OCS Study
MMS 2002-078

Deepwater Program

Bluewater Fishing and OCS Activity: Interactions between the Fishing and Petroleum Industries in Deepwaters of the Gulf of Mexico

Final Report





MMS U.S. Department of the Interior
Minerals Management Service
Gulf of Mexico OCS Region

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Bluewater Fishing and OCS Activity, Interactions between the Fishing and Petroleum Industries in Deepwaters of the Gulf of Mexico

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ACRONYMS AND ABBREVIATIONS

AFS	American Fisheries Society
BCF	Bureau of Commercial Fisheries
CAPP	Canadian Association of Petroleum Producers
C/COG	California/Coastal Operators Group
CEQA	California Environmental Quality Act
CNOPB	Canada-Newfoundland Offshore Petroleum Board
CNSOPB	Canada-Nova Scotia Offshore Petroleum Board
CPUE	catch per unit effort
DOCD	Development Operations Coordination Document
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EIS	Environmental Impact Statement
FAD	fish attracting device
FCF	Federal Contingency Fund
FLO	Fisheries Liaison Officer
FLS	Fishing Liaison Skipper
FOOCG	Fisheries and Offshore Oil Consultative Group
FPS	floating production system
FPSO	floating production system with storage and offloading
GI	gas injector
GIS	geographic information system
GMFMC	Gulf of Mexico Fishery Management Council
ICCAT	International Commission for the Conservation of Atlantic Tunas
IDWG	Interagency Decommissioning Working Group
IGFA	International Game Fish Association
IUCN	International Union for Conservation of Nature and Natural Resources
LCF	Local Contingency Fund
MMS	Minerals Management Service
MODU	mobile offshore drilling unit
MRFSS	Marine Recreational Fisheries Statistics Survey
NFFO	National Federation of Fishermen's Organizations
NMFS	National Marine Fisheries Service
NTL	Notice to Lessees
OCS	outer continental shelf
PA	plugged and abandoned
POE	Plan of Exploration
ROV	remotely operated vehicle
SAFMC	South Atlantic Fishery Management Council
SBC	Santa Barbara County
SFF	Scottish Fishing Federation
TA	temporarily abandoned
TLP	tension leg platform
TOR	Terms of Reference
TPWD	Texas Parks & Wildlife Department
UKOOA	United Kingdom Offshore Operators Association

1.0 INTRODUCTION

The fishing and offshore energy industries have coexisted for decades in shelf waters of the northern Gulf of Mexico. This coexistence has been amicable and apparently not detrimental, as productivities of both industries have ranked highly in their respective global arenas since the 1950's. Some are of the opinion that the offshore oil and gas industry has actually improved or even created fisheries due to the artificial reef effect that more than 4,000 offshore platforms and structures have had on the regional fish fauna. As a result of the artificial reef effect of structures, recreational and commercial fishers regularly use offshore platforms as fishing sites (e.g., Stanley and Wilson 1990). This interaction between oil and gas and fisheries endeavors is considered beneficial. However, other fisheries, particularly bottom trawling for shrimp, have had to yield ground to the platforms, pipelines, and vessels that comprise the offshore oil and gas industry. These types of interactions are usually termed space-use conflicts. Space-use conflicts can arise when more than one interested party competes for a finite, spatially bound resource. Such interactions have occurred offshore of California (Cormick and Knaster 1986) and in the North Sea, where fisheries and oil and gas activities overlap within a much smaller area than the Gulf of Mexico shelf.

The offshore energy industry in the Gulf of Mexico is shifting its interest beyond the shelf and into deeper waters (>200 m). This is evidenced by almost 3,800 active leases and about 36 development/production facilities in water depths greater than 200 m. Economic feasibility of development in deeper waters has been facilitated by the passage of the Deep Water Royalty Relief Act, which provides tax incentives to the energy companies, and the development of new technology for exploration and recovery of hydrocarbon reserves. Existing and future structures represent new and evolving technology that could interact with existing deepwater (bluewater) fisheries in ways that differ from the experience in shelf waters. In fact, all phases of the offshore energy industry--geophysical surveys, exploratory drilling, development/production, and abandonment--could interact with current deepwater fishing practices. In the northern Gulf of Mexico, these practices include trapping for golden crab, trawling for royal red shrimp, bottom longlining for groupers, snapper, and tilefishes, and surface longlining for sharks, swordfish, and tunas. At the same time, the energy industry is leasing tracts of seafloor from the Minerals Management Service (MMS) for the purpose of hydrocarbon development. The process is very costly and interruptions to normal operations due to entanglement with fishing gear could be very costly and even pose risks to human safety. Therefore, despite the fact that the fisheries and energy industries have coexisted for so long in shelf waters, the differing methods and technologies employed in deep waters of the Gulf could present potential problems for each industry.

The potential for interactions between bluewater fishing and deepwater energy industry was raised as a major concern by a fisheries subcommittee convened during a recent deepwater workshop (Carney 1998) sponsored by the MMS. This concern provided the impetus for the present study to gather and analyze available information to ascertain the potential for interactions in the near future of current deepwater activity in the Gulf of Mexico.

In this report, actual and potential interactions between the two industries are assessed through the following objectives:

- Determine bluewater fishing endeavors and practices and deepwater outer continental shelf (OCS) energy development activities;
- Describe and map bluewater fishing and deepwater OCS energy development activities;
- Describe current Gulf of Mexico and relevant worldwide interactions and predict future situations that may occur in the Gulf of Mexico between bluewater fishing and deepwater OCS energy development activities; and
- Recommend proactive mitigation measures for MMS and for the fishing and OCS energy industries.

The report is arranged into six sections. This section (**Section 1.0**) provides the introduction and statement of the problem. **Section 2.0** contains a description of the methods, rationale, and data sources used. **Section 3.0** contains a discussion of commercial and recreational bluewater fishing industries in the Gulf of Mexico, beginning with a brief history of bluewater fishing in the Gulf followed by a series of biological accounts of the primary species sought by bluewater fishers. Commercial fisheries are characterized by gear type and catch and effort, and recreational/charter fisheries are characterized using similar information. Geographic Information System (GIS) mapping is used to support descriptions of spatial patterns in the fisheries. **Section 4.0** is a profile of the deepwater energy industry with descriptions of facilities and activities currently in use in the Gulf. Present and future leasing activity is assessed to project where future interactions could occur. **Section 5.0** is an examination of the current information on conflicts between fishing and oil and gas industries in domestic and international waters; a subsection (**Section 5.2**) presents the use of GIS analyses of spatially explicit data gathered in **Sections 3.0** and **4.0** to project future areas of possible interactions in deep waters of the Gulf. A synthesis of the information is provided in **Section 6.0** and a list of recommendations is presented. The final section (**Section 7.0**) is the literature cited. The **Appendices** contain extensive tables and other information supporting various discussions in **Sections 3.0**, **4.0**, and **5.0**.

2.0 METHODS

The study area for the project includes the Exclusive Economic Zone (EEZ) of the Gulf of Mexico in water depths greater than 200 m (**Figure 2.1**).

2.1 DATA SOURCES AND ACQUISITION

2.1.1 OCS Energy Industry

The first two objectives were addressed by gathering descriptive information and "mappable" data from a variety of sources for the fishing and OCS energy industries. Much of the data on leases, wells, and exploration and development planning, upon which the description of OCS activities (**Section 4.0**) is based, was downloaded from publicly available databases maintained by the MMS on their Gulf of Mexico website (www.gomr.mms.gov/). Information on deepwater platforms was obtained from MMS platform verification records and operators.

Past and current information gathered from the MMS data sets contained the following:

- Active leases;
- Sale 181 lease blocks;
- Filed Plans of Exploration (POEs);
- Existing development facilities; and
- Existing pipelines.

Existing facility descriptions were obtained from filed Development Operations Coordination Documents (DOCDs) or POEs, U.S. Coast Guard files, and industry operators. Future OCS activity was projected from the MMS data sets that included active leases with filed POEs or DOCDs, announced discoveries with filed POEs or DOCDs, and future pipelines. In addition, an analysis of lease bonuses paid on existing leases was made to identify lease blocks that received high bids. The MMS lease database from July 2000 was used as the source for examining information on lease bonuses paid. All exploration drilling and development activities in deepwater Gulf of Mexico require written plans to be submitted by the operator and approved by the MMS. Operators' POEs and DOCDs are perhaps the most direct indicator of future activities. This evaluation is based on plans approved by the MMS between December 1997 and July 2000 – the rationale for this is that older plans are likely either completed or changed. During that period, unique plans covering over 400 deepwater lease blocks were approved.

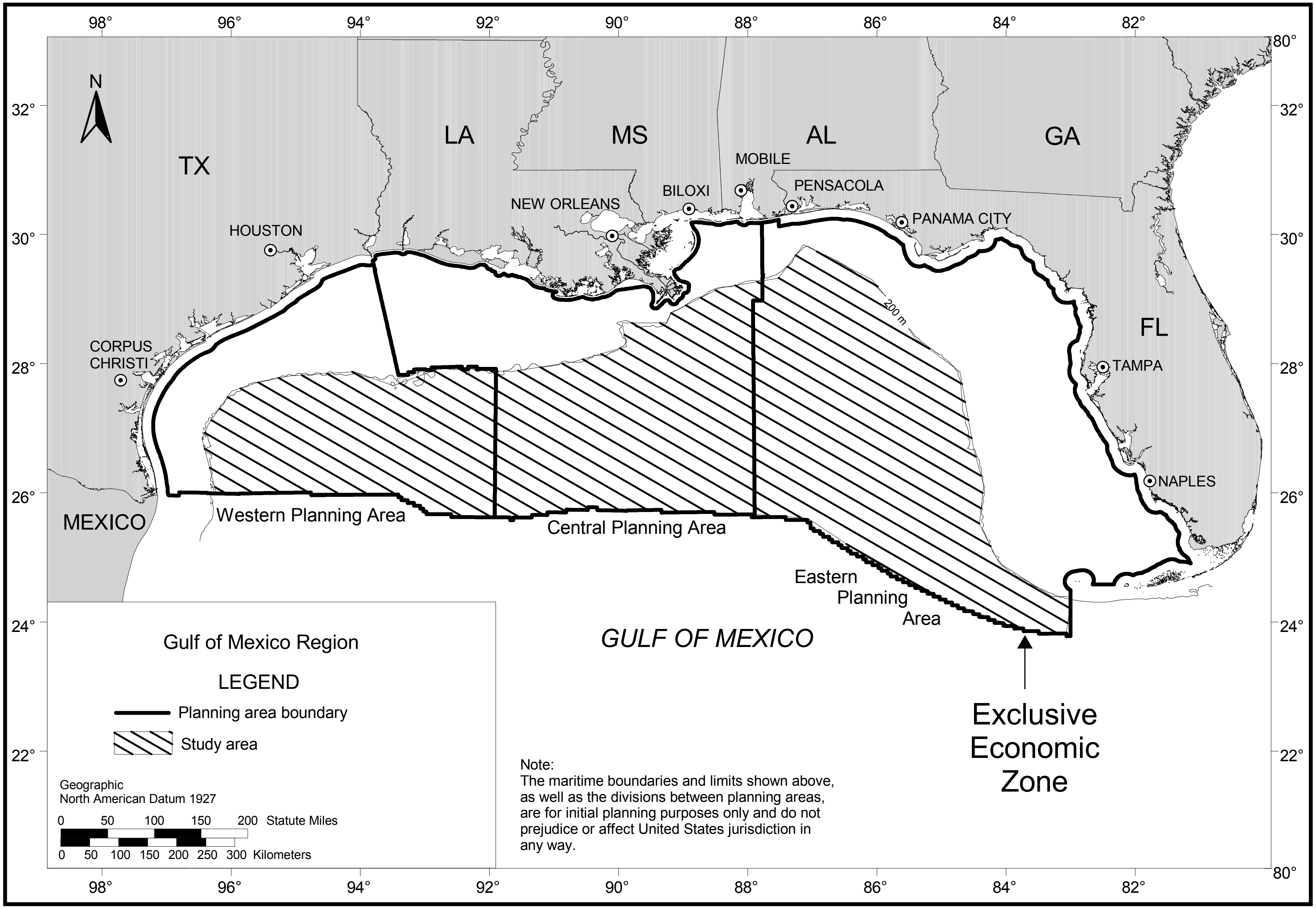

Figure 2.1. Gulf of Mexico study area showing the planning area boundaries, the 200-m isobath, and the Exclusive Economic Zone boundary.

2.1.2 Bluewater Fishing

2.1.2.1 Commerical Fishing

The bluewater commercial fishing industry was described from data obtained from National Marine Fisheries Service (NMFS). Several relevant data sets (with contact persons and their affiliations) were available, including the following:

- Pelagic Longline Logbook (Josh Bennett and Gerry Scott, NMFS, Miami, Florida);
- Reef Fish Logbook (Mike Judge, NMFS, Miami, Florida);
- Shrimp Landings and Trips (Grid, Water Depth) (Josh Bennett, NMFS, Miami, Florida); and
- Fishery Permits (Robert Sadler, NMFS, Miami, Florida).

Mandatory logbook programs provide detailed data for certain fisheries, including fishing area, times, and gear types. The two logbook data sets are derived from a self-reporting system required of the permit holders. There is concern that these reports may lack objectivity and therefore accuracy (Larkin et al. 1998). However, we assumed, as others have (Larkin et al. 1998), that the data were reported accurately and are valid for relative observations about the fisheries. For the longline logbook data, two subsets were extracted. One longline set data file that included length of set, number of hooks, latitude and longitude of the set by month and year for years 1994 to 1998. Another was a subset of data with the catch information for each longline set matched to the latitude and longitude (minutes and seconds) of the set data. Only sets with 100 or more hooks were included to ensure that only true longline sets were being analyzed. The number of vessels involved in each year's data set also was provided by NMFS. The data were scanned and obviously erronous records were discarded prior to analyses.

The spatial resolution of the pelagic longline logbook data was very good; however, the reef fish and shrimp data sets were recorded at the much coarser scale of the NMFS statisical grids. The statistical grid system was developed to track the shrimp fisheries, but it is now used to monitor the spatial distribution for many finfisheries (**Figure 2.2**). There are 21 contiguous grids around the northern Gulf extending from the Florida Keys to the Texas-Mexico border. Although many of the individual grids shown in **Figure 2.2** have seaward edges inside the 200-m isobath, permit holders recording catches from deeper waters assume that the closest grid extends across the depth contours. The reef fish data set included state, gear type, grid, numbers, and weights of fish caught by trip for the years 1994 to 1998. However, there is no explicit way to ascertain the actual water depth of the catch from the data set. Therefore, to map information from the reef fish data sets, we used the known depth ranges for species reported within individual grids. There are 55 species on the logbook form filled out by permit holding fishers. For the purposes of describing the fishery in water depths exceeding 200 m, we extracted 11 species known to be caught primarily in deeper waters from that list and designated them as "deep reef" fishes. These species, referrred to as "deep reef" fishes in the rest of the report, are listed in **Table 2.1**. We sought species that would normally sustain a fishery in these water depths.

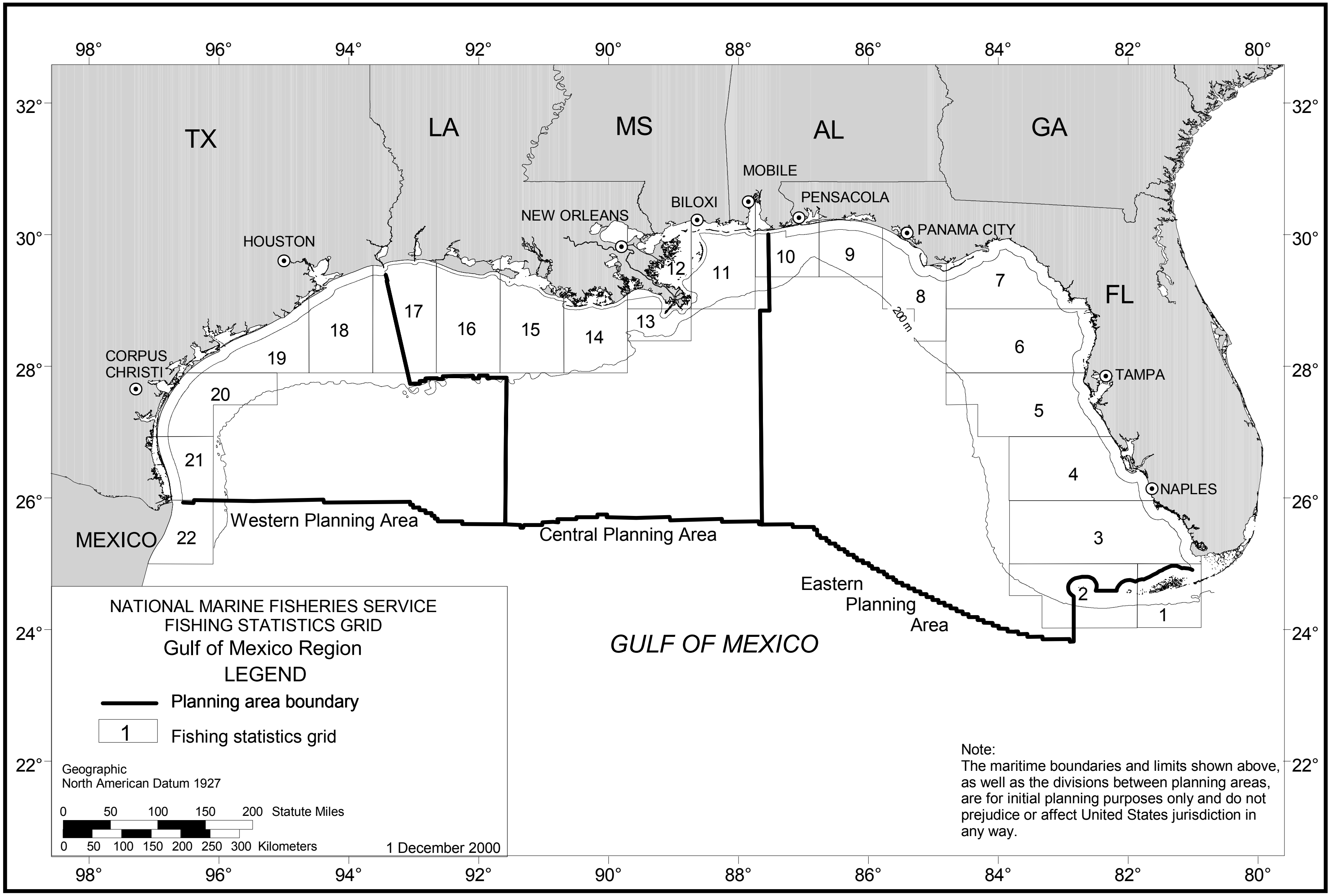

Figure 2.2. National Marine Fisheries Service statistical grid system for the Gulf of Mexico.

Table 2.1. Deep reef species from the National Marine Fisheries Service reef fish logbook data set.

Common Name	Scientific Name
Yellowedge grouper	*Epinephelus flavolimbatus*
Warsaw grouper	*Epinephelus nigritus*
Snowy grouper	*Epinephelus niveatus*
Misty grouper	*Epinephelus mystacinus*
Speckled hind	*Epinephelus drummondhayi*
Tilefish	*Lohpolatilus chamaeleonticeps*
Blueline tilefish	*Caulolatilus microps*
Vermilion snapper	*Rhomboplites aurorubens*
Silk snapper	*Lutjanus vivanus*
Blackfin snapper	*Lutjanus bucanella*
Queen snapper	*Etilus oculatus*

The shrimp data set used to characterize royal red shrimp catches and effort included depth ranges, month, and grid for each year from 1994 to 1998.

2.1.2.2 Recreational Fishing

Marine recreational fishery catch and effort data for Louisiana, Mississippi, Alabama, and Florida (NMFS, Fisheries Statistics and Economics Division 2001) were obtained from the NMFS Marine Recreational Fisheries Statistics Survey (MRFSS) website at http://www.st.nmfs.gov/st1/recreational/queries/index.html. Recreational fishery data from Texas were obtained through the cooperation of Page Campbell and Rocky Strong of the Texas Parks & Wildlife Department (TPWD 2001). The MRFSS data set lacks measures of fishing effort, while the TPWD provides this information.

Gulf of Mexico billfish catch and effort data were obtained from Eric Prince and Arietta Venizelos of the NMFS, Miami, Florida (NMFS 2001a). These data are summarized in **Appendix A, Table A-1**. Most of the data are from tournaments, with only a small bit of non-tournament dock coverage from five ports (St. Petersburg, Destin, Galveston, Port Aransas, Padre Island). State and port data must be compared with caution, however, because levels of monitoring effort at each port differ. In addition, the species catch and release data are confined to billfishes (blue marlin, *Makaira nigricans*; white marlin, *Tetrapterus albidus*; sailfish, *Istiophorus platypterus*; swordfish, *Xiphias gladius*; and spearfishes, *Tetrapterus* spp.) and two large species of tuna, the bluefin (*Thunnus thynnus*) and yellowfin (*Thunnus albacares*). In recent years, other species, notably wahoo (*Acanthocybium solandri*) and dolphin (*Coryphaena hippurus* and *C. equisetis*), have been monitored as well (Venizelos, pers. comm.), but such data are not available for our time period. The billfish and large tuna data likely are representative of the entire offshore pelagic recreational fishery.

The NMFS permit office provided the number of charter vessel permits issued for each state bordering the Gulf of Mexico. Because Florida data were not electronically separated into east (Atlantic coast) and west (Gulf of Mexico) coast categories, hand counts were made from the master list to determine the number of permit holders listing home ports along the Florida Gulf coast (not including the Florida Keys).

Recreationally caught billfish catch-per-unit-effort statistics from the Gulf of Mexico for the period 1973 through 1999 was gathered from International Commission for the Conservation of Atlantic Tunas (ICCAT) Working Document SCARS/00/58 entitled "Standardized Catch Rates for Blue (and White) Marlin" by Mauricio Ortiz and Mark I. Farber [available on-line at www.iccat.org]. The NMFS billfish program supplied the data for this region to ICCAT.

Walt Jennings of Venice, Florida kindly supplied a manuscript containing information on Gulf of Mexico billfish fishing techniques, popular fishing locations, and overall trends of abundance. His forthcoming article, *"Coming Of Age – A Guide to the Northern Gulf of Mexico's Burgeoning Billfish Action,"* is scheduled to appear in a future issue of Sport Fishing magazine. This manuscript proved to be an invaluable source of historical and current information on the fishery.

Mitch Roffer of Roff's Ocean Fishing Forecasting Service, Inc. in Miami, Florida provided valuable information on where and when bluewater fishers are active in the northern Gulf of Mexico. His forecasting service supplies locations of mesoscale oceanographic features gathered from real-time interpretation of satellite imagery to fishers venturing offshore in search of epipelagic species.

2.1.3 Conflict Information

Information on current domestic conflicts was gathered from the NMFS Fishermen's Contingency Fund (Gulf of Mexico and California) and California Fisheries Liaison Office, Santa Barbara County, California. Information on international interactions was compiled from a variety of sources. Oil and gas groups that proved to be important sources of information included the following:

- The Canadian Association of Petroleum Producers;
- Canada-Nova Scotia Offshore Petroleum Board;
- Canada-Newfoundland Offshore Petroleum Board;
- Minerals Resources, Tasmania; and
- Australian Petroleum Production and Exploration.

2.2 GEOGRAPHIC INFORMATION SYSTEMS

ArcView 3.2® GIS was used to conduct the spatial overlap analysis. GIS techniques were used to determine the relative potential of future interactions between deepwater development and bluewater fishing activity. The types of bluewater fishing considered in the analysis were pelagic longline fishing, deep reef fishing, and royal red shrimp trawling. Trapping for deepwater crabs was not used because of limited activity in that fishery. The deepwater development factors considered in the spatial overlap analysis included existing deepwater structures, i.e., platforms and lease blocks with high lease bonus bids, filed POEs, and filed DOCDs.

Pelagic longline fishing effort was depicted in ArcView 3.2® by plotting locations (geographic coordinates) of longline sets from a database provided by NMFS. Spatial overlap analysis for pelagic longline fishing was constrained by the fact that it occurred in practically all of the deepwater areas of the Gulf of Mexico. The deep reef and royal red shrimp data were more amenable to spatial overlap analyses. Separate shapefiles (the native ArcView 3.2® file format) of the NMFS statistical grid were created to depict fishing effort (number of trips) for deep reef species and royal red shrimp using data provided by NMFS. Using bathymetry data (isobaths) for the Gulf of Mexico provided by the MMS, depth distributions for two key deep reef species, i.e., tilefish and yellowedge grouper (**Table 2.1**), and royal red shrimp reported in the literature were used to create depth range polygons spanning the entire Gulf of Mexico. Because the available isobaths in the MMS bathymetry did not correspond to the actual depth distributions, the closest isobath shoreward of the depth distribution and the closest deeper isobath was used for the depth range. The depth distributions of tilefish and yellowedge grouper were combined to create a single deep reef species depth range polygon. The seaward limits of the NMFS statistical grids do not reach the deep reef species and royal red shrimp depth ranges, although efforts and landings are reported still on the basis of the NMFS statistical grids. Therefore, the depth range polygon for each species was subdivided into smaller cells (subpolygons) corresponding to the nearest NMFS statistical grid inshore of the depth range. The area of each resulting depth range cell was then calculated.

Polygons of lease blocks with high lease bonus bids were created as ArcView 3.2® shapefiles along with lease blocks with filed POEs and DOCDs. Using a polygon demarcating the deepwater areas (200 m and deeper) of the Gulf of Mexico located within MMS planning areas, deepwater platforms were extracted from the original shapefile of offshore platforms in the Gulf of Mexico provided by the MMS. The total number of deepwater platforms was counted. Excel® databases listing lease blocks with high lease bonus bids and filed POEs and DOCDs were used to extract corresponding lease blocks from the original lease block shapefile provided by the MMS and create separate shapefiles for each. The total number of lease blocks in each of the resulting shapefiles was counted.

The spatial overlap analysis was conducted using geoprocessing techniques in ArcView 3.2®. Spatial analyses considering deep reef species and royal red shrimp were possible because of the discrete areas (depth ranges) that could be identified. Similarly, spatial overlaps between lease blocks with high lease bonus bids, filed POEs, and filed DOCDs and deep reef species and royal red shrimp were more amenable to analysis because more discrete areas of lease blocks could be identified compared with platforms. Overlap of platforms with fishing activity was examined by creating a 500-m radius area centered on the platform. The 500-m radius is the maximum mandated safety zone around deepwater platforms that vessels must avoid under current U.S. Coast Guard regulations (33 CFR 147). This safety zone must be applied for through set policies and announcement procedures (see **Section 5.1.1.2**)

When all the required shapefiles were ready, the analysis continued with an examination of the spatial overlap between deepwater development features and bluewater fishing areas. The deep reef species and royal red shrimp depth range shapefiles were overlain on the deepwater platform, lease bid, POE, and DOCD shapefiles successively. The results of the successive overlays then were converted into separate shapefiles that depicted deepwater development features that were found within the bluewater fishing areas, i.e., deep reef and royal red shrimp depth zones. The number of deepwater development features and combined areas of each then were counted and calculated, respectively. The results were plotted and tabulated to depict and summarize the results of the overlap analysis.

3.0 BLUEWATER FISHING IN THE GULF OF MEXICO

3.1 HISTORY OF BLUEWATER FISHERIES IN THE GULF OF MEXICO

Bluewater fishing in the Gulf of Mexico originated during 1950 with federally-funded exploratory fishing programs administered by the Bureau of Commercial Fisheries (BCF). These programs began by investigating deepwater shrimp resources and graduated to tuna fishing in the waters of the open Gulf (Bullis 1955a; Iwamoto 1965). BCF experimented with tuna fishing techniques that had been used successfully in the Pacific: live bait fishing with hook and line, purse netting, and longlining. After several attempts at live baiting and purse netting essentially failed, the BCF's exploratory efforts shifted to longlining in 1952 (Bullis 1955a,b,c). The gear deployed during trials consisted of 12 to 18 km of mainline with up to 600 total hooks. Initial exploratory longline efforts yielded blackfin, yellowfin, bluefin, and skipjack tunas in various areas of the northern Gulf. Although the findings failed to generate any interest from domestic fishers, by the mid-1950's Japanese fishers began setting longlines for tunas in the Gulf of Mexico (Iwamoto 1965; Lopez et al. 1979; Thompson 1982). This fishery continued for the next 30 years from 1952 until 1982, when the longlining ceased under an international agreement (Honma et al. 1985; Prager and Browder 1992). In the early 1970's, a domestic swordfish fishery became established in the Gulf (South Atlantic Fishery Management Council [SAFMC] 1985). This was a seasonal (mostly fall and winter) fishery. By about 1983, an increasing demand for tuna caused many swordfish longliners to switch methods to target tunas (Taniguchi 1987). The Gulf tuna longlining fleet reached 350 to 400 vessels in 1988 to 1989 (Russell 1993) and continues today with a similar number of permitted vessels (Cramer and Adams 1999), but only about a fourth of these permitted vessels actually fish. In the southern Gulf, Mexican fishers have been longlining for yellowfin tuna since about 1980, following the departure of the Japanese fleet (Prager and Browder 1992).

