas, and regional retention limits. The basis for how sandbar and non-sandbar quotas were determined (with regard to landings and discards in other fisheries) is outlined in Appendix A. Appendix C is meant to describe new analyses that were considered with respect to public comments as well as recommendations received from science centers within NMFS. This section is structured so as to explain what was proposed in the Draft Environmental Impact Statement (DEIS) (NMFS, 2007) and how that would be changed in the Final Environmental Impact Statement (FEIS). An overall summary of what would be implemented in the FEIS with regard to quotas, regions, and retention limits can be found in Section C.2.

C.1 Considerations based on public comment

Quotas

Draft Environmental Impact Statement

Non-Sandbar LCS

During the comment period on the DEIS for Amendment 2 to the Consolidated Highly Migratory Species (HMS) Fishery Management Plan (FMP), NMFS received recommendations regarding the proposed quota for the non-sandbar LCS complex from the Southeast Fisheries Science Center (SEFSC). NMFS had originally used logbook data to estimate the non-sandbar LCS quota, based on historical landings from 2003 to 2005 as recommended by the 2005/2006 blacktip stock assessment (see Appendix A). Logbook data also allowed NMFS to estimate associated effort and landings by permit type, number of fishing vessels by permit type, and the amount of landings by fishing vessel. NMFS had originally proposed a non-sandbar LCS quota of 541.2 mt dw based on landings reported in the HMS and Coastal Fisheries logbook (582.4 mt dw of average historical landings – 41.2 mt dw shark research and display quota = 541.2 mt dw). In addition, based on discards and recreational landings (a total of 463.2 mt dw; Appendix A, Table A.3), NMFS proposed a total allowable catch (TAC) for non-sandbar LCS as 1,045 mt dw (Appendix A, Table A.3).

Sandbar Sharks

In the DEIS, NMFS proposed a sandbar shark quota of 116.6 mt dw (see Appendix A). Unlike the blacktip stock assessment, the 2005/2006 sandbar shark stock assessment recommended a TAC, or total mortality across all fisheries, of 158.3 mt dw (220 mt ww) in order to attain a 70-percent probability for sandbar sharks to rebuild by 2070. Chapter 1 outlines the rebuilding plan for sandbar sharks.

Non-Sandbar LCS

During the comment period, the SEFSC recommended using HMS shark dealer reports (*i.e.*, southeast and northeast general canvass and SEFSC quota monitoring databases) to calculate historical landings of non-sandbar LCS since the stock assessments were, in part, based on landings reported by HMS shark dealer reports. The HMS shark dealer reports also include landings by both state and Federal shark fishermen, because Federal shark dealers are required to report all landings, whereas logbook data only captures Federally permitted shark fishermen. Thus, dealer reports include all shark landings, resulting in a higher non-sandbar LCS quota, and are more consistent with datasets used for quota monitoring and stock assessments. The average annual combined landings of the predominate LCS species besides sandbar sharks (blacktip, bull, hammerhead sharks, lemon, nurse, silky, tiger, and smooth hammerhead sharks) as reported by the HMS shark dealer reports from 2003 to 2005 was 719 mt dw (Cortés, pers. comm; Cortés and Neer, 2005, SEDAR 11 LCS05/06-DW-16: http://www.sefsc.noaa.gov/sedar/Sedar_Documents.jsp?WorkshopNum=11&FolderType=Data). With the inclusion of discards and recreational landings of non-sandbar LCS (*i.e.*, an additional 463.2 mt dw; Appendix A, Table A.3), the aggregate TAC for non-sandbar LCS would be 1,182.2 mt dw (719 mt dw of commercial landings + 463.2 mt dw in discards and recreational landings = 1,182.2 mt dw).

In addition, under the preferred alternative suite 4, NMFS would establish a small shark research fishery. NMFS also received comments regarding how the quotas should be allocated between the research fishery and non-research shark fisheries. In particular, there was concern that if the sandbar and non-sandbar LCS fishery closed when either quota was filled at 80 percent, the research fishery could close down prematurely while sandbar quota was still available. Therefore, NMFS has created a separate non-sandbar LCS base quota for the research fishery. In the DEIS, NMFS determined that while fishermen in the research fishery harvested the sandbar shark quota of 116.6 mt dw, they would also harvest approximately 50 mt dw of the non-sandbar LCS quota (see Appendix A). Thus, to allow the research fishery to remain open if the non-sandbar LCS quota is filled outside the research fishery, NMFS would allocate 50 mt dw of non-sandbar LCS base quota to the research fishery. NMFS would continue to monitor sandbar shark discards through the observer program covering trips outside of the research fishery that are targeting other species, depending on available funding. In the FEIS, NMFS would close each shark fishery when each quota reaches 80 percent. This should allow for the research fishery to continue year-round. Such research could also focus on other shark species if the sandbar quota within the research fishery is fulfilled (see Chapter 4 under the preferred alternative suite 4 for research objectives of the shark research fishery).

Based on the SEFSC recommendations, NMFS revised the non-sandbar commercial LCS quota in the FEIS. After accounting for the shark research and display quota (41.2 mt dw), discards and recreational landings of non-sandbar (463.2 mt dw), and the separate non-sandbar LCS quota for the shark research fishery (50 mt dw), the base quota for non-sandbar LCS outside the research fishery would be 627.8 mt dw for the preferred alternative suite 4 (719 mt dw in commercial landings – 41.2 mt dw shark research and display quota – 50 mt dw of non-sandbar LCS quota for the research fishery = 627.8 mt dw; Table C.1). For alternative suites 2 and 3,

which would not have a separate non-sandbar LCS quota for a research fishery, the base quota would be 677.8 mt dw (719 mt dw average historical landings via dealer reports – 41.2 mt dw shark research and display quota = 677.8 mt dw; Table C.1).

In addition, NMFS also considered regional quotas for non-sandbar LCS (see "*Regions*" discussion below). To do so, NMFS evaluated the average percentage of landings of non-sandbar LCS in the Gulf of Mexico versus the Atlantic region (North Atlantic and South Atlantic regions combined). On average, 70 percent of the total non-sandbar LCS landings occurred in the Gulf of Mexico whereas 30 percent of the non-sandbar LCS landings occurred in the Atlantic region each year. For the preferred alternative suite 4, this would result in non-sandbar LCS regional base quotas of 439.5 mt dw in the Gulf of Mexico region (70 percent x 627.8 mt dw = 439.5 mt dw) and 188.3 mt dw in the Atlantic region (30 percent x 627.8 mt dw = 188.3 mt dw; see Table C.1). For alternative suites 2 and 3, the annual non-sandbar LCS base quotas would be 474.5 mt dw in the Gulf of Mexico region (677.8 mt dw x 70 percent = 474.5 mt dw) and 203.3 mt dw in the Atlantic region (677.8 mt dw x 30 percent = 203.3 mt dw; Table C.1). However, these base quotas would be adjusted to account for overharvest of the LCS complex in 2007 (see "*Overharvests*" discussion below).

Table C.1 Base quotas and overharvests

A. Regions	B. Sandbar Base Quota (mt dw)	C. Non-Sandbar LCS Base Quota (mt dw)*	D. Non-Sandbar LCS Base Quota Within Research Fishery (mt dw)		F. Quota not harvested during 2008 1st trimester season (mt dw)		H. 2007 Overharvest from 2007 2nd and 3rd Combined Trimester Adjusted for Quota not Harvested in 2008 1st Trimester (mt dw) (G-F)	I. % Sandbar Landings (based on avg. 2nd and 3rd trimester total harvest in 2006 & 2007)	J. % Non-Sandbar Landings (based on avg. 2nd and 3rd trimester total harvest in 2006 & 2007)	K. Sandbar Overharvest (mt dw) (H*I)	L. Non-Sandbar LCS Overharvest (mt dw) (H*J)
One	116.6	677.8	50	627.8	66.2	520	453.8	41%	59%	186.1	267.7
Atlantic	116.6	203.3	50	188.3	13.9	72.3	58.4	63%	37%	36.8	21.6
GOM		474.5		439.5	52.3	447.7	395.4	27%	73%	106.8	288.6

*Base quota for alternative suites 2 and 3

†Base quota for alternative suite 4

Sandbar Sharks

Despite these changes in the non-sandbar LCS quota, the sandbar shark base quota would still remain 116.6 mt dw (see Appendix A). Unlike the blacktip stock assessment, the 2005/2006 sandbar shark stock assessment recommended a total allowable catch (TAC), or total mortality across all fisheries, of 158.3 mt dw (220 mt ww) in order to attain a 70-percent probability for sandbar sharks to rebuild by 2070 (NMFS, 2006; see Chapter 1 for the rebuilding plan for sandbar sharks). After accounting for landings and discards in other HMS as well as non-HMS fisheries (see Appendix A for more details), NMFS estimated that a commercial quota of 116.6. mt dw could keep overall landings and discards of sandbar sharks below 158.3 mt dw per year. Therefore, since this quota is not based on historical landings, as is the non-sandbar LCS quota, NMFS is not changing the base quota for sandbar sharks at this time.

Overharvests

Draft Environmental Impact Statement

During the development of the DEIS, NMFS was not aware of the overharvests that occurred during the shark 2007 fishing season. Therefore, the quotas for sandbar sharks and non-sandbar LCS in the DEIS were based on the recommendations from the shark stock assessment as explained in Appendix A. In the FEIS, the non-sandbar LCS quota would be modified as explained above in the "*Quotas*" section, however, the sandbar shark quota would remain as explained in Appendix A. These quotas would be considered the "base quotas."

Final Environmental Impact Statement

During the comment period for the DEIS, NMFS compiled landings updates for the 2007 shark fishery. In doing so, NMFS calculated large overharvests of LCS that occurred in 2007, predominantly in the Gulf of Mexico region during the 2007 2nd and 3rd combined trimester. To account for these overharvests, NMFS must adjust the sandbar and non-sandbar LCS quotas in the FEIS and the final rule. Table C.1 shows the amount of overharvest that was determined in the different regions as of December 21, 2007 (Column G in Table C.1). Column G represents the amount of landings that occurred above the adjusted 2007 2nd and 3rd combined trimester quotas. These adjusted quotas for the 2007 2nd and 3rd combined trimester were 69 mt dw in the North Atlantic region, 163.7 mt dw in the South Atlantic regions, and 83.1 mt dw in the Gulf of Mexico region. However, as if December 21, 2007, landings during the 2007 2nd and 3rd combined trimester were 123.6 mt dw in the North Atlantic region, 181.4 mt dw in the South Atlantic region, and 530.8 mt dw in the Gulf of Mexico region.

Based on landings during the 2007 2nd and 3rd combined trimester, there was a total overhavest of 520 mt dw of LCS in all regions. When broken down by region, this resulted in a LCS overharvest of 72.3 mt dw in the Atlantic region, and a LCS overharvest of 447.7 mt dw in the Gulf of Mexico region (Column G in Table C.1). After accounting for the 2008 1st season LCS quota that was not harvested due to closure, there was a total overhavest of 453.8 mt dw of LCS in all regions (Column H in Table C.1). However, when broken down by region, this resulted in a LCS overharvest of 58.4 mt dw in the Atlantic region and 395.4 mt dw in the Gulf of Mexico region (Column H in Table C.1).

In order to account for these overharvests, NMFS must lower the "base quotas" for sandbar sharks and non-sandbar LCS that are explained above. These lowered quotas as a result of overharvests in 2007 would be termed "adjusted quotas." Because of differences in management measures in 2007 compared to those preferred in this amendment (*i.e.*, differences in species complexes), NMFS does not have the actual tonnage of the sandbar shark overage by region for 2007. Instead, NMFS only has the total LCS overage in aggregate by region. Therefore, to determine the amount of overharvest that should be attributed to the sandbar shark quota versus the non-sandbar LCS quota, NMFS must estimate the sandbar shark versus non-sandbar LCS overage using the species composition percentages of the total landings in the 2nd and 3rd combined trimester in 2006 and 2007.

NMFS first determined the species composition of the total landings in the 2nd and 3rd combined trimester in 2006 and 2007. NMFS then took the average species composition for the two years to account for temporal variability in species composition of landings. Based on this average, NMFS then determined the percentage of sandbar sharks versus non-sandbar LCS that were harvested for one region as well as the percentage of sandbar sharks and non-sandbar LCS harvested in the Gulf of Mexico and Atlantic regions (columns I and J in Table C.1). NMFS applied these percentages to the total amount of overharvest in one overall region and to the amount of overharvest in each region (column H in Table C.1). Because catch composition of sandbar sharks and non-sandbar LCS varied among regions, the consideration of regions affected the amount of sandbar versus non-sandbar LCS overharvest that would be deducted from the base quotas. For instance, if NMFS considered only one region, then 41 percent of the overharvest would be deducted from the sandbar base quota and 59 percent of the overharvest would be deducted from the non-sandbar LCS quota. This would results in 186.1 mt dw deducted from the sandbar quota (453.8 mt dw x 41 percent = 186.1 mt dw; column K in Table C.1) and 267.7 mt dw deducted from the non-sandbar LCS base quota (453.8 mt dw x 59 percent = 267.7 mt dw; column L in Table C.1). However, if NMFS considered two regions, 63 percent of the landings in the Atlantic was sandbar sharks and 37 percent was non-sandbar LCS. From the 58.4 mt dw of overharvest in the Atlantic region, 36.8 mt dw would be deducted from the sandbar shark base quota (58.4 mt dw x 63 percent = 36.8 mt dw) and 21.6 mt dw would be deducted from the non-sandbar LCS base quota in the Atlantic region (58.4 mt dw x 37 percent = 21.6 mt dw; Table C.1). Conversely, since 27 percent of the total landings in the Gulf of Mexico were sandbar sharks, and 73 percent were non-sandbar LCS landings. Therefore, of the 395.4 mt dw overharvest in the Gulf of Mexico, 106.8 mt dw would be deducted from the sandbar shark base quota and 288.6 mt dw would be deducted from the non-sandbar LCS base quota in the Gulf of Mexico region (Table C.1). This results in a total overharvest of 143.6 mt dw deducted from the sandbar shark base quota if two regions are considered whereas 186.1 mt dw of overharvest would be deducted from the sandbar shark base quota if only one region was considered (Table C.1). However, the total overharvest of 453.8 mt dw would still be accounted for with the consideration of one region (186.1 mt dw + 267.7 mt dw = 453.8 mt dw) or two regions (36.8 mt dw + 21.6 mt dw + 106.8 mt dw + 288.6 mt dw = 453.8 mt dw). Therefore, allocation of the overharvests between the different quotas would depend on the consideration of one versus two regions. The overall amount deducted from the sandbar shark quota versus non-sandbar LCS quota would differ depending on the consideration of regions due to differences in

catch composition between regions; however, the total amount of the overharvest would be accounted regardless of the number of regions considered.

Given the large amount of overharvests in 2007, NMFS evaluated the adjusted quotas (base quota minus overharvests in 2007) when the overharvests shown in columns K and L of Table C.1 were spread out over one to five years (see Table C.2). For alternative suites 2 and 3 (which would not include a research fishery set aside for non-sandbar LCS), NMFS took the amount of overharvest and divided it over one to five years. These amounts were then subtracted from the base quotas shown in column C in Table C.1. For simplicity, NMFS is only showing the adjusted quota after the overharvests have been divided over five years in Table C.2.

The 2005/2006 LCS stock assessment did not include the 2007 overharvests when the assessment scientists determined the rebuilding timeframe for sandbar sharks since those overharvests occurred after the conclusion of the assessment and before NMFS could conduct another assessment before completion of the FEIS. However, the SEFSC conducted *ad hoc* projections to evaluate how the overharvests in 2007 would affect the overall rebuilding timeframe from the original 2005/2006 LCS stock assessment. In addition, the SEFSC evaluated how accounting for the overharvests in one year (up to that year's sandbar shark quota for the research fishery or 116.6 mt dw) and then in subsequent years until the entire overharvest has been accounted for or accounting for them over five years would affect the rebuilding timeframe for sandbar sharks. The SEFSC found that when the actual level of harvest in 2007 was accounted for in their projections, there was no significant change in the rebuilding timeframe for sandbar sharks compared to the original sandbar shark assessment. In addition, the SEFSC found that accounting for the entire overharvest in one year (up to that year's sandbar shark quota for the research fishery or 116.6 mt dw) and then in subsequent years until the entire overharvest has been accounted for or accounting for the overhavest over five years would result in similar outcomes for the stock, with the same rebuilding timeframe resulting from either scenario. This is most likely the case because of the longevity of the species and the ratio of immature to mature individuals in the catches. Overall, the SEFSC found that reducing the commercial quota to account for overharvests in 2007 would have positive ecological impacts on the stock by lowering overall mortality, which could allow the stock to rebuild more quickly, regardless of how quickly the overharvest from 2007 were accounted for.

Table C.2 **Adjusted quotas after overharvests spread out over five years for sandbar sharks for alternative suites 2 through 4 and non-sandbar LCS for alternative suites 2 & 3. Note: see Tables C.3 and C.4 for the non-sandbar LCS adjusted quotas under alternative suite 4.**

Regions	Adjusted Quotas if Overharvests Spread Over 5 Years (mt dw)	
	Sandbar Sharks for Alt. Suites 2-4	*Non-Sandbar LCS for Alt. Suites 2 & 3*
One	79.4	624.3
Atlantic	87.9	198.9
GOM		416.7

Sandbar Sharks

NMFS evaluated the resulting adjusted quotas if the overharvests in 2007 were accounted for over one to five years. For example, if NMFS deducted the entire overharvest of 2007 from the sandbar shark base quota in one year, the end result would be -69.5 mt dw or -27 mt dw of adjusted sandbar shark quota, depending on whether or not regions were considered (one region: 116.6 mt dw – 186.1 mt dw = -69.5 mt dw; two regions: 116.6 mt dw – (36.8 mt dw + 106.8 mt dw) = -27 mt dw; Table C.1). The remaining 27 mt dw overharvest would then be deducted in the next calendar year. However, accounting for the overharvests in the shortest time period (*i.e.*, one year plus 27 mt dw in the next calendar year) would preclude any sandbar shark research during that time. Thus, NMFS also evaluated the resulting sandbar quota if the overharvest was spread over two, three, four, and five years. The resulting sandbar quota would be 44.8 mt dw, 68.8 mt dw, 80.7 mt dw, or 87.9 mt dw per year, respectively. Based on projections run by the SEFSC, accounting for the entire overharvest in one year (and the remaining 27 mt dw in the next calendar year) or accounting for the overhavest over five years would result in similar outcomes for the stock, with the same rebuilding timeframe resulting for either scenario. In addition, the overall rebuilding timeframe would be shorter than if the 2007 overharvests were not accounted for in this amendment.

Given accounting for the 2007 overharvests in one year (up to that year's sandbar shark quota for the research fishery or 116.6 mt dw) and then in subsequent years until the entire overharvest has been accounted for would preclude a shark research fishery for at least one year, and sandbar sharks would rebuild within the same timeframe if NMFS spread out the 2007 overharvest over one or five years, in alternative suite 4 NMFS prefers to spread the sandbar overharvest over five years to allow for a much-needed research to occur; smaller quotas would jeopardize NMFS' abilities to accomplish shark research objectives and could disrupt the collection of fishery dependent data. In addition, it is likely that there will be a new assessment within the next five years. That assessment will need the data collected from the shark research fishery and could result in new shark management measures. For this reason, NMFS chose not to spread out the 2007 overharvest beyond five years. This would result in a five year adjusted sandbar quota of 79.4 mt dw for one region or 87.9 mt dw for two regions (Table C.2). However, any additional overharvests that occurred during each year between 2008 and 2012 would be deducted from this adjusted quota in the following year, or depending on the level of overharvest, over multiple years until the entire overharvest was accounted for. If additional overharvests do occur, this may result in a reduced sandbar shark quota that may preclude a shark research fishery in future years. This would result in the loss of fishery dependent data for future stock assessments; however, since the shark research fishery would be monitored through

scientific observer reports, NMFS anticipates that the sandbar shark quota would be monitored in an almost real-time manner that would help prevent future overharvests.

Non-Sandbar LCS

NMFS also evaluated the non-sandbar LCS adjusted quotas over one to five years based on overharvests in 2007. To complement the timeframe for paying back the sandbar overharvests, NMFS would choose five years to account for the non-sandbar LCS overharvests as well. Alternative suites 2 and 3 (which would not have a non-sandbar LCS quota set aside for a research fishery) would have a five year non-sandbar LCS adjusted quota of 624.3 mt dw for one region or 416.7 mt dw in the Gulf of Mexico region and 198.9 mt dw in the Atlantic region (Table C.2).

Overharvests under alternative suite 4 were applied slightly differently to the base quotas than as explained for alternative suites 2 and 3 due to the research quota set aside for non-sandbar LCS. Since the sandbar shark base and adjusted quotas would affect the amount of non-sandbar LCS that would be harvested within the research fishery, NMFS had to adjust the non-sandbar LCS quota for the research fishery for overharvests as well. This, in turn, affected the amount of non-sandbar LCS quota available outside the research fishery. Based on the adjusted sandbar quota, NMFS estimated the reduced amount of non-sandbar LCS quota that would be taken in the shark research fishery. NMFS used the same approach as described in Appendix A to determine how much non-sandbar LCS quota would be taken when the shark research fishery harvested the adjusted sandbar quota.

NMFS first determined the number of trips it would take to land the adjusted sandbar quotas, assuming a 4,000 lb dw sandbar and non-sandbar LCS trip limit (however, this trip limit would be based on the research objectives for a given year). The number of trips was determined by looking at the catch composition of directed BLL trips reported in the BLL observer program (Hale and Carlson, 2007). The observer program data indicated that 70 percent of the catch on directed shark BLL trips in the South Atlantic region was comprised of sandbar sharks versus 30 percent of the catch on directed shark BLL trips in the Gulf of Mexico region. Based on one region and spreading the overharvests over five years, NMFS estimated that the sandbar adjusted quota for the research fishery would be 79.4 mt dw (Table C.2). By taking a precautionary approach and assuming that 70 percent of a 4,000 lb dw trip limit (or 2,800 lb dw) is made up of sandbar sharks and 30 percent (or 1,200 lb dw) is made up of non-sandbar LCS, the 79.4 mt dw of sandbar adjusted quota could be caught in approximately 62 trips (79.4 mt dw = 180,998 lb dw; 175,045 dw / 2,800 lb dw = 62 trips). Based on two regions and spreading the overharvests over five years, NMFS estimated that the sandbar adjusted quota for the research fishery would be 87.9 mt dw (Table C.2). Using the same approach as described above, NMFS estimated that the 87.9 mt dw of sandbar adjusted quota could be caught in approximately 69 trips (87.9 mt dw = 193,784 lb dw; 93,784 lb dw / 2,800 lb dw = 69 trips).

Using the same catch composition as above (2,800 lb dw of sandbar sharks and 1,200 lb dw of non-sandbar LCS per trip), 62 trips to harvest 79.4 mt dw of adjusted sandbar quota for one region would result in 33.7 mt dw of non-sandbar LCS quota being harvested in the shark research fishery (62 trips x 1,200 lb dw = 74,400 lb dw or 33.7 mt dw) (Table C.3). When two regions are considered, 87.9 mt dw of sandbar quota harvested in 69 trips would result in 37.5 mt

dw of non-sandbar LCS quota being harvested in the shark research fishery (69 trips x 1,200 lb dw = 82,800 lb dw or 37.5 mt dw) (Table C.3). Therefore, the adjusted non-sandbar LCS quota for the shark research fishery would be 33.7 mt dw if one region is considered and 37.5 mt dw if two regions are considered.

Table C.3 Adjusted non-sandbar LCS quota within the research fishery for alternative suite 4

A. Regions	B. Non-Sandbar LCS Quota Minus Shark Research and Display Quota(mt dw)	C. Non-Sandbar LCS Adjusted Quota Within Research Fishery (mt dw)	D. Resulting Non-Sandbar LCS Base Quota to Subtract Overharvests From Outside Research Fishery (mt dw)
One	677.8	33.7	644.1
Atlantic	203.3	37.5	192.1
GOM	474.5		448.2

This would result in a non-sandbar LCS quota of 644.1 mt dw outside the research fishery for one region, or 192.1 mt dw in the Atlantic region, and 448.2 mt dw in the Gulf of Mexico region for two regions under alternative suite 4 (Table C.3). From these numbers, NMFS subtracted the amount of overharvest shown in column L of Table C.1 spread out over one to five years for one or two regions (Column B in Table C.4). For the preferred alternative suite 4, this results in a five year adjusted non-sandbar LCS quota of 590.6 mt dw for one region or 187.8 mt dw in the Atlantic region and 390.5 mt dw in the Gulf of Mexico region for two regions (Column D in Table C.4).

Table C.4 Adjusted non-sandbar LCS quotas outside the research fishery after overharvests spread out over five years for alternative suite 4.

Regions	A. Total Non-Sandbar LCS Overharvest (mt dw)	B. Amount of Non-Sandbar LCS Overharvest Divided Over 5 Years	C. Resulting Non-Sandbar LCS Base Quota to Subtract Overharvests From Outside Research Fishery (mt dw)	D. Adjusted Non-Sandbar LCS Quota if Overharvest accounted for over 5 years for Alt. Suite 4 (mt dw) (C-B)
One	267.7	53.5	644.1	590.6
Atlantic	21.6	4.3	192.1	187.8
GOM	288.6	57.7	448.2	390.5

Regions

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In the DEIS, NMFS preferred one overall region for quotas and retention limits. Based on one region, NMFS calculated sandbar and non-sandbar LCS quotas and retention limits for the different alternative suites as explained in Appendix A.

Final Environmental Impact Statement

During the comment period on the DEIS, NMFS received a number of comments regarding the proposed one region for non-sandbar LCS sharks. Commenters felt that since the blacktip stock assessment showed that the Gulf of Mexico blacktip population is healthy and the status is unknown in the Atlantic, NMFS should acknowledge the differences in stock status and maintain specific regions that might allow a sustainable blacktip fishery in the Gulf of Mexico. Regional quotas may allow for a higher quota in the Gulf of Mexico where more non-sandbar LCS are caught compared to the Atlantic region where more dusky and sandbar sharks are caught. Others commented that NMFS should take a more cautious approach in the Atlantic since the Atlantic population status of blacktip sharks is unknown. In addition, there was concern regarding how 2007 overharvests would be accounted for if there was only one region; overharvests in one area, such as the Gulf of Mexico, would potentially have to be paid back by fishermen everywhere. Based on these public comments, NMFS considered regional quotas and retention limits for two regions, the Atlantic and Gulf of Mexico regions. NMFS choose to evaluate two regions based on the results of the blacktip shark assessment and on how NMFS interacts with the two Marine Fisheries Commissions, the Atlantic States Marine Fisheries Commission and the Gulf of Mexico States Marine Fisheries Commission. In doing so, NMFS evaluated the retention limits and associated discards for the different alternative suites with and without regions (Table C.5 and Table C.6).

Based on overharvests in 2007, results for the 2005/2006 blacktip stock assessments, and the fact that the ASMFC is developing an interstate shark management plan that would implement measures in state waters of the Atlantic, NMFS would choose to set regional quotas for non-sandbar LCS. For the preferred alternative suite 4, the regional non-sandbar LCS base quotas would be 439.5 mt dw in the Gulf of Mexico region and 188.3 mt dw in the Atlantic region (see "*Quotas*" discussion above; Table C.1). Based on overharvests in 2007, the adjusted

regional non-sandbar LCS quotas would be 390.5 mt dw in the Gulf of Mexico region and 187.8 mt dw in the Atlantic region for five years (Table C.4). This would allow more non-sandbar LCS quota in the Gulf of Mexico (predominately comprised of blacktip sharks) to be harvested from a healthy blacktip population. In addition, it would allow for regional accountability for overharvests in 2007 and in terms of any future overharvests. However, since the sandbar quota would be taken within the shark research fishery, which would be proportioned out over space and time to ensure adequate sampling, there would be one overall sandbar shark base quota of 116.6 mt dw. The adjusted annual sandbar shark quota would be 87.9 mt dw for five years (from 2008 until the end of 2012).

Retention Limits

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Retention limits for the different alternative suites in the DEIS are described in Appendix A.

Final Environmental Impact Statement

In the FEIS, NMFS reconsidered retention limits for the different alternative suites based on the revised non-sandbar LCS quota, overharvests in 2007, and regions. NMFS considered two approaches for calculating retention limits. One is considered the ratio approach, and the other approach divides the available quota over historical effort. Each approach is described below.

Ratio Approach - One approach calculated retention limits based on the catch composition as reported in observer program data when fishermen were targeting sharks under past retention limits (4,000 lb dw LCS/vessel/trip). This approach was used to calculate the retention limits for alternative suites 2 and 3. Since the overall quota for non-sandbar LCS is higher than the overall sandbar quota, dividing the available quota over the average historical fishing effort would result in higher retention limits for non-sandbar LCS. Since shark fisheries are typically mixed fisheries where sandbar sharks are caught in combination with non-sandbar LCS, this could result in sandbar sharks being discarded as fishermen reach their sandbar trip limit, but continue fishing to fulfill their non-sandbar LCS retention limits.

Basing the retention limit on the catch composition ratio could help reduce sandbar discards. The catch composition ratio of sandbar to non-sandbar LCS varies by region with a 1:4 ratio (1 sandbar shark for 4 non-sandbar LCS) in the Gulf of Mexico region, a 1:1.4 ratio in the South Atlantic region, and an average ratio of 1:2.7 for the combined regions. When considering one region, NMFS used the average ratio of sandbar to non-sandbar LCS to evaluate retention limits whereas for two regions, NMFS used the regional ratio of sandbar to non-sandbar LCS (Table C.5). Thus, NMFS calculated the number of sandbar sharks that could be retained per trip while staying within the allocated sandbar shark quota (79.4 mt dw or 87.9 mt dw; Table C.2). To do this, NMFS multiplied the number of sandbar sharks per trip by the number of historical trips that were taken by different permit types for each alternative suite. NMFS then based the non-sandbar LCS retention limit on the number of sandbar sharks per trip. For instance, if there was a three sandbar shark trip limit in the Gulf of Mexico, then fishermen could potentially

retain up to 12 non-sandbar LCS without having to discard sandbar sharks (3 sandbar sharks x 4 = 12 non-sandbar LCS). However, the approach would severely limit fishermen's ability to harvest the available non-sandbar LCS quota. Given the lower sandbar shark retention limit, fishermen would only harvest a small portion of the non-sandbar LCS quota under the different alternative suites (see column H in Table C.5). Thus, NMFS did not choose to use this approach for setting retention limits.

Table C.5 **Retention limits based on catch composition from observer program data. Note: average sandbar weight is 40.5 lb dw; average non-sandbar LCS weight is 33.7 lb dw; average dusky weight is 74 lb dw (Cortés and Neer, 2005)**

A. Alternative Suite	B. Region	C. Non-Sandbar LCS Adjusted Quota (overharvest spread over 5 years) (mt dw)	D. Sandbar Adjusted Quota (mt dw) (overharvest spread over 5 years) (mt dw)	E. Retention limits based on sandbar to non-sandbar catch composition ratio (average ratio 1:2.7; 1:1.4 in Atlantic; 1:4 in GOM)	F. Total Dusky Mortality (mt dw)	G. Total Sandbar Mortality (mt dw)	H. Non-sandbar Quota Harvested Based on Sandbar Retention Limits (mt dw)
1 (status quo)					33.1	594.4	-
2 (only directed permits)	One	624.2	79.4	10 non-sandbar/ 4 sandbar	8.6	97.8	120.7
	Two	GOM: 416.7 ATL: 198.9	87.9	GOM: 20 non-sandbar/ 5 sandbar ATL: 7 non-sandbar/ 5 sandbar	8.6	113.3	164.7
3 (same retention limits for all permits)	One	624.2	79.4	5 non-sandbar/2 sandbar	20.4	87.2	111.2
	Two	GOM: 416.7 ATL: 198.9	87.9	GOM: 8 non-sandbar/2 sandbar ATL: 4 non-sandbar/3 sandbar	20.4	105.1	126.9
3 (different retention limits for different permits)	One	624.2	79.4	(*Directed*) 8 non-sandbar/3 sandbar *(Incidental)* 3 non-sandbar / 2 sandbar	20.4	97.3	151.3
	Two	GOM: 416.7 ATL: 198.9	87.9	*(Directed)* GOM: 12 non-sandbar/3 sandbar ATL: 4 non-sandbar/3 sandbar *(Incidental)* 3 non-sandbar / 2 sandbar	20.4	109.8	136.3
4 (shark research fishery; same retention limits for all permits)	One	590.6*	79.4	2 non-sandbar	9.0	119.4	77.7
	Two	GOM: 390.5* ATL: 187.8*	87.9	GOM: 3 non-sandbar ATL: 1 non-sandbar	9.1	127.9	76.4

*Accounts for a separate non-sandbar LCS quota allocated to the research fishery

Dividing available quota over the historical number of trips – NMFS also evaluated what retention limits would be if the available quota was divided among the average annual number of trips that were reported in the HMS and Coastal Fisheries logbooks from 2003 to 2005. NMFS projected the number of trips that could be taken by directed and incidental permit holders based on average past fishing effort. NMFS chose to average effort from 2003 to 2005 to remove any anomalies within a given year. The overall choice for the time series of 2003 to 2005 is discussed in Chapter 4. NMFS acknowledges that this level of effort may not be achieved in the future given the reduced retention limits and sandbar quota; therefore, retention limits could be changed as necessary via framework actions based on quota monitoring and achieved fishing effort.

Since each alternative suite dealt with different permit types (*i.e.*, alternative Suite 2: only directed permit holders; alternative Suite 3: directed and incidental permit holders), the number of trips varied among alternative suites, resulting in different retention limits (see Table C.6). NMFS did this for the different alternative suites while considering one versus two regions (Table C.6). For instance, the sandbar retention limit is dependent on which part of the commercial fishery (*i.e.*, directed and/or incidental permit holders) is allowed to retain sandbar sharks. Alternative suite 2 would allow only directed shark permit holders to retain any shark species, and there would be no retention of sandbar sharks with PLL gear. Therefore, the sandbar quota (79.4 mt dw for one region) was averaged over the average annual number of directed shark permit holder trips reported in the Coastal Fisheries Logbook from 2003 through 2005 (*i.e.*, 790 trips). This would result in a sandbar trip limit of five sandbar sharks overall for directed permit holders (Table C.6). NMFS took the same approach for the non-sandbar LCS quota.

In addition, NMFS received comments regarding one retention limit for both directed and incidental permit holders. Since there has been a historic distinction in retention limits based on permit type, and because of differences in the cost associated with acquiring incidental versus directed permits, NMFS evaluated different retention limits for different permit types (Tables C.5 and Table C.6). It should be noted that the current trip limit for LCS for directed permits is 4,000 lb dw per trip whereas incidental permit holders are allowed to retain five LCS or, on average, 182.1 lb dw per trip. This is approximately a 22:1 ratio in trip limits between directed and incidental permit holders (*i.e.*, directed permit holders can retain 22 LCS for every 1 shark an incidental permit holder can retain). However, given the reduced trip limits necessary to accommodate the reduced quotas, NMFS cannot maintain this current ratio. Therefore, NMFS based the incidental trip limit for the final rule on the status quo (on average, 3 non-sandbar LCS and 2 sandbar sharks per trip). The directed trip limit was determined by dividing the available quota (minus what incidental permit holders would harvest) over the number of historic trips taken by directed permit holders. For instance, in the preferred alternative suite 4, there were, on average, 347.3 incidental trips taken per year from 2003 to 2005 that landed non-sandbar LCS. Based on this level of incidental effort and a 3 non-sandbar LCS trip limit, it is estimated that incidental permit holders would harvest approximately 35,112 lb dw (or 15.9 mt dw) of non-sandbar LCS. This leaves 611.9 mt dw of non-sandbar LCS quota available for harvest by directed permit holders (627.8 mt dw – 15.9 mt dw = 611.9 mt dw) under the base quota. Given there were, on average, 1,107 trips taken per year by directed permit holders who landed non-sandbar sharks from 2003 to 2005, this would result in a 36 non-sandbar LCS per trip for

directed permit holders. However, under the adjusted quota, this leaves 562.4mt dw of non-sandbar LCS quota available for harvest by directed permit holders (578.3 mt dw – 15.9 mt dw = 562.4 mt dw). Given the average 1,107 trips taken by directed permit holders, this would result in a 33 non-sandbar LCS per trip for directed permit holders (see Table C.6).

NMFS chose the approach of dividing the available quota for incidental and directed permit holders over historical fishing effort to determine retention limits instead of the ratio approach as explained above because it would allow the entire non-sandbar LCS quotas to be harvested. In addition, as explained below, under the preferred alternative suite 4, NMFS prefers one retention limit for all regions. Therefore, the retention limits for directed permit holders under the base or adjusted non-sandbar LCS quotas would be the same in the Atlantic and Gulf of Mexico regions. Incidental permit holders would have a reduced retention limit, but it would also be the same in all regions. This would allow for easier enforcement by having the same retention limits in all regions. In addition, while historical fishing effort was used as a proxy for determining retention limits, it is uncertain how effort would be distributed among regions in the future. Therefore, NMFS divided the available quota over the total historical fishing effort in all regions to determine retention limits for the preferred alternative suite 4.

Table C.6 **Retention limits based on dividing available quota over the average number of historical trips. Italicized alternative suite 4 is the preferred alternative suite in the FEIS. Note: average sandbar weight is 40.5 lb dw; average non-sandbar LCS weight is 33.7 lb dw; average dusky weight is 74 lb dw (Cortés and Neer, 2005)**

Alternative Suite	Region	Non-Sandbar LCS Adjusted Quota (overharvest spread over 5 years) (mt dw)	Sandbar Adjusted Quota (mt dw) (overharvest spread over 5 years) (mt dw)	Retention Limits Based on Dividing Available Quota Over Average Number of Historical Trips	Total Dusky Mortality (mt dw)	Total Sandbar Mortality (mt dw)
1 (status quo)					33.1	594.4
2 (only directed permits)	One	624.2	79.4	51 non-sandbar / 5 sandbar†	8.6 (†14.3)	119.1 (†408.8)
	Two	GOM: 416.7 ATL: 198.9	87.9	GOM:68 non-sandbar/ 5 sandbar† ATL: 32 non-sandbar / 6 sandbar†	8.6 (†10.7)	127.6 (†340.2)
3 (same retention limits for all permits)	One	624.2	79.4	27 non-sandbar / 2 sandbar†	20.4 (†26.9)	114.7 (†297.7)
	Two	GOM: 416.7 ATL: 198.9	87.9	GOM:45 non-sandbar /3 sandbar† ATL: 15 non-sandbar / 3 sandbar	20.4 (†22.6)	123.2 (†191.4)
3 (different retention limits for different permits)	One	624.2	79.4	(*Directed*) 36 non-sandbar / 3 sandbar† (*Incidental*) 3 non-sandbar / 2 sandbar	20.4 (†26.2)	114.7 (†327)
	Two	GOM: 416.7 ATL: 198.9	87.9	*(Directed)* GOM: 63 non-sandbar/4 sandbar† ATL: 18 non-sandbar/ 3 sandbar *(Incidental)* 3 non-sandbar / 2 sandbar	20.4 (†22.5)	123.2 (†210.7)
4 (shark research fishery; same retention limits for all permits)	One	590.6*	79.4	26 non-sandbar†	9.0 (†14.3)	119.4 (†327.3)
	Two	GOM: 390.5* ATL: 187.8*	87.9	GOM: 42 non-sandbar† ATL: 14 non-sandbar	9.1 (†10.1)	127.9 (†214.3)

Alternative Suite	Region	Non-Sandbar LCS Adjusted Quota (overharvest spread over 5 years) (mt dw)	Sandbar Adjusted Quota (mt dw) (overharvest spread over 5 years) (mt dw)	Retention Limits Based on Dividing Available Quota Over Average Number of Historical Trips	Total Dusky Mortality (mt dw)	Total Sandbar Mortality (mt dw)
4 (shark research fishery; (different retention limits for different permits)	One	590.6*	79.4	*(Directed)* 34 non-sandbar† *(Incidental)* 3 non-sandbar	9.0 (†13.6)	119.4 (†361.5)
	Two	GOM: 390.5* ATL: 187.8*	87.9	*(Directed)* GOM: 60 non-sandbar† ATL: 18 non-sandbar *(Incidental)* 3 non-sandbar	9.1 (†9.9)	127.9 (†241.2)
***4** (shark research fishery; regional quotas, one retention limit for 2 regions; different retention limit for different permits)*	*Two*	*GOM: 390.5* ATL: 187.8* (Total: 578.3)*	*87.9*	*(Directed)* *33 non-sandbar†* *(Incidental)* *3 non-sandbar*	*9.1* *(†9.9)*	*127.9* *(†365)*

*Accounts for a separate non-sandbar LCS quota allocated to the research fishery

(†) Targeting of non-sandbar LCS with the indicated retention limit could result in sandbar and dusky mortality as shown in parentheses; numbers not in parentheses indicate mortality associated with targeting species other than non-sandbar LCS

Discards

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Estimated discards for the different alternative suites, based on one overall region are shown in Table 4.1 in Chapter 4.

Final Environmental Impact Statement

In the FEIS, based on the new analyses of retention limits, NMFS estimated discards according to discards reported in the HMS logbook and discards from the bottom longline and gillnet 2005 to 2006 observer reports. NMFS estimated the total mortality for dusky and sandbar sharks for the different alternative suites assuming 1) that fishermen would incidentally catch non-sandbar LCS as they targeted other species given the reduced trip limits, and 2) that fishermen may target non-sandbar LCS in one region if retention limits were high enough. By doing this NMFS established a range in the possible mortality of sandbar and dusky sharks as a result of different alternative suites and different retention limits (Table C.6).

Discards associated with incidental fishing for sharks – Since dusky sharks have been prohibited since 2000 and have not been a targeted species since then, NMFS used the estimates of dusky discards from the different fishing sectors as explained in Table 4.1 in Chapter 4 to estimate incidental catch and discards of dusky sharks. NMFS used the same estimates for sandbar sharks as shown in Table 4.1 in Chapter 4 with the exception of the "estimated dead discards on directed shark BLL gear" and the "total discards in South Atlantic region due to non-sandbar LCS retention limit." Based on the re-calculation of retention limits as described above, NMFS estimated the discards associated with BLL gear when fishermen would incidentally capture sandbar sharks and/or non-sandbar LCS (*i.e.*, not target sandbar sharks and/or non-sandbar LCS) for the different alternative suites.

For alternative suite 4, NMFS first assumed that the reduced non-sandbar LCS trip limits would keep fishermen outside the shark research fishery from targeting non-sandbar LCS. Instead, the non-sandbar LCS retention limit would allow fishermen to keep non-sandbar LCS while they target other species, such as reef fish or the snapper-grouper complex. NMFS determined the level of discards a given retention limit could result in compared to what incidental fishermen kept while targeting other species. For instance, based on data collected by the shark BLL observer program from 2005 to 2007, fishermen with directed shark permits fishing for snapper-grouper kept, on average, 12 sharks per trip. Higher retention limits than this would presumably keep fishermen from having to discard sharks. In addition, fishermen that did not target sharks (*i.e.*, trips targeting snapper-groupers), on average, caught one sandbar shark per trip. The soak times on these trips are much shorter than soak times associated with shark targeted sets (Hale and Carlson, 2007; Hale *et al.* 2007). Therefore, it is anticipated that any sandbar sharks caught while fishermen targeted non-shark species could be released alive. In addition, even though recreational fishermen would not be allowed to retain sandbar sharks, NMFS estimated the sandbar shark mortality due to recreational fishing to be 27 mt dw per year due to potential post-release mortality and non-compliance. This level of mortality due to recreational fishing is amount based on the annual average landings of sandbar sharks under the

status quo. Thus, based on these assumptions, and on the adjusted sandbar shark quota for one or two regions (79.4 mt dw or 87.9 mt dw, respectively), NMFS calculated the total sandbar mortality associated with the different alternative suites (Table C.6). For instance, under the preferred alternative suite 4, it is estimated that there would be 9.1 mt dw of dusky discards (see Table 4.1 in Chapter 4). Total sandbar mortality would be 127.9 mt dw under the preferred alternative suite 4 (27 mt dw due to recreational anglers + 2.3 mt dw of discards by fishermen targeting non-shark species with BLL gear + 6.1 mt dw discards by fishermen with non-HMS permits + 4.3 mt dw of discards by fishermen using PLL gear + 0.3 mt dw of discards by fishermen within the shark research fishery + 87.9 mt dw of directed catch by fishermen in the shark research fishery) (Table C.6; Table 4.1 in Chapter 4). Under the base quota for sandbar sharks, total mortality would be slightly higher at 156.6 mt dw (27 mt dw due to recreational anglers + 2.3 mt dw of discards by fishermen targeting other non-shark species with BLL gear + 6.1 mt dw discards by fishermen with non-HMS permits + 4.3 mt dw of discards by fishermen using PLL gear + 0.4 mt dw of discards by fishermen within the shark research fishery + 116.6 mt dw of directed catch by fishermen in the shark research fishery). Dusky mortality would be 9.1 mt dw (see Table 4.1 in Chapter 4).

Discards associated with targeting sandbar sharks and/or non-sandbar LCS – NMFS also calculated the level of dusky and sandbar mortality in terms of landings and discards that could result if fishermen still continue to target sandbar sharks and/or non-sandbar LCS (Table C.6; mortality associated with targeting sandbar sharks and/or non-sandbar LCS is shown in parentheses). By doing this, NMFS was able to establish a range in possible landings and discards for dusky and sandbar sharks. NMFS did this for one region and for the Gulf of Mexico region, since the retention limits were higher in the Gulf of Mexico region than the Atlantic region. Again, NMFS used sandbar and dusky discards from the different fishing sectors as explained in Table 4.1 in Chapter 4, with the exception of the "estimated dead discards on directed shark BLL gear" and the "total discards in South Atlantic region due to non-sandbar LCS retention limit." For dusky sharks, based on observer program reports, NMFS multiplied the average number of dusky sharks discarded on directed shark trips in the different regions (0.10 per trip in the Gulf of Mexico region and 0.33 per trip in the Atlantic region) by the number of trips taken in the different regions under the different alternative suites. This was added to the rest of dusky discards from other fishing sectors as described in Table 4.1. The total dusky landings and discards for each alternative suite if fishermen continue to target sharks are shown in Table C.6. Under the preferred alternative suite 4, it is estimated that a total of 9.9 mt dw of dusky sharks will be landed or discarded if fishermen continue to target non-sandbar LCS outside the research fishery (Table C.6).

For sandbar sharks, NMFS calculated the number of sandbar sharks that would be discarded per trip if fishermen targeted sandbar sharks and/or non-sandbar LCS in different regions as a result of the different non-sandbar LCS retention limits. Discards were based on the catch composition of sandbar to non-sandbar LCS as reported in the observer program reports (1:4 ratio in the Gulf of Mexico region, and 1:1.4 ratio in the Atlantic region) and how many sandbar sharks may be retained under each alternative suite. This was then multiplied by the number of trips taken under the different alternative suites, and then added to the rest of the sandbar discards in Table 4.1, in addition to the sandbar quota for one or two regions (79.4 mt dw or 87.9 mt dw), and recreational catch (27 mt dw). Total sandbar mortality associated with

the different alternative suites and different retention limits if fishermen continue to target sharks is shown in Table C.6. For instance, in the Gulf of Mexico under alternative suite 2, fishermen would be able to retain 68 non-sandbar LCS and five sandbar sharks per trip. Based on the 1:4 ratio of sandbars to non-sandbar LCS in the Gulf of Mexico region, this would result in 17 sandbar sharks being caught per trip. Since five sandbar sharks could be retained, 12 would be discarded per trip. Since, on average, there were 397.3 directed trips in the Gulf of Mexico, 87.6 mt dw of sandbar sharks would be discarded. When this is added to other discards from other fisheries and mortality due to recreational fishing, the total sandbar mortality could be 340.2 mt dw (Table C.6). Under the preferred alternative suite 4, it is estimated that 365 mt dw of sandbar shark mortality may result if fishermen continued to direct on non-sandbar LCS outside the research fishery (236.8 mt dw of discards from BLL fishing + 87.9 mt dw harvested in the research fishery + 13.1 mt dw discarded in other fisheries + 27 mt dw mortality due to recreational fishing) (Table C.6). Since this would be above the 158.3 mt dw recommended TAC from the sandbar shark assessment, NMFS would have to take additional steps to lower sandbar shark mortality if fishermen continue to target non-sandbar LCS after these management measures are implemented.

C.2 Final management actions regarding quotas, regions, overharvests, and retention limits

As mentioned in chapters 2 and 4, NMFS prefers alternative suite 4 at this time. This would establish a small shark research fishery where different shark species could be harvested, and fishermen operating outside the research fishery would be allowed to retain non-sandbar LCS, pelagic sharks, and small coastal sharks (SCS). However, NMFS would change some of the measures in the FEIS within alternative suite 4 from what were proposed in the DEIS. As described above, NMFS would establish regional non-sandbar LCS quotas (an Atlantic and Gulf of Mexico region) for the preferred alternative suite 4 (whereas only one region was considered in the DEIS). This is based, in part, on public comment as well as the results of the blacktip shark assessment, the fact that the ASMFC is developing an interstate shark management plan that would implement measures in state waters of the Atlantic, and accounting for overharvests that occurred in 2007. In addition, NMFS would use HMS shark dealer reports to set the non-sandbar LCS quota based on recommendations from the SEFSC. NMFS would establish a separate non-sandbar LCS base quota for the shark research fishery of 50 mt dw. This would allow the shark research fishery to continue even if the non-sandbar LCS quota outside the research fishery is fulfilled. In addition, 43.1 mt dw of quota would be set aside for the shark research and display quota. This results in a base non-sandbar LCS quota of 439.5 mt dw in the Gulf of Mexico region and 188.3 mt dw in the Atlantic region (Table C.1 and Table C.7). However, based on the TAC from the sandbar stock assessment, NMFS would use the proposed 116.6 mt dw sandbar quota in the DEIS as the base quota for sandbar sharks.

Due to overharvests during the 2007 fishing year (Table C.1), NMFS would adjust these base quotas to account for the overharvests. Because of the large amount of overharvests that occurred in 2007, and because sandbar sharks would rebuild within the same timeframe if NMFS spread out the 2007 overharvest over one or five years, NMFS has decided to spread out the overharvests over five years to allow for a small sandbar research fishery and non-sandbar LCS fishery (Table C.2). This would result in an adjusted quota of sandbar sharks of 87.9 mt dw for five years (Table C.7). Based on this adjusted sandbar quota, the adjusted non-sandbar quota for

the shark research fishery would be 37.5 mt dw (Table C.3). This would allow the shark research fishery to continue even if the non-sandbar LCS quota outside the research fishery is fulfilled. The research fishery itself would continue until both the sandbar and non-sandbar LCS quota established for the research fishery were 80 percent filled (*i.e.*, if the non-sandbar LCS quota within the research fishery reached 80 percent, non-sandbar LCS retention in the research fishery would end, but sandbar sharks could continue to be retained until that sandbar quota reached 80 percent). However, if such a non-sandbar LCS quota is not adequate for the research fishery, NMFS would adjust the quota through a framework action. The resulting adjusted non-sandbar LCS quota outside the research fishery would be 390.5 mt dw in the Gulf of Mexico region and 187.8 mt dw in the Atlantic region (or a total of 578.3 mt dw of non-sandbar LCS quota) (Table C.6 and Table C.7). After the overharvests have been accounted for, unless new management measures are in place, the base quotas would then be implemented (as of January 1, 2013).

In addition, based on public comment and to preserve differences among directed and incidental permit holders, NMFS would set separate retention limits based on permit type; directed permit holders would be allowed a higher retention limit than incidental permit holders. This would afford directed permit holders, who presumably paid more for their directed shark permit and rely on shark products for a larger part of their income, a higher retention limit than if all permit holders had the same retention limit. However, while NMFS would implement regional quotas for non-sandbar LCS and different retention limits for directed and incidental permit holders, NMFS would not implement regional non-sandbar LCS retention limits. Instead, directed permit holders would have the same retention of non-sandbar LCS whether they fish in the Atlantic or the Gulf of Mexico. Similarly, incidental permit holders would have the same retention limit in all regions (Table C.7). This would allow for easier enforcement by having the same retention limits in all regions. In addition, while historical fishing effort was used as a proxy for determining retention limits, it is uncertain how effort would be distributed among regions in the future. Therefore, NMFS spread the total amount of adjusted non-sandbar LCS quota (578.3 mt dw) among the number of historical trips taken in all regions. Based on this, NMFS would keep the retention limit for incidental permit holders according to status quo at 3 non-sandbar LCS per trip and establish a trip limit of 33 non-sandbar LCS for directed permit holders based on the adjusted non-sandbar LCS quotas (see Table C.6 and Table C.7). Trip limits under the non-sandbar LCS base quota, 627.8 mt dw for all regions, would be 36 non-sandbar LCS per trip for directed permit holders and 3 non-sandbar LCS per trip for incidental permit holders (Table C.7)

NMFS also estimated discards of dusky sharks and sandbar sharks under the preferred alternative suite 4. Assuming fishermen would not target non-sandbar LCS based on the reduced trip limits (on average, directed shark holders landed 69 sandbar sharks and 35 non-sandbar LCS per trip under the status quo; therefore, a 33 or 36 non-sandbar LCS trip limit for directed permit holders would be approximately one quarter of what they landed under the status quo). NMFS assumes fishermen would catch dusky and sandbar sharks and non-sandbar LCS in an incidental manner as they target other species. Therefore, the level of total sandbar mortality is expected to stay below the TAC of 158.3 mt dw. NMFS estimates total sandbar landings and discards to be approximately 127.9 mt dw per year given the adjusted quotas and retention limits (Table C.6). Dusky shark discards are expected to decrease by over 70 percent from 33.1 mt dw per year (under the status quo) to an average of 9.1 mt dw per year. However, if fishermen continue to

target non-sandbar LCS and sandbar shark discards result in sandbar mortality above the recommended sandbar shark TAC, NMFS may consider reducing non-sandbar LCS trip limits, as appropriate.

Table C.7 Overview of quotas and retention limits under the base and adjusted quotas for the preferred alternative suite 4.

	Sandbar Quota (mt dw)	Non-sandbar LCS Quota Inside Research Fishery (mt dw)	Non-sandbar LCS Quota Outside Research Fishery (mt dw)	Retention Limits for Directed Permit Holders (Outside Research Fishery)	Retention Limits for Incidental Permit Holders (Outside Research Fishery)
Base Quotas (as of January 1, 2013)					
Atlantic	116.6	50	188.3	36 non-sandbar LCS/vessel/trip	3 non-sandbar LCS/vessel/trip
Gulf of Mexico			439.5		
Adjusted Quotas (from 2008 until December 31, 2012)					
Atlantic	87.9	37.5	187.8	33 non-sandbar LCS/vessel/trip	3 non-sandbar LCS/vessel/trip
Gulf of Mexico			390.5		

Appendix C References

Cortés, E. and J.A. Neer. 2005. Updated catches of Atlantic sharks. LCS05/06-DW-16. NMFS, Southeast Fisheries Science Center, Panama City, Florida. 58 p.

Hale, L.F. and J.K. Carlson. 2007. Characterization of the Shark Bottom Longline Fishery: 2005-2006. National Oceanic and Atmospheric Administration Technical Memorandum. NMFS-SEFSC-554. 25pp.

Hale, L.F., L.D. Hollensead, and J. K. Carlson. 2007. Characterization of the shark bottom longline fishery: 2007. NOAA Technical Memorandum NMFS-SEFSC 564, 25 pp.

NMFS. 2006. SEDAR 11 Stock Assessment Report: Large Coastal Shark Complex, Blacktip and Sandbar Shark. Highly Migratory Species Management Division, 1315 East West Highway, Silver Spring, MD 20910. 257 pp.

NMFS. 2007. Draft Amendment 2 to the Consolidated Highly Migratory Species Fishery Management Plan. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Sustainable Fisheries, Highly Migratory Species Management Division, 1315 East West Highway, Silver Spring, MD. Public Document. 450 pp.

APPENDIX D TABLE OF CONTENTS

D. APPENDIX: PROPOSED RULE AND DRAFT ENVIRONMENTAL IMPACT STATEMENT COMMENTS AND RESPONSES

D.1 Quotas/Species Complexes

Quotas

Comment 1: The National Marine Fisheries Service (NMFS) should consider reducing the fishing mortality for overfished sandbar sharks.

Response: NMFS is taking steps to reduce fishing mortality for overfished sandbar sharks. In particular, NMFS is reducing the base commercial quota for sandbar sharks to 116.6 metric ton (mt) dressed weight (dw). This is approximately an 80-percent reduction in sandbar shark landings compared to the status quo (594.4 mt dw). This base commercial quota of 116.6 mt dw combined with estimated discards both within and outside the commercial shark fishery (*e.g.*, including other commercial fisheries and recreational fisheries) is anticipated to keep sandbar mortality below the recommended total allowable catch (TAC) of 158.3 mt dw, which gives this stock a 70-percent probability of rebuilding by 2070, as described in Chapter one of Amendment 2 to the Consolidated Highly Migratory Species (HMS) Fishery Management Plan (FMP).

Comment 2: NMFS should have considered Individual Transferable Quotas (ITQs) for the shark fishery in this rulemaking. The quota is just too small for the number of participants. Individual Fishing Quotas (IFQs) or ITQs would accomplish the same objectives as the research fishery. ITQs/IFQs are the fairest, simplest, most rational method for this dilemma. NMFS should switch to an ITQ system with no trip limit, because a lot of times fishermen do not weigh the sharks rather fishermen know their legal trip limit based on how they fill their fish boxes. An ITQ system with no trip limit would result in fewer dead discards.

Response: While NMFS agrees that ITQs may be beneficial in many fisheries, NMFS did not consider ITQs for this rulemaking because setting up an ITQ system would have taken too much time to set up and implement, therefore allowing overfishing of sharks to continue in spite of the mandate to rebuild overfished stocks in § 304(e) of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). The Magnuson-Stevens Act states that for stocks identified as overfished or having overfishing occurring, the appropriate Council or Secretary shall prepare a fishery management plan, plan amendment, or proposed regulations for the fishery to end overfishing in the fishery and rebuild affected stocks within one year of that determination. NMFS satisfied that timing provision: sandbar sharks and dusky sharks were determined to be overfished with overfishing occurred on November 7, 2006 (71 FR 65086), and NMFS published the draft Amendment 2 to the Consolidated HMS FMP on July 27, 2007 (72 FR 41325). NMFS notes that the 2006 Magnuson-Stevens Fishery Conservation and Management Reauthorization Act amended § 304(e) to include a two-year timing provision for preparation and implementation of actions, and the new provision will be effective July 12, 2009.

Given § 304 and other timing considerations for this action, NMFS did not consider an ITQ system as a reasonable alternative, as it would have taken NMFS several years to properly design an ITQ system that appropriately considers the views of all stakeholders and then to implement such a system. The general requirements for ITQs or Limited Access Privilege Programs (LAPP) were included in the 2007 reauthorized Magnuson-Stevens Act (§ 303A). Overall, two basic things must be done when and/or implementing a LAPP system: 1) determine who would receive and who can hold the harvest privileges; and 2) define the nature of the harvesting privilege. In addition, there are referenda requirements for LAPP programs that are currently being established by NMFS (for instance, a particular allocation scheme must be approved by a given level of the industry). In addition, unlike the research fishery, which would allow an individual fisherman to target sharks on a yearly basis, allocation under an ITQ, IFQ, or LAPP program would be for a much longer period of time. Thus, NMFS would need to work with all stakeholders to devise the best allocation scheme possible, which would take considerable time. However, NMFS will consider developing an IFQ or LAPP program for sharks as well as other NMFS in the future.

Comment 3: NMFS should reconsider how it calculated the non-sandbar Large Coastal Shark (LCS) quota. The non-sandbar LCS quota is low because fishermen were not targeting non-sandbar LCS in the past. They were targeting sandbar sharks. If fishermen had been targeting non-sandbar LCS, historical landings would be much higher, and there would be a larger non-sandbar LCS quota than is currently proposed.

Response: NMFS is implementing a larger non-sandbar LCS base quota of 627.8 mt dw outside the shark research fishery based on dealer reports rather than logbooks, as originally proposed. Using dealer reports would include landings outside of the Agency's jurisdiction (*e.g.*, state landings) and would maintain consistency with data used in the stock assessments.

NMFS is using historical landings reported by shark dealers to calculate the non-sandbar LCS quota in order to follow the recommendations of the stock assessments for Gulf of Mexico and Atlantic blacktip shark populations. These stock assessments recommended keeping catch levels the same in the Atlantic region and not increasing catch levels in the Gulf of Mexico region. Basing quotas on dealer reports would cap fishing effort at historical levels and keep stocks in the Gulf of Mexico healthy and stocks in the Atlantic from declining. Setting quotas higher than these levels could have detrimental effects on shark stocks.

Comment 4: NMFS should consider allocating the entire sandbar quota to fishermen participating in the research fishery because giving a few sandbar sharks to those outside of the research fishery would not be worth it. NMFS should also consider only allowing fishermen with directed shark permits to participate in the shark fishery.

Response: Under the preferred alternative suite 4, NMFS would allocate the base sandbar quota of 116.6 mt dw to the shark research fishery, the adjusted quota would be 87.9 mt dw to account for overharvests that occurred in 2007. NMFS would publish a Federal Register notice each year, inviting permit holders to apply who are willing to

participate in the shark research fishery. Within that notice, NMFS would publish the selection criteria that NMFS would use to select participants for the research fishery. For example, depending on the research objectives for a given year, NMFS may consider applications from a variety of permit holders, including directed, incidental and charter/headboat (CHB) permit holders, in the shark research fishery. In addition, based on available funds, NMFS would place observers on vessels outside the shark research fishery that catch sharks incidentally. These observers would sample sandbar sharks that may be encountered, but fishermen would not be able to retain them outside the research fishery.

Comment 5: NMFS should acknowledge that the proposed reduction in quotas is the end of the directed shark fishery. NMFS should ensure that sharks are not discarded and accommodate incidental landings whenever possible.

Response: The reductions in quotas and retention limits and the prohibition of retaining sandbar sharks outside the research fishery would result in fishermen with directed shark permits no longer targeting non-sandbar LCS outside of the research fishery. However, fishermen could still retain non-sandbar LCS while they target other species such as reef fish and snapper-grouper. NMFS would implement a 33 non-sandbar LCS trip limit for fishermen with directed shark permits and a trip limit of 3 non-sandbar LCS for fishermen with incidental permits. NMFS would also implement management measures to reduce fishing mortality of sandbar, dusky, and porbeagle sharks based on recent stock assessments. Modifications to quotas and retention limits are necessary to end overfishing and rebuild overfished stocks. The trip limit for non-sandbar LCS outside the research fishery is based, in part, on bottom longline (BLL) observer program data from 2005 to 2007. The observer data showed that fishermen with directed shark permits fishing for snapper grouper kept, on average, 12 sharks per trip. A 33 non-sandbar trip limit would allow fishermen with directed permits to retain sharks (besides sandbar sharks) they catch while targeting other species and would minimize discards. The incidental trip limit is based on what fishermen with incidental permits currently retain under the status quo. In addition, fishermen targeting other species besides sharks (*i.e.*, snapper-grouper), on average, caught one sandbar shark per trip. Given that these sets not targeting sharks are typically shorter in length and duration than sets on trips targeting sharks, it is anticipated that sandbar sharks would remain on the gear for less time than on trips targeting shark species, and, thus, would have a greater likelihood of being released alive. Therefore, the current trip limits are not anticipated to result in increased dead discards.

Comment 6: NMFS needs to take a more a precautionary approach in regard to hammerheads, common thresher sharks, and blacktip sharks in the Atlantic region, which have an unknown stock status; NMFS should follow international organizations such as the World Conservation Union (IUCN), and pay attention to red listed shark species such as hammerheads, dusky, and sand tigers sharks, which would likely be taken (under the quota or as bycatch) in the fishery and are particularly depleted. Considering these factors, as well as NMFS' poor record for shark recovery to date, NMFS should close the commercial shark fishery; NMFS should put a moratorium on LCS fishing in the Atlantic until the stock status of Atlantic blacktip sharks is known; NMFS should only allow

fishing for Atlantic blacktip sharks within scientifically derived limits when the population is capable of supporting such exploitation and bycatch of prohibited species is demonstrated to be insignificant.

Response: NMFS is implementing management measures based on the latest NMFS-conducted stock assessments for blacktip, dusky, and sandbar sharks, and the LCS complex, which represent the best available science by independent peer reviewers. These management measures are consistent with rebuilding targets established in the latest shark stock assessments. In general, shark stock status determinations are based on NMFS-conducted stock assessments. NMFS does not rely on outside organizations, such as the IUCN, when making stock status determinations. This is due to the unknown nature of the data and peer review methodology applied by these outside groups. NMFS uses a Southeast Data, Assessment, and Review (SEDAR) process for shark assessment, which is open to the public and uses the Center for Independent Experts (CIE) to peer review assessment results.

The latest blacktip shark assessments recommended not increasing catch levels in the Gulf of Mexico and keeping catch levels at historical levels in the Atlantic. To account for differences in catch between the Gulf of Mexico and Atlantic region and to follow recommendations from the blacktip sharks stock assessments, NMFS would implement a Gulf of Mexico non-sandbar LCS regional quota and an Atlantic non-sandbar LCS regional quota based on historical landings from Highly Migratory Species (HMS) shark dealer reports from 2003 to 2005. This result is a lower non-sandbar LCS base quota in the Atlantic region (188.34 mt dw) than in the Gulf of Mexico region (439.5 mt dw). Since the Atlantic blacktip shark assessment did not recommend prohibiting blacktip sharks in the Atlantic region, NMFS would implement this regional quota based on historical landings in this region.

Unlike the sandbar shark assessment, which recommended a specific TAC, or the blacktip stock assessments, which recommended specific catch levels, the dusky shark assessment did not give specific mortality targets. In addition, even if NMFS stopped all shark fishing in the Atlantic, dusky sharks would still be caught as bycatch in other fisheries. NMFS has already taken a precautionary approach by placing this species on the prohibited species list in 2000; however, there continue to be dusky discards. NMFS estimated reduction in dusky mortality as a result of sandbar and non-sandbar LCS management actions. Based on the reduced quotas and trip limits, NMFS estimates that dusky shark mortality would be reduced from 33.1 mt dw to 9.1 mt dw per year. This is a 73-percent reduction in mortality compared to the status quo, which should help rebuild the dusky shark population and afford dusky sharks more protection compared to the status quo.

Finally, NMFS is conducting a stock assessment for hammerhead sharks, but not a separate stock assessment for common threshers or sand tiger sharks. This is due to the lack of species-specific information collected to conduct stock assessments for each species of sharks involved in commercial shark fisheries. Therefore, species such as hammerhead sharks and common threshers are managed within species complexes. It is likely that hammerhead sharks landings would be reduced due to the reduced non-

sandbar LCS quota and retention limits. NMFS has not considered specific management actions for common threshers in this rulemaking, but an annual quota is in place for the pelagic shark complex (488 mt dw), and underharvests of this complex are not applied to the next season. NMFS may consider additional management actions for this species, as warranted, in the future. For sand tiger sharks, based on their high vulnerability to exploitation and to discourage any directed fisheries from occurring in the future, in 1997 NMFS included it on the prohibited species list. Additionally, as with the dusky sharks, a reduction in discards based on the sandbar and non-sandbar LCS quotas and management actions taken in this rulemaking should afford additional protection for sand tiger sharks.

Comment 7: NMFS should include landings by states, such as Louisiana and Alabama, against the Federal shark quota.

Response: NMFS counts for both Federal and state landings of sharks against the Federal shark quota since sharks in both state and Federal waters contribute to the stocks that are Federally managed. This approach is consistent with that used by NMFS to manage other Federal fisheries such as reef fish and snapper grouper.

Comment 8: NMFS should consider species-specific quotas. NMFS should begin with blacktip sharks, since an assessment was done for them in both the Gulf of Mexico and Atlantic. This is because of variation in life history parameters, different intrinsic rates of increase, and different catch and abundance data for all species listed in each complex. Managing sharks as a complex is inappropriate.

Response: NMFS is moving towards species-specific management, including species-specific quotas. However, for some species, NMFS has only limited data which requires management to be based on species within a complex. Based on the latest stock assessment, NMFS has removed sandbar sharks from the LCS complex, resulting in a sandbar shark quota, and a non-sandbar LCS quota, comprised of blacktip, bull, smooth hammerhead, scalloped hammerhead, smooth hammerhead, lemon, nurse, silky, tiger, and spinner sharks. The sandbar shark assessment gave a specific TAC for sandbar sharks, which resulted in NMFS accounting for sandbar mortality in all fisheries (both commercial and recreational sectors) before establishing a base commercial quota of 116.6 mt dw. In order to monitor this quota, NMFS removed sandbar sharks from the LCS complex and set a separate commercial quota for this species.

However, while separate blacktip shark assessments were conducted, NMFS has decided not to have separate blacktip shark quotas because NMFS is also limited by the fact that the shark fishery is a multi-species fishery. The majority of sharks harvested in the directed shark fishery beside sandbar sharks are blacktip sharks. For instance, 82-percent of sharks caught in the directed shark fishery in the Gulf Mexico region are blacktip sharks (not including sandbar sharks). The next highest landings were for hammerhead sharks at 7-percent and bull sharks at 5-percent. In the South Atlantic region, outside of sandbar sharks, had the same pattern with the highest percentage of landing for blacktip sharks at 72-percent followed by hammerhead sharks at 14-percent, and then bull sharks at 4-percent. Therefore, since NMFS did not have species-specific assessments on other species besides blacktip and sandbar sharks, and because the

majority of the LCS catch, not including sandbar sharks, are blacktip sharks, NMFS chose to create a non-sandbar LCS complex with its own quota. To account for differences in catch between the Gulf of Mexico and Atlantic region, NMFS would implement a regional Gulf of Mexico non-sandbar LCS quota and an Atlantic non-sandbar LCS quota.

Comment 9: NMFS should split the sandbar quota between research and bycatch. This could be a "phased-in" quota system where 2/3 of the quota in the first year would be allocated toward incidental landings and 1/3 would be allocated toward research.

Response: Based on the available base commercial sandbar quota (116.6 mt dw), a 1/3 allocation of the quota for research would only result in 38.8 mt dw of quota. In addition, due to overharvests in 2007 (see Appendix C in the Final Environmental Impact Statement (FEIS) for more details), NMFS is reducing the base commercial sandbar shark quota to 87.9 mt dw annually for five years. A 1/3 allocation of this reduced quota would only leave 29.3 mt dw of sandbar quota available for research. One third of neither the base annual quota nor the adjusted five year quota would provide enough trips or observations to produce statistically sound data on the several research questions NMFS intends to address. In addition, a 2/3 allocation of the sandbar quota would only allow fishermen (directed or incidental) to retain few sandbar sharks (less than what was proposed under alternative suite 3, where all permit holders would have been allowed to retain sandbar sharks). Thus, splitting the quota into thirds would not provide benefits to the fishery nor to the research needed for future stock assessments. However, as funds are available, NMFS would have scientific observers on vessels fishing outside the research fishery that would monitor discards of sandbar sharks. If large number of sandbar dead discards occurred in the fishery, resulting in mortality above the recommended TAC, NMFS would take management action, as necessary.

Comment 10: NMFS should not use the maximum rebuilding time period (70 years) allowed under the law but should use a more precautionary approach. NMFS should not strive for maximum sustainable yield (MSY) for blacktip and sandbar sharks. The proposed sandbar shark quota of 116 metric tons (mt) is too high to ensure recovery of this population and NMFS should consider adopting an even lower final number.

Response: The 2005/2006 stock assessment for sandbar sharks discussed three rebuilding scenarios, including: a rebuilding timeframe under no fishing; a TAC corresponding to a 50-percent probability of rebuilding by 2070; and a TAC corresponding to a 70-percent probability of rebuilding by 2070. Since sharks are caught in multiple fisheries, to meet the rebuilding timeframe under no fishing, NMFS would have to implement restrictions in multiple fisheries to reduce mortality, such as shutting down multiple fisheries to prevent bycatch. If NMFS were to shutdown the shark fishery, such action would likely have severe economic impacts on the fishing community and it would likely result in difficulties for Council-managed and Commission-managed fisheries which often catch sharks as bycatch. Therefore, a rebuilding timeframe under no fishing is not practicable at this time. The recommended TAC associated with a 50-percent probability of rebuilding by 2070 is 172.7 mt dw (or 240 mt whole weight (ww)). However, given the life history of sharks including slow growth, late age of maturity, and

relatively small litter sizes, as described in the 1999 Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks (1999 FMP), a 50-percent probability of success is minimally acceptable for sharks. Thus, NMFS adopted the TAC corresponding to a 70-percent probability of rebuilding by 2070, or 158.3 mt dw (220 mt ww). This timeframe is consistent with the Magnuson-Stevens Act, the National Standard (NS) 1 guidelines in at §600.310, the 2006 Consolidated HMS FMP (which includes the rebuilding requirements of the 1999 FMP), and the other NSs that require NMFS to consider the economic and social impacts of the fishery.

Discard Issues

Comment 11: NMFS should consider sandbar shark discards outside the research fishery. NMFS should also be concerned with derby-style fishing with the reduced quotas and retention limits.

Response: NMFS considered sandbar shark discards outside the shark research fishery when it established the base sandbar shark quota (see Table A.1 in Appendix A of the Final EIS). In doing so, NMFS set a commercial sandbar shark quota, that in addition to considering discards in other fisheries outside the shark research fishery, should keep sandbar shark mortality below the recommended TAC of 158.3 mt dw each year. In order to deter derby-style fishing outside the shark research fishery, NMFS reduced the trip limit for directed shark permit holders to 33 non-sandbar LCS. This should allow the shark fishery to stay open longer than it has in the past while also minimizing, to the extent practicable, regulatory discards and derby-style fishing.

Comment 12: NMFS should acknowledge that dusky bycatch will be an issue both inside and outside the research fishery. Seventy percent of dusky sharks are dead at haulback.

Response: Dusky sharks could be caught as bycatch under the new management measures, most of which would result in dead discards. However, most of the current dusky shark discards occur within the directed shark fishery (on average, 24.5 mt dw per year), with a total of 33.2 mt dw of dusky sharks discarded on average per year. Under the preferred management measures, there would no longer be a directed shark fishery, except within the shark research fishery. Depending on the number trips taken within the research fishery, yearly dusky discards could be between 0.5 (64 trips associated with the adjusted sandbar shark quota) and 0.6 mt dw (92 trips associated with the base sandbar shark quota), with a total of 9.1 mt dw of dusky shark discards across all fisheries. This is a 73-percent reduction in dusky discards compared to the status quo.

Comment 13: NMFS should evaluate if highgrading will be an issue outside the research fishery.

Response: Highgrading, or the discarding of smaller, less valuable animals and retaining only the most valuable animals to fill a retention limit, is prohibited. However, highgrading may be an issue whenever trip limits are implemented. Based on the latest shark stock assessments, NMFS would implement a reduced shark trip limit of 33 non-

sandbar LCS trip limit for directed permit holders operating outside the research fishery. NMFS expects that this reduced trip limit (approximately one quarter of what directed fishermen lands on a trip under the status quo) and the prohibition on the retention of sandbar sharks would result in fishermen with directed shark permits no longer targeting non-sandbar LCS. Additionally, this trip limit is higher than the average number of sharks directed shark fishermen currently retain when targeting other species (*i.e.*, 12 sharks). Thus, NMFS assumes that such a trip limit would allow directed shark fishermen to keep all incidentally caught non-sandbar LCS as they target non-sharks species, which should keep fishermen from highgrading.

Species Complexes

Comment 14: NMFS should reconsider the use of the term "non-sandbar LCS." This title is awkward and might confuse some fishers. The use of "LCS" or "LCS (other than sandbars)" is recommended following the same logic as when referring to "pelagic sharks" (which otherwise would be referred to as non-blue or porbeagle pelagic sharks.)

Response: NMFS considered several names for the new complex of LCS that would not include sandbar sharks. NMFS felt keeping the title "LCS" for the new complex may be confusing with the "old" LCS complex (*i.e.*, the complex prior to the implementation of the amendment). NMFS choose "non-sandbar LCS" because it was the most explicit description of the new complex: the LCS complex with sandbar sharks removed. While this may differ from the terminology for pelagic sharks, NMFS is not specifically removing porbeagle or blue sharks from the pelagic unit, therefore, it is not necessary to rename the pelagic shark complex at this time.

Comment 15: NMFS is taking sandbars out of the LCS complex. Where did NMFS get the authority to remove a given species from a complex?

Response: The sandbar shark assessment gave a specific TAC for sandbar sharks, which resulted in NMFS establishing a base commercial quota of 116.6 mt dw. In order to monitor this quota, NMFS removed sandbar sharks from the LCS complex and set a separate commercial quota for this species. NMFS has the authority under Magnuson-Stevens Act to manage all sharks individually or as a complex, and may set species-specific quota as appropriate, given the best available science.

Comment 16: The Director of the North Carolina Division of Marine Fisheries stated that NMFS should place blacktip sharks in the small coastal shark (SCS) complex.

Response: NMFS is not changing the composition of the SCS complex in this rulemaking. Rather, based on the TAC recommended by the sandbar shark stock assessment, NMFS is removing sandbar sharks from the LCS complex. The revised LCS complex would be named the non-sandbar LCS complex and would consist of blacktip, bull, smooth hammerhead, scalloped hammerhead, smooth hammerhead, lemon, nurse, silky, tiger, and spinner sharks. Blacktip sharks are the species most commonly caught within this complex. In the 1993 Fishery Management Plan for Atlantic Sharks, blacktip sharks were placed within the LCS complex based on fishery dynamics. Blacktip sharks

are more commonly caught with gear targeting LCS (*i.e.*, BLL gear) rather than gear used to target SCS (*i.e.*, gillnet gear). In addition, the blacktip shark stock assessments recommended that blacktip shark landings should not change or increase from historical catch levels. By placing blacktip sharks within the SCS complex, NMFS could either drastically reduce the blacktip shark regional quotas if the 454 mt dw SCS complex quota was not increased (*i.e.*, the 454 mt dw quota would include the quota for blacktip sharks and SCS), or increase the SCS complex quota to include historical catch of blacktip sharks. Placing blacktip sharks within the SCS complex and increasing the overall SCS quota could result in increased catch levels of SCS. These catch levels may or may not be sustainable for the SCS complex. Therefore, at this time, NMFS is not placing blacktip sharks within the SCS complex.

Over- and Underharvests

Comment 17: NMFS received several comments regarding transferring quota. These include: NMFS should consider transferring unused quota to the next season; NMFS should not consider transferring underharvests to the next season even if species are not overfished or the status is unknown. This is because other bodies such as the IUCN have expressed concern as to some of these species; NMFS should subtract quota overages from the subsequent season's quota and disallow carry over of underages to the next season for populations that are of unknown status, overfished, or experiencing overfishing.

Response: The preferred alternative would remove the three fishing seasons and replace them with a fishing year. NMFS would subtract overhavests from the next fishing year for all species/complexes. In addition, NMFS would transfer underharvest up to 50-percent of the base quota to the next fishing year for species whose stock status are not unknown, not overfished, or overfishing is not occurring. Currently this would only apply for SCS. At the present time, IUCN has not expressed concern regarding any species within the SCS complex (finetooth, blacknose, sharpnose, and bonnethead sharks). However, NMFS would not carry over underharvest to the next season for species whose stock status is unknown, or overfished, or overfishing is occurring. Not applying underharvests would increase the likelihood that these stocks rebuild in a timelier manner. This approach is also used in other fisheries that NMFS manages including bluefin tuna and swordfish.

Shark Display and Research Quota

Comment 18: NMFS received several comments in favor of the preferred management measures affecting display quotas under alternative suite 4. These comments included: NMFS should allocate 2 mt dw of sandbar sharks from the overall 60 mt ww display and shark research quota to public display and research under exempted fishing permits (EFPs); the 60 metric tons (mt ww) quota for display permits and research should be reduced if it has never been attained; NMFS should prohibit dusky sharks for public display; and, dusky sharks have no display value.

Response: In order to stay within the TAC recommended by the sandbar stock assessment, NMFS reduced the commercial sandbar shark quota. In order to be equitable to all sectors, NMFS also restricted the number of sandbar sharks that could be collected under EFPs and Display Permits. While the 60 mt ww shark display and research quota has never been exceeded, the full quota has been allocated in the past. While NMFS is not reducing the overall 60 mt ww shark display and research quota, NMFS would restrict the sandbar shark collection for 1 mt dw for research under EFPs and 1 mt dw for public display to ensure that the sandbar shark mortality stays below the 158.3 mt dw TAC and to ensure that the research fishery has as much quota as possible in which to produce statistically sound data. The preferred allocations to the EFP and display quotas were based on the 2 mt dw average annual collection of sandbar sharks under the exempted fishing program from 2000 to 2006. As such, NMFS does not anticipate these restrictions to affect future sandbar shark collections under EFPs.

Due to the severity of the overfished and overfishing status of dusky sharks, dusky sharks would be prohibited for collection for public display. Aquariums that currently have dusky sharks would have to maintain their current stock. In addition, NMFS would review the allocation of dusky sharks for research under EFPs on a case by case basis. This would allow for research under EFPs on dusky sharks to continue, as appropriate.

Comment 19: The Agency received numerous comments stating that NMFS should not reduce the existing research/display quotas for sharks because: the quota is already small and not expected to increase in the future; the exempted fishing program quota has never been exceeded; the collection of sandbar sharks for public display is not a significant contributing factor to the reported decline of this stock; there is a disproportionate amount of regulations on display permits compared to other fishermen; any reduction in quotas or restrictions on species, if scientifically warranted and if based on scientifically peer-reviewed stock assessments, should come entirely out of the commercial quotas which have not been historically adhered to, and where the animals are landed dead with zero conservation or educational value; the sandbar shark is one of only a handful of shark species which are exceptionally hardy and historically has adapted well to closed aquarium environments.

Response: While the 60 mt ww (or 43.2 mt ww) shark display and research quota is small compared to the current 1,017 mt dw LCS quota, it was set aside for permits that are allocated on a case by case basis. The overall display and research quota would not be reduced. As described in the response to Comment 18 above, the quantity of sandbar and dusky sharks authorized for such activities is going to be limited. NMFS would limit the allocation of sandbar sharks under exempted fishing permits (EFPs) and display permits to what has been landed, on average, under the program during the past six years. Therefore, no negative economic impacts are anticipated with this allocation of sandbar sharks. Fishing mortality in the commercial and recreational sectors would also be reduced significantly as a result of final measures in this rulemaking. Finally, because exempted fishing permits exempt fishermen from regulations that other fishermen must follow, other regulations regarding reporting, notifying enforcement, and tagging animals are appropriate and warranted.

Comment 20: NMFS should consider an exemption to allow for the live take of dusky sharks for public display. Aquariums need to work on the husbandry of these sharks.

Response: As discussed in the response to Comment 18, due to the severity of the overfished and overfishing status of dusky sharks, dusky sharks would be prohibited for collection for public display. Moreover, dusky sharks do not do well in captivity. Currently, only 13 dusky sharks per year have been collected under the exempted fishing program. Under the preferred management measures, NMFS would review the allocation of dusky sharks for research under EFPs on a case by case basis. This would allow for research under EFPs on dusky sharks to continue, as appropriate.

Comment 21: NMFS should explain how it will prohibit sandbar and dusky sharks for EFPs and display permits.

Response: Exempted fishing permits allow fishermen to harvest species otherwise prohibited by existing regulations. NMFS is not prohibiting the collection of sandbar sharks under the exempted fishing program. Instead, 1 mt dw for research under EFPs and 1 mt dw for public display would be allocated to fishermen to ensure that the sandbar shark mortality stays below the 158.3 mt dw TAC. However, due to the severity of the overfished and overfishing status of dusky sharks, dusky sharks would be prohibited for collection for public display because they do not do well in captivity. While NMFS cannot prohibit fishermen from incidentally catching dusky sharks, NMFS can prohibit their retention for public display or research under EFPs. NMFS reviews the allocation of dusky and sandbar sharks under EFPs and Display Permits on a case by case basis. If research on dusky sharks must be conducted under an EFP and is deemed scientifically necessary, even if it includes mortality, NMFS may issue the necessary permits. However, such permits must have scientific merit and the research conducted by scientific staff in order for the permit to be issued. As is currently done for the exempted fishing program, NMFS would monitor all sources of mortality as a result of EFPs, Display Permits, Scientific Research Permits, and Letters of Acknowledgements, and these data would be incorporated in future stock assessments.

Comment 22: NMFS should provide more information on how they track landings under exempted fishing permits and what happens to HMS that are collected under EFPs.

Response: NMFS requires persons who receive EFPS to report the number of total animals kept, discarded alive, and discarded dead under the exempted fishing program. This information is published in the Federal Register every November/December in conjunction with the Agency's request for comments and Notice of Intent to issue EFPs and related permits in the subsequent year. The information is also published in the annual SAFE report and may be used in stock assessments, if appropriate. Permittees who do not provide this information, may not receive a permit in the future (*i.e.*, NMFS would deem future applications incomplete until all required reporting from past permits was received). NMFS does not track what is done with the animals after they have been collected by the original permittees.

D.2 Porbeagle Sharks as Prohibited

Comments in favor of prohibiting porbeagle sharks

Comment 1: NMFS received several comments in support of prohibiting the take of porbeagle sharks including, NMFS should prohibit porbeagle sharks because seasoned fishermen misidentify porbeagle sharks as mako sharks; the prohibition on the possession of porbeagle sharks is long overdue; NMFS should prohibit porbeagle sharks and implement stricter management measures that address porbeagle take, including bycatch; and NMFS should prohibit the possession of porbeagle sharks, however, if bycatch of porbeagle sharks is allowed, the rule will have little effect on the overall status of porbeagle.

Response: As a result of the 2005 Canadian stock assessment for the North Atlantic porbeagle shark, NMFS has determined that porbeagle sharks are overfished, but overfishing is not occurring. While the United States is not responsible for a large proportion of the porbeagle sharks landed in the Northwest Atlantic, NMFS would establish a reduced TAC for porbeagle sharks that would cap fishing mortality at its current level. The commercial quota would be 1.7 mt dw, commercial discards would be 9.5 mt dw, and recreational catch, including landings in tournaments, would be 0.1 mt dw per year. This TAC would increase the likelihood that fishing mortality would remain low and allow the stock to rebuild within 100 years (see rebuilding plan in Chapter 1 of the FEIS). While bycatch of porbeagle sharks would continue, the majority of porbeagle sharks caught are discarded alive. For instance, of an average of 723 porbeagle sharks that were discarded annually in the PLL fishery, only 161.3 were discarded dead whereas 561.6 were discarded alive. Therefore, dead discards should continue to be low and not negatively affect the stock.

Comments in favor of not prohibiting porbeagle sharks

Comment 2: NMFS received several comments, including comments from the states of Massachusetts and New Hampshire, opposing the prohibition of porbeagle sharks including: there is a small historical porbeagle shark catch here in the United States that is not significantly contributing to the loss of the porbeagle shark. The U.S. porbeagle fishery has remained sustainable under current regulations; other countries, such as Canada, should be more responsible for rebuilding this stock as they contribute more towards Atlantic-wide fishing mortality; NMFS should pressure to have Canadians reduce their porbeagle catch; porbeagle sharks are the only big game fish in the Northeast; and placing porbeagle sharks on the prohibited species list takes away 33-percent of the potential catch in New England.

Response: NMFS believes that a reduced TAC for porbeagle sharks would cap fishing mortality at its current level. Given the low level of porbeagle catch in U.S. waters, capping mortality at the current fishing level should allow the porbeagle shark population to rebuild within 100 years (see rebuilding plan in Chapter 1 of the FEIS), but discourage any future directed fishery on this species. As a result of this TAC, NMFS does not anticipate any increase in landings of porbeagle sharks within U.S. waters.

Other countries that have a directed fishery for porbeagle sharks have reduced their porbeagle quotas. For instance, the Canadian porbeagle quota was cut by 80-percent in 1998. It was cut back even further in 2001 and 2006. The current Canadian quota is 250 mt per year, 185 mt of which may be taken by the directed porbeagle shark fishery, with the rest of the quota being allocated for bycatch. In addition, according to the latest ICCAT Recommendation (07-06), all contracting parties are obligated to reduce mortality of porbeagle sharks in their directed porbeagle shark fisheries. NMFS may take more precautionary measures in the future, as necessary, if future stock assessments warrant such action.

Comment 3: The Atlantic States Marine Fisheries Commission (ASMFC) requested establishing a 2 mt quota for porbeagle sharks to allow a limited harvest. Allowing a small harvest of porbeagle sharks would help the ASMFC set identical species groups while offering protection from overharvest.

Response: NMFS would set a reduced TAC for porbeagle sharks of 11.3 mt dw of which 1.7 mt dw is allocated to commercial harvest. This caps fishing mortality at its present level by commercial and recreational fishermen and should prevent a directed fishery for this species from developing in the future. In addition, it is an 88-percent reduction in the current commercial quota of 92 mt dw, which should offer the species a greater likelihood of rebuilding within 100 years (see rebuilding plan in Chapter 1 of the FEIS).

Porbeagle mortality and rebuilding

Comment 4: Does NMFS have any evidence that Canadian porbeagle sharks go into U.S. waters? Is NMFS aware if U.S. fishermen are catching these Canadian sharks?

Response: Tagging data provide strong evidence that there are distinct porbeagle populations in the Northeast and Northwest Atlantic, and that the Northwest Atlantic stock is a separate population that undertakes extensive annual migrations between Canada and northeastern United States. Given these migrations, porbeagle sharks found in U.S. and Canadian waters constitute one stock, and fishermen in the United States catch porbeagle sharks that migrate between U.S. and Canadian waters.

Comment 5: If porbeagle sharks are overfished but overfishing is not occurring, what would the rebuilding timeframe be if the fishery was to continue at the current level?

Response: Since the 2005 Canadian stock assessment included U.S. commercial landings of porbeagle sharks, capping fishing mortality at its current level should allow the species to rebuild within 100 years (see rebuilding plan in Chapter 1 of the FEIS).

Comment 6: Will NMFS propose similar porbeagle shark prohibition measures at the International Commission for the Conservation of Atlantic Tunas (ICCAT) meeting this year? Since most landings for porbeagle occur outside the United States, international cooperation is needed to help manage this species.

Response: At the 2007 ICCAT annual meeting in Turkey, ICCAT Recommendation (07-06) obligates all Contracting Parties to take appropriate measures to reduce fishing mortality in fisheries targeting porbeagle sharks. While the United States does not have a directed porbeagle shark fishery, and U.S. commercial and recreational landings are small (1.8 mt dw), this ICCAT measure would help reduce mortality of porbeagle sharks that are targeted by other countries. The United States would also implement a reduced TAC of 11.3 mt dw, which is below the current commercial quota of 92 mt dw per year for porbeagle sharks, and encourage the live release of porbeagle sharks. This should prevent a directed fishery from developing for porbeagle sharks in U.S. waters in the future.

Quantifying recreational landings

Comment 7: NMFS has underestimated the number of porbeagle sharks being caught. This is because the Marine Recreational Fisheries Statistics Survey (MRFSS) data is flawed. Porbeagle sharks are not present in New England waters when MRFSS is collecting their surveys in this area.

Response: NMFS is currently working on a marine recreational information program to improve data collection from the recreational sector. Due to the rarity of porbeagle shark landings, it is difficult to estimate porbeagle landings with survey data, which only sample a portion of the recreational fishing fleet and then extrapolate the number of fish caught based on the estimated number of anglers. Therefore, NMFS may consider census data (*i.e.*, a trip ticket or a call-in system where all porbeagle shark landings are counted) in the future to better estimate recreational porbeagle landings.

Comment 8: The Large Pelagic Survey (LPS) started out as a tuna survey, and the LPS survey happens during the middle of summer. There is no LPS survey taking place when porbeagle sharks are present, so NMFS data is skewed.

Response: The LPS survey was designed to capture recreational landings in the Northeast during the time period when most fishing takes place north of Virginia. Currently, the survey consists of randomly selected weekly telephone and dockside intercept interviews, with mandatory participation from June 1 through October 31 from Virginia to New York. The survey is conducted July 31 through October 31 for states north of New York. Past phone surveys indicated this is when most of the fishing effort occurs in this region. As mentioned in the response to Comment 7, due to the rarity of porbeagle shark landings, it is difficult to estimate porbeagle landings with survey data. Therefore, NMFS may consider census data (*i.e.*, trip ticket or a call-in system where all porbeagle sharks landed are counted) in the future to better estimate recreational porbeagle landings.

Comment 9: NMFS should have recreational fishermen report their porbeagle landings.

Response: NMFS currently does not require recreational fishermen to report shark landings. NMFS collects data on recreational fishing catch and effort through the

LPS and the MRFSS, which is considered the best available science for determining recreational landings. These surveys collect data on fishing effort and catch of highly migratory species. In addition, randomly selected fishing tournaments are an important component of HMS recreational fisheries data. However, because of the rarity of porbeagle shark landings, in general, NMFS may not be capturing all of the porbeagle sharks landed recreationally through these types of surveys. Thus, NMFS is currently working on ways to gather more data on recreational landings of porbeagle sharks.

D.3 Retention Limits

Comment 1: The proposed 22 non-sandbar LCS retention limit is not economically feasible and is the equivalent of shutting down the fishery; NMFS should consider a trip limit of 30 to 75 non-sandbar LCS to maintain economic viability.

Response: NMFS is aware of the economic impacts of the proposed retention limits. The 22 non-sandbar shark LCS retention limit was calculated by dividing the available quota over average annual number of trips that landed non-sandbar LCS by directed and incidental permit holders as reported in the Coastal Fisheries logbook and the HMS logbooks. At the time of the Draft EIS, the available non-sandbar LCS quota was determined by the average annual landings reported in the HMS and Coastal Fisheries logbooks from 2003 to 2005. However, during the comment period, the Southeast Fisheries Science Center (SEFSC) recommended using HMS shark dealer reports (*i.e.*, southeast and northeast general canvass and SEFSC quota monitoring databases) to calculate historical landings of non-sandbar LCS since the stock assessments were, in part, based on landings reported by HMS shark dealer reports. The HMS shark dealer reports also include landings by both state and Federal shark fishermen, whereas logbook data only includes Federally permitted shark fishermen. Thus, dealer reports include all shark landings, which results in a higher non-sandbar LCS quota.

NMFS is using landings from the HMS shark dealer reports to revise the non-sandbar LCS quota based on SEFSC recommendations. After accounting for overharvests that occurred in 2007 (see Appendix C of the Final Environmental Impact Statement), NMFS would revise the retention limits based on the larger non-sandbar LCS quota. The final measures would implement a 33 non-sandbar LCS trip limit for directed permit holders and a three non-sandbar LCS trip limit for incidental permit holders. While the trip limit for directed permit holder has increased from what was proposed in the Draft EIS, NMFS is assuming that fishermen with directed shark permits would no longer target non-sandbar LCS outside the research fishery. Rather, a 33 non-sandbar LCS trip limit would allow fishermen to keep non-sandbar LCS while they target other species, such as reef fish and snapper-grouper. Based on BLL observer program from 2005 to 2007, fishermen with directed shark permits fishing for snapper/grouper kept, on average, 12 sharks per trip. A 33 non-sandbar LCS trip limit would allow fishermen to retain non-sandbar LCS that they catch while targeting other species, therefore, preventing excess discards. However, this retention limit would be too low for fishermen to target non-sandbar LCS; NMFS is aware that the revised retention limit of 33 non sandbar sharks per vessel/trip is a significant reduction from the current 4,000 lb dw LCS

retention limit for directed permit holders. Despite this, these measures are necessary to rebuild overfished stocks, reduce bycatch, and end overfishing.

Comment 2: NMFS should consider a per day limit in lieu of an individual trip limit. NMFS could reduce the limit to something like 2,000 lb non-sandbar LCS per day. This would allow a larger amount to be harvested in a single trip, making it more profitable for the fishermen. A day limit would also keep quota available for longer throughout the year.

Response: NMFS has not considered a per day trip limit because of the difficulty in determining how NMFS would monitor what a vessel lands within a 24 hour period. Currently the shark fishery is based on a per trip basis, as are most of the HMS fisheries. While a higher per day limit may allow for a larger single trip, which may reduce discards, it would be difficult for NMFS to monitor when a vessel left and returned to port and whether or not this was done multiple times within 24 hours, especially if vessels visited several ports and are not required to possess vessel monitoring systems (VMS). A per trip limit is easier to enforce; no matter what port a vessel returns to, they would be held to the same trip limit. While a per day limit may reduce the number of trips and elongate the season based on how gillnet and BLL trips targeting non-shark species typically fish, the trip limits under the preferred alternative suite 4 were devised in such a way to keep the non-sandbar LCS season open longer than they have been in the past. Given the reduced trip limits to accommodate the reduced shark quotas, NMFS believes that dividing the available quota across the historical fishing effort would help the shark fisheries stay open longer. In addition, since directed shark permit holders would presumably no longer target non-sandbar LCS based on those reduced trip limits and the prohibition on retention of sandbar sharks outside the research fishery, the non-sandbar LCS fishery would be incidental in nature where non-sandbar LCS are landed while fishermen target other species throughout the year.

Comment 3: NMFS should propose a 4,000 lb level per year for directed permit holders and grant the least productive vessels an incidental permit.

Response: Based on the reduced quotas from the latest shark stock assessment recommendations, a 4,000 lb dw LCS trip limit for directed shark permit holders would exceed sandbar TAC and blacktip landing recommendations. Based on the available quota (see Appendix C for more details), NMFS would set a non-sandbar LCS trip limit of 33 non-sandbar LCS for directed shark permit holders; incidental permit holders would be allowed 3 non-sandbar LCS per trip. Fishermen selected to participate within the shark research fishery would be afforded higher trip limits consistent with research objectives and would be allowed to land all shark species, except prohibited sharks.

In order for NMFS to change retention limits for individual vessels based on their past landing history, NMFS would have to consider an IFQ or LAPP program. However, as explained in response to Comment 2 under "*Quotas*" above and in Chapter 1, it would take NMFS several years to implement an ITQ system. Under the current timeline under the Magnuson-Stevens Act for establishing a plan amendment to end overfishing, NMFS has insufficient time to establish an IFQ or LAPP program for sharks. However, NMFS

would consider developing an IFQ or LAPP program for sharks as well as other highly migratory species in the future.

Comment 4: NMFS should carve out a retention limit specific to existing gillnetters. Gillnetters are being penalized by the preferred retention limit because they catch very few sandbar and dusky sharks.

Response: NMFS prefers revised quotas and retention limits for non-sandbar LCS that would apply to all gear types. These revised retention limits include a higher retention limit for directed shark permit holders compared to incidental shark permit holders. While sandbar and dusky sharks may be less likely to be caught in gillnet gear compared to BLL gear, setting separate gillnet retention limits was not considered as a part of this rulemaking mainly because NMFS has serious concerns regarding interaction rates with marine mammals and protected resources with gillnets. Given these interactions, NMFS would be reluctant to implement measures that increase fishing effort with this gear type. The five year incidental take statement (ITS) for the drift gillnet fishery is 10 loggerhead sea turtles (with 1 mortality), 22 leatherback sea turtles (with 3 mortalities) and 1 smalltooth sawfish (with zero mortalities). However from 2003 to 2007 (2003 being the start of the ITS period), drift, sink, and strike gillnets interacted with a total of 13 loggerhead sea turtles (3 of which died or were unresponsive when discarded), 1 leatherback sea turtle and 2 bottlenose dolphins (1 which died). In addition, in January 2006, an Atlantic right whale calf was caught and died in gillnet gear off the northeast coast of Florida. Therefore, NMFS is not endorsing gillnet fishing with a higher, specific gillnet retention limit at this time.

Comment 5: NMFS should consider capping the number of vessels that can deploy gillnets for sharks.

Response: There are currently only 4 to 6 sink and strike gillnetting vessels combined that target sharks (Carlson and Bethea, 2007). Given the reduction in trip limits as a result of this rulemaking, and restrictions and regulations under the Atlantic Right Whale Take Reduction Plan for this gear, NMFS does not believe there would be a significant increase shark gillnet fishing in the future.

Comment 6: NMFS should lower the incidental catch limit for non-sandbar LCS to be more in line with the current average (3 non-sandbar LCS/vessel/trip); NMFS should not decrease the directed permit holder retention limits by 30-percent while increasing the incidental retention limit by more than seven times; NMFS should provide better justification for raising the trip limits for incidental permit holders; the proposed retention limit increase for incidental permit holders could increase fishing effort and bycatch; NMFS should consider restricting incidental take of non-sandbar LCS.

Response: In the preferred alternative suite 4, NMFS would establish retention limits of 33 non-sandbar LCS for directed permit holders and 3 non-sandbar LCS retention limit for incidental permit holders. NMFS initially proposed retention limits that were similar for directed and incidental permit holders because NMFS considers the future non-sandbar shark fishery outside the shark research fishery as mainly incidental in

nature, (*i.e.*, fishermen would not target non-sandbar LCS based on the low retention limits). Under this scenario, incidental permit holders could have experienced a net positive economic benefit, given the retention limit of 22 non-sandbar LCS trip limit was more than the average 3 non-sandbar LCS per trip they currently retain. Therefore, such an increase in trip limits for incidental permit holders could have resulted in increased fishing pressure by incidental permit holders. Additionally, discards by incidental permit holders were lower than directed permit holders. On average, directed permit holders had more discards of sandbar and dusky sharks (8.1 mt dw and 25.7 mt dw per year, respectively) than did incidental permit holders (1.5 mt dw and 3.8 mt dw per year, respectively). This was mainly due to discards in the directed shark BLL fishery.

Based on public comment and to acknowledge differences among directed and incidental permit holders, NMFS is preferring to set separate retention limits based on permit type. Directed permit holders would be allowed a higher retention limit than incidental permit holders. This affords directed permit holders, who presumably paid more for their directed shark permit and rely on shark products for a larger part of their income, a higher retention limit than if all permit holders had the same retention limit.

Comment 7: NMFS should clarify how a retention limit based on the number of sharks per trip would work. What happens if you get 100 sharks on a line? Under these new regulations, one will have to make multiple trips to be legal.

Response: Currently, NMFS has a directed LCS trip limit of 4,000 lb dw. Under the current regulations, if fishermen exceed that trip limit on a given set, they often leave their gear in the water and go to port to offload their legal trip limit. Once offloaded, they return to retrieve the rest of their gear and catch. The same principle would apply for a trip limit based on the number of sharks allowed to be retained under Amendment 2 to the Consolidated HMS FMP. NMFS must decrease retention limits based on the results from the latest shark stock assessments. The Agency assumes that fishermen with directed shark permits would no longer target non-sandbar LCS as they have in the past because of the reduced retention limits and the fact that fishermen would no longer be allowed to possess sandbar sharks outside the shark research fishery. Rather, reduced non-sandbar LCS trip limits would allow fishermen to keep non-sandbar LCS while they target other species, such as reef fish and snapper-grouper. NMFS assumes that fishermen with directed shark permits would no longer make sets targeting sandbar and non-sandbar LCS outside the research fishery. However, a trip limit of 33 non-sandbar LCS for directed shark permits would minimize dead discards of sharks that fishermen catch while in pursuit of other species. Data from the BLL observer program from 2005 to 2007 indicate that fishermen with directed shark permits fishing for snapper grouper kept, on average, 12 sharks per trip.

Comment 8: NMFS should have proposed different retention trip limits for different species in different regions because there are more sandbars available in the Atlantic and more blacktip sharks available in the Gulf of Mexico; NMFS would split trip limits by state and the tendency of the area to catch sandbar or dusky sharks; NMFS should consider the fact that Louisiana fishermen catch mostly blacktip sharks and no sandbar or dusky sharks and, therefore, should have a larger retention trip limit.

Response: Based on public comment, NMFS analyzed regional quotas and retention limits for two regions *(i.e.*, Atlantic and Gulf of Mexico regions). As a result, NMFS would implement regional quotas based on the results of the blacktip shark assessment, overharvests that occurred in 2007 (for more details, see Appendix C), and the fact that the ASMFC is developing an interstate shark management plan that would implement measures in state waters of the Atlantic. Regional quotas would allow for a higher non-sandbar LCS quota in the Gulf of Mexico region, which is comprised of a healthy stock of blacktip sharks. It would also allow for a lower non-sandbar LCS quota in the Atlantic region where the stock status of blacktip sharks is unknown and the majority of dusky sharks are caught.

However, while NMFS is preferring regional quotas for non-sandbar LCS, NMFS would not implement regional non-sandbar LCS retention limits. Instead, the same retention limit for non-sandbar LCS would apply in the Atlantic and the Gulf of Mexico regions. NMFS believes that a single retention limit, regardless of region, would help with enforcement. Fishermen could move between the two regions and have the same retention limit regardless of region. Alternatively, having multiple retention limits in Federal waters based on each state's catch composition in the past would be difficult to enforce; having the same retention limit in both state and Federal waters helps with ease of enforcement. Finally, while historical fishing effort was used as a proxy for determining retention limits, it is uncertain how effort would be allocated among regions, or even states, in the future, which makes it difficult to determine a region-specific or state-specific retention limit, given the reduction in shark quotas.

Comment 9: NMFS should consider having a set-aside quota for the incidental fishermen so that they can still retain sharks when the directed fishery is closed.

Response: NMFS is assuming that fishermen with directed shark permits would no longer target non-sandbar LCS. Rather, reduced non-sandbar LCS trip limits would allow fishermen to keep sharks while they target other species such as reef fish and snapper-grouper. Since directed shark permit holders would presumably no longer target non-sandbar LCS based on those reduced trip limits and the prohibition on the retention of sandbar sharks outside the research fishery, the non-sandbar LCS fishery would be incidental in nature where non-sandbar LCS are landed as fishermen target other species throughout the year. Given the reduced trip limits for non-sandbar LCS, NMFS believes that the shark fishery would remain open for longer periods than in the past. Therefore, such a set aside would not be necessary in the future.

Comment 10: NMFS should consider a trip limit that is not based on weight since most fishermen do not have scales on their vessels.

Response: Under the preferred alternative suite 4, NMFS would not base trip limits on weight. Rather, trip limits would be based on the number of sharks per trip for both directed and incidental permit holders.

Comment 11: NMFS sandbar discard calculations are flawed. If NMFS claims that 7 out of 10 of LCS landed are sandbar sharks and NMFS has a 500+ mt dw non-

sandbar LCS quota, NMFS discard calculations are flawed. With a 500+ mt dw non-sandbar LCS quota, that is 3,500 mt of sandbars being discarded.

Response: NMFS used BLL reports from trips taken by directed permit holders with a 4,000 lb dw LCS directed trip limit to estimate the number of trips that the shark research fishery could take to harvest the available sandbar shark quota. Based on the observer data and a 4,000 lb dw trip limit, NMFS estimated that 70-percent of each trip, or 2,800 lb dw, would consist of sandbar landings. This catch composition was then used to determine the number of trips that could be taken within the shark research fishery to harvest the available quota.

The catch composition described above would only be realized if 1) fishermen were directing on sharks, and 2) there was a 4,000 lb dw trip limit. However, for trips outside the research fishery, sandbar sharks would be prohibited and there would be reduced non-sandbar LCS trip limits. Therefore, NMFS assumes that directed shark permit holders would no longer target non-sandbar LCS, and the catch composition used for trips in the shark research fishery would not apply to trips occurring outside the research fishery. Given this assumption, and based on the best available science from logbook, dealer reports, and observer program data, NMFS estimates that incidental sandbar mortality outside the research fishery would be approximately 40 mt dw. This estimate was determined by evaluating logbook data and observer reports to estimate sandbars discards from pelagic longline (PLL) gear (4.3 mt dw), discards by recreational fishermen (27 mt dw), discards within the shark research fishery (0.3 mt dw), sandbar sharks discarded by fishermen without HMS permits (6.3 mt dw), and sandbar sharks that used to be landed by incidental fishermen (2.3 mt dw).

D.4 Fins on Requirement

Support/Opposition for fins attached

Comment 1: NMFS received several comments in support of a ban on shark finning as well as support for the proposal to land sharks with their fins attached. Commenters believe that shark identification is hampered by fin removal, enforcement is made easier if sharks are landed with fins attached, that the quality of data collected would improve which is critical to improving the sustainability of sharks, and that technical difficulties of landing sharks whole could be alleviated with input from fishery experts and NOAA staff. A commenter also stated that NMFS should implement this measure promptly in the Atlantic while also taking steps to ensure a similar measure is implemented in the U.S. Pacific waters.

Response: On December 21, 2000, the Shark Finning Prohibition Act (Public Law 105-557) (Act) was signed into law. The Act amended the Magnuson-Stevens Act Section 307(1)(P), making it unlawful for any person "(i) to remove any of the fins of a shark (including the tail) and discard the carcass of the shark at sea; (ii) to have custody, control or possession of any such fin aboard a fishing vessel without the corresponding carcass; or (iii) to land any such fin without the corresponding carcass." On February 11, 2002 (67 FR 6194), NMFS published a final rule that established regulations which,

among other things, prohibit any person from engaging or attempting to engage in shark finning; possessing shark fins without the corresponding carcasses while on board a U.S. fishing vessel; and landing shark fins without the corresponding carcasses. In this Amendment, NMFS is selecting an alternative that would require fishermen to land sharks with their fins attached to improve enforcement, species identification, data quality for future stock assessments, and to further prevent the practice of shark finning. In the U.S. Pacific Ocean, three Regional Fishery Management Councils are responsible for shark management: the Pacific Fishery Management Council, the North Pacific Fishery Management Council, and the Western Pacific Management Council. Amending fishery management plans to include measures to land sharks with fins attached in the U.S. waters of the Pacific Ocean would need to be considered by the three Fishery Management Councils.