As the pelagic longline fishery was developing, exploratory fishing with bottom trawls proved productive when in the early 1950's, exploitable quantities of royal red shrimp (*Pleoticus robustus*) were found around the Gulf of Mexico in 500 to 900 m water depths (Bullis 1956). Commerical fishers did not begin targeting royal red shrimp until the 1960's (Gulf of Mexico Fishery Management Council [GMFMC] 1996). Exploratory efforts by the BCF were also the first to attempt bottom longline fishing in deepwaters of the Gulf of Mexico (Nelson and Carpenter 1968). The primary species caught by bottom longlining during that cruise was the tilefish, which was of no commercial importance at that time. Few fishers were regularly using bottom longline gear in the Gulf of Mexico until the late 1970's (Prytherch 1983). Since that time, bottom longlining has become the most important means of harvesting tilefishes and deepwater groupers in the Gulf.

In the 1980's NMFS conducted another exploratory fishery program to examine the efficacy of trawling for gulf butterfish (*Peprilus burti*). Commercial butterfish vessels and captains from the northeastern U.S. were hired to fish in various areas of the eastern Gulf (Vecchione 1987). Although the results were promising (Vecchione 1987), no extensive butterfish fishery has developed (but see McIlwain 1999).

The early BCF explorations for royal red shrimp also yielded catches of red and golden crab; however, there was little commerical interest in these species for years to come. In the late 1970's, another exploratory fishing program sought to develop a fishery for golden crab in the northeastern Gulf of Mexico (Otwell et al. 1984). Despite these efforts, most golden crab fishing has been restricted to the southeastern Gulf offshore of western Florida (Lindberg and Wenner 1990). The GMFMC recently formed a deepwater crab advisory committee to gather information needed to develop a fishery management plan for the Gulf of Mexico.

3.2 CHARACTERISTICS OF BLUEWATER FISHING IN THE GULF OF MEXICO

The major commercial bluewater fisheries in the Gulf of Mexico target epipelagic species, deep reef species, and invertebrates. Although recreational bluewater fishers concentrate on members of the epipelagic group, we have described this fishery separately from the commercial fisheries. The following sections describe general gear types and fishing methods as well as catch and effort for these fisheries in the Gulf of Mexico.

Other fishery activities that may eventually be important in deepwaters of the Gulf of Mexico include cage aquaculture (Bennetti et al. 1999) and spearfishing. Because of limited information on these endeavors and the fact that neither was currently established in deepwater areas, they were not covered in this report.

3.2.1 Commercial Fishing

3.2.1.1 Gear and Methods

The major gear types used by the bluewater commercial fishery in the Gulf of Mexico are pelagic longline for epipelagic species and bottom longline for deep reef species. Other gear used to a lesser extent includes bottom trawl, traps, hook and line, and mid-water trawl. An additional commercial enterprise that could interact with deepwater energy development in the future is cage aquaculture. Because there are no cage aquaculture projects currently operating in the deepwater Gulf, this topic is not discussed further in this report.

General gear types and fishing methods used for target species groups (epipelagic fishes, deep reef fishes, and invertebrates) are described in detail in the following discussion. All information given in the following discussion is derived from existing literature, data, and conversations with knowledgeable persons. Every detail will not be captured by this approach because individual fishers likely vary their methods continuously based upon past successes, personal preference, or logistical factors. We cannot incorporate these nuances into the descriptions without personal interviews. The following descriptions are generic, and accurate to the extent that they will describe aspects of fishing methods and gear that could potentially interact with oil and gas activities.

Epipelagic Fishery

Today most longliners working in the Gulf of Mexico employ variations of what Berkeley et al. (1981) called the "Florida" style of fishing for swordfish. Longlines consist of a monofilament main line suspended in the water column by regularly spaced buoys (**Figure 3.1**). Some of these buoys, referred to as high-flyers (**Figure 3.2**), have staffs with metal radar reflectors and strobe lights attached to allow the fishing vessel to keep track of the position of the drifiting longline. The buoy lines are used to adjust the fishing depth of the mainline. Monofilament leaders or gangions with baited hooks ranging from 15 to 70 m in length are attached at regular intervals along the length of the mainline. Longlines set in the Gulf of Mexico between 1994 and 1998 averaged 69 km and ranged from 51 to 76 km long (**Table 3.1**). The number of hooks per kilometer ranged from 10 to 14. Hooks used vary with individuals, but usually are Japanese style circle hooks (size range: 7/0 to 11/0). Leaders are tied on 300 to 600-lb test monofilament line; the length of the leaders varies and can range from 10 to 40 m. Length of leaders and mainline can vary if particular species are targeted. For example, when targeting dolphin, leaders and mainline are usually much shorter than those used for tunas.

Table 3.1. Summary data from the National Marine Fisheries Service (NMFS) longline logbook program for the Gulf of Mexico, 1994 to 1998 (Source: NMFS 1999a).

Year	Number of Vessels	Total Number of Sets	Average Length of Set (km)	Average Number of Hooks per km
1994	146	4,159	76	9.8
1995	156	4,181	74	10.4
1996	141	5,173	51	14.3
1997	135	4,934	72	10.2
1998	106	3,696	70	10.8

In the Gulf of Mexico, pelagic longlines are mainly used to catch yellowfin tuna. Because tuna are targeted, there are some differences in fishing techniques as compared to swordfish fishing techniques. Sets targeting tunas are made during daylight hours, whereas swordfish sets are made in the afternoon to fish during the night. Sets made for swordfish are made shallower and baits are supplemented with chemical light sticks (Cyalume® sticks) to increase attractiveness to swordfish. After the longline is deployed, it is allowed to drift for 4 to 5 h.

Longline gear is deployed from a moving vessel. As the mainline is put out, usually over the stern of the vessel, baited leaders are clipped in place at regular intervals. Leader spacing varies. Buoys, including the high-flyers, are also attached at regular intervals. Some of the buoys are equipped with coded radio direction beacons and radar reflectors that allow the vessel to track the movement of different sections of the drifting line.

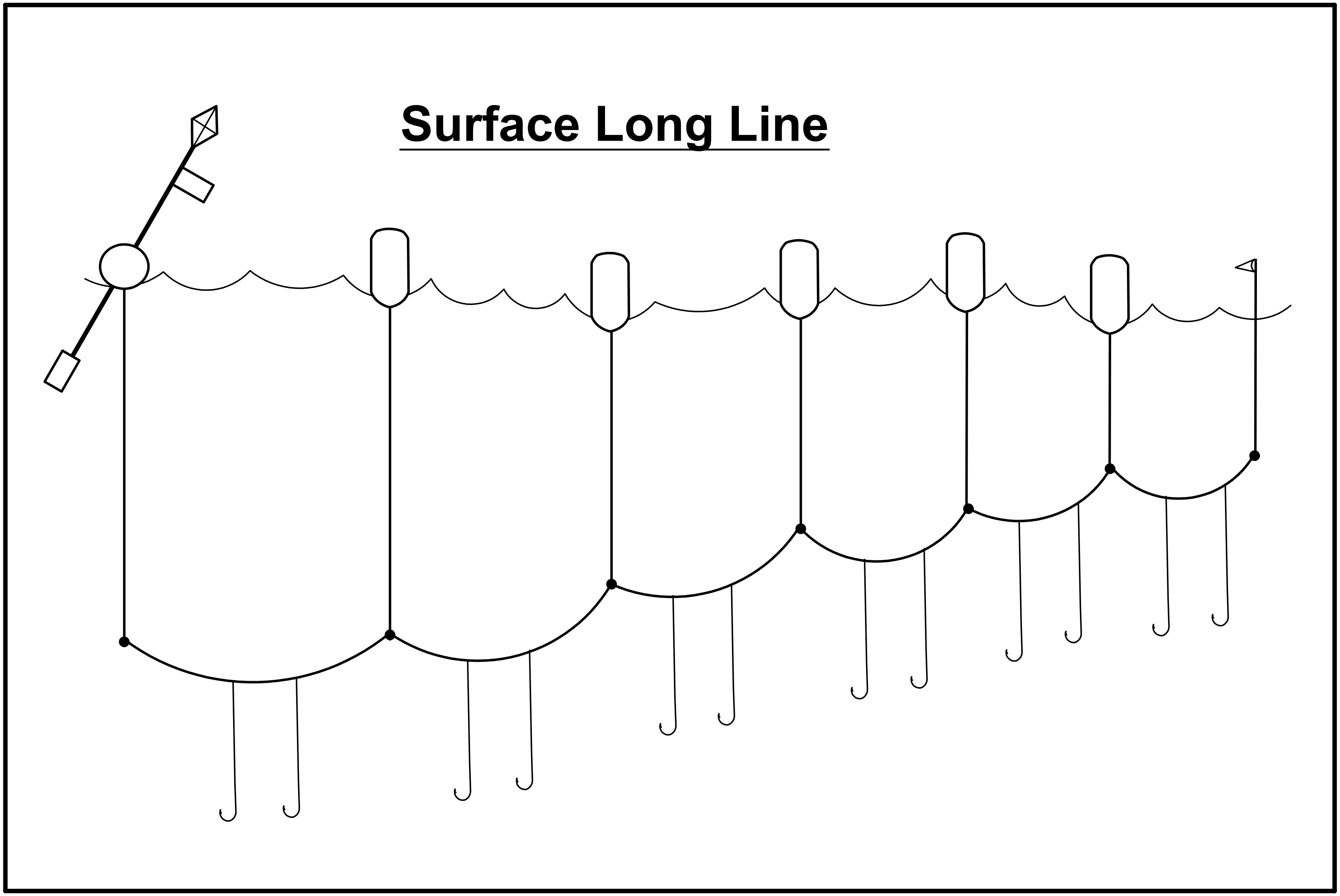

Figure 3.1. A typical pelagic longline used in the Gulf of Mexico epipelagic fishery.

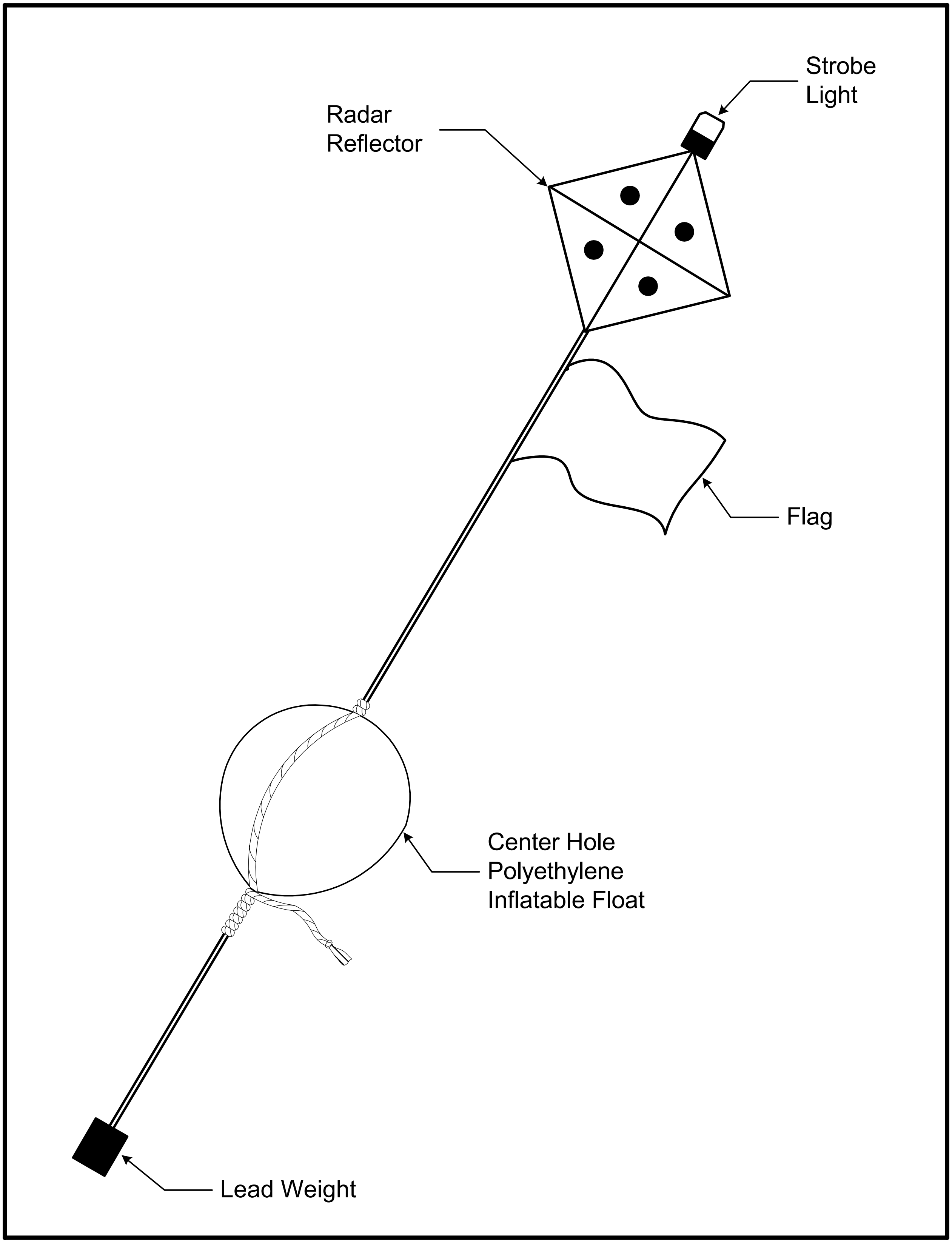

Figure 3.2. A high-flyer buoy and staff used on pelagic longlines in the Gulf of Mexico.

Bait used is usually squid or fish, in particular scads (carangids) or mackerels (scombrids). Many fishers seeking yellowfin tuna preferred using live bait (Russell 1993); however, recent legislation now prohibits the use of live bait, because it tends to catch more non-commerical (and protected) billfishes. It takes 8 to 10 h to deploy a 70 km longline and about the same to to retrieve it. Longlines are often set near oceanographic features such as fronts or downwellings, often with the aid of sophisticated on-board temperature sensors, depth finders, and positioning equipment.

Vessels used in the western Atlantic longline fleet (including the Gulf of Mexico) range in length from 10 to 30 m and average 19 m (Larkin et al. 1998). Most vessels in the Atlantic fleet characterized by Larkin et al. (1998) were between 12 and 16 m long. Very few vessels were longer than 30 m. The size of the vessel determined the duration and frequency of trips. Large vessels (21 to 27 m) average about eight trips per year that lasted an average of 17.3 days at sea, whereas smaller vessels (15 to 26 m) averaged about 11 trips per year averaging 6.6 days at sea. For the 1994 to 1998 period, permitted Gulf of Mexico vessels averaged 4,429 sets per year. The number of permitted vessels contributing to the logbook data set ranged from 156 in 1995 to 106 in 1998 (**Table 3.1**). The primary homeports for longline vessels are Dulac and Venice, Louisiana; and Destin, Madiera Beach, and Panama City, Florida (Tanaguchi 1987).

Reef Fish Fishery

Deepwater reef fishes are caught with bottom longlines, traps, powered reels, and handlines. In the Gulf of Mexico, most of the landings of deep reef fishes are made by bottom longlines, followed by powered reels. Bottom longlines are most effective for reef species that are widely distributed over the available habitat rather than congregated around discrete high-relief bottom structures. Yellowedge grouper and tilefish are two widely distributed species that are effectively caught by bottom longline. These longlines are configured similarly to pelagic longlines described previously except that the mainline is anchored or weighted to the bottom rather than drifting passively (**Figure 3.3**). Bottom longlines are much shorter than surface longlines, usually 3 km or less, but can reach 40 km (GMFMC 1981; Prytherch 1983). Bottom longlines are deployed from a moving vessel (3 to 7 kn) in the same fashion described above for pelagic longlining. Buoys equipped with radar reflectors and flag staffs are usually placed only at the ends of the mainline. Leaders with hooks are clipped on regularly about 3 to 5 m apart as the line is paying out. The ends of the mainline, called groundlines, are weighted as needed to compensate for current and water depth. The line is allowed to fish (soak) for between 1.5 to 3 h during daylight hours and between 9 and 14 h overnight in the eastern and western Gulf. In some areas, fishes that are left in the water longer than 2 to 3 h become infested with parasitic isopods (Prytherch 1983).

Prytherch (1983) reported that vessels operating in the bottom longline fishery ranged from 8 to 20 m in length, but most were greater than 10 m. Most vessels during this survey were converted shrimp trawlers. There is no way to accurately estimate the number of vessels involved in the Gulf of Mexico deep reef longline fishery from the available data . There are 1,208 reef fish permits held by fishers residing in Florida (928; including east coast), Lousisiana (106), Texas (78), Alabama (28), and

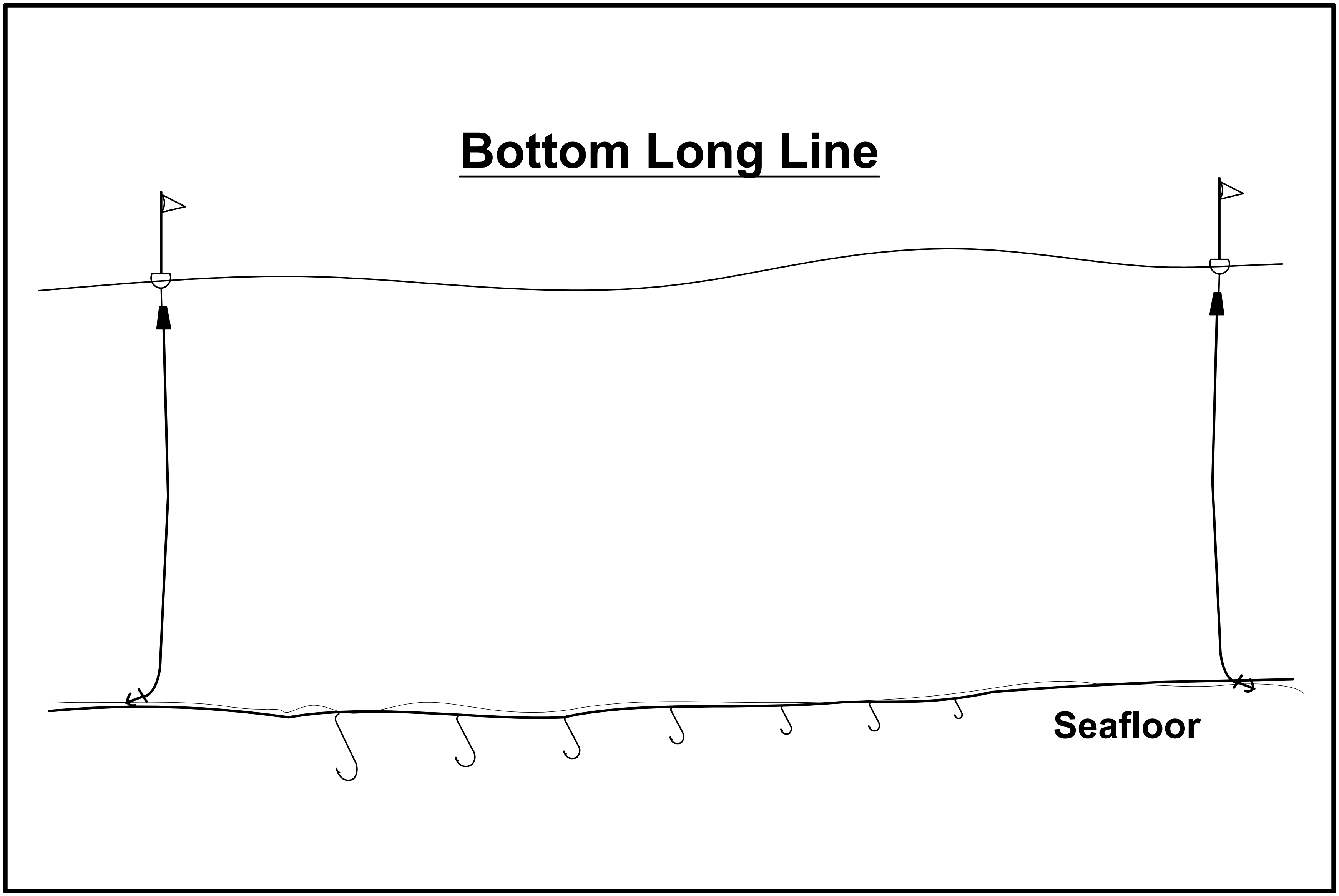

Figure 3.3. A typical bottom longline used in the Gulf of Mexico deep reef fishery.

Mississippi (14). Probably no more than 10 percent of these permit holders fish for deep reef fishes in the Gulf.

In the reef fish fishery, deepwater snappers, groupers, and tilefishes are also caught using electric or hydraulic powered reels. These reels are configured with short (1 m) fiberglass or metal arms that act as the "fishing rod" and have a large handle protruding laterally from the spool, and are often called "one-armed bandits" or simply "bandit reels." Stainless wire line is threaded through a small block mounted at the end of the arm and attached to terminal tackle that is tailored for the target species. The terminal tackle consists basically of a monofilament leader with a series of up to 10 hooks arranged vertically with a large lead weight attached at the bottom of the rig. These rigs are fished from drifting or anchored vessels for deep reef species such as snowy grouper (*Epinephelus niveatus*), warsaw grouper (*Epinephelus nigritus*), and silk snapper (*Lutjanus vivanus*) that tend to congregate around high-relief structures.

Invertebrate Fishery

Shrimp trawling is one of the most important commercial enterprises in the Gulf of Mexico. However, most of the current shrimp grounds lie well inshore of 200-m isobath. Most of the commercial trawling in water depths >200 m in the Gulf is targeting royal red shrimp. This effort is concentrated in water depths of 400 to 500 m in the northern Gulf (GMFMC 1996). Gear used for royal red shrimp is very similar to shallow water shrimp trawling gear, but to accommodate the greater depths involved, all components, including winches, bridles, trawl doors, and wire, must be stronger and more durable. Obviously, the total amount of wire used is greatly increased to accommodate the water depth. Large otter trawls are used with doors measuring 3 m x 1 m and nets with headropes of 10 to 12 m. Trawls may be towed in single or double configurations (Watson et al. 1984; Harrington et al. 1988).

Traps are used to catch deepwater crabs offshore of southwestern and southeastern Florida. These traps have a rectangular (1.2 m x 1.8 m x 0.8 m) frame of 0.9 cm reinforcing bar (Nielson, in Lindberg and Wenner 1990). The bottom of the trap is lined with plastic-coated wire (3.8 cm mesh), while the top and sides are covered with nylon webbing (12.5 cm stretch mesh). These traps usually have a double entrance, with each entrance about 61 cm diameter. Individual traps are attached in a series about 275 m apart along a polypropylene mainline. Most deepwater crabbers working offshore of Florida do not use surface buoys to mark the position of their trap string. Instead, they use a global positioning system (GPS) or Loran C coordinates to locate the general location of the string (or trawl as it is called by the trappers) and then grapple for the mainline using a weighted grapple hook while drifting perpendicular to the string. Once the mainline is grappled, traps are hauled aboard using a standard hydraulic powered pot-hauling winch. The mainline is faked into plastic tubs as it comes aboard. Traps are baited with fish remains, then returned to the desired fishing area.

3.2.1.2 Catch and Effort

Epipelagic Fishery

Catch composition of the pelagic longline logbook data set included 38 taxa from 10 families. The tuna and shark families were well represented by 10 and 20 taxa, respectively (**Table 3.2**). The top 10 species collectively represented 90 percent of the total catch for the 5-year period. Yellowfin tuna contributed 40 percent of the total weight caught over the 1994 to 1998 period, and averaged 30,000 kg annually during the period. Swordfish were second, accounting for 16 percent of the catch and averaging 12,000 kg per year. Escolar (*Lepidocybium flavobrunneum*) and dolphin contributed 6 and 4 percent of the weight, respectively. As a group, sharks contributed about 12 percent of the total weight and averaged about 10,000 kg per year.

The yearly number of longline sets made during the 1994 to 1998 period ranged from 5,173 in 1996 to 3,696 in 1998 (**Table 3.1**). **Figure 3.4** shows the average number of sets made per month for the logbook data set. There is moderate increase in fishing effort over the year, with more sets being made on average during the summer months. This may reflect periods of good weather.

Spatial distributions of the longline sets for 1994 to 1995 are given in **Figures 3.5** to **3.8**. Sets are distributed throughout the open Gulf, with most effort in the Central and Western Planing Areas. Average monthly catches of key species (yellowfin tuna, swordfish, dolphin, and wahoo) are shown in **Figure 3.9**. The common trend for yellowfin tuna, dolphin, and wahoo is for a peak in summer months. Swordfish catches peaked during winter months, a trend indicative of their migratory patterns.

Because longline fishing has been identified as contributing to the bycatch mortality of billfishes and undersized swordfish, several management measures were recently enacted. The Highly Migratory Species Act, Pelagic Longline Management, Final Rule 50 Code of Federal Regulations (CFR) Part 635 established several new regulations for longline fishing in the region. In the Gulf of Mexico, two adjacent areas in the De Soto Canyon region were closed to longline fishing in August 2000 (**Figure 3.10**). At the same time, the use of live bait on longlines in the south Atlantic (including the Gulf of Mexico) was prohibited. Live bait tends to catch more billfishes and thus contributes to their bycatch by this gear. Other claims against longline fishing that may ultimately affect fishing effort include bycatch of seabirds and sea turtles (50 CFR 635).

Deep Reef Fishery

To evaluate catch and effort in the deep reef fishery we examined data from the NMFS reef fish logbook data for the years 1994 to 1998 (NMFS 1999b). As mentioned in **Section 2.1**, the reef fish logbook data do not include water depth data. Therefore, we extracted a suite of species that normally inhabit water depths of 200 m or greater from the total management unit.

Table 3.2. Relative catches (kg) reported in the National Marine Fisheries Service (NMFS) longline logbook data set, 1994 to 1998 (Source: NMFS 1999a.).

Species Name	1994	1995	1996	1997	1998	Total
Yellowfin tuna	28,735	22,947	33,059	35,451	29,803	149,995
Swordfish	12,146	11,735	14,595	12,868	8,876	60,218
Dolphin	4,351	11,624	10,932	12,279	3,488	42,674
Escolar	3,381	3,504	5,011	5,051	5,382	22,329
Wahoo	2,359	3,575	3,107	3,358	3,863	16,262
Blacktip shark	4,478	5,929	2,926	1,660	507	15,500
Sandbar shark	249	5,473	2,959	1,087	820	10,587
Blackfin tuna	1,566	1,286	1,130	1,633	1,151	6,765
Finfishes (unclassified)	18	3,125	2,708	1,412	91	7,354
Silky shark	1,424	561	1,904	1,222	398	5,509
Shark (unclassified)	1,528	1,558	499	826	217	4,629
Dusky shark	912	651	910	514	309	3,297
White marlin	514	668	734	628	333	2,877
Blue marlin	583	542	620	606	414	2,766
Sailfish	798	417	471	520	321	2,527
Hammerhead shark	217	1,076	1,374	39	17	2,722
Shortfin mako	453	545	801	505	152	2,457
Bigeye tuna	297	787	314	385	292	2,074
Spinner shark	393	630	351	69	326	1,768
Shark, tiger	540	616	266	196	180	1,798
Tuna, skipjack	393	288	284	276	319	1,561
Shark, scalloped hammerhead	94	45	703	41	8	892
Bonito, atlantic	257	82	339	56	27	762
Tuna, unc	389	224	58	77	17	766
Tuna, albacore	128	137	112	277	67	721
Tuna, bluefin (unclassified)	129	108	94	102	136	569
Shark, longfin mako	119	104	200	113	61	598
Shark, night	36	36	291	62	93	519
Shark, smooth hammerhead	77	27	429	21	7	561
Shark, bigeye thresher	55	96	178	119	55	503
Shark, oceanic whitetip	81	50	195	76	33	435
Mackerel, king	53	103	55	8	66	285
Greater amberjack	50	248	6	4	3	312
Shark, blue	45	53	74	78	40	290
Shark, thresher	48	77	95	52	16	288
Shark, bignose	100	103	21	14	6	245
Shark, white	55	41	59	26	21	203
Banded rudderfish	0	146	5	1	0	152
Spearfishes	18	11	8	28	8	73
Shark, porbeagle	3	9	26	4	2	44
Grand Total	67,072	79,241	87,903	81,746	57,925	373,887
Total Sets	4,159	4,181	5,173	4,934	3,696	

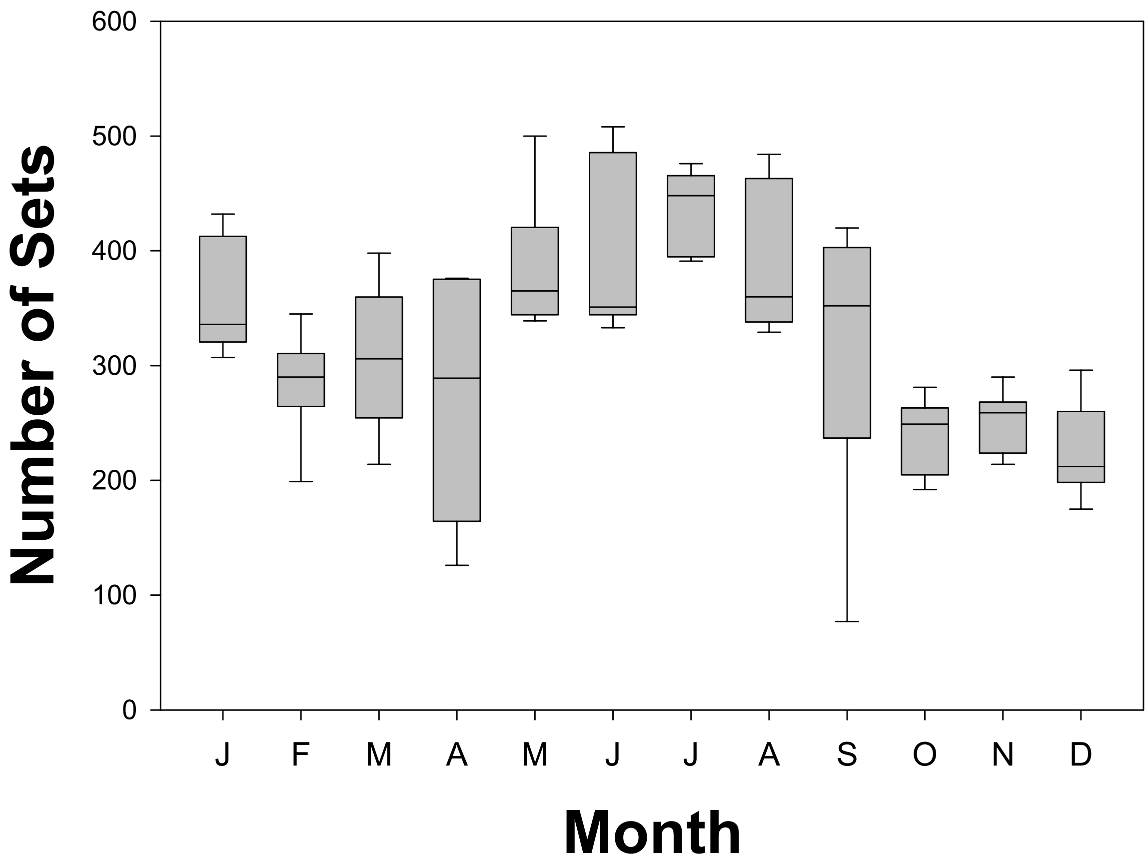

Figure 3.4. The average number of pelagic longline trips made per month from 1994 to 1998 in the Gulf of Mexico (Source: National Marine Fisheries Service 1999a).

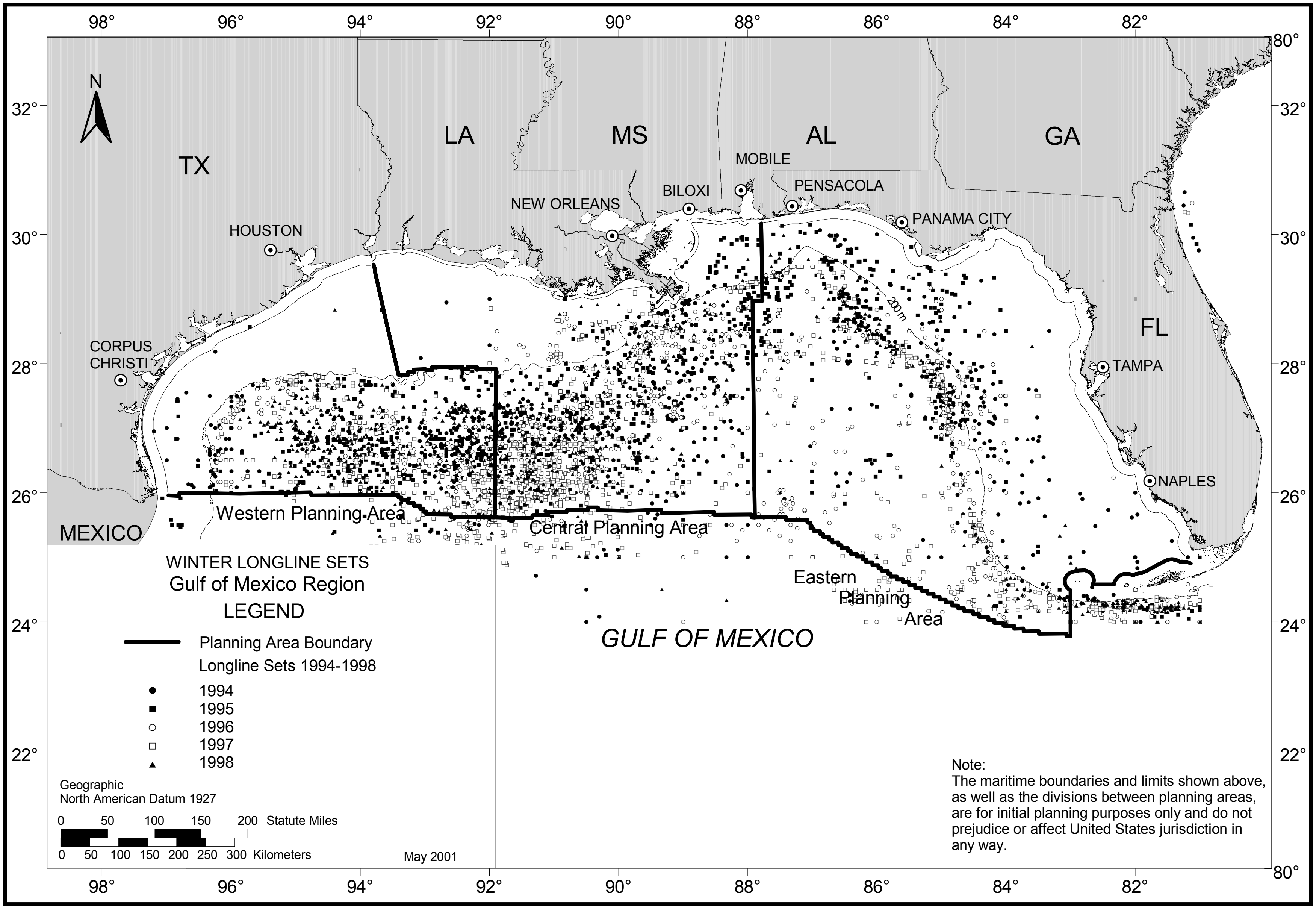

Figure 3.5. The spatial distribution of pelagic longline sets in the Gulf of Mexico for winter 1994 to 1998 (Source: National Marine Fisheries Service 1999a).

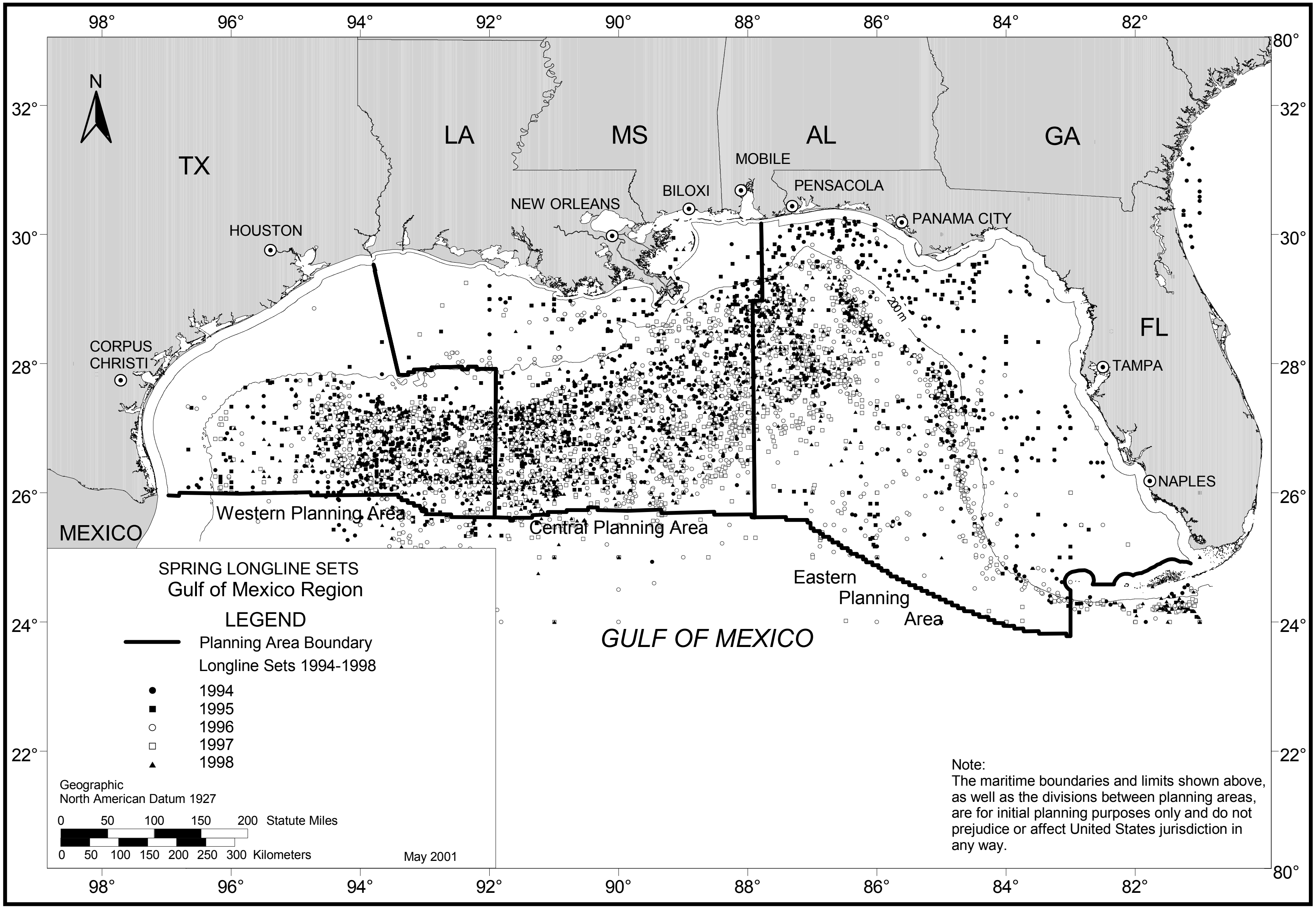

Figure 3.6. The spatial distribution of pelagic longline sets in the Gulf of Mexico for spring 1994 to 1998 (Source: National Marine Fisheries Service 1999a).

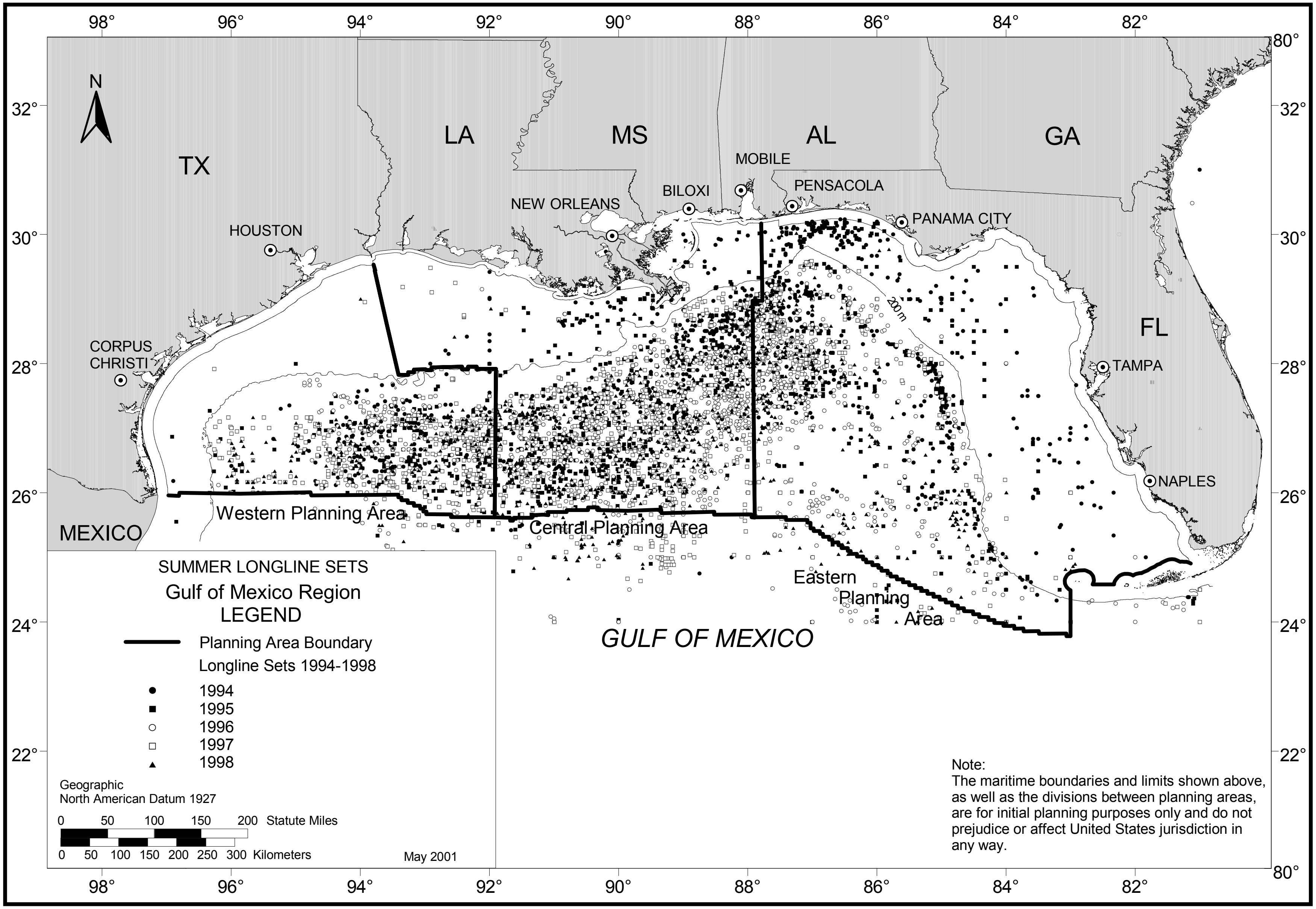

Figure 3.7. The spatial distribution of pelagic longline sets in the Gulf of Mexico for summer 1994 to 1998 (Source: National Marine Fisheries Service 1999a).

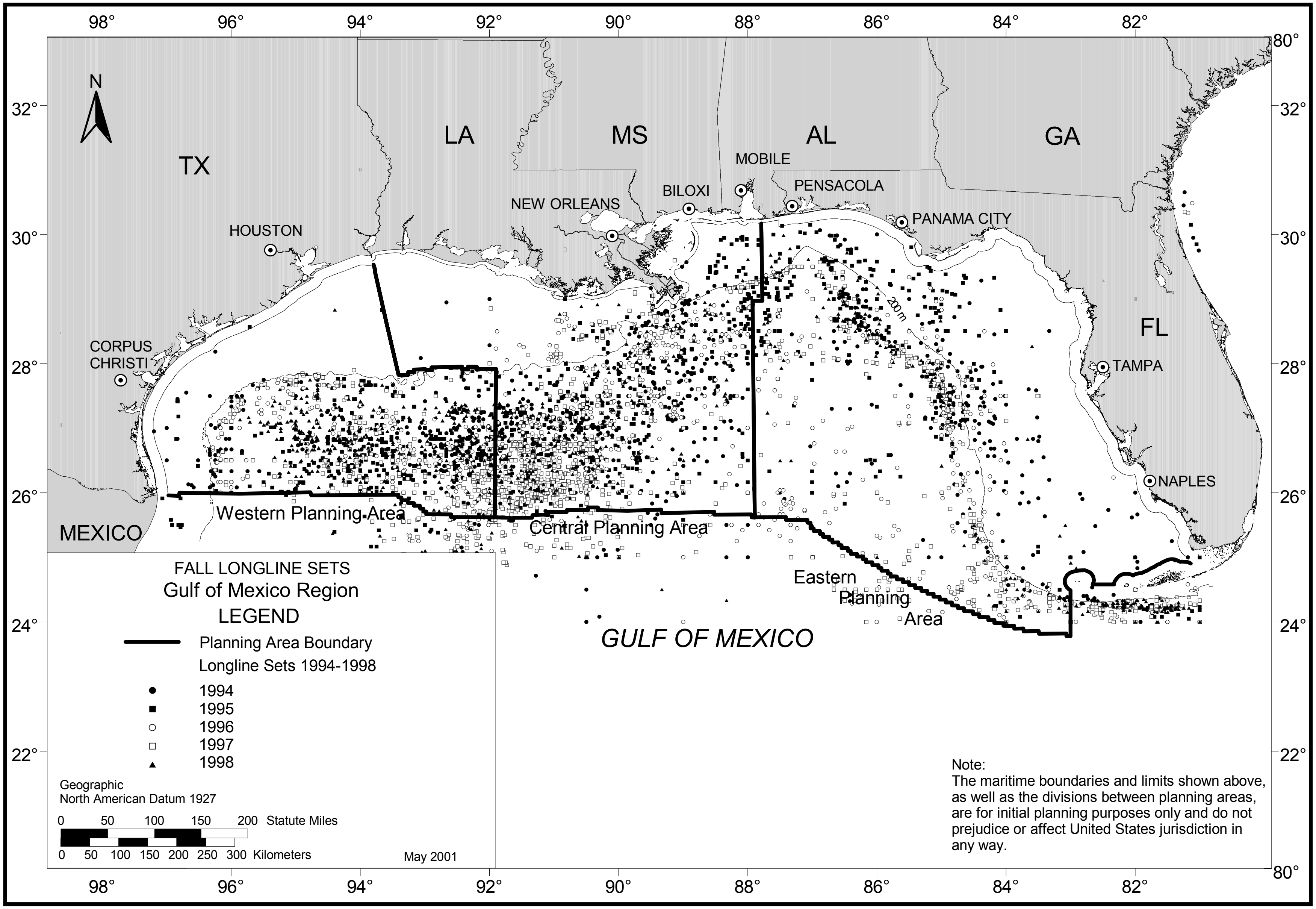

Figure 3.8. The spatial distribution of pelagic longline sets in the Gulf of Mexico for fall 1994 to 1998 (Source: National Marine Fisheries Service 1999a).

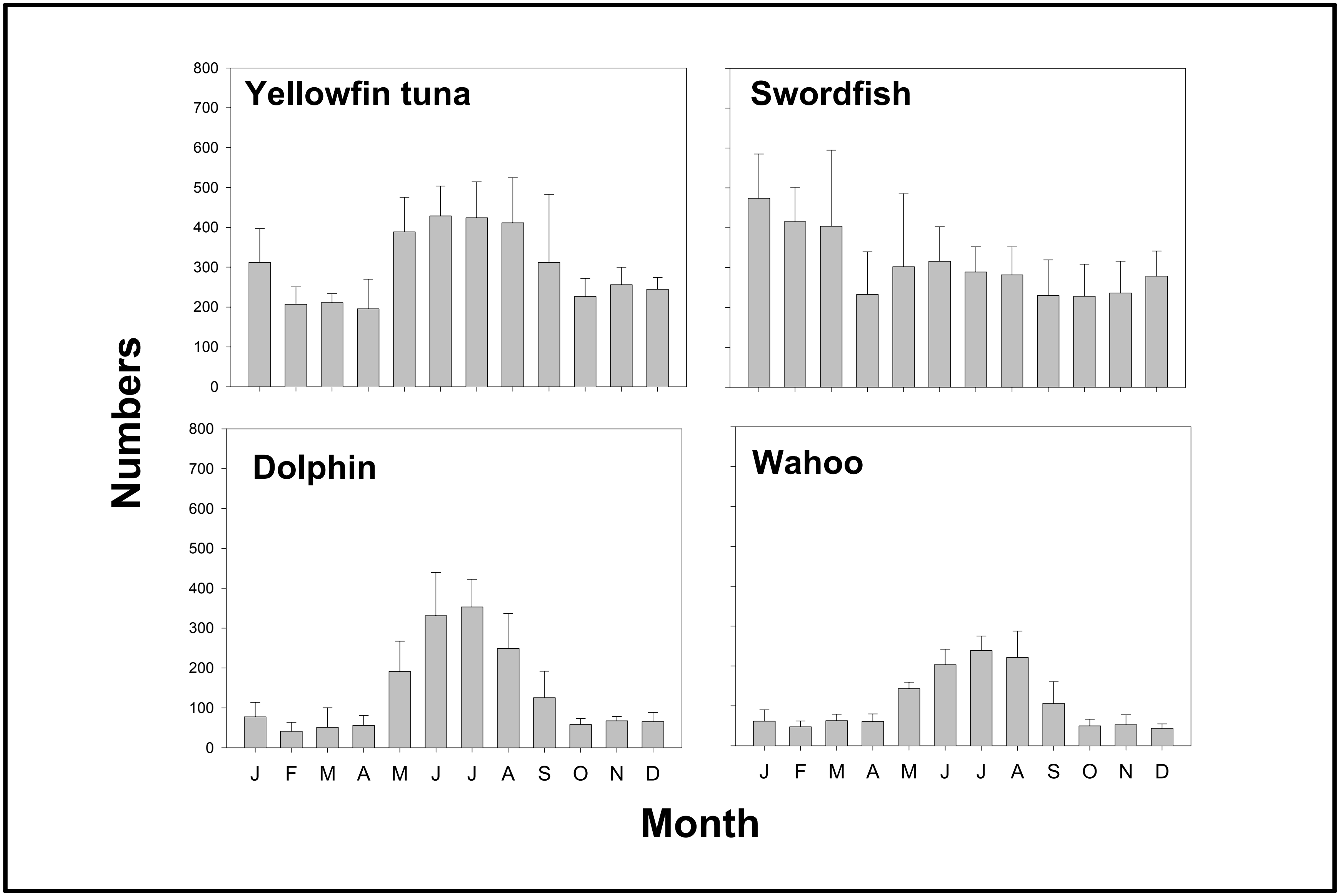

Figure 3.9. Average monthly catch for yellowfin tuna, swordfish, dolphin, and wahoo per pelagic longline set in the Gulf of Mexico from 1984 to 1988 (Source: National Marine Fisheries Service 1999a).

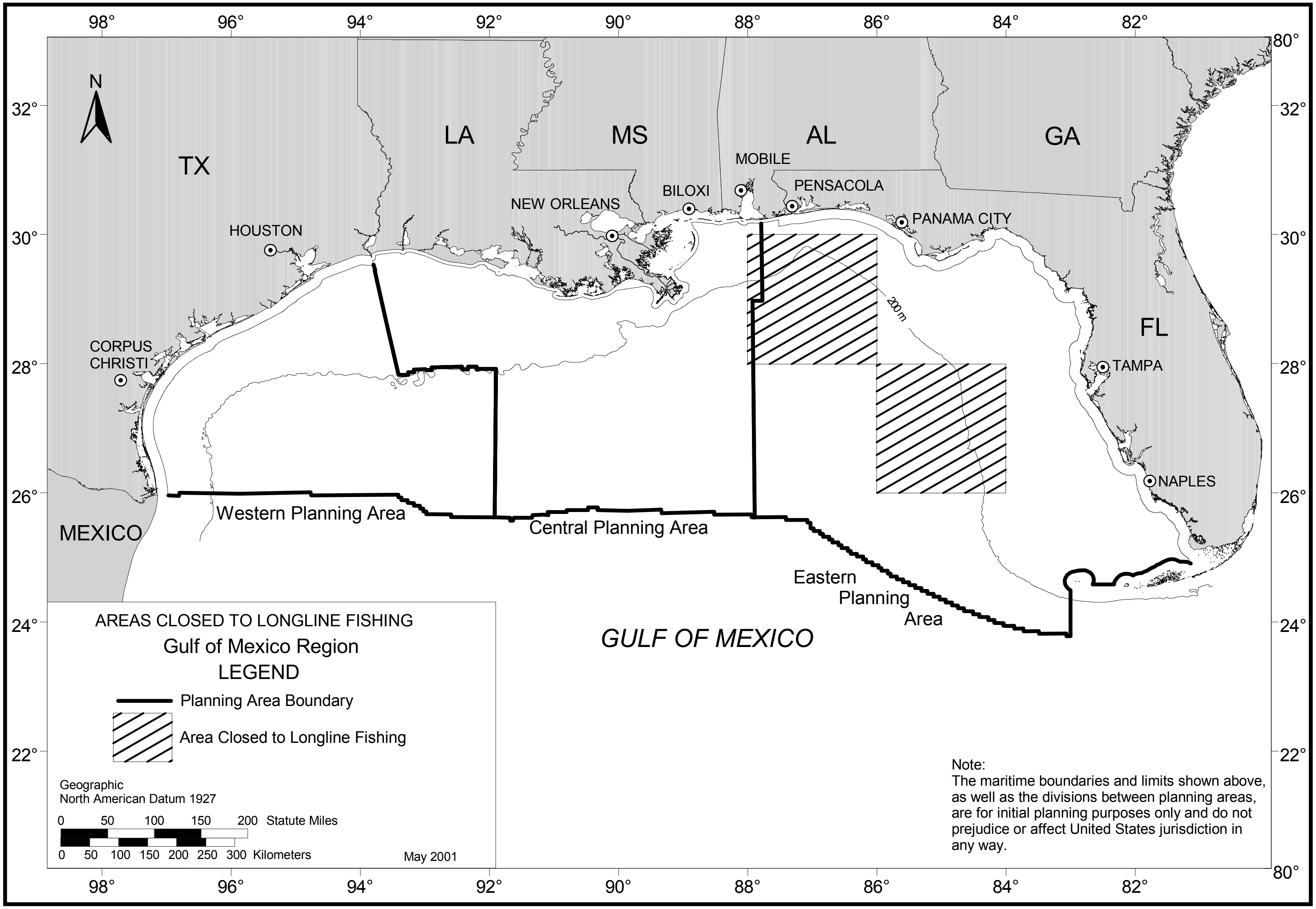

Figure 3.10. Areas closed to longline fishing in the eastern Gulf of Mexico.

Table 3.3 provides average catches of deep reef species by state. The most consistently caught species were tilefish and yellowedge grouper. Snowy and warsaw groupers also were important, but contributed less to the catches than the two primary species. Queen, silk, and blackfin snappers were caught in appreciable numbers off Florida, Louisiana, and Texas. Snappers, snowy groupers, and warsaw groupers were caught mostly with bandit reels rather than bottom longline (**Figure 3.11**). This is not surprising, as snappers and some groupers such as snowy and warsaw will congregate around structures and are more efficiently caught by vertical tackle employed by bandit reel fishers. The tilefish and yellowedge grouper tend to be more dispersed over low relief bottom, making longline a better gear for covering the broad habitat used by these species. By examining catch and effort by the two principal gear types (bandit reel and bottom longline), we were able to determine which gear type was most important to the principal species in the deep reef fisheries.

Table 3.3. Average catch (kg) per trip for deep reef fishes presented by state in the northern Gulf of Mexico for 1994 to 1998 (Source: National Marine Fisheries Service 1999b).