Comment 2: NMFS received several comments in opposition to landing sharks with fins attached stating that this requirement would result in large amounts of waste at the dock, that the market has grown accustomed to receiving sharks in log form, that it will be more difficult for law abiding fishermen to comply with the law, and it will do nothing for those intent on breaking the law who may still bring only fins to the docks.

Response: NMFS does not believe that the requirement to land sharks with fins attached is overly burdensome for the following reasons. The requirement to land sharks with fins attached would allow fishermen to leave the fins attached by just a small piece of skin so that the shark could be packed efficiently on ice while at sea. Shark fins could then be quickly removed at the dock without having to thaw the shark. Sharks may be eviscerated, bled, and the head removed from the carcass at sea. These measures should prevent excessive amounts of waste at the dock, since dressing (except removing the fins) the shark may be performed while at sea. While this would result in some change to the way in which fishermen process sharks at sea, because the fins may be removed quickly once the shark has been landed, NMFS expects that the market would continue to receive sharks in their log form. No person aboard a vessel with a shark permit would be allowed to possess shark fins without the fins being attached to the corresponding carcass until the shark is landed. Individuals that do not have a shark permit or who land sharks fins detached from the corresponding carcass would be in violation of the regulations and subject to enforcement action.

Issues with the 5-percent fin-to-carcass ratio

Comment 3: NMFS received several comments regarding the 5-percent fins to carcass ratio stating that 1) the ratio is wrong and NMFS needs to collect data to re-examine the ratio because it is different for all species, 2) NMFS should urge Congress to revise the fin to carcass ratio in the Shark Finning Prohibition Act, 3) making fishermen land sharks with fins attached could still lead to a violation of the 5-percent ratio, and 4) fishermen are unsure of which weight to record in their logbook if the 5-percent ratio remains in effect and sharks are landed with fins attached.

Response: NMFS first implemented the 5-percent fin to carcass ratio in the 1993 Shark FMP. This ratio was based on research that indicated that the average ratio of fin

weight to dressed weight of the carcass was 3.6-percent, and the sandbar fin ratio was 5.1-percent. In the shark research fishery, NMFS may conduct additional research on the fin to carcass ratio. In December 2000, the Shark Finning Prohibition Act (Act) was signed into law. The Act established a rebuttable presumption that any shark fins landed from a fishing vessel or found on board a fishing vessel were taken, held, or landed in violation of shark finning if the total weight of shark fins landed or found on board exceeded 5-percent of the total weight of sharks carcasses landed or found on board. It was implemented by NMFS through a final rule released in February 2002. Thus, any changes to the 5-percent ratio would have to be modified by Congressional action. In order to help fishermen document that sharks were landed with their fins attached, NMFS would modify the dealer weigh-out slips so that it may be clearly documented that the sharks were landed with fins attached. Consistent with the regulations at § 635.30(c)(3), a person that has been issued a Federal shark LAP and who lands shark in an Atlantic, Gulf of Mexico, or Caribbean coastal port must have all fins and carcasses weighed and recorded on the weigh-out slips specified in § 635.5(a)(2) and in accordance with regulations at part 600, subpart N. Fishermen may either record the weight of the whole shark landed or they may record carcass and fin weights separately.

Conversion from whole weight (ww) to dressed weight (dw)

Comment 4 : NMFS received several comments, including one from the state of Florida, that NMFS should recalculate the conversion factor between dressed weight and whole weight of a shark since more of the shark is going to be landed.

Response: The 1.39 conversion factor from dressed weight to whole weight is used to convert the dressed (gutted) weight of a shark, (the weight of the shark carcass in a log form with fins removed) to a whole weight. NMFS would continue to monitor shark quotas in dressed weight (*i.e.*, carcass in log form with fins removed) and would use shark landings recorded via dealer reports to monitor the quota outside the shark research fishery. Therefore, the conversion factor would not need to be recalculated since the definition of dressed weight would still constitute a shark log with fins removed. However, NMFS would monitor the situation and would change the conversion factor if needed. Currently, dealers record the fin weights and dressed weight of the shark carcasses separately on their dealer reporting forms; NMFS would ask dealers to continue reporting fin weights and dressed shark carcasses separately on their forms in the future. However, if the processing of shark carcasses changes, NMFS would recalculate and change the conversion factor, as appropriate.

Leaving some of the fins attached and provision of a diagram

Comment 5: NMFS received several comments stating that NMFS should allow fishermen to remove just one pectoral fin, remove all fins except the pectoral fins, allow the removal of fins from species in the SCS complex, and that vessels operating in the shark research fishery should be allowed to remove the fins since those vessels would have 100-percent observer coverage. NMFS also received several comments from the State of Florida that NMFS should allow fishermen to remove the tail of the shark at sea

and that NMFS should provide fishermen with a diagram depicting the proper way to clean and land sharks with fins attached.

Response: The provision to land sharks with their fins attached would allow fishermen to bleed, eviscerate, and remove the head at sea while cutting the fins almost all the way off so that the fins can be folded and the shark can be packed on ice. Authorizing the removal of certain fins or the fins of a specific species, or within a species complex, or from vessels within the research fishery could create enforcement problems and loopholes in the regulations. Therefore, NMFS is requiring that all fins remain attached to the carcass through landing for all vessels. Because there are potentially many ways that the sharks may be dressed while leaving the fins attached, at this time, NMFS does not want to provide specific instructions on how to dress sharks. NMFS only requires that sharks must be landed with their fins naturally attached. Fishermen are allowed the flexibility to dress the shark and tailor the method to their specific operation, providing they land all sharks with their fins naturally attached.

Hazardous Analysis of Critical Control Point: product quality concerns

Comment 6: NMFS received several comments regarding the potential food safety or Hazardous Analysis of Critical Control Point (HACCP) concerns if shark fins cannot be removed until the shark is landed because it may be difficult to keep the core temperature of the shark at 40 degrees in 90 degree heat. The state of Florida commented that NMFS should test shark meat quality to determine if there is a decrease in quality as a result of regulatory actions.

Response: The Food and Drug Administration (FDA) published regulations (December 18, 1995; 60 FR 65092) that mandate the application of the HACCP principles to ensure the safe and sanitary processing of seafood products. Although these regulations do not apply to fishing vessels or transporters, the processors of domestic seafood must take responsibility for the incoming product. Dealers should consult the FDA Center for Food Safety and Applied Nutrition Fish and Fisheries Products Hazards and Controls Guidance, for further information. The provision to land sharks with their fins attached would allow fishermen to bleed, eviscerate, and remove the head at sea while cutting the fins almost all the way off so that the fins can be folded and the shark can be packed on ice. Because the sharks may be dressed and the fins cut almost all the way off the shark at sea before it is packed on ice, the shark should not have to be thawed to completely remove the fins once the shark is landed. In addition, reduced retention limits would reduce the number of sharks that are landed per trip, therefore decreasing the amount of processing time at the dock. Research conducted through the shark research fishery, which would be afforded higher retention limits, and thus, increased processing times, can be conducted to test if new requirements affect fish meat quality.

International cooperation and banning imports

Comment 7: NMFS received several comments regarding international cooperation and imports including, 1) NMFS should set a firm shark conservation precedent for the international community, 2) NMFS should not get too far out in front of

the international community, and 3) that the United States should ban imports of shark fins from countries that do not prohibit shark finning.

Response: The United States has taken an active role in promoting improved international shark conservation and management measures in international fora such as Regional Fisheries Management Organizations, the United Nations General Assembly, the Convention on International Trade of Endangered Species, and the Convention on Migratory Species. Consistent with the United Nations Food and Agricultural Organizations' International Plan of Action for sharks, the United States completed and implemented the National Plan of Action (NPOA) for sharks in February 2001. The NPOA calls for data collection, assessment of elasmobranch stocks, development of management measures, where appropriate, research and development of mitigation measures to reduce shark bycatch, and outreach and education. The requirement to land sharks from the U.S. Atlantic Ocean with their fins attached would help raise awareness in the international arena of enforcement issues associated with shark finning bans and the 5-percent fin to carcass ratio. NMFS published a proposed rule on April 4, 2008 (73 FR 18473), that would amend the International Trade Permit (ITP) Program to require shark fin importers, exporters, and re-exporters (shark fin traders) to obtain an ITP. This requirement would provide needed information on shark fin trade participation and would provide NMFS enforcement access to trade records, since the export of shark fins is one of the primary economic incentives for much of the U.S. Atlantic shark fishery.

D.5 Time Area

Comment 1: NMFS should include the Marine Protected Areas (MPAs) recommended by the South Atlantic Fishery Management Council (SAFMC) in alternative suite 5 because if that alternative were selected, the MPAs proposed by the SAFMC would still need to be implemented.

Response: NMFS decided to include a prohibition on shark BLL fishing in the MPAs in several of the alternative suites in order to ensure that the SAFMC's Amendment 14 prohibition on bottom tending gear would include HMS BLL gear. NMFS needed to implement complementary regulations in order for the MPAs to be effective. Since alternative suite 5 would result in a closure of the entire shark fishery, no shark BLL fishing would occur in the MPAs or elsewhere. Thus NMFS did not need to include a prohibition on shark BLL fishing in MPAs in alternative suite 5.

Comment 2: NMFS received a number of specific comments regarding the MPAs being implemented by the SAFMC, including: 1) coordinates of MPAs – NMFS should provide the correct coordinates for the Charleston Deep Artificial Reef MPA; 2) NMFS should state the specific type of MPAs being implemented (*i.e.*, type II MPAs); and, 3) NMFS should include a transit exemption for vessels traveling through proposed MPAs with BLL.

Response: NMFS is aware of problems with the coordinates provided in the Draft Amendment for the Charleston Deep Artificial Reef. NMFS has provided the correct coordinates for the Charleston Deep Artificial Reef in the Final Amendment 2 to the

Consolidated HMS FMP. In the Draft EIS, NMFS described the MPAs as type II MPAs according to the language used in the SAFMC's Amendment 14. Type II MPAs areas are closed to bottom fishing but allow trolling for coastal pelagics and HMS. Since NMFS is prohibiting the use of BLL gear in these MPAs there is no need to specify the type of MPA in the proposed or final rules. Readers should refer to Amendment 14 for more information on the type of MPAs being implemented by the Council. NMFS did not implement a stowage provision because very few HMS permitted vessels have historically fished in the MPAs, the MPAs are generally small in size, and can easily be circumnavigated by BLL vessels. If the SAFMC implements a stowage provision, then NMFS may consider a similar backstop provision in the HMS regulations.

Comment 3: NMFS should implement VMS requirements for the SAFMC Amendment 14 MPAs.

Response: Since the Council's Amendment 14 does not include a VMS requirement, NMFS decided not to implement a VMS requirement for HMS vessels either. NMFS has several other VMS requirements in place for HMS vessels including all vessels with gillnet gear during certain times of the year, BLL vessels in the vicinity of the mid-Atlantic shark closed area, and all vessels with PLL gear on board year-round. To the extent that some of those vessels would fish in the vicinity of the MPAs, NMFS would be able to track their movements. However, most vessels that do not fish with PLL and maintain directed or incidental shark permits in the South Atlantic are not required to have VMS.

Comment 4: NMFS should use the terms "closed areas" or "area closures" to describe the locations where the proposed regulations apply to avoid confusion on the intent of the MPAs (since they are for snapper/grouper, and not sharks) and to improve compliance by fishermen. Marine protected area is not a term used in the Magnuson-Stevens Act. NMFS should clarify how and why closures for fisheries management are part of the official MPA classification system.

Response: NMFS chose to use the term MPA because that is the specific language provided in Amendment 14, and because NMFS is supporting the Council's Amendment 14 regulations at the request of the SAFMC. Although NMFS agrees that the intent of the MPAs is to protect snapper grouper species, NMFS wanted to avoid confusion that may result by using different nomenclature to refer to the closures included in Amendment 14. NMFS is referring to the closures as the SAFMC MPAs.

Comment 5: NMFS should prohibit the use of longline gear in existing and new MPAs. The overall amount of bycatch within MPAs may not be minimal when considered in the context of the relevant MPA and the number of species and individuals found within the MPA.

Response: NMFS is prohibiting the use of BLL gear in all of the preferred SAFMC MPAs because those are the areas considered most important for certain grouper species that are sometimes caught incidentally on shark BLL gear.

Comment 6: The ASMFC Spiny Dogfish and Coastal Sharks Management Board would like NMFS to reconsider the closures off of North Carolina. Specifically, the Board asks that the duration of the closure be reduced to run from January 1 – May 14. This request is based on the Coastal Sharks Technical Committee's recommendation for a state water closure from May 15 through July 15 from Virginia to New Jersey. This state water closure is designed to protect large adult female sandbar sharks when they are on the pupping grounds. The closure off of North Carolina was designed to protect juvenile sharks in the nursery area in the winter, however the majority of the small sharks have migrated out of that area by mid-May.

Response: The mid-Atlantic shark closed areas was implemented to protect juvenile sandbar sharks and all life stages of prohibited dusky sharks. Survey data collected from the NOAA fisheries research vessel Delaware II from April through May 2007 indicate that the majority of sandbar sharks caught in the mid Atlantic shark closed area were juvenile (56-percent immature vs. 44-percent mature). Therefore, maintaining the mid-Atlantic closed area would continue to reduce the number of interactions of BLL gear with sandbar and dusky sharks as well as reduce the number of interactions with immature sandbar and dusky sharks. This would provide positive ecological benefits for both of these overfished shark stocks. Furthermore, measures implemented by the ASMFC are not yet finalized. Once finalized measures are in place, the Agency may consider taking additional action to complement state measures. Implementing these measures before they are finalized in the ASMFC plan could result in inconsistent management measures.

Comment 7: The SAFMC and the South Carolina Department of Natural Resources support the time area closures as proposed in the draft amendment.

Response: NMFS plans to implement the MPA provisions in Amendment 14.

D.6 Reporting

Comment 1: NMFS should take action to ensure that fishermen report their landings correctly and honestly as most fishermen do not currently provide accurate reports.

Response: The regulations require fishermen to submit accurate and truthful reports on their fishing activities. If fishermen chose not to abide by these regulations, then they may face enforcement action.

Comment 2: NMFS received many comments on the dealer reporting timeframe, including: NMFS should consider stronger restrictions on dealer reporting; NMFS should allow two-weeks for dealer reports to be submitted; 10 days is acceptable for the report to be postmarked, but not for NMFS to receive it; NMFS should consider more frequent reporting; NMFS should consider 24 hour reporting for shark dealers; NMFS should consider electronic reporting for dealers (once a week); dealers still need to be able to fax reports; more frequent reporting is not needed. NMFS should take action against dealers

that are not reporting; NMFS should not renew a dealer permit if they don't report on time; making reports "received by" will not allow fishermen to know if NMFS got their report on time; NMFS should provide confirmation numbers when dealer reports are received.

Response: NMFS prefers to require dealer reports be received within ten days of the end of the reporting period at this time. NMFS may consider additional modifications and/or adjustments to reporting frequency for future implementation. The preferred alternative suite 4 does not require twenty-four hour reporting as such reporting would result in a significant increase in reporting burden for shark dealers. NMFS is concerned about dealers that are not reporting and is working with National Oceanic Atmospheric Administration's (NOAA) Office of Law Enforcement to pursue shark dealers who do not meet their reporting obligations. NMFS is currently capable of accepting electronic reports and faxes of shark dealer landings. NMFS does not issue confirmation numbers when shark dealer reports are received. Submitting dealer reports by FAX or email would include a date/time stamp in addition to whether the transmission was successful or not. Shark dealers may also consider using certified mail to provide verification that the correspondence was received.

Comment 3: NMFS should be more proactive and contact dealers as the quotas fill up.

Response: Significant overharvests in the shark fishery in recent years have occurred because shark dealers were not submitting their reports in the time period required by NMFS regulations. NMFS is working to ensure better compliance with its reporting regulations by encouraging shark dealers to report on time or face possible enforcement action for failing to do so.

Comment 4: Does NMFS have a specified time that it must turn around dealer reports?

Response: The Agency provides shark landings reports, by complex or species, on a frequent basis to ensure participants are aware of catches in the shark fishery. The Agency does not have a specified time frame as to when it provides landings reports; however, efforts are being made to provide more frequent shark landings updates in light of NMFS' preferred alternative to close seasons when a species/complex quota has reached 80-percent of their quota.

Comment 5: NMFS should stick to its existing reporting system rather than create a new one.

Response: The Agency agrees with this comment and will not be instituting a new reporting system.

Comment 6: NMFS should not allow sharks to be listed as unclassifieds and, if dealers continue to report unclassifieds, they should have their permits revoked. Unclassified sharks should not be counted against the sandbar shark quota because the sandbar shark quota for the research fishery is already miniscule.

Response: Current regulations require that all sharks landed should be identified and reported at the species-level. While it is in violation of the current regulations to report sharks as unclassifieds, and the Agency has recently completed shark identification workshops to improve shark dealers' identification skills, the Agency must account for unclassified shark landings in near real-time in order to produce timely and accurate shark landings reports as unclassified landings would likely continue to occur. The Agency would use species composition data from the observer reports outside the shark research fishery to determine which proportion of unclassified sharks should be deducted from the appropriate quotas (*i.e.*, sandbar, non-sandbar LCS, SCS, and pelagic sharks). This methodology is consistent with how unclassified sharks are treated in stock assessments. Shark dealers that continually report sharks as unclassified would be reported to NOAA Office of Law Enforcement and may face enforcement action.

NMFS had originally proposed counting all unclassified sharks from shark dealer reports as sandbar sharks to provide dealers with an incentive to identify sharks to the species level because if the quota for sandbar sharks were filled, they would no longer be able to purchase sandbar sharks. However, the Agency believes that allocating landings to the appropriate complex/species based on observer data is a more accurate means of accounting for unclassified landings. Furthermore, the Agency is concerned that counting all unclassified sharks as sandbar sharks may result in the shark research fishery closing prematurely.

Comment 7: NMFS received a comment stating that a dealer had inadvertently reported all sharks landed in the past as sandbar sharks and that they knew of no dealers that identify sharks to species.

Response: All dealers are required to report shark landings at the species level. The Agency has instituted shark identification workshops to assist dealers in properly identifying sharks in order to obtain more accurate landings data.

Comment 8: NMFS received a comment wondering how the stock assessments can use the dealer data because of the lack of species-level landings data for sharks.

Response: Similar to the final measures being implemented in Amendment 2 to the Consolidated HMS FMP, stock assessments assign unclassifieds to a species/complex group based on species composition data from the observer program. Regional and temporal species composition data attained from observed trips are summarized and applied to the unclassified sharks to estimate the proportion that should be assigned to respective quotas and complexes.

Comment 9: NMFS received a comment in support of the workshops for shark identification because dealers have observed a drastic reduction in the number of sharks that are not being identified properly.

Response: NMFS is encouraged by the results of the shark identification workshops for dealers. Better shark identification should lead to more accurate landings data which should improve the quality of data used in stock assessments.

Comment 10: NMFS received several comments on the "dealer" definition (*i.e.*, who is required to have a dealer permit), including: NMFS should provide the current definition of a shark dealer; the current definition is satisfactory; the proposed dealer definition is appropriate; the first receiver cannot be the shark dealer; an intermediary on land is needed solely for transport; and, the definition should take into account multiple transfers.

Response: The current definition of a shark dealer is anyone who has a valid permit for shark and purchases sharks from the owner or operator of a vessel who has a valid commercial shark permit (50 CFR 635.31 (c) (4)). To clarify who needs to attend the workshops and to aid enforcement, in the proposed rule, NMFS modified the definition of shark dealers and requested public comments on this new definition. Specifically, NMFS proposed to modify this definition and include a definition for "first receiver" at 50 CFR 635.2: "First receiver means the entity, person, or company that takes, for commercial purposes, immediate possession of the fish, or any part of the fish as long as the fish are offloaded from a fishing vessel of the United States, as defined under 600.10". As a result of public comments received and suggestions from the Advisory Panel and enforcement, NMFS is modifying the proposed definition.

Comment 11: Can federally permitted dealers buy state landed sharks? Do federally permitted dealers have to report state landings?

Response: The current regulations at 50 CFR 635.31 (c)(4) state that only dealers that have a valid permit for shark may purchase a shark from the owner or operator of a fishing vessel. Dealers may purchase a shark only from an owner or operator of a vessel that has a valid commercial permit for shark, except that dealers may purchase a shark from an owner or operator of a vessel that does not have a commercial permit for shark if that vessel fishes exclusively in state waters (*i.e.*, no Federal commercial shark permit). Federal dealer permit holders must report all sharks landed, including those from state waters, and cannot purchase any sharks, caught in state or Federal waters, once the Federal shark fishing season is closed.

Comment 12: NMFS received a comment questioning the mechanism that keeps dealers reporting on time.

Response: All federally permitted shark dealers are required to submit a dealer report on a bimonthly basis. Failure to do so could result in enforcement action.

Comment 13: NMFS should implement the strongest possible restrictions to ensure prompt and reliable reporting by dealers, within 24 hours if possible. Landings of 300 to 500-percent of allowable quotas, even if subtracted in subsequent seasons, are simply not acceptable and do not reflect the close attention and precautionary action required to achieve sustainable shark fisheries.

Response: NMFS agrees that accountability measures for quota overages are necessary to maintain a balance between fishery removals and rebuilding. Final measures would include closing the fishery for a particular species when 80-percent of the quota is

reached with five days notice upon filing in the Federal Register in order to reduce the likelihood of overharvests. NMFS would also send out e-mail notices and outreach regarding closures upon filing in the Federal Register, giving fishermen five days to be notified of a closure Reduced retention limits and other effort control measures are expected to reduce fishing mortality in the shark fishery. In addition, under the preferred alternative suite 4, NMFS would change the reporting requirements for shark dealers so that shark dealer reports must be received by NMFS within 10 days after the reporting period ends. This would ensure timelier reporting and potentially avoid overharvests.

Comment 14: NMFS received several comments regarding excess shark landings in state waters and NMFS' coordination with various states, including: NMFS should preempt the state of Louisiana or others as necessary pursuant to authority provided in the Magnuson Stevens Act (§306 paragraph (b)) if shark landings in state waters impact Federal shark fishery management; NMFS should recognize that Federal fishermen are catching adults during designated fishing seasons, while state fishermen are catching juveniles all year long; NMFS should allow Federally permitted fishermen to fish in state waters; NMFS should ensure that state waters are closed at the same times as Federal waters to protect juveniles; NMFS should consult with the states in order to manage fisheries better; NMFS should require states to abide by Federal rules; NMFS should coordinate with the ASMFC.

Response: Pursuant to the Magnuson-Stevens Act, NMFS has jurisdiction to manage fisheries in Federal waters of the Exclusive Economic Zone (EEZ). Landings in state waters are counted against Federal shark quotas because many shark species inhabit both Federal and state waters, and thus make up one population or stock. NMFS includes state landings in stock assessments for coastal sharks. This practice is consistent with quota monitoring and management strategies for many marine species.

NMFS has been working with the State of Louisiana, and other states, to ensure consistent management strategies for sharks in state and Federal waters due to excessive landings that occurred in Louisiana state waters in 2007. In 2007, the State of Louisiana agreed with NMFS to close its state waters until Amendment 2 is effective in 2008. Simultaneously, ASMFC is implementing a coast-wide state shark plan for states in the Atlantic Ocean. The final measures included in this plan are expected to be effective in 2008. The Agency is working with the ASMFC to ensure that consistent measures would be considered for Federal and state waters once the ASMFC plan is in place. Once implemented, this state shark plan could potentially lead to similar measures being implemented in the Gulf of Mexico.

Comment 15: NMFS should provide information in the shark landings update on the percentage of total shark landings that are state and Federal.

Response: Federal dealers must report all landings, however, they are not required to differentiate which landings are purchased from Federal vessels and which shark products are purchased from state vessels (if a Federal dealer also has a state dealer permit). Current reporting requirements make it difficult to determine state versus Federal landings.

Comment 16: The stock assessment does not take the area inside state waters into consideration.

Response: Stock assessments include both fishery dependent and fishery independent landings and effort data from state and Federal waters.

Comment 17: NMFS should not mandate that all shark fishing stop entirely once the sandbar quota is met.

Response: NMFS would not close both the sandbar and non-sandbar LCS fisheries if either quota was met. Rather, NMFS would close the sandbar and non-sandbar LCS quota, individually, if either reaches 80-percent of their respective quotas.

Comment 18: The State of Florida supports decreasing the length of time it takes to supply NMFS with landings information used to manage the shark fishery. NMFS should also decrease the time it takes to make this information available to the public. The time required for NMFS to process such information should be public knowledge.

Response: The Agency makes every attempt to provide timely reports of shark catches to constituents on a frequent basis in order for fishermen to plan their activities accordingly. However, it is also necessary to ensure that shark landings data are accurate prior to making them available to the public. NMFS would attempt to provide more frequent shark landings updates in the future.

D.7 Seasons

Comment 1: The change to one commercial season would lead to derby fishing.

Response: NMFS believes that having a commercial season that opens January 1 and remains open until 80-percent of the quota is achieved would reduce the need for fishermen to engage in derby fishing. Furthermore, the retention limits represent a significant reduction for directed permit holders compared to previous limits. Derby fishing is more likely when seasons are shorter in duration and retention limits are conducive to trips targeting sharks exclusively. The preferred alternative would result in one season, opening January 1. The season is expected to remain open longer as fishermen outside the research fishery are not expected to make trips targeting non-sandbar LCS because of reduced retention limits and the prohibition on the retention of sandbar sharks.

Comment 2: NMFS received several comments including a comment from the State of Florida regarding the proposal to open shark seasons on January 1, including: NMFS should consider the fact that not all shark species are present in all regions in equal abundance on January 1; July 15th may be a more appropriate time to open the season; January 1 may be good for sandbar sharks but not other species; opening the season at another time may result in the quota being filled before sharks arrive in some regions; the season should be opened on January 1.

Response: NMFS is aware of the fact that sharks are migratory and present in different areas, at different levels of abundance, at different times of the year. As described in the proposed rule, and preferred in the final EIS, NMFS would only allow landings of sandbar sharks by a limited number of vessels selected to participate in a shark research fishery. Therefore, only vessels participating in this fishery would be authorized to target sandbar sharks. Vessels outside the research fishery would be allowed to keep 33 non-sandbar LCS for directed permit holders and 3 non-sandbar LCS for incidental permit holders. NMFS anticipates that this reduced retention limit would result in directed shark fishermen no longer targeting non-sandbar LCS outside the research fishery. Rather, shark fishermen would be authorized to keep non-sandbar LCS incidentally caught while targeting other species. Given fishermen outside the research fishery would no longer target non-sandbar LCS, NMFS expects that the shark seasons would be open longer, and fishermen in the regions that have non-sandbar LCS present later in the year would still be able to harvest non-sandbar LCS when they are present. In addition, opening the season on January 1 should allow the shark fishery to overlap with open seasons for other non-shark species and may reduce regulatory discards that may occur as a result of keeping the shark season closed until later in the year.

Comment 3: NMFS received numerous comments, including comments from the ASMFC and the State of Florida that NMFS should open the season on July 15 instead of January 1 so the season would be open when sharks are present in all areas and to prevent fishing mortality during shark pupping season. Other comments included: NMFS should not allow shark fishing during April, May, and June as these months are when shark pupping occurs and state waters should be closed from May 15 through July 15 to protect pupping; considering the size of the quota, shark migration patterns, and the ASMFC closure, it is likely that the quota would be harvested before sharks become available to fishermen in the North Atlantic; beginning the fishing season on July 16 would allow the quota to be shared geographically; opening the fishing season in July would reduce mortality of pregnant females and ensure that northern states have access to the fishery.

Response: Opening the season on January 1 and keeping it open until 80-percent of a quota is achieved may result in pregnant or neonate sharks being landed. However, given the low retention limits for non-sandbar sharks outside the research fishery and because fishermen would not be allowed to retain sandbar sharks outside the research fishery, NMFS expects that fishermen with directed shark permits outside the research fishery would no longer target non-sandbar LCS. This should reduce overall shark mortality, including mortality of pregnant females during pupping season. NMFS expects that the reduced retention limits outside the research fishery would result in fishermen with directed shark permits no longer targeting non-sandbar LCS on any given trip. However, the retention limits would allow fishermen to keep non-sandbar LCS that they catch while targeting other species. If the season is closed from April through June or July, vessels that land sharks while targeting other species would have to discard all sharks. The ASMFC is currently developing an interstate shark management plan for sharks in state waters of the U.S. Atlantic Ocean. Since most shark pupping occurs in state waters, the ASMFC plan may be more appropriate for addressing fishing mortality of pregnant females or neonate sharks; however, this plan has not been finalized.

However, Federal measures may be modified in the future depending on finalized measures in Atlantic state waters as a result of the ASMFC shark plan.

The shark fishery has traditionally been managed on a calendar year, and NMFS prefers to maintain this practice. The Agency anticipates that the shark fishery would be open for a longer duration than it has in the past because of the reduction in retention limits for non-sandbar sharks and the fact that sandbar sharks may not be retained outside of the shark research fishery. Thus, the shark fishery will be open at the same time as other fisheries. This would allow fishermen in these fisheries to keep incidentally landed non-sandbar LCS, therefore, reducing dead discards. Opening the shark fishing season later in the year may allow the quota to be shared more geographically as sharks would be present in all regions. However, having the season closed from January 1 through July 15 would also translate to discards as fishermen pursuing other target species with longline or gillnet gear in regions where sharks are present would not be able to retain any sharks. In addition, the majority of permit holders in the shark fishery live in regions where there are sharks present on January 1, and markets are also geared to receive shark product at the beginning of the year after seasons have traditionally been closed in November and December.

Comment 4: NMFS should provide more advance notice of season openings because fishermen have had a hard time planning how much bait they need to buy, planning for freezer spaces, *etc*.

Response: The current regulations require that NMFS complete proposed and final rulemaking prior to the establishment of shark seasons. Under the preferred alternative suite, NMFS would open the fishing season on January 1 each year (except 2008). The season would likely remain open longer, dependent upon available quota. A final rule published in the Federal Register prior to the opening of the subsequent season's start date (January 1) would provide information on the available quota, retention limits, and other pertinent information. A proposed rule giving notice of the anticipated quotas and season dates would be published in September or October each year prior to the final rule. The public would have the opportunity to comment on the proposed rule that contains the quotas and other information regarding the forthcoming season.

Comment 5: NMFS should implement one shark fishing season.

Response: NMFS is implementing one season, starting January 1 each year. This date is more likely to overlap with open seasons for other BLL and gillnet fisheries, and also provides fishermen a full calendar year to harvest available quota.

Comment 6: NMFS should ensure smaller amounts of shark are consistently available throughout the year to help increase the price and marketability of sharks since restaurants would know they could count on it year round. Currently, with such short seasons, there is not really a market.

Response: The Agency is aware that short seasons under existing trip limits may quickly flood markets, depressing prices for some shark products, particularly shark meat. Shark meat prices are more likely to be affected by the short seasons because there is less demand for shark meat than for shark fins. The majority of shark fins are exported to other countries and prices tend to remain higher and more stable than shark meat. In the past, fishermen with a directed shark permit were capable of making profitable trips exclusively for sharks. Reduced retention limits and prohibiting retention of sandbar sharks outside the research fishery would reduce the likelihood that fishermen would make trips targeting non-sandbar LCS outside the research fishery. Rather, fishermen are more likely to harvest non-sandbar LCS incidentally while targeting other species. NMFS expects that a fishing season that opens on January 1 each year with lower retention limits will result in smaller quantities of shark product being available for a larger proportion of the year. This could conceivably increase demand and marketability of shark products because the availability of meat and fins would be more reliable throughout the year compared to the past when shark seasons were only open for short periods of time. This increased demand for shark products on the behalf of wholesalers may translate to elevated prices received by shark fishermen for shark meat and fins.

Comment 7: NMFS should elaborate on the reasons that trimesters were originally implemented for the commercial shark fishery. Trimesters may still be necessary to reduce fishing mortality.

Response: Trimesters were originally implemented to provide a higher degree of resolution on which to manage seasonal shark fisheries. Furthermore, trimesters may reduce fishing mortality during peak pupping seasons and may be used to address other bycatch concerns. This rulemaking would implement significant measures to reduce fishing mortality of sharks, predominantly by modifying quotas, retention limits, and species authorized to be landed in commercial and recreational fisheries.

These measures would reduce the mortality of pregnant females. Furthermore, the closed area off the coast of North Carolina, which is important habitat for dusky and sandbar sharks, would continue to be in effect. The Agency expects that shark seasons would be open during a larger proportion of the year so that a limited number of sharks may be landed and possessed while fishermen are pursuing other species with longline or gillnet gear. NMFS does not expect that fishermen would be able to make a profitable trip "targeting" sharks with the preferred retention limits and because of the fact that sandbar sharks may not be possessed outside the shark research fishery. The resultant incidental fishery would translate to significant benefits to shark populations as a whole, and pregnant females in particular and thus eliminate the need to maintain trimesters.

Eighty Percent Threshold with 5 Days Notice Upon Filing in the Federal Register

Comment 8: Closing the season when landings reach the 80-percent threshold should be sufficient, but can the other 20-percent of the quota be filled in five days? NMFS should consider closing the shark fishery at 90 to 95-percent of the quota and consider re-opening a season if the quota has not been caught for a given season.

Response: The Agency requested public comment specifically on setting 80-percent as a threshold for closing the fishery because it allows a substantial amount of the harvest to occur, yet allows a sufficient buffer to prevent overharvest from the time the 80-percent is reached until the time NMFS can actually close the fishery. The Agency's goal is to allow fishermen to harvest the full quota without exceeding it in order to maximize economic benefits to stakeholders while achieving long-term conservation goals and preventing overfishing. A five-day notice upon filing in the Federal Register would allow fishermen to complete fishing trips that have already been initiated and/or provide fishermen the chance to catch the remaining 20-percent of the quota if they embarked on additional trips prior to the closure. As mentioned previously, the reduced retention limits and the fact that fishermen outside the research fishery would not be allowed to land sandbar sharks is expected to reduce the number of trips targeting non-sandbar LCS and keep the shark season open year-round. Additionally, NMFS must take into account state landings that continue to occur after closure of the Federal fishery.

NMFS believes that closing the fishery at 90 to 95-percent of attaining the quota would likely result in overharvests. Overharvests would result in reduced quotas in the future since all overharvests would be accounted for when establishing subsequent seasons and quotas.

The Agency expects that the quota would continue to be harvested between the time that the 80-percent threshold is reached and the time that the season actually closes - five days after the filing of such a notice in the Federal Register. The Agency must also account for late reporting by shark dealers and provide some amount of buffer to include landings received after the reporting deadline in an attempt to avoid overharvests.

Comment 9: NMFS should allow more time prior to closing the seasons. A 5-day notice will not work for PLL fishermen because their trips are long.

Response: PLL gear is not the primary gear-type used to target sharks. Most sharks are landed on BLL or gillnet gear on trips that last several days. Fishermen deploying PLL gear generally target tunas and/or swordfish depending on the time of the year and location. Therefore, the Agency does not expect the five day notice upon filing in the Federal Register for closing the shark fishery to have adverse impacts on vessels deploying PLL gear. Historically, the shark fishery used to close with five days notice in the past; therefore, there is a precedent for this amount of time prior to taking action.

Comment 10: NMFS should consider a 3-day warning prior to closing seasons to prevent overharvests, consistent with the notice granted in the bluefin industry. This would better assure that quotas are not exceeded. If NMFS does not decrease the closure time to three days, and instead keeps five days, NMFS should adopt the trigger of 70-percent rather than 80-percent.

Response: The Agency prefers the five day closure period upon filing in the Federal Register to maximize the proportion of the quota that fishermen may harvest without exceeding the quota and to allow time for notifying fishermen of a closure. When the notice files in the Federal Register, NMFS would send out e-mail notices and

other outreach materials to notify the public of the fishery closure within 5 days. Approximately one day after filing, the notice would publish in the Federal Register, and then the fishery would officially close five days from the original filing date. NMFS believes closing the fishery for individual species or species complexes with five days notice upon filing in the Federal Register is adequate to prevent overharvests. Historically, shark trips have been 1-4 days. Therefore, five days notice upon filing in the Federal Register would be adequate for notifying fishermen of a closure because it would give fishermen enough time to complete trips that are already in progress. Significant reductions in retention limits and the fact that fishermen outside the research fishery cannot retain sandbar sharks would also reduce the potential for overharvests in the period between meeting the 80-percent threshold and when the fishery is actually closed five days later.

Comment 11: NMFS should predict how long the season should remain open to fill the quota based on past catch rates.

Response: In the past, seasons were set based on available quota, past catch rates, and other considerations. In the future, given the preferred suite of measures, determining the season length in advance of the season and not closing it when the quota is reached may result in significant overharvests and may not be the best strategy for ensuring that sandbar, dusky, and porbeagle shark populations rebuild. Overharvests in 2006 and 2007 may be indicative of past catch rates not being appropriate indicators of future catch rates because of the fact that in those years, catch rates were greater and the quota was smaller, leading to overharvests. In addition, significant changes in quotas, authorized species, and retention limits would further complicate establishing seasons in advance.

Based on recent stock assessments, this amendment reduces retention limits and modifies this list of authorized species that can be possessed by commercial vessels. This amendment reduces the number of LCS that can be possessed by directed permit holders from 4,000 lb dw/vessel/trip to 33 non-sandbar LCS/vessel/trip. Furthermore, it prohibits the retention of sandbar sharks outside the shark research fishery.

Comment 12: NMFS needs to analyze the length of trips that land sharks and base the time needed to notify the fishery on length of trip.

Response: Observer data indicate that most trips targeting sharks last between 1-4 days depending on the region, season, and amount of sharks that are landed. However, this duration corresponds to past retention limits that are being reduced substantially for directed permit holders. Five days was selected as a reasonable amount of time for fishermen to get word about a fishery closure and either finish a current trip without discarding sharks dead or incorporate a trip for another species while keeping the ability to land sharks incidentally prior to the closure. NMFS anticipates that the significant reduction in retention limits and the prohibition on retaining sandbar sharks outside the research fishery will result in most fishermen targeting other species and incidentally landing non-sandbar LCS.

Comment 13: NMFS needs to look at past data and see if an 80-percent threshold would be adequate to prevent overharvests based on how much quota is caught after the seasons.

Response: NMFS selected the 80-percent threshold for taking action with the five days notice upon filing in the Federal Register for season closure because it would ensure that the majority of the quota is harvested without exceeding the quota. Giving fishermen the opportunity to harvest most of the quota within a given season is important because NMFS is also preferring to only carry-forward underharvests for species that are not overfished, experiencing overfishing, or of unknown status. It is difficult to determine the amount of landings that occur before or after a season closure as these data may include sharks legally landed in state waters with seasons that may not be consistent with Federal seasons.

D.8 Regions

Comment 1: NMFS received several comments regarding regions. Comments in favor of maintaining three regions included: NMFS should assess the impacts of moving to one region; NMFS should describe the rationale for moving to one region; NMFS should not implement one region; having one region ignores the stock assessments and the temporal nature of the fishery; NMFS should implement separate permits, separate fishing zones, and separate quotas, so that fishermen in one zone are not penalized for a quota overage that occurs in another zone; the ASMFC requests a minimum of two management regions (Gulf of Mexico and Atlantic States) to ensure equitable and biologically sound geographic distribution of quotas; a one-region plan could reduce or eliminate any quota for Atlantic States if Gulf of Mexico states overharvest; the Gulf States do not have coordinated management and have overharvested in excess of 200-percent in recent years; under one management region, the ASMFC would have reduced or zero quotas for years subsequent to Gulf overages.

NMFS also received several comments opposed to maintaining the three regions, including: NMFS should either divide quota equally among regions or have one region since quotas are so low; Gulf of Mexico and South Atlantic stocks should be managed as one unit.

NMFS received numerous comments from Texas Parks and Wildlife, Gulf of Mexico Fishery Management Council, ASMFC, Mississippi Department of Marine Resources, and members of the general public in favor of maintaining more than one region. Reasons for maintaining more than one region, include: the best scientific evidence available indicates that the Gulf of Mexico and the South Atlantic stocks are separate; genetic evidence has shown separate stocks of some species between the Gulf and South Atlantic; shark management should account for separate stocks and separate the quota accordingly; we do not support one region because blacktip sharks are healthy in the Gulf of Mexico; because bycatch issues are unique to each region; does not support one region because blacktip sharks are healthy in that region, and; moving to one region ignores stock assessments and the temporal nature of the fishery, which was identified during the previous amendment.

Response: NMFS assessed the impacts of moving to one region in the Draft EIS for Amendment 2. The analyses indicated that the overall economic impacts would likely be negative in regions (*i.e.*, North Atlantic) that do not have sharks present in their waters year-round. The North Atlantic is expected to be disadvantaged as a result of implementing two regions. However, reduced quotas for non-sandbar LCS, prohibiting retention of sandbar sharks outside the research fishery, and reduced retention limits would result in significant negative economic impacts even if a distinct region for the North Atlantic were maintained. Ecological impacts of implementing one region were expected to be neutral.

The three regions were proposed to be combined to one region to simplify quota monitoring and to prevent derby-style fishing and potential overharvests that may occur as a result of attempting to allocate smaller quotas to regional and trimester seasons. Based on public comment and other considerations, NMFS would implement two regions, Gulf of Mexico and Atlantic, for management of the commercial shark fishery rather than one region as originally proposed. Maintaining two regions has several advantages, including: it adheres to the stock assessment for blacktip sharks which assessed this species separately in the Gulf of Mexico and Atlantic; it accounts for overharvests that occurred in the Gulf of Mexico and Atlantic in 2007 more equitably; it allows for unique quotas to be implemented in each region that account for different species composition in each region; and, maintains the flexibility to implement unique regulations in the Gulf of Mexico and Atlantic Ocean.

The 2006 LCS assessment assessed blacktip sharks as two distinct populations, the Gulf of Mexico and Atlantic. Unique results were found for each population with the Gulf of Mexico population healthy and the Atlantic stock unknown. The assessment recommended maintaining current harvest levels in both regions. The Agency prefers measures consistent with the stock assessment by maintaining two regions, Gulf of Mexico and Atlantic. Blacktip sharks were the only species that were assessed as distinct, regional populations.

At this time, NMFS does not issue unique permits based on geography within the Atlantic, Caribbean, and Gulf of Mexico. This type of permit was not considered in the draft Amendment 2 to the Consolidated HMS FMP.

Comment 2: NMFS should have one region because since NMFS went into regions, we have been going over the quota.

Response: There are several factors that may be the cause of recent overharvests. Recent overharvests have likely occurred because of increased fishing effort, increased availability of sharks when seasons are open, inconsistent reporting on behalf of the dealers, and the fact that previous years overharvests are taken off subsequent years' quotas resulting in smaller regional quotas. As quotas decrease and effort stays the same; the likelihood of overharvests increases.

Comment 3: NMFS should describe the original reasoning for establishing the three regions.

Response: The regions were implemented in Amendment 1 to the 1999 FMP in 2003 because of spatial differences in fishery practices, variable CPUE between regions, and to afford managers the flexibility to adjust regional quotas to reduce mortality of juvenile and pregnant female sharks.

Comment 4: The Agency should create a separate region for the Caribbean.

Response: The Caribbean is now managed as part of the South Atlantic region. This amendment would include the Caribbean in the Atlantic region. Permit data indicate that there are not any commercial shark fishing permits and only one shark dealer permit in the Caribbean region. In addition, NMFS is in the process of initiating rulemaking to address some of the unique aspects of Caribbean fisheries for HMS.

Comment 5: NMFS should change the regions so that the Florida Keys are entirely in the South Atlantic or entirely in the Gulf of Mexico. The State of Florida recommends that the existing regions be maintained, however, both Gulf and Atlantic coasts of Florida should be kept in the same region to facilitate improved management and enforcement.

Response: NMFS implemented separate regions for the Gulf of Mexico and South Atlantic in Amendment 1 to the 1999 FMP. The existing boundary between the regions was adopted because it is consistent with the boundary defined by both the Gulf of Mexico and South Atlantic Fishery Management Councils. Creating new boundaries that are not consistent with the jurisdictions defined by the relevant Councils or Marine Fisheries Commissions would likely introduce confusion and lead to difficulties with quota monitoring and enforcement.

D.9 Recreational Measures

Comment 1: NMFS should maintain the same standards for recreational and commercial fisheries. Since the commercial industry reports many unidentified or unclassified sharks, the commercial industry should be regulated based on misidentification as well.

Response: The majority of sharks landed commercially are reported as unclassified by shark dealers, not fishermen. The Agency has implemented shark identification workshops for shark dealers which are expected to provide shark dealers with the knowledge and skills to properly identify the sharks that they purchase. Recreational fishermen generally do not see sharks as often as commercial fishermen targeting sharks. Thus, commercial fishermen may be more adept at shark identification.

Comment 2: The preferred alternative would set a bad precedent in allowing a fishery that caused the decline in shark populations to continue on a limited basis, while the public cannot fish for the same shark species. The commercial fishermen should be allowed to catch the same shark species as the recreational fishermen. The ASMFC requests allowing recreational possession/take of all species that may be harvested by commercial fishermen to keep the shark fishery equitable to all sectors and help establish identical species groups.

Response: The Agency prefers measures that would allow recreational permit holders to possess all non-ridgeback sharks and tiger sharks. These species of sharks have external characteristics that are easy for recreational anglers to properly identify. NMFS proposed to add blacktip, spinners, bull, and finetooth sharks to the list of prohibited shark species in the draft Amendment 2 to the Consolidated HMS FMP. However, based on public comment, NMFS decided to allow recreational anglers to land these sharks. NMFS would allow recreational anglers to land these species because of extensive public comment that was received in favor of allowing recreational anglers to land these species. NMFS would not authorize recreational anglers to land sandbar sharks and silky sharks because recreational anglers may confuse these species with dusky sharks which is on the list of prohibited shark species. NMFS would only allow participants in the shark research fishery to land sandbar sharks commercially, thus, precluding the vast majority of commercial fishermen from landing sandbar sharks.

Silky sharks would be authorized for landing in commercial fisheries because there is a higher likelihood that these sharks may be discarded dead than if they were landed in recreational fisheries. Moreover, commercial fishermen are more adept at distinguishing between silky sharks and sandbar or dusky sharks. Prohibiting silky sharks in commercial fisheries would result in more significant economic consequences than prohibiting them in recreational fisheries because commercial fishermen are allowed to sell the fins and flesh of sharks that are caught within the commercial regulations. There is not a significant targeted fishery among recreational or charter/headboat anglers for spinner sharks, therefore, economic impacts would be less severe among this group of stakeholders.

Comment 3: The recreational and commercial sectors contribute nearly equivalently towards reductions in mortality of sharks, and reductions in mortality are absolutely necessary.

Response: The Agency is implementing measures consistent with recent stock assessments to prevent overfishing and/or to rebuild stocks of porbeagle, dusky, and sandbar sharks. Concurrently, landings of blacktip sharks in the Gulf of Mexico and Atlantic should not be increased. Both commercial and recreational shark landings are included in stock assessments. While commercial fisheries generally comprise the majority of shark landings, recreational landings are also a significant component of overall shark mortality. Additional measures are necessary to reduce fishing mortality on several shark species. Modifications to quotas, authorized species, and retention limits are expected to prevent overfishing and to rebuild overfished stocks. For example, sandbar sharks would only be landed by a small number of commercial participants in the shark research fishery subject to a commercial quota that represents an 80-percent reduction in landings of sandbar sharks compared to previous years. Recreational fishermen would not be able to retain sandbar sharks due to their overfished status and the potential for confusion with prohibited dusky sharks.

Comment 4: NMFS should consider additional alternatives for the recreational industry. The alternative suites contain only either status quo or close all the recreational fishery.

Response: The recreational measures include more measures than status quo and closing the fishery. Alternative suites 2 through 4 in the draft Amendment 2 to the Consolidated HMS FMP would modify the authorized shark species for recreational fishermen to those that can be positively identified. These alternatives would be modified in the final Amendment 2 to the Consolidated HMS FMP to include all non-ridgeback and tiger sharks as authorized species in recreational shark fisheries.

Comment 5: NMFS should describe the data or analysis used to justify the proposed authorized species for recreational fisheries. There is no precedent for "easily-identifiable." The Agency needs to make an effort to educate anglers before assuming they cannot identify what they are catching. The State of Georgia commented that NMFS should only allow sharks without an interdorsal ridge to be landed, that would improve identification and reduce confusion. The State of Florida indicated that sandbar and dusky sharks can easily be differentiated from many other shark species by the presence of an interdorsal ridge.

Response: NMFS only included shark species that are readily identifiable by recreational participants that may not interact with a large number of sharks and therefore may not be able to accurately identify sharks. The Agency specifically requested public comment on the proposed list to be authorized for recreational participants and has modified the final list as a result. The final measures would allow any non-ridgeback sharks and tiger sharks to be landed by recreational anglers. The absence of an interdorsal ridge and/or the distinctive black vertical stripes on tiger sharks should allow recreational anglers to determine if a shark may be possessed or not. The Agency intends to disseminate information for recreational permit holders on HMS regulations and external characteristics for positive identification of authorized shark species.

Comment 6: The recreational fishery should be observed.

Response: Recreational permit holders can request to take an observer onboard to monitor fishing activities, however, they are not required to carry observers. Observers are placed on commercial fishing vessels as a requirement of the biological opinion for the shark fishery. To date, the biological opinion for the shark fishery has not required observer coverage in the recreational fishery. In addition, recreational fishing vessels are not required to obtain a U.S. Coast Guard safety inspection, which is a requirement for placing observers on commercial vessels to ensure that the vessels has all the required safety equipment. In addition, the bag limits are quite restrictive in the recreational fishery (1 shark per vessel per day over 54 inches) and therefore it is not likely that the majority of fishing mortality is occurring in the recreational shark fishery.

Comment 7: NMFS received several comments regarding outreach efforts on shark identification to the recreational sector, including: NMFS should release an identification guide similar to the Rhode Island Sea Grant guide; recreational fishermen care about positive identification; NMFS should send all permit holders the $20 shark identification book instead of shutting down the fishery; NMFS should explore identification workshops for recreational fishermen; the Agency needs to find better ways to educate the public to ensure positive identification; NMFS should use educational tools

to improve identification; and, recreational fishermen may confuse porbeagle sharks with shortfin makos.

Response: In 2003, NMFS released a guide to Sharks, Tunas, and Billfishes of the U.S. Atlantic and Gulf of Mexico in conjunction with Rhode Island Sea Grant. While the guide is currently out of print, additional copies are being printed and there are additional materials currently available at: http://seagrant.gso.uri.edu/bookstore/index.html.

The Agency is working on additional outreach materials to improve identification and understanding of regulations among recreational anglers. These outreach materials would be either free or available at a low cost to ensure that all permit holders have access to them. The Agency has recently implemented shark identification workshops for shark dealers and other interested members of the public. While not mandatory for recreational anglers, participants in any HMS sector or the general public may attend. These workshops provide anglers, dealers, and commercial fishermen with the ability to properly identify carcasses.

Comment 8: NMFS received several comments, including comments from the State of Florida, the State of Mississippi, the Gulf of Mexico Fishery Management Council, Texas Parks and Wildlife Department, South Carolina Department of Natural Resources, and the ASMFC regarding the shark species that should be included on the list of recreationally authorized shark species. Comments included: spinner, silky, bull, and blacktip sharks should be included in the list of species authorized for recreational anglers because fishers are capable of accurately identifying shark species; common thresher sharks should stay on the list of species authorized for recreational anglers; NMFS should not propose restricting recreational anglers from keeping blacktip sharks in the Gulf of Mexico if the stock is not overfished or experiencing overfishing; spinners are not endangered, nor are they depleted; the status of spinner or bull sharks has not been assessed, therefore, prohibiting the capture of blacktip and bull sharks would be an overly risk-averse strategy considering that the status of blacktip sharks (at least in the Gulf of Mexico) is satisfactory; identification is only a problem for species that cannot be identified externally; eliminating the retention of a healthy species of sharks, based on the assumption that they might be misidentified is subjective and is definitely not sound fishery management practice; NMFS is mandated under the Magnuson Stevens Act (NS 1) to strive for optimum sustainable yield and blacktip status in the Gulf of Mexico are healthy; NMFS' stated reason is concern over angler misidentification with sandbar and dusky sharks, however, these species may be readily identified by their interdorsal ridges; the list is acceptable, except for oceanic whitetip and hammerhead sharks. Do not allow the recreational catch of these two species as scientific studies show they are in decline; allowing the recreational harvest of blacktip and spinner sharks would therefore have no negative impact on sandbar and dusky sharks; silky sharks can be confused with dusky sharks and should remain off the list that recreational anglers may land; NMFS should not prohibit recreational anglers from landing bull, blacktip, bull, spinner, and finetooth sharks because these species represent 37-percent of recreational shark landings off the State of Florida.

Response: Final measures would allow recreational anglers to possess all non-ridgeback and tiger sharks, including blacktip sharks. The presence/absence of an interdorsal ridge, coupled with other morphological characteristics and outreach materials on shark identification for recreational anglers are likely to reduce the incidence of misidentification in this fishery. Common threshers would also continue to be authorized for landing in recreational shark fisheries as these were not proposed to be prohibited for recreational anglers. The Agency had originally proposed that blacktip and spinner sharks not be authorized in recreational fisheries because the morphological differences between the two sharks are not obvious to anglers who are unfamiliar with sharks and NMFS wanted to ensure that recreational anglers were only landing sharks that could be positively identified. Based on extensive public comment in support of being able to land blacktip, spinner, and bull sharks, the preferred alternative suite would allow these sharks to be landed. Further, the Agency will enhance outreach efforts to ensure that recreational shark fishermen are positively identifying the sharks they interact with.

Comment 9: NMFS should address the fact that recreational anglers in Delaware, Maryland, and New Jersey are catching lots of pregnant thresher sharks during certain times of the year.

Response: NMFS is concerned about recreational anglers catching pregnant female thresher sharks. Recreational fisheries do not have closed seasons like commercial fisheries; therefore, pregnant females may be caught and possessed by recreational anglers. However, a minimum size limit of 54" fork-length and a bag limit of one shark (except bonnethead and Atlantic sharpnose) per vessel per trip should minimize the potential for deleterious impacts to populations of common thresher sharks. Furthermore, this species may be afforded additional protection by shark tournaments that limit the sharks that are actually landed to those that are actually eligible to win a prize category.

Comment 10: The Agency received a comment suggesting that hammerheads may need to be prohibited for recreational anglers because the IUCN considers them threatened and it is not easy to distinguish between scalloped and great hammerhead sharks.