Species	AL	FL	LA	MS	TX
Yellowedge grouper	436	424	385	62	438
Snowy grouper	70	89	49	30	65
Warsaw grouper	42	52	47	47	63
Misty grouper	0	137	41	0	14
Speckled hind	0	61	19	0	17
Tilefish	1,124	435	482	0	881
Blueline tilefish	7	102	11	11	64
Silk snapper	37	75	76	42	112
Queen snapper	254	41	81	21	121
Blackfin snapper	293	50	66	7	51

Effort by coastal state is presented in **Table 3.4**. The values in the table indicate the numbers of fishing trips per year during the 1994 to 1998 period. Most of the effort in terms of overall trips made for deep reef species was offshore of Florida, followed by Louisiana and Texas. Effort for the primary species in the deep reef fishery (tilefish, snowy grouper, and yellowedge grouper) follows the same trend, with most effort offshore Florida, followed by Louisiana and Texas (**Table 3.4**). **Figure 3.12** depicts effort (number of trips) for these three species by longline vs. bandit reel averaged over 1994 to 1998 for the NMFS statistical grids. Again, most trips catching snowy grouper were made using bandit reels, and those trips catching yellowedge grouper and tilefish were mostly using longline gear.

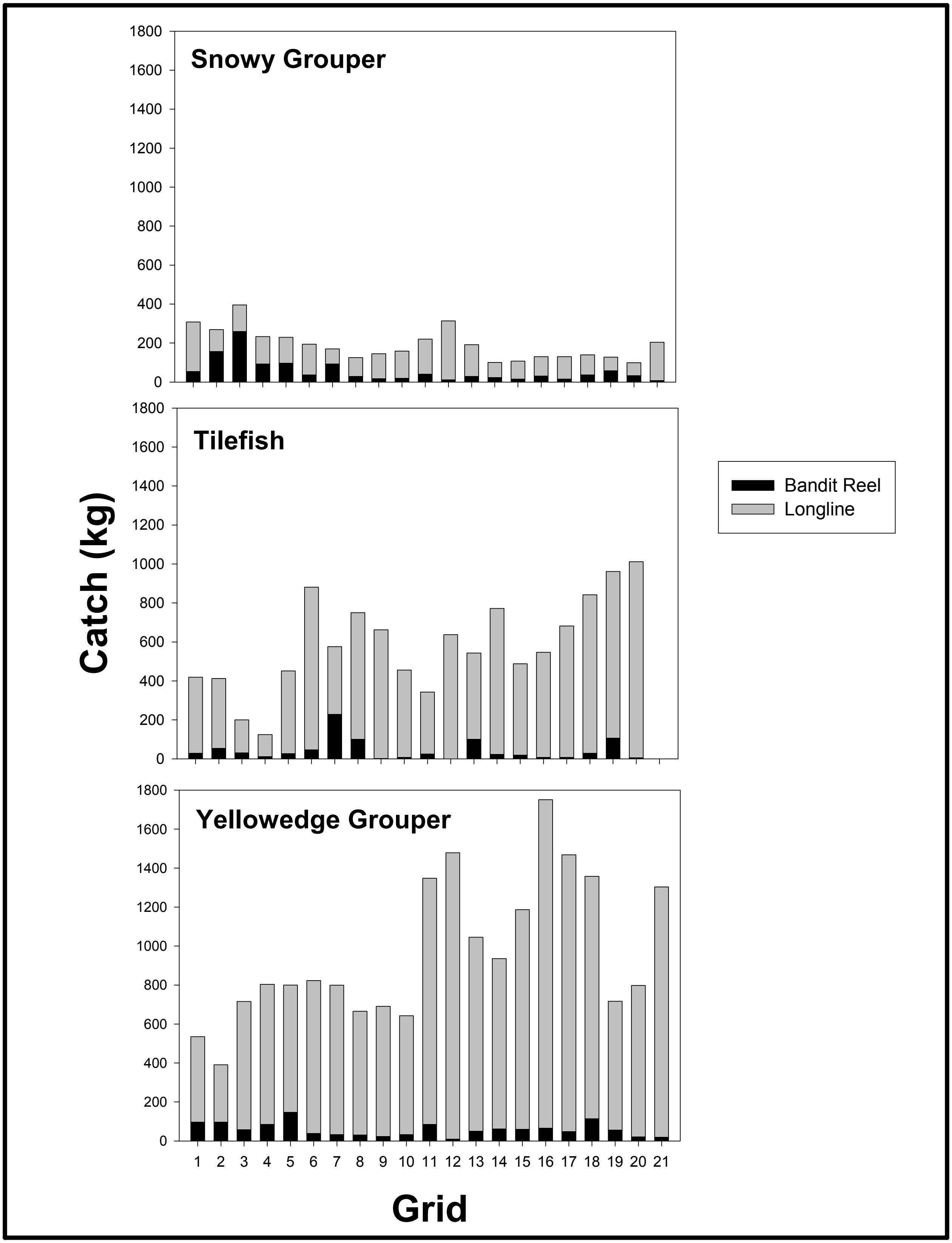

Figure 3.11. Average catch/trip from 1994 to 1998 made using either bandit reels or bottom longline for snowy grouper, tilefish, and yellowedge grouper arranged by statistical grid (Source: National Marine Fisheries Service 1999b).

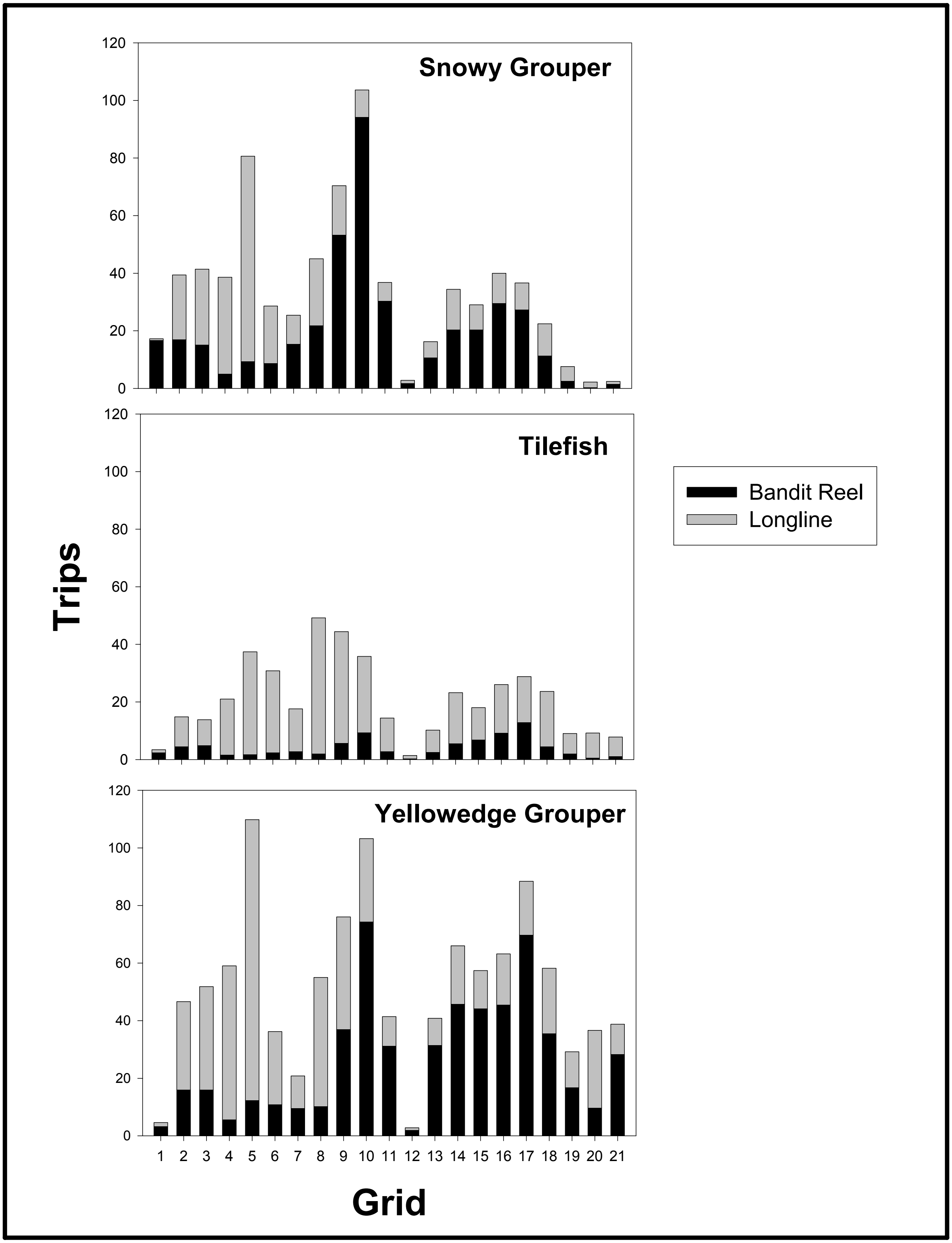

Figure 3.12. Average number of trips/year from 1994 to 1998 made using either bandit reels or bottom longline for snowy grouper, tilefish, and yellowedge grouper arranged by statistical grid (Source: National Marine Fisheries Service 1999b).

Table 3.4. Average number of trips for deep reef fish trips by state from 1994 to 1998 (Source: National Marine Fisheries Service 2000).

Species	AL	FL	LA	MS	TX
Yellowedge grouper	14	599	304	15	161
Snowy grouper	3	2,752	486	44	177
Warsaw grouper	0	82	7	0	1
Misty grouper	3	266	376	49	266
Speckled hind	1	106	86	4	16
Tilefish	2	346	87	4	15
Blueline tilefish	0	99	57	0	3
Silk snapper	66	2,338	1,025	129	610
Queen snapper	24	281	107	0	48
Blackfin snapper	1	395	123	5	8
Totals	114	7,264	2,658	250	1,305

Invertebrate Fishery

The effort in this fishery is low and spatially concentrated. Effort has historically been very low for royal red shrimp in the Gulf (GMFMC 1996). The number of vessels contributing to the catch and effort is usually very low, ranging between 5 and 12 vessels (Rick Leard, GMFMC, pers. comm. 2000). During 1994 to 1998, a total of 392 trips was taken for royal red shrimp in the northern Gulf. During this period, 78 percent of the trips were made in Grid 10 offshore of Alabama/Florida and an additional 12 percent of the trips were made (mostly during 1994) in Grid 21 offshore of Texas. An average of 60 trips per year was made in Grid 10 over the same period. Other grids with landings were Grids 4, 5, 7, 8, 9, and 11. Grid 10 produced 86 percent of the weight of royal red shrimp caught. Catches of royal red shrimp declined over the period, and in Grid 10 ranged from 118,344 kg in 1994 to 68,637 kg in 1998.

The number of vessels involved in the royal red shrimp fishery has been very low, averaging less than 10 per year (GMFMC 1996). During the time series from 1962 to 1994, there were no more than 25 vessels reporting catches of royal red shrimp (GMFMC 1996).

Most fishing for golden crab has been offshore of southern Florida. Presently very few fishers are involved in the golden crab fishery (GMFMC 2000, pers. comm.). In fact, there were so few fishers reporting that the individual data were subject to proprietary restrictions and could not be released by NMFS (Josh Bennett, NMFS 2000, pers. comm.).

3.2.2 Recreational Fishery

3.2.2.1 Gear and Methods

Billfish Fishery

Gear types and fishing techniques have changed over the last quarter century, resulting in increased cruising ranges of fishing vessels, more effective presentation of terminal fishing tackle to target species, and perhaps an increased strike rate during a period of billfish population decline. Information on gear and methodology in this section is derived from Jennings' (2001) interviews with northern Gulf fishers and his characterization of the fishery. Names of interviewed fishers are included because these individuals are respected members of their profession and thus may be considered definitive sources of information on the fishery.

Buck Duncan, a captain operating out of Panama City, Florida, noted that when he first fished for billfish out of that port in 1977, the preferred method of fishing was trolling with dead bait such as mullet (*Mugil* spp.), little tunny (*Euthynnus alletteratus*), and Spanish mackerel (*Scomberomorus maculatus*) at speeds of 4 to 5 kn. The largest billfish captured were in the 135 to 180 kg range. In the early 1980's, vessel captains in his area began trying artificial lures, and that within a couple of years everyone had switched to that technique. The change to artificial lures reportedly resulted in greater catches and larger individuals, with late-1980's tournament winners averaging from 180 to 225 kg. Duncan indicated today's anglers use better tackle, are more knowledgeable about their quarry, and cover a greater sea area while trolling at faster speeds with artificial baits.

These sentiments were reiterated by Scott Burt, tournament director of Panama City, Florida's annual 4th of July Bay Point Billfish Invitational Tournament, who pointed out that new high performance boats allow anglers to cruise several hundred kilometers to fish for billfishes. Captain Brandon Ballay (Venice, Louisiana), who fishes off the mouth of the Mississippi River, also felt that larger and faster boats allow fishers to readily get out to the many deepwater oil rigs that host prey species that attract billfishes. James Peters, another Venice, Louisiana captain, observed that most vessels fishing for marlin currently troll high speed plastic lures that don't require as much angler attention to performance as natural baits, thus allowing greater coverage of water. He noted that most of the larger fishing vessels now have air-conditioned cabins. Anglers often wait in air-conditioned upper steering stations for the mate to tell them they have a fish hooked. Even anglers in smaller center-console boats venture 80 km or more offshore, five times the distance from shore they fished only 15 years ago.

Roger Dart targeted marlin for 10 years as a charterboat captain in the Panama City, Florida area. He routinely steamed to depths of 70 to 80 fathoms, then stopped to examine the water. If signs of good fishing (e.g., diving birds, schools of bait, weed lines, current rips, debris, or anything different on the surface) were present, he began trolling and continued out towards 100 fathoms. Lack of appropriate signs at these shallower depths resulted in a direct move to the 100 fathoms region.

Alternative methods of fishing were espoused by Ben Fairey, a captain fishing out of Perdido Pass, Florida. He prefers to drift around the offshore oil drilling rigs, using live bait and kite fish. He also trolls around the rigs, using dead bait such as ballyhoo (*Hemiramphus* spp.) and/or cedar plugs.

Non-Billfish Fishery

Most non-billfish fishing in offshore waters targets smaller pelagic species such as wahoo, yellowfin tuna, and dolphin. Anglers seeking these species frequently employ gear capable of hooking and landing larger billfishes as well. Thus the techniques described above, especially trolling with artificial lures and rigged dead fishes, are applicable to this fishery. Sizes of rods and reels may be downsized if some of these smaller species are specifically targeted. Vessel size also may be smaller in this fishery because logistic and safety considerations involved in billfishing can be ignored.

One technique often used when targeting wahoo is deep trolling. Deep trolling involves the use of a weight or sled deployed off of a separate down-rigger to get the trolled bait below the surface, occasionally as far down as 20 m. Stainless wire line is preferred with this method, as it is less resistant to drag than monofilament line. The line is connected to the weight with a clip that releases when a fish strikes. Artificial and natural baits similar to those described above are used. Trolling speeds vary, but can be as much as 15 kn when targeting wahoo.

Bluefin tunas (*Thunnus thynnus*) were once more common in the offshore waters of the Gulf of Mexico than they are today, reflecting the general decline of stocks in the western North Atlantic and the world. Joe Yurt, weighmaster for the New Orleans Big Game Fishing Club, said "There was a time years ago when I weighed in more ‘giants’ [a bluefin tuna that weighs 225+ kg] each year than I did billfish." In 1970, he weighed in 17. Today, catches are infrequent (**Appendix A**, **Table A-1**).

Bottom fishing around deepwater platforms is not as popular as surface trolling for billfishes, tunas, and wahoos. However, as Olander (2001) describes, recreational fishers bottom fishing around the deepwater platforms *Cognac* and *Lena* in the Mississippi Canyon area of the northern Gulf of Mexico are finding some success. He reported catching snowy grouper (*Epinephelus niveatus*), barrelfish (*Hyperoglyphe perciformis*), and oilfish (*Ruvettus pretiosus*) on electric-powered reels in water depths exceeding 300 m.

3.2.2.2 Factors Affecting Fishing Locations

Three factors are repeatedly pointed to by fishing captains as major recent influences on their choices of fishing locations in the north-central Gulf of Mexico. Perhaps the most important factor is trends in extra-territorial weather, which greatly affect the flow of the Mississippi River and profoundly influence local oceanographic conditions. An unusually rainy season anywhere in the Mississippi River drainage results in increased muddy water moving into the upper Gulf of Mexico, causing blue offshore water and its billfishes, wahoos, tunas, and dolphin to move further offshore. In the past 2 years, the outflow of the Mississippi River was lower than normal and "bluewater" came to within 8 to 32 km miles of the river mouth. In 2000, "bluewater" came into depths of 150 m off the northern mouth of the Mississippi River and a blue marlin was captured in just 55 m of water. During this time period, marlins were abundant along the floating weed-line where the "bluewater" met the muddy river water.

Local oceanographic and weather conditions, such as hurricanes and cold air temperatures, also are highly influential. Annually, there usually are two periods of blue and white marlin movements in the upper Gulf of Mexico. The spring run occurs from April through June, when the Loop Current starts changing direction and yellowfin tuna start migrating into the Gulf. The fall run takes place from August through November. If air and water temperatures stay warm, the fall offshore fishing season for billfishes, wahoo, and yellowfin tuna is prolonged.

Large bluefin tuna are said to arrive in the upper Gulf of Mexico in early April to mid-May and stay until the middle of June. Jim Franks, fisheries research biologist with the Gulf Coast Research Lab in Ocean Springs, Mississippi, has examined two bluefins caught in the Mississippi Gulf Coast Billfish Classic, a 379-kg male in 1999 and a 291-kg female in 2000, and both were in spawning condition. It is thought that offshore Gulf of Mexico waters are seasonally important spawning grounds for the highly overfished bluefin tuna (Nemerson et al. 2000).

Another factor commonly cited as influencing the abundance and location of targeted pelagic fish species is the presence of recently built offshore oil rigs. Perdido Pass captain Ben Fairey believes that the establishment of the oil drilling rigs in the north-central Gulf is the biggest factor that has contributed to improving billfishing in the area. These are said to "hold" baitfishes within the region, attracting billfishes, yellowfin tunas, wahoos, and large dolphins. Fairey said, "The fish we're after are going to be where the bait is, and these big rigs are giant FADs [fish attraction devices], and it's unbelievable how big some of them are and how much bait they hold." Orange Beach captain Brent Shaver echoed Fairey's comment about the oil rigs, saying he fishes them almost daily, with catches sometimes reaching three or four billfishes a day. Fishers generally agree that such rigs have greatly increased the opportunity for catching billfishes and other pelagic fishes.

3.2.2.3 Key Fishing Ports and Tournaments

The number of charter vessel permits issued for each state bordering the Gulf of Mexico provides insight into fishing effort in the region. According to the NMFS, the Florida West Coast (not including the Florida Keys) currently has 758 permitted vessels, with Panama City (129) and Destin (114) the highest permitted ports. Other state totals include Texas (270), Alabama (131), Louisiana (110), and Mississippi (87). Since the number of vessel permits does not necessarily translate into bluewater fishing effort, it is imperative to review fishing effort data to gain a better feel for key fishing ports and regions.

The NMFS billfish monitoring program data detailing catches and releases of billfishes and large tunas during the period 1994 to 1998 are presented in **Appendix A, Tables A-1** to **A-6**. Ports monitored included St. Petersburg, Treasure Island, Panama City, Destin, and Pensacola, Florida; Orange Beach and Dauphin Island, Alabama; Mississippi (no specific locality given, but likely Biloxi and Gulfport); Grand Isle, South Pass, and Freeport, Louisiana; and Galveston, Port O'Connor, Port Aransas, Port Mansfield, Port Isabel, and Padre Island, Texas. The greatest fishing effort for the Gulf coastal states monitored was as follows:

- Florida (106,812 boat-hours from 25 port-years of sampling);
- Louisiana (104,872 boat-hours, 14 port-years);
- Texas (79,684 boat-hours, 19 port-years);
- Alabama (56,517 boat-hours, 6 port-years); and
- Mississippi (7,146 boat-hours, 2 port-years).

Ports with the highest fishing efforts are illustrated in **Table 3.5**. South Pass, Louisiana ranked first, followed by Orange Beach, Pensacola, Port Isabel, Panama City, and Port O'Connor. Grand Isle, Destin, St. Petersburg, Freeport, and Mississippi formed a second tier of fishing activity. Lesser effort ports not shown in **Table 3.5** included Port Mansfield (5,358 boat-hours), Port Aransas (3,334 boat-hours), Dauphin Island (1,326 boat-hours), Clearwater (1,182 boat-hours), Treasure Island (632 boat-hours), Padre Island (135 boat-hours), and Galveston (36 boat-hours).

Table 3.5. Gulf of Mexico ports monitored by the National Marine Fisheries Service (NMFS) Billfish Survey with the highest recreational bluewater fishing effort (Source: NMFS 2001a).

Port	Effort (boat-hours)
South Pass, LA	83,116
Orange Beach, AL	55,191
Pensacola, FL	50,465
Port Isabel, TX	48,922
Panama City, FL	34,373
Port O'Connor, TX	21,935
Grand Isle, LA	13,487
Destin, FL	11,014
St. Petersburg, FL	9,146
Freeport, TX	8,269
Mississippi	7,146

The NMFS MRFSS data set does not differentiate individual ports, presenting data only by state. Thus, neither billfish nor non-billfish fishery port data are available. Considering that anglers seeking billfishes and other offshore pelagic fishes employ similar fishing gear and vessels as those seeking billfishes, it is highly likely that the major ports previously listed above for billfish catches are equally important for those seeking these smaller pelagic species.

The state of Texas produces its own recreational data, and catch and effort information is available for selected ports. **Table 3.6** details fishing pressure, by Texas port, for the years 1993-94 to 1997-98. Galveston (650,600 man-hours) was the most active port, followed by Corpus Christi (286,000 man-hours), Matagorda (254,900 man-hours), Sabine Lake (199,200 man-hours), and the Lower Laguna Madre (77,600 man-hours). Most of the ports monitored in the NMFS billfish survey were not screened by TPWD (including such high use ports as Port Isabel and Port O'Connor) and vice versa, making comparisons between the two data sets extremely difficult.

Table 3.6. Fishing pressure (man-hour x 1,000) by port and year for Texas (Source: Texas Parks & Wildlife Department 2001).*

Year	Sabine Lake	Galveston	Matagorda	Corpus Christi	Lower Laguna Madre	Coastwide
1993-94	18.1	45.2	30.7	34.8	3.6	132.3
1994-95	27	156.3	35.3	48.6	22.3	289.5
1995-96	36	119.7	60.7	39.8	16.1	272.3
1996-97	68.9	165.1	71.8	64.5	19.9	390.1
1997-98	49.2	164.3	56.4	98.3	15.7	383.8
Total	199.2	650.6	254.9	286	77.6	1468

*Does not include Prince data.

The NMFS billfish data set provides information on 66 tournaments occurring from Florida to Texas. Based on level of fishing effort, the major tournaments during 1994 to 1998 are given in **Table 3.7**. Year by year fishing effort for individual tournaments is presented in **Appendix A**, **Table A-2**.

The Mississippi Gulf Coast Billfish Classic, hosted every June by the Isle of Capri casino in Biloxi, currently is the largest prize money tournament in the Gulf of Mexico (Jennings 2001). NMFS billfish program data for this tournament was listed only for the years 1997 and 1998, so fishing effort totals are not comparable to those tournaments detailed above (each based on 4 or 5 years of sampling). Nevertheless, an examination of the tournament's mean yearly fishing effort during that 2-year period (**Appendix A**, **Table A-3**) placed it among the most heavily fished tournaments in the Gulf of Mexico.

Table 3.7. Major billfish tournaments sampled by National Marine Fisheries Service (NMFS) in the Gulf of Mexico from 1994 to 1998 ranked by level of fishing effort (boat-hours) (Source: NMFS 2001a).

Port	Tournament	Effort (boat-hours)	Number of Tournaments
Panama City, FL	Bay Point Invitational	29,071	5
Pensacola, FL	International Billfish	28,761	5
Port Isabel, TX	Texas International	27,377	5
Port O'Connor, TX	Poco Bueno	21,935	5
South Pass, LA	New Orleans Big Game Fishing Club Invitational	19,326	5
Orange Beach, AL	Mobile Big Game Fishing Club Memorial Day	18,343	5
Orange Beach, AL	Orange Beach Invitational	17,099	4
Pensacola, FL	Blue Marlin Classic	12,891	5
Empire/South Pass, LA	Fishing Rodeo	12,000	5
Orange Beach, AL	Mobile Big Game Fishing Club Ladies	10,938	5
Ft. Walton/Destin, FL	Annual Billfish	10,040	5

3.2.2.4 Primary Fishing Areas

Jennings (2001) and M. Roff (pers. comm. 2001) provided details on offshore locations fished by anglers leaving from several key ports, as summarized below. Many of these "hot-spots" are visited by fishers steaming from numerous ports of origin. **Figure 3.13** gives the locations of primary ports and fishing locations. For locations not plotted on this figure, the positions are given in the text.

Panama City anglers targeting marlin, wahoo, and yellowfin tuna usually take a heading of 220° out of St. Andrews Pass and travel approximately 80 km to the 100 fathom curve at an area referred to as "The Squiggels" (29.30°N, 86.25°W). "The Squiggels" received its name from the bottom contour representing the 100-fathom curve as seen on navigation charts. Two other frequented fishing areas are the northwest end of "The Wings" (29.23°N, 86.07°W) and "Lloyds Ridge" or "The Bill of the Sailfish" (28.12°N, 86.45°W).

Bluewater fishers from Destin, Ft. Walton Beach, and Pensacola head to several offshore locations. An area known as "Rock Cliffs" (30.07°N, 86.53°W) is popular, as is the De Soto Canyon region (29.22°N, 86.60°W). Three other localities forming a triangle draw many anglers; these are "The Nipple," "The Spur" (29.27°N, 86.56°W), and "The Elbow." Another frequently visited spot is "The Steps" (29.18°N, 87.39°W). Most

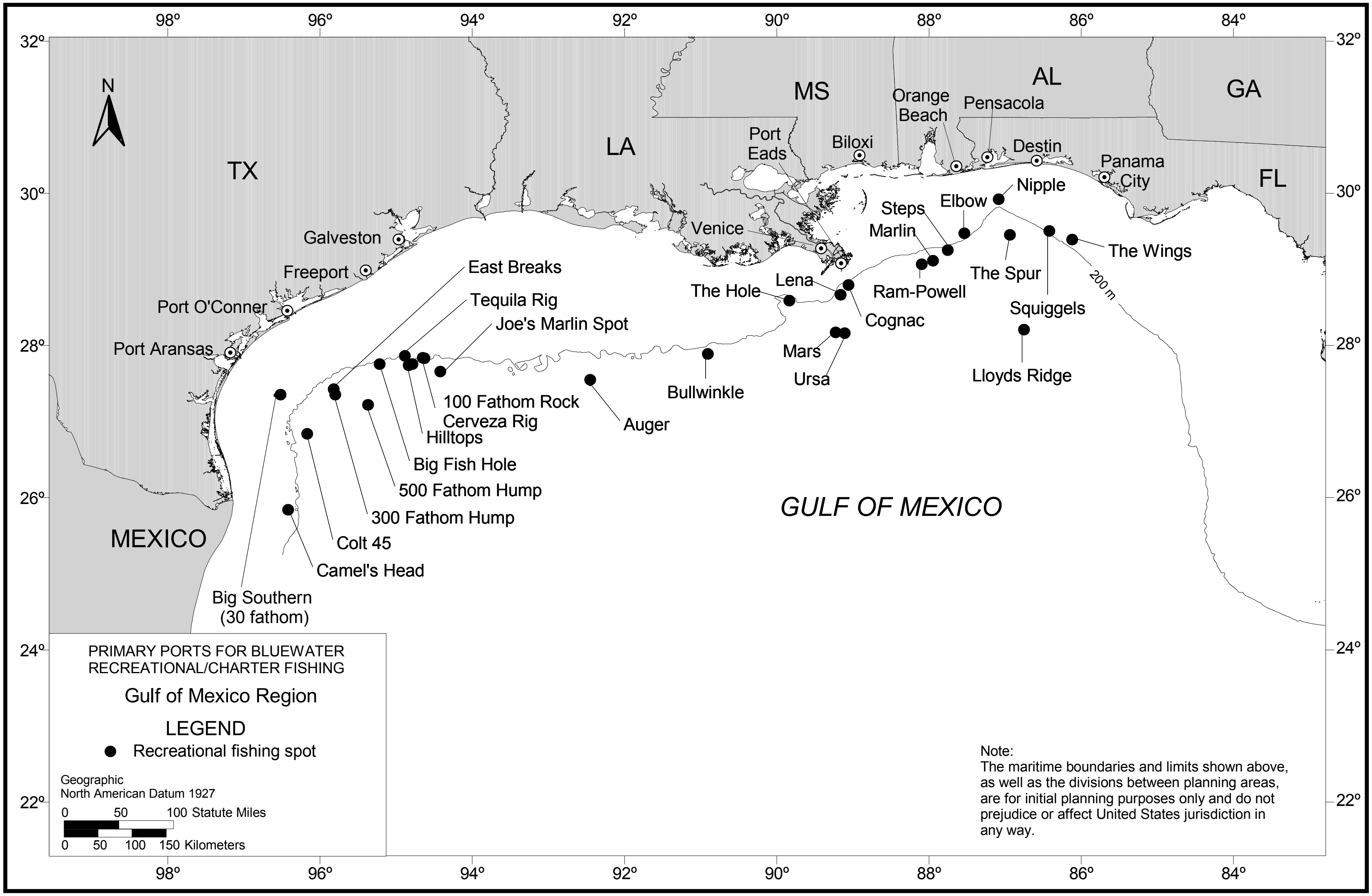

Figure 3.13. Locations of key ports and fishing locations for bluewater recreational anglers in the Gulf of Mexico.

bluefin tuna caught in the northeastern Gulf are taken during May and June in depths of around 200 m from an area known as the "Double Nipple," located 137 km south of Orange Beach.

Orange Beach anglers leave out of Perdido Pass on their way offshore. They frequently head for the Ram-Powell floating oil production platform located 137 km SE of Perdido Pass (29.02°N, 88.04°W) in about 975 m of water. Completed in 1995, the Ram-Powell rig is a joint venture between Shell, BP/Amoco, Exxon, and Mobil. The Ram-Powell rig is also utilized by fishers traveling from Biloxi, Gulfport, and South Pass (it is located 88 km SE of South Pass).

Another deepwater oil platform located nearby also is frequented by bluewater fishers from Louisiana, Mississippi, and Alabama. The "Beer Can" (29.09°N, 88.04°W) is a smaller deepwater oil platform located in 670 m of water about 10 km NE of the Ram-Powell rig. The Ram-Powell, "Beer Can," and other large deepwater oil rigs have spawned the development of a fleet of 18-m plus long charterboats targeting bluewater anglers interested in overnight and 3-day fishing trips to these waters.

The influx of casinos into southern Mississippi has resulted in increased interest in offshore fishing in the region. Charterboats from Biloxi and Gulfport usually move through South Pass near Venice, Louisiana as they run to the continental shelf, 161 km south of the Mississippi coastline. In addition to the Ram-Powell (143 km offshore of Biloxi) and "Beer Can" (121 km from Biloxi) rigs, destinations include the "Mars" (80 km from South Pass and Port Eads), and "Ursa" (225 to 241 km from Biloxi and 97 km south of South Pass and Port Eads) oil rigs.

Anglers leaving Venice and Grand Isle frequently head to Green Canyon or Mississippi Canyon areas. These areas contain a series of oil platforms that draw the attention of Louisiana fishers: the "Discovery," "Cognac," "Lena," and the previously mentioned Mars and Ursa rigs, while others prefer the "Midnight Lumps." Fishers leaving South or Tiger Pass generally travel 48 to 80 km to get to the preferred fishing grounds.

In the western Gulf, bluewater fishers from Texas ports such as Port Aransas, Port O'Connor, and Port Isabel visit an array of offshore rigs and natural features. Natural features include the "Camel's Head," "300 Fathom Hump,""500 Fathom Hump," "East Breaks," "Hilltops," and "Joe Marlin Spot." Frequently fished offshore rigs in this area are "Tequila" and "Cerveza" in the west, and to the east, "Auger" and "Bullwinkle."

3.2.2.5 Catch and Effort

Catch and effort data derived from the NMFS billfish and the TPWD data sets, and catch data from the NMFS MRFSS data set, are presented in **Appendix A**, **Tables A-1** to **A-5**.

Both the TPWD and NMFS MRFSS data sets have imperfections. Most notably, offshore (greater than 200 m) catch data frequently include a variety of typically inshore species that surely were not captured at these depths or offshore habitats, making the data sets suspect. Obvious errors were eliminated by selectively removing data for species that clearly could not have been captured in offshore waters (e.g., freshwater catfishes, estuarine species), but retained species or taxonomic groups that conceivably could occasionally occur there. In addition, the "other species" categories are nebulous and likely host similar species/groups clearly out of depth ranges or usual habitats. Certain fishes, such as billfishes, are noticeably missing from the data sets. Because these species/groups may have been "buried" in the "other species" listing, we retained that data category without modification. The extent and styles of port sampling also were dissimilar, making direct comparisons between the two data sets difficult.

After the obviously incorrect species were removed, the remaining species were allocated into 12 major taxonomic groups (**Table 3.8** and **Appendix A, Table A-4**). Those not allocated to one of those 12 major taxonomic groups were added to the existing "other species" category. The latter represented primarily non-targeted bycatch species not falling into the 12 major taxonomic groups plus the nebulous original assemblage, which likely includes billfishes. The major group categories include most of the key game fishes sought by anglers. These taxonomic groups are barracudas, dolphins, drums, grunts, jacks, porgies, sea basses/groupers, sharks, skates/rays, snappers, triggerfishes/filefishes, and tunas/mackerels. Most of the species in these groups (drums, grunts, jacks, porgies, sea basses/groupers, skates/rays, snappers, triggerfishes/filefishes) primarily are taken in the recreational bottom fishery in depths of less than 100 fathoms, but since some members of the group are potentially taken in deeper waters, they are presented here. The other groups (barracudas, dolphins, sharks, tunas/mackerels) can be found in both areas or are most common in deeper water.

The NMFS 1994-1998 billfish data set is the most robust and reliable of the three data sets because the species identities are accurate and appropriate for the fishing region, and the port coverage seemingly is representative of the offshore recreational fishing user community. Its enumeration of billfish catches (**Appendix A, Table A-1**), missing from the other data sets, and of the large tuna catch is superior and offers a more precise view of offshore fishing. It also comes with effort data, allowing the calculation of catch per unit effort (CPUE) measures.

The catch of billfishes and tunas was highest on vessels originating from Louisiana (1,288) and Texas (1,131) ports during the 1994-1998 period (**Appendix A, Table A-1**). Florida (750), Alabama (431), and Mississippi (52) vessels had significantly fewer catches. Mississippi (57.7 percent) and Florida (55.1 percent) anglers landed more of their billfish catches than those in other states; Texas and Louisiana fishers were the most conservation-conscious, releasing 65.7 percent and 61.3 percent of their catches, respectively. Calculated CPUE figures indicated that anglers in Texas (0.014 billfishes and tunas per boat-hour fished) and Louisiana (0.012) waters were roughly twice as likely to be successful as fishers in Alabama (0.008), Florida (0.007), and Mississippi (0.007). This suggests that the catch-and-release ethic may be paying dividends in those areas where it is in practice.

Table 3.8. Total number of individuals caught by species and state (1994-1998) (Source: National Marine Fisheries Service 2001b).

1994-1998	West Florida	Alabama	Mississippi	Louisiana	Texas*	Total
Barracudas	330,197	116	0	2,270	0	332,583
Dolphins	2,009,400	2,363	203	103,143	39,500	2,154,609
Drums	63,162	13,904	251,628	328,090	22,400	679,184
Grunts	968,670	151,000	2,589	352	0	1,122,611
Jacks	623,170	83,261	25,280	65,555	3,500	800,766
Porgies	513,088	71,978	116,425	48,260	0	749,751
Sea Basses	2,939,007	93,598	4,195	8,294	0	3,045,094
Sharks	53,980	959	40,269	50,262	7,600	153,070
Skates/Rays	4,942	0	137	212	800	6,091
Snappers	3,758,838	2,811,734	129,800	796,334	323,000	7,819,706
Triggerfishes/Filefishes	669,099	424,822	12,834	66,175	20,400	1,193,330
Tunas and Mackerels	2,149,560	74,420	186,188	39,491	92,100	2,541,759
Other Species	251,063	23,032	21338	52,855	50,600	398,888
Total	14,334,176	3,751,187	790,886	1,561,293	559,900	20,997,442

* Texas Parks & Wildlife Department 2001.

The NMFS billfish data set also is useful in identifying fishing ports and tournaments with the highest catches. Total catches (**Table 3.9**) during the monitored period were highest in South Pass (1,041 billfishes and tunas) and Port Isabel (737). Other important ports of origin included Orange Beach (425), Pensacola (411), Port O'Connor (255), Panama City (191), Grand Isle (134), and Freeport (113). Smaller catches were recorded by anglers from Destin (77), Port Mansfield (72), Port Aransas (63), St. Petersburg (60), and "Mississippi" (probably Biloxi-Gulfport) (52). Occasional catches were noted in Clearwater (9), Dauphin Island (6), Galveston (4), Padre Island (4), and Treasure Island (2).

Based on CPUE calculations (**Table 3.9**), anglers fishing from Port Isabel (0.015 billfishes and tunas per boat-hour fished), Freeport (0.014), Port Mansfield (0.013), South Pass (0.013), Port O'Connor (0.012), and Grand Isle (0.010) were most successful in capturing their quarry. Orange Beach (0.008 billfishes and tunas per boat-hour fished), Pensacola (0.008), Destin (0.007), and Panama City (0.006) yielded less fishes per fishing hour.

Table 3.9. Ports monitored by the National Marine Fisheries Service (NMFS) Billfish Survey producing the highest total catches and catches per unit effort (CPUEs) of billfishes and tunas during 1994 to 1998 (ranked by total catch) (Source: NMFS 2001a).

Port	Total Catch	CPUE (boat-hour)
South Pass, LA	1,041	0.013
Port Isabel, TX	737	0.015
Orange Beach, AL	425	0.008
Pensacola, FL	411	0.008
Port O'Connor, TX	225	0.012
Panama City, FL	191	0.006
Grand Isle, LA	134	0.010
Freeport, TX	113	0.014
Destin, FL	77	0.007
Port Mansfield, TX	72	0.013

The 10 tournaments yielding the largest numbers of catches during the monitored time period are provided in **Table 3.10**. Tournaments following those shown in **Appendix A**, **Table A-6** included: Grand Isle Tarpon Rodeo (114), [Orange Beach] Mobile Big Game Fishing Club Memorial Day (104), [South Pass] New Orleans Big Game Fishing Club September (100), and [South Pass] New Orleans Big Game Fishing Club Ladies Day (100). Year by year catch totals for individual tournaments are presented in **Appendix A, Table A-5**.

Table 3.10. Tournaments monitored by the National Marine Fisheries Service (NMFS) Billfish Survey producing the highest total catch of billfishes and tunas during 1994 to 1998 (ranked by total catch) (Source: NMFS 2001a).

Tourney	Location	Total Catch
Texas International Fishing	Port Isabel, TX	336
Poco Bueno	Port O'Connor, TX	255
New Orleans Big Game Fishing Club Invitational	South Pass, LA	191
Pensacola International Billfish	Pensacola, FL	185
Orange Beach Invitational	Orange Beach, AL	166
Blue Marlin Classic	Pensacola, FL	146
Bay Point Invitational	Panama City, FL	136
New Orleans Big Game Fishing Club Labor Day	South Pass, LA	126
Marlin International Lonestar Showdown	Port Isabel, TX	122
Empire-South Pass Fishing Rodeo	South Pass, LA	122

When only tournaments monitored for 3 to 5 years are considered, the highest CPUE calculations (**Table 3.11**) were from five Port Isabel tournaments. Five South Pass tournaments and one hosted in Pensacola produced high catch rates.

Table 3.11. Tournaments monitored by the National Marine Fisheries Service (NMFS) Billfish Survey producing the highest catch per unit effort (CPUE) for billfishes and tunas during 1994 to 1998 (ranked by CPUE) (Source: NMFS 2001a).

Tournament	Location	CPUE
South Texas Big Game Fishing Club Second	Port Isabel, TX	0.026
South Texas Big Game Fishing Club Third	Port Isabel, TX	0.024
South Texas Big Game Fishing Club Finale	Port Isabel, TX	0.023
South Texas Big Game Fishing Club Fourth	Port Isabel, TX	0.022
Marlin International Showdown	Port Isabel, TX	0.021
New Orleans/Baton Rouge Big Game Fishing Club Labor Day	South Pass, LA	0.020
New Orleans/Baton Rouge Big Game Fishing Club September	South Pass, LA	0.019
Pratt Martin/New Orleans Big Game Fishing Club First	South Pass, LA	0.018
Monkey Boat Billfish	Pensacola, FL	0.015
Cypress Cove Invitational	South Pass, LA	0.014

The least productive major tournaments were the Bay Point Invitational in Panama City, Florida (0.005); Old Salt in St. Petersburg, Florida (0.005); Mobile Big Game Fishing Club Memorial Day in Orange Beach, Alabama (0.006); Annual Ft. Walton-Destin, Florida Billfish (0.006), Outcast Small Boat Billfish in Pensacola, Florida (0.006); Pensacola Ladies [0.006], South Pass Memorial Day (0.006), and Pensacola International Billfish (0.006).

Recreational angler billfish CPUE statistics for the western Atlantic and Gulf of Mexico were extracted from Ortiz and Farber's (2000) ICCAT working document (**Figure 3.14**). Although not tested statistically, the overall trend is for a reduced catch rate during this time period, a trend observed in bluefin tunas and other pelagic fishes as well many inshore species.

Composition of the Gulf of Mexico billfish/tuna catch is given in **Appendix A, Table A-1**. From 1994-1998 there were 1,320 blue marlin (52.5 percent of Billfish Catch [BC], 36.1 percent of Total Catch [TC]), 744 white marlin (29.6 percent BC, 20.4 percent TC), 440 sailfish (17.5 percent BC, 12.0 percent TC), 10 spearfishes (0.4 percent BC, 0.3 percent TC) and 1,138 yellowfin tunas (31.2 percent TC) captured. There were no recorded catches of bluefin tuna or swordfish.

The offshore catch composition of the combined NMFS MRFSS and TPWD data sets is presented in **Table 3.8** and **Appendix A, Table A-4**. We are reticent to discuss these data in detail because of previously described misgivings regarding quantity and quality of the data sets. However, it is obvious, regardless of data shortcomings, that the most numerically important taxonomic groups were the snappers (family Lutjanidae, mostly *Lutjanus* spp. and *Rhomboplites aurorubens*; 7,819,706) and sea basses/groupers (family Serranidae, mostly *Epinephelus* spp., *Mycteroperca* spp., and *Centropristis* spp.; 3,045,094), the primary target species in the continental shelf (less than 100 fathoms) bottom fishery. Mackerels and tunas (Scombridae, primarily king and Spanish mackerels, *Scomberomorus cavalla* and *S. maculatus,* little tunny, *Euthynnus alletteratus*, and wahoo, *Acanthocybium solandri;* 2,541,759), dolphins (Coryphaenidae, mostly *Coryphaena hippurus*; 2,154,609), triggerfishes/filefishes (Balistidae and Monacanthidae, primarily the gray triggerfish, *Balistes capriscus*; 1,193,330), and grunts (Haemulidae, mostly the white grunt, *Haemulon plumieri*, and tomtate, *H. aurolineatum*; 1,122,611) were the next most abundant groups represented in catches. Of these, the latter two groups are usually by catch in the snapper-grouper fishery (although they occasionally are targeted). Only the mackerels/tunas and dolphins are normally taken in depths greater than 200 m, but not all mackerel/tuna species are "bluewater" inhabitants.

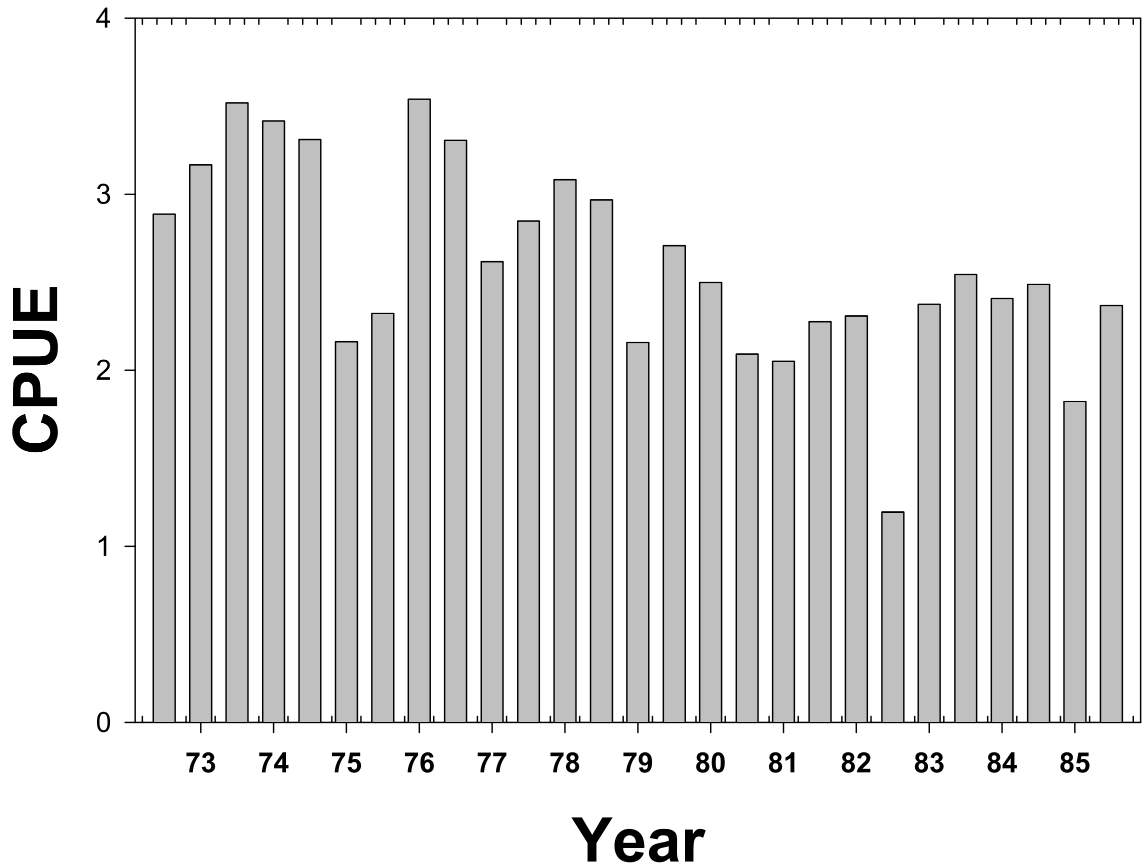

Figure 3.14. Time series trend in billfish catch per unit effort (CPUE) for the western Atlantic and Gulf of Mexico (Source: Ortiz and Farber 2000).

3.3 LIFE HISTORY SYNOPSES OF KEY BLUEWATER FISHERIES SPECIES

This subsection provides brief life history synopses for the major species from the epipelagic, deep reef, and invertebrate bluewater fisheries. Each synopsis includes taxonomic status with currently used scientific names, geographical distribution, habitat, biology, fishery importance, and conservation. Information provided under each category is limited by the available literature.

Shortfin Mako Shark

Order: Lamniformes
Family: Lamnidae
Genus: *Isurus*
Species: *oxyrinchus*

Taxonomy

Rafinesque first described this shark as *Isurus oxyrinchus* in 1810. Since then it also has appeared as *Isurus spallanzani, Oxyrhina glauca, Isuropsis dekayi, Isurus mako,* and *Isurus africanus.*

Geographical Distribution

The shortfin mako has a wide distribution. It is found in warm and warm-temperate waters throughout the world's oceans. However, it also is found in cool, deep waters of tropical regions. In North America, it ranges from California to Chile in the Pacific and in the Atlantic from the Grand Banks to the hump of Brazil, including the Gulf of Mexico and the Caribbean Sea. It is commonly seen in offshore waters from Cape Cod to Cape Hatteras. In the eastern Atlantic, shortfin makos range from Norway to South Africa, including the Mediterranean, and are found throughout the Indian Ocean from South Africa to Australia. In the western Pacific, the shortfin mako ranges from Japan to New Zealand, and in the central Pacific it occurs from the Aleutian Islands to the Society Islands.

Habitat

Although this species is most common north or south of equatorial or tropical regions, it also is found in the cooler, deeper waters of the tropical regions. In some tropical areas where the temperature of the surface water may be 27°C, at depths of between 30 and 60 m, the water temperature may be as low as 15°C. With the ability to elevate body temperature, makos are able to maintain themselves in temperatures of 5°C to 11°C. In this sense the makos are somewhat "warm-blooded," meaning that heat in their blood is conserved within the body and not lost through the gills. They have been recorded at depths of 740 m. However, shortfin makos prefer water temperatures between 17°C and 20°C. It has been hypothesized that this species migrates seasonally to warmer waters, and this has been supported by some tag and release studies.

Biology

Size, Age, and Growth

Average adult size is 3 m and 60 to 135 kg. As with most shark species, females are larger than males and may reach 3.8 m and weigh 570 kg. The largest "mako" taken on hook and line worldwide was 506 kg, however no identification was made of the species (shortfin or longfin mako). The shortfin mako has a growth rate that exceeds other lamnids. Length analyses, as well as counts of growth rings on vertebral centra have been utilized in studies to estimate the age of this species. Most shortfin makos likely live approximately 20 years.

Feeding

The shortfin mako is an apex predator that feeds on other fast-moving pelagic fishes such as swordfish, tunas, squids and other sharks. Interestingly, the stomach contents of shortfin makos caught in gill nets off Natal, South Africa, showed a ratio of 60 percent shark and 40 percent fish, while a study off the northeastern U.S. found 77.5 percent of their diet was bluefish. Marine mammals and sea turtles are rarely ingested by shortfin makos.

Reproduction

Males mature at about 2.0 m, while females mature at 2.75 m. They reach sexual maturity between 4 to 6 years of age and have a reproductive cycle of 2 years. Development of young is ovoviviparous. Embryos in the female's uterus hatch in uteri and are nourished by yolk stored in a yolk sac. There is no placental connection between mother and young. Once the young are hatched into the uterus, uterine cannibalism (known as oophagy) occurs. Oophagy is the ingestion of unfertilized or less developed eggs by a fetus that is more developed. Young are born upon completion of an approximate 15 to 18 month gestation. Litters range from 8 to 10 pups, and the pups are probably born at 68 to 70 cm. Upon capture, pregnant females usually abort embryos; therefore few specifics about reproduction are known.

Fishery Importance

The shortfin mako is considered to be one of the great game fishes in the world, owing to its beauty, power, aggressiveness, grace, and athletic jumping ability. Shortfin makos are recreationally caught with trolled baits and lures as well as with live or dead baits fished from anchored or drifting boats.

Highest recreational catches occur off southern California, the northeastern U.S., Australia, and New Zealand. The shortfin mako was made famous in Ernest Hemingway's *The Old Man and the Sea*. Hemingway also caught a 357 kg mako with a rod and reel off Bimini, the Bahamas, in 1963. It is a highly sought commercial species as well. Its flesh is flavorful and limited quantities may be found in the U.S. markets, including California where it sometimes is sold as swordfish. Commercial captures are made using longlines, stationary gill nets, and drift nets. The fins and liver oil are also marketed. Shortfin makos are a major bycatch component of the tuna and swordfish fisheries. Unfortunately, accurate bycatch numbers are not available.

Conservation
The world's affinity for shark fin soup and the delectable flesh of the shortfin mako has lead to their decreased numbers. Worldwide, the shortfin mako is not only subject to overharvesting by direct hunting, they are often bycatch victims of the tuna and swordfish fishing industries. As a result, NMFS has included the shortfin mako on their list of managed pelagic sharks. The NMFS has reduced the number of commercial and recreational shortfin mako catches allowed per year by 50 percent in an attempt to counter act its declining numbers. However, the NMFS regulations apply only to U.S. Atlantic and Gulf waters. Hastening the shortfin mako's population decrease is their slow reproductive rate. They are incapable of replenishing their populations as quickly as they are being decimated.

Sources: Allen 1999; Bass et al. 1975b; Compagno 1984a; Last and Stevens 1994; Moreno and Moron 1992; Oldewage and Smale 1993; Pratt and Casey 1983; Springer and Gold 1992.

Silky Shark

Order: Carcharhiniformes
Family: Carcharhinidae
Genus: *Carcharhinus*
Species: *falciformis*

Taxonomy
The first specimen described was given the name *Carcharias (Prionodon) falciformis* by Müller and Henle in 1841. Other names appearing in the literature include *Squalus* or *Prionodon tiburo*, *Gymnorhinus* or *Gymnorrhinus pharaonis*, *Aprionodon sitankaiensis*, *Carcharhinus floridanus*, *Eulamia malpeloensis*, and *Carcharhinus atrodorsus*.

Geographical Distribution
The silky shark is a common tropical-subtropical, epipelagic species that occurs in the Atlantic, Pacific, and Indian Oceans. In the western Atlantic, it ranges from Massachusetts to Brazil (including the Gulf of Mexico and Caribbean Sea) and from Spain to Angola in the eastern Atlantic. It is found in the western Indian Ocean and the Red Sea from Tanzania to Mozambique, including Madagascar and the Comores and in the mid- and eastern Indian Ocean from the Maldives and Sri Lanka to western Australia. It occurs from China to New Zealand in the western Pacific (including the Hawaiian Islands), and from Baja California to Peru in the eastern Pacific.

Habitat
Although essentially pelagic, the silky shark is not restricted to the open ocean and has been recorded from depths as shallow as 18 m. It is an active, swift shark that prefers warmer water (about 23°C). It is commonly found near the edges of continental shelves and over deepwater reefs where there is abundant food source. Typically, it ranges from the surface down to at least 500 m, but has been caught over water as deep as 4,000 m. Studies show no strong tendency for sexual segregation in the silky shark, however, they often travel with others of their own size indicating that size segregation is present within

the species. Typically, smaller sharks can be found in coastal nurseries and adults further offshore over deeper water. Small silky sharks are commonly associated with schools of tuna.

Biology

Size, Age, & Growth

Maximum length for this species is 3.3 m. Males mature at 215 to 230 cm (9 to 10 years of age) and grow to a lesser size than females, which reach maturity at 230 to 245 cm (12 years of age), however, these numbers may vary by population. For example, populations in the Pacific and Indian Oceans generally have a smaller size at maturation. Size at birth is 70 to 85 cm. Maximum age is believed to be 22+ years.

Feeding

This species feeds primarily on a variety of bony fishes, cephalopods, and to a lesser extent, crustaceans. Tunas (little tunny and yellowfin), albacore, mullet, mackerel, porcupine fish, squid, nautiluses, and various crabs have all been found in the stomachs silky sharks.

Reproduction

Reproduction is viviparous (placental). In the western North Atlantic, females give birth in late spring (May to June) and mate around the same time in alternating years. The gestation period is about 12 months. Number of sharks per litter is 6 to 14 in the western Atlantic, 9 to 12 in the eastern Atlantic, 9 to 14 in the western Indian, and 2 to 11 in the central Indian. Neonates spend first the few months near reefs but move to the open ocean by the first winter. In the western North Atlantic, nursery areas are located along the Caribbean islands.

Fishery Importance

The silky shark is of considerable importance to longline and gillnet fisheries in many parts of the world. In the Gulf of Mexico it is often caught as bycatch in the tuna fishery, but also is harvested by the directed shark fishery. In the Caribbean it is sometimes fished, primarily by longline, but is not a common catch. It is used for its meat, oil, and fins. The silky shark is also taken by recreational fishermen. Other than its importance to various fisheries, the silky shark has been used in various scientific studies investigating the sensory biology of sharks.

Conservation

As with other sharks, the silky shark is vulnerable to overfishing due to its long gestation period, low number of offspring, and slow growth rate. Presently, the silky shark is listed by the International Union for Conservation of Nature and Natural Resources (IUCN) as LR/nt (lower risk/near threatened).

Sources: Bass et al. 1975a; Bigelow and Schroeder 1948; Bonfil et al. 1993; Branstetter 1987; Castro 1983; Clark and von Schmidt 1965; Compagno 1984b; Garrick 1982; Garrick et al. 1964; Joseph 1999.

Dusky Shark

Order: Carcharhiniformes
Family: Carcharhinidae
Genus: *Carcharhinus*
Species: *obscurus*

Taxonomy

Lessueur first described the dusky shark in 1818 and classified it as *Squalus obscurus*. Since then it has appeared in the literature under several different names, including *Geleolamna greyi, Carcharias macrurus, Galeolamna (Galeolamnoides) eblis, Carcharhinus iranzae*, and *Carcharhinus obscurella*.