Response: The Agency is not proposing management measures specific to scalloped or great hammerhead sharks in recreational fisheries at this time. NMFS has not yet reviewed stock assessments on these species. A stock assessment has been completed for hammerhead sharks, however, the assessment has not undergone extensive peer-review which is necessary prior to the Agency making management decisions based on the assessment. The IUCN determined that the scalloped hammerhead is "lower risk, near threatened" with an unknown population trend in 1994. In 2001, the IUCN listed great hammerhead sharks as "endangered" with a decreasing population trend. The recreational bag limit (1 vessel/day) and minimum size (> 54" fork length) should preclude overfishing of the scalloped hammerhead shark species. The Agency intends to improve outreach materials available so that recreational anglers would have the tools necessary to distinguish between scalloped and great hammerheads.

Comment 11: The Agency should consider the impacts of recreational fishing for sharks and its implications on populations. Specific comments received include: shark tournaments since the 1980s are responsible for a 50-percent reduction in dusky sharks and a 35-percent reduction in sandbar sharks; the stock assessment does not say that recreational anglers have a significant impact on the shark stocks; the recreational angling public has a virtually imperceptible impact on LCS because recreational anglers practice catch and release and have very conservative size limitations.

Response: The Agency is aware of the impacts of recreational fisheries and their impacts on shark populations. Recreational data have been used in past stock assessments for both sandbar and dusky sharks. Thus, the impact of recreational mortality on shark stocks has been included in these stock assessments. NMFS has implemented a size and bag limit for recreational fishermen to limit effort and protect sharks that have not reached sexual maturity. The final Amendment 2 to the Consolidated HMS FMP provides recreational landings by species.

Comment 12: NMFS should increase enforcement of recreational regulations because participants are not adhering to the 54 inch minimum size for sharks.

Response: The Agency intends to take steps to improve outreach to recreational shark anglers to ensure that the public is aware of all the regulations in place for recreational shark fisheries.

Comment 13: NMFS should not allow shark tournaments that give monetary prizes. The impacts of such tournaments are unknown and public perception of them is poor.

Response: HMS tournament participants are required to possess the necessary HMS permits, to register their tournaments, submit data if selected, and abide by all HMS and tournament regulations for sharks. The shark tournaments are subject to the recreational shark bag and size limits which are quite restrictive in the recreational fishery (1 shark per vessel per day over 54 inches) and therefore it is not likely that the majority of fishing mortality is occurring in shark tournaments. Specific measures concerning tournaments were not proposed, or analyzed, in the draft Amendment 2 to the Consolidated HMS FMP.

Comment 14: NMFS should not propose that recreational fishermen cannot land sandbars and then account for recreational landings by removing the recreational landings (27 mt dw) in establishing the commercial quota for sandbar sharks.

Response: Accounting for the recreational landings (27 mt dw) between 2003-2005 is necessary to ensure rebuilding of sandbar sharks and that all fishing mortality is within the TAC. Sandbar sharks are likely to be landed in recreational fisheries outside of NMFS jurisdiction (*i.e.*, state waters), illegally, or may die as a result of post-release mortality. If the Agency did not account for recreational mortality of sandbar sharks efforts to prevent overfishing and rebuild sandbar sharks would be compromised.

Comment 15: Why were the effects of Katrina to the Texas recreational industry not analyzed?

Response: Consistent with NS1 of the Magnuson-Stevens Act, NMFS is required to implement management measures to rebuild overfished shark species and prevent overfishing. The impacts to the recreational shark fishing industry as a result of Katrina were not specifically analyzed in this rulemaking. Rather, the impacts of the proposed measures that would affect the recreational shark fishing industry in states impacted by Hurricane Katrina were evaluated.

Comment 16: NMFS should require that recreational anglers only catch and release and also require recreational anglers to report any and all interactions with protected species.

Response: Alternative suite 5 proposed prohibiting the possession of sharks in both commercial and recreational fisheries, but it was not the preferred alternative. This alternative was not preferred because of the adverse economic impacts that would be incurred by these fisheries. The stock status of many shark species does not warrant a requirement to only catch and release all shark species landed recreationally. The bag limit and minimum size requirements are sufficient to conserve shark stocks, and the Agency does not believe a prohibition on landing all sharks in recreational fisheries is warranted at this time.

Comment 17: A typo was made regarding allowable recreational species. On the HMS website copy of the proposed Amendment, the spinner shark was included on the recreational list. On a powerpoint presentation prepared for the public hearings, which was formerly posted on the HMS website, the spinner shark was not included on the recreational list. NMFS should update the draft document on the HMS website so that the commenting public would have access to the proper information necessary to adequately prepare their comments.

Response: The typographical errors in the draft Amendment 2 to the Consolidated HMS FMP have been addressed. An errata sheet describing these errors was posted to the HMS website on November 19, 2007, prior to the end of the public comment period and is available at: http://www.nmfs.noaa.gov/sfa/hms/sharks/Amendment%202/Errata_Sheet_for_DEIS.pdf

Comment 18: NMFS should consider the cumulative impacts on CHB operators who also fish for sharks in light of measures that have been imposed on this industry for other fisheries such as snapper. Snapper business is down 75-percent and proposed measures for the shark recreational fishery are the nail in the coffin for CHB; and, NMFS is violating NEPA by limiting recreational alternatives and through limited cumulative impact analysis such as that caused by red snapper regulations.

Response: NEPA requires all Federal agencies to consider and analyze a range of alternatives to achieve the stated objective and analyze cumulative impacts of proposed actions. NMFS considered the cumulative impacts by analyzing permits that participants

held in other fisheries. Negative economic impacts that may have been realized by the CHB industry targeting sharks would be mitigated by the final measures included in Amendment 2 to the Consolidated HMS FMP. Based on public comment and other factors, the Agency is modifying the shark species that can be retained by recreational anglers to include all non-ridgeback sharks and tiger sharks. This modification would allow CHB operators to continue to retain blacktip, spinner, finetooth, and bull sharks which had originally been proposed to be prohibited for recreational anglers due to concerns about anglers' ability to positively identify these species.

Comment 19: Party charter operators have to submit Vessel Trip Reports (VTRs) for every trip. NMFS should look into those to get a handle on recreational catches.

Response: VTR data were considered for the final rule, however, these data showed only four porbeagle sharks landed by party headboats. MRFSS and LPS are the only databases that NMFS has to track recreational landings. However, for some species, like porbeagle sharks, the timing of these programs do not necessarily capture when porbeagle sharks are caught by recreational fishermen in New England. As such, NMFS is considering ways to improve its recreational landings data collection. The Agency is interested in gathering more shark landings data from tournaments with prize categories for sharks, especially porbeagle sharks.

Comment 21: NMFS received numerous comments, including one from the South Carolina Department of Natural Resources, stating that the Agency should increase the retention limit for Atlantic sharpnose per vessel in the for-hire fishery. Recreational fishermen cannot avoid sharpnose sharks and the recent stock assessment declared that they were not overfished or subject to overfishing.

Response: Modifying the retention limits for Atlantic sharpnose was not considered in this amendment. Measures concerning Atlantic sharpnose sharks and other small coastal sharks (SCS) may be included in a future amendment to the Consolidated HMS FMP that is necessary as a result of recent (2007) stock assessments for SCS.

D.10 Stock Assessment and Fishery Evaluation (SAFE) Report and Stock Assessment Frequency

Comment 1: NMFS should implement the preferred alternative 9 for SAFE report frequency, which would allow NMFS to publish a SAFE report by the fall of each calendar year.

Response: NMFS prefers alternative 9, which would modify the existing regulations by requiring the publication of a SAFE report in the fall of each year. This would allow NMFS more flexibility to balance other responsibilities throughout the calendar year, as necessary, and would give NMFS the ability to include data for the SAFE report that is typically collected at the beginning of each calendar year.

Comment 2: Within the annual SAFE report, NMFS needs to correctly identify the overfished and overfishing status of every managed shark species by species, rather than by complex.

Response: The SAFE report follows the guidelines specified in NS2 and is used by NMFS to develop and evaluate regulatory adjustments under the framework procedure or the FMP amendment process. Within each SAFE report, NMFS lists the status determination of each stock. If the stock is managed within a species complex, then NMFS would report the status of the complex. For sharks, NMFS does not have the necessary information to conduct separate stock assessments for each species. Therefore, NMFS cannot make species-specific stock status determinations for every species of shark that is commercially harvested. Therefore, those species are managed within a species complex. NMFS is moving towards more species-specific management as available data allows, as is the case with sandbar sharks, which would be managed separately from the LCS complex based on measures in the final Amendment 2 to the Consolidated HMS FMP.

Comment 3: NMFS should implement the preferred alternative 7 for shark stock assessments, which would allow NMFS to conduct shark stock assessments at least once every five years.

Response: Because of the time necessary to modify management measures consistent with stock assessments, NMFS would implement the preferred alternative 7 and have shark stock assessments conducted at least once every five years. This would provide sufficient time for existing or forthcoming management measures to take effect (*i.e.*, a few years) prior to the next stock assessment.

Comment 4: NMFS received several comments in favor of the status quo for timing of stock assessments, including: NMFS should consider keeping the status quo for the timing of stock assessment for sharks; we are opposed to having an assessment at least once every five years; five years is too long to wait for an assessment; it is critical that stock assessments be regular and robust; NMFS should implement alternative 6, the status quo for the timing of shark stock assessments, with a mandate of stock assessments no less frequently than every 3 years; and, stock assessments should occur at least every 2 to 3 years without any further delays.

Response: Because of the time necessary to modify management measures consistent with stock assessments, NMFS is finalizing measures that would increase the amount of time between stock assessments to allow existing or forthcoming measures to be in place and have an effect on the population before the next assessment takes place. In 2003, NMFS adopted the SEDAR process for completing shark stock assessments at the request of industry, environmentalists, and academics. This process increases the time necessary to complete a stock assessment because it entails three workshops where data are reviewed, stock assessment models are run, and results are reviewed by an outside panel. Since this process alone may take over a year to complete, conducting assessments every 2 to 3 years is not practical. Allowing stock assessments to be conducted at least once every five years would allow research suggested by the last assessment to be completed before the next assessment is done, thus providing the necessary data for future assessments. It would also allow management measures, which need to be in place for several years to have an effect, before a new assessment is done. For instance, the last stock assessment, which was completed in 2006, included data

through 2004. NMFS is currently developing management based on that assessment, and new management measures would be in place by July 2008. If the next stock assessment is conducted in 2009 (3 years from 2006), and includes data up through 2007 or 2008, the new management measures would not have had time to take effect as they were not in place for the time series of data used for the next assessment. Increasing the frequency to at least once every five years would result in the next assessment occurring in 2011, which would include data up through 2010 and include 2.5 years of data collected under the new management measures.

Comment 5: The Georgia Coastal Resources Division believes that while conducting assessments every 2-3 years is too short for an accurate assessment, conducting stock assessments every five years is too frequent for the rebuilding timeframes necessary for the concerned species and to evaluate the effects of management.

Response: Alternative 7 would change the current process outlined in the 1999 FMP by requiring stock assessments for sharks at least every five years instead of every two to three years. Stock assessments could occur more frequently, however, they must be conducted at least every five years. While stock assessments at least every five years may be too frequent given the life history of sharks, NMFS' policies require that an assessment be no more than five years old. Therefore, NMFS proposes to conduct stock assessments at least once every five years.

D.11 Research Fishery/Preferred Alternative

Comment 1: NMFS should not finalize the proposed preferred alternative suite 4. The sandbar shark quota should be spread over 40–50 vessels making 1 – 2 trips annually rather than 5-10 vessels making more trips.

Response: The preferred alternative suite strikes a balance between positive ecological impacts that must be achieved to rebuild and stop overfishing on depleted stocks while minimizing the severity of negative economic impacts that would occur as a result of these measures. By allowing a limited number of historical participants to continue to harvest sharks, the Agency ensures that data for stock assessments and life history samples would continue to be collected. This would also allow a small pool of individuals to continue to collect revenues from sharks as they have in the past. Increasing the number of vessels included in the shark research fishery would simply provide a much smaller benefit for a larger pool of individuals. Furthermore, the Agency intends to address vital research concerns via the shark research fishery. Having fewer vessels involved in the research fishery would ensure less variation among vessels and would also maintain more consistent sampling protocols. Fewer vessels in the research fishery would also allow each vessel to make more sets targeting sandbar sharks throughout the year and within each region rather than a larger number of vessels only making one or two trips in a particular region/season. The selection process would take place each year in an attempt to maximize potential participants.

Comment 2: NMFS received several comments on research fishery vessel selection. These comments included: the Agency should select vessels based on a fisherman's income from the shark industry; NMFS should consider if a fisherman has helped with research in the past and consider whether or not the researchers had a positive experience; NMFS should consider any past violations, and if a vessel is conducive to research (*i.e.*, enough deck space); captains and crew should have an understanding of why the research is being done, an understanding of the costs associated with the research, the ability to fish in multiple regions, the ability to carry observers; past participation in the observer program and shark fishery should be considered; NMFS should create a point system based on criteria for selection of vessels and if there are more than 5-10 vessels, then a lottery should be used; NMFS should administer the research fishery much like they do the EFP program; the shark research fishery should only include directed shark permit holders; NMFS should increase the number of vessels in the research fishery and decrease the amount of sandbars each vessel may land; observer coverage should still happen within the research fishery; the Agency needs to provide clarification as to how vessels will be selected to participate in the shark research fishery included in the preferred alternative, and; who will pick the fishermen for the research fishery?

Response: Applications and permits for the shark research fishery would be administered through the HMS Exempted Fishing Permit program. The HMS Management Division would coordinate with Agency scientists to determine research objectives. NMFS would publish an annual notice in the Federal Register that describes the expected research objectives, number of vessels needed, selection criteria, and the application deadline. Requested information could include, but is not limited to, name and address, permit information, number of expected trips to collect sharks, regions where fishing activities would occur, vessels employed, and gear used. NMFS would review all complete applications and rank vessels according to the ability of the vessel to meet research objectives, fish in the specified regions and seasons, carry a NMFS approved observer, and meet other criteria as published in the Federal Register notice. Establishing a point system or a lottery for selection of vessels may be considered as a means of selecting among qualified vessels interested in participating in a shark research fishery. NMFS would include the appropriate types of permit holders in the shark research fishery as determined by the research objectives on an annual basis.

Comment 3: NMFS should allow vessels participating in the research fishery and collecting data to make the most of what they catch.

Response: Non-prohibited sharks landed in the shark research fishery would be sold by fishermen. NMFS-approved observers onboard vessels in the shark research fishery would be authorized to collect any and all samples from any specimens retained during fishing activities to fulfill research goals.

Comment 4: Quota for the research fishery should be equally distributed geographically.

Response: The Agency would consider the geographic distribution of vessels selected to participate in the shark research fishery to reflect traditional participation by vessels targeting sharks and to ensure that data are maintained for future stock assessments. Further, equal geographic distribution would allocate economic benefits to all regions affected by measures in the final rule and ensure that samples are collected from sandbar and other species of sharks throughout their geographic range.

Comment 5: NMFS should clearly state how the quota for sandbar sharks will be calculated.

Response: The sandbar shark quota was determined by the TAC recommended by the sandbar shark stock assessment for the species to rebuild by 2070. The available quota for commercial shark fishermen participating in the shark research fishery (116.6 mt dw) was determined based on the TAC while considering other sources of sandbar shark mortality in recreational fisheries and dead discards that occur in other fisheries. This quota would be reduced to 87.9 mt dw through the end of 2012. Additional detail on these calculations may be found in Appendix A and C of the final Amendment 2 to the Consolidated HMS FMP.

Comment 6: Is NMFS going to provide flexibility regarding when and where vessels fish?

Response: Research vessels would have some flexibility with regard to timing of trips subject to the objectives and needs of the research fishery. Vessels selected for, and fishing under, the auspices of the shark research permit would be required to take a NMFS-approved observer on all trips, therefore, observer availability may limit timing of individual trips by vessels. Furthermore, NMFS intends for the quota available for the shark research fishery to last throughout the year so that samples are collected from vessels fishing in all regions and seasons. The number of available trips targeting sharks would be dependant on retention limits, success of other vessels targeting sharks, available quota, and other considerations.

Comment 7: NMFS received several comments on research fishery goals and science, including: NMFS should describe its data and research needs; a research plan needs to be developed; a research plan should be devised first before the vessels/fishermen are selected; and the design of the sandbar-oriented research fishery requires scientific input and oversight in order to fulfill a research mission.

Response: The research goals and objectives are being developed with Agency scientists. Research objectives may very each year, depending on scientific needs. Several research needs were identified by the peer-reviewers during the LCS stock assessment in 2006. Available data on LCS are also presented in the data workshop summary report which is located on the SEDAR website: (http://www.sefsc.noaa.gov/sedar/Sedar_Workshops.jsp?WorkshopNum=11). The objectives would be published and made available to the public in conjunction with the Federal Register notice that solicits applications from fishermen interested in participating in the shark research fishery. Research topics may include, but are not

limited to: target and bycatch rates using circle and J-hooks with unique bait combinations; sandbar age at first maturity and maturity ogive; reducing bycatch rates of protected resources and prohibited sharks; and, life history of coastal sharks.

Comment 8: NMFS received several comments on which permit holders should be able to participate in the shark research fishery, including: the research fishery should include charter/headboat permit holders and NMFS should not allow incidental permit holders to apply for the research fishery.

Response: The research fishery may include any HMS permit holder subject to the research objectives for a given year. These objectives and the types of vessels that would be considered would be published annually in advance of research activities so that fishermen with the appropriate permits may apply.

Some of the objectives for the research fishery are to continue to collect sandbar shark landings to ensure consistent time-series data for future stock assessments and to answer specific research questions concerning shark life history and mechanisms to reduce bycatch, among others. Incidental permit holders have contributed to limited landings of sandbar sharks in the past; therefore, some landings data for sandbar sharks from incidental permit holders in the shark research fishery may be warranted.

Comment 9: NMFS should not implement a research fishery because it will take quota away from U.S. fishermen.

Response: Quota would not be taken away from U.S. fishermen as a result of the shark research fishery, however, a reduced quota consistent with the recommended TAC would be implemented in this final rulemaking. All of the available sandbar shark quota would be harvested in the shark research fishery. Interested U.S. fishermen would have the opportunity to apply for, and participate in this fishery, which would allow fishermen to harvest and sell sandbar sharks.

Comment 10: The research fishery should be limited in its first year (maybe 25-percent of the sandbar quota) so NMFS could figure out how the research fishery process would work. For the rest of the fishery, fishermen could then land some sandbars.

Response: There is a limited amount of sandbar shark quota available compared to previous years because the Agency is implementing a TAC and commercial sandbar quota that are consistent with the 2005/2006 sandbar shark stock assessment. Overharvests of sandbar sharks from 2006 and 2007 must also be accounted for resulting in an adjusted commercial sandbar quota of 87.9 mt dw between 2008-2012. Allocating a small portion of this reduced quota to fishermen outside the shark research fishery would reduce the quota available for the research fishery, limiting the Agency's ability to achieve research objectives.

Comment 11: There is an inconsistency in alternative suite 4 worth noting. In regard to the number of vessels that would be allowed to participate in the research fishery. In Chapter 2, it was stated "the Agency is not certain regarding the number of vessels that may participate in the shark research fishery." (pg 2-8), yet in Chapter 4 (pg

4-77), it states "NMFS scientists and managers would select a few vessels (*i.e.*, 5-10) each year to conduct the prescribed research."

Response: The Agency is not certain on the exact number of vessels that would be selected for the research fishery. The number of vessels selected depends on research objectives, the number of vessels that qualify to participate in the shark research fishery, and quota available. Inclusion of five to ten vessels in the draft documents associated with the proposed rule provided the public with an estimate of how many vessels may be needed under historical retention limits and proposed commercial quotas for the shark research fishery.

Comment 12: The Georgia Department of Coastal Resources supports alternative suite 4 but thinks that unclassified sharks should be grouped as ridgeback and non-ridgeback.

Response: The Agency proposed counting unclassified sharks as sandbar sharks in the draft Amendment 2 to the Consolidated HMS FMP to provide an incentive for shark dealers to properly identify the sharks they purchase to the species level. Since the commercial quota for sandbar sharks is the lowest, the Agency had proposed a precautionary approach to ensure that overfishing of sandbar sharks did not occur by providing an incentive for shark dealers to properly identify what they purchase and not list sharks as unclassified. However, NMFS is concerned that too many unclassified sharks being counted as sandbar sharks may fill the sandbar quota and close the shark research fishery prematurely. NMFS would use observer reports from outside the research fishery to determine species/complex (*i.e.*, non-sandbar LCS, SCS, pelagic sharks, sandbar sharks) from which the unclassified sharks should be deducted. This would result in unclassified sharks being counted from a more appropriate assemblage than assuming all unclassified sharks are sandbar sharks and may result in the shark research fishery staying open for a longer period of time.

Comment 13: NMFS should implement alternative suite 4 because it will greatly improve data collection prior to the next SEDAR for LCS. It will help re-analyze the life history of sandbar sharks, especially.

Response: NMFS prefers alternative suite 4 because it implements a shark research fishery that would provide a limited number of fishermen with the economic incentive to collect valuable scientific data on sharks for the Agency. The Agency would attain information from this research that would help future stock assessments fill in some of the data gaps that previous stock assessments have identified.

Comment 14: Alternative suite 4 allows fishing to continue on shark species without having adequate information to responsibly do so. NMFS should limit shark fishing activities until the status of remaining (all sharks but sandbar, dusky, porbeagle) sharks has been determined.

Response: NMFS is implementing measures that would reduce fishing mortality of sharks significantly while collecting data for future stock assessments. Without this

data, NMFS' ability to conduct future stock assessments would be hampered. Currently, the Agency and other collaborating fishery management entities have completed stock assessments for all the shark species that have ample data available.

Comment 16: NMFS should not implement a lethal sandbar research fishery. NMFS should implement a tag and release research fishery.

Response: It is not possible to gather all the necessary samples, including reproductive organs and vertebrae, without some sandbar shark mortality. Commercial fishermen also need some incentive to participate in the shark research fishery as there is no other compensation that would be provided, therefore, the proposed research fishery would allow data collection and the sale of animals collected to reduce dead discards and waste.

Comment 17: NMFS should address bycatch in alternative suite 4. This alternative suite is not adequate to ensure the recovery of depleted sandbar and dusky sharks.

Response: Measures implemented in alternative suite 4 would ensure that fishing effort targeting sandbar sharks and non-sandbar LCS is reduced, consistent with stock assessment recommendations. This would result in reductions to bycatch and target catch. Landings of sandbar sharks are expected to decrease by 80-percent. Discards of dusky sharks are expected to decrease by 74-percent. Modifications to retention limits, quotas, and authorized species in commercial and recreational fisheries are expected to decrease bycatch and landings of target species to a level that is consistent with recommendations of the 2005/2006 LCS stock assessment and provides a mechanism for rebuilding of sandbar and dusky sharks.

Comment 18: Alternative suite 4 could shift effort to SCS and pelagics.

Response: Fishing effort directed at SCS and pelagics may increase, however, these quotas are traditionally not fully utilized and are not being modified at this time with the exception of porbeagle sharks. The commercial quota for porbeagle sharks is being established based on historical commercial landings to prevent fishing effort from increasing while the stock is being rebuilt. Should fishing effort increase to the extent that the best available science indicates overfishing is occurring or stocks are overfished or approaching an overfished condition, NMFS would take additional action.

Comment 19: The management measures in alternative suite 4 will not adequately prevent the quota overages that have historically occurred within this fishery.

Response: Maintaining 100-percent observer coverage in the shark research fishery would enable the Agency to monitor landings in the shark research fishery in near real-time, reducing the likelihood of overharvests. Reducing retention limits outside the research fishery would reduce the number of non-sandbar LCS individual vessels may land each trip, which should prevent directed permit holders from targeting non-sandbar LCS. Instead, directed permit holders are anticipated to incidentally land non-sandbar LCS while they target other species. This, coupled with the fact that sandbar shark

retention would be prohibited outside the research fishery may reduce the number of overall trips landing sharks. Lastly, ensuring that shark dealer reports are received by the Agency within ten days of the 15th or 1st of every month would provide the Agency with the ability to provide more frequent landings updates and close the fishery if necessary to avoid overharvests.

D.12 Comments on Other Alternative Suites and Management Measures

Comment 1: NMFS received several comments on the status quo alternative (alternative suite 1), including: NMFS should maintain the status quo; and NMFS should implement different measures because the status quo clearly is not working and should be abandoned.

Response: NMFS chose not to select the status quo alternative as the preferred alternative because it does not end overfishing or implement rebuilding plans for overfished stocks as required under Magnuson-Stevens Act. NMFS is preferring alternative suite 4 with minor modifications based on further analysis and public comment because it implements quotas and retention limits necessary to rebuild and end overfishing of several shark species. The preferred alternative suite 4 maximizes scientific data collection by implementing a limited research fishery for sandbar sharks with 100-percent observer coverage. It also mitigates some of the significant economic impacts that are necessary and expected under all alternative suites to reduce fishing mortality as prescribed by recent stock assessments. Thus, alternative suite 4 strikes a balance between positive ecological impacts that must be achieved to rebuild and end overfishing on depleted stocks while minimizing the negative economic impacts that would occur as a result of these measures.

Comment 2: NMFS received several comments on alternative suite 2, including: NMFS should not implement alternative suite 2 because it does not allow ILAP (Incidental Limited Access Permit) holders to land sandbar sharks; NMFS should implement alternative suite 2 with the caveats that porbeagle sharks be authorized for recreational fishermen and sandbars should be allowed on PLL gear; alternative suite 2 is more protective of the species than preferred Alternative 4.

Response: The Agency did not prefer alternative suite 2 because incidental permit holders would not be able to land any sharks, which could result in excessive dead discards. There would also be an increased reporting burden for shark dealers, which could result in negative economic impacts for shark dealers.

Under alternative suite 2, porbeagle sharks would be added to the prohibited list for commercial and recreational fishing because porbeagle sharks were determined to be overfished based on the 2005 Canadian stock assessment. In addition, porbeagle sharks often look similar to other prohibited species (*i.e.*, white sharks). Therefore, placing porbeagle sharks on the prohibited species list would prohibit landings and help rebuild this overfished species. It may also stop commercial and recreational landings of other look-alike shark species, such as white sharks, which are also prohibited.

Alternative suite 2 is not more protective of the species than alternative suite 4. In fact, it could result in more sandbar discards compared to alternative suite 4 (43.2 mt dw compared to 13.1 mt dw; see Table 4.1). In addition, allowing directed shark permit holders to fish for sandbar sharks with PLL gear, especially in the mid-Atlantic closed area, could increase discards and overall mortality of dusky sharks. Thus, sandbar sharks would be prohibited on PLL gear under alternative suite 2 to offer dusky sharks more protection. NMFS estimated that prohibiting the retention of sandbar sharks on PLL gear under alternative suite 2 could reduce dusky discards to 8.6 mt dw per year (see Table 4.1).

Finally, NMFS prefers alternative suite 4 because this alternative would implement reduced quotas and retention limits to rebuild depleted shark stocks and end overfishing of several shark species, while minimizing regulatory discards. In addition, it would allow for the collection of fishery dependent data for future stock assessments and biological samples for shark research. It would also allow a few shark fishermen to continue to fish and generate revenues from shark landings as they have in the past.

Comment 3: NMFS received several comments regarding alternative suite 3, including: NMFS should support a year-round incidental fishery where all participants could keep a few sharks (including sandbars) to avoid dead discards; NMFS should eliminate the directed shark permit; if NMFS allowed a bycatch industry only, prices for meat might increase because there would be a consistent quantity of sharks year-round; alternative suite 3 is best for retention limits; NMFS should support a revised alternative suite 3 with current reporting requirements and no restrictions for recreational fishermen, except the current species limitations.

Response: Positive ecological impacts would likely be more pronounced for some species under the preferred alternative suite 4 compared to alternative suite 3 because discards would be lower under alternative suite 4. For instance, sandbar discards under alternative suite 3 are estimated to be 23.5 mt dw per year, whereas under alternative suite 4, they would be approximately 13 mt dw (see Table 4.1). In addition, dusky discards under alternative suite 3 are estimated as 20.4 mt dw, whereas they are only 9.2 mt dw under alternative suite 4 (Table 4.1). Therefore, NMFS is preferring alternative suite 4 at this time.

Economic impacts under alternative suite 3 would vary depending on permit type. For instance, the retention limits under alternative suite 3 are higher than retention limits for incidental permit holders under alternative suite 4, possibly resulting in positive economic impacts for incidental shark permit holders. In addition, under alternative suite 3, incidental and directed permit holders would have the same retention limit. This would presumably remove the difference and value between permit types, which may benefit incidental permit holders, but may be detrimental to directed permit holders. Under the preferred alternative suite, directed and incidental permit holders outside the research fishery would have different non-sandbar LCS retention limits based on permit type. This would allow the distinction and value between directed and incidental permit types to continue. In addition, directed and incidental permit holders outside the research fishery would not be able to retain sandbar sharks. This would most likely result in

fishermen no longer directing on sharks outside the research fishery, which could have negative economic impacts on these fishermen. However, unlike alternative suite 3, in alternative suite 4, there would be a small research fishery, which would allow a few shark fishermen to direct on sharks and sell their catch. This research fishery would also allow the continuation of fishery dependent data collection to help with future stock assessments. Therefore, NMFS is preferring alternative suite 4 at this time.

Retention limits under alternative suite 3 and 4 were designed to keep the shark fishery open longer than it has been in the past. This could allow shark products to be available year-round, and possibly avoid gluts in the market, as was experienced in the past when a majority of the shark products were available for a short period of time.

In addition, under alternative suite 3 and 4, NMFS would change the reporting requirements to shark dealers mailing reports so that they are received by NMFS within 10 days after the reporting period ends. This would ensure timelier reporting and potentially avoid overharvests. However, under alternative suite 3, NMFS considered a list of species that recreational anglers could land; however, this list did not include blacktip, bull, or spinner sharks because of potential misidentification issues with overfished shark species. However, based on public comment, NMFS would revise this list to allow recreational fishermen to land these species. The diagnostic characteristic for recreational anglers would be the lack of an interdorsal ridge. Recreational fishermen would be allowed to land non-ridgeback LCS plus tiger sharks. This characteristic should allow fishermen to land blacktip, bull, and spinner sharks, but not mistakenly land sandbar sharks, which have an interdorsal ridge (and silky sharks, which are often mis-identified as sandbar or dusky sharks). Therefore, given public comment and the revision in the allowable species for recreational anglers, NMFS is preferring alternative suite 4 over alternative suite 3 at this time.

Comment 4: NMFS should not use economic and historical significance of the directed fishery as a basis for selecting alternatives. NMFS did not prefer alternative suite 3 because "it diminishes the economic and historical significance of the directed fishery…" (72 FR 41400).

Response: NMFS did not select alternative suite 3 as the preferred alternative because the available sandbar and non-sandbar LCS quota would have been spread out over all directed and incidental permit holders, providing an extremely limited quota to a large number of fishermen. NMFS did not think this would be the best approach to rebuild the fishery. In addition, directed permit holders would have had the same retention limit as incidental permit holders, which would have diminished the value of directed shark permits. Under the preferred alternative suite 4, NMFS would establish a small research fishery where a small proportion of the directed shark fleet would be able to fish and harvest all shark species, except for prohibited sharks. In addition, NMFS evaluated retention limits of non-sandbar LCS for fishermen operating outside the shark research fishery. NMFS is preferring to preserve differences among directed and incidental permit holders and set separate retention limits based on permit type; directed permit holders would be allowed a higher retention limit than incidental permit holders. This affords directed permit holders, who presumably paid more for their directed shark

permit and rely on shark products for a larger part of their income, a higher retention limit than if all permit holders had the same retention limit. Thus, in the preferred alternative suite 4, NMFS would establish retention limits of 33 non-sandbar LCS for directed permit holders and 3 non-sandbar LCS retention limit for incidental permit holders.

Comment 5: All permit holders should be allowed to keep incidentally-caught sandbar sharks. NMFS should allow an incidental fishery, year-round, for all commercial permit holders.

Response: NMFS considered an alternative where all fishermen would be able to keep incidentally caught sandbar sharks under alternative suite 3. However, NMFS prefers alternative suite 4 because it would establish a small shark research fishery where the sandbar quota would be harvested. This research fishery was not proposed under alternative suite 3. Because of this, alternative suite 3 would have compromised NMFS' ability to collect fishery dependent data needed for future stock assessments, and therefore, was not preferred. This research fishery would allow NMFS to collect scientific data on sandbar sharks that is essential for future stock assessments. In addition, a few fishermen would be allowed to have some economic benefit from the sale of shark products. Spreading the sandbar shark quota among all fishermen with shark permits would not meet the goals established for the sandbar shark research fishery and would result in low retention limits fleetwide. Therefore, NMFS prefers alternative suite 4, which would end overfishing on depleted stocks while minimizing the severity of negative economic impacts that would occur as a result of these measures.

Comment 6: NMFS received several comments regarding alternative suite 5, including: NMFS should close the shark fishery, considering the poor status of most of the species in the LCS complex, the uncertainty of the blacktip assessment, and the ineffectiveness of NMFS shark recovery plans to date; a commercial fishery at this time is simply not acceptable; NMFS should support a catch, tag, and release (no finning) fishery only for all shark fisheries; NMFS should not support a commercial LCS fishery because it is not prudent or acceptable; NMFS should just close the sandbar and dusky fisheries; NMFS should be concerned about bycatch; NMFS should keep the Atlantic LCS fishery closed until more is known about these species; NMFS should narrow Alternative 5 to the commercial and large coastal fisheries; NMFS should consider closing the commercial LCS fishery entirely.

Response: NMFS does not believe that closing the entire shark fishery, or establishing a catch and release fishery, is warranted at this time. Recent stock assessments for sandbar, dusky, Atlantic blacktip, and porbeagle sharks indicate that these species are overfished or their status is unknown. In addition, NMFS is following the recommendations of these latest stock assessments and taking significant steps in this amendment to rebuild these overfished stocks, reduce fishing mortality, and allow these species to rebuild while minimizing economic impacts and achieving optimum yield. Alternative suite 5 would have the most positive ecological impacts for sharks, protected resources, and EFH of the alternative suites considered in this document. However, closing the Atlantic shark fishery under alternative suite 5 would also incur the most

economic impacts on U.S. shark fishermen, shark dealers, shark tournament operators, and others involved in supporting industries. There are numerous species of shark that are not overfished or experiencing overfishing, such as the Gulf of Mexico blacktip sharks, and therefore, do not warrant a full closure of the shark fishery at this time. Furthermore, by closing the shark fishery, the Agency would lose a valuable source of fishery dependent data (through logbooks and the sharks BLL observer program) that are essential for future shark stock assessments. Other alternative suites considered by NMFS would strike a balance between ending overfishing and allowing overfished shark stocks to rebuild and allowing some retention of sharks to meet the economic needs of the shark fishing community.

Comment 7: NMFS should reconsider a ban on BLL gear to reduce landings/mortality of sandbar and dusky sharks. There is not significant merit in the argument that more participants will transfer fishing effort to the gillnet fisheries for sharks.

Response: BLL gear is the primary gear used to harvest sharks by shark permit holders, but it is also deployed in other fisheries to target non-HMS (*i.e.*, snapper-grouper, reef fish, and tilefish). Many shark permit holders also maintain permits in these other non-HMS fisheries. Banning retention of sharks caught with BLL gear to reduce landings and mortality of sandbar and dusky sharks could result in regulatory discards of sharks because vessels deploying BLL gear in other fisheries would have to discard all incidentally caught sharks in the pursuit of other non-HMS species with BLL gear. In addition, by banning BLL gear for sharks, sharks could only be harvested by gillnet gear, rod and reel, or PLL gear. Given concerns of protected species interactions in both the PLL and gillnet fisheries, NMFS would not want to redistribute shark BLL effort into these fisheries. Therefore, NMFS is not considering banning BLL gear for sharks at this time.

Comment 8: NMFS should analyze an alternative suite that banned commercial shark fisheries without restricting the recreational shark fishery to lessen economic impact, overall.

Response: NMFS did not analyze a closure of the only the commercial shark fishery while allowing a recreational shark fishery to continue due to concerns over equity to different sectors. NS4 requires that allocation of fishery resources be fair and equitable to all fishermen. Since shark species that are overfished and experiencing overfishing are caught both in the commercial and recreational fisheries, NMFS considered management measures that applied to both sectors that would help rebuild shark stocks and end overfishing. Additionally, since commercial fishermen may sell shark products where recreational fishermen cannot, closing the commercial shark sector could have the largest economic impact. There are also numerous species of shark that are not overfished or experiencing overfishing, and therefore do not warrant a full closure of the commercial or recreational Atlantic shark fishery at this time. Furthermore, by closing the shark fishery, the Agency would lose a valuable source of fishery dependent data (through logbooks and the shark observer programs) that would limit future shark stock assessments. Therefore, NMFS prefers alternative suite 4.

Comment 9: NMFS should not establish a small research fishery because it would benefit few and disadvantage most of the shark fishermen. Everyone should get a chance at the quota, either through ITQs, or by having NMFS open up the fishery on January 1 every year and allowing all fishermen to catch sharks until the quota is has been filled.

Response: NMFS prefers alternative suite 4 to allow for the collection of scientific data with the sandbar shark quota while at the same time allowing a few fishermen to have some economic benefit from the sale of shark products. Spreading the sandbar shark quota among all fishermen with shark permits would not foster sandbar shark research. While NMFS agrees that ITQs may be beneficial to fishermen, it would take NMFS several years to implement an ITQ system. The primary goal of this amendment is to end overfishing and implement rebuilding plans for deplete shark stocks under the timeframe specified by Magnuson-Stevens Act. Due the complexities and time needed to develop and implement ITQs, NMFS does not have time to establish an IFQ or LAPP program for sharks within that time period. However, NMFS would consider developing an IFQ or LAPP program for sharks as well as other HMS in the future.

Comment 10: The Georgia Coastal Resources Division NMFS requests that NMFS should include an alternative on eliminating gillnets because of their large bycatch.

Response: In the past, shark gillnet fishermen have had 100-percent observer coverage during the Atlantic Right Whale Calving season and approximately 30-percent observer coverage during the rest of the year, which documents all bycatch on observed trips. Based on this observer coverage, compared to other gear types, such as PLL gear, gillnet gear has relatively low bycatch, with finfish bycatch ranging from 1.3 to 13.3-percent and observed sea turtle and marine mammals bycatch less than 0.1-percent. Given the reduction in trip limits as a result of this amendment, and the four to six vessels that currently use strike or drift gillnet for sharks, NMFS does not believe there would be a significant increase shark gillnet fishing pressure in the future and, therefore, NMFS does not feel it is appropriate to eliminate gillnets as an authorized gear at this time.

Comment 11: None of the suites completely represent the interests of the fishery.

Response: The alternative suites represent a range of management measures derived from scoping and public comment that could be considered based on stock assessments. NMFS assessed the impacts of the alternative suites, reviewed all public comments, and utilized the best available data to make a final analysis. NMFS prefers alternative suite 4 because it implements quotas and retention limits necessary to rebuild and stop overfishing of several shark species. The preferred alternative suite 4 maximizes scientific data collection by implementing a limited research fishery for sandbar sharks with 100-percent observer coverage. It also mitigates some of the significant economic impacts that are necessary and expected under all alternative suites to reduce fishing mortality as prescribed by recent stock assessments. Ultimately, alternative suite 4 strikes a balance between positive ecological impacts that must be achieved to rebuild and stop overfishing on depleted stocks while minimizing the negative economic impacts that would occur as a result of these measures.

Comment 12: We are concerned about wasteful discards under the proposed alternatives. NMFS should encourage responsible and targeted fishing by providing incentives for fishermen who can fish without discards or minimal discards.

Response: NMFS believes that the reduced trip limits (which would be approximately one quarter of the current trip limit for directed fishermen under the status quo) and the prohibition of the retention of sandbar sharks outside the research fishery would result in directed fishermen no longer targeting non-sandbar LCS. Currently, most of the discards of dusky, sandbar, and other shark species come from the directed shark fishery (see Table 4.1). The only directed shark fishing that would occur under the preferred alternative suite would be within the research fishery. Thus, under the preferred alternative where most fishermen would target other species and only incidentally catch non-sandbar LCS, NMFS does not anticipate excessive shark discards. For instance, based on shark BLL observer program data, on average, non-shark BLL trips caught one sandbar shark per trip and 12 non-sandbar LCS. The retention limits of 33 non-sandbar LCS per trip for directed permit holders would allow fishermen to keep incidentally caught non-sandbar LCS as they target other species. In addition, these non-shark trips typically have much shorter soak times (2-3 hours) compared to shark trips (12-14 hour soak times). Thus, it is estimated that most sandbar bycatch could be released alive since they would be released from longline gear in a relatively short period of time.

D.13 Science

Comment 1: NMFS received several comments regarding the rebuilding timeframe for sandbar sharks stating that NMFS should take a more precautionary approach rather than the maximum rebuilding timeframe of 70 years for sandbar sharks and that NMFS should consider a total ban on sandbar shark landings in all fisheries and an accelerated rebuilding timeframe of 38 years.

Response: The 2005/2006 LCS stock assessment discussed three rebuilding scenarios, including: rebuilding timeframe under no fishing; a TAC corresponding to a 50-percent probability of rebuilding by 2070; and a TAC corresponding to a 70-percent probability of rebuilding by 2070. Under no fishing, the stock assessment estimated that sandbar sharks would rebuild in 38 years. Adding a generation time (28 years), as described under NS1 for species that require more than 10 years to rebuild even if fishing mortality were eliminated entirely, the target year for rebuilding the stock was estimated to be 2070 (28 years mean generation time + 38 years to rebuild if fishing mortality eliminated = 66 years, starting in 2008). Assuming fishing mortality from 2005 to 2007 would be maintained at levels similar to 2004 (the last year of data used in the stock assessment was from 2004) and that there would be a constant TAC between 2008 and 2070, the assessment estimated that sandbars would have a 70-percent probability of rebuilding by 2070 with a TAC of 220 mt ww (158 mt dw)/year and a 50-percent probability of rebuilding by 2070 with a TAC of 240 mt ww (172 mt dw)/year. Since sharks are caught in multiple fisheries, a rebuilding timeframe of 38 years under no fishing would require management restrictions in many fisheries. Given the negative economic impacts associated with this, NMFS does not prefer such a rebuilding time

frame at this time. As described previously, NMFS is using the 70-percent probability of rebuilding to ensure that the intended results of a management action are actually realized given the life history traits of sandbar sharks.

Comment 2: NMFS received a comment stating disagreement with the science that suggests there is a decline in sandbar sharks because the industry went over their quota by 300-percent in two weeks and therefore shark populations are healthy and abundant.

Response: NMFS used the best available science and a rigorous SEDAR assessment process to make the determination that sandbar sharks are overfished. Recent landings and higher catch rates do not necessarily indicate errors in the stock assessment, or that the sandbar shark populations have recovered. Catch rates alone do not tell the whole story, nor do percentages because they may be a reflection of lower quotas as described in further detail below. Most catch rate series show stable or unclear trends in recent years, but large declines occurred in the late 1970s and 1980s. There has been a commercial quota imposed on the shark fishery since 1993; stable landings in the last decade most likely reflect the effect of a commercial quota, not necessarily a stable population. For instance, commercial catch declined from 162,000 individuals in 1989 to 72,600 individuals in 1993 prior to implementation of the commercial quota. A 300-percent overharvest of LCS does not necessarily mean that more sharks were being caught or that it represents a healthy shark population; rather, it may be the result of significantly reduced LCS quotas due to overharvests in recent years and fishermen continuing to fish at effort levels similar to those set in 2003 and 2004.

Comment 3: NMFS received a comment stating that fishermen/dealers do not properly identify what they are catching, which may have impacted the results of the stock assessment.

Response: Since 1993, species-specific reporting has been required for shark fishermen and shark dealers. However, some fishermen and dealers still report sharks in more general terms as “sharks” or “large coastal sharks”. These unclassified sharks have been problematic for shark stock assessments. Fisheries observers are trained in species-specific identification and report the correct species-level data. Thus, NMFS uses observer data to determine species composition of unclassified sharks for stock assessment purposes. In addition, recognizing that the accuracy of stock assessments and management can be improved with correct species identification, in the Consolidated HMS FMP, NMFS implemented mandatory shark identification workshops for shark dealers. The objective of these workshops is to reduce the number of unknown and improperly identified sharks reported in the dealer reporting form, and to increase the accuracy of species-specific dealer reported information, quota monitoring, and the data used in stock assessments. These workshops train shark dealers to properly identify Atlantic shark carcasses. NMFS is also developing an identification guide of the authorized species for recreational anglers.

Comment 4: NMFS received a comment stating that 80-percent of the landings in the VIMS dataset were sandbar sharks. The VIMS data says there are no large sandbar

sharks. However, we see large adult sandbar sharks all the time, and their size has not changed over time.

Response: The Virginia Institute of Marine Science's BLL survey examines catch rates for the LCS complex and sandbar sharks. This survey has sampled a set of seven stations since 1974. Over this time, the survey has collected over 5,200 sandbar sharks and more than 6,000 LCS. Over the course of the study (1974-2004), both the sandbar shark and the LCS complex showed significant declines, with no signs of recovery for all age classes. Because of a number of factors including environmental changes, the gear used, random sampling scheme used, and experience and efficiency of fishermen, the number of sharks seen by one person or in one year may not be representative of the stock as a whole. The stock assessment included a variety of data sources, which taken together indicated a decline in the sandbar shark population.

Comment 5: NMFS received several comments regarding the results of the 2005/2006 LCS stock assessments, specifically that 1) the science used in the LCS assessment for 2006 was questionable, and the stock assessment needs to be re-done before Amendment 2 is finalized, 2) the science regarding sandbar sharks is flawed, 3) that information/data was left out of the stock assessment, 4) that the stock assessment does not represent the best available science as indicated by the independent stock assessment specialists, and 5) that the specialists raised issues such as needed future research.

Response: The 2005/2006 LCS complex, sandbar, and blacktip shark stock assessments were conducted using the SEDAR process. SEDAR is organized around three workshops. The first is the data workshop, during which fisheries, monitoring, and life history data are reviewed and compiled. The second is the assessment workshop, during which assessment models are developed and population parameters are estimated using the information provided from the data workshop. The final workshop is the review workshop, during which independent experts review the input data, assessment method, and assessment products. All of the workshops are open to the public to ensure the assessment process is transparent. The review workshop panel consists of a chair and 2 reviewers appointed by the CIE, an independent organization that provides independent, expert reviews of stock assessments and related work. With regard to the LCS complex assessment, the review panel determined that the data utilized in the assessment were the best available to the analysis at the time. For the sandbar shark assessment, the review panel concluded that the population model and resulting population estimates were the best possible given the available data. The review panel was also confident that the 2005/2006 sandbar shark assessment produced more reliable estimates of stock status than previous stock assessments because the SEDAR stock assessment resulted in a more thorough review at all stages of the process. For the blacktip shark assessment in the Atlantic and Gulf of Mexico, the review panel determined that the data were treated appropriately, were adequate for the models used to assess the stocks and represented the best estimates of assessment information currently available. As one of the Terms of Reference for the Review workshop, the review panel was asked to develop recommendations for future research for improving data collection and stock assessments. These research recommendations are customary not only during

the review workshop but also during the data and assessment workshops and do not imply that the current research used in the stock assessment was insufficient. For a complete review of the documents used in the stock assessment, please visit http://www.sefsc.noaa.gov/sedar/Sedar_Workshops.jsp?WorkshopNum=11

Therefore, NMFS believes that the 2005/2006 LCS complex, blacktip and sandbar shark stock assessments represent the best available science and is not considering re-doing the stock assessment before implementing management measures in Amendment 2 to the Consolidated HMS FMP. Under the NS1 Guidelines, if a stock is overfished, NMFS is required to "take remedial action by preparing an FMP, FMP amendment, or proposed regulation...to rebuild the stock or stock complex to the MSY level within an appropriate time frame" (50 CFR 600.310(e)(3)(ii)). Additionally, "in cases where a stock or stock complex is overfished, [the] action must specify a time period for rebuilding the stock or stock complex that satisfies the requirements of section 304(e)(4)(A) of the Magnuson-Stevens Act." Therefore, consistent with the results of the 2005/2006 LCS complex, blacktip and sandbar shark stock assessment results, the Consolidated HMS FMP and the Magnuson-Stevens Act, NMFS is implementing final management measures to rebuild sandbar, dusky and porbeagle sharks while providing an opportunity for the sustainable harvest of blacktip sharks and other sharks in the LCS complex.

Comment 6: NMFS received a comment stating that offers from an industry representative to give shark fin data to NMFS were refused and therefore historic fin data must have been left out of the assessment.

Response: NMFS included all shark fin data that were purchased from shark limited access permit holders by Federally permitted shark dealers, and all data from both the shark fin and carcass landings recorded and submitted by Federally permitted dealers, as required by the regulations at § 635.5 (b)(1)(i), in the 2005/2006 LCS stock assessments. In addition, during the data workshop for the 2005/2006 LCS stock assessments, the public was invited to submit data in the appropriate format to be considered for the stock assessment. If the data were not submitted in the appropriate format for assessment scientists to determine the applicability of the data, then they were not included in the assessment. The public would have additional opportunities to submit data during the data workshop at the next LCS stock assessment. This data would be included in the stock assessment provided that it is submitted in the appropriate format.

Comment 7: NMFS should have used the data from the Oregon II index which showed that the catch per unit effort was increasing.

Response: The Oregon II data was included in the 2005/2006 LCS complex, blacktip, and sandbar shark stock assessments. The SEFSC's Mississippi Laboratories has conducted standardized BLL surveys from the Oregon II in the Gulf of Mexico, Caribbean and Southern North Atlantic since 1995. The data were reviewed by the indices working group at the data workshop. This data showed that blacktip shark catch rates, when combined with year, area, and depth as variables, increased in later years in the Gulf of Mexico and were low with breaks in the time series in the Atlantic south of

37º. The sandbar sharks catch rates in the Gulf of Mexico and Atlantic combined with year, area, and depth stayed about the same over the data time series. This data set was just one of many data sets related to abundance indices included in the 2005/2006 stock assessment.

Comment 8: NMFS received a comment stating that NMFS should have included Mexican data of shark catches in the 2005/2006 LCS assessment.

Response: The 2005/2006 LCS complex, blacktip, and sandbar shark assessment did include detailed estimates of Mexican catches of blacktip and sandbar shark for the period of 1962-2000. Species composition in weight for different sharks taken in Mexican waters was estimated from the data given in several Mexican studies. These were then used to estimate the total weight and numbers caught of each species in each state. In addition, annual estimates from 2000-2004 of illegal catches of LCS from Mexican fishing vessels fishing in the U.S. EEZ were also included in the 2005/2006 LCS stock assessments.

Comment 9: NMFS received a comment stating that NMFS does not need to implement an amendment to the Consolidated HMS FMP until July 12, 2009.

Response: The mandate to rebuild overfished stocks is in § 304(e) of the Magnuson-Stevens Act. The Magnuson-Stevens Act states that for stocks identified as overfished or having overfishing occurring, the appropriate Council or Secretary shall prepare a fishery management plan, plan amendment, or proposed regulations for the fishery to end overfishing in the fishery and rebuild affected stocks within one year of that determination. NMFS satisfied that timing provision: sandbar sharks and dusky sharks were determined to be overfished with overfishing occurred on November 7, 2006 (71 FR 65086), and NMFS published the draft Amendment 2 to the Consolidated HMS FMP on July 27, 2007 (72 FR 41325). NMFS notes that the 2006 Magnuson-Stevens Fishery Conservation and Management Reauthorization Act amended § 304(e) to include a two-year timing provision for preparation and implementation of actions, and the new provision will be effective July 12, 2009.

Comment 10: NMFS received several comments regarding conflict of interest, including, 1) there was a conflict of interest at the LCS assessment workshop and review workshop; 2) several reviewers were biased against the industry; 3) the stock assessment is fixed to give a particular outcome based on pressures by conservationists, and; 4) there are conflicts of interest between NMFS employees and the American Elasmobranch Society which should invalidate all studies and assessments.

Response: NMFS does not believe that there was any conflict of interest on the part of participants or reviewers in the stock assessment process. The third workshop in the SEDAR process is the review workshop during which a panel of independent experts reviews the input data, assessment methods, and assessment products. This workshop is open to the public. The review workshop panel consists of a chair and 2 reviewers appointed by the CIE, an independent organization that provides independent, expert reviews of stock assessments and related work. The individuals appointed to the review

panel can have no affiliation with any of the affected parties to the assessment, including government, industry, or advocacy groups. The review workshop chair is appointed by the CIE. Two additional reviewers, selected by the Shark SEDAR Coordinator for their expertise in shark stock assessments, were also included on the LCS shark complex review panel. The panel concluded that the data used in the analyses, the assessment approach, and overall conclusions of the assessment were valid. The panel provided no indication that there were any conflicts of interest during the assessment process.

The American Elasmobranch Society (AES) is a non-profit organization that seeks to advance the scientific study of living and fossil sharks, skates, rays, and chimaeras, and the promotion of education, conservation, and wise utilization of natural resources. The Society holds annual meetings and presents research reports of interest to students of elasmobranch biology. Those meetings are held in conjunction with annual meetings of the American Society of Ichthyologists and Herpetologists each year at rotating North American venues. Membership in the AES is open to any person who has an interest in the object of AES. Members of AES include, but are not limited to, representatives from state and federal governmental and non-governmental organizations, and academic institutions. NMFS employees are not restricted from participating in professional societies, and therefore, NMFS believes that there is not a conflict of interest between NMFS employees and AES.

Comment 11: NMFS should assess the eleven prohibited LCS species individually and in a public forum and that the shark stock assessments should break out all sharks by species, especially bull sharks, scalloped hammerhead, and tiger sharks.

Response: NMFS continues to collect species-specific data in support of species-specific stock assessments. To date, NMFS has conducted individual stock assessments for dusky, sandbar, blacktip, Atlantic sharpnose, finetooth, blacknose, and bonnethead sharks. As additional biological and fishery-related data become available, NMFS would conduct other species-specific stock assessments.

Comment 12: NMFS possessed certain species-specific knowledge regarding blacktip sharks that it failed to produce for the assessment.

Response: NMFS has included all the available data that were presented at the data workshop and has not withheld or failed to produce relevant datasets. NMFS held a data workshop for the 2005/2006 LCS stock assessment that was open to the public and requested that participants submit any relevant data or analysis in the form of working documents. During the assessment workshop, the assessment scientists determined the adequacy and appropriateness of the submitted data to be included in each assessment.

Comment 13: Why did the 2005/2006 LCS stock assessment not assess sandbars as two separate populations, one in the Gulf of Mexico and one in the Atlantic similar to what was done for blacktip sharks.