Geographical Distribution

The dusky shark is a cosmopolitan species that occurs along continental coastlines in tropical and temperate waters. It ranges from Nova Scotia to Cuba (including the northern Gulf of Mexico) and from Nicaragua to southern Brazil in the western Atlantic and from southern California to the Gulf of California in the eastern Pacific. It is also found in the Mediterranean Sea, Indian Ocean, and western Pacific, including Madagascar and Australia.

Habitat

C. obscurus occurs along continental shorelines where it ranges from shallow inshore waters to the outer reaches of the continental shelf and adjacent oceanic waters. Although generally a bottom feeder, it can be found from the surface to a depth of 400 m. Adults of this species tend to avoid areas of low salinity and rarely enter estuaries. The young congregate in very shallow coastal water (nurseries) in estuaries and bays from New Jersey to Cape Hattaras.

This species is known to be highly migratory in the western Atlantic and eastern Pacific, moving north during the summer months and south in the winter. Males and females undertake these seasonal migrations separately.

Biology

Size, Age, Growth

A large shark, *C. obscurus* can attain a length of about 400 cm. Average size and weight are 320 cm and 160 to 180 kg, respectively. Males mature at about 280 cm and females the same or slightly larger. Size at birth ranges from 70 to 100 cm. Dusky sharks are very slow growing, mature at about 20 years, and may live as long as 45 years.

Feeding

C. obscurus preys on a wide array of bony and cartilaginous fishes as well as a variety of invertebrates. Food items include herring, eels, mullet, groupers, grunts, croakers, bluefish, mackerel, tunas, various flatfish, a variety of sharks, skates and rays, crabs, octopuses, squid, starfishes, and sometimes human refuse.

Reproduction
In the western Atlantic, mating occurs in the spring. Due to the presence of two class sizes of young found in pregnant females off the coast of Florida, it is believed that females of this species only mate every second year. These different class sizes suggest alternating birth seasons every 2 years with a gestation period of about 8 months or a single season with a longer gestation period of about 16 months.

As with other carcharhinids, developing embryos are nourished via a pseudo-placental sac, a reproductive strategy known as viviparity. In the western Atlantic, the number of young per liter ranges from 6 to 10 with an average of 8, whereas in the southeastern Atlantic, numbers are slightly higher (range 6 to 14, average 10). In both cases, both sexes are represented in a 1:1 ratio.

Fishery Importance
The dusky shark is commonly harvested in the western Atlantic where its fins are sold overseas for shark fin soup base. It is also regularly taken on commercial longlines as a bycatch in the swordfish/tuna fishery. Its flesh is marketed for human consumption, its skin is used for leather, and its rich liver oil yields important vitamins. In this region, catch rates of all sizes of dusky sharks are greatly reduced; large individuals are now a rarity in recreational catches and their occurrence on commercial gear has declined. Because of its large size and tenacity, the dusky shark is regularly sought after by anglers.

Conservation
On a global scale, dusky shark populations are considered at-risk, with the World Conservation Union (IUCN) assessing the species as LR/nt (lower risk, near threatened). However, an ongoing decline in numbers indicated by low catch rates in the western North Atlantic has prompted a ban on the harvesting of dusky sharks by U.S. commercial fishermen and has led to this regional population being placed on the 2000 IUCN's Redlist of threatened species. Presently, the dusky shark in the western North Atlantic is listed as VU A1abd (vulnerable, with a population reduction of 20 percent over the last 10 years). In a recent assessment of fish stocks at risk of extinction by the American Fisheries Society (AFS) (Musick et al. 2000), populations of dusky sharks in the western Atlantic and eastern Pacific are both considered *vulnerable* (not *endangered* or *threatened* severely but at possible risk of falling into one of these categories in the near future).

Sources: Bass et al. 1973a; Bigelow and Schroeder 1948; Compagno 1984b; Castro 1983; Garrick 1982; Last and Stevens 1994; Simpfendorfer 2000.

<u>Sandbar Shark</u>

Order: Carcharhiniformes
Family: Carcharhinidae
Genus: *Carcharhinus*
Species: *plumbeus*

Taxonomy
The sandbar shark was described by Nardo in 1827 as *Squalus plumbeus* based on a specimen taken from the Adriatic Sea. In 1841, Muller and Henle assigned *Eulamia milberti* as the scientific name for the sandbar shark and since then, there have been various names used in its classification. Some of these include *Carcharias ceruleus, Lamna caudata, Squalus caecchia, Carcharias japonicus, Carcharhinus platyodon, Carcharhinus bleekeri, Carcharias obtusirostris, Carcharias stevensi, Carcharias latistomus,* and *Galeolamna dorsalis*. The species name *milberti* was used by some scientists until recently, based on the belief that the population of sandbar sharks in the Mediterranean Sea was made up of a distinct species. It is now known that these sharks are identical to those from the western Atlantic and Pacific Oceans.

Geographical Distribution
The sandbar shark is coastal-pelagic species that inhabits temperate and tropical waters. It is the most abundant species of large shark in the Western Atlantic. It has a global distribution, being found in the Western and Eastern Atlantic, including the Mediterranean. In the Indo-Pacific, it ranges from the Persian Gulf, Red Sea, and South and East Africa to the Hawaiian Islands. It also inhabits the Revillagigedo and Galapagos Islands in the Eastern Pacific.

Habitat
C. plumbeus is essentially a bottom-dwelling, shallow coastal water species that is seldom seen at the water's surface. It tends to prefer waters on continental shelves, oceanic banks, and island terraces but is also commonly found in harbors, estuaries, at the mouths of bays and rivers, and shallow turbid water. Despite this, *C. plumbeus* is exclusively a marine species and does not venture into freshwater. It is believed that the sandbar shark favors a smooth substrate and will avoid coral reefs and other rough-bottom areas. It spends most of the time in water from 20 to 65 m deep, but undoubtedly moves into deeper water to undergo migration and has also been reported in water so shallow it leaves the first dorsal fin exposed.

Like many sharks of its genus, the sandbar shark undergoes seasonal migrations. These movements are influenced mainly by temperature although it is believed that ocean currents also play a significant role. In the western North Atlantic, adult sandbars move as far north as Cape Cod during the warmer summer months and return to the south at the onset of the cooler weather. The adults of this species do not migrate together. Instead, males migrate earlier and in deeper, cooler water than females. Male sandbar sharks also demonstrate congregated migrations and often travel in large schools, whereas females experience solitary migrations.

Biology
Distinctive Features
The sandbar shark's most distinguishing characteristic is its taller than average first dorsal fin, which originates above or slightly anterior to the pectoral axil. It has a short, bluntly rounded snout that is shorter than the width of the mouth. An interdorsal ridge is present between the dorsal fins. Its widely spaced dermal denticles have no definite teeth and don't overlap, as is with most sharks of the family carcharhinidae.

Size, Age, and Growth

C. plumbeus is a moderately large shark that can reach up to 2.4 m in length but more typically grows to 200 cm. Males reach maturity between 130 to 180 cm, while females mature at 145 to 180 cm. Size at birth ranges from 55 to 70 cm. The sandbar shark can weigh from 45 to 90 kg at maturity but averages 50 kg for males and 68 kg for females.

Feeding

The sandbar shark is an opportunistic bottom-feeder that preys on relatively small fishes, mollusks, and crustaceans. Common food items include various bony fishes, eels, skates, rays, dogfish, octopus, squid, bivalves, shrimps, and crabs. The sandbar shark feeds throughout the day but becomes more active at night. Because of the high percentage of sharks found with partially full stomachs and their relatively large liver, which contains high percentage of oil and vitamins, it is believed that these sharks have a very successful feeding strategy and receive a more regular supply of food than other carcharhinids.

Reproduction

In the Northern Hemisphere, mating occurs in the spring or early summer (May to June). In correlation with the warmer summer season, mating takes place in late October to January in the Southern Hemisphere. During this time, a mature male persistently follows a female, occasionally biting the area between her dorsal fins until she turns over allowing him to insert his claspers into each oviduct via the cloaca. This form of courtship behavior, which is present in most carcharhinids, often leaves the female with permanent scaring.

Once fertilization occurs, the gestation period can range from 8 to 12 months, depending upon geographical location. In the western Atlantic, pups are born from June through August, while off southeastern Africa, pups are born from December to February. In the western North Atlantic, bays and estuaries from Delaware to North Carolina are the prime sand bar shark nursery areas. As with gestation period and mating times, litter size also varies by region. Young sandbar sharks resemble their adult parents, although the characteristically large first dorsal fin may not yet be as prominent at this early stage. Juvenile sandbar sharks remain in the shallows until late fall, at which time they form schools and move southward and further offshore only to return for the summer months. This movement between shallow coastal waters and warmer, deeper waters may continue for a period of up to 5 years but should not be confused with adult migrations that involve much greater distances.

Fishery Importance

The sandbar shark plays an important role in the commercial shark fishery along the eastern U.S. In fact, because of its numbers, moderate size, palatable meat, and high fin-to-carcass ratio, it is the primary targeted species in this area. It is also harvested in the eastern North Atlantic as well as the South China Sea for its fins, flesh, skin and liver. In addition to the significant impact the sandbar shark has on the commercial fishery, it is valuable to recreational fishermen as a game fish.

Conservation
As is with other species of shark that demonstrate a reproductive strategy that includes a relatively long gestation period, a low number of offspring per litter, and a slow growth rate, the sandbar shark is vulnerable to over-exploitation by fishing. Increased recreational fishing and a heightened demand for shark fins as well as shark meat in the 1980's had a profound adverse effect on the numbers of sandbar sharks in the southwestern Atlantic. It has been proposed that the population of sandbar sharks in this area dropped by two-thirds between the 1970's and early 1990's. However, there has been a slight rise in population numbers in recent years directly as a result of the imposition of fishery regulations. In addition, it is believed that there has been a decrease in the predation of juvenile sandbar sharks in nursery grounds by larger sharks. This is based on the observation that fishing pressure was also reducing the number of larger predatory sharks, most notably tiger (*Galeocerdo cuvier*) and bull sharks. Currently, the sandbar shark is listed as "lower risk" by the IUCN.

Sources: Bass et al. 1973; Bigelow and Schroeder 1948; Castro 1983; Castro 1993; Compagno 1984b; Garrick 1982; Last and Stevens 1994; Radcliffe 1916.

Dolphin

Order: Perciformes
Family: Coryphaenidae
Genus: *Coryphaena*
Species: *hippurus*

Taxonomy
The dolphin was first described by Linnaeus in 1758. Other names that have been used for this species include *Scomber pelagicus*, *Coryphaena fasciolata*, *Coryphaena imperialis*, *Lemimphis hippuroides*, *Coryphaena immaculata*, *Coryphaena macgravii*, *Coryphaena suerii*, *Coryphaena dorado*, *Coryphaena dolfyn*, *Coryphaena virgata*, *Coryphaena argyrurus*, *Coryphaena vlamingii*, *Lampugus siculus*, *Corypheana scomberoides*, *Corypheana nortoniana*, and *Ecterias brunness*.

Common Name
The common name for this fish is a source of much confusion. The fish known as the "dolphin" is not related to the marine mammal of the same common name (family Delphinidae). Additionally, two species of dolphin fish exist, the common dolphin (*C. hippurus*) and the pompano dolphin (*C. equiselis*). Both these species are commonly marketed by their Pacific name, mahi-mahi.

Geographical Distribution
The common dolphin is a common pelagic species worldwide. It is found throughout the Atlantic, Pacific, and Indian Oceans, as well as the Caribbean and Mediterranean Seas. The common dolphin is abundant in the Gulf of Mexico.

Habitat

The common dolphin is pelagic, distributed worldwide in tropical and subtropical waters. Unlike the pompano dolphin, it is sometimes caught in estuaries and coastal waters. It is usually caught in water temperatures over 21°C.

Biology

Size, Age, and Growth

Males and females are approximately equal in weight up to a length of 95 cm, at which point the males are heavier than the females. During the peak months of the summer fishing season, the mean weight of fish landed in Florida is 1.69 kg, in North Carolina is 2.92 kg, and in Bermuda is 3.85 kg. These measurements reflect the growth of the young of the year as they migrate northward over a period of several months. Size at maturity in the western central Atlantic is 39 cm for males and 34 cm for females. The International Game Fish Association (IGFA) lists the all-tackle record as 39.91 kg.

General Behavior

Common dolphin apparently migrate towards the northern and southern extremes of their range during spring and summer. Dolphin school at all sizes. Small females are more likely to school along tide lines, while small males will swim in open water with larger males and females. Dolphins may separate into schools based upon size and/or sex. Common and pompano dolphins have been observed in the same school. Little is known of migratory patterns. It is not uncommon for dolphin schools to follow a drifting object or vessel for many days, indicating that similar chance encounters may dictate their movements. There are reports of young dolphin following a *Sargassum* line for 370 km, and of dolphin schooling under a raft as it was towed 48 km. It is recognized that dolphins generally migrate northward during the spring and summer. This may represent a response to movements of food items, the expansion of their range due to warmer weather, or prespawning activity.

Feeding

Many observations have been made on the feeding habits of dolphins. Dolphins are swift-moving, agile predators and are able to overcome most prey items. The common dolphin often associates with *Sargassum* in the Florida Current and Gulf Stream, where they prey primarily upon the smaller fishes and invertebrates associated with these tide lines. They are not selective in their feeding habits, although diet changes with growth. Larvae and juveniles feed primarily upon crustaceans, especially copepods. Adults feed mostly upon bony fishes, with flying fishes (Exocoetidae) constituting approximately 25 percent of the food by weight. Other common food items include crabs, shrimps, and cephalopods. *Sargassum* is frequently found in the stomachs, but this is probably an incidental intake associated with foraging in the *Sargassum* communities. Dolphins feed primarily during the day, as they rely upon the vision (as well as their lateral line system) to detect prey. There is evidence that they may also feed at night when the moon provides ample light. Males are apparently more active feeders than females, evidenced by the larger amounts of food found in their stomachs. Males tend to be larger than females of the same age, and thus probably need more energy to support their metabolism.

Reproduction
Unlike most pelagic species, common dolphin grow very rapidly. Additionally, their maximum lifespan is only about 4 years. Dolphins reach sexual maturity within 1 year of life, by 6 to 7 months in the western central Atlantic. In the Straits of Florida, female dolphins begin to mature before males. Female common dolphin begin to mature at approximately 350 mm fork length. They are completely mature at 550 mm fork length. Males may mature as early as 427 mm fork length, but generally are larger before maturity. The spawning season for dolphins is long, and multiple spawnings per year are common in both males and females. In the tropics, they spawn year-round; young dolphin have been found year-round in the Straits of Florida, supporting this assumption. In the northern and southern extremes of the range, they apparently spawn only in the warmer months. In laboratory conditions, dolphins have spawned both at day and night.

Early Life History
Larvae are found in tropical waters worldwide. Young dolphins are found in the Florida Current year-round, but the peak abundance occurs in the summer. Young common dolphins are found primarily off Florida from November to May and August, and off North Carolina from July to September. Larvae hatch at approximately 4 mm total length. Within 4 days, they reach a length of 5.7 mm. At 15 days, the larvae are approximately 15 mm long. Vague adult characteristics are visible at this size, and the eyes and mouth are fully developed. Juvenile common dolphins have a very distinct pattern of alternating light and dark bars.

Fishery Importance
Commercial Fisheries
Dolphin represent the most important species of large pelagic in the southeastern Caribbean commercial fishery. Tuna longliners in the Gulf of Mexico will target dolphin and consider this fish a valuable incidental catch. This fishery is seasonal, in response to the movements of the dolphin.

Recreational Fisheries
Dolphin are a very popular game fish throughout their range. They are the most commonly taken species taken on charter boats in Florida and North Carolina. They are usually hooked by anglers who are trolling for another species and encounter a school of dolphin. Anglers who seek dolphin specifically scan the water for *Sargassum* lines. Dolphin fishing is especially popular off North Carolina, Florida, the Gulf of Mexico, the Bahamas, the Caribbean Sea, the Mediterranean Sea, Spain, Hawaii, and Japan. June through September are the primary months of the fishery, although most sport catches around Florida occur between March and August. Because they exhibit fast growth and a short lifespan, dolphin populations have not suffered as much as other pelagic species from recent increases in fishing pressure.

Conservation Status
Dolphins are not thought to be endangered at this time, although regionally stocks have been overfished.

Sources: Collette et al. 1969; Ditty et al. 1994; Gibbs and Collette 1959; Johnson 1978; Kelley et al. 1993; La Monte 1945 ; La Monte 1952; McClane 1965; Oxenford and Hunt 1983; Oxenford and Hunt 1986; Potthoff 1971; Richards et al. 1984; Uchiyama et al. 1986.

Yellowfin Tuna

Order: Perciformes
Family: Scombridae
Genus: *Thunnus*
Species: *albacares*

Taxonomy

The yellowfin tuna was first described by Bonnaterre in 1788, where it was named Scomber albacares. The species appeared under a variety of names before Ginsburg first used the combination Thunnus albacares in 1953. Some other names that have been used to refer this species include *Scomber albacorus*, *Orcynus macropterus*, *Thunnus allisoni*, *Semathunnus itosibi*, *Neothunnus argentivittatus*, *Neothunnus brevipinna*, *Thunnus zacalles*, and *Thunnus catalinae*.

Distribution

Yellowfin are found worldwide in tropical and subtropical waters, from latitudes of approximately 40°N to 35°S. They are not present in the Mediterranean. The yellowfin tuna is a highly migratory species. In the Pacific, however, there is little evidence for long-range north-south or east-west migration, suggesting relatively little genetic exchange between the eastern, central, and western Pacific. This suggests potential subspecies.

Habitat

The yellowfin tuna is an epipelagic, oceanic species, living above and below the thermocline, at temperatures of 18°C to 31°C. It is generally found in the upper 100 m of the water column.

Biology

Size, Age, and Growth

The maximum length reported for yellowfin is 280 cm total length and the maximum weight is 200 kg. The all-tackle record recognized by IGFA is 176.4 kg. Yellowfin more commonly attain a length of 110 cm fork length and a weight of 55 kg.

General Behavior

Yellowfin are a schooling species. Their tendency to school with organisms of the same size is stronger than the tendency to school by species. They often swim in mixed schools of skipjack, bigeye, and other tunas. In the eastern Pacific, larger yellowfin frequently school in association with dolphins, particularly the spotted dolphin, spinner dolphin, and common dolphin. Such associations with dolphins have not been observed in the rest of the Pacific, the Indian, or the Atlantic Oceans. Yellowfin will commonly school under drifting objects such as driftwood, patches of seagrass, boats, or dead marine mammals.

Yellowfin swimming further from the surface are less likely to school and tend to scatter. There is perhaps less benefit to schooling in such cases, as there are fewer predators and little reason to attempt to obtain food at depth.

Feeding

Primary prey items include fish, cephalopods, and crustaceans. Yellowfin appear to forage rather indiscriminately for any of these items. One study found 37 families of fishes and eight orders of invertebrates in yellowfin stomachs (Wantanabe 1958). Yellowfin are apparently sight-oriented predators, as their feeding tends to occur in surface waters during daylight. Other large fishes and marine mammals compete with yellowfin for food.

Reproduction

Size at maturity varies by region, and may also be different between individuals found near shore and offshore. All yellowfin are reproductively mature by the time they reach a length of 120 cm fork length (correlating to an age of 2 to 3 years), however some are mature by 50 to 60 cm fork length (correlating to 12 to 15 months). In juvenile fishes and adults up to 140 cm, the sex ratio is approximately 1:1. The proportion of females declines after this point, although the reason is not understood.

Reproduction occurs year-round, but is most frequent during the summer months in each hemisphere. It is believed that 26 °C is the lower temperature limit for spawning. In the tropical waters of Mexico and Central America, it has been determined that yellowfin spawn at least twice a year.

Early Life History

Each female spawns several million eggs per year. Larval yellowfin can be identified by the presence of a single spot of black pigment under the chin and a lack of pigment on the tail. Also, in profile, the center of the eye is above the line of the body axis. Postlarval and small juveniles are very difficult to distinguish from related species because these diagnostic characters become obscured. The juveniles grow quickly, weighing 3.4 kg at 18 months and 63.5 kg at 4 years.

Fishery Importance

Yellowfin are a popular target for commercial fisheries. In the U.S., yellowfin catchs have grown to nearly 45 percent of the U.S. North Atlantic catch. At the surface, they are primarily caught by purse-seine. A purse-seine vessel first encircles a school with a large net. The bottom of the net is closed off, and the net is pulled upwards and brought aboard the boat, where the catch can be released by reopening the bottom of the net. The purse-seine method is central to the "dolphin-safe" tuna fishing legislation. In the late 1950's, fishermen in the eastern tropical Pacific began to exploit the tendency of yellowfin to school with dolphins. When dolphins were spotted on the surface, the fishermen would encircle them with their purse seines, hoping tuna would be schooling just below the surface. Originally, little effort was made to release the dolphins, which were of no commercial value. The dolphins would become entangled in the nets and drown. Hundreds of thousands of dolphins were killed every year by this method. Current fisheries based out of the U.S. and other nations, in concert with conservationists and consumer interest, are now working to reduce or eliminate dolphin bycatch. Yellowfin are a sportfishing target in many areas. They are caught in southern California, Baja, Mexico, and Hawaii, as well as the southeastern U.S. Atlantic states and in the Gulf of Mexico.

Sources: Collette and Nauen 1983; Kelley et al. 1993; La Monte 1945; La Monte 1952; McClane 1965; Nakamura 1985; Nishikawa and Rimmer 1987; Richards et al. 1984; Westin 1975.

Bluefin Tuna

Order: Perciformes
Family: *Scombridae*
Genus: *Thunnus*
Species: *thynnus*

Taxonomy
The bluefin tuna was first described by Linnaeus in 1758 as *Scomber thynnus*. A variety of names followed, including *Thynnus thynnus*, *Thunnus vulgaris*, and *Albacora thynnus*. In 1896, Jordan and Evermann first allocated the species into the genus *Thunnus*, now the accepted name. While scientists have debated whether the species actually represents multiple species or subspecies, evidence now suggests that *Thunnus thynnus* is a single species.

Geographical Distribution
The bluefin is distributed throughout the Atlantic and Pacific in tropical and temperate waters. In the eastern Atlantic, it is found from Labrador, Canada, to northern Brazil. In the eastern Atlantic, it is found from Norway to the Canary Islands. In the western Pacific, it is distributed from Japan to the Philippines. In the western Pacific, it is distributed from the southern coast of Alaska to Baja California, Mexico.

Habitat
The bluefin is epipelagic and oceanic, coming near shore seasonally. It can tolerate a considerable range of temperatures and has been observed both above and below the thermocline.

Biology
Size, Age, and Growth
The maximum length reported is 458.0 cm total length and the maximum weight reported is 684 kg. Bluefin commonly attain a size of 200 cm. The IGFA all-tackle record is 679 kg.

General Behavior
Bluefin exhibit strong schooling behavior while they are young. While schooling is believed to be sight oriented, schools have been observed at night. Therefore, other senses (particularly the lateral line) appear to be involved.

Bluefin tuna migrate northward from Baja California, Mexico, from June to September. Near Japan, they migrate northward during the summer. Tagged adult fish have also made trans-Pacific migrations: some eastward, and some westward. Other tagging studies have determined a bluefin can cross the Atlantic in less than 60 days.

Feeding
Bluefin exhibit different feeding techniques, resulting in different prey items. A quick, energetic pursuit of prey results in obtaining smaller schooling fishes, particularly anchovies, while "modified filter feeding" is used to catch small, slow moving organisms. Bluefin feeding near shore have been recorded to eat starfishes, kelp, and smaller shallow water fishes.

Bluefin are less likely to feed during the spawning season, when the majority of their activity must be dedicated to spawning activities. Their major competitors for food are marine mammals and other large fishes, notably other scombrids and billfishes.

Reproduction
Bluefin are oviparous. In the Atlantic, spawning has been detected in only two areas: the Mediterranean and Gulf of Mexico. This is a limited spawning area compared to other tropical tunas. Little is known about the spawning of bluefin, as it has not been observed. Spawning in the Gulf of Mexico occurs from April to June and Mediterranean spawning occurs from June to August. Differences in timing could be due to any of numerous factors. Among them are differing environmental cues and genetic variation. In the Gulf of Mexico, spawning occurs at temperatures of 24.9°C to 29.5°C while in the Mediterranean it occurs at 19°C to 21°C.

In captivity, bluefin have reached sexual maturity at 3 years. Others have suggested that bluefin become sexually mature at an age 4 to 5 years, and are suggested to live for 35 years. Average females produce up to 10 million eggs per year. Their eggs are buoyant and surface currents can distribute these a considerable distance.

The young, up to a size of 40 to 80 kg, will separate into schools based upon size. These schools often consist of multiple species, possibly containing albacore, yellowfin, bigeye, skipjack, frigate tuna, bonito, and yellowtail.

Fishery Importance
The bluefin is highly valued as a food fish around the world. It is sold fresh or frozen. Quality fish are especially favored in Japan, where they can fetch a high price in the raw seafood market. The popularity of the species in commercial markets has led to severe exploitation in several areas, most notably in the North Atlantic Ocean. Because bluefin migrate long distances, and because much of the fishery occurs in international waters, international cooperation is necessary in management decisions. ICCAT was created in

1966 to specifically address the conservation issues facing the bluefin and other highly migratory species. Over 20 nations are now active in this organization, including the U.S., Canada, Japan, Spain, and France. ICCAT attempts to organize and coordinate international research, and proposes management regulations. Major issues facing the commission are reasonable definitions of management units and development of reliable abundance estimates.

The bluefin tuna is also a popular game fish, especially in the U.S., where it is caught by hook and line. In some areas, it is reported that bluefin do not readily take bait. Instead, they will bite only when in mixed schools including albacore or yellowfin. Scientists speculate that the intense feeding activity of these other species stimulates a feeding response in bluefin.

Sources: Collette and Nauen 1983; Kelley et al. 1993; La Monte 1945; La Monte 1952; McClane 1965; Mooney-Seus and Stone 1996; Nishikawa and Rimmer 1987; Richards et al. 1984; Walter 1997; Westin 1975.

Skipjack Tuna

Order: Perciformes
Family: Scombridae
Genus: *uthynnus*
Species: *pelamis*

Taxonomy

The skipjack tuna was first described in 1758 by Linnaeus, who named it *Scomber pelamis*. There is still much debate about the generic placement of the skipack, some preferring to group it with other members of the genus *Euthynnus*, while others recommending it be placed in its own genus, *Katsuwonus*. Other names which have been used to refer to this species include *Scomber pelamides*, *Scomber pelamys*, *Thynnus pelamys*, *Thynnus vagran*, *Orcynus pelamy*, and *Gymnosarda pelamis*.

Geographical Distribution

Skipjack are distributed circumtropically. Additionally, they are present along the oceanic coast of Europe and throughout the North Sea, but are absent from the Mediterranean and Black Seas.

Habitat

The skipjack tuna is an epipelagic species, living in the surface water of the deep ocean. It can be found in water ranging in temperature from 14.7°C to 30°C. While skipjack remain at the surface during the day, they may descend to depths of 260 m at night. Skipjack have a tendency to school, often under drifting objects or marine mammals. (For theories regarding this behavior, see Yellowfin Tuna.)

Biology

Size, Age, and Growth

The record maximum length is 108 cm fork length and the maximum weight is 34.5 kg. Skipjack commonly grow to a length of 80 cm and a weight of 8 to 10 kg.

General Behavior

Skipjack exhibit many types of schooling behavior. Skipjack school with drifting objects, sharks, or whales. They may swim slowly and in circular paths, travel in a single direction, or jump. These schools may consist only of skipjack, or other tuna species may be present as well. Skipjack often divide into schools based upon their size. This may be because the smaller fish cannot maintain the same top speeds of larger fish. Small fish may school while feeding, while larger fish (greater than 20 cm) tend to feed alone.

Feeding

Skipjack feed primarily upon fishes, crustaceans, and mollusks. Cannibalism is common. Their diet appears to be very broad and suggests an opportunistic method of feeding. The peaks of foraging appear to occur around dawn and dusk. This may be in response to the diurnal, vertical migrations of other organisms, or it may suggest that skipjack satiate their food drive mid-day. Additionally, since skipjack appear to use vision when feeding, night may not offer enough light for visual recognition of prey.

Schools of skipjack are commonly found near convergences and upwellings. In such sites, distinct bodies of water, often of varying temperature, collide with one another. These areas are generally very productive and food is abundant. Other organisms that may compete with adult skipjack for food include the whale shark, yellowfin tuna, albacore, frigate tuna, dolphin fish, rainbow runner, and seabirds.