Response: During the data workshop portion of the LCS stock assessment, the life history working group looked at multiple studies and data sources to summarize life

history information such as stock definition, age, growth size at maturity, and mortality for sandbar, and blacktip sharks that was then used in the stock assessments for each species. For sandbar sharks, after considering the available data, the working group decided that the stock definition should be the Western North Atlantic from southern New England to the Gulf of Mexico. Tagging studies suggest that one stock unit exists from Cape Cod south down the U.S. Atlantic coast and into the Gulf of Mexico, extending around the U.S. and Mexican portions of the Gulf of Mexico to the northern Yucatan peninsula. Genetic studies conducted on specimens from Virginia waters and the Gulf of Mexico further support the existence of a single stock that utilizes the area of Cape Cod to the northern Yucatan peninsula. For blacktip sharks, conventional tagging evidence suggests little exchange between the U.S. Atlantic Ocean and Gulf of Mexico. Genetic heterogeneity and female philopatry also demonstrates multiple genetic reproductive stocks among blacktip sharks in the Gulf of Mexico and South Atlantic Bight. Therefore, blacktip sharks were divided into two stocks: an Atlantic stock defined as extending from Delaware to the Straits of Florida, and a Gulf of Mexico stock designated as extending from the Florida Keys throughout the Gulf of Mexico.

Comment 14: NMFS received a comment asking who the peer reviewers were for the 2006 dusky assessment.

Response: In order to preserve the integrity of the independent review process of stock assessments, NMFS does not provide the names of the peer reviewers, including those used for the dusky shark assessment.

Comment 15: NMFS received several comments regarding the continuation of shark data collection once Amendment 2 is implemented, asking how NMFS is going to do a stock assessment after Amendment 2 is implemented because NMFS would have no data from fishermen, and that NMFS should obtain more data from the fishermen by placing scientists on fishing vessels.

Response: The management measures in this amendment would establish a small research fishery that would harvest the entire commercial sandbar shark quota. Vessels operating within the shark research fishery could also retain non-sandbar LCS, SCS and pelagic sharks. These vessels would also have 100-percent observer coverage. Vessels operating outside of the shark research fishery would only be able to retain non-sandbar LCS, SCS and pelagic sharks. The vessels outside the shark research fishery would continue to be selected for observer coverage. Observers provide baseline characterization information, by region, on catch rates, species composition, catch disposition, relative abundance, and size composition within species for the large coastal and small coastal shark BLL fisheries. NMFS would use observer data as well as logbook and shark dealer data and fisheries independent data to conduct stock assessments in the future.

Comment 16: NMFS received a comment supporting stock assessments that occur in the United States and not those that occur in other countries.

Response: To date, the United States has not conducted a stock assessment on porbeagle sharks. NMFS has reviewed the Canadian stock assessment and found that it made full use of all fishery and biological information available and therefore deems it to be the best available science and appropriate to use for U.S. domestic management purposes. Canada has conducted stock assessments on porbeagle sharks in 1999, 2001, 2003, and 2005. Reduced Canadian porbeagle quotas in 2002 brought the 2004 exploitation rate to a sustainable level. According to the 2005 recovery assessment report conducted by Canada, the North Atlantic porbeagle stock has a 70-percent probability of recovery in approximately 100 years if F is less than or equal to 0.04. The Canadian assessment indicates that porbeagle sharks are overfished ($SSN_{2004}/SSN_{MSY} = 0.15 – 0.32$; SSN is spawning stock number and used as a proxy for biomass). However, the Canadian assessment indicates that overfishing is not occurring ($F_{2004}/F_{MSY} = 0.83$). Based on these results, NMFS declared the status of porbeagle sharks as overfished, but overfishing is not occurring (71 FR 65086).

Comment 17: NMFS received a comment asking if shark migration patterns been studied along with sea surface temperatures.

Response: Sea surface temperature is an important physical data parameter that is collected during investigations of shark migration patterns. The data workshop for the 2005/2006 LCS stock assessment included several studies investigating the correlation of sea surface temperature and shark migration patterns. A summary of these studies and reference citations can be found in the SEDAR 11 final stock assessment report available on the HMS website at http://www.nmfs.noaa.gov/sfa/hms/hmsdocument_files/sharks.htm.

Comment 18: Does NMFS have an idea of the status of common threshers? It seems that they are abundant.

Response: To date, NMFS has not conducted a species-specific stock assessment for thresher sharks and their status in the Atlantic Ocean is unknown. However, commercial landings data compiled from the most recent stock assessment documents indicate approximately 307, 291 lb dw of thresher sharks have been landed from 2000 to 2005. Recreational landings data obtained from the recreational landings database for HMS indicates approximately 8,000 thresher sharks have been harvested in the Atlantic HMS recreational shark fishery from 1999 to 2005.

Comment 19: NMFS should implement the status quo, Alternative 1, because this is the only viable option for Amendment 2 until the scientific issues that have been raised are addressed and resolved.

Response: As described in response to comments 5 and 10, NMFS disagrees that the results of the LCS assessment should be put on hold due to concerns raised about the scientific validity and impartiality of reviewers. NMFS has carefully reviewed and considered all public comments received on the assessment and determined that the assessment was appropriate, used the best scientific data available, and is scientifically valid. The 2005 Canadian porbeagle shark stock assessment, the 2006 dusky shark

assessment, and the 2005/2006 LCS stock assessment determined that porbeagle, dusky, and sandbar sharks are overfished. Overall, the status quo alternative, which would maintain the current annual LCS quota of 1,017 mt dw, in conjunction with the management measures mentioned above, would have negative ecological impacts on sandbar, dusky and porbeagle sharks, as well as protected resources and marine mammals. The social and economic impacts would likely be neutral because current fishing effort would remain the same in the short term. In the long term, as stocks continue to decline, profits may decrease as costs associated with finding and catching these depleted stocks increases. Management measures are needed to rebuild overfished stocks and prevent overfishing consistent with the mandates of the Magnuson-Stevens Act. Therefore, maintaining the LCS quota of 1,017 mt dw would be inconsistent with the Magnuson-Stevens Act and the recent LCS stock assessment that recommended a TAC of 158.3 mt dw for sandbar sharks in order for this species to rebuild by 2070. Current fishing effort, under the status quo alternative, would lead to continued overfishing of sandbar, porbeagle and dusky sharks, which would prevent these species from rebuilding in the recommended timeframe. As a result, NMFS did not implement this alternative. Rather, NMFS prefers to implement quotas and retention limits necessary to rebuild and stop overfishing of several shark species while maximizing scientific data collection by implementing a limited research fishery for sandbar sharks. The final management measures also mitigate some of the significant economic impacts that are necessary and expected under all alternative suites 2 though 5 to reduce fishing mortality as prescribed by recent stock assessments. The final management measures strike a balance between positive ecological impacts that must be achieved to rebuild and stop overfishing on depleted stocks while minimizing the severity of negative economic impacts that would occur as a result of these measures. By allowing a limited number of historical participants to continue to harvest sandbar sharks within the research fishery, NMFS ensures that data for stock assessments and life history samples would continue to be collected. Directed permit holders not selected to participate in the shark research fishery would still be authorized to land 33 non-sandbar LCS per vessel per trip and incidental permit holders would be authorized to land 3 non-sandbar LCS per trip. This would limit the number of trips targeting non-sandbar LCS sharks; however, it would still afford the opportunity to keep non-sandbar LCS that are landed incidentally, preventing excessive discards.

Comment 20: The stock assessment is flawed because sandbar sharks do not occur west of Mobile, Alabama.

Response: The stock assessment represents the best available science, and included all data that was presented at the Data Workshop for 2005/2006 LCS stock assessment. Included in the assessment are fishery independent shark surveys that were conducted from 1995-2005 from the Oregon II. The results of that survey can be found in LCS05-06-DW-27. This survey showed the capture of sandbar sharks in the Gulf of Mexico, including west of Mobile, Alabama (see Figure 4 within LCS05-06-DW-27).

D.14 National Standards

Comment 1: The proposal to prohibit blacktip sharks in the recreational fishery violates NS2 of the Magnuson-Stevens Act because the stock assessment determined that blacktip sharks in the Gulf of Mexico are not overfished.

Response: NS2 requires that conservation and management measures be based upon the best scientific information available. NMFS believes that the 2006/2007 LCS stock assessment constitutes the best available science. The 2005/2006 LCS complex, sandbar, and blacktip shark stock assessments were conducting using the SEDAR process. SEDAR is organized around three workshops. All of the workshops are open to the public to ensure the assessment process is transparent. The review workshop panel consists of a chair and 2 reviewers appointed by the CIE, an independent organization that provides independent, expert reviews of stock assessments and related work. With regard to the LCS complex assessment, the review panel determined that the data utilized in the assessment were the best available to the analysis at the time. For the sandbar shark assessment, the review panel concluded that the population model and resulting population estimates were the best possible given the available data. The review panel was also confident that the 2005/2006 sandbar shark assessment produced more reliable estimates of stock status than previous stock assessments because the SEDAR stock assessment resulted in a more thorough review at all stages of the process. For the blacktip shark assessment in the Atlantic Ocean and Gulf of Mexico, the review panel determined that the data were treated appropriately, were adequate for the models used to assess the stocks and represented the best estimates of assessment information currently available.

In the proposed rule, NMFS proposed an authorized recreational species list that was limited to those species that are easy to identify or that could not be misidentified with other species. NMFS originally proposed to prohibit the retention of blacktip sharks because of the potential for misidentification with spinner sharks, but specifically asked for public comment on the proposed list of prohibited species. As a result, based on public comments received and because blacktip sharks are healthy in the Gulf of Mexico, NMFS prefers an amended authorized shark species list in the recreational fishery. The amended list is based on readily identifiable characters such as the lack of an inter-dorsal ridge, which would enable the landing of non-ridgeback sharks plus tiger sharks. This would add blacktip, spinner, finetooth, porbeagle and bull sharks to the list of authorized species for recreational anglers in all regions.

Comment 2: NMFS violated NS4 of the Magnuson-Stevens Act because the commercial fishery will be allowed to catch their TAC and the recreational fishery cannot catch the same species of sharks

Response: NS4 requires that conservation and management measures shall not discriminate between residents of different States. Based on public comments, NMFS is modifying the list of authorized species in the recreational shark fishery to address concerns expressed by certain states that prohibiting blacktip and other sharks would unfairly discriminate against the recreational fishery. This amended list more closely

aligns with the authorized species in the commercial fishery. NMFS would continue to prohibit sandbar and silky sharks in the recreational fishery due to concerns of misidentification with dusky sharks and because sandbar sharks are overfished. However, most of the commercial sector would not be able to retain sandbar sharks unless fishermen participate in the shark research fishery. Thus, other than in the shark research fishery, NMFS is prohibiting the retention of sandbar sharks in both the commercial and recreational sectors.

Comment 3: NMFS violated NS8 of the Magnuson-Stevens Act because Port Aransas is a fishing community and was not treated as such in the analysis.

Response: NS8 requires that conservation and management measures shall, consistent with the conservation requirements of the Magnuson Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities. NMFS recognizes the importance of Port Aransas, TX, and numerous other communities as fishing communities. A social impact and community profile assessment was completed for the 2006 Consolidated HMS FMP. Section 9 of the Consolidated HMS FMP includes an analysis of the State of Texas and the fishing communities within the state. Because this analysis was recently completed, it was not repeated for the Draft EIS for Amendment 2 to the Consolidated HMS FMP, however, it was referred to in the Draft EIS for Amendment 2 to the Consolidated HMS FMP. The Final EIS for Amendment 2 to the HMS FMP includes a recently completed report by MRAG Americas, Inc. and Jepson (2008) that provides updates to the social impact and community profile assessments for HMS dependent fishing communities. This report can be found in Appendix E.

Comment 4: NMFS violated NS9 of the Magnuson-Stevens Act because all the proposed prohibited species will be released and some will die and, thus, bycatch will not be minimized.

Response: NS9 says that conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch. The reduced commercial shark quotas and retention limits proposed in Amendment 2 to the Consolidated HMS FMP would greatly reduce bycatch of target and non-target species. Because of the reduced retention limits outside the research fishery, it is likely that fishermen would not be targeting non-sandbar LCS. In addition, retention limits under the final management measures are such that fishermen targeting non-shark species should be able to retain incidentally caught non-sandbar LCS. Soak times in non-shark BLL and gillnet fisheries are also much shorter than commercial shark sets; these shorter soak times should increase post-release survival of sandbar sharks. Regulatory discards were taken into consideration when determining the quotas and retention limits of sandbar and non-sandbar sharks both inside and outside of the research fishery. In addition, commercial fishermen using BLL and PLL gear are required to have specified safe handling and release gear on board, which should help release shark bycatch in such a manner to maximize post-release survival. In the

recreational fishery, NMFS is modifying the list of authorized species. This amended list more closely aligns with the authorized species in the commercial shark fishery. NMFS intends to increase educational outreach to the recreational fishing sector to increase shark identification to avoid misidentification with prohibited species. Bycatch in the recreational fishery is also minimized because soak times are considerably less than those in commercial fisheries.

D.15 Economic Impacts

Comment 1: NMFS should consider an alternative suite that incorporates a "phase out" of the commercial shark industry. The present stock situation is untenable. Prolonged rebuilding periods are not acceptable. Managing a minimal yet unsustainable large coastal shark fishery violates NS1 of the Magnuson-Stevens Act. The costs of management far outweigh the benefits to a small number of fishermen who target sharks commercially.

Response: NMFS did consider a suite in the Draft EIS that would have ended Atlantic commercial shark fishing, alternative suite 5. Under this proposed alternative, shark landings would be limited to research and the collection for public display via the HMS Exempted Fishing Program. Recreational fisheries would be catch and release only. However, after careful consideration of the other alternatives, this alternative suite was not selected.

Longer rebuilding periods are allowed under NS1 of Magnuson-Stevens Act when the following conditions specified in the NS 1 Guidelines (50 CFR 600.310 (e)(4)(ii)(B)(3)):

> "[i]f the lower limit is 10 years or greater, then the specified time period for rebuilding may be adjusted upward to the extent warranted by the needs of fishing communities....except that no such upward adjustment can exceed the rebuilding period calculated in the absence of fishing mortality, plus one mean generation time or equivalent period based on the species' life-history characteristics."

NMFS recognizes that the costs of managing the shark fishery relative to the level of future shark fishing activity will be high. However, there are non-monetary benefits associated with maintaining a limited commercial shark industry. These benefits include the ability to continue gathering fishery data, maintenance of industry knowledge regarding shark fishing practices, and other potential cultural and social benefits. The preferred alternative attempts to balance the economic needs of fishing communities with the recommendations of recent stock assessments. BLL and gillnet gear would continue to be deployed in other fisheries that interact with sharks. Setting a retention limit that allows fishermen to keep a portion of these fish without targeting non-sandbar LCS would minimize dead discards while discouraging targeting of non-sandbar LCS. Allocating the entire sandbar shark quota to a shark research fishery quota would result in collection of data that would improve future stock assessments and management measures in place for the fishery.

Comment 2: NMFS received several comments regarding an industry buyout/buyback. These comments include: the environmentalists should fund a buyout of the commercial shark fishery; NMFS should consider a buyout to provide financial relief for the shark fishermen that will be put out of business as a result of the preferred alternative; NMFS should buy all of the directed shark permits for $50,000 to $100,000 because NMFS sold them to fishermen and created this problem; the industry is not in favor of a 5-percent tax to come up with buyout money; a buyout plan aimed at removing longline and gillnet vessels from the shark fishery and other fisheries would reduce fishing pressure, reduce bycatch and protected species interactions, and would address NMFS' concern that further reducing shark landing quotas will result in redistribution of fishing effort on other equally harmful fisheries.

Response: NMFS recognizes that some participants of the Atlantic shark fishery expressed interest in reducing fishing capacity for sharks via some form of buyout program. Buyouts can occur via one of three mechanisms, including: through an industry fee, via appropriations from the United States Congress, and/or provided from any State or other public sources or private or non-profit organizations. A buyout plan is not proposed in this amendment, despite requests for consideration from the HMS Advisory Panel and other affected constituents, because the Agency is unable to implement a buyout as a management option. Buyouts must be initiated via one of the aforementioned mechanisms.

The shark fishery did develop an industry "business plan" that examined options for a buyout, which is further described in Chapter 1 of the Draft EIS.

Comment 3: NMFS should look at data on the number of commercial permit holders by state and the socio-economic impacts of the proposed measures on these fishermen.

Response: NMFS examined the number of commercial permit holders by state. This information was presented in Table 9.1 of the Draft EIS. The socio-economic impacts of the preferred measures were analyzed in Chapters 6, 7, and 8 of the Draft EIS for Amendment 2.

Comment 4: NMFS received several comments concerning the potential for severe economic impacts associated with all of the alternatives considered (other than status quo). Comments indicated a concern that many fishermen may not be able to survive economically until the next stock assessment. One dealer for example saw a 75-percent decrease in revenue in 2007 because of restrictions. The lack of a shark season in 2008 could bring about a financial collapse of the industry. The industry is completely based on sandbar sharks.

Response: NMFS has estimated that the alternatives considered, including the no action alternative, would result in economic consequences to the shark fishery. The severity of the economic consequences varies by alternative suite, with alternative suite 5, the complete closure of the Atlantic shark fishery, having the greatest economic impact.

The economic impacts of the various alternative suites are summarized in Table 7.5 of the EIS for Amendment 2.

NMFS acknowledges that dealer impacts could also be substantial and could vary significantly depending upon how important sharks are to their operations.

NMFS recognizes the importance of sandbar shark landing to the shark fishing sector. However, sandbar shark landings only composed 30-percent of the estimated total value of the shark fishery in 2005 ($602,764 in sandbar shark meat and $1,181,803 in fins, versus a total shark fishery revenue of $6,027,516).

Comment 5: NMFS should include analysis of the negative economic impacts associated with prohibiting porbeagle sharks in shark tournaments, especially in New England. These tournaments have negligible impacts on porbeagle stocks. An example was provided regarding a tournament that has caught only 4 porbeagle sharks in the past 10 years.

Response: NMFS appreciates this additional information regarding the importance of porbeagle sharks in tournament fisheries. Additional information has been incorporated into the final EIS for Amendment 2 to further address the potential economic impacts of a prohibition of porbeagle landings. Based on public comments received, NMFS selected an alternative suite that permits the recreational retention of porbeagle sharks.

NMFS is reviewing existing data sources for recreational landings of porbeagle sharks. Efforts to expand recreational data collection may be necessary to improve information on porbeagle shark landings in recreational fisheries.

Comment 6: NMFS should specify what the $1.8 million fishery-wide economic impacts include; recreational, commercial, or both? Recreational impacts would be significant if sandbar, bull, and blacktip are not authorized to be landed in the recreational fishery. NMFS has grossly underestimated the impact to recreational fishermen in this proposal.

Response: The $1.8 million discussed for the preferred alternative is the estimated reduction in gross revenues from sandbar and non-sandbar LCS resulting from the proposed quota reductions to the commercial shark fishery. Impacts to the recreational shark fishing sector were also analyzed. For the preferred alternative, these impacts included: the negative economic impacts resulting from the reduced number of sharks that could be legally landed by recreational anglers, particularly pronounced in areas where blacktip sharks are frequently encountered. In addition, tournaments offering prize categories for sharks could also experience negative economic impacts as a result of not allowing six additional species to be retained in recreational fisheries. Due to a lack of information regarding the relative preferences of shark fishermen to retain shark species over practicing catch-and-release shark fishing, the Agency was unable to quantitatively estimate the economic impacts of the proposed recreational measures restricting the authorized list of species that could be retained.

Final measures would allow recreational anglers to harvest blacktip, finetooth, bull, spinner, and porbeagle sharks.

Comment 7: Proposed measures will result in a year-round fresh shark meat product. Inconsistent seasons are not good for prices and shark meat is currently $0.30 because the market is flooded so quickly and then seasons are over so soon.

Response: NMFS recognizes that moving to one season for the shark fishery could alleviate some of the uncertainty in the market associated with varying shark seasons. Depending on the intensity of fishing effort at the beginning of the season, there is indeed the potential that the measures would result in a year-round fresh shark meat market. This could help improve the prices received for shark meat and help offset some of the negative economic impacts associated with this rule.

Comment 8: Dealers will not likely be interested in continuing to buy shark products when the proposed measures go into place.

Response: NMFS acknowledges that some dealers may opt to no longer participate in the shark fishery. However, the information available to the Agency indicates that several shark dealers already handle small quantities of shark products, and therefore, changes in the shark fishery are unlikely to cause them to change their business practices. Reduced domestic harvest of sandbar sharks could potentially increase the value of harvest in the future due to reduced supplies. Furthermore, having the season open for a longer period of time each year, subject to reduced retention limits, may enhance the domestic shark meat market and increase prices.

Comment 9: Closing fisheries increases the quantity of fisheries products and other countries do not have the conservation measures that are present in the United States.

Response: The United States imports modest quantities of shark species. According to U.S. Census Bureau data, the United States imported 459 mt of shark in 2006 with an estimated value of $3.41 million. In contrast, the United States exported 1597 mt of shark in 2006 estimated to be worth $6.17 million. The United States may be an important transshipment port for shark fins, which may be imported wet, processed and then exported dried. The United States is in fact a net exporter of shark species. NMFS acknowledges that other countries may not have the same conservation measures as the United States.

Comment 10: NMFS should implement a retraining program for fishermen and families that are displaced by this action. Others suggested fishermen reconfigure their businesses towards providing tourism services.

Response: NMFS has worked with a number of other agencies/departments to explore programs that are available to fishermen and other businesses affected by fishery management measures. Some of these include retaining programs.

The Economic Development Administration (EDA) was created to create new jobs and retain existing jobs in economically stressed communities. Through a series of grant programs, the EDA helps distressed communities develop strategies to improve their own economic situation through a multifaceted cooperative effort. Most of the EDA activity affecting the fishing industry has been funded through the EDA's Public Works Program and the EDA's Economic Adjustment Program. The Public Works Program has funded port and harbor improvements. The Economic Adjustment Program helps communities adjust to serious changes in their economic situation, and proceeds from this program are generally used for organization, business development, revolving loan funds, infrastructure, and market research. Interested parties can learn more about these programs, including eligibility requirements and contact information, by visiting the EDA website: http://www.eda.gov/.

The U.S. Department of Labor's Economic Dislocation and Worker Adjustment Assistance Act provides funds to States and local substate grantees so they can help dislocated workers find and qualify for new jobs. It is part of a comprehensive approach to aiding workers who have lost their jobs that also includes provisions of the Worker Adjustment and Retraining Notification Act and the Trade Adjustment Assistance program. Workers who have lost their jobs and are unlikely to return to their previous industries or occupations are eligible for the program. This includes workers who lose their jobs because of plant closures or mass layoffs; long-term unemployed persons with limited job opportunities in their fields; and farmers, ranchers and other self-employed persons who become unemployed due to general economic conditions. Services include retraining services, readjustment services, and needs-related payments. Interested parties can obtain more information about services available and contact information by visiting the following website: http://www.doleta.gov/tradeact/.

Comment 11: Commenters suggested that NMFS consider giving shark fishermen swordfish handgear permits in order to help offset negative economic impacts, while also increasing swordfish landings.

Response: NMFS did not propose changes to the permit system, however, the Agency will take this suggestion under consideration for future actions. The Agency notes that the swordfish handgear permit is a limited access permit. Therefore, issuing new swordfish handgear permits may result in negative economic impacts to current holders of swordfish handgear permits. In addition, NMFS has been recently issued new regulations to revitalize the swordfish fishery and may consider additional measures in the future depending on the outcome of the current regulatory changes.

Comment 12: NMFS should consider the compound effect of this Amendment and the economic hardships of the Gulf of Mexico red snapper fishing industry.

Response: NMFS considered the cumulative impact of this Amendment with that of other regulatory changes in other fisheries, including the Gulf of Mexico red snapper fishing industry. This analysis is provided in Chapter 4 of the Draft EIS.

Comment 13: If NMFS does not maintain the status quo, NMFS should declare an emergency disaster.

Response: Section 312 (a) of the Magnuson-Stevens Act addresses fisheries disaster relief. This section states:

"At the discretion of the Secretary or at the request of the Governor of an affected State or a fishing community, the Secretary shall determine whether there is a commercial fishery failure due to a fishery resource disaster as a result of natural causes, man-made causes beyond the control of fishery managers to mitigate through conservation and management measures, including regulatory restrictions (including those imposed as a result of judicial action) imposed to protect human health or the marine environment, or undetermined causes."

All analyses for determinations (which can be at the request of a Governor or at the Secretary's own discretion) under 312 (a) must undergo a three-prong test. The Secretary must determine if there has been a commercial fishery failure. He must also determine that any such failure is the result of a fishery resource disaster. The cause of that disaster must meet the articulated causes outlined in the statute.

Comment 14: NMFS should look into the impact of this Amendment on the consumer. How much will consumer costs increase as a result of your action?

Response: NMFS did not focus its analysis of the impacts of this Amendment on the consumer since shark is primarily exported. The domestic consumption of shark fins is limited. It is unlikely that reduction in the production of shark fin will impact consumer prices in the United States. The consumption of fresh shark meat is somewhat limited and is not as widespread as that of other fish species in the U.S. market. There may be some impacts to domestic consumers of shark, especially sandbar sharks, as a result of the preferred management measures. However, it is unlikely that this Amendment will result in significant increases in consumer costs due to the availability of imports. Information available on consumer prices of shark and domestic demand of shark products is limited, making it infeasible to conduct a more quantitative analysis of the impacts on consumers.

Comment 15: NMFS received a comment questioning whether shark permits will still be worth anything after the proposed management changes take place.

Response: It is uncertain as to what shark directed and incidental permits may be worth after the management changes associated with this Amendment are implemented. It is likely that shark permits may be worth less as a result of quota reductions and reduced retention limits. However, there will still be some demand for shark permits by new entrants into the commercial swordfish and tuna fisheries that require all three HMS permits to go fishing.

Note that under 50 CFR 635.4(3), "Limited access vessel permits or any other permit issued pursuant to this part do not represent either an absolute right to the resource or any interest that is subject to the takings provision of the Fifth Amendment of the U.S.

Constitution. Rather, limited access vessel permits represent only a harvesting privilege that may be revoked, suspended, or amended subject to the requirements of the Magnuson-Stevens Act or other applicable law."

Comment 16: NMFS received comments indicating that requiring fishermen to land sharks with fins on will change the entire pricing structure. NMFS could be changing the whole valuation process here by requiring that sharks have their fins on.

Response: The requirement to land sharks with their fins attached would allow fishermen to leave the fins attached by just a small piece of skin so that the shark could be packed on ice at sea efficiently. Shark fins could then be quickly removed at the dock without having to thaw the shark. Sharks may be eviscerated, bled and the head removed from the carcass at sea. These measures should prevent any excessive amounts of waste at the dock, since dressing (except removing the fins) the shark can be performed while at sea. While this will result in some changes of how fishermen process sharks at sea, because the fins can be removed quickly once the shark has been landed. NMFS expects that the market will continue to receive sharks in their log form. While there may be some changes in the way sharks are marketed and priced, it is unlikely that the total ex-vessel value of sharks will change significantly due to the requirement to land sharks with their fins attached.

Comment 17: NMFS needs to reduce the number of limited access permits.

Response: Reducing the number of limited access permits was not proposed for this Amendment because of the ramifications that taking this action would have on other fisheries and the overall HMS permit structure. NMFS chose to limit effort via management measures in this proposed rule because these measures can be implemented with greater expediency and improve the likelihood that fishing mortality will be reduced consistent with NS1. The Agency may consider reductions in the number of permits in future actions.

D.16 Miscellaneous

Comment 1: There should not be any netting allowed in the Delaware Bay as this is a nursery ground for sharks.

Response: The waters of the Delaware Bay are in state waters; therefore any management of sharks in Delaware Bay is conducted by the states of New Jersey, Delaware, and Pennsylvania. The Consolidated HMS FMP only regulates fisheries in Federal waters.

Comment 2: In the "old" Magnuson-Stevens Act (before reauthorization), there was a section indicating that if NMFS reduces incomes by 13-percent, then fishermen are supposed to receive due compensation.

Response: The current Magnuson-Stevens Act has no such provision.

Comment 3: NMFS should allow vessel owners to keep sharks that are dead at haulback if observers are onboard the vessel.

Response: The Agency did not consider modifying this provision in the draft Amendment 2 to the Consolidated HMS FMP. Generally speaking, the observers are onboard to monitor fishing activities. It is not the responsibility of observers to predict whether or not sharks caught during fishing activities would survive if released. All sharks that are not, or can not be possessed must be released in a manner that would maximize their chances of survival. Allowing dead sharks to be harvested only when observers are onboard could potentially put them in more of an enforcement role which is not the intent of the fisheries observer program. Furthermore, this might encourage fishermen to fish in a different manner when observers are onboard. Modifying the soaktime or types of hooks and bait deployed to ensure that more sharks are dead at haulback would not provide the observer program with data that is representative of fishing behavior when observers are not present. Increasing the number of sharks that are harvested in this manner may have negative ecological impacts on shark populations.

Comment 4: NMFS should consider making video copies of the shark identification workshops, so that those who don't have the money to travel may watch the presentation?

Response: The Agency may consider alternative methods for shark dealers to renew their shark identification certificates as long as the original objective of the identification workshops are met. Alternative methods may include, but are not limited to, renewing identification certificates via the internet.

Comment 5: NMFS should manage all fish caught on BLL gear collectively, including grouper and tilefish. When I fish for sharks, I cannot keep snapper, yet we have a combined fishery. These should not be managed separately.

Response: The HMS Management Division is responsible for managing Atlantic sharks, tunas, billfish, and swordfish. Currently, grouper and tilefish are managed by Fishery Management Councils depending on the specific region. The Agency may consider more cooperative management initiatives in the future, as necessary.

Comment 6: Will shark fishing be closed until this Amendment is implemented?

Response: Fishing for large coastal sharks will be closed through the second trimester. A final rule describing the seasons and quota for the first and second trimester of 2008 was published in the Federal Register on November 29, 2007 (72 FR 67580).

Comment 7: NMFS needs to realize that fishermen are still going to go fishing for other species year-round. As a result, fishermen are going to end up killing sharks and discarding them dead. Another fishery is going to get more pressure as a result of these measures because shark fishermen aren't going to stop fishing.

Response: The Agency understands that participants in the shark fishery also participate in numerous other fisheries. Reductions in fishing mortality that is necessary

in this amendment would likely result in fishing effort shifting from the shark fishery to other fisheries in which participants maintain permits. Reduced retention limits and the fact that sandbar sharks would only be landed in the shark research fishery are expected to result in trips targeting other species. The Agency has devised retention limits and seasons such that fishermen targeting other non-shark species would be able to possess a limited number of non-sandbar LCS incidentally, minimizing the need to discard sharks dead.

Comment 8: NMFS should clarify what the gear limitations within the shark research fishery are and whether or not participants would be able to possess sandbar sharks if they have an observer onboard.

Response: Gear limitations within the shark research fishery would depend on annual research objectives. An objective of the shark research fishery is to continue to collect fishery-dependant data that reflects how the fishery operated historically. Therefore, BLL gear would likely be the predominant gear deployed. However, research objectives might also require participants to deploy alternative gear types to discern their feasibility and impacts on target and non-target catch. Only vessels participating in the research fishery would be able to possess sandbar sharks, and these vessels would have 100-percent observer coverage.

Comment 9: NMFS should not require fishermen to fill out a logbook when they only use dealer data. Instead of logbooks, NMFS should use carbon copies of trip tickets that are submitted to dealers.

Response: NMFS uses logbook data in addition to data collected from dealer reports. The draft Amendment 2 used logbook data to devise quotas for non-sandbar LCS. Logbooks provide vessel specific landings and effort data that are not reflected in shark dealer data. Sharks dealer data are used for quota monitoring and stock assessments.

Comment 10: NMFS should consider reducing soak time as a means of reducing the number sandbar shark dead discards.

Response: NMFS has examined the regulation of soak times to reduce fishing mortality and dead discards, however, the Agency found that it would be extremely difficult to monitor and enforce soak times.

Comment 11: NMFS should consider placing observers on all vessels and letting all fishermen continue to fish for sharks. That is how the Agency will get accurate data.

Response: NMFS is requiring that observers are present on all trips within the shark research fishery. A limited number of vessels selected to participate in the research fishery will continue to able to fish for sharks, including sandbar sharks, subject to available quota. NMFS is also attempting to maintain adequate observer coverage outside the research fishery.

Comment 12: These measures will cause a large increase in dead discards, which equals wasted fish and wasted money.

Response: The management measures included in this amendment would effectively create an incidental fishery for sharks. The allowance for incidental landings and seasons that are open longer than they have been historically should minimize a large increase in dead discards from occurring. Dead discards could potentially increase if there were a reduced retention limit or if the shark season were closed for extensive periods, during which, all sharks would be discarded at sea.

Comment 13: NMFS should consider physically enhancing habitat to protect these species.

Response: Habitat enhancement does not address removal of sharks. Existing fishing mortality levels for sandbar and dusky sharks indicate that these species are experiencing overfishing and that the stocks have been overfished. Habitat enhancement was not considered because, in isolation, it does not address overfishing or rebuilding overfished stocks.

Comment 14: NMFS should require shark fishermen to take the shark dealer identification course.

Response: The public is welcome to attend the shark identification courses provided by NMFS. It is currently voluntary for shark fisherman to participate in shark identification courses. The Agency wants to ensure that shark dealers are aware of how to properly identify sharks because NMFS uses information from shark dealer reports is used to monitor the quota during the fishing season. Further, shark dealer reports play a critical role in conducting stock assessments. The Agency may consider expanding the groups of participants required to complete these workshops in the future.

Comment 15: The Magnuson-Stevens Act says to rebuild overfished stocks by 2012. NMFS should not use rebuilding schedules that require hundreds of years.

Response: Longer rebuilding periods are allowed under NS1 of Magnuson-Stevens Act when the following conditions specified in the NS1 Guidelines are met, which is the case with the species that are being rebuild in this amendment. The regulatory text at 50 CFR 600.310 (e)(4)(ii)(B)(3) states:

> "[i]f the lower limit is 10 years or greater, then the specified time period for rebuilding may be adjusted upward to the extent warranted by the needs of fishing communities....except that no such upward adjustment can exceed the rebuilding period calculated in the absence of fishing mortality, plus one mean generation time or equivalent period based on the species' life-history characteristics."

Comment 16: NMFS should not require the public to attend identification workshops for sharks when shark fishing will essentially be banned.

Response: While shark fishing will be substantially reduced under this Amendment, there will still be incidentally caught sharks. Accurate shark identification will be important for gather information for future management.

Comment 17: Fishermen should be allowed to keep dead dusky sharks on haulback because discarding dead sharks is a waste.

Response: Dusky sharks are a prohibited species that must be released. NMFS has determined that dusky sharks are a prohibited species because of their life history is not conducive to commercial or recreational fisheries targeting them. Dusky sharks are late-maturing and have very few offspring. Further, these species do not have high post release survival on longline gear. NMFS continues to discourage fishermen from targeting dusky sharks because the recent stock assessment indicates that dusky sharks are overfished and experiencing overfishing despite being listed as a prohibited species since 2000.

Comment 18: NMFS needs to consider an exit strategy in case things don't work out as planned in the amendment.

Response: NMFS believes that this Amendment allows for sufficient flexibility to make adjustments as conditions may change in the fishery. Furthermore, regulations and constantly being reviewed for their utility and whether or not they are meeting their stated objectives. Additional regulations are expected as new stock assessments become available.

Comment 19: NMFS needs to improve international management with Mexico to manage sharks throughout their range.

Response: NMFS is currently working through the appropriate international foras to improve shark management in Mexico.

Comment 20: NMFS should consider adding a "use it or lose it" requirement on shark permits.

Response: Measures requiring shark fishermen to demonstrate landings history or risk losing their commercial shark fishing permit were not considered in this amendment. The adding of a "use it or lose it" condition on shark permits may actually result in increased pressure on sharks if holders of latent permits are compelled to use their permits sufficiently to avoid losing them in the future.

Comment 21: There is an inconsistency in the Draft EIS, Chapter 3 page 16. This presents state regulations, and fails to mention that long line gear is also prohibited in Georgia's state waters. Additionally, Georgia's Small Shark Composite should have the acronym SSC, not SCS, which is the federal Small Coastal Sharks management group.

Response: These inconsistencies have been addressed in the Final EIS.

Comment 22: There is new scientific evidence that oceanic whitetip sharks have declined.

Response: NMFS has not conducted a stock assessment for oceanic whitetips. NMFS will continue to work with international partners and ICCAT towards more species-specific assessments for pelagic sharks. Data may be a limiting factor, however, as there are limited landings data for oceanic whitetip sharks. To date, ICCAT has completed assessments for blue and shortfin mako sharks. There is scant data available on oceanic whitetip landings.

Comment 23: The Draft EIS does little to address bycatch of protected species aside from the suggestion that the preferred alternative may provide a mechanism to conduct the field trials necessary to appropriately assess the efficacy of circle hooks for reducing bycatch and post-hooking mortality of sea turtles in the BLL fishery. While both the pelagic and BLL fisheries are required to carry tools to remove gear from turtles before they are released, there are no performance goals for removing gear or a requirement to use circle hooks for bycatch of protected species.

Response: NMFS may consider additional management measures for reducing bycatch in the future. The Southeast Regional Office of Protected Resources Division is preparing a new Biological Opinion (BiOp) regarding the proposed actions under Amendment 2 to the Consolidated HMS FMP, which is expected to be completed by Spring of 2008 and before the release of the final rule. The last consultation on HMS shark fisheries resulted in an October 29, 2003 BiOp (NMFS, 2003) which concluded the proposed action was likely to adversely affect, but not likely to jeopardize the continued existence of, green, Kemp's ridley, leatherback, and loggerhead sea turtles and smalltooth sawfish. The opinion also concluded that marine mammals, the Gulf of Maine Atlantic salmon DPS, shortnose sturgeon, Gulf sturgeon, and right whale critical habitat were not likely to be adversely affected by the action. HMS plans to implement Amendment 2 to the Consolidated HMS FMP consistent with any recommendations in the upcoming BiOp.

Comment 24: If Atlantic and Gulf of Mexico fisheries are to continue, 100-percent observer coverage should be required.

Response: In 2007 and 2008, the Agency is implementing 100-percent observer coverage for vessels operating in the Gulf of Mexico with pelagic longline gear. Outside of this period, a statistically significant level of observer coverage will be used that is consistent with relevant Biological Opinions and other factors.

Comment 25: Deepwater sharks need protection. This group of sharks is simply too vulnerable to sustain fisheries so NMFS should prevent the development of fisheries before any fishermen invest in them. The deep water shark complex needs attention and it was a major mistake to remove deep water sharks from the management unit as was done in Amendment 1 and it should not be repeated in this Amendment through benign neglect.

Response: Deepwater sharks were previously removed from the management unit in Amendment 1 to the 1999 FMP. There are no fisheries targeting deepwater sharks and no data from fisheries that catch deepwater sharks as bycatch. The referenced changes clarify the regulations by linking the definition of "shark" more directly to the definition of the shark "management unit." The only regulation prior to this time (2003) was the ban on shark finning, however, this was addressed in the Shark Finning Prohibition Act of 2000. NMFS will continue to collect information on deepwater sharks and may add them to the management unit or implement additional management measures to protect them in the future.

Comment 26: NMFS claims that dusky bycatch will decrease, however, the species will nonetheless be subject to an increased non-sandbar LCS retention limit. This means that the actual catch of dusky sharks is not likely to significantly decrease. Catch of dusky sharks must be significantly reduced in order for the species' population to rebuild.

Response: Unlike the sandbar shark assessment, which recommended a specific TAC, or the blacktip stock assessments, which recommended specific catch levels, the dusky shark assessment did not give specific mortality targets. In addition, even if NMFS stopped all shark fishing in the Atlantic, dusky sharks would still be caught as bycatch in bottom longline and gillnet fisheries targeting other non-shark species. NMFS has taken a precautionary approach already by placing this species on the prohibited species list in 2000, however, discards continue. NMFS estimated a reduction in dusky mortality as a result of sandbar and non-sandbar LCS management actions. Based on the reduced quotas and trip limits, NMFS estimates that dusky shark mortality would be reduced from 33.1 mt dw to 9.1 mt dw per year. This is a 73-percent reduction in mortality compared to the status quo, and should afford dusky sharks more protection compared to the status quo.

Comment 27: The proposed rule does not offer protection for Small Coastal Sharks (SCS).

Response: NMFS is planning to address SCS in a future FMP amendment based on the 2007 SCS stock assessment.

Comment 28: NMFS should consider impacts of gear (longline, gillnet) on essential fish habitat and coral reefs.

Response: NMFS is currently developing a draft Amendment 1 to the Consolidated Atlantic HMS FMP to address essential fish habitat issues, including gear impacts on HMS and non-HMS habitat.

Comment 29: Is a "suite" a new concept or term for alternatives? The suite format is very effective.

Response: The term "suite" is used here to group regulatory alternatives created to address the objective of a rulemaking. The suite concept is used to help facilitate the communication of logical groupings of potential management measures that could be

used in conjunction to address the objectives of this rulemaking. The suite approach also allows for a more holistic analysis of the overall benefits and costs associated with the major regulatory alternatives considered. For example, the specific quotas implemented in this amendment would also need to correspond to modified retention limits, reporting requirements, and regions.

Comment 30: All commercial fish profiteers should be banned from catching any sharks at any time.

Response: The Agency manages commercial fisheries for authorized species in the Exclusive Economic Zone of the United States. Alternative suite 5 included measures that would have closed all shark fisheries. This alternative suite is not preferred because of the significant economic impacts it would have elicited and the fact that all sharks would have to be discarded, often dead.

Appendix D References

Carlson, J.K. and D. M. Bethea. 2007. Catch and bycatch in the shark gillnet fishery: 2005-2006. NOAA Technical Memorandum NMFS-SEFSC-552, 26 p.

Ingram, W., T. Henwood, M. Grace, L. Jones, W. Driggers, and K. Mitchell. 2005. Catch rates, distribution and size composition of large coastal sharks collected during NOAA Fisheries Bottom Longline Surveys from the U.S. Gulf of Mexico and U.S. Atlantic Ocean. LCS05-06-DW-27, 62 pp.

MRAG, Americas, Inc., and M. Jepson. 2008. Updated Profiles for HMS Dependant Fishing Communities: Social Impact Assessment Services for HMS Fishing Communities. Solicitation Number: DG133F06RQ0381, 84, pp.

NMFS. 2003. Endangered Species Act Section 7 Consultation: Biological Opinion on the continued operation of Atlantic shark fisheries (commercial shark bottom longline and drift gillnet fisheries and recreational shark fisheries) under the Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks (HMS FMP) and the proposed Rule for Draft Amendment 1 to the HMS FMP, July 2003. NMFS, Southeast Regional Office, Protected Resources Division, I.D. No. F/SER/2003/00953. 65 pp. + apps.

APPENDIX E: UPDATED PROFILES FOR HMS DEPENDENT FISHING COMMUNITIES

Updated Profiles for HMS Dependant Fishing Communities

Social Impact Assessment Services
For
HMS Fishing Communities

Solicitation Number: DG133F-06-RQ-0381

By
MRAG Americas, Inc.
&
Michael Jepson, Ph.D.

January 2008

Table of Contents

List of Figures

List of Tables

1 HMS Fishing Communities

1.1 Social Impact Assessment of Fishing Communities

With the addition of National Standard 8 to the Magnuson Stevens Fishery Conservation and Management Act (MSFCMA), there has been a concerted effort by the National Marine Fisheries Service (NMFS) to identify fishing communities throughout all regions of the US, including its territories. Initial research focused on how to identify a fishing community and how to determine its dependence upon fishing (Jacob et al. 2002; Hall-Arber et al. 2001; McCay and Cieri 2000). These early efforts explored placing boundaries around a fishing community, investigating various criteria for determining dependence and focusing on the complexity of fishing infrastructure and the degree of gentrification for individual communities. Some used rapid appraisal methods to a limited extent and all included secondary data. Jacob et al. (2002) gathered primary data through a telephone survey while the others used modified ethnographic techniques to gather qualitative data for descriptive analysis.

Following these initial attempts to define fishing communities, focus shifted to using rapid appraisal methods to provide cursory indices of dependence (Agar and Stoffle 2006; Griffith et al. 2006; Impact Assessment 2004, 2005a, 2005b, 2006b; Jepson et al. 2005; Langdon-Pollack 2004)[1]. Field visits to conduct key informant interviews and windshield surveys in coastal communities have provided basic descriptions of fishing infrastructure and in some cases provided a ranking of coastal communities in terms of their fishing dependence. Unfortunately, without definitional guidelines for identifying fishing communities and their dependence upon fishing it is difficult to say with any certainty which is a fishing community and which is not, as many coastal communities have some association with the occupation. As acknowledged by Griffith et al. (2006:1) "our research suggests that it is difficult to find many communities so heavily dependent on fishing that a decline in fishery resources would result in the entire community's collapse, yet the communities we designate highly dependent on fishing certainly would experience widespread economic dislocation with a substantial decline in fishing resources or activity." Furthermore, without specific guidelines, there have been substantial differences in the construction of indices of dependence. This variability stems from the availability of different information that is collected throughout regions and fisheries. While there is consistency in certain data, e.g., census data, the problems encountered with certain types of census data prevent an accurate portrayal of some occupational sectors within the community, especially related to fishing (both commercial and recreational) (Jacob et al. 2005; Kitner 2001).

Problems in defining community boundaries, the forward and backward linkages to the fishing industry that pertain to the community, issues of growth and development from other economic activities and the accumulated impacts of regulation over time are just a few of the important problems that have emerged from the previous work in all regions. Coastal communities are affected by numerous challenges, whether they are heavily fishery dependent or not (Jepson 2006; Walker et al. 2006). This makes it difficult to ascertain specific social impacts that might accrue from changes in fishing regulations and other factors. With communities so imbedded in a coastal economy that is often tied to recreational tourism, isolating the impacts on the fishing population is complicated, if not impractical with current forms of data available.

Under mandates to conduct social impact assessments, Regional Fishery Management Councils and the NMFS have proceeded to incorporate fishing community profiles into management plans in order to provide some indication of the impacts of fishing regulations. Recent management actions have included summaries of impacts based upon the identification of fishing communities in all regions among most fisheries (GMFMC 2005; NEFMC 2003; NMFS 2006; SAFMC 2006; PFMC 2003; WPFMC 2006). Unfortunately, the collection of information

[1] Similar efforts have been undertaken in the Northeast and Mid-Atlantic but formal reports are unavailable at this time. Profiles were provided for this analysis, yet there is no formal publication to cite.

on fishing communities is not detailed enough to ascertain specific social impacts (Hanna 2004; Kaplan 2004). The baseline information that is collected provides the basis for building a social impact assessment, but further data and analysis are required, especially when attempting to ascertain cumulative impacts within an ecosystems approach (Cheuvront et al. 2005).

Although previous guidelines for conducting social impact assessments are available and have provided direction for much of the Social Impact Assessment (SIA) work to date (IOCGP 2003; Bright et al. 2003), there remain certain issues that require elaboration for definitional and analytical consistency within Fishery Management Plans. Recent attempts to construct indices of vulnerability and resilience have borne out the difficulty in choosing consistent, valid and reliable variables to measure such concepts across research and regional boundaries (GMFMC 2004; 2005; Hall-Arber et al. 2001). Nevertheless, there remains a need to collect baseline information on fishing communities to build valid measures for social impact assessment that can apply to all regions and fisheries.

1.2 Possible HMS Fishing Communities

The following table provides a summary of communities that were acknowledged as possible candidates for updated profiles as identified through key informant interviews with members of the Highly Migratory Species (HMS) Advisory Panel (AP) and a review of the Consolidated HMS Fishery Management Plan (NMFS, 2006). This list served as the first cut, from which we have established a prioritized list of communities, provided in section 1.6 that underwent rapid appraisals, provided in section 2. Existing profiles identified by research reports for those communities are also listed in Table 1.1.

Table 1.1 List of HMS Communities Recently Profiled and Suggested for Profiling

State	Community	Profiled in HMS (1998)	Profiled in HMS Amend 1 (2000)	Profiled in Consolidated HMS FMP (2006)	Profiled in Jepson (2005)	Profiled by Griffith et al. (2006)	Profiled by Agar & Stoffle (2006)	Profiled by Impact Assessment (2004-2006)	Profiled by NMFS Northeast Region
Rhode Island	Wakefield								X
Massachusetts	New Bedford	X		X					X
	Gloucester	X		X					X
New York	Montauk								X
New Jersey	Barnegat Light	X	X	X	X				X
	Brielle	X		X					X
	Cape May								X
Maryland	Berlin								
	Ocean City								X
North Carolina	Wanchese	X	X	X	X				
	Hatteras Village	X	X	X	X				
	Morehead City								
Florida	Islamorada	X	X	X					
	Pompano Beach	X	X	X	X				
	Ft. Pierce		X		X				
	Port Salerno				X				
	Panama City	X	X	X	X			X	
	Madeira Beach	X	X	X	X			X	
	Port St. Joe							X	
	Mexico Beach							X	
	Pensacola							X	
	Apalachicola							X	
	Destin							X	
Alabama	Orange Beach							X	
Mississippi	Biloxi							X	
Louisiana	Dulac	X	X	X	X			X	
	Venice	X	X	X	X			X	
	Grand Isle							X	
	Houma							X	
Texas	Port Aransas							X	

State	Community	Profiled in HMS (1998)	Profiled in HMS Amend 1 (2000)	Profiled in Consolidated HMS FMP (2006)	Profiled in Jepson (2005)	Profiled by Griffith et al. (2006)	Profiled by Agar & Stoffle (2006)	Profiled by Impact Assessment (2004-2006)	Profiled by NMFS Northeast Region
	Freeport							X	
	South Padre Isle							X	
Puerto Rico	Aguadilla	X				X			
	Arecibo	X		X		X			
	San Juan					X			
	Guaynabo					X			
	Mayguez					X			
	Vega Baja					X			
St. Croix	Christiansted						X		
U.S. Virgin Isles							X		

Recommended for future profiling by Advisory Panel members
Recommended for future profiling by HMS FMP *and* AP members

1.3 Prioritization

Accurate and complete, as far as possible, community profiles are essential for comprehensive fisheries management. Fishery Management Councils need to have a clear idea of the activities occurring within their jurisdiction and which communities are active and dependant upon fishing in order to conduct effective assessments to gauge the social, cultural and economic consequences of fishery management actions. Therefore, fishing community profiles are increasingly being incorporated into management plans to provide some indication of the impacts of proposed fishing regulations.

In our previous reports, we provided a summary of existing literature and efforts to define fishing communities and identified obstacles to defining community boundaries, including: the forward and backward linkages to the fishing industry that pertain to the community, issues of growth and development from other economic activities, and the accumulated impacts of regulation over time (Jepson and MRAG Americas 2007; MRAG Americas and Jepson 2007). Previously collected information on communities has not been detailed enough or consistent between communities to determine specific social impacts. There needs to be progress towards collecting consistent baseline data in all communities dependent, to some degree, on fishing. In this report, we utilize a modified method that allows for ranking and selecting those communities most involved in HMS fisheries.

The previous section yielded a list of communities recently profiled, year they were profiled and suggested communities for future profiling. This list served as the first cut, from which we have established a prioritized list of communities that will undergo profiling. The next section provides a brief description of the method used to isolate a distinct list of communities for updated profiling was that subsequently prioritized according to how recently, and completely a particular community was last profiled.

1.4 Methodology

After consideration of previous methods used, we chose to employ a recent methodology by Sepez et al. (2005). In their paper, they utilized a method with a variety of data including ratios of permits by population for each community. This method was revised in later work where they employed a data envelopment analysis (DEA) to compare entities by their level of fishery participation (Sepez et al. 2007). DEA is a nonparametric, multidimensional approach used to compare entities in various ways; in their case they used multiple indicators (92 in all) of fishing activity to rank communities' level of participation in the West Coast and North Pacific commercial fisheries. The efficiency of a chosen entity (the communities) is measured through the outputs and input into the entity. Numerical values were used for the inputs and outputs, which allows for a comparison on the relative performance of communities; this avoids making subjective decisions on the relative types of involvement within the communities. For a complete description of the approach, refer to Sepez et al. 2007. This method seems to work well and should be considered in future community profiling. However, it is beyond the scope of this project and alternative methods were chosen.

For our purposes, we simplified the approach by Sepez et al. using permit data (as the outputs) provided to us by the HMS office at NOAA Fisheries; something more analogous to that used in their 2005 work. We received permits data for all areas around the US including Puerto Rico and the Virgin Islands where HMS permit holders reside. The data was reduced to 7 permit types: angling permits, charter permits, tuna dealer, general, longline, swordfish, and shark; these were the model outputs. A single input was used: US Census 2000 population data of each community. Both the input and the output data were extracted for the communities listed in the first section, with the additions of Beaufort and Atlantic Beach, North Carolina, as suggested by permit data. In an excel spreadsheet, communities were listed with number of

permits by type and community down columns. Each permit type was ranked by the percentage ratio of the number permits (by type) to the community population. Communities that did not meet the mean for number of permits (by type) to population were not further considered. This yielded a list of 24 communities (Table 1.2). These communities were then prioritized according to how recently they were/weren't profiled (Table 1.3).

1.5 Results

The highlighted numerical cells yield values greater than or equal to the mean for each category of permit divided by population with the percentage ratio provided. The highlighted communities appeared to have a high number of permits in several categories but had not been identified previously. Each community that has a ratio at the mean or higher will be included in the profiles below.