Reproduction

Skipjack are oviparous. In warm equatorial waters, skipjack spawn year-round. As distance from the equator increases, the spawning season is limited to the warmer seasons or months. Sexual maturity may occur as early as 40 cm length, however most fish appear to mature at larger sizes. Larger females produce significantly more eggs than smaller females, and the average adult may produce 80,000 to 2 million eggs per year. The eggs are approximately 0.94 mm in diameter, with a clear shell.

Early Life History

The larvae hatch at a size of 3.0 mm notochord length (NL). They have large heads and large jaws, and lack pigment. They can be distinguished from closely related larvae by their pigmented forebrains. Like *Thunnus* species, they also lack pigment in the caudal region.

Fishery Importance

In recent decades, skipjack have come to dominate the world's tuna market. Major fisheries are based out of Japan, the U.S., Indonesia, Papua New Guinea, the Philippines, France, Senegal, and Spain. Commercially, skipjack are usually taken at the surface, primarily with purse seines. In artisanal industries, hook and line is still a common method of capturing skipjack. Deeper captures are incidentally made by longline. Many newer practices have made the fishery much more successful in recent years. Artificial flotsam or other manmade floating structures are often used to attract the fish to an area, and aerial spotter planes sometimes now accompany fishing vessels. Skipjack is popular in raw fish dishes, where it is marketed as *katsuo*. In Japan it is dried, and known as *katsuobushi*. Skipjack can also be marketed fresh, frozen, or canned. Skipjack are not a major target of recreational fisheries.

Sources: Collette and Nauen 1983; Hester and Otsu 1973; Kelley et al. 1993; La Monte 1945; La Monte 1952; McClane 1965; Nishikawa and Rimmer 1987; Richards et al. 1984; Tanabe and Niu 1998; Westin 1975; Yoshida 1971.

<u>Wahoo</u>

Order:	Perciformes
Family:	Scombridae
Genus:	*Acanthocybium*
Species:	*solandri*

Taxonomy
The wahoo was first described by Cuvier in 1831, who named it *Cybium solandri*. Other names that have been used to refer to this species include *Cybium sara*, *Cybium petus, Cybium verany*, and *Acanthocybium petus*. A common alternative spelling that occurs in recent literature is *Acanthocybium solanderi*.

Geographical Distribution
The wahoo is distributed worldwide in tropical and subtropical waters. In the Atlantic, it is found from the North American coast to approximately 40°W longitude, and from about 35°N to 5°N latitude. It is distributed in the Gulf of Mexico and off the west coast of Central America. The wahoo is also present in the Mediterranean and in the Indian Ocean, from off the east coast of Africa to the waters off Sri Lanka. Additionally, it is found in the Indo-Pacific and in the central Pacific Ocean to approximately 150°W.

Habitat
The wahoo is found in the epipelagic zone of oceanic waters.

Biology
Size, Age, and Growth
The maximum reported size for the wahoo is 250 cm total length, with a maximum weight of 83 kg. Typically, individuals attain a size of 100 to 170 cm. After reaching a length of 96 to105 cm, individuals grow at a rate of 3 to 4 cm per month. Latitude appears to influence size, with average weight increasing with distance from the equator, apparently correlated to cooler temperatures. According to IGFA, the all-tackle record is 11.34 kg.

Feeding
Wahoo feed primarily upon other pelagic fishes, as well as squids. They have been recorded feeding on tunas, porcupinefishes, flyingfishes, herrings, pilchards, scads,

lanternfishes, as well as many other species. Their fusiform body and great endurance allow them to pursue and overcome prey, which can be readily captured with their strong jaws.

Reproduction
An average female may produce 60 million eggs per spawning. Spawning sites are known from Cuba, Straits of Yucatan, and Florida. Spawning appears to occur over an extended period of time. The simultaneous presence of wahoo at varying stages of maturity may indicate year-round spawning in some areas.

Fishery Importance
There have not traditionally been organized fisheries for wahoo, although it is favored for human consumption. This lack may perhaps be because wahoo do not school as many scombrids do. In the areas where it is caught commercially, it is marketed fresh, salted, spice-cured, or frozen. The wahoo is appreciated as a game fish, especially in the U.S. and Australia, where it is caught by hook and line.

Sources: Collette and Nauen 1983; Kelley et al. 1993; La Monte 1945; La Monte 1952; Manooch and Hogarth 1983; McClane 1965; Nishikawa and Rimmer 1987; Richards et al. 1984.

Swordfish

Order:	Perciformes
Family:	Xiphiidae
Genus:	*Xiphias*
Species:	*gladius*

Taxonomy
Linnaeus first described the swordfish in 1758, providing the name that is still in use today, *Xiphias gladius*. Other names that have been used for this species include *Xiphias imperator, Xiphias rondeletti*, *Phaethonichthys tuberculatus*, *Xiphias estara, Tetrapterus imperator*, and *Xiphias thermaicus*.

Geographical Distribution
The swordfish is found in oceanic regions worldwide, in all but the cool polar waters; its latitudinal range is approximately from 50°N to 45°S.

Habitat
Generally an oceanic species, primarily found in surface waters of 18°C to 22°C. Although mainly a warm-water species, the swordfish has the widest temperature tolerance of any billfish, and can be found in waters from 5°C to 27°C. The swordfish is most commonly observed in surface waters, although it is believed to swim to depths of 650 m or greater, where the water temperature may be just above freezing. One adaptation that allows for swimming in such cold water is the presence of a "brain heater," a large bundle of tissue associated with one of the eye muscles, which insulates and warms the brain. Blood is supplied to the tissue through a specialized vascular heat

exchanger, similar to the counter current exchange found in some tunas. This helps prevent rapid cooling and damage to the brain as a result of extreme vertical movements.

Biology

Size, Age, and Growth

Swordfish reach a maximum size of 450 cm total length and a maximum weight of 650 kg, although the individuals commercially taken are usually 120 to 190 cm long in the Pacific. Females are larger than males of the same age, and nearly all specimens over 140 kg are female. Pacific swordfish grow to be the largest, while western Atlantic adults grow to 320 kg and Mediterranean adults are rarely over 230 kg. The IGFA all tackle record is 536.15 kg.

General Behavior

The swordfish is a highly migratory species, generally moving to warmer waters in the winter and cooler waters in the summer. It is often present in frontal zones, areas where ocean currents collide and productivity is high. They generally do not form schools.

Feeding

Adults feed opportunistically. They have been observed feeding at the water surface, and stomach contents indicate they feed at the bottom of their depth range (>650 m) as well. They feed mostly upon pelagic fishes, and occasionally squids. At depth they feed upon demersal fishes. The sword apparently is used in obtaining prey, as squids and cuttlefishes commonly exhibit slashes to the body when taken from swordfish stomachs. A recent study found the majority of large fish prey had been slashed, while small prey items had been consumed whole.

Reproduction

Swordfish have been observed spawning in the Atlantic, in water less than 75 m deep. Estimates vary considerably, but females may carry from 1 million to 29 million eggs in their gonads. Solitary males and females appear to pair up during the spawning season. Spawning occurs year-round in the Caribbean Sea, Gulf of Mexico, the Florida coast and other warm equatorial waters, while it occurs in the spring and summer in cooler regions. Being the only member of its family, the swordfish has unique-looking larvae. The larvae are 4.2 mm long at hatching. At this stage, body is only lightly pigmented. The snout is relatively short and the body has many distinct, prickly scales. With growth, the body narrows. By the time the larvae reach 12 mm, the bill is notably elongate, but both the upper and lower portions are equal in length. The dorsal fin runs the length of the body. As growth continues, the upper portion of the bill grows proportionately faster than the lower bill, eventually producing the characteristic prolonged upper bill. Specimens up to approximately 23 cm in length have a convex dorsal fin which extends the entire length of the body. With further growth, the fin develops a single large lobe, followed by a short portion that still reaches to the caudal peduncle. By approximately 52 cm, the second dorsal fin has developed, and at approximately 150 cm, only the large lobe remains of the first dorsal fin.

Fishery Importance
Swordfish fisheries are active in tropical and temperate waters worldwide. The nations with the highest swordfish catches in the North Atlantic are Spain, the U.S., Canada, Portugal, and Japan. Brazil, Japan, Spain, Taiwan, and Uruguay are the nations that catch the most swordfish in the South Atlantic. In 1995, the Atlantic swordfish industry caught 36,645 tons, or 41 percent of the world total catch of swordfish.

Sources: Barrett et al. 1998; Carey 1982; Ehrhardt 1992; Kelley et al. 1993; La Monte 1945; La Monte 1952; McClane 1965; Nakamura 1985; Nishikawa and Rimmer 1987; Richards et al. 1984.

Atlantic White Marlin

Order: Perciformes
Family: Istiophoridae
Genus: *Tetrapterus*
Species: *albidus*

Taxonomy
The Atlantic white marlin was first described by Canestrini in 1861, under the name *Tetrapterus lessonae*. In 1926, Jordan and Evermann first used the name *Maikara albida*. Other names that have been used for this species include *Maikara lessonae* and *Lamontella albida*.

Geographical Distribution
The white marlin is an Atlantic species, distributed from approximately 45°N to 45°S in the western Atlantic and 35°S in the eastern Atlantic. As its distribution is limited by temperature, its boundaries vary throughout the year; it is found in the northern and southern extremes of its range only in the respective warm season. Specimens have been reported from the Mediterranean Sea and from the coast of France, but these are believed to be isolated occurrences of individuals who have strayed outside the regular distribution. While Atlantic white marlins do travel long distances, they apparently do not perform the transoceanic migrations of related species.

Habitat
The white marlin is pelagic and oceanic, usually found in water over 100 m deep. It generally swims above the thermocline, in water of surface temperatures above 22°C, and salinities between 35 and 37 ppt. Much of the white marlin's habitat has a current of 0.5 to 2.0 kn. The white marlin is often associated with upwellings and weed lines. It frequents regions with benthic geographic features such as drop-offs, canyons, and shoals.

Biology
Size, Age, and Growth
The white marlin is smaller than many other billfishes. The maximum length for the white marlin is 280 cm total length and the maximum weight is over 82 kg. The fish taken by Atlantic longline vessels usually range from 130 to 210 cm body length. The

all-tackle record, as recognized by the IGFA, is 82.50 kg. Females tend to reach larger ages than do males.

General Behavior

Atlantic white marlins are not strong schoolers. They are usually observed swimming alone or in pairs. White marlins commonly display a swimming technique known as "tailing," in which only the dorsal lobe of the caudal fin is visible above the surface of the water. Small schools may be observed around schools of bait fish. Limited schooling may also occur, by sex or size, during certain periods of the year, but little is known of this behavior.

Feeding

Atlantic white marlins appear to be sight-oriented, daytime feeders. They often accumulate near fronts, the edges between water bodies of differing temperatures or salinities. These confluences produce nutrient-rich upwellings, and thus are successful feeding areas for the white marlin and other predatory fishes. There is some evidence that white marlins can stun or kill their prey by spearing or slashing it with their bill. Unlike swordfish, which use the same technique, however, the majority of prey items in the stomachs of white marlins appear without slashes. This indicates that white marlins more often overtake the prey by speed, rather than injuring it first. A main prey item for white marlins is squid. Bony fishes, especially dolphins, blue runner, mackerels, flying fish, and bonito are also commonly eaten. Round herring, which are abundant along the central Atlantic coast, are commonly consumed in that region. Much of the white marlin's distribution coincides with that of the yellowfin tuna and the blue marlin. As these fishes feed on many of the same prey items, there likely is considerable competition for food resources.

Reproduction

Little is known of reproduction in Atlantic white marlins. They appear to spawn once per year. They migrate to subtropical waters and spawn in early summer, over deep oceanic water. In the western North Atlantic, spawning grounds have been identified northeast of Little Bahama Bank, northwest of Grand Bahama Island, and southwest of Bemuda. They spawn in deep and blue oceanic water, generally of a high surface temperature. It is believed that they spawn in pairs, as opposed to communal or mass spawning.

Fishery Importance

The Atlantic white marlin is a popular game fish. The largest fishery for this species occurs in the summer, between Cape Cod, Massachussetts, and Cape Hatteras, North Carolina. It is marketed fresh everywhere it is caught, and sold frozen in Japan.

Sources: Gibbs 1957; Kelley et al. 1993; La Monte 1945; La Monte 1952; Mather et al. 1975; McClane 1965; Nakamura 1985; Nishikawa and Rimmer 1987; Richards et al. 1984.

Blue Marlin

Order: Periformes
Family: Istiophoridae
Genus: *Makaira*
Species: *nigricans*

Taxonomy

The taxonomic status of the blue marlin is a matter of some debate. Certain authors consider the blue marlin a species with a worldwide distribution in tropical and warm-temperate waters, while other authors consider the blue marlin of the Pacific and Indian Oceans a distinct species, *Makaira mazara*, a conclusion based largely on differences in lateral line structure. Other names which have previously been used for the blue marlin include *Tetrapterus herschelii*, *Histiophorus herschelii*, *Tetrapterus amplus*, *Tetrapterus herschelii*, *Makaira bermudae*, *Makaira nigricans nigricans*, *Makaira nigricans ampla*, *Makaira ampla ampla*, *Makaira perezi*, *Orthocraeros bermudae*, and *Makaira herschelii*.

Geographical Distribution

The blue marlin is found worldwide in warm to semi-temperate seas.

Habitat

Although occasional forays to deeper waters are made, the blue marlin prefers to stay in the warm waters above the thermocline.

Biology

Size, Age, and Growth

The blue marlin is perhaps the largest billfish. The blue marlin can reach a length of 4.3 m and a weight of 910 kg. Females are generally much larger than males. IGFA lists separate records for Atlantic and Pacific blue marlin. The all-tackle record for the Atlantic is 636 kg; the all-tackle record for the Pacific is 624 kg.

Feeding

Primarily near-surface pelagic fishes such as mackerels, tunas, and dolphin fishes are consumed by the blue marlin. Squids, and the occasional deepsea fish have been noted in the stomachs of blue marlin. Considerable disagreement among researchers exists over whether or not the bill is used during feeding. It is believed by some to be used to stun prey with a swift lateral strike or strikes. The blue marlin is capable of consuming prey of relatively large proportion. Blue marlin are not known to feed at night.

Reproduction

Spawning is known to occur near Cuba between May and November. Egg hatching is dependent upon temperature, but likely occurs well inside of a week. A single spawning produces millions of eggs each 1-mm in diameter, opaque white or yellow in color.

Fishery Importance
The blue marlin is an important game fish. Blue marlin are greatly coveted by sportsfishers and the presence of this species in the waters offshore a number of developing countries imparts an important economic benefit to such areas.

Sources: Kelley et al. 1993; La Monte 1945; La Monte 1952; McClane 1965; Nakamura 1985; Nishikawa and Rimmer 1987; Richards et al. 1984; Rivas 1975; Witzell and Scott 1990.

Atlantic Sailfish

Order: Perciformes
Family: stiophoridae
Genus: *Istiophorus*
Species: *albicans*

Taxonomy
Latrelle first described the Atlantic sailfish in 1804 and assigned it the species name *Makaira albicans*. Some scientists believe that the Atlantic sailfish and the Pacific sailfish, *I. platypterus*, are a single species. Other names which have been used for this species include *Histiophorus americanus*, *H. pulchellus, Makaira velifera*, *Skeponopodus guebucu*, *H. granulifer*, *Xiphias velifer, I. americanus*, *I. wrighti*, *I. maguirei*, *I. volador*, and *H. albicans*.

Geographical Distribution
The Atlantic sailfish is distributed from approximately 40°N to 40°S in the western Atlantic and 32°S in the eastern Atlantic. It has been identified from the Mediterranean Sea, although few records exist for this region. In the western Atlantic, its highest abundance is in the Gulf of Mexico, the Atlantic coast of Florida, and the Caribbean Sea. In this region, distribution is apparently influenced by wind conditions as well as water temperature. Above and below the equator, the extremes of the distribution are only inhabited during the respective warm seasons. This change in distribution may be linked to prey movement. In the eastern Atlantic, there is an aggregation off the coast of West Africa.

Habitat
The Atlantic sailfish swims in the surface waters of epipelagic and oceanic waters. It generally remains above the thermocline, in water temperatures between 21°C to 28°C. There is evidence that it also swims into deeper water as well. It is less oceanic than other billfishes common to the Atlantic, and will make forays into nearshore water.

Biology
Size, Age, and Growth
The Atlantic sailfish is one of the smaller members of the family Istiophoridae. The maximum size for the Atlantic sailfish is 315 cm total length and around 58 kg. The all-tackle record listed by IGFA is 64 kg. In southern Florida, the fish tend to be smaller, generally between 173 and 229 cm total length. Commercial longline vessels in the

Atlantic generally catch fish between 125 and 210 cm. The largest fish are usually females. Cephalopods (squids and octopus) and bony fishes are the primary prey items. Mackerels, tunas, jacks, halfbeaks, and needlefishes are the most commonly taken fishes. These prey items indicate that some feeding occurs at the surface, while some occurs in midwater, along reef edges, or along the bottom.

Spawning may begin as early as April, but occurs mainly in the summer months. In Florida in the summer months, females will swim slowly through shallow water, with their dorsal fin above the water's surface. One or more males will accompany her and spawn near the surface. Spawning also may occur in deep waters along the coast of North America and over the continental shelf off the West African coast. Spawning has been observed year-round in the eastern Atlantic, with a peak in the summer months. A large female may release over 4,500,000 eggs in a spawning.

Early Life History

Atlantic sailfish are approximately 0.318 cm at hatching. Larval sailfish lack the jaw characteristic of the adults. The head contains many spines: one above the eye, on the lower operculum, and a smaller one located between these. At 0.64 cm, the jaws begin to elongate. At 20 cm, all larval characteristics have disappeared and the juvenile contains all the features of the adult. The young of the year can often be observed off the coast of Florida. At 6 months, a juvenile may weight 2.7 kg and be 1.4 m long. Upon reaching this size, growth rate decreases.

Fishery Importance

The Atlantic sailfish is highly sought after by recreational fishermen. Popular fishing locations include Bermuda, Puerto Rico, the Windward Islands, and the Gulf of Mexico. Atlantic sailfish are generally caught by angling.

Sources: Beardsley et al. 1975; Kelley et al. 1993; La Monte 1945; La Monte 1952; McClane 1965; Nakamura 1985; Nishikawa and Rimmer 1987; Post et al. 1997; Richards et al. 1984; Tinsley 1964.

Yellowedge Grouper

Order: Perciformes
Family: Serranidae
Genus: *Epinephelus*
Species: *flavolimbatus*

Taxonomy

First described as *Epinephelus flavolimbatus* by Poey in 1865, no synonyms exist for the yellowedge grouper.

Geographical Distribution

The yellowedge grouper occurs along the outer continental shelf and upper continental slope in the western Atlantic from North Carolina to southern Brazil including the Caribbean Sea and the Gulf of Mexico.

Habitat
This species inhabits rocky and sand/clay bottoms in water depths ranging from 64 to 275 m. Submersible observations revealed that yellowedge groupers occupy depressions or burrows (some constructed by tilefishes).

Biology
Size, Age, and Growth
This species reaches a maximum length of 110 cm. Males are significantly larger than females. Yellowedge groupers have proven difficult to age by standard otolith methods. The maximum estimate ages may range between 15 and 20 years.

Reproduction
This species is a protogynous hermaphrodite. Females mature at 52 to 60 cm total length and are thought to change sex at about 75 cm. Ripe females have been observed in the Gulf of Mexico from January to October and peak spawning occurs from May to September. There is circumstantial evidence that the yellowedge grouper aggregates to spawn, possibly in water depths as shallow as 60 m.

Feeding
Yellowedge groupers feed on fishes and invertebrates including mollusks, brachyuran crabs, echinoderms, and urochordates.

Fishery Importance
This species is one of the most important deep reef species in the western Atlantic and Gulf of Mexico. Bottom longline is the most common commercial mode of fishing for the yellowedge grouper.

Conservation
The yellowedge grouper is listed by AFS as "at risk of extinction." Fishing pressures have been high over the years and catches have declined.

Sources: Bullock et al 1996; Bullock and Smith 1991; Heemstra and Randall 1993; Jones et al. 1989; Musick et al. 2000.

<u>Snowy Grouper</u>

Order: Perciformes
Family: Serranidae
Genus: *Epinephelus*
Species: *niveatus*

Taxonomy
Valenciennes in Cuvier and Valenciennes first described the snowy grouper as *Serranus niveatus* in 1828. It was later named *Serranus margritifer* by Gunther in 1859. Various synonyms have been used since, including *Serranus conspersus* (Poeyi 1860); *Hyporthodus flavicauda* (Gill 1862), and *Alphestes scholanderi* (Walters 1957).

Geographical Distribution
The snowy grouper occurs in the western Atlantic from Massachusetts to southern Brazil, including the Caribbean Sea, the Gulf of Mexico, and Bermuda.

Habitat
Adults of this species inhabit rocky hard bottom areas and artificial structures in water depths ranging from 30 to 525 m. Juveniles often occur in depths as shallow as 10 m.

Biology
Size, Age, and Growth
Snowy groupers reach a maximum total length of 120 cm and weight of 30 kg. Maximum estimate age is at least 27 years.

Reproduction
This species is a protogynous hermaphrodite; over 40 percent of all fish over 8 years of age are male. Females mature at 40 to 50 cm total length (4 or 5 years old). It is possible that this species aggregates to spawn during winter months in the South Atlantic Bight.

Feeding
Adults feed on fishes, gastropods, cephalopods, and brachyuran crabs.

Fishery Importance
One of the most important deepwater grouper species, taken by longlines and electric powered reels in the Gulf of Mexico and the South Atlantic. Snowy grouper are attracted to artificial structures such as ship and airplane wrecks on the OCS and upper continental slope. This habitat makes snowy grouper a target for recreational fishers as well.

Conservation
This species is listed by AFS as "at risk of extinction." Fishing pressures have been high over the years and catches have declined.

Sources: Bullock and Smith 1991; Coleman et al. 1999; Coleman et al. 2000; Heemstra and Randall 1993; Moore and Labisky 1984; Musick et al. 2000; Wyansky et al. 2000.

Warsaw Grouper

Order:	Perciformes
Family:	Serranidae
Genus:	*Epinephelus*
Species:	*nigritus*

Taxonomy
This species was originally described as *Serannus nigritus* by Holbrook in 1855, and later as *Centropristis merus* by Poey in 1868. No other synonyms are known to exist.

Geographical Distribution
Warsaw groupers range from Massachusetts to Brazil including the Gulf of Mexico. This species is most common in continental waters.

Habitat
This species occurs over natural and artificial hard bottom in water depths ranging from 50 to 400 m. Juveniles are also found in hard bottom areas and around artificial structures; occasionally at depths as shallow as 10 m.

Biology
Juveniles are dark brown with small irregularly spaced white spots on the flanks; pectoral and caudal fins are yellow. Adults are similarly colored except the fins lose the juvenile yellow coloration. This the largest of the deep dwelling groupers, reaching a weight of 200 kg and length of 230 cm. Otolith data indicate that warsaw groupers reach 41 years of age. Back calculated lengths for the ages 1, 5, 10, 20, 30, and 40 were 292, 920, 1,194, 1,559, 2,043, and 2,301 cm total length, respectively. Little is known about reproduction in this species.

Fishery Importance
The warsaw grouper is not part of a directed fishery, but is an incidental to fisheries targeting other grouper or snapper species.

Conservation
Warsaw grouper species is listed by AFS as "at risk of extinction." Fishing pressures have been high over the years and catches have declined.

Sources: Coleman et al. 2000; Heemstra and Randall 1993; Manooch 1984; Musick et al. 2000; Smith 1971.

Tilefish

Order: Perciformes
Family: Malacanthidae
Genus: *Lopholatilus*
Species: *chamaeleonticeps*

Taxonomy
This species was named *Lopholatilus chamaeleonticeps* by Goode and Bean in 1800, and there have been no nomenclatorial changes proposed since that time.

Geographical Distribution
The tilefish occurs along the outer shelf and upper slope from the Scotian shelf to along the entire coast of the U.S. and Gulf of Mexico to Campeche Bank, and off Venezeula, Guyana, and Surinam.

Habitat
Tilefish inhabit a narrow depth band ranging from 75 to 450 m along the upper slope; in the Gulf of Mexico it occurs in water depths ranging from 165 to 411 m. This species

prefers clayey bottoms where adults will construct burrows. The preferred temperature range is 9°C to 14ºC.

Biology
Tilefish grow to 110 cm in length weighing 18 kg. Growth is slow, approximately 0.2 cm per year. Male are usually larger than females and will sometimes delay spawning for 2 to 3 years. Adults of both sexes reach maturity at 50 cm at an age of 5 years. Spawning extends from March to November with peak time between May and September. Fecundity for New England fish ranged from 188,000 to 1,000,000 eggs. Tilefish feed on a variety of benthic macrofauna, including fishes and decapod crustaceans.

Fishery Importance
Tilefish is an important component of the deep reef fish fishery in the mid-Atlantic, south Atlantic, and Gulf of Mexico. Tilefish are caught with bottom longlines and powered reels in the Gulf of Mexico. Some recreational anglers will occasionally fish for tilefish with special gear.

Conservation
Although tilefish is considered a candidate for overfishing, it has not been formally listed.

Sources: Dooley 1978; Freeman and Turner 1977; Nelson and Carpenter 1968.

Royal Red Shrimp

Order: Decapoda
Family: Solenoceridae
Genus: *Pleoticus*
Species: *robustus*

Taxonomy
Originally described by Smith as *Hymenopenaeus robustus* in 1885, now known as *Pleoticus robustus*.

Geographical Distribution
Royal red shrimp occur from Massachusetts through the Gulf of Mexico, Central America, and northern South America to Guyana.

Habitat
Royal red shrimp prefer level bottom composed of sand, clay, or mud in water depths ranging from 70 to 915 m; the preferred depth range in the Gulf of Mexico is between 250 to 550 m. Preferred water temperature range is from 8°C to 12.5°C. Primary grounds in the Gulf of Mexico occur off Dry Tortugas and the Mississippi delta. The Dry Tortugas grounds are characterized by calcareous mud, whereas the Mississippi Delta grounds have blue-black terrigenous silt and greenish mud.

Biology
Royal red shrimp coloration is variable and ranges from milky white to pink, salmon, or orange. Spawning likely occurs year-round, with peaks between January and May. Females reach a maximum total length of 225 mm, whereas males reach 180 mm total length. Males reach sexual maturity at about 125 mm total length. Females mature at about 40 mm in total length. Estimated age at maturity is about 3 years and minimum life span is thought to be 5 years. Recruitment to the adult habitat begins with 1 year old individuals and takes about 2 years.

Fishery Importance
Royal red shrimp are caught by trawling in upper slope waters (400 m). The primary grounds are off the Mississippi Delta, Dry Tortugas, and off northeastern Florida. Very few fishers have been involved in the royal red shrimp fishery. The expense and trouble of trawling in deep water is not rewarded by the price of the product.

Conservation
Mangement of royal red shrimp populations in the Gulf of Mexico has been minimal because the limted fishery never reaches the Total Allowable Catch. Otherwise its status is unknown.

Sources: Anderson and Lindner 1971; Bullis 1956; GMFMC 1996; Roe 1969.

Golden Crab

Order: Decapoda
Family: Geryonidae
Genus: *Chaceon*
Species: *fenneri*

Taxonomy
This species was originally named *Geryon fenneri*. The genus was later changed to *Chaceon* by Manning and Holthius in 1989.

Geographical Distribution
Upper continental slope from New England to Brazil, including the Gulf of Mexico.

Habitat
Golden crabs are found on and over silty sediments often associated with hard bottom. Their preferred depth range is from 200 to 800 m. There is bathymetric separation of sexes—females are more abundant in shallower water depths than males. Water temperatures averaged from 8°C to 12ºC where golden crabs are usually found in the eastern Gulf.

Biology
Golden crabs are slow growing and long-lived. Average carapace width for adults ranges from 90 to 143 mm. Males grow up to 50 percent larger than females. This species reproduces during during fall and winter in the eastern Gulf of Mexico. Ovoposition occurs from mid-August and continues until early October. A single batch of eggs is produced annually and the number of eggs produced increases with increasing body size. Female golden crabs produce from 188,000 to 371,000 eggs per year in one brood per year. Ecologically this species is thought to be an important benthic predator on the slope.

Fishery Importance
Golden crabs have been the subject of exploratory fishing efforts of the eastern U.S. mostly from Cape Hatteras, North Carolina to the Florida Keys. Limited commercial fisheries are conducted from southeastern Florida, the Florida Keys, and offshore southwest Florida. The fishery potential for this species is considered viable but not capable of sustaining a large fishery.