Table 1.2 List of communities requiring updated profiles as determined through the ratio of permit type to population

Community	Angling Permits	Charter Permits	Tuna Dealer	General	Longline	Swordfish	Shark	Population	Angling Ratio	Charter Ratio	Tuna Dealer Ratio	General Ratio	Longline Ratio	Swordfish Ratio	Shark Ratio
Percentage Mean for permit category									**1.70%**	**.60%**	**.02%**	**.45%**	**.14%**	**.13%**	**.12%**
Rhode Island															
Wakefield	43	14	9	15	0	0	0	8468	0.51%	0.17%	0.11%	0.18%	0.00%	0.00%	0.00%
Massachusetts															
New Bedford	8	1	18	36	3	3	3	93768	0.01%	0.00%	0.02%	0.04%	0.00%	0.00%	0.00%
Gloucester	97	32	12	144	4	3	4	30273	0.32%	0.11%	0.04%	0.48%	0.01%	0.01%	0.01%
New York															
Montauk	184	78	5	65	3	5	5	3851	4.78%	2.03%	0.13%	1.69%	0.08%	0.13%	0.13%
New Jersey															
Barnegat Light	45	14	4	11	15	17	22	764	5.89%	1.83%	0.52%	1.44%	1.96%	2.23%	2.88%
Cape May	521	88	3	30	4	8	10	4034	12.92%	2.18%	0.07%	0.74%	0.10%	0.20%	0.25%
Brielle	48	37	1	11	2	0	1	4893	0.98%	0.76%	0.02%	0.22%	0.04%	0.00%	0.02%
Maryland															
Ocean City	523	94	0		4	0		7173	7.29%	1.31%	0.00%	0.00%	0.06%	0.00%	0.00%
North Carolina															
Wanchese	18	17	5	31	11	13	14	1544	1.17%	1.10%	0.32%	2.01%	0.71%	0.84%	0.91%
Hatteras Village	62	57	1	16	1	1	5	2797	2.22%	2.04%	0.04%	0.57%	0.04%	0.04%	0.18%
Beaufort	115	21	6	31	0	2	3	3528	3.26%	0.60%	0.17%	0.88%	0.00%	0.06%	0.09%
Morehead City	269	48	3	82	0	0	1	7649	3.52%	0.63%	0.04%	1.07%	0.00%	0.00%	0.01%
Atlantic Beach	35	36	1	47	0	0	0	1811	1.93%	1.99%	0.06%	2.60%	0.00%	0.00%	0.00%
Florida															
Madeira Beach	3	1	0	0	8	10	18	4511	0.07%	0.02%	0.00%	0.00%	0.18%	0.22%	0.40%

Community	Angling Permits	Charter Permits	Tuna Dealer	General	Longline	Swordfish	Shark	Population	Angling Ratio	Charter Ratio	Tuna Dealer Ratio	General Ratio	Longline Ratio	Swordfish Ratio	Shark Ratio
Port Salerno	5	0	0	3	0	1	18	10141	0.05%	0.00%	0.00%	0.03%	0.00%	0.01%	0.18%
Destin	116	48	1	7	7	7	13	11119	1.04%	0.43%	0.01%	0.06%	0.06%	0.06%	0.12%
Apalachicola,	5	1	1	1	0	0	1	2334	0.21%	0.04%	0.04%	0.04%	0.00%	0.00%	0.04%
Islamorada	40	45	0	3	0	1	2	6846	0.58%	0.66%	0.00%	0.04%	0.00%	0.01%	0.03%
Alabama															
Orange Beach	205	49	0	8	1	1	1	3748	5.47%	1.31%	0.00%	0.21%	0.03%	0.03%	0.03%
Louisiana															
Dulac	1	1	2	0	22	11	11	2458	0.04%	0.04%	0.08%	0.00%	0.90%	0.45%	0.45%
Venice	95	26	1	10	3	2	2	2220	4.28%	1.17%	0.05%	0.45%	0.14%	0.09%	0.09%
Grand Isle	55	6	0	4	0	0	0	1541	3.57%	0.39%	0.00%	0.26%	0.00%	0.00%	0.00%
Texas															
Port Aransas	16	43	0	3	1	1	1	3370	0.47%	1.28%	0.00%	0.09%	0.03%	0.03%	0.03%
Freeport	66	48	5	18	0	0	0	12708	1.63%	0.38%	0.04%	0.14%	0.00%	0.00%	0.00%

(Permits data courtesy of NOAA Fisheries, HMS Office; Population data from the US Census Bureau: http://www.census.gov/main/www/cen2000.html)

1.6 Prioritized Community List

Communities identified for profiling (Table 1.2) have been prioritized by how recently they were last profiled and how complete those profiles were. The prioritized list below (Table 1.3) contains all of the communities to be included in profiling. The list had been previously prioritized given the time constraints of the project, due in part to delays in receiving permit and related data. In section 2 below, we provide updated profiles for the entire list. The use of phone interviews with key informants within some of those communities was sufficient to provide updated appraisals with a focus on HMS activities. The communities within Puerto Rico and the Virgin Islands are not listed; these communities have recently been profiled, and completed documents were not available at this time. Although some of these communities were included in the selection protocol, none met the criteria for inclusion (of a permit to population ration above the mean). A brief discussion of HMS activities and relevant social aspects of the Puerto Rico and the Virgin Islands are provided in the discussion below. Additionally, in our previous report we identified Berlin, MD, as a community that had not been profiled; it was subsequently determined, in consultations with NOAA Fisheries HMS staff, that Berlin, MD, was not a substantial HMS dependent community as it is only 9.5 miles west of Ocean City, MD, which has been identified as a substantial HMS fishing community.

The profiles that follow are brief synopses that reference other more complete profiles. Because most of these communities have been profiled elsewhere, it did not seem necessary nor was it feasible to include extensive discussions of socio-demographic profile, permit data or lengthy descriptions of the fishing infrastructure that already exist. A table with the 2007 HMS permit types for each community, including the number and percent of the total of each type of permit held within the community are provided in each updated profile below. Permits were assigned by homeport designation. Permits in the HMS fisheries cover a number of categories: formerly tuna only permits, there are general, longline, harpoon and purse seine for commercial fishers and charter/headboat and angling categories for recreational; Swordfish and Shark permits are broken into two categories of directed and incidental; and dealer permits for those that wish to sell tuna. Also included in the profiles are the 2007 landings by species from the HMS logbook landings data. Landings totals are given in weight; the number of fish supplied in the logbook data was converted to weight by multiplying the number for each species by the average weight for that species. Census demographic tables comparing data from the 1990 and 2000 census for each community are provided in Appendix A; in most instances available 1990 data was limited. Using updated information from key informants, we have tried to focus on the HMS fishing activity and how it relates to the community, where possible.

The discussion that follows the profiles provides suggestions for future HMS community profiling and comments on information needed to conduct future social impact assessments. As noted in this and earlier reports, it will be increasingly valuable to define a baseline method for collecting information and conducting community profiles for comparison across fisheries and regions.

Table 1.3 Prioritized list of communities for updated profiles.

Community	Profiled in HMS (1998)	McCay and Cieri (2000)	Profiled in HMS Amend 1 (2000)	Profiled in Jepson et al. (2005)	Profiled by Impact Assessment (2004-2006)	Profiled in Consolidated HMS FMP (2006)	Profiled by NMFS Northeast Region
Beaufort, NC				X			
Atlantic Beach, NC				X			
Wakefield, RI							X
Montauk, NY		X					X
Cape May, NJ		X					X
Ocean City, MD		X					X
Port Salerno, FL				X			
Morehead City, NC		X		X			
Destin, FL					X		
Apalachicola, FL					X		
Orange Beach, AL					X		
Grand Isle, LA					X		
Port Aransas, TX					X		
Freeport, TX					X		
Barnegat Light, NJ	X	X	X	X		X	X
Brielle, NJ	X	X				X	X
Wanchese, NC	X	X	X	X		X	
Hatteras Village, NC	X	X	X	X		X	
Islamorada, FL	X		X			X	
Madeira Beach, FL	X		X	X	X	X	
New Bedford, MA	X					X	X
Gloucester, MA	X					X	X
Dulac, LA	X		X	X	X	X	
Venice, LA	X		X	X	X	X	

2 HMS Community Profiles

2.1 Beaufort, North Carolina

Figure 2.1 Beaufort, North Carolina
(Microsoft Streets and Trips 2002)

The community of Beaufort was added to the list of communities to be profiled because of its proximity to Morehead City and the proliferation of permits related to HMS species. Morehead City was recommended for inclusion by HMS Advisory Panel members because of the increase in HMS activity among charter fishermen, profile provide in section 2.8. As we began to look at the community of Morehead City, it became apparent that there was also substantial HMS fishing activity in terms of permits for Beaufort in comparison. It may be that the close proximity of these fishing communities warrants a more inclusive profile that encompasses both communities. Beaufort was profiled in the South Atlantic Fishery Management Council's fishing community profiles which includes extensive census demographic and permit information (Jepson et al. 2005).

Beaufort is near the center of the North Carolina coast, on what is called the Crystal Coast, just south of the Outer Banks and next to Morehead City in Carteret County. The community was originally built on a former Native American village called Warelock, which means "fish town" or "fishing village." Tourism, service industries, retail businesses and construction are the primary economic engines for the area with many shops and restaurants catering to visitors from outside the area. The community is home to the NOAA Center for Coastal Fisheries and Habitat Research and the Duke Marine Sciences Center. Located between Beaufort and Morehead city is Radio Island, which is the hub of commercial fishing for both communities. There are several marinas in Beaufort and several businesses that provide support services for both the recreational and commercial fishing industries (Jepson et al. 2005).

Beaufort was once considered a “commercial” fishing community. Today its reliance on that sector is far less than in the past. There seems to be more of a shift to increased reliance on the recreational sector and tourism, especially charter fishing in the area.

According to the community profiles for the South Atlantic (Jepson et al. 2005) there were about seven trawlers and four small snapper/grouper boats that dock at one facility in Beaufort. During the summer, three longline vessels travel from New York docking at that facility and fishing primarily HMS species locally and further south. The aforementioned facility is a full service fish house, with processing, ice, fuel, and its own net repair. Elsewhere there may be as many as 20 trawlers that dock near Radio Island throughout the year.

Table 2.1 HMS Permits for Beaufort, North Carolina, 2006

Type of Permit	Frequency	Percent of total
HMS Angling	154	0.6%
Shark Directed	0	1.5%
Shark Incidental	3	-
Swordfish Directed	0	-
Swordfish Incidental	0	-
HMS General	31	0.7%
HMS Charter/Headboat	22	0.5%
HMS Longline	0	-
Tuna Dealer	6	1.5%

There are three fish houses in Beaufort, one of which deals primarily in bait, yet there are 6 Tuna Dealer permits located in the community. Although there were about 25 large commercial vessels (70-90’) in addition to many smaller vessels in Beaufort during the late eighties; now there may be only approximately 11 large commercial vessels that homeport in Beaufort. According to the HMS fishing community profile (Kirkley 2005) commercial landings of HMS species for Beaufort from 1996 to 2002 was over 650,000 pounds. Landings for 2007 commercial HMS species show Swordfish, yellowfin tuna and sandbar and mako shark with the most landings respectively (Table 2.2).

With several recreational fishing tournaments for HMS species held in the area, the marinas in Beaufort are where many vessels dock that participate in tournaments in Morehead City and Atlantic Beach (Appendix B provides a list of relevant tournaments). The community of Beaufort does hold a billfish tournament for boys and girls with the proceeds donated to charity. The tournament is held in July. Many of the charter fishing clientele, according to one individual, are seasonal residents or retirees who have fueled the recent growth in condo sales and second homes that affect the entire area, but more so the beach communities. An overview demographic profile for Beaufort is provided in Table 5.1.

Table 2.2 HMS Commercial Species Landed for Beaufort, North Carolina, 2006

Species	Pounds
Swordfish	176,952
Bigeye Tuna	3,928
Bluefin Tuna	1,854
Yellowfin Tuna	30,578
Albacore Tuna	640
Blue Shark	0
Hammerhead	2,517
Thresher	0
Blacktip	0
Hammerhead Scalloped	0

Species	Pounds
Hammerhead Smooth	0
Ocean Whitetip	31
Porbeagle	0
Silky	502
Spinner	48
Tiger	0
Other Coastal	0
Other Pelagic	0
Sandbar	8,139
Mako Shortfin	4,161
Skipjack	0

2.2 Atlantic Beach, North Carolina

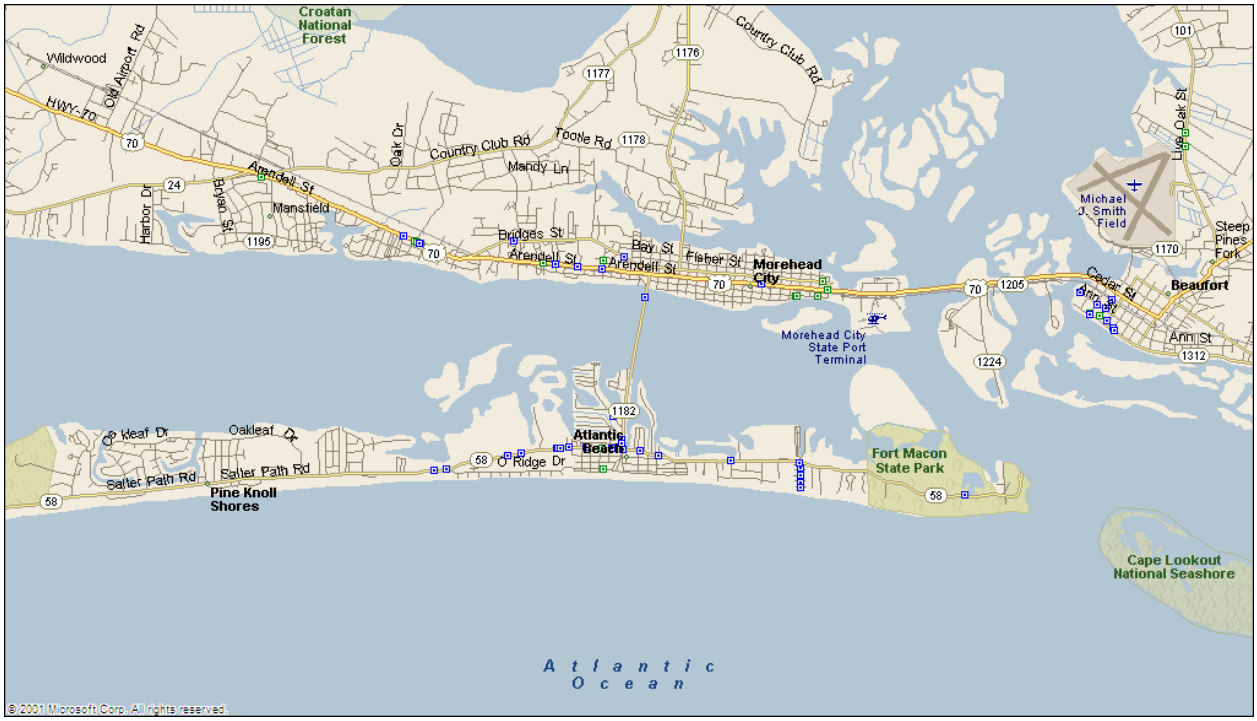

Figure 2.2 Atlantic Beach, North Carolina
(Microsoft Streets and Trips 2002)

Atlantic Beach was profiled in the South Atlantic Fishery Management Council's community profile document (Jepson et al. 2005). Census demographic information is also provided in that document along with regional and state permit data. The community had a total population of 1,781in 2000.

Atlantic Beach has been a popular resort community since the 1870s. The beach is the primary attraction and there is seasonal tourism during the summer months. There is a small marina in the community, with charter boats, but there are no commercial vessels that homeport in Atlantic Beach. There are about 12-14 charter boats total, according to one respondent. They fish for bluefin tuna November through February and for yellowfin tuna and marlin from March through November. The charter business is very seasonal and during the off season

charter fishermen take on other jobs, like carpentry or whatever is available (Jepson et al. 2005). The community hosts several king mackerel tournaments throughout the year along with a billfish tournament (Appendix B provides a list of relevant tournaments); king mackerel is not an HMS species and the tournaments are not provided in the calendar in Appendix B. Like Beaufort, Atlantic Beach has been affected the recent growth of seasonal residents and second homes. There has also been a rise in the percentage of individuals over 65, which may be indicative of the area becoming increasingly a destination for retirees. This demographic group is better off financially and can afford to pay for offshore charters, which may explain the growth in that sector of the charter industry for the area. An overview demographic profile for Atlantic Beach is provided in Table 5.2.

Table 2.3 HMS Permits for Atlantic Beach, North Carolina, 2006

Type of Permit	Frequency	Percent of total
HMS Angling	145	0.5%
Shark Directed	0	-
Shark Incidental	0	-
Swordfish Directed	0	-
Swordfish Incidental	0	-
HMS General	48	1.1%
HMS Charter/Headboat	37	0.8%
HMS Longline	0	-
Tuna Dealer	1	0.2%

2.3 Wakefield, Rhode Island

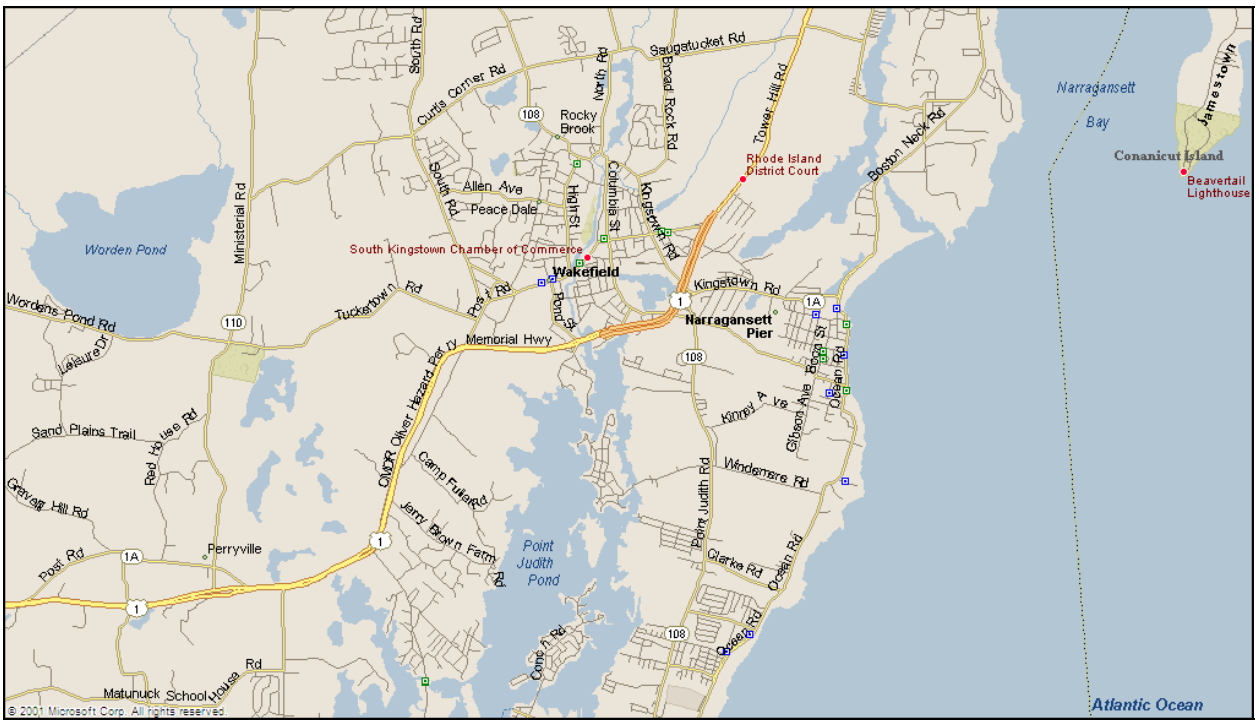

Figure 2.3 Wakefield, Rhode Island
(Microsoft Streets and Maps 2002)

Wakefield, Rhode Island is profiled in the Northeast Fisheries Science Center community profiles with extensive census demographic information along with a description of the fishing infrastructure and landings. The community had a total population of 8,468 in 2000.

Wakefield is located at the northern end of Point Judith Pond, along with several other villages in Washington County, 25 miles southeast of Providence. Wakefield is combined into a single Census Designated Place or CDP, along with the villages of Curtis Corner, Green Hill, Indian Lake Shore, Kingston, Matunuck, Middlebridge, Perryville, Rocky Brook, Snug Harbor, Tuckertown, Usquepaugh, and West Kingston, and is actually part of the town of South Kingstown. The economy of the area is diverse but Wakefield does have several fish processing and distributing businesses. Deepsea Fish (See NMFS NEFSC Northeast Profiles for more in depth description).

Wakefield has no real commercial fishing infrastructure. Members of this community who fish commercially do so from neighboring ports including Narragansett and Point Judith. The charter fishing fleet in Wakefield is based at Snug Harbor Marina. Billington Cove Marina is a full service marina as is Point Judith Marina in Wakefield. The community has several other marinas which serve recreational boaters (NMFS NEFSC Northeast Profiles). While there is little, if any, commercial fishing activity, the community does have 9 tuna dealer permits located within. The HMS logbook data shows no landings from Wakefield with all HMS species landings for Rhode Island attributed to Point Judith. Most of the HMS fishing activity occurs through the charter businesses and private boat owners. Several charter businesses advertise shark and tuna as species they target and the community hosts a shark tournament during mid-July (Appendix B). An overview demographic profile for Wakefield is provided in Table 5.3.

Table 2.4 HMS Permits for Wakefield, Rhode Island, 2006

Type of Permit	Frequency	Percent of total
HMS Angling	44	0.2%
Shark Directed	0	-
Shark Incidental	0	-
Swordfish Directed	0	-
Swordfish Incidental	0	-
HMS General	15	0.3%
HMS Charter/Headboat	14	0.3%
HMS Longline	0	-
Tuna Dealer	9	2.2%

2.4 Montauk, New York

Figure 2.4 Montauk, New York
(Microsoft Streets and Trips 2002)

Montauk has been profiled the Mid-Atlantic Council fishing community profiles (McCay and Cieri 2000) and was also included in the Northeast fishing community profiles conducted by the Northeast Fisheries Science Center which has updated detailed census information. The total population as of 2000 was 3,851 and showed an increase over the past decade. The community has a large percentage of its population declaring Hispanic descent with over 23% which is above the national average of 14%. Montauk is located at the eastern tip of the South Fork of Long Island in Suffolk County, New York. The village of Montauk is the largest fishing port in the state of New York and one of the few that has been able to maintain a commercial industry. Montauk's location is close to important fishing grounds for both commercial and recreational fishermen and its harbor provides a naturally large protected harbor (NMFS NEFSC Northeast Profiles).

Table 2.5 HMS Permits for Montauk, New York, 2006

Type of Permit	Frequency	Percent of total
HMS Angling	187	0.7%
Shark Directed	0	-
Shark Incidental	5	1.7%
Swordfish Directed	3	1.6%
Swordfish Incidental	5	1.7%
HMS General	65	1.5%
HMS Charter/Headboat	78	1.8%
HMS Longline	3	1.3%

Tuna Dealer	5	1.2%

Fishing is an important part of the economy and the culture of Montauk. The community has several events that celebrate the commercial fishing heritage with a monument dedicated to those who have lost their lives in the pursuit of fish. The community holds a blessing of the fleet in June and has several fishing tournaments, with three shark tournaments between June and the end of August (Appendix B). Blue, Mako and Thresher shark are the primary tournament targeted species. Charter fishers target shark, tuna and marlin from June through October.

Montauk has a very diverse commercial fishery, using a number of different gear types and catching a variety of species. According to the NEFSC profiles, the top three valued fisheries in 2003 were Squid, Golden Tilefish, and Silver Hake (NMFS NEFSC Northeast Profiles). According to Kirkley (2005) Montauk had over 1.6 million pounds of HMS species landed from 1996 through 2002 with a peak in landings occurring in 1999. Since that time HMS landings have declined to around 170,000 pounds in 2002 and in 2007 a little over 3,000 lbs according to the HMS logbook landings with bigeye and yellowfin tuna being the dominate species landed (Table 2.5).

There were a number of longline vessels that fish out of Montauk, including 4-5 fishing for tilefish and up to 8 fishing for tuna and swordfish. Additionally, a number of longline vessels from elsewhere in New York State and New Jersey sometimes land their catch at Montauk (NMFS NEFSC Northeast Profiles). A key issue for the commercial fishery is the lack of docking space as most of the waterfront is occupied by recreational marinas. An overview demographic profile for Montauk is provided in Table 5.4.

Table 2.6 HMS Commercial Species Landed for Montauk, New York, 2006

Species	Pounds
Swordfish	848
Bigeye Tuna	1,172
Bluefin Tuna	0
Yellowfin Tuna	1,526
Albacore Tuna	96
Blue Shark	0
Hammerhead	0
Thresher	0
Blacktip	0
Hammerhead Scalloped	0
Hammerhead Smooth	0
Ocean Whitetip	0
Porbeagle	0
Silky	0
Spinner	0
Tiger	0
Other Coastal	0
Other Pelagic	0
Sandbar	0
Mako Shortfin	157
Skipjack	0

2.5 Cape May, New Jersey

Figure 2.5 Cape May, New Jersey
(Microsoft Streets and Trips 2002)

Cape May, New Jersey is another community recently profiled by the Northeast Fisheries Science Center Social Science Group and earlier by McCay and Ceiri (2000). The NE profile includes a brief local history and census demographic information. There is also detailed information on the economic base and both the commercial and recreational fishing infrastructure.

The community is at the southern tip of Cape May Peninsula in New Jersey and had a total population of 4,034 as of 2000 which was a slight decrease from the previous census. While the economy depends upon seasonal tourism, commercial fishing is the second largest industry. The community has a number of cultural institutions which provide support to the fishing industry through both economic and civic activities (NMFS NEFSC Northeast Profiles).

Cape May is the largest commercial fishing port in New Jersey and is one of the largest on the East Coast with its fisheries focusing on squid, mackerel, fluke, sea bass, porgies, lobsters and menhaden. Highly Migratory Species landings from 1996 through 2002 were near 146,000 pounds (Kirkley 2005). In 2007, tunas dominated the landings with yellowfin, bigeye and albacore the primary species of tuna landed. Cape May is homeport to one the few vessels holding a tuna purse seine permit. There were also 28,000 pounds of swordfish landed last year. The community is home to several large processors and fish houses and has over 180 commercial vessels that call it their homeport.

In addition, there are numerous charter fishing vessels that are also homeported in Cape May with over 30 charter vessels and three party boats (headboats) (NMFS NEFSC Northeast Profiles). Fishing tournaments are held throughout the year with several targeting HMS species with tournament dates from June through August (Appendix B). Charter fishing for many HMS species such as shark, marlin, swordfish and tuna takes place primarily offshore from July

through October. Canyon fishing, which is offshore fishing for many HMS pelagics, is an important offshore destination for many charter vessels (McCay and Ceiri 2000).

Table 2.7 HMS Permits for Cape May, New Jersey, 2006

Type of Permit	Frequency	Percent of total
HMS Angling	538	2.1%
Shark Directed	2	0.9%
Shark Incidental	8	2.7%
Swordfish Directed	2	1.1%
Swordfish Incidental	8	2.7%
HMS General	30	0.7%
HMS Charter/Headboat	88	2.1%
HMS Longline	4	1.7%
Tuna Dealer	4	0.9%

Cape May seems to have a diverse fishing profile with a mix of both commercial and recreational fishing infrastructure, although there is more of an emphasis upon the recreational fishing sector with an increasing presence on the waterfront. Although the high cost of waterfront may also impede expansion of that sector as much of the land is being sited for residential development. An overview demographic profile for Cape May is provided in Table 5.5.

Table 2.8 HMS Commercial Species Landed for Cape May, New Jersey, 2006

Species	Pounds
Swordfish	28,044
Bigeye Tuna	11,302
Bluefin Tuna	1,483
Yellowfin Tuna	116,843
Albacore Tuna	6,500
Blue Shark	465
Hammerhead	587
Thresher	0
Blacktip	0
Hammerhead Scalloped	0
Hammerhead Smooth	0
Ocean Whitetip	0
Porbeagle	0
Silky	0
Spinner	0
Tiger	773
Other Coastal	0
Other Pelagic	0
Sandbar	6,644
Mako Shortfin	3,454
Skipjack	0

2.6 Ocean City, Maryland

Figure 2.6 Ocean City, Maryland
(Microsoft Streets and Trips 2002)

Ocean City, Maryland has been profiled by both the Northeast Social Science Group (NMFS NEFSC Northeast Profiles) and McCay and Ceiri (2000) for the Mid-Atlantic Council. Extensive census demographic information is included in the NE profile for 2000 with a detailed, but dated, description of the fishing activity in the Mid-Atlantic profile. According to the Census 2000 data, Ocean City town had a population of 7,173 which was up substantially form the previous census in 1990 (NMFS NEFSC Northeast Profiles). However complete demographic information from 1990 was not available.

According to McCay and Ceiri (2000), Ocean City is the only major fishing community in Maryland. While the community is a major tourist destination, it has a substantial charter fishing fleet that is located at several marinas in the community and a commercial fleet that is docked primarily in West Ocean City on the mainland. According to the NE Profiles, there are over 100 charter vessels docked at various marinas in the community. Tuna fishing is one of the more popular HMS species targeted, with marlin being a more elite fishery. It should be noted that Ocean City has been labeled the "White Marlin Capital of the World (McCay and Ceiri 2000). There are several fishing tournaments held in Ocean City with many targeting HMS species. The Mako Mania Shark Tournament is held in June and in July the Ocean City Tuna Tournament is held (Appendix B). The town hosts what is called the world's largest billfish tournament in terms of participants, the White Marlin Open, and offers cash prizes for different species with over $2.0 million given away in prizes. The dates for the tournament are often in the first weeks in August.

Table 2.9 HMS Permits for Ocean City, Maryland, 2006

Type of Permit	Frequency	Percent of total
HMS Angling	667	2.5%
Shark Directed	4	1.7%
Shark Incidental	2	0.7%
Swordfish Directed	6	3.5%
Swordfish Incidental	2	0.7%
HMS General	31	0.7%
HMS Charter/Headboat	110	2.6%
HMS Longline	4	1.7%
Tuna Dealer	2	0.4%

As mentioned most of the commercial fishing infrastructure is found in West Ocean City. With regard to commercial landings, according to the NE fishing profiles, no HMS species are ranked in the top 15 species landed in terms of value. However, Kirkley (2005) reported over 700,000 lbs of HMS species landed between 1996 and 2002. Landings for 2007 from the HMS logbook indicate yellowfin tuna with over 100,000 lbs and over 45,000 lbs of swordfish. Sandbar and mako shark account for over 35,000 lbs. An overview demographic profile for Ocean City is provided in Table 5.6.

Table 2.6.1 HMS Commercial Species Landed for Ocean City, Maryland, 2006

Species Landed	Pounds
Swordfish	47,540
Bigeye Tuna	25,499
Bluefin Tuna	3,337
Yellowfin Tuna	100,569
Albacore Tuna	4,643
Blue Shark	58
Hammerhead	0
Thresher	0
Blacktip	0
Hammerhead Scalloped	0
Hammerhead Smooth	0
Ocean Whitetip	0
Porbeagle	0
Silky	3,797
Spinner	0
Tiger	0
Other Coastal	0
Other Pelagic	0
Sandbar	21,885
Mako Shortfin	14,838
Skipjack	17

2.7 Port Salerno, Florida

Figure 2.7 Port Salerno, Florida
(Microsoft Streets and Trips 2002)

Port Salerno has not been profiled in other documents, and was suggested for inclusion by an Advisory Panel member as fishing vessels with HMS permits have moved to that community as homeport. The community had a total population of 10,104 in 2000. Demographically, the community is 88% white and has seen a decrease in the percentage of the population that lives below the poverty threshold from 1990 to 2000. The port was once a thriving commercial fishing harbor with as many as eight working fish houses but today only one remains. This community has, over time, seen a concentration of longline and other vessels that fish in the SE shark fishery homeporting here.

This migration has been in response to the disappearance of commercial waterfront along Florida's east coast as former fish houses close due to increasing competition from imports and the gentrification of the coast. Efforts by Port Salerno Commercial Fishing Dock Authority were successful in securing waterfront property to maintain a commercial docking and offloading facility, the only one remaining in Martin County. With rapidly increasing property values for waterfront businesses, insurance and property taxes have made it difficult for commercial fishing entities to remain competitive, especially when the demand for waterfront residences is growing and can command much higher values. Add to that the increasing regulation on the shark fishery which has reduced landings and dealers, fishers find themselves being squeezed out of their traditional place on the waterfront. The continued efforts of the Commercial Fishing Dock Authority have been successful with the establishment of an annual seafood festival in the community which further helps the efforts of the small non-profit to bring awareness to the plight of the commercial fishing sector in that area.

With regard to recreational fishing, the area holds several tournaments that are sponsored by the local sailfish club in Stuart. In fact, the area is referred to as the self proclaimed "Sailfish Capital of the World." Tournaments targeting sailfish are normally held

during the months of November through January and are featured at local marinas (Appendix B).

Table 2.10 HMS Permits for Port Salerno, Florida, 2006

Type of Permit	Frequency	Percent of total
HMS Angling	5	.02%
Shark Directed	13	5.6%
Shark Incidental	4	1.3%
Swordfish Directed	0	-
Swordfish Incidental	4	1.3%
HMS General	3	0.1%
HMS Charter/Headboat	0	-
HMS Longline	0	-
Tuna Dealer	0	-

With over 5% of directed shark permits, it is easy to see why Port Salerno was selected under the criteria for inclusion. Although, the community is in the middle of a large metropolitan area, it has relatively few angling permits. Overall, the contribution of HMS fishing or any other commercial or recreational fishing to the economy is likely to be minimal. However, for those who are involved in commercial sector and especially the shark fishery, access to infrastructure has become a critical issue for their survival. An overview demographic profile for Port Salerno is provided in Table 5.7.

2.8 Morehead City, North Carolina

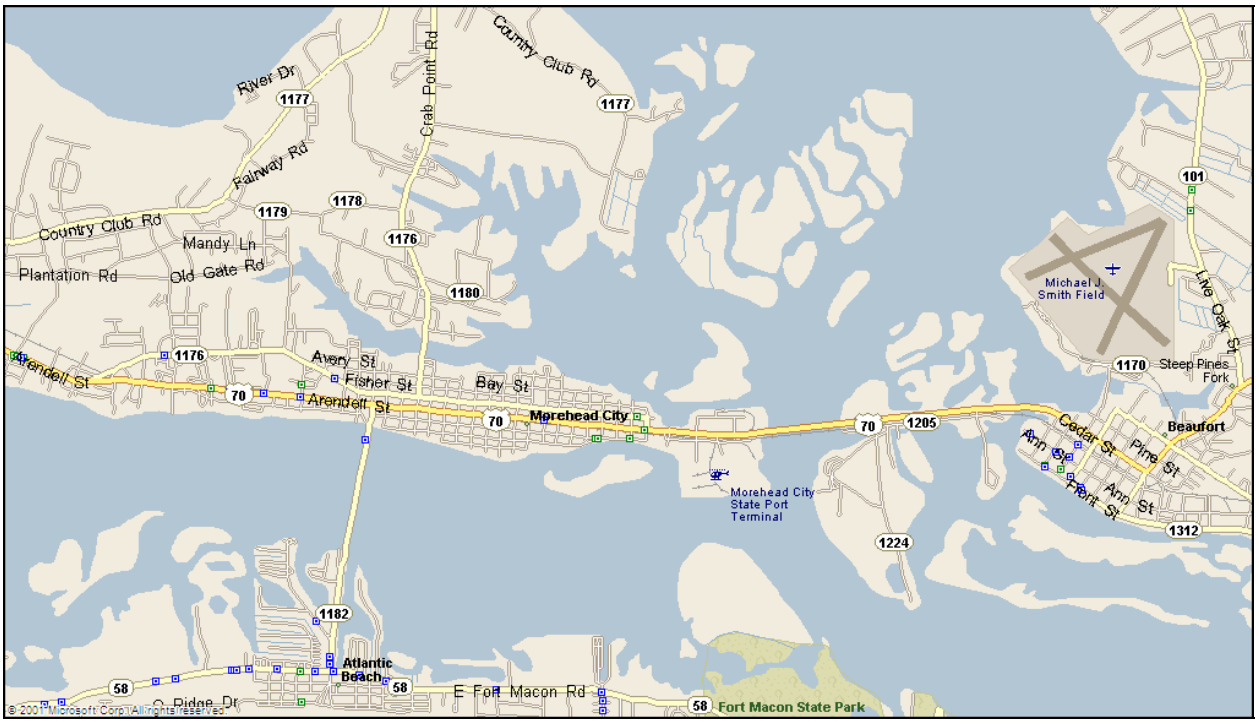

Figure 2.8 Morehead City, North Carolina
(Microsoft Streets and Trips 2002)

Morehead City, North Carolina, has been profiled in both the Mid-Atlantic and South Atlantic fishing community documents (McCay and Cieri 2000; Jepson et al. 2005). The South Atlantic profile has more recent census and permit data, while a more detailed description of the fishing infrastructure and culture is documented in the Mid-Atlantic document. The community had a total population of 7,649 in 2000.

While there are commercial docks located near the downtown waterfront, there are far more recreational marinas in and around the area. The town is becoming increasingly dependent upon tourism with growing focus on recreational fishing with growth in the charter industry over the past decade. There are approximately 20 charter fishing vessels and a few headboats that homeport in Morehead City. It has been said that the best fishing area on the NC coast is 50-100 miles offshore of the surrounding area. As with the charter fishing in Beaufort and Atlantic Beach, the same HMS species are seasonally targeted.

Most of the commercial vessels target snapper grouper or coastal pelagic species. Many of the vessels homeported in Morehead City were using bandit reels according to McCay and Cieri (2000).

There are many different recreational fishing tournaments held throughout the year with a focus on Mackerel and Marlin. One of the largest tournaments is the Big Rock Marlin tournament which is billed as the biggest paying tournament on the East Coast and is held in early June. Another billfish tournament is held in late July or early August (Appendix B). An overview demographic profile for Morehead City is provided in Table 5.8.

Table 2.11 HMS Permits for Morehead City, North Carolina, 2006

Type of Permit	Frequency	Percent of total
HMS Angling	294	1.1%
Shark Directed	0	-
Shark Incidental	1	0.3%
Swordfish Directed	0	-
Swordfish Incidental	1	0.3%
HMS General	83	1.8%
HMS Charter/Headboat	49	1.1%
HMS Longline	0	-
Tuna Dealer	3	0.7%

Table 2.12 HMS Commercial Species Landed for Morehead City, North Carolina, 2006

Species	Pounds
Swordfish	4,026
Bigeye Tuna	345
Bluefin Tuna	0
Yellowfin Tuna	127
Albacore Tuna	224
Blue Shark	0
Hammerhead	0
Thresher	0
Blacktip	0
Hammerhead Scalloped	0
Hammerhead Smooth	0
Ocean Whitetip	0

Species	Pounds
Porbeagle	0
Silky	0
Spinner	0
Tiger	0
Other Coastal	0
Other Pelagic	0
Sandbar	0
Mako Shortfin	79
Skipjack	0

2.9 Destin, Florida

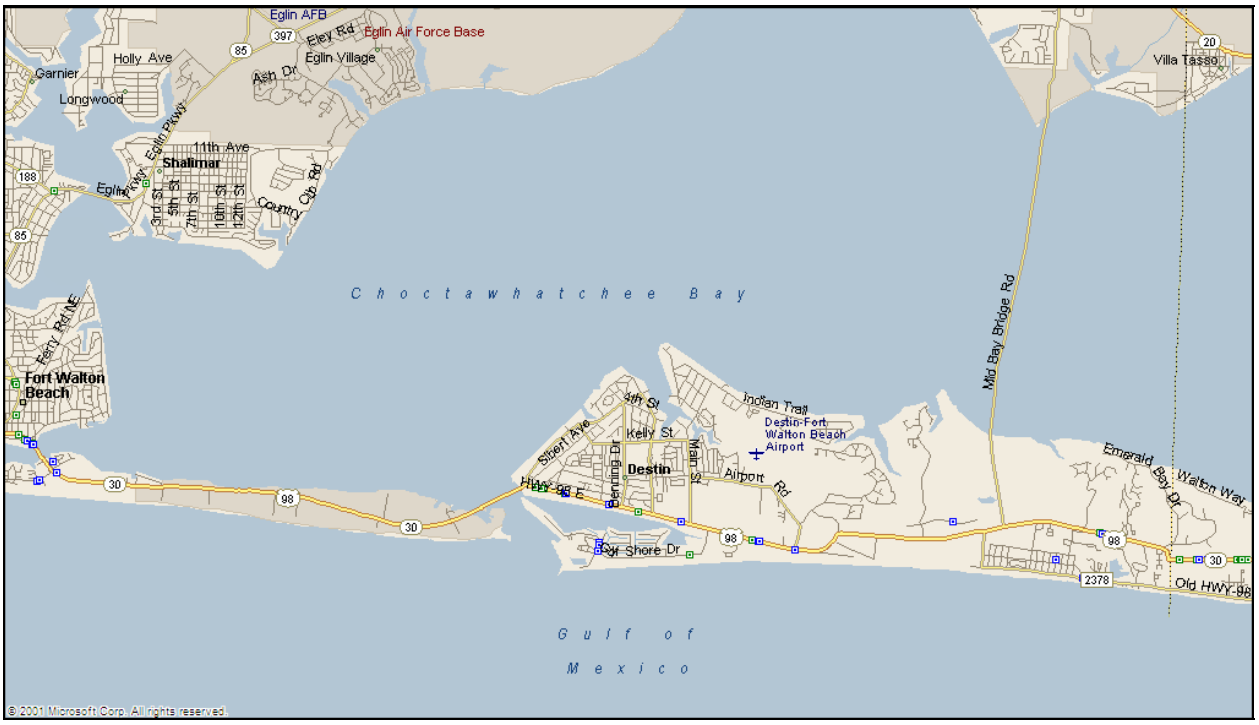

Figure 2.9 Destin, Florida
(Microsoft Streets and Trips 2002)

Destin, Florida, was chosen for profiling through a recommendation from an Advisory Panel member who represents the charter industry and through the protocol of permit ratio to population with the number of shark permits per population being above the mean. Destin has been profiled in several documents including the Gulf EFH EIS (2004) and the Gulf Shark Buyout (Jepson 2005).

Destin sits on the western end of Moreno Point at the bottom of Choctawhatchee Bay in Okaloosa County. Destin was reportedly homeport to 161 vessels, with136 of those holding charter permits according to the Gulf EFH EIS (2004).

Destin is a major tourist destination with its white sand beaches and azure waters being the main attraction, yet, as with many coastal communities with a strong tourism economy, recreational fishing is an important part of the mix. Known as the self proclaimed Billfish Capital of the Gulf, offshore fishing for blue and white marlin takes place from August through October.

Tournaments are scheduled throughout the year, but primarily in early Spring, Summer and early Fall (Appendix B).

Although not as significant as the recreational fishery in terms of overall economic impact, Destin did have over 500,000 pounds of HMS species landed between 1996 and 2002 (Kirkley 2005). Landings of sandbar shark dominated the HMS species landed in 2007 with yellowfin and bigeye tuna next according to the HMS logbook landings. An overview demographic profile for Destin is provided in Table 5.9.

Table 2.13 HMS Permits for Destin, Florida, 2006

Type of Permit	Frequency	Percent of total
HMS Angling	116	0.4%
Shark Directed	7	3.0%
Shark Incidental	6	2.0%
Swordfish Directed	5	2.7%
Swordfish Incidental	6	2.0%
HMS General	7	0.2%
HMS Charter/Headboat	48	1.1%
HMS Longline	7	3.0%
Tuna Dealer	1	0.2%

Table 2.14 HMS Commercial Species Landed for Destin, Florida, 2006

Species	Pounds
Swordfish	2,755
Bigeye Tuna	551
Bluefin Tuna	0
Yellowfin Tuna	4,132
Albacore Tuna	0
Blue Shark	0
Hammerhead	1,762
Thresher	0
Blacktip	0
Hammerhead Scalloped	0
Hammerhead Smooth	0
Ocean Whitetip	0
Porbeagle	0
Silky	0
Spinner	1,104
Tiger	1,208
Other Coastal	0
Other Pelagic	0
Sandbar	12,043
Mako Shortfin	79
Skipjack	0

2.10 Apalachicola, Florida

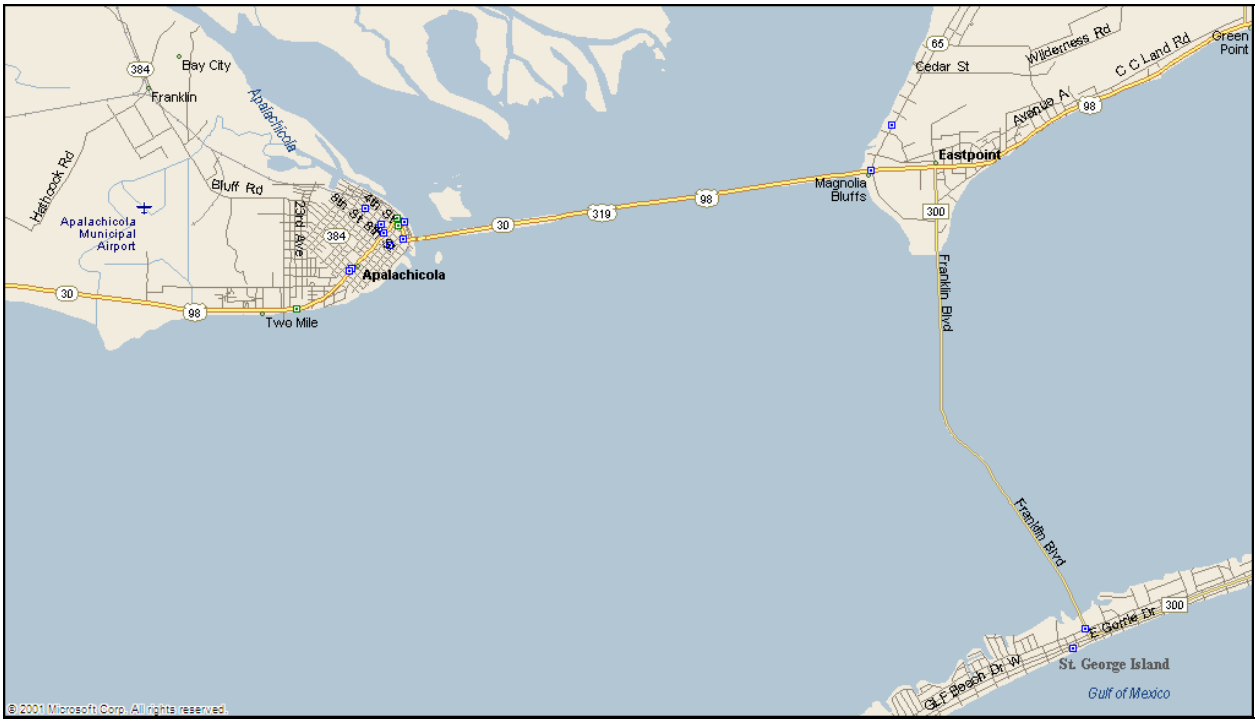

Figure 2.10 Apalachicola, Florida
(Microsoft Streets and Trips 2002)

Apalachicola, Florida, was profiled in the MARFIN study by Jacob et al. (2002) which included detailed census demographic and permit data for the community. The total population for the community in 2000 was 2,334. While the majority of the population is white at 63% of the total, there is a significant part of the population that is African American with 35% of the total population. The community also has a large percent of individuals living below the poverty level with 25%.

Apalachicola is located at the mouth of Apalachicola River and East Bay, both of which feed into Apalachicola Bay. Apalachicola has historically been a working fishing village. The community was a major seaport from 1827 to 1861and became Florida's largest cotton port before the Civil War. One of the communities more famous former residents was Dr. John Gorrie who devised the first ice-making and refrigeration systems which were quickly adapted to the needs of commercial seafood processing and shipment (Jacob et al. 2002).

Apalachicola is well known for its oysters and produces the bulk of Florida's oyster crop but tourism is beginning to change the face of the community. The amount of HMS activity in Apalachicola is minimal. The criteria by which Apalachicola made the cut with regard to profiling were the number of tuna dealers by population. It is obvious that its small population was the primary driver in placing at the mean or above. Overall, there is relatively little HMS fishing activity, however, there were more than 69,000 pounds of HMS species landed in Apalachicola from 1996 through 2002 (Kirkley 2005).

While there are few HMS permits in Apalachicola today, there is considerable change occurring in the community as a result of significant development taking place within Franklin County. With the closing of the Port St. Joe paper company and the planned development of former timber lands by the newly formed Port St. Joe development company, the most obvious change within Apalachicola are the new boutiques and restaurants that have recently opened

downtown. With the development of the panhandle coast and a likely emphasis upon recreational tourism, there may be a parallel rise in both the recreational and charter fishery for HMS species in the future. An overview demographic profile for Apalachicola is provided in Table 5.10.

Table 2.15 HMS Permits for Apalachicola, FL, 2006

Type of Permit	Frequency	Percent of total
HMS Angling	5	0.02%
Shark Directed	0	-
Shark Incidental	1	0.3%
Swordfish Directed	0	-
Swordfish Incidental	1	0.3%
HMS General	1	-
HMS Charter/Headboat	1	0.02%
HMS Longline	0	-
Tuna Dealer	1	0.2%

2.11 Orange Beach, Alabama

Figure 2.11 Orange Beach, Alabama
(Microsoft Streets and Trips 2002)

Orange Beach, Alabama, has been included in the recent Gulf of Mexico Fishing Community profiles (Impact Assessment 2006b) which include detailed census and permit data along with information on fishing infrastructure. Orange Beach is located along Wolf Bay in southern Baldwin County. The 2000 census totaled 3,784 persons in Orange Beach which was

an increase from 1990. The community has a relatively low unemployment at around 3% but shows about 10% of the population living under the poverty rate.

The community is primarily a tourist beach destination with high rise condominiums and hotels along the beachfront. According to the Gulf profile (Impact Assessment 2006b), there is a substantial charter fishing fleet is based in Orange Beach. The charter fleet is distributed across ten local marinas with over 50 vessels docked in either Orange Beach or Gulf Shores. Most are offshore vessels ranging in size from 30 to 65 feet. Offshore fishing trips target blue and white marlin, sailfish and yellowfin tuna. The community is the site of ten or more recreational fishing tournaments throughout the year starting in May through August (Appendix B).

The community was especially hit hard by the 2004 Gulf hurricane season and Hurricane Ivan. Several marinas were damaged with the majority of the charter fishing fleet left intact. The industry has recovered with marinas rebuilt the charter business improving. An overview demographic profile for Orange Beach is provided in Table 5.11.

Table 2.16 HMS Permits for Orange Beach, Alabama, 2006

Type of Permit	Frequency	Percent of total
HMS Angling	205	0.8%
Shark Directed	0	-
Shark Incidental	1	0.3%
Swordfish Directed	0	-
Swordfish Incidental	1	0.3%
HMS General	8	0.2%
HMS Charter/Headboat	49	1.2%
HMS Longline	1	0.4%
Tuna Dealer	0	-

2.12 Grand Isle, Louisiana

Figure 2.12 Grand Isle, Louisiana
(Microsoft Streets and Trips 2002)

Grand Isle, Louisiana, was also included in the Gulf of Mexico fishing community profiles conducted by Impact Assessment (2004). The community is in southernmost Jefferson Parish on Louisiana's only inhabited barrier island. The local economy is based, in part, on seasonal tourism with commercial shrimp and crab fisheries, and services related to offshore oil and gas production are also locally important. Grand Isle had a year 2000 population of 1,541 persons a slight increase from 1990 (Impact Assessment 2004).

Recreational and commercial fishing boats were docked throughout the community along with oil industry vessels and share the commercial oil industry waterfront prior to Hurricane Katrina. There were several recreational marinas prior to the hurricane, but in 2006 only one marina remained in the community. While there were several fishing tournaments prior to the hurricane, none were held within the community after according to Impact Assessment (2006a). Prior to the hurricane there were over 230 commercial fishing vessels and as many as 25 charter boats; afterward there were only 40 commercial and 9 charter vessels. With very little HMS activity, the relativity small population to angling permit ratio is why the community was above the mean for permits in that category. An overview demographic profile for Grand Isle is provided in Table 5.12.

Table 2.17 HMS Permits for Grand Isle, Louisiana, 2006

Type of Permit	Frequency	Percent of total
HMS Angling	55	0.2%
Shark Directed	0	-
Shark Incidental	0	-
Swordfish Directed	0	-
Swordfish Incidental	0	-
HMS General	4	0.1%
HMS Charter/Headboat	6	0.1%
HMS Longline	0	-
Tuna Dealer	0	-

2.13 Port Aransas, Texas

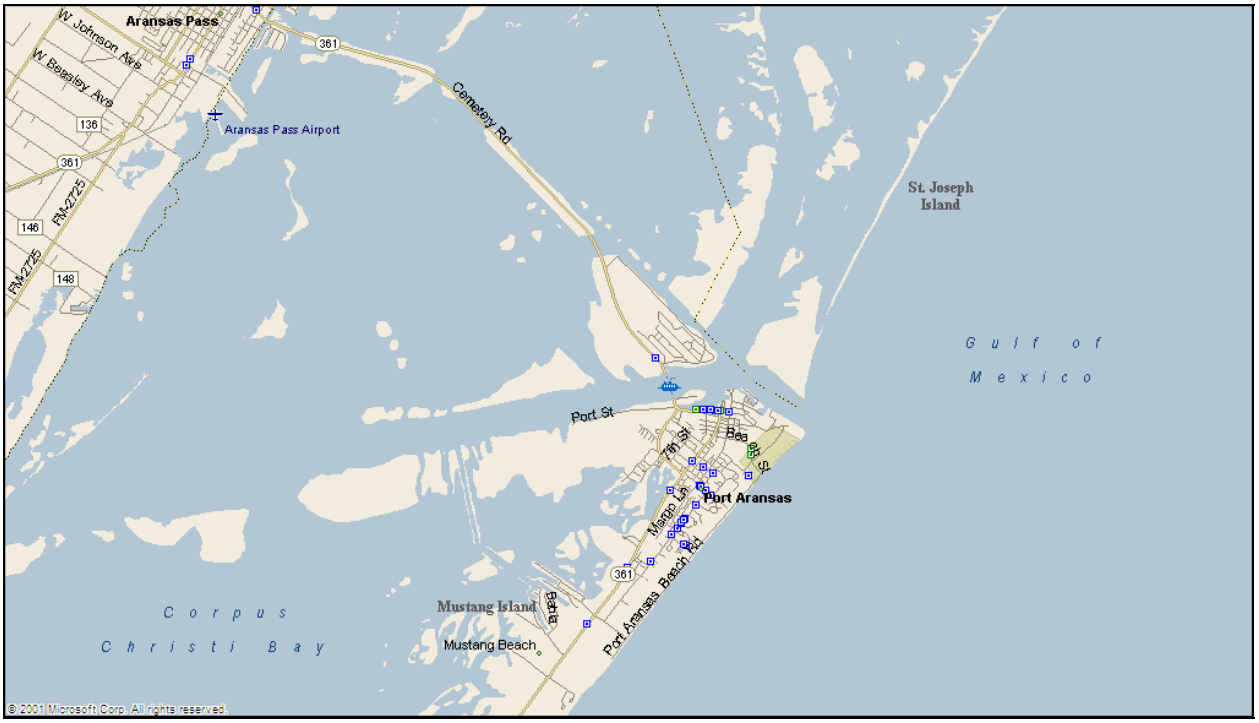

Figure 2.13 Port Aransas, Texas
(Microsoft Streets and Trips 2002)

Port Aransas, Texas, is a small seaside town located on the northern tip of Mustang Island in northeastern Nueces County. The most recent profile was conducted by Impact Assessment as part of the community profiles for the Gulf of Mexico fishing community research (Impact Assessment 2005). That document includes detailed census and permit data along with a description of the fishing infrastructure. The most recent census enumerated 3,370 persons in year 2000 which was a small increase from 1990.

Table 2.18 HMS Permits for Port Aransas, Texas, 2006

Type of Permit	Frequency	Percent of total
HMS Angling	93	0.3%
Shark Directed	0	-
Shark Incidental	0	-
Swordfish Directed	0	-
Swordfish Incidental	0	-
HMS General	3	0.1%
HMS Charter/Headboat	43	1.0%
HMS Longline	0	-
Tuna Dealer	0	-

According to the Gulf community profile, Port Aransas has become a popular destination for recreational anglers targeting primarily inshore species but there are also many charter boats are available for deep sea fishing. As many as 20 charter vessels are advertised in the area and fish for a variety of HMS species including shark, tuna, marlin and sailfish. At least

four HMS tournaments are held in Port Aransas being held throughout the month of August (Appendix B). Species targeted are white and blue marlin, tuna, sailfish and swordfish.

There were no landings attributed to Port Aransas according to Kirkley (2005) nor were any landings logged in the HMS logbook landings file for 2007. An overview demographic profile for Port Aransas is provided in Table 5.13.

2.14 Freeport, Texas

Figure 2.14 Freeport, Texas
(Microsoft Streets and Trips 2002)

Freeport, Texas is a small seaside city located along the Brazos River and Gulf Intracoastal Waterway in southern Brazoria County and was profiled in the most recent Gulf of Mexico fishing community profiles (Impact Assessment 2005) which include detailed census and permit data from the southeast region. The community was also suggested for inclusion by a HMS advisory panel member who noted that there had been a substantial change in the community with regard to the growth of the charter fishing sector. This is evident through the percentage of HMS angling and charter permits within the community which allowed it to meet the criteria for inclusion into the profiles.

The community had a total population of 2,708 persons in 2000 and an economy which is highly diverse according to the Gulf profile. Numerous businesses and services in the Freeport area support both commercial and recreational fishing. A large seafood processor is located in the community and there are commercial docking facilities, vessel repair facilities, and recreation-oriented marinas.

While some fishing activities occur inshore, the Gulf of Mexico is readily accessible with most of the fishing and shrimping occurring in the nearshore and offshore waters of the Gulf. A large and productive shrimp trawl fleet is based in Freeport. As many as 70 Gulf shrimp permit holders may have been based here in 2000 (Impact Assessment 2005). There is smaller local

pelagic fleet, but an extensive charter fleet operates from the area. As many as 22 charter operators are located in the area fishing for sailfish and marlin during the summer months and tuna in the winter. Freeport has a few bass and king mackerel fishing tournaments held in late summer. An overview demographic profile for Freeport is provided in Table 5.14.

Table 2.19 HMS Permits for Freeport, Texas, 2006

Type of Permit	Frequency	Percent of total
HMS Angling	66	1.5%
Shark Directed	0	-
Shark Incidental	0	-
Swordfish Directed	0	-
Swordfish Incidental	0	-
HMS General	18	0.4%
HMS Charter/Headboat	48	1.1%
HMS Longline	0	-
Tuna Dealer	5	1.2%

2.15 Barnegat Light, New Jersey

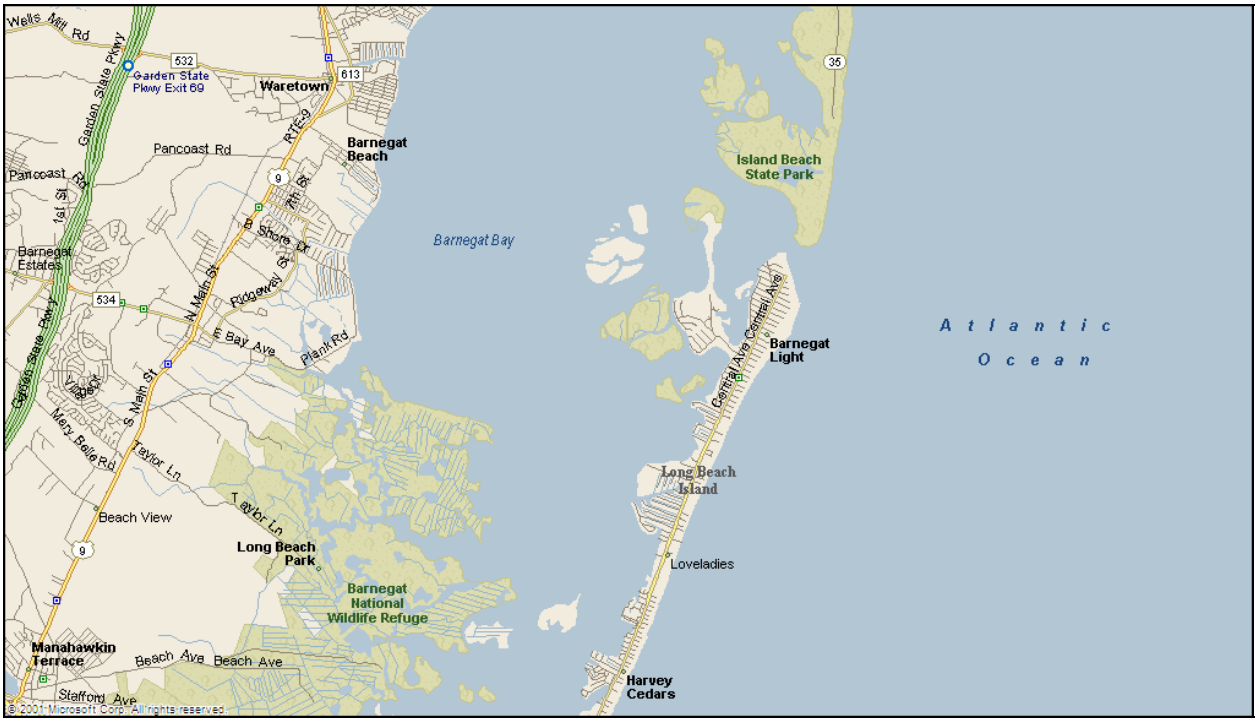

Figure 2.15 Barnegat Light, New Jersey
(Microsoft Streets and Trips 2002)

The community of Barnegat Light, New Jersey has been profiled in several documents in the past few years including the most recent amendment to the Fishery Management Plan for Atlantic Tunas, Swordfish and Sharks (NMFS 2006). Other profiles include Wilson and McCay

(1998) and McCay and Cieri (2000) and the most recent NEFSC profiles. Most include updated census demographic information and landings data.

Barnegat Light is an important fishing port in New Jersey as it harbors one of the Northeast's more important long line fleets, in addition to scallop vessels and inshore gill-netters. Recreational and charter boats are also important component of this port (McCay and Cieri, 2000). Today there is an economic mix of both tourism and fishing with an estimate of fishing employment being over 50 percent for those within the civilian labor force (NMFS 2006).

Table 2.20 HMS Permits for Barnegat Light, New Jersey, 2006

Type of Permit	Frequency	Percent of total
HMS Angling	11	0.2%
Shark Directed	17	7.4%
Shark Incidental	5	1.7%
Swordfish Directed	14	7.7%
Swordfish Incidental	5	1.7%
HMS General	11	0.2%
HMS Charter/Headboat	9	0.2%
HMS Longline	15	6.3%
Tuna Dealer	4	0.9%

Table 2.21 HMS Commercial Species Landed for Barnegat Light, New Jersey, 2006

Species	Pounds
Swordfish	146,859
Bigeye Tuna	68,297
Bluefin Tuna	9,640
Yellowfin Tuna	203,427
Albacore Tuna	31,666
Blue Shark	0
Hammerhead	0
Thresher	0
Blacktip	0
Hammerhead Scalloped	0
Hammerhead Smooth	0
Ocean Whitetip	0
Porbeagle	0
Silky	153
Spinner	0
Tiger	0
Other Coastal	0
Other Pelagic	0
Sandbar	166
Mako Shortfin	13,660
Skipjack	0

There are five marinas in Barnegat Light with the two largest having at least 36 full-time resident commercial boats, roughly 40 recreational and charter boats, and some transient vessels. Commercial fishing boats work out of these docks year round. The three remaining docks can each have room for approximately 30-35 boats, the majority of which are recreational boats and charter/ party boats, with a few headboats. Most of the recreational fishing boats are

here for a portion of the year, from May or June through early October. The long line fishery and scallop are economically the most important fisheries according to McCay and Cieri (2000).

Kirkley (2005) reported almost 3 million pounds of HMS species landed in Barnegat Light from 1996 through 2002. According to HMS logbook landings yellowfin tuna were the top HMS species landed with over 200 thousand pounds. Swordfish was next with over 140,000 lbs in 2007. An overview demographic profile for Barnegat Light is provided in Table 5.15.

2.16 Brielle, New Jersey

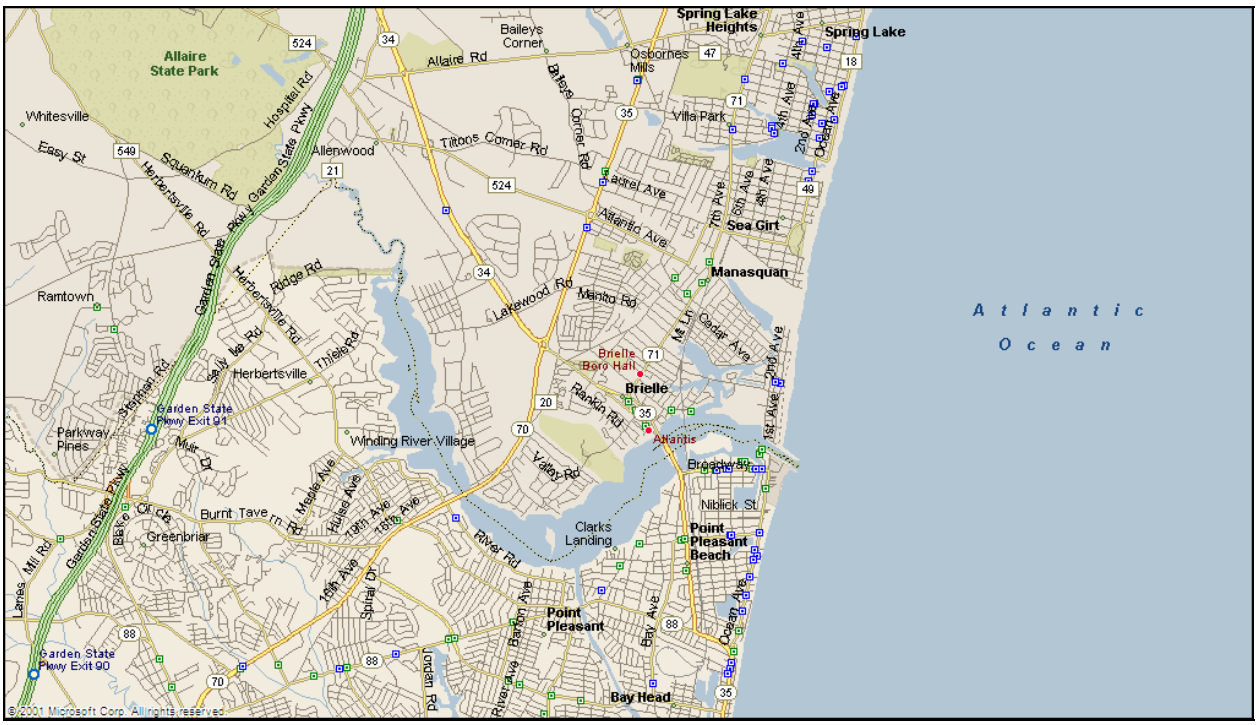

Figure 2.16 Brielle, New Jersey
(Microsoft Streets and Trips 2002)

The borough of Brielle, New Jersey is located on the New Jersey bay shore at the southeastern tip of Monmouth County and was most recently profiled in the NEFSC community profiles. The community does not border on the ocean but rather sits along the Manasquan River, just inside Manasquan Inlet and had a total 2000 population of 4,893, up slightly from the previous census.

The community has also appeared in the Mid-Atlantic fishing community profiles (McCay and Cieri 2000) and the recent Amendment to the HMS FMP (NMFS 2006). Bluefin tuna fishing was reportedly an important recreational fishery according to McCay and Cieri, but increasing regulation has restricted effort with many charter fishers switching to bluefish (NEFSC Profiles). There were approximately three marinas in the community with about 17 charter vessels spread among the marinas.

Brielle had no landings of HMS species according to Kirkley (2005) and no landings were reported in the HMS logbook landings file for 2007. An overview demographic profile for Brielle is provided in Table 5.16.

Table 2.22 HMS Permits for Brielle, New Jersey, 2006

Type of Permit	Frequency	Percent of total
HMS Angling	11	0.2%
Shark Directed	0	-
Shark Incidental	1	0.3%
Swordfish Directed	0	-
Swordfish Incidental	1	0.3%
HMS General	11	0.2%
HMS Charter/Headboat	37	0.8%
HMS Longline	0	-
Tuna Dealer	1	0.1%

2.17 Wanchese, North Carolina

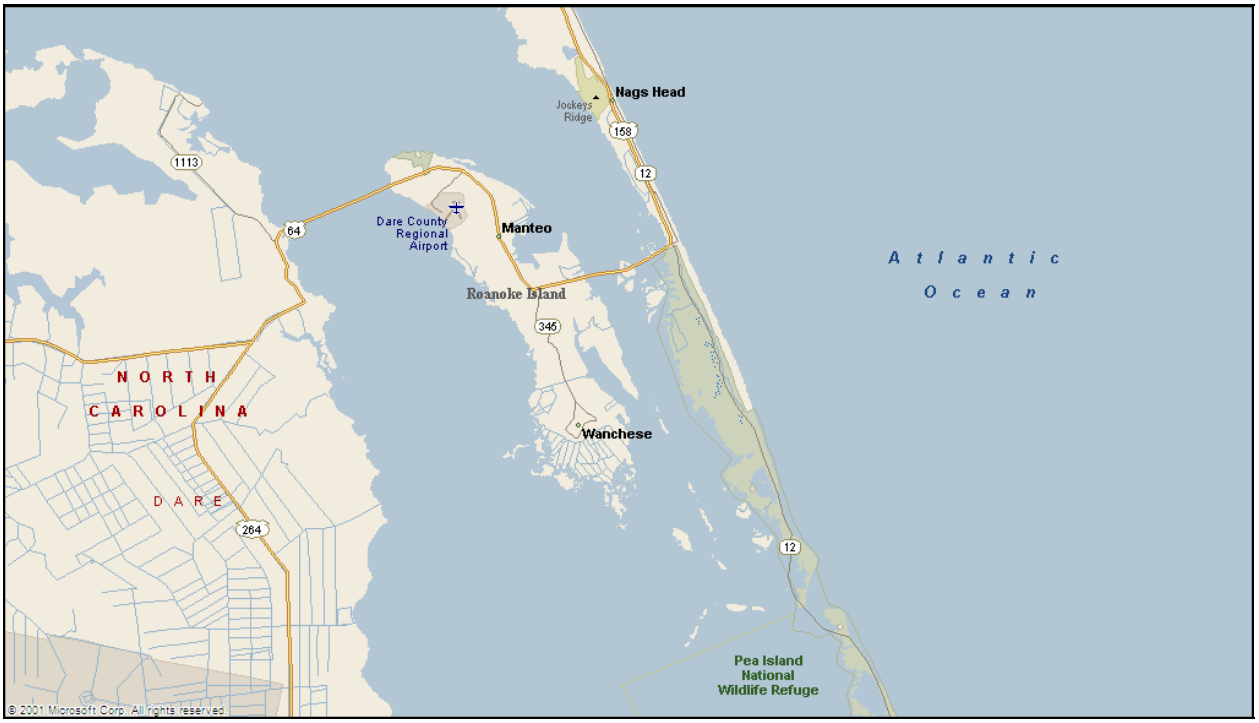

Figure 2.17 Wanchese, North Carolina
(Microsoft Streets and Trips 2002)

Wanchese has been extensively profiled and is included in most HMS fishing community profiles beginning with Wilson and McCay's profile of HMS communities (1998). Other profiles which included Wanchese are the Mid-Atlantic fishing community profiles (McCay and Cieri 2000), the South Atlantic fishing community profiles (Jepson et al. 2005); the HMS Amendment (NMFS 2006). All include extensive census demographic and permit information and discussions of the fishing infrastructure. Wanchese had a total population of just over 1500 people in 2000 and the community had a relatively low unemployment level of 2.8 percent. There was approximately only 8.0 percent of the population living below the poverty level according to census demographics in Appendix A.

Wanchese is located on the southern part of Roanoke Island, on the northern part of North Carolina's coast. According to Wilson and McCay (1998), commercial fishing is vital to the economy of Wanchese. Wanchese fishermen fish a large number of commercially important species according to the time of the year. According to Wilson and McCay (1998), fishermen have to be versatile to survive, facing rapid changes in water temperatures and other conditions affecting fish availability. Tunas and swordfish are accessible to medium sized boats that utilize both gillnets and long line in the early to mid-summer; the larger longliners fish for swordfish, tuna and dolphin. Kirkley (2005) shows total landings of HMS species from 1996 through 2002 as over 3.3 million pounds. The 2007 logbook landings data show yellowfin tuna as the species landed most with bigeye tuna and swordfish the next highest in landings respectively. An overview demographic profile for Wanchese is provided in Table 5.17.

Table 2.23 HMS Permits for Wanchese, North Carolina, 2006

Type of Permit	Frequency	Percent of total
HMS Angling	32	0.7%
Shark Directed	12	5.2%
Shark Incidental	2	0.7%
Swordfish Directed	8	4.4%
Swordfish Incidental	2	0.7%
HMS General	32	0.7%
HMS Charter/Headboat	17	0.4%
HMS Longline	11	4.7%
Tuna Dealer	5	1.2%

Table 2.24 HMS Commercial Species Landed for Wanchese, North Carolina, 2006

Species	Pounds
Swordfish	231,768
Bigeye Tuna	266,710
Bluefin Tuna	14,460
Yellowfin Tuna	1,004,736
Albacore Tuna	4,899
Blue Shark	2,035
Hammerhead	17,202
Thresher	3,335
Blacktip	0
Hammerhead Scalloped	0
Hammerhead Smooth	0
Ocean Whitetip	0
Porbeagle	0
Silky	175
Spinner	5,856
Tiger	725
Other Coastal	0
Other Pelagic	0
Sandbar	74,209
Mako Shortfin	44,513
Skipjack	370

2.18 Hatteras Village, North Carolina

Figure 2.18 Hatteras Village, North Carolina
(Microsoft Streets and Trips 2002)

Hatteras is included in most profiles of HMS fishing communities and the most recent HMS Consolidated Amendment (2006). Located on the southern end of Hatteras Island on North Carolina's Outer Banks makes Hatteras somewhat isolated. Hatteras has historically been a seaport community with whaling an important part of the economy in its early history. Since the 1940s, the economy of the community has depended on charter and commercial fishing. More recently, tourism has become an ever increasing important economic activity (McCay and Cieri 2000).

There is some seasonal variation to the local economy. During the spring tourist season from April to May, about 30 commercial vessels become active in charter fishing. A winter fishery for bluefin tuna has been a recent development and provides income for many locals who previously had little choice for work during the slack time. There are a couple of fishing tournaments that take place out of Hatteras (Appendix B).

According to Wilson and McCay (1998) and McCay and Cieri (2000) there are approximately 500 to 600 part and full time commercial fishermen in Hatteras and the surrounding townships. This has been considered to be accurate for the recent community profiles compiled in the Amendment to the HMS fishery management plan (NMFS 2006). There were five seafood wholesalers, one retail market, and three marinas at the time of the earlier studies and Hatteras Village was considered totally dependent on fishing with a considerable reliance on HMS species. However the largest fish house was recently sold for condominium development and there may be only four working fish houses left in the community. According to one individual, many fishermen are leaving the fishing business as tourism is beginning to dominate the economy of the area.

The total HMS species landed from 1998 through 2002 was only 40,000 pounds (Kirkley 2005) and the most recent HMS logbook landings showed a little over 11,000 pounds of

sandbar shark landed in the community. An overview demographic profile for Hatteras Village is provided in Table 5.18.

Table 2.25 HMS Permits for Hatteras Village, North Carolina, 2006

Type of Permit	Frequency	Percent of total
HMS Angling	16	0.3%
Shark Directed	3	1.3%
Shark Incidental	2	0.7%
Swordfish Directed	0	-
Swordfish Incidental	2	0.7%
HMS General	16	0.4%
HMS Charter/Headboat	57	1.3%
HMS Longline	1	0.4%
Tuna Dealer	1	0.2%

Table 2.26 HMS Commercial Species Landed for Hatteras Village, North Carolina, 2006

Species	Pounds
Swordfish	0
Bigeye Tuna	0
Bluefin Tuna	0
Yellowfin Tuna	0
Albacore Tuna	0
Blue Shark	0
Hammerhead	168
Thresher	0
Blacktip	0
Hammerhead Scalloped	0
Hammerhead Smooth	0
Ocean Whitetip	0
Porbeagle	0
Silky	0
Spinner	0
Tiger	145
Other Coastal	0
Other Pelagic	0
Sandbar	11,503
Mako Shortfin	0
Skipjack	0

2.19 Islamorada, Florida

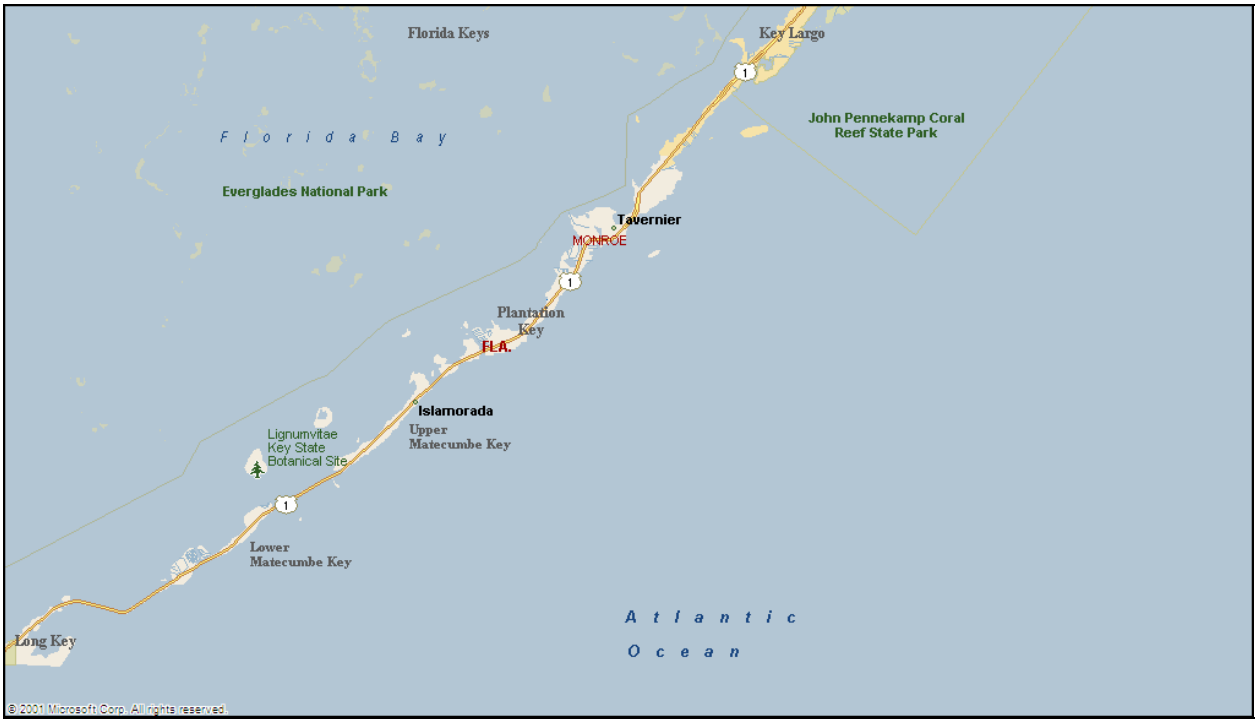

Figure 2.19 Islamorada, Florida
(Microsoft Streets and Trips 2002)

Islamorada, Florida is another HMS fishing community that has been profiled in many documents. Being first included in the Wilson and McCay (1998) study; this Key's community has appeared in the South Atlantic fishing community profiles (Jepson et al. 2005) and the HMS Amendment (NMFS 2006), all with census demographics and permit information. There are also more detailed discussions of the fishing infrastructure of the community included in those profiles.

Islamorada has remained an important sport fishing center and self proclaimed "Sportfishing Capital of the World." It has been estimated that there are over 100 charter fishing vessels in Islamorada. In addition to offshore charters there are probably just as many guide boats that fish the nearshore and inshore waters. The community supports a large tourist economy that is centered on the charter fishing industry and has at least 24 marinas and approximately 45 hotels/motels to cater to fishermen (Jepson et al. 2005). Islamorada holds over ten fishing tournaments for HMS species that begin in November with dates through February with a sailfish tournament is held in August (Appendix B).

There are a few commercial operations in the community, with several lobster and stone crab vessels being the primary commercial fishing operations. There were a few small longline vessels that were struggling to continue to operate in nearby waters, but regulation and recent sanctuaries have pushed most out of the area. An overview demographic profile for Islamorada is provided in Table 5.19.

Table 2.27 HMS Permits for Islamorada, Florida, 2006

Type of Permit	Frequency	Percent of total
HMS Angling	3	0.06%
Shark Directed	1	0.4%
Shark Incidental	0	-
Swordfish Directed	0	-
Swordfish Incidental	1	0.3%
HMS General	3	0.1%
HMS Charter/Headboat	45	1.0%
HMS Longline	0	-
Tuna Dealer	0	-

2.20 Madeira Beach, Florida

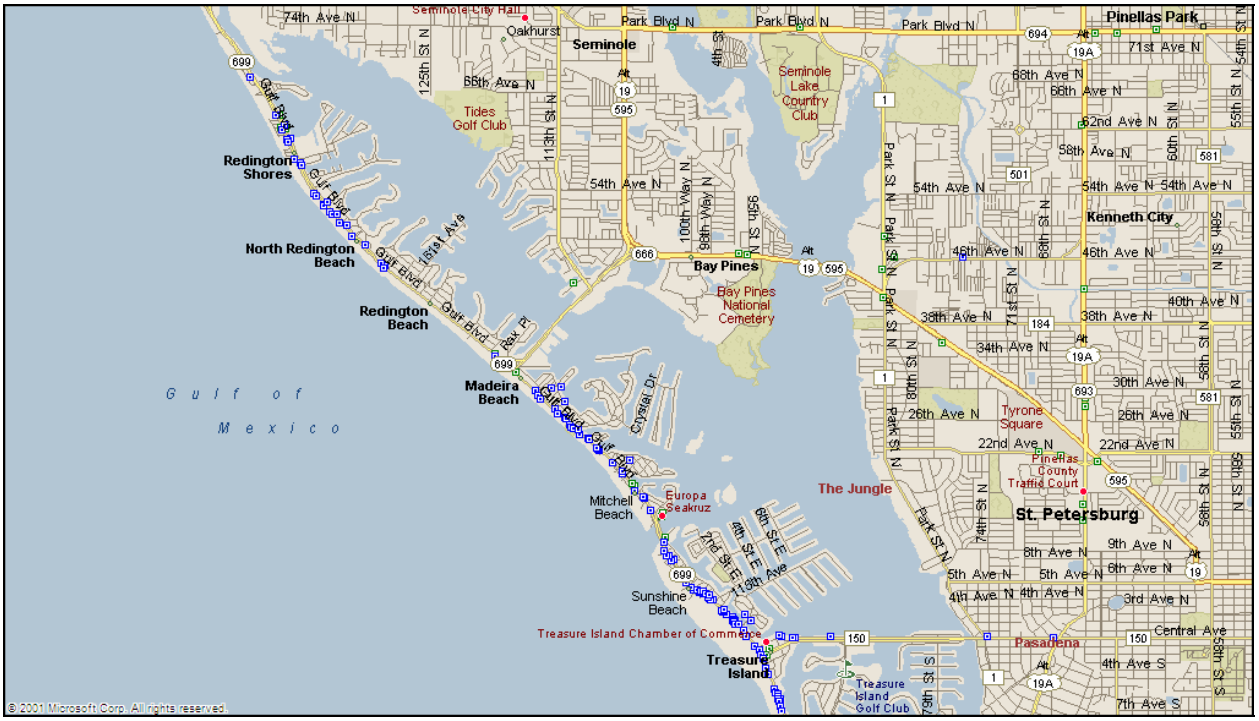

Figure 2.20 Madeira Beach, Florida
(Microsoft Streets and Trips 2002)

As one of the ubiquitous HMS fishing communities in all profiles, Madeira Beach has also been included in the more recent HMS Amendment (NMFS 2006) and the recent profile of shark fishing communities (Jepson 2005), as well as the recent profiles of Gulf fishing communities (Impact Assessment 2005a).

Madeira Beach is one of several beachfront communities on the barrier island that cater to tourists and seasonal residents and has a population of 4,500 as of the 2000 census. According to Wilson and McCay (1998), offshore fishing in Madeira Beach began as bandit reel fishing for grouper in the 1960's. There were two fish houses supported primarily by charter fishing and a small commercial operation. It was during the early 1970's that two vessels began experimenting with long line fishing, but were initially unsuccessful. Later, several vessels began using longlines for swordfish and began to do well, but as swordfish stocks began to

diminish in the Gulf they were forced to expand their fishing territory to the eastern seaboard. It was on return trips that these vessels began to experiment with longlines in deeper water and discovered an abundance of tilefish and yellow edge grouper. As of their report, 95 percent of the fishing fleet in Madeira Beach was using longlines (Wilson and McCay 1998). There were four fish houses in Madeira Beach at the time dealing in primarily grouper but also swordfish, shark and other species. Approximately 100 vessels were working out of the community then but with the closure of two fish houses, the number of vessels homeported there has been greatly diminished.

Madeira Beach still retains many of the accouterments of a fishing community but is changing rapidly. Lucas (2001) found an estimated 87 long line and 48 bandit reel vessels homeported in the community. This number has diminished since that time, but the community is still a major homeport for shark fishermen. Most shark fishermen have multiple permits and the majority fish grouper primarily. One dealer estimated that before restrictions on shark fishing his business used to be 45 percent grouper, 45 percent shark, and 10 percent sword and tuna, now it is 75 percent grouper, 10 percent shark and 15 percent sword and tuna (Wilson and McCay 1998). Different gear is used for grouper, shark, and swordfish and tuna. Longline fishermen use a wire cable for grouper, while for shark they use monofilament mainline. Some fish grouper with a monofilament mainline using weights to sink it. Fishermen from Madeira Beach and elsewhere go to Louisiana and Texas to fish and land their fish in Venice, Louisiana and Galveston, Texas, often doing a double trip in 22-23 days. According to Jepson (2005) there were 73 vessels that list their home port as Madeira Beach according to the permit data from the Southeast. An overview demographic profile for Madeira Beach is provided in Table 5.20.

Table 2.28 HMS Permits for Madeira Beach, Florida, 2006

Type of Permit	Frequency	Percent of total
HMS Angling	0	-
Shark Directed	17	7.0%
Shark Incidental	4	1.3%
Swordfish Directed	5	2.7%
Swordfish Incidental	4	1.3%
HMS General	0	-
HMS Charter/Headboat	1	0.02%
HMS Longline	8	3.4%
Tuna Dealer	0	-

2.21 New Bedford, Massachusetts

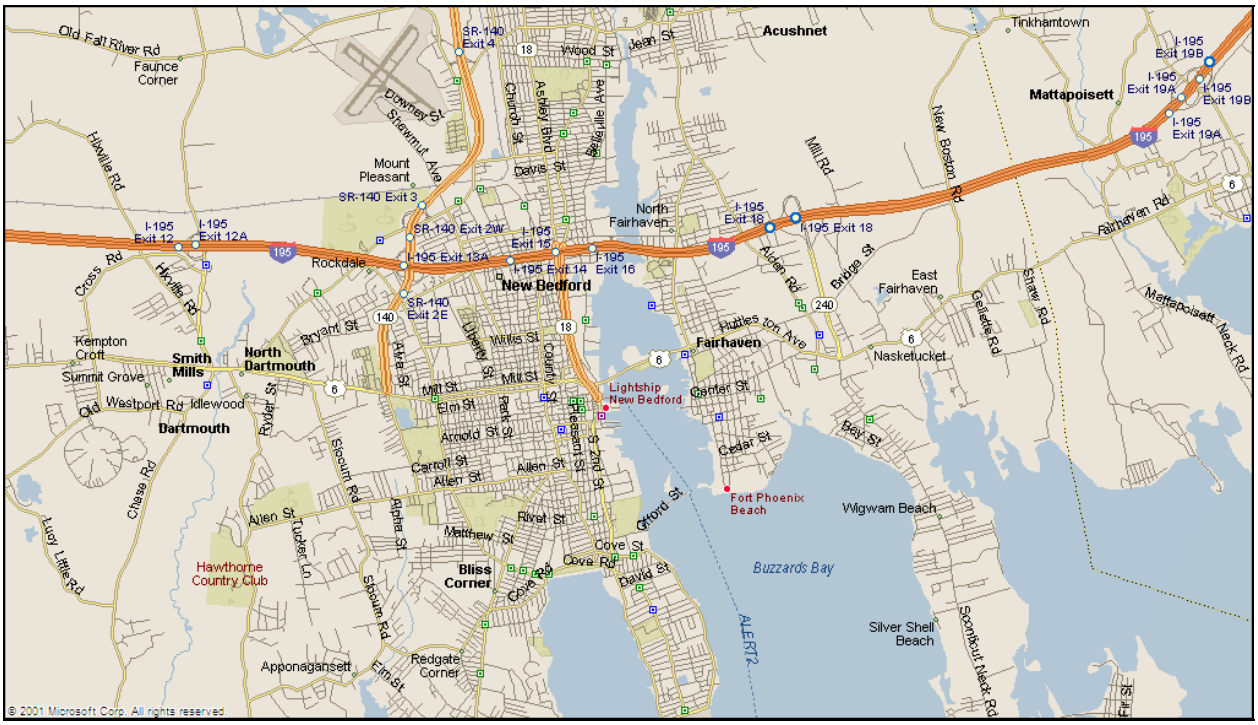

Figure 2.21 New Bedford, Massachusetts
(Microsoft Streets and Maps 2002).

New Bedford is located in the southeastern section of the state in Bristol County bordered by Dartmouth on the west, Freetown on the north, Acushnet on the east, and Buzzards Bay on the south.

There are several marinas in New Bedford and nearby Fairhaven, in addition to the major commercial docks. New Bedford has seen difficult times as fishing regulations have had a dramatic impact on the community. In the 1980s, fishermen experienced high landings and bought new boats due to a booming fishing industry. In the 1990s, however, due to depleted fish stocks, the fishing industry experienced a dramatic decrease in groundfish catches and a subsequent vessel buyback program, and strict federal regulations in attempts to rebuild the depleted fish stocks.

The range of species landed in New Bedford is quite diverse and according to the commercial landings data, New Bedford's most successful fishery in the past ten years has been scallops, followed by groundfish.

The fishing infrastructure within New Bedford is quite extensive. According to the NEFSC profile, the number of vessels whose owner's city was New Bedford fluctuated between 137 and 199 vessels. New Bedford has approximately 44 fish wholesale companies, 75 seafood processors, and some 200 shore side industries (NEFSC Community Profiles).

Kirkley (2005) reports just over 470,000 lbs of HMS species landed in New Bedford from 1996 through 2002. The HMS logbooks indicate that swordfish ranked first in terms of landings in 2007 with over 100,000 pounds landed in New Bedford. The next highest in terms of pounds landed was yellowfin tuna with over 54,000 and bigeye tuna with over 17,000 pounds landed. An overview demographic profile for New Bedford is provided in Table 5.21.

Table 2.29 HMS Permits for New Bedford, Massachusetts, 2006

Type of Permit	Frequency	Percent of total
HMS Angling	36	0.8%
Shark Directed	0	-
Shark Incidental	3	1.0%
Swordfish Directed	3	1.6%
Swordfish Incidental	3	1.0%
HMS General	36	0.8%
HMS Charter/Headboat	1	0.02%
HMS Longline	3	1.3%
Tuna Dealer	18	4.4%

Table 2.30 HMS Commercial Species Landed for New Bedford, Massachusetts, 2006

Species	Pounds
Swordfish	100,449
Bigeye Tuna	17,436
Bluefin Tuna	2,225
Yellowfin Tuna	54,544
Albacore Tuna	7,620
Blue Shark	0
Hammerhead	587
Thresher	0
Blacktip	0
Hammerhead Scalloped	0
Hammerhead Smooth	0
Ocean Whitetip	0
Porbeagle	0
Silky	44
Spinner	0
Tiger	580
Other Coastal	0
Other Pelagic	0
Sandbar	42
Mako Shortfin	6,594
Skipjack	0

2.22 Gloucester, Massachusetts

Figure 2.22 Gloucester, Massachusetts
(Microsoft Streets and Trips 2002)

Gloucester is another of those often profiled HMS fishing communities. A community profile is included in the NEFSC fishing community profiles, the early HMS study by Wilson and McCay (1998) and the early National Standard 8 study by Hall-Arber et al. (2001). Each of the aforementioned studies includes detailed census demographics and discussions of the fishing infrastructure.

The city of Gloucester is located on Cape Ann, on the northern east coast of Massachusetts in Essex County. Gloucester has revolved around the fishing and seafood industries since its settlement in 1623. Part of the town's claim to fame is being the oldest functioning fishing community in the United States. The town is still well-known as the home of Gorton's frozen fish packaging company, the nation's largest frozen seafood company. Gloucester demonstrates dedication to its fishing culture through numerous social events, cultural memorial structures, and organizations. Furthermore interesting infrastructure that demonstrates the significance of fishing history in this city include "Our Lady of Good Voyage Church" built in 1893 and the recent opening of the Gloucester Maritime Heritage Center, which provides visitors and the city residents with information of the historic and current fishing industry. The statue named "The Man at the Wheel" was built in memory of the 5,300 fishermen that died at sea. In 2001 a new statue dedicated to fishermen's wives was built by The Gloucester Fishermen's Wives Association (NEFSC Profiles).

Gloucester fishermen held a large number of HMS General Permits in 2007 at 145 which was an increase over the 2005 number of 106. There were also 145 HMS angling permits located within the community. According to Kirkley (2005) a total of 251,000 pounds of HMS species were landed between 1997 through 2001. The HMS logbook landings file shows a small amount of HMS species landed in Gloucester with swordfish landings far and above other species with over 25,000 pounds. Bluefin tuna was a high dollar fishery for recreational

fishermen who traveled to Gloucester to charter fish and had some modest impacts on the local economy (NMFS 2006). An overview demographic profile for Gloucester is provided in Table 5.22.

Table 2.31 HMS Permits for Gloucester, Massachusetts, 2006

Type of Permit	Frequency	Percent of total
HMS Angling	145	3.3%
Shark Directed	2	0.9%
Shark Incidental	2	0.7%
Swordfish Directed	3	1.6%
Swordfish Incidental	2	0.7%
HMS General	145	3.2%
HMS Charter/Headboat	32	0.8%
HMS Longline	4	1.7%
Tuna Dealer	12	2.9%

Table 2.32 HMS Commercial Species Landed for Gloucester, Massachusetts, 2006

Species	Pounds
Swordfish	25,501
Bigeye Tuna	6,547
Bluefin Tuna	1,483
Yellowfin Tuna	1,844
Albacore Tuna	1,889
Blue Shark	0
Hammerhead	0
Thresher	0
Blacktip	0
Hammerhead Scalloped	0
Hammerhead Smooth	0
Ocean Whitetip	0
Porbeagle	0
Silky	0
Spinner	0
Tiger	0
Other Coastal	0
Other Pelagic	0
Sandbar	0
Mako Shortfin	4,710
Skipjack	0

2.23 Dulac, Louisiana

Figure 2.23 Dulac, Louisiana
(Microsoft Streets and Trips 2002)

Dulac, located in the center of Terrebonne Parish, about 15 miles south of Houma, is another often profiled HMS fishing community. Profiles have been included in the Gulf of Mexico fishing community profiles (Impact Assessment 2004).

While local residents of Dulac have been involved in commercial fishing, many of those involved in the commercial tuna, swordfish and shark industry live elsewhere (Wilson and McCay 1998).

Landings of tuna, swordfish and shark indicate that Dulac is among the most important ports in the state and even along the Gulf of Mexico coast for those species (Wilson and McCay 1998). Kirkley (2005) reports almost 6 million pounds of HMS species landed in Dulac from 1996 through 2002. Many of those who fish for HMS species are of Vietnamese heritage, but live near New Orleans rather than in Dulac.

Of HMS species small blacktip shark is the main catch in the shark fishery. Shark fishermen don't fish much during the winter because the boats tend to be smaller. Sharks are caught at five to 20 miles from shore, and tuna are caught 100-300 miles out. Tuna fishermen generally cut the line when they hook a shark. Swordfish is not targeted by Dulac longliners (Wilson and McCay 1998).

Dulac fishermen held over 9% of HMS longline permits with a large number of swordfish directed and incidental permits. Dulac had almost 6 million pounds of HMS species landed from 1996 through 2002 (Kirkley 2005). Yellowfin tuna was landed the most in 2007 with over one million pounds according the HMS logbook data. Swordfish was next with 274,000 pounds landed in the community of Dulac. An overview demographic profile for Dulac is provided in Table 5.23.

Table 2.33 HMS Permits for Dulac, Louisiana, 2006

Type of Permit	Frequency	Percent of total
HMS Angling	0	-
Shark Directed	1	0.4%
Shark Incidental	10	3.4%
Swordfish Directed	10	5.5%
Swordfish Incidental	10	3.4%
HMS General	0	-
HMS Charter/Headboat	1	0.02%
HMS Longline	22	9.3
Tuna Dealer	2	0.5%

Table 2.34 HMS Commercial Species Landed for Dulac, Louisiana, 2006

Species	Pounds Landed
Swordfish	274,010
Bigeye Tuna	45,416
Bluefin Tuna	23,359
Yellowfin Tuna	1,090,811
Albacore Tuna	7,204
Blue Shark	116
Hammerhead	0
Thresher	0
Blacktip	0
Hammerhead Scalloped	0
Hammerhead Smooth	0
Ocean Whitetip	0
Porbeagle	0
Silky	0
Spinner	0
Tiger	0
Other Coastal	0
Other Pelagic	0
Sandbar	0
Mako Shortfin	1,021
Skipjack	470

2.24 Venice, Louisiana

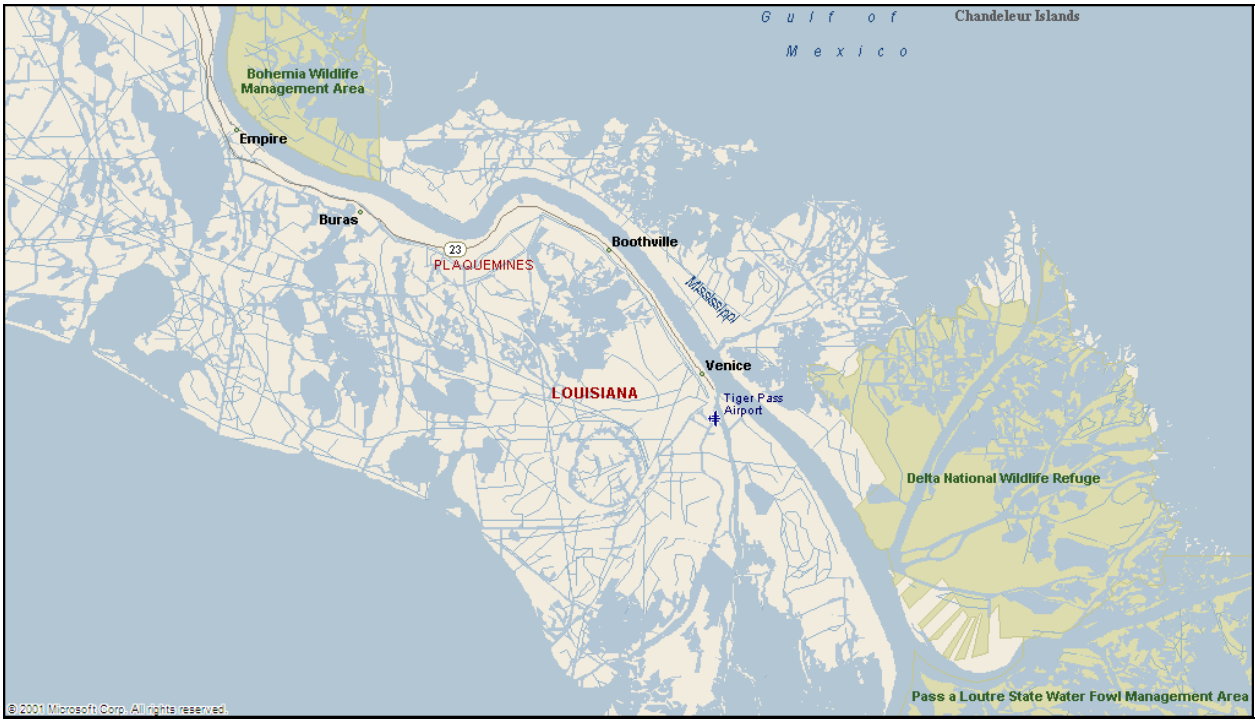

Figure 2.24 Venice, Louisiana
(Microsoft Streets and Trips 2002)

Venice is located on the Mississippi River's west bank in Plaquemines Parish and had a year 2000 population of 699 persons, down significantly from 1,003 persons in 1990. Venice is both a shrimp-focused community and a popular point of departure for recreational and charter vessels fishing the blue water of the Gulf. Venice is a top regional producer of shrimp, crab, and fish, but has been included in most HMS fishing community profiles.

Despite apparent overall out-migration, numerous Vietnamese and Cambodians families have moved to the area over the last decade. While many initially went into the fishing way of life, there has been an apparent shift among many new arrivals toward citrus farming.

Fishing infrastructure in Venice is extensive. There are several seafood dealers and docks; sale and repair facilities for commercial and recreational boats, bait shops, ice houses, boat launches, and several small marinas and marine suppliers. One of the marinas, the Cypress Cove Marina and Lodge, is a large facility offering boat storage, charter services. The majority of business in the community is sport-recreational as some have suggested that commercial fishing activity has declined over the last several years. Venice residents seem to be more focused on recreational fishing and oil field support. Venice is located at the end of the Mississippi Delta in Plaquemine Parrish, on the southern most tip of Louisiana accessible by car. It lies about 30 miles south of Point a la Hache. The major industries are oil, seafood and, increasingly, recreational fishing. A couple of billfish tournaments are held during the spring/summer months (Appendix B).

Like the HMS fishers in Dulac, most pelagic long liners who sustain the commercial tuna industry in Venice are Vietnamese and live in New Orleans or a suburb of the city. Even Louisiana natives who fish for shark with nets in state waters live in neighboring towns, not in Venice (Wilson and McCay 1998). Kirkley (2005) found over 3 million pounds of HMS species

were landed from 1996 through 2002, but in 2007 landings of 58,000 pounds of yellowfin tuna were the practically the only HMS species landed as reported in the HMS logbook landings file.

Like many communities along the Louisiana coast, Venice suffered significant damage to its commercial and recreational fishing infrastructure. Although there has been progress, the recreational sector has outpaced the commercial in terms of recovery. This is partially due to the fact that many commercial vessels were displaced and owners, who were already affected by a depressed fishing economy, have been unable to raise sufficient funds to recover or repair vessels. An overview demographic profile for Venice is provided in Table 5.24.

Table 2.35 HMS Permits for Venice, Louisiana, 2006

Type of Permit	Frequency	Percent of total
HMS Angling	10	0.2%
Shark Directed	0	-
Shark Incidental	2	0.7%
Swordfish Directed	1	0.5%
Swordfish Incidental	2	0.7%
HMS General	10	0.2%
HMS Charter/Headboat	26	0.6%
HMS Longline	3	1.3%
Tuna Dealer	1	0.2%

Table 2.36 HMS Commercial Species Landed for Venice, Louisiana, 2006

Species	Pounds
Swordfish	2,543
Bigeye Tuna	689
Bluefin Tuna	0
Yellowfin Tuna	58,930
Albacore Tuna	0
Blue Shark	0
Hammerhead	0
Thresher	0
Blacktip	0
Hammerhead Scalloped	0
Hammerhead Smooth	0
Ocean Whitetip	0
Porbeagle	0
Silky	0
Spinner	0
Tiger	0
Other Coastal	0
Other Pelagic	0
Sandbar	0
Mako Shortfin	236
Skipjack	0

3 Discussion

The community profiles included here are not an exhaustive or definitive listing of HMS fishing communities. Given the budget and time limitations for this research, a more modest profiling exercise was chosen. However, the important question of how to include a community into an HMS profile became a focus and the center of this discussion.

As discussed earlier, recent research by Sepez et al. (2007) has successfully used a method called Data Envelopment Analysis for selecting communities for profiling. Key to this method is having permit, landings and census data available for the analysis. Given the scope of this research and time limitations, it was not possible to assemble all the data necessary to use their method for selecting communities to be profiled. However, future profiling efforts might explore this methodology for a more robust and meaningful protocol for selecting communities.

Having proposed this methodology as possible criteria by which to choose communities for profiling, some qualifications must also be mentioned. One of the keys to selecting HMS fishing communities is using criteria that are relevant to HMS species. This becomes problematic when profiling fishing communities as the infrastructure that is often in place is often not specific to vessels that fish for HMS species. As is obvious from the above profiles, HMS species are often a small percentage of the total involvement in fisheries for a community. Furthermore, most if not all HMS permit holders fish for other species outside of the HMS management plans. Therefore when assessing impacts of HMS regulations, it is difficult to understand the full ramifications without understanding the larger economic and social environment within which these fishers operate. HMS regulations may have impacts that resonate through other fisheries, as well as regulations in other fisheries will resonate through HMS fisheries.

While it is recognized that management regimes often dictate not only the regulations, but also the scope of impact analysis, in terms of cumulative impacts, it is obvious that, at the community level, analysis of social impacts is complicated. While much of the work in profiling communities has been descriptive, future impact assessment would benefit from more quantitative analysis. With the current suite of profiles it may be possible to combine data that has already been gathered with more current permit and landings data to create a series of indices that may offer a better understanding of impacts that is more cumulative and inclusive of more than just one fishery.

Social indicators have been used recently in creating a variety of community well-being measures (Jepson and Jacob 2007). These measures may include census and other data at the community level that tap into issues such as vulnerability to economic change, gentrification, coastal hazards and many other issues that, while outside the scope of fishery management, do have impacts upon coastal fishing communities and their ability retain critical commercial waterfronts and to function as a fishing community. Utilizing permit and landings data, specific indices can be created to address specific fisheries or broader issues of change related to several different fisheries.

While community profiles are important and mandated, they constitute an initial step in the social impact assessment by providing key data for further analysis. It is imperative that these data become the basis for developing more robust analyses to better assess the social impacts of fishery regulation that will allow for a more complete assessment of fishery regulations.

While we noted that fishing communities in the U.S. Virgin Islands and Puerto Rico also have HMS fishing activity, after reviewing community profiles it quickly became apparent that profiling those communities would entail far more effort and time than were possible. In a recent profile of the island of St. Croix, there was fishing for HMS species reported, however, much of that fishing activity was subsistence or for small markets (Agar and Stoffle 2006). The difficulty

in assessing HMS fishing activity for communities on the island is that the argument for St. Croix fishing communities is to consider the entire island a fishing community. Moreover, there are relatively few landings attributed to the Virgin Islands and Puerto Rico, in addition to few permits. There is also considerable HMS activity in Puerto Rico and St. Thomas and St. John with both subsistence and market fishing occurring, along with high end charter and tournament fishing in several communities. However, at least for St. John and St. Thomas, it has not been determined where the boundaries of the fishing communities lie. As research continues in these Caribbean communities deliberation of HMS profiles should be considered.

4 References

Agar, Juan and Brent Stoffle. 2006. Profiling Fishing Communities in St. Croix and the U.S. Virgin Islands. (Document not yet available).

Bright, Alan D., H. Ken Cordell, Anne P. Hoover, and Michael A. Tarrant. 2003. A Human Dimensions Framework: Guidelines for Conducting Social Assessments. United States Department of Agriculture, Forest Service, Southern Research Station, General Technical Report SRS–65.

Cheuvront, Brian, Elizabeth Griffin, Kathi Kitner, Vishwanie Maharaj, Candace Nachman, and Bryan Oles. 2005. The Cumulative Social, Cultural, and Economic Effects of Seasonal Closures on Fishing Communities. Special Report No. 85 of the Atlantic States Marine Fisheries Commission.

Griffith, David, Manuel Valdés Pizzini and Carlos García Quijano. 2006. Entangled Communities: Socioeconomic Profiles of Fishers, their Communities, and their Responses to Marine Protective Measures in Puerto Rico.

GMFMC. 2004. Draft Final Environmental Impact Statement for the Generic Essential Fish Habitat Amendment to the following fishery management plans of the Gulf of Mexico. Gulf of Mexico Fishery Management Council, Tampa, Florida

GMFMC. 2005. Final Amendment 13 to the Fishery Management Plan for the Shrimp Fishery of the Gulf of Mexico, United States Waters. Gulf of Mexico Fishery Management Council, Tampa, Florida.

Hall-Arber, Madeleine, Chris Dyer, John Poggie, James McNally, Renee Gagne M. 2001. New England's Fishing Communities. A final report for Northeast MARFIN grant #NA87FF0547.

Hanna, Susan. 2004. External Examination of Economic and Social Analyses Related to Amendment 13 to the New England Fishery Management Council's Multispecies Fishery Management Plan

Impact Assessment, Inc.

2004. Identifying communities associated with the fishing industry in Louisiana. Prepared for the U.S. Department of Commerce, NMFS, Southeast Regional Office, 9721 Executive Center Drive, St. Petersburg, Florida 33702, Contract number WC133F-02-SE-0297. 646 pp.

2005a. Identifying Communities Associated with the Fishing Industry along the Florida Gulf Coast. U. S. Department Of Commerce NOAA Fisheries, Southeast Regional Office St. Petersburg, Florida. Contract WC133F-02-SE- 0298.

2005b. Identifying communities associated with the fishing industry in Texas. A report prepared for U. S. Department of Commerce, NOAA Fisheries, Southeast Region St. Petersburg, Florida Contract WC133F-03-SE-0603. 424 pp.

2006a. Preliminary Assessment of the Impacts of Hurricane Katrina on Gulf of Mexico Coastal Fishing Communities. Final Technical Report submitted to U. S. Department Of Commerce NOAA Fisheries, Southeast Regional Office St. Petersburg, Florida. Contract # WC133F-06-CN-0003

2006b. Identifying Communities Associated with the Fishing Industry in Alabama and Mississippi. U. S. Department Of Commerce NOAA Fisheries, Southeast Regional Office St. Petersburg, Florida. Contract WC133F-03-SE- 0603.

Interorganizational Committee on Principles and Guidelines (IOCGP) for Social Impact Assessment 2003. Principles and guidelines for social impact assessment in the USA

Jacob, Steve, Michael Jepson, Carlton Pomeroy, David Mulkey, Chuck Adams and Suzanna Smith. 2002. Identifying Fishing Dependent Communities: Development and Confirmation of a Protocol. A MARFIN Project and Report to the NMFS Southeast Fisheries Science Center.

Jepson, Michael. 2005. Socio-economic and Community Profile for Florida Gulf Coast Shark Buyout Program. Final Report submitted to The Gulf and South Atlantic Fishery Foundation, Inc., Tampa Florida. GASAFFI NO.: 84-03-45500/6500.

Jepson, Michael. 2006. A Cultural Sea Change. Forum Magazine. A Florida Humanities Council Publication. Summer.

Jepson, Michael, and Steve Jacob. 2007. Social Indicators and Measurements of Vulnerability for Gulf Coast Fishing Communities. NAPA Bulletin 28.

Jepson, Michael, Kathi Kitner, Arianna Pitchon and W. Perry. 2005. Fishing Communities in the Carolinas, Georgia and Florida: An Effort at Baseline Profiling and Mapping. South Atlantic Fishery Management Council, Charleston, SC.

Jepson, Michael and MRAG Americas. 2007. Part One Report For General Information – Social Impact Assessment Services HMS Fishing Communities Solicitation Number: DG133F-06-RQ-0381. Report to NMFS, HMS Division. September 12, 2007.

Kaplan, Ilene. 2004. The Social Dimensions of Ecosystem-Based Fisheries Management. Presentation at the Woods Hole Oceanographic Institution, Union College.

Kirkley, James. 2005. The communities of the Atlantic Highly Migratory Species (HMS) Fishery: An overview of change associated with the HMS Fishery Management Plan. Department of Coastal and Ocean Policy, School of Marine Science, Virginia Institute of Marine Science, College of William and Mary, Gloucester Point, Virginia.

Kitner, Kathi. 2001. Ethnographic Tracing of an Interesting Social Network of South Atlantic Commercial Fishermen. U.S. Bureau of the Census and National Marine Fisheries Service.

Langdon-Pollock, Jennifer. 2004. West Coast Marine Fishing Community Descriptions. Pacific States Marine Fisheries Commission, Economic Fisheries Information Network, 205 SE Spokane Street, Suite 100, Portland, OR 97202-6413

Lucas, Linda. 2001. Fishery Management and Local Communities: The Case of Madeira Beach. Marine Fisheries Review 63(4):32-42.

Lucas, Linda. 2004. External Examination of Economic and Social Analyses Related to Amendment 13 to the New England Fishery Management Council's Multispecies Fishery Management Plan

McCay, Bonnie and Marie Cieri. 2000. Fishing Ports of the Mid-Atlantic. A Report to the Mid-Atlantic Fishery Management Council, Dover, Delaware, April 2000.

Microsoft Streets and Trips. 2002.

MRAG Americas and Michael Jepson. 2007. Prioritized Communities for Profiling: Methods and Suggested List Social Impact Assessment Services for HMS Fishing Communities Solicitation Number: DG133F-06-RQ-0381. Report to NMFS, HMS Division. November 19, 2007.

NEFMC. 2003. Final Amendment 13 to the Northeast Multispecies Fishery Management Plan. New England Fishery Management Council, 50 Water Street, Newburyport, MA 01950

NMFS NESC Northeast Profiles, Contact Northeast Fisheries Science Center, http://www.nefsc.noaa.gov/.

NMFS. 2006. Final Consolidated Atlantic Highly Migratory Species Fishery Management Plan. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Sustainable Fisheries, Highly Migratory Species Management Division, Silver Spring, MD.

NMFS. 2000. Final Supplemental Impact Statement. Regulatory Amendment 1 to the Atlantic Tunas, Swordfish, and Sharks Fishery Management Plan. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Sustainable Fisheries, Highly Migratory Species Management Division, Silver Spring, MD.

PFMC. 2003. Final management plan and environmental impact statement for U.S. west coast fisheries for highly migratory species. Pacific Fishery Management Council, Portland, Oregon.

SAFMC. 2006. Final Amendment 13c to the Snapper Grouper Fishery Management Plan. South Atlantic Fishery Management Council, Charleston, SC.

Sepez, J., B.D. Tilt, C.L. Package, H.M. Lazrus and I. Vaccaro. 2005. Community Profiles for North Pacific Fisheries – Alaska. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-160.

Sepez, J., K. Norman and R. Felthoven. 2007. A Quantitative Model for Ranking and Selecting Communities Involved in Commercial Fisheries. NAPA Bulletin. 28: 43-56.

US Census Bureau. 2000. Census 2000 (http://www.census.gov/).

Walker, Bobbi, Robert Zales and Betty Rockstall. 2006. Charter Boat Fleet In Peril: Losses to the Gulf of Mexico Charter Fleet From Hurricane Storms during 2005. National Association of Charterboat Operators, Orange Beach, Alabama.

WPFMC. 2006. Amendment 14 to the Fisheries Management Plan for Pelagic Fisheries of the Western Pacific. Western Pacific Fishery Management Council. Honolulu, Hawaii.

5 Appendix A Demographic Profiles

For all profiles, data for 1990 provided where available. 2000 information provided from the Census 2000 (http://www.census.gov/).

Table 5.1 Demographic Profile of Beaufort, North Carolina

Factor	1990	2000
Total population	3,808	3,771
Gender Ratio M/F (Number)		1,755 / 2,016
Age (Percent of total population)		
Under 18 years of age		18.3
18 to 64 years of age		61.9
65 years and over	19.1	19.8
Ethnicity or Race (Percent)		
White		75.9
Black or African American		20
American Indian and Alaskan Native		0.1
Asian		0.4
Native Hawaiian and other Pacific Islander		0.1
Some other race		2.4
Two or more races		1.2
Hispanic or Latino (any race)		3.8
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	45	6.2
Percent high school graduate or higher	85.1	78.9
Percent with a Bachelor's degree or higher	24.1	21.7
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	2.6	7
And Percent who speak English less than very well	1.1	2.7
Household income (Median $)	21,532	28,763
Poverty Status (Percent of population with income below poverty line)	17.4	16.6
Percent female headed household	23.8	15.3
Home Ownership (Percent)		
Owner occupied		56.1
Renter occupied		43.9
Value Owner-occupied Housing (Median $)		119,200
Monthly Contract Rent (Median $)	373	502
Employment Status (Population 16 yrs and over)		
Percent in the labor force	60	56.3
Percent of civilian labor force unemployed	8.1	4.7
Occupation (Percent in workforce)**		
Management, professional, and related occupations	22	26.9
Service occupations	14.1	18.6
Sales and office occupations	15.8	28.7
Farming, fishing, and forestry occupations	0.9	1.2
Construction, extraction, and maintenance occupations		14.9
Production, transportation, and material moving occupations		9.7
Industry (Percent in workforce)**		
Agriculture, forestry, fishing, hunting and mining	3	2.4
Manufacturing	10.9	7.6
Percent government workers	25.3	13.5

Table 5.2 Demographic Profile of Atlantic Beach, North Carolina

Factor	1990	2000
Total population	1,938	1,781
Gender Ratio M/F (Number)		941 / 840
Age (Percent of total population)		
Under 18 years of age		9.8
18 to 64 years of age		72
65 years and over	12.5	18.2
Ethnicity or Race (Percent)		
White		98
Black or African American		0.6
American Indian and Alaskan Native		0.2
Asian		0.7
Native Hawaiian and other Pacific Islander		<0.1
Some other race		<0.1
Two or more races		0.4
Hispanic or Latino (any race)		0.7
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	3	2.8
Percent high school graduate or higher	85.1	90
Percent with a Bachelor's degree or higher	24.1	30.7
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	2.6	3.9
And Percent who speak English less than very well	1	1
Household income (Median $)		38,312
Poverty Status (Percent of population with income below poverty line)		7.3
Percent female headed household		5
Home Ownership (Percent)		
Owner occupied		64.7
Renter occupied		35.3
Value Owner-occupied Housing (Median $)		207,800
Monthly Contract Rent (Median $)		582
Employment Status (Population 16 yrs and over)		
Percent in the labor force	69.8	63.3
Percent of civilian labor force unemployed	2.9	3.2
Occupation (Percent in workforce)**		
Management, professional, and related occupations	27	36.6
Service occupations	11.1	8.8
Sales and office occupations	23.7	35.4
Farming, fishing, and forestry occupations	2.6	0.5
Construction, extraction, and maintenance occupations		14.8
Production, transportation, and material moving occupations		3.8
Industry (Percent in workforce)**		
Agriculture, forestry, fishing, hunting and mining	2.7	0.7
Manufacturing	7.6	2.2
Percent government workers	17.6	17.6

Table 5.3 Demographic Profile of Wakefield, Rhode Island

Factor	1990	2000
Total population	7134	8468
Gender Ratio M/F (Number)	3368 / 3766	3958 / 4510
Age (Percent of total population)		
Under 18 years of age	25.06	2401
18 to 64 years of age	59.94	4945
65 years and over	15	1122

Factor	1990	2000
Ethnicity or Race (Percent)		
White	6631	90.3
Black or African American	182	2
American Indian and Alaskan Native	257	3.1
Asian	64	1.2
Native Hawaiian and other Pacific Islander		<0.1
Some other race	0	0.6
Two or more races		2.8
Hispanic or Latino (any race)		1.6
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	3.9	3
Percent high school graduate or higher	62.6	89.8
Percent with a Bachelor's degree or higher	22.7	41.9
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	3.7	5.9
And Percent who speak English less than very well		1.2
Household income (Median $)	39,500	50,313
Poverty Status (Percent of population with income below poverty line)		5.4
Percent female headed household	4.3	13.1
Home Ownership (Percent)		
Owner occupied		71.3
Renter occupied		28.7
Value Owner-occupied Housing (Median $)	143400	151,700
Monthly Contract Rent (Median $)	530	427
Employment Status (Population 16 yrs and over)		
Percent in the labor force		70.4
Percent of civilian labor force unemployed		3.2
Occupation (Percent in workforce)**		
Management, professional, and related occupations		42.2
Service occupations		23.3
Sales and office occupations		21.2
Farming, fishing, and forestry occupations		0.7
Construction, extraction, and maintenance occupations		5.6
Production, transportation, and material moving occupations		6.9
Industry (Percent in workforce)**		
Agriculture, forestry, fishing, hunting and mining		1.2
Manufacturing		9.4
Percent government workers		23.9

Table 5.4 Demographic Profile of Montauk, New York

Factor	1990	2000
Total population	3,001	3,851
Gender Ratio M/F (Number)		1976/1875
Age (Percent of total population)		
Under 18 years of age		20
18 to 64 years of age		65.5
65 years and over	14.9	14.5
Ethnicity or Race (Percent)		
White		87
Black or African American		0.9
American Indian and Alaskan Native		0.1

Factor	1990	2000
Asian		0.8
Native Hawaiian and other Pacific Islander		<0.1
Some other race		9.8
Two or more races		1.4
Hispanic or Latino (any race)		23.9
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	7	7.6
Percent high school graduate or higher	88.5	84
Percent with a Bachelor's degree or higher	25.7	24.8
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	17.6	30.3
And Percent who speak English less than very well	8.2	15.6
Household income (Median $)	31,849	42,329
Poverty Status (Percent of population with income below poverty line)	2.9	7.7
Percent female headed household	6.7	8.7
Home Ownership (Percent)		
Owner occupied		65.7
Renter occupied		34.3
Value Owner-occupied Housing (Median $)		290,400
Monthly Contract Rent (Median $)	804	863
Employment Status (Population 16 yrs and over)		
Percent in the labor force	70.1	61.5
Percent of civilian labor force unemployed	5	7.7
Occupation (Percent in workforce)**		
Management, professional, and related occupations	23.5	20.3
Service occupations		23.3
Sales and office occupations	25.7	27.9
Farming, fishing, and forestry occupations	9	5.8
Construction, extraction, and maintenance occupations		19
Production, transportation, and material moving occupations		3.6
Industry (Percent in workforce)**		
Agriculture, forestry, fishing, hunting and mining	8	6.1
Manufacturing	1.8	2
Percent government workers	8.4	11.8

Table 5.5 Demographic Profile of Cape May, New Jersey

Factor	1990	2000
Total population	4,668	4,034
Gender Ratio M/F (Number)		1,987/2,047
Age (Percent of total population)		
Under 18 years of age		16.3
18 to 64 years of age		55.2
65 years and over	25	28.5
Ethnicity or Race (Percent)		
White		91.3
Black or African American		5.3
American Indian and Alaskan Native		0.2
Asian		0.4
Native Hawaiian and other Pacific Islander		<0.1
Some other race		1.3
Two or more races		1.5
Hispanic or Latino (any race)		3.8
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	3.8	2.6
Percent high school graduate or higher	84.4	87.6

Factor	1990	2000
Percent with a Bachelor's degree or higher	25.2	30.8
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	4.7	8.9
And Percent who speak English less than very well	0.7	2.9
Household income (Median $)		33,462
Poverty Status (Percent of population with income below poverty line)		9.1
Percent female headed household		7
Home Ownership (Percent)		
Owner occupied		56.8
Renter occupied		43.2
Value Owner-occupied Housing (Median $)		212,900
Monthly Contract Rent (Median $)		564
Employment Status (Population 16 yrs and over)		
Percent in the labor force	63.8	57.5
Percent of civilian labor force unemployed	2.7	3.8
Occupation (Percent in workforce)**		
Management, professional, and related occupations	40.9	33.7
Service occupations	16.9	21
Sales and office occupations	26	33.3
Farming, fishing, and forestry occupations	2.1	0.9
Construction, extraction, and maintenance occupations		5.9
Production, transportation, and material moving occupations		5.2
Industry (Percent in workforce)**		
Agriculture, forestry, fishing, hunting and mining	1.7	0.4
Manufacturing	5.5	2.4
Percent government workers	26.5	20.2

Table 5.6 Demographic Profile of Ocean City, Maryland

Factor	1990	2000
Total population	5,074	7,173
Gender Ratio M/F (Number)	2415 / 2659	3,680 / 3,493
Age (Percent of total population)		
Under 18 years of age		21.3
18 to 64 years of age		63.5
65 years and over		25.2
Ethnicity or Race (Percent)		
White	4852	95.3
Black or African American	143	2.5
American Indian and Alaskan Native	33	0.1
Asian	46	0.7
Native Hawaiian and other Pacific Islander		<0.1
Some other race	0	0.3
Two or more races		0.9
Hispanic or Latino (any race)		1.2
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	4.8	2.6
Percent high school graduate or higher	61	87.1
Percent with a Bachelor's degree or higher	13.4	28
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	4.1	7
And Percent who speak English less than very well		2.9
Household income (Median $)	33350	35,772
Poverty Status (Percent of population with income below poverty line)		8.4
Percent female headed household	3.7	6.4
Home Ownership (Percent)		

Factor	1990	2000
Owner occupied		67.4
Renter occupied		32.6
Value Owner-occupied Housing (Median $)	136100	152,200
Monthly Contract Rent (Median $)	517	640
Employment Status (Population 16 yrs and over)		
Percent in the labor force		60.4
Percent of civilian labor force unemployed		9.3
Occupation (Percent in workforce)**		
Management, professional, and related occupations		31.6
Service occupations	18	24.1
Sales and office occupations		29.2
Farming, fishing, and forestry occupations		0.3
Construction, extraction, and maintenance occupations		9.5
Production, transportation, and material moving occupations		5.2
Industry (Percent in workforce)**		
Agriculture, forestry, fishing, hunting and mining		0.5
Manufacturing		2.4
Percent government workers		11.3

Table 5.7 Demographic Profile of Port Salerno, Florida

Factor	1990	2000
Total population	7,786	10,104
Gender Ratio M/F (Number)	3,748 / 4,038	4,928 / 5,176
Age (Percent of total population)		
Under 18 years of age	19.2	19.9
18 to 64 years of age	56.8	55.4
65 years and over	23.9	24.7
Ethnicity or Race (Percent)		
White	88.0	88.8
Black or African American	6.9	7.0
American Indian and Alaskan Native	0.2	0.1
Asian	0.4	0.7
Native Hawaiian and other Pacific Islander		0.1
Some other race	0.1	2.3
Two or more races		1.3
Hispanic or Latino (any race)	4.4	8.2
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	6.3	3.2
Percent high school graduate or higher	81.2	85.4
Percent with a Bachelor's degree or higher	17.9	21.5
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	10	9.5
And Percent who speak English less than very well	3.2	4.5
Household income (Median $)	31,687	39,839
Poverty Status (Percent of population with income below poverty line)	6.9	9.6
Percent female headed household	7.7	9.3
Home Ownership (Number)		
Owner occupied		3262
Renter occupied		1204
Value Owner-occupied Housing (Median $)		116,900
Monthly Contract Rent (Median $)		559
Employment Status (Population 16 yrs and over)		
Percent in the labor force	57.1	54.3

Factor	1990	2000
Percent of civilian labor force unemployed	5.5	2.8
Occupation (Percent in workforce)**		
Management, professional, and related occupations	-	28.5
Service occupations	-	19.3
Sales and office occupations	-	27.6
Farming, fishing, and forestry occupations	3.6	0,8
Construction, extraction, and maintenance occupations	-	13.9
Production, transportation, and material moving occupations	-	10
Industry (Percent in workforce)**		
Agriculture, forestry, fishing, hunting and mining	3.1	0.9
Manufacturing	12	8.8
Percent government workers	9.8	10.4

Table 5.8 Demographic Profile of Morehead City, North Carolina

Factor	1990	2000
Total population	6,046	7,691
Gender Ratio M/F (Number)		3,507 / 4,184
Age (Percent of total population)		
Under 18 years of age		20.2
18 to 64 years of age		59
65 years and over	16.7	20.8
Ethnicity or Race (Percent)		
White		81.7
Black or African American		14
American Indian and Alaskan Native		0.7
Asian		0.8
Native Hawaiian and other Pacific Islander		<0.1
Some other race		1.1
Two or more races		1.7
Hispanic or Latino (any race)		2.3
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	11.9	8.1
Percent high school graduate or higher	70.6	80.1
Percent with a Bachelor's degree or higher	13.2	20.8
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	3.9	4.7
And Percent who speak English less than very well	1.4	1.4
Household income (Median $)	20,041	28,737
Poverty Status (Percent of population with income below poverty line)	19.1	14.6
Percent female headed household	25.4	13.7
Home Ownership (Percent)		
Owner occupied		55.5
Renter occupied		44.5
Value Owner-occupied Housing (Median $)		106,400
Monthly Contract Rent (Median $)	376	507
Employment Status (Population 16 yrs and over)		
Percent in the labor force	59.4	60.2
Percent of civilian labor force unemployed	3.6	4.6
Occupation (Percent in workforce)**		
Management, professional, and related occupations	21.3	33.1
Service occupations	17.4	19.7
Sales and office occupations	27.1	21
Farming, fishing, and forestry occupations	3.4	1.1
Construction, extraction, and maintenance occupations		14.4

Factor	1990	2000
Production, transportation, and material moving occupations		10.7
Industry (Percent in workforce)**		
Agriculture, forestry, fishing, hunting and mining	3	1.1
Manufacturing	8.9	7.4
Percent government workers	15.7	18.1

Table 5.9 Demographic Profile of Destin, Florida

Factor	1990	2000
Total population	8,080	11,119
Gender Ratio M/F (Number)		5,610/5,509
Age (Percent of total population)		
Under 18 years of age		19.4
18 to 64 years of age		63.6
65 years and over	13.2	17
Ethnicity or Race (Percent)		
White		96.2
Black or African American		0.4
American Indian and Alaskan Native		0.4
Asian		0.1
Native Hawaiian and other Pacific Islander		0.1
Some other race		0.4
Two or more races		1.5
Hispanic or Latino (any race)		2.7
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	1.6	2.3
Percent high school graduate or higher	88.1	91.9
Percent with a Bachelor's degree or higher	24.9	31.4
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	4.3	6.8
And Percent who speak English less than very well	0.9	2.4
Household income (Median $)	32,712	53,042
Poverty Status (Percent of population with income below poverty line)	7	5.5
Percent female headed household	10.9	8
Home Ownership (Percent)		
Owner occupied		75.3
Renter occupied		24.7
Value Owner-occupied Housing (Median $)		153,800
Monthly Contract Rent (Median $)	506	774
Employment Status (Population 16 yrs and over)		
Percent in the labor force	66.6	60
Percent of civilian labor force unemployed	1.8	3.8
Occupation (Percent in workforce)**		
Management, professional, and related occupations	28.6	36.3
Service occupations		14.6
Sales and office occupations	28.3	28.4
Farming, fishing, and forestry occupations	4.7	2
Construction, extraction, and maintenance occupations		10.7
Production, transportation, and material moving occupations		8.1
Industry (Percent in workforce)**		
Agriculture, forestry, fishing, hunting and mining	4.3	1.2
Manufacturing	5.5	4.2
Percent government workers	11.5	9.1

Table 5.10 Demographic Profile of Apalachicola, Florida

Factor	1990	2000
Total population	2,707	2,334
Gender Ratio M/F (Number)		1,107 / 1,227
Age (Percent of total population)		
Under 18 years of age		21.9
18 to 64 years of age		57.6
65 years and over	16.3	20.5
Ethnicity or Race (Percent)		
White		63.4
Black or African American		34.9
American Indian and Alaskan Native		0.2
Asian		0.4
Native Hawaiian and other Pacific Islander		<0.1
Some other race		0.5
Two or more races		0.6
Hispanic or Latino (any race)		1.7
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	21.9	9.1
Percent high school graduate or higher	52.9	69.2
Percent with a Bachelor's degree or higher	12	15.3
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	2.3	2.6
And Percent who speak English less than very well	1.2	1
Household income (Median $)	12,813	23,073
Poverty Status (Percent of population with income below poverty line)	34.6	25.3
Percent female headed household	23.3	15
Home Ownership (Percent)		
Owner occupied		69
Renter occupied		31
Value Owner-occupied Housing (Median $)		83,800
Monthly Contract Rent (Median $)	285	393
Employment Status (Population 16 yrs and over)		
Percent in the labor force	48.7	50.5
Percent of civilian labor force unemployed	3.8	3.6
Occupation (Percent in workforce)**		
Management, professional, and related occupations	16.8	25.4
Service occupations	21.6	27.5
Sales and office occupations	24.7	21.2
Farming, fishing, and forestry occupations	4.6	5.9
Construction, extraction, and maintenance occupations		5.6
Production, transportation, and material moving occupations		14.4
Industry (Percent in workforce)**		
Agriculture, forestry, fishing, hunting and mining	5.4	4
Manufacturing	5	2.9
Percent government workers	22.5	20.3

Table 5.11 Demographic Profile of Orange Beach, Alabama

Factor	1990	2000
Total population	2,253	3,784
Gender Ratio M/F (Number)	1,153 / 1,100	1,967 / 1,817
Age (Percent of total population)		
Under 18 years of age	15	16.6
18 to 64 years of age	63.4	65.2
65 years and over	21.6	18.2

Factor	1990	2000
Ethnicity or Race (Number)		
White	99.2	94.8
Black or African American	0.1	0.4
American Indian and Alaskan Native	0.5	0.7
Asian	0.1	0.2
Native Hawaiian and other Pacific Islander	0.0	0.0
Some other race	0.1	2.0
Two or more races	0.0	1.9
Hispanic or Latino (any race)	0.6	2.8
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	3.1	2.1
Percent high school graduate or higher	84.3	88.4
Percent with a Bachelor's degree or higher	21.2	24.7
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	4.3	6.3
And Percent who speak English less than very well	1.1	4.3
Household income (Median $)	30,445	40,542
Poverty Status (Percent of population with income below poverty line)	8.6	10.6
Percent female headed household	5.9	7.8
Home Ownership (Percent)		
Owner occupied	798	1,305
Renter occupied	228	474
Value Owner-occupied Housing (Median $)	94,700	204,500
Monthly Contract Rent (Median $)	374	577
Employment Status (Population 16 yrs and over)		
Percent in the labor force	56.7	62.7
Percent of civilian labor force unemployed	3.9	3.1
Occupation (Percent in workforce)**		
Management, professional, and related occupations		25.9
Service occupations		18.4
Sales and office occupations		27.6
Farming, fishing, and forestry occupations	3.7	1.2
Construction, extraction, and maintenance occupations		20.4
Production, transportation, and material moving occupations		6.5
Industry (Percent in workforce)**		
Agriculture, forestry, fishing and hunting	2.7	0.6
Manufacturing	8.6	3.8
Percent government workers	10.3	9.4

Table 5.12 Demographic Profile of Grand Isle, Louisiana

Factor	1990	2000
Total population	1,455	1,541
Gender Ratio M/F (Number)	738/717	788 / 753
Age (Percent of total population)		
Under 18 years of age	28.4	23.7
18 to 64 years of age	49.4	63.1
65 years and over	7.8	13.2
Ethnicity or Race (Percent)		
White	99.5	96
Black or African American	0.1	0.2

Factor	1990	2000
American Indian and Alaskan Native	0.4	2.3
Asian	0.0	0.2
Native Hawaiian and other Pacific Islander	N/A	<0.1
Some other race	0.0	0.4
Two or more races	N/A	0.9
Hispanic or Latino (any race)	0.8	1.5
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	23.9	17
Percent high school graduate or higher	57	68.3
Percent with a Bachelor's degree or higher	5.6	13.3
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	28.2	18.4
And Percent who speak English less than very well	10.9	3.2
Household income (Median $)	19,454	33,548
Poverty Status (Percent of population with income below poverty line)	25.8	13.2
Percent female headed household	9.7	8.4
Home Ownership (Percent)		
Owner occupied	74	80.1
Renter occupied	26	19.9
Value Owner-occupied Housing (Median $)	42,100	69,500
Monthly Contract Rent (Median $)	249	409
Employment Status (Population 16 yrs and over)		
Percent in the labor force	55.1	57.8
Percent of civilian labor force unemployed	3.9	4.7
Occupation (Percent in workforce)**		
Management, professional, and related occupations	N/A	22
Service occupations	N/A	16.9
Sales and office occupations	N/A	22.5
Farming, fishing, and forestry occupations	5.4	8.8
Construction, extraction, and maintenance occupations	N/A	13.9
Production, transportation, and material moving occupations	N/A	15.9
Industry (Percent in workforce)**		
Agriculture, forestry, fishing, hunting and mining	13.9	15.3
Manufacturing	17.6	8.9
Percent government workers	13.8	14.2

Table 5.13 Demographic Profile of Port Aransas, Texas

Factor	1990	2000
Total population	2,233	3,370
Gender Ratio M/F (Number)	1,146 / 1,087	1,753 / 1,617
Age (Percent of total population)		
Under 18 years of age	21.6	18.9
18 to 64 years of age	64.5	65.4
65 years and over	13.9	15.7
Ethnicity or Race (Percent)		
White	96.1	93.9
Black or African American	0.2	0.4
American Indian and Alaskan Native	0.4	1.2
Asian	1.3	0.9
Native Hawaiian and other Pacific Islander	N/A	<0.1
Some other race	1.9	2.2
Two or more races	N/A	1.4
Hispanic or Latino (any race)	6.2	6.1
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	3.7	2.5

Factor	1990	2000
Percent high school graduate or higher	81.2	87.4
Percent with a Bachelor's degree or higher	23.9	27.9
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	8.3	9
And Percent who speak English less than very well	3.1	2.2
Household income (Median $)	23,396	39,432
Poverty Status (Percent of population with income below poverty line)	15.8	11.3
Percent female headed household	8.1	7.3
Home Ownership (Percent)		
Owner occupied	59	69.3
Renter occupied	41	30.7
Value Owner-occupied Housing (Median $)	67,100	110,500
Monthly Contract Rent (Median $)	317	571
Employment Status (Population 16 yrs and over)		
Percent in the labor force	65.6	61.5
Percent of civilian labor force unemployed	4.6	4.1
Occupation (Percent in workforce)**		
Management, professional, and related occupations	N/A	36.4
Service occupations	N/A	21
Sales and office occupations	N/A	20.3
Farming, fishing, and forestry occupations	6.3	2.8
Construction, extraction, and maintenance occupations	N/A	11.8
Production, transportation, and material moving occupations	N/A	7.7
Industry (Percent in workforce)**		
Agriculture, forestry, fishing, hunting and mining	7.3	3.6
Manufacturing	5	1
Percent government workers	20.6	21.4

Table 5.14 Demographic Profile of Freeport, Texas

Factor	1990	2000
Total population	11,389	12,708
Gender Ratio M/F (Number)	5,692/5,697	6,353 / 6,355
Age (Percent of total population)		
Under 18 years of age	34.2	35.7
18 to 64 years of age	56.7	56.2
65 years and over	9.1	8.1
Ethnicity or Race (Percent)		
White	62.2	61.6
Black or African American	15.3	13.4
American Indian and Alaskan Native	0.4	0.6
Asian	0.3	0.4
Native Hawaiian and other Pacific Islander	0.0	<0.1
Some other race	21.9	20.9
Two or more races	0.0	3.2
Hispanic or Latino (any race)	38.6	52
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	21.3	22.6
Percent high school graduate or higher	58.1	55.1
Percent with a Bachelor's degree or higher	6.4	5.4
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	31.9	45.3
And Percent who speak English less than very well	13.7	23.5
Household income (Median $)	21,483	30,245
Poverty Status (Percent of population with income below poverty line)	24.1	22.3
Percent female headed household	13.4	16.8

Factor	1990	2000
Home Ownership (Percent)		
Owner occupied	57	57
Renter occupied	43	43
Value Owner-occupied Housing (Median $)	35,800	35,700
Monthly Contract Rent (Median $)	259	439
Employment Status (Population 16 yrs and over)		
Percent in the labor force	63.6	54.3
Percent of civilian labor force unemployed	9.5	13.7
Occupation (Percent in workforce)**		
Management, professional, and related occupations	N/A	16.4
Service occupations	N/A	16.8
Sales and office occupations	N/A	24
Farming, fishing, and forestry occupations	2.3	0.1
Construction, extraction, and maintenance occupations	N/A	20.5
Production, transportation, and material moving occupations	N/A	22.2
Industry (Percent in workforce)**		
Agriculture, forestry, fishing, hunting and mining	3.8	0.4
Manufacturing	24.9	17.7
Percent government workers	10.1	10.5

Table 5.15 Demographic Profile of Barnegat Light, New Jersey

Factor	1990	2000
Total population	681	764
Gender Ratio M/F (Number)	354 / 327	389 / 375
Age (Percent of total population)		
Under 18 years of age		14.4
18 to 64 years of age		46.1
65 years and over	30.4	34.3
Ethnicity or Race (Percent)		
White	99.6	98.3
Black or African American	0.4	0.5
American Indian and Alaskan Native		
Asian		0.2
Native Hawaiian and other Pacific Islander		0.2
Some other race		0.4
Two or more races		0.2
Hispanic or Latino (any race)		0.8
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade		2
Percent high school graduate or higher	84.9	92.1
Percent with a Bachelor's degree or higher		38.9
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home		7.3
And Percent who speak English less than very well		1.5
Household income (Median $)	37,955	52,361
Poverty Status (Percent of population with income below poverty line)	7.2	4.7
Percent female headed household		3.2
Home Ownership (Percent)		
Owner occupied	82.6	87.9
Renter occupied	17.4	12.1
Value Owner-occupied Housing (Median $)		170,800
Monthly Contract Rent (Median $)		672
Employment Status (Population 16 yrs and over)		
Percent in the labor force	52.6	46.9

Factor	1990	2000
Percent of civilian labor force unemployed	0.5	2.7
Occupation (Percent in workforce)**		
Management, professional, and related occupations	32.4	40.8
Service occupations		13
Sales and office occupations	31.4	23.3
Farming, fishing, and forestry occupations	13.9	6.5
Construction, extraction, and maintenance occupations	10.4	11.3
Production, transportation, and material moving occupations		5.1
Industry (Percent in workforce)**		
Agriculture, forestry, fishing, hunting and mining	12.6	8.2
Manufacturing	7.4	4.8
Percent government workers		17.5

Table 5.16 Demographic Profile of Brielle, New Jersey

Factor	1990	2000
Total population	4,406	4,893
Gender Ratio M/F (Number)	2,124 / 2,282	2,336 / 2,557
Age (Percent of total population)		
Under 18 years of age		23.7
18 to 64 years of age		58.6
65 years and over	19.2	17.7
Ethnicity or Race (Percent)		
White	93.8	93.1
Black or African American	5.4	3.5
American Indian and Alaskan Native	0.8	0.1
Asian		0.7
Native Hawaiian and other Pacific Islander		<0.1
Some other race		1.6
Two or more races		1.1
Hispanic or Latino (any race)		3.3
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade		1.8
Percent high school graduate or higher	91.3	94.8
Percent with a Bachelor's degree or higher		44.7
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home		4.3
And Percent who speak English less than very well		1.1
Household income (Median $)	53,485	68,368
Poverty Status (Percent of population with income below poverty line)	2.3	3.9
Percent female headed household		7.6
Home Ownership (Percent)		
Owner occupied	82.3	83.4
Renter occupied	17.7	16.6
Value Owner-occupied Housing (Median $)		285,000
Monthly Contract Rent (Median $)		1,090
Employment Status (Population 16 yrs and over)		
Percent in the labor force	58.6	59.4
Percent of civilian labor force unemployed	4.4	3.5
Occupation (Percent in workforce)**		
Management, professional, and related occupations	44.7	56
Service occupations		10.1
Sales and office occupations	31.5	21.8
Farming, fishing, and forestry occupations	6.8	0.7
Construction, extraction, and maintenance occupations	0.9	4.8

Factor	1990	2000
Production, transportation, and material moving occupations		6.5
Industry (Percent in workforce)**		
Agriculture, forestry, fishing, hunting and mining	1.6	0.7
Manufacturing	11.7	8.4
Percent government workers		18

Table 5.17 Demographic Profile for Wanchese, North Carolina

Factor	1990	2000
Total population	1,380	1,527
Gender Ratio M/F (Number)	696 / 684	773 / 754
Age (Percent of total population)		
Under 18 years of age	23.4	23.4
18 to 64 years of age	58.8	64.5
65 years and over	12	12
Ethnicity or Race (Percent)		
White	99.0	96.7
Black or African American	0.1	0.3
American Indian and Alaskan Native	0.3	0.6
Asian	0.4	0.1
Native Hawaiian and other Pacific Islander	0.0	0.0
Some other race	0.3	0.5
Two or more races	N/A	0.4
Hispanic or Latino (any race)	1.1	1.8
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	10.8	4.5
Percent high school graduate or higher	67.3	76.5
Percent with a Bachelor's degree or higher	7.8	16.2
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	2.1	1.2
And Percent who speak English less than very well	0	0
Household income (Median $)	25,977	39,250
Poverty Status (Percent of population with income below poverty line)	9.3	8.1
Percent female headed household	9.4	9.8
Home Ownership (Percent)		
Owner occupied	71.2	72.3
Renter occupied	28.8	27.7
Value Owner-occupied Housing (Median $)	75,200	104,900
Monthly Contract Rent (Median $)	326	423
Employment Status (Population 16 yrs and over)		
Percent in the labor force	78.1	66.6
Percent of civilian labor force unemployed	8.9	2.8
Occupation (Percent in workforce)**		
Management, professional, and related occupations	N/A	24.3
Service occupations	N/A	18.3
Sales and office occupations	N/A	21.9
Farming, fishing, and forestry occupations	18.8	9.5
Construction, extraction, and maintenance occupations	N/A	15.8
Production, transportation, and material moving occupations	N/A	10.2
Industry (Percent in workforce)**		
Agriculture, forestry, fishing, hunting and mining	19.7	8.2
Manufacturing	9.5	13.1
Percent government workers	16.5	23.9

Table 5.18 Demographic Profile for Hatteras, North Carolina

Factor	1990	2000
Total population	2,675	2,797
Gender Ratio M/F (Number)	1,380 / 1,294	1,412 / 1,385
Age (Percent of total population)		
Under 18 years of age	23.9	20
18 to 64 years of age	65	64.2
65 years and over	11.1	15.1
Ethnicity or Race (Percent)		
White	98.8	96.7
Black or African American	0.4	0.0
American Indian and Alaskan Native	0.0	0.0
Asian	0.8	0.0
Native Hawaiian and other Pacific Islander	0.0	0.0
Some other race	0.0	1.4
Two or more races		1.9
Hispanic or Latino (any race)	0.7	3.5
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	7.1	6.6
Percent high school graduate or higher	74.4	80.2
Percent with a Bachelor's degree or higher	20.6	17.2
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	1.6	5.1
And Percent who speak English less than very well	0	2.6
Household income (Median $)	N/A[1]	N/A[1]
Poverty Status (Percent of population with income below poverty line)	6	10
Percent female headed household	9	6.2
Home Ownership (Percent)		
Owner occupied	72.3	78.1
Renter occupied	27.7	21.9
Value Owner-occupied Housing (Median $)	N/A[2]	N/A[2]
Monthly Contract Rent (Median $)	N/A[3]	N/A[3]
Employment Status (Population 16 yrs and over)		
Percent in the labor force	67.3	68.2
Percent of civilian labor force unemployed	4.2	8.9
Occupation (Percent in workforce)**		
Management, professional, and related occupations	23.7	24.6
Service occupations	15.4	16.8
Sales and office occupations	17.3	20.4
Farming, fishing, and forestry occupations	6.4	7.8
Construction, extraction, and maintenance occupations	16.4	20
Production, transportation, and material moving occupations	13.9	10.5
Industry (Percent in workforce)**		
Agriculture, forestry, fishing, hunting and mining	11.3	8.4
Manufacturing	3.4	4.4
Percent government workers	21	19.3

[1] Median Household Income is between $16,799-29,900 for 1990; $33,456-40,718 for 2000

[2] Median Value Owner-occupied Housing is between $51,900-127,600 for 1990; $111,300-155,100 for 2000

[3] Median Contract Rent is between $325-338 for 1990; $335-421 for 2000

Table 5.19 Demographic Profile for Islamorada, Florida

Factor	1990	2000

Factor	1990	2000
Total population	1,293	6,846
Gender Ratio M/F (Number)	701 / 592	3,626 / 3,220
Age (Percent of total population)		
Under 18 years of age		15.5
18 to 64 years of age		67.6
65 years and over	19.2	16.9
Ethnicity or Race (Percent)		
White	95.3	96.8
Black or African American	0.9	0.5
American Indian and Alaskan Native	0	0.2
Asian	0	0.6
Native Hawaiian and other Pacific Islander	0	0.1
Some other race	3.9	0.8
Two or more races		1
Hispanic or Latino (any race)		6.7
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade		2.7
Percent high school graduate or higher	77.8	91.7
Percent with a Bachelor's degree or higher		28.6
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home		9.3
And Percent who speak English less than very well		1.4
Household income (Median $)	26,266	41,522
Poverty Status (Percent of population with income below poverty line)	9.1	6.9
Percent female headed household		4.9
Home Ownership (Percent)		
Owner occupied	65.9	71.1
Renter occupied	34.1	28.9
Value Owner-occupied Housing (Median $)		263,500
Monthly Contract Rent (Median $)		771
Employment Status (Population 16 yrs and over)		
Percent in the labor force	73.2	62.9
Percent of civilian labor force unemployed		3.7
Occupation (Percent in workforce)**		
Management, professional, and related occupations	25.9	28
Service occupations		20.1
Sales and office occupations	30.7	30
Farming, fishing, and forestry occupations	7.9	3.9
Construction, extraction, and maintenance occupations	7.8	7
Production, transportation, and material moving occupations		10.9
Industry (Percent in workforce)**		
Agriculture, forestry, fishing, hunting and mining	6.8	3.7
Manufacturing	4.6	1.9
Percent government workers		13.5

Table 5.20 Demographic Profile of Madeira Beach, Florida

Factor	1990	2000
Total population	4,225	4,511
Gender Ratio M/F (Number)	2,156 / 2,069	2,376 / 2,135
Age (Percent of total population)		
Under 18 years of age	8.7	8.2
18 to 64 years of age	65.7	69.8
65 years and over	25.6	22
Ethnicity or Race (Percent)		

Factor	1990	2000
White	98.5	97.1
Black or African American	0.2	0.3
American Indian and Alaskan Native	0.2	0.3
Asian	0.8	0.6
Native Hawaiian and other Pacific Islander		0.0
Some other race	0.4	0.7
Two or more races		1.1
Hispanic or Latino (any race)	2.5	2.4
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	4.2	2.6
Percent high school graduate or higher	83.8	87.3
Percent with a Bachelor's degree or higher	19.5	22.2
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	4.5	6.8
And Percent who speak English less than very well	1.5	2
Household income (Median $)	24,748	36,671
Poverty Status (Percent of population with income below poverty line)	8.4	9.8
Percent female headed household	5.3	5.3
Home Ownership (Percent)		
Owner occupied	1,290	1,454
Renter occupied	940	1,074
Value Owner-occupied Housing (Median $)	111,400	171,000
Monthly Contract Rent (Median $)	392	555
Employment Status (Population 16 yrs and over)		
Percent in the labor force	58.5	61.5
Percent of civilian labor force unemployed	2.7	4.4
Occupation (Percent in workforce)**		
Management, professional, and related occupations		30.4
Service occupations		22.1
Sales and office occupations		28.9
Farming, fishing, and forestry occupations	1.4	0.7
Construction, extraction, and maintenance occupations		10.6
Production, transportation, and material moving occupations		7.2
Industry (Percent in workforce)**		
Agriculture, forestry, fishing, hunting and mining	1.4	0
Manufacturing	7.5	7
Percent government workers	8.2	4.5

Table 5.21 Demographic Profile for New Bedford, Massachusetts

Factor	1990	2000
Total population	99,922	93,768
Gender Ratio M/F (Number)		44,173 / 49,595
Age (Percent of total population)		
Under 18 years of age		24.9
18 to 64 years of age		58.4
65 years and over	17.4	16.7
Ethnicity or Race (Percent)		
White	87.8	78.9
Black or African American	3.8	4.4
American Indian and Alaskan Native	0.4	0.6
Asian	0.3	0.7
Native Hawaiian and other Pacific Islander		<0.1
Some other race		9.5
Two or more races		5.9

Factor	1990	2000
Hispanic or Latino (any race)		10.2
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade		24.3
Percent high school graduate or higher	49.7	57.6
Percent with a Bachelor's degree or higher		10.7
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home		37.8
And Percent who speak English less than very well		17.3
Household income (Median $)	22,647	27,569
Poverty Status (Percent of population with income below poverty line)	16.8	20.2
Percent female headed household	23.8	18.9
Home Ownership (Percent)		
Owner occupied	43.8	43.8
Renter occupied	56.2	56.2
Value Owner-occupied Housing (Median $)		113,500
Monthly Contract Rent (Median $)	404	455
Employment Status (Population 16 yrs and over)		
Percent in the labor force	52.1	57.7
Percent of civilian labor force unemployed	7.2	5
Occupation (Percent in workforce)**		
Management, professional, and related occupations	17	20.8
Service occupations		19.8
Sales and office occupations	27.2	23.6
Farming, fishing, and forestry occupations	11.9	1
Construction, extraction, and maintenance occupations	2.6	9.8
Production, transportation, and material moving occupations		25.1
Industry (Percent in workforce)**		
Agriculture, forestry, fishing, hunting and mining	3.2	1.1
Manufacturing	27.8	20.7
Percent government workers	14.6	13.1

Table 5.22 Demographic Profile of Gloucester, Massachusetts

Factor	1990	2000
Total population	28,716	30,273
Gender Ratio M/F (Number)	1,4874 / 1,3841	14,502 / 15,771
Age (Percent of total population)		
Under 18 years of age		22
18 to 64 years of age		62.4
65 years and over	15.4	15.6
Ethnicity or Race (Percent)		
White	99.4	97
Black or African American	0.2	0.6
American Indian and Alaskan Native	0.1	0.1
Asian	0.2	0.7
Native Hawaiian and other Pacific Islander		<0.1
Some other race		0.5
Two or more races		1
Hispanic or Latino (any race)		1.5
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade		5.2
Percent high school graduate or higher	75.6	85.7
Percent with a Bachelor's degree or higher		27.5
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home		10.3

Factor	1990	2000
And Percent who speak English less than very well		3.6
Household income (Median $)	32,690	47,722
Poverty Status (Percent of population with income below poverty line)	7.5	8.8
Percent female headed household		10.6
Home Ownership (Percent)		
Owner occupied	57.8	59.7
Renter occupied	42.2	40.3
Value Owner-occupied Housing (Median $)		204,600
Monthly Contract Rent (Median $)		677
Employment Status (Population 16 yrs and over)		
Percent in the labor force	62.6	66.1
Percent of civilian labor force unemployed	4.5	3.2
Occupation (Percent in workforce)**		
Management, professional, and related occupations	26.8	36.1
Service occupations		15.1
Sales and office occupations	28	25.4
Farming, fishing, and forestry occupations	13	2
Construction, extraction, and maintenance occupations	2.8	8
Production, transportation, and material moving occupations		13.4
Industry (Percent in workforce)**		
Agriculture, forestry, fishing, hunting and mining	3.9	2.5
Manufacturing	22.1	16.7
Percent government workers		12.2

Table 5.23 Demographic Profile for Dulac, Louisiana

Factor	1990	2000
Total population	3,273	2,458
Gender Ratio M/F (Number)	1,673 / 1,600	1.229 / 1,229
Age (Percent of total population)		
Under 18 years of age	36.9	31.4
18 to 64 years of age	56	58.8
65 years and over	7.1	9.8
Ethnicity or Race (Percent)		
White	49.0	54.0
Black or African American	2.4	2.5
American Indian and Alaskan Native	47.9	39.4
Asian	0.4	0.5
Native Hawaiian and other Pacific Islander	0.0	0.0
Some other race	0.3	0.5
Two or more races		3.1
Hispanic or Latino (any race)	2.0	1.7
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	55.5	38.1
Percent high school graduate or higher	27.1	39.9
Percent with a Bachelor's degree or higher	1.9	3.9
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	50.1	37.4
And Percent who speak English less than very well	14.5	10.8
Household income (Median $)	12,653	22,900
Poverty Status (Percent of population with income below poverty line)	49.3	30.9
Percent female headed household	12.2	14.2
Home Ownership (Percent)		
Owner occupied	80.1	79.3
Renter occupied	19.9	20.7

Factor	1990	2000
Value Owner-occupied Housing (Median $)	28,700	54,700
Monthly Contract Rent (Median $)	179	407
Employment Status (Population 16 yrs and over)		
Percent in the labor force	45.9	44.9
Percent of civilian labor force unemployed	17.5	6.7
Occupation (Percent in workforce)**		
Management, professional, and related occupations		12.4
Service occupations		12.7
Sales and office occupations		17.7
Farming, fishing, and forestry occupations	17.2	15.9
Construction, extraction, and maintenance occupations		12
Production, transportation, and material moving occupations		29.4
Industry (Percent in workforce)**		
Agriculture, forestry, fishing, hunting and mining	19.6	19.8
Manufacturing	14	10
Percent government workers		6

Table 5.24 Demographic Profile of Venice, Louisiana

Factor	1990	2000
Total population	1,073	699
Gender Ratio M/F (Number)	545 / 528	377 / 322
Age (Percent of total population)		
Under 18 years of age	35.8	31.9
18 to 64 years of age	56.2	60.1
65 years and over	8	8
Ethnicity or Race (Percent)		
White	86.7	83.3
Black or African American	6.6	7.9
American Indian and Alaskan Native	5.5	3.9
Asian	1.2	3.6
Native Hawaiian and other Pacific Islander		0.0
Some other race	0.0	0.4
Two or more races		1.0
Hispanic or Latino (any race)	2.1	1.0
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	32.2	37.2
Percent high school graduate or higher	41.4	39.9
Percent with a Bachelor's degree or higher	2.8	3.6
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	6.7	9.4
And Percent who speak English less than very well	0.6	2.5
Household income (Median $)	17,717	33,750
Poverty Status (Percent of population with income below poverty line)	40.9	19.3
Percent female headed household	0	10.5
Home Ownership (Percent)		
Owner occupied	283	223
Renter occupied	49	23
Value Owner-occupied Housing (Median $)	49,200	35,600
Monthly Contract Rent (Median $)	219	275
Employment Status (Population 16 yrs and over)		
Percent in the labor force	45.3	48.1
Percent of civilian labor force unemployed	5.6	6.6
Occupation (Percent in workforce)**		

Factor	1990	2000
Management, professional, and related occupations	7.2	7.1
Service occupations	11.5	15.7
Sales and office occupations	18.1	26.7
Farming, fishing, and forestry occupations	12.5	12.4
Construction, extraction, and maintenance occupations	35.6	18.1
Production, transportation, and material moving occupations	14.8	19.6
Industry (Percent in workforce)**		
Agriculture, forestry, fishing and hunting	17.4	8.6
Manufacturing	5.2	9
Percent government workers	7.2	14.3

6 Appendix B HMS Tournament Calendar

Table 6.1 Calendar of Relevant HMS Fishing Tournaments

Location	Event*	Date	Web site
Beaufort, NC	Barta Boys and Girls Club Billfish Tournament	July 17 - 19, 2008	http://www.bartabillfish.com/
Wakefield, RI	Annual Snug Harbor Shark Tournament	July 12 - 13, 2008	http://www.snugharbormarina.com/door/
Montauk, NY	Star Island Shark Tournament	June 11 - 14, 2008	http://www.starislandyc.com/tournaments.asp
	Montauk Marine Basin Shark Tournament	June 26 - 28, 2008	http://www.montaukmarinebasin.com
	Star Island Mako/Thresher Mania Tournament	August 8 - 9, 2008	http://www.starislandyc.com/tournaments.asp
Cape May, NJ	South Jersey Shark Tournament	June 12 - 15, 2008	http://www.sjmarina.com
	The War at the Shore	July 9 - 13, 2008	http://www.sjmarina.com
	Mid-Atlantic Tuna Tournament	July 16 - 19, 2008	http://www.sjmarina.com
	17th Annual Mid-Atlantic $500,000	August 17 - 22, 2008	http://www.ma500.com
Ocean City, MD	Annual Mako Mania Shark Tournament	June	http://www.bahiamarina.com/
	28th Annual Ocean City Shark Tournament	June 11 - 15, 2008	http://www.bigsharks.com/tournament.htm
	21st Annual Ocean City Tuna Tournament	July 11 - 13, 2008	http://www.oceancitytunatournament.com/ or www.ocfishing.com
	Mid Atlantic $500,000	August TBA	http://www.ma500.com
	The White Marlin Open	August 4 - 8, 2008; August 3 - 7, 2009	http://www.whitemarlinopen.com/
	Annual Captain Steve Harman Poor Girl's Open	August	http://www.bahiamarina.com/
Port Salerno, FL	Stuart Sailfish Ladies Tournament	May	http://www.stuartsailfishclub.com/
	Small Boat Tournament	June	
	Junior Angler Tournament	September	
	Stuart Sailfish Club Members Tournament	November	
	Light Tackle Tournament	December	
Morehead City, NC	The Big Rock Blue Marlin tournament	June 7 - 14, 2008	http://www.thebigrock.com
	N.C. Ducks Unlimited Band the Billfish 2008	July 31 - August 2, 2008	http://www.bandthebillfish.com

Location	Event*	Date	Web site
Destin, FL	Destin Fishing Rodeo	October	http://www.destinfishingrodeo.org/
	Emerald Coast Blue Marlin Classic	June 24 - 29, 2008	http://www.fishecbc.com/
Orange Beach, AL	Mobile Big Game Fishing Club Memorial Day Tournament 2008	May 23 - 26, 2008	http://www.mbgfc.org/
	The Masters at Wharf 2008	June 17 - 22, 2008	http://www.worldbillfishseries.com/tournament.php?tournamentid=112
	Mobile Big Game Fishing Club Ladies Day Tournament	June 20 - 21, 2008	http://www.mbgfc.org/
	Orange Beach Billfish Classic 2008	July 30 - August 3, 2008	http://www.orangebeachbillfishclassic.com/
	Mobile Big Game Fishing Club Jr. Angler	July 11 - 12, 2008	http://www.mbgfc.org/
	Mobile Big Game Fishing Club Small Boat Billfish Limited	July 25 - 27, 2008	http://www.mbgfc.org/
	Mobile Big Game Fishing Club Labor Day	August 29 - September 1, 2008	http://www.mbgfc.org/
Port Aransas, TX	Port Aransas Grand Slam	Dates not available	http://www.marlininternational.com/texas.htm
	Texas Legends Billfish Open	August 7 - 10, 2008	http://www.stingerhooksystems.com/legends.htm
	Alice Kelly Memorial Texas Ladies Only Billfish Tournament	August 12 - 15, 2008	http://www.pcbgt.com
	Texas Women Anglers Tournament	August 22 - 24, 2008	http://www.gofishtx.com/TWA/Home
Atlantic Beach, NC	Captain Fannie's Billfish Tournament (Marline International Association)	Dates not available	http://www.marlininternational.com/n.htm
Hatteras, NC	Hatteras Village Offshore Open (Marline International Association)	Dates not available	http://www.marlininternational.com/n.htm
	Holiday Isle Sailfish Classic	January 11 - 13, 2008	http://www.inthebite.com/fishing_calender/tournycalender2008.shtml
Islamorada, FL	Outdoor Channel Offshore Classic	January 14 - 16, 2008	http://www.igfatournaments.com
	Cheeca Lodge Presidential Sailfish Tournament	January 17 - 19, 2008	http://www.cheeca.com/index.asp

Location	Event*	Date	Web site
	Islamorada Fishing Club Sailfish Tournament	January 23 - 24, 2008	http://www.theislamoradafishingclub.com
	Islamorada Women's Sailfish Tournament	February 8 - 10, 2008	http://www.inthebite.com/fishing_calender/tournycalender2008.shtml
	Islamorada Swordfish Tournament 2008	August 15-17, 2008	http://www.miamiswordfishtournament.com
	Islamorada Sailfish 500	November TBA	http://www.inthebite.com/fishing_calender/tournycalender2008.shtml
	Islamorada Sailfish Tournament	December TBA	http://www.inthebite.com/fishing_calender/tournycalender2008.shtml
	Islamorada Fishing Club Captain's Cup Sailfish Tournament	December TBA	http://www.inthebite.com/fishing_calender/tournycalender2008.shtml
	Annual Captain Don Gurgiolo Sailfish Classic	December TBA	http://www.inthebite.com/fishing_calender/tournycalender2008.shtml
	Islamorada Junior Sailfish Tournament	December TBA	http://www.inthebite.com/fishing_calender/tournycalender2008.shtml
Venice, LA	Cajuns Billfish Classic	May 27 - June 1, 2008	http://www.comfishla.com
	New Orleans Invitational Billfish Tournament	June 14-15, 2008	http://www.nobgfc.com
Other Useful Links			
http://www.fishwbs.com/index.php			
http://www.fishingworks.com/fishing-tournaments/			
http://www.igfa.org/			
http://www.inthebite.com/			

This list is not intended to be exhaustive