Sources: Lindberg and Wenner 1990; Lindberg and Lockhart 1993; Manning and Holthuis 1989; Perry et al. 1995.

Red Crab

Order: Decapoda
Family: Geryonidae
Genus: *Chaceon*
Species: *quinquedens*

Taxonomy
This species was originally named *Geryon quinquedens.* The genus was later changed to *Chaceon* by Manning and Holthius in 1989.

Geographical Distribution
Upper continental slope from New England to Brazil including the Gulf of Mexico.

Habitat
Red crabs are found in water depths ranging from 300 to 2,000 m. This species prefers temperatures ranging from 4.5°C to 10ºC.

Biology
Red crabs are slow growing and long-lived. Average carapace width for adults range from 98 to 118 mm. This species reproduces during during fall and winter in the eastern Gulf of Mexico. Ovoposition occurs from mid-August and continues until early October. A single batch of eggs is produced annually and the number of eggs produced increases with increasing body size. Female golden crabs produce from 132,000 to 226,000 eggs per year in one brood per year.

Fishery Importance

Red crab is caught commercially in some areas such as the mid-Atlantic and Bermuda. No directed fishery exists in the Gulf of Mexico, but this could change in the future.

Sources: Lindberg and Wenner 1990; Lindberg and Lockhart 1993; Manning and Holthuis 1989; Perry et al. 1995.

4.0 DEEPWATER OCS ENERGY INDUSTRY IN THE GULF OF MEXICO

4.1 OVERVIEW

Many of the hardware systems and work processes used in the various activities associated with finding, developing, and transporting oil and gas in the deepwater areas of the Gulf of Mexico OCS have been developed specifically for deepwater. The underlying work process is, however, the same that drives energy related activities in shallower water. Broadly, four stages of activity, i.e., Exploration, Development, Production, and Abandonment, can be identified, but there are distinct activities within each of these stages. The nature and scope of these activities vary widely; in some cases involving large, contiguous zones of the OCS, involving only localized areas in others. The duration of involvement can also vary from transitory, to short term, to durations extending into decades. When compared to similar activities in shallow water, nearly all stages of activity in deepwater involve higher cost, larger and more complex systems and equipment, and take longer. One notable exception may be the duration of the Production stage as high capital costs and other economic factors, including the potential reuse of facilities, create an incentive to accelerate deepwater production.

4.1.1 Exploration Stage

There are two primary types of field activity during Exploration: geophysical surveying and exploration drilling. The overall objective of Exploration is to find oil and gas reservoirs that can be commercially developed. Understanding the geology of the subsurface is a critical element in this finding effort. The critical end point of this is identifying places in the subsurface where hydrocarbons might be trapped, but the overall picture starts with an understanding of when, where, and how hydrocarbons are formed and traces the path of migration from genesis to trap. The data from geophysical surveys are interpreted by geophysicists and geologists to create vertical cross-section maps, which depict subsurface stratification along the survey tracklines. Cross-sections are combined to create three-dimensional (3D) models of subsurface structure, which in turn provide indications of where oil and gas might be trapped. Geophysical survey activities are carried out mainly by contractors, but some energy companies may still collect their own field data. Geophysical survey field activities are described in more detail in **Section 4.4**.

The initial pick of a potential hydrocarbon trap is often called a "lead." Additional analysis, data processing, and even additional geophysical surveys will be required to mature the identified lead to the level of a "prospect" before the several million dollar cost of an exploration well will be approved. At any point in time, an operator will likely have a portfolio of leads and prospects, each of which is at a different level of evaluation and maturity. An operator might identify and study 5 or 10 leads for every exploration well it ultimately drills.

Leasing is an important activity that must take place before an operator can drill. Oil and gas leasing activities in the deepwater Gulf of Mexico are administered by the MMS. Leases are obtained through periodic closed bid, public sales, in which the MMS has the right to reject all bids as insufficient, but generally awards the lease to the bidder offering the highest cash bonus. Lease terms and dimensions vary, but most give the leaseholder the exclusive right to explore for oil and gas in the lease area for a period of 10 years. Leases generally cover an area 3 miles square, and the term of the lease can be extended as long as either production or development/drilling activities are progressing. The amount an operator is willing to bid as a cash bonus for a lease is a direct reflection of the expected profitability of the leads/prospects the operator believes lie within the boundaries of that lease.

Exploration drilling activities are conducted by drilling contractors operating under contract with a leaseholder/operator. At a particular site, exploration drilling activities may last from several weeks to several months in duration. These activities are described in more detail in **Section 4.5**.

While the operator generally hopes each exploration well will find a hydrocarbon reservoir that can be developed commercially, the outcome is more often both surprising and disappointing. The likelihood that an exploration well will find an oil or gas field that is ultimately developed varies, depending mostly on factors that relate to the maturity of the particular geologic play model and the quality of the geophysical data that are available, but generally is well less than 50 percent. Generally the data collected during the process of drilling the well provide both indirect and direct information on the subsurface structure, the reservoir characteristics of the rock, and even the nature of the liquid or gas that fills the pore space.

Data obtained from exploration drilling provide key calibration points for the cross-sections and maps derived from geophysical survey data. Whether the outcome is encouraging or disappointing, these data will generally trigger a significant effort to reevaluate and update the geophysical cross-sections and geologic models upon which the decision to drill was based. A positive result will likely lead to further "appraisal" drilling and possibly additional geophysical survey activity in order to both confirm and define the extent of the reservoir enough to support a decision to initiate development. Even if the outcome is disappointing, the reevaluation will often lead to sidetracking the initial well or drilling another exploration well to test a different section or zone.

Ultimately, most of the deepwater area of the Gulf of Mexico may be covered by at least one geophysical survey and dozens of exploration wells may be drilled each year. In most instances, however, interest in (and therefore activity at) a particular OCS site will terminate in the Exploration stage.

4.1.2 Development Stage

Results from a fraction (generally well less than 50 percent) of the sites drilled will justify development. Development represents a transitional stage between Exploration and Production. Broadly speaking, deepwater developments can generally be characterized as being either a central processing platform or a host platform (sometimes called a "hub" or a "tieback"). Developments are generally connected to existing infrastructure by at least one export pipeline. Additional geophysical surveys may be carried out to support detailed planning of development drilling and the location and installation of production facilities and pipelines. Boat-based activities or the deployment of moored or unmoored data buoys may be required to collect meteorological and oceanographic data to support design. The time delay needed to design, construct, and install may be as little as a year or less for a simple "tieback" to several years for a major new platform. The duration of installation, which is the only part of Development that involves offshore activities, may range from a few weeks to several months. The nature of the installation activities for deepwater developments in the Gulf of Mexico is described in **Section 4.6**.

4.1.3 Production Stage

Once the facility is installed, it will enter its production stage. This stage may last from a few years to several decades. In the case of a central processing platform development, essentially all the activities associated with this stage will be confined to the platform, however there may be a standby vessel stationed in the area and supply boats will make periodic visits to provide logistical support. Drilling, completion, and workover activities associated with subsea well tiebacks will be carried out from floating drilling rigs, which are either moored on location or are dynamically positioned and may stay on location for periods ranging from a few days to several months. The number, location, and characteristics of the various development systems installed in the deepwater area of the Gulf of Mexico are described in **Section 4.7**.

4.1.4 Abandonment Stage

Once the facility has ceased to serve a useful purpose, the site will be abandoned and the lease will be returned to the MMS. The nature of the activities and the equipment involved in abandonment will generally be similar to those involved in installation, but some components of the development system may be abandoned in place. A specific plan for abandonment of each facility will be submitted and approved by the MMS. To date, only one deepwater facility installed in the Gulf of Mexico has been abandoned – a floating production system and its associated mooring equipment was removed from Green Canyon Area Block 29 in 1989.

4.2 OBSTRUCTION TEMPLATES

The primary objective of the description of OCS activities is to provide a basis for evaluating interactions with fishery activities in the deepwater OCS (i.e., at least 200 m of water). The physical dimensions of the water column that are involved in the activity will be a key parameter in this evaluation, but the duration of the activity and whether the activity is stationary or involves movement will also be important. The obstruction template shown in **Table 4.1** was developed to facilitate this evaluation.

Table 4.1. Obstruction templates – outer continental shelf activities.

Type	Description	Water Column Interference			Mobility	Duration
		Shallow	Mid-Depth	Bottom		
A	Seismic Data Collection	Narrow, but long	Generally none	Generally none	Moving, but set pattern and not maneuverable	Days to weeks
B	Exploration Drilling ■ Moored ■ Dynamically Positioned	■ Narrow to Broad ■ Narrow	■ Narrow to Broad ■ Narrow	■ Broad ■ Narrow	Stationary	Several months
C	Construction/ Installation	Variable	Variable	Variable	Moving within area, but setting permanent objects	Days to months
D	Logistics ■ Boats ■ Barges	Generally small	None	None	Moving and generally maneuverable	In transit
E	Abandonment	Variable	Variable	Variable	Moving within area, but removing permanent objects	Days to months

4.3 LEASING ACTIVITY

For the purposes of this study, deepwater is defined to include all leases encompassing water depths of at least 200 m. More than 6,000 deepwater leases have been issued, but many of these have expired or been otherwise terminated. As of mid-2000, there were approximately 3,754 deepwater leases that were considered “active” (i.e., either held by production, part of a unit, or within primary term). The location of these leases is shown in **Figure 4.1**. More than 90 companies hold deepwater leases, but approximately 75 percent are held by 8 companies.

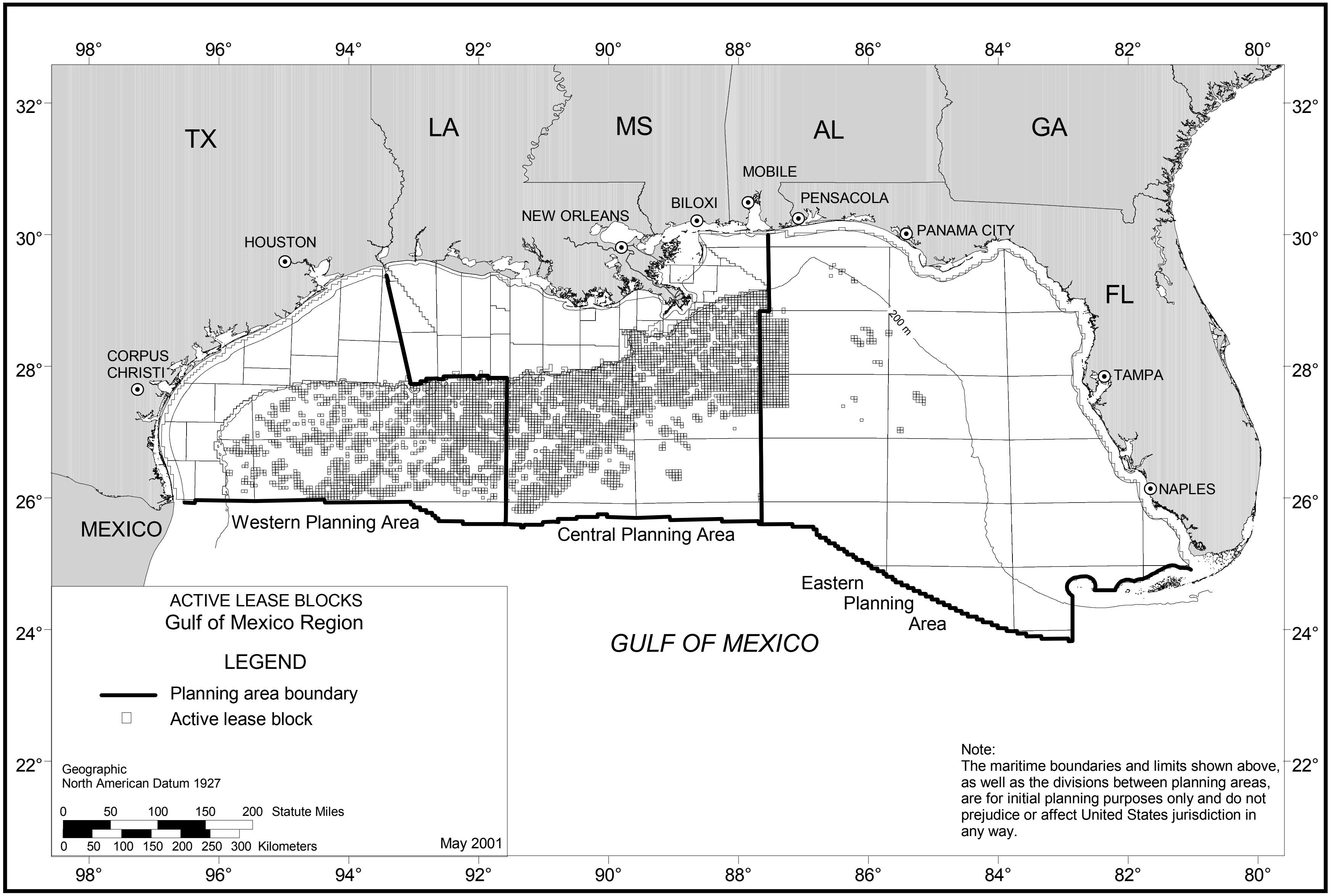

Figure 4.1. Active lease blocks in water depths greater than 200 m in the Gulf of Mexico.

4.4 GEOPHYSICAL (SEISMIC) SURVEYS

Geophysical or seismic surveys are one of the primary means of locating potentially productive reserves of oil and gas trapped within or between geological layers beneath the present-day seafloor. As described earlier, data from seismic surveys are processed, evaluated, and combined with geologic play models to create cross-section maps and 3D models of subsurface structure. During a seismic survey, a strong acoustic pulse is sent from a signal source towed behind the survey vessel. This pulse is reflected by boundaries between geological layers of the earth's crust with varying chemical and physical properties. The reflected signals are recorded by strings of hydrophones towed in a cable up to 12 km long. Thus, the basic marine seismic survey consists of a sound source, a receiving system, and a survey vessel.

The equipment used to both obtain and interpret geophysical survey data has undergone dramatic changes over the past two decades. Deepwater surveys are conducted using technology that provides not only high-resolution images of geological strata, but also information on various shallow geohazards (e.g., bottom topography, shallow gas pockets etc.), which can be crucial for safe installation of pipelines, platforms, and bottom facilities in the event that commercial hydrocarbons are discovered.

There are several variations of reflection surveys including high resolution site surveys, two dimensional (2D) surveys, 3D surveys, time lapse (4D) surveys, ocean cable surveys, vertical cable surveys, multi-ship surveys, and deep tow side-scan arrays. Each of these methods employs slightly different equipment, configurations, and operations. The speed and cost of acquisition and variations in the nature and quality of the data make these alternatives most suitable to a particular stage of the exploration-production cycle.

The following description of seismic surveying was taken from Greve (2000), Davis et al. (1998), and Gordon et al. (1998). This overview focuses on the aspects of seismic surveys that would be most likely to interact with deepwater fisheries. Characteristics such as vessel size, length of towed arrays, depth of towed arrays, survey track line spacing, duration of surveys, and spatial extent of surveys conducted in the Gulf of Mexico are emphasized.

4.4.1 Two Dimensional (2D) Surveys

Two dimensional surveys resolve geophysical information of large spatial scales at fairly low resolution. These surveys provide the coarse description of subsurface hydrocarbon reserves over large areas. Although the number of 2D surveys is small compared to 3D surveys, they are important as the survey can cover a larger area in less detail resulting in a lower cost per area covered.

The ships conducting 2D surveys range from 60 to 90 m long and tow a single source (air gun) array from 100 to 200 m behind the ship. Each sound source array is about 20 m long and 24 m wide. Following another 100 to 200 m behind the source array is a single hydrophone cable (or streamer) ranging from 4.5 to 12 km long. Attached to the end of the streamer cables are tail buoys with radar reflectors. The average vessel used for 2D seismic streamer work is 70 m long and 18 m wide, weighing 1,573 tons. While surveying, vessels operate at 4 to 5 kn (typically 4.5 kn). Cruising speeds between projects are considerably higher, about 12 to 14 kn.

To complete a survey, the vessel will traverse a trackline for 12 to 20 h (100 to 166 km), depending upon the size of the survey area. Reaching the end of the track, the ship will take 2 to 3 h to turn around and start down another (parallel) track. The spacing between tracks is usually about 2 km. This procedure takes place day and night and may continue for days, weeks, or months depending upon the size of the survey area. Most 2D surveys cover large areas encompassing multiple lease blocks.

4.4.2 3D Surveys

Vessels conducting 3D surveys are generally larger than those used in 2D surveys since they are towing more equipment. Vessels range from 80 to 90 m long with 10 to 20 m beams and weigh 4,000 to 9,000 tons. These vessels tow two sound source arrays 100 to 200 m behind the ship. The two source arrays are identical to those used in the 2D surveys described above. Following another 100 to 200 m behind the dual source arrays are anywhere from 6 to 12 streamer cables 3 to 8 km long, spread out over a breadth of 600 to 1,000 m.

The survey vessel tows the above apparatus at a speed of 4.5 kn (8.3 km/hr). About every 16 s (37.5 m), one of the dual airgun arrays is fired. Sixteen seconds later, the other array is fired. The timing between shots is governed by the desired spacing between firings, so the firings vary depending upon the actual speed of the ship.

Keeping track of where the air guns are fired, the position of the streamer cables, and the depth of the streamer cables is controlled by an integrated navigational system. Streamer depth is regulated by automated depth controllers called "birds." The streamer cable lateral position is calculated by accelerometers placed in the cable feeding their signals into the navigational computer. The tail buoys at the ends of the streamer cable are tracked by radar using the tail buoy radar reflectors.

To complete a survey, the ship will follow a trackline from 12 to 20 hours (100 to 166 km), depending upon the size of the survey. Reaching the end on the track, the ship will take 2 to 3 h to turn around and start down another track. This procedure takes place day and night and may continue for days, weeks, or months depending upon the size of the survey. A primary difference in survey operation is that 3D surveys follow a grid with fairly tight trackline spacing, whereas 2D surveys utilize parallel tracklines only.

The number of streamer cables, their separation, and their length cover an area immediately below the sea surface known as the footprint. For example, a ship towing five streamers, 8 km long with each streamer separated from the other by 100 m leaves a footprint of 3.2 square kilometers. Footprints can be as large as 8 square kilometers and as small as 2 square kilometers.

4.4.3 High-Resolution Site Surveys

High-resolution site surveys are essentially 2D surveys conducted at a much smaller spatial scale, usually individual lease blocks (4.8 km on a side). These surveys investigate the shallow subsurface strata for geohazards and sedimentary conditions at much smaller spatial scale than the average 2D survey. A typical operation consists of a ship towing an air gun (about 25 m behind the ship) and a 600 m streamer cable with a tail buoy (about 700 m behind the ship). The ship travels at 3 to 3.5 kn (5.6 to 6.5 km/hour) and the air gun is fired every 12.5 m (or about every 7 to 8 s). Typically, the vessel steams in one direction for about an hour, then turns around (about 20 to 30 minutes) and surveys the next track. MMS regulations require information be gathered on a 300 m by 900 m grid, which amounts to about 129 line km of data per lease block. Including line turns, the time to survey one block is about 36 h; however, before surveying the block the streamer cable has to be balanced to enable it to stream at the proper depth, and the streamer and air gun must be deployed. These ancillary operations add to the total survey time.

Recently, 3D high-resolution site surveys using ships towing multiple streamer cables have become available. Since multiple streamers are towed, the ships tend to be slightly larger (47 vs. 37 m). Up to six streamers 100 to 200 m long are used with a tri-cluster of 8 to 10 cubic inch gas injector (GI) airguns. With this system, 66 track lines are necessary per block, which takes about 5 days to collect. The final bin size after processing is 6.25 by 12.5 m.

Ships used in high-resolution operations are generally smaller vessels, as the equipment used is less complex than that used in the normal seismic 2D and 3D surveys. That is not to say that high-resolution work is not done. Ships are generally 37 to 47 m long with the longer ships used for the 3D high-resolution work. The ships are designed to be ultra-quiet as the higher frequencies used in high-resolution work are easily lost in the noise if special attention is not paid to keeping the ships quiet.

4.4.4 Ocean Bottom Cable Surveys

Ocean bottom cable surveys were originally designed to enable seismic surveys in congested areas such as producing fields with their many platforms and producing facilities. Recently, these surveys have been found to be useful for obtaining multi-component (seismic pressure, vertical, and the two horizontal motions of the water bottom) information. This multi-component information allows more information to be extracted from the seismic data and hence greater information about the fluids and rock characteristics in the subsurface. In addition, if gas effects resulting from leaky reservoir seals obscure the seismic information, these multi-component surveys can result in better structural definition of the hydrocarbon trap. Hydrophone detectors limit the water depth of these surveys to about 50 m. However, if only water bottom motions are recorded using seismometers, the water depth at which seismic data can be collected is extended to depths of 2,500 m.

Ocean bottom cable surveys require the use of multiple vessels (usually two cable layout/ pickup, one recording, one shooting, and two utility boats). These vessels are generally smaller than those used in streamer operations and the utility boats can be very small. Operations are conducted “around the clock” and begin by dropping the cables off the back of the layout boat. Length of the cable depends upon the survey demands; it is typically 4,200 m but can be up to 12 km. Groups of seismic detectors, usually hydrophones and vertical motion geophones, are attached to the cable in intervals of 25 to 50 m. Multiple cables are laid parallel to each other using this layout method with a 50 m interval between cables. Dual air gun arrays are used. When the cable is in place, a ship towing an air gun array (which is the same air gun array used for streamer work) passes between the cables, firing every 25 m. Sometimes a faster source ship speed of 6 kn instead of the normal 4.5 kn speed is used with a decrease in time between gun firings. After a source line is shot, the source ship take about 10 to 15 minutes to turn around and pass down between the next two cables. This shooting and recording system results in a survey with subsurface information collected in bins 25 by 25 m. Some surveys modify the shooting and cable geometry to result in a bin size of 12.5 by 25 m, but the same approach to collecting the data is used. When a cable is no longer needed to record seismic data, it is picked up by the cable pickup ship and is moved over to the next position where it is needed. A particular cable can lay on the bottom anywhere from 2 h to several days, depending upon operation conditions. Normally a cable will be left in place about 24 h.

Ships used for ocean bottom cable work are even smaller, with lengths of 67 m, 14 m beam, and a gross tonnage of 1,771 tons. Although streamer work can be done with one vessel, ocean bottom cable work requires the use of up to six ships (one shooting, one recording, two cable layout/pickup, two all purpose boats for trouble shooting, survey, etc.).

Location of the cables on the bottom is done by acoustic pingers located at the detector groups and by using the time of first arrival of the seismic pulse at the detector group. To obtain more accurate first arrival times, the seismic data are recorded with less electronic filtering than is normally used. This detailed location is combined with normal GPS navigational data collected on the source ship.

4.4.5 Time-Lapse (4D) Surveys

The purpose of time-lapse surveys is to detect residual or undetected hydrocarbons in an already discovered oil or gas field. Not all fields are candidates for time-lapse surveys and careful analysis must be done on each field to determine its feasibility for a time-lapse survey. A time-lapse survey requires repeat surveys with highly accurate navigation to ensure the same subsurface points are measured on each repeat survey. Time-lapse surveys are usually repeated every 6 months to a year, but occasionally the repeat interval can be as short as 4 months.

Time-lapse surveys can use either seismic streamer cables or ocean bottom cables to house the seismic detectors, depending on which system was used to discover the field. This results in cheaper acquisition costs. Although a field could be discovered with a system using streamer cables and the subsequent time-lapse surveys done with ocean bottom cables, this would increase the cost. Whether the time-lapse surveys use streamer cables or water bottom cables to record the seismic signals, the procedure closely resembles the ones described previously for 3D seismic surveys or ocean bottom cable surveys. The main difference is in the size of the survey. Since the oil or gas field has already been located, the survey is much smaller and the time spent conducting the survey much shorter than an exploration survey. An average survey takes 2 to 4 weeks and can cover 20 square kilometers.

Although the technique began using streamer cables, the difficulty in locating the sensors with suitable precision led to the use of bottom cables, then to fixed bottom cables. When fixed bottom cables are used, the survey time, after the first survey, is much shorter since all that has to be done is connect the fixed bottom cable to the recording instruments and start shooting. The fixed cable is easily located by attaching an acoustic transponder that responds when activated to the fixed cable.

4.4.6 Vertical Cable Surveys

Vertical cable surveys are similar to ocean bottom surveys in that the receivers are deployed and then shot into by a source boat. However, they are substantially different from ocean bottom surveys in that the receivers are located in vertical cables anchored to the ocean bottom. Two identically configured boats are used during the survey. At the beginning of the survey, both boats are used to place the vertical cables. During the survey, one boat is used as a source boat and the other to recover and re-deploy the vertical cables.

The vertical cables are deployed on two overlapping grids. On each grid, vertical cables are deployed every 2 km. One grid is staggered 1 km from the other such that any one vertical cable is no more than 1.4 km from its closest neighbor. Normally 28 or 32 vertical cables are deployed at any one time. Placing the cables in a known fixed position is a very critical part of the placement process. To aid in the positioning, an acoustic transponder is attached to the bottom of each vertical cable. Each vertical cable consists of an active section and lead in section. At the bottom of the active section is not only the transponder, but also an anchor composed of 680 kg of steel. In the active section are 16 specially constructed hydrophones spaced 25 m apart, which makes the active section 375 m long. At the top of the active section are placed buoyant floats to keep the cable as vertical as possible. Also attached to the top of the active section is the lead, which leads to the surface where buoyant floats and a 16 channel 24-bit recorder are located.

Once the cables are in place, the source boat begins shooting in such a way that each vertical cable receives shots at a distance of 5 km in all directions. This is accomplished by sailing down lines parallel to the grid of vertical cables. (Turn around from line to line is only 15 minutes as only the source boat with its attached array has to make the turn.) This forms a shooting box around the grid of vertical cables that extends 5 km outside the vertical cable grid. This makes the operational grid 14 by 20 km. However, once the shooting boat shoots a line 1 km beyond the first row of vertical cables, the first row of vertical cables is recovered and re-deployed. Cables may be left in place for hours or days, depending upon the size of the survey and operating conditions. Shots are taken every 50 m, and the shot lines are 80 m apart. The source boat uses the same source array as is normally used in 3D streamer surveys. This array is composed of three six-gun sub-arrays with a total volume of 3,090 cubic inches. The largest air gun in the array is a Bolt Long Life 250 cubic inch air gun. Vessel speed is normally 4.5 kn and operations are conducted “around the clock.”

Surveys are normally conducted at water depths up to 1,700 m; however, since specially constructed hydrophones are used, surveys can be conducted in water depths up to 2,500 m.

4.4.7 Multi-ship Surveys

Of course, multi-ship surveys are an integral part of ocean bottom surveys and vertical cable surveys. However, in the quest for seismic data recorded at greater distances from the source, multi-ship surveys are becoming more prevalent. Generally, this technique is used to either obtain converted wave data (shear wave) or to penetrate hard water bottom layers. Two sorts of operations are in use—one 2D and the other 3D.

The 2D operation places two ships, one behind the other, towing single streamer cables at a distance apart and a streamer length sufficient to record seismic data at distances of 8 to 12 km. The 3D operation places two ships, one behind the other, towing multiple (up to 12) streamers 2,500 m long a sufficient distance apart to record seismic data at distances of 9 km.

4.4.8 Deep Tow Side-scan Sonar Surveys

Deep tow side-scan sonar surveys are conducted in the Gulf of Mexico primarily for engineering studies involving the placement of production facilities and pipeline routing. These surveys provide information on the presence of sand flows, hydrates, and seeps, as well as bottom topography.

Operations are conducted from vessels towing cables up to 7,000 m long that enable operations in water depths up to 3,000 m deep. Close to the end of the cable is a 30 to 45 m long section of chain to keep the sensor package (tow-fish) tracking at approximately 25 to 30 m above the bottom. To do this requires the chain to drag along the water bottom, causing an approximately 10-cm wide by 15-cm deep trench to be cut in the water bottom. In situations where the chain can become entangled in shipwrecks, wellheads, or other obstructions or natural hard bottom areas, the chain is removed and the tow-fish's position in the water column is maintained by adjusting the length of the tow cable. Maintaining a constant elevation above the seafloor by adjusting the cable length is very difficult, and the elevation above the seafloor is kept somewhat greater in this case. The average tow-fish is about 3.6 to 4.3 m long and 1 m in diameter.

During operations, the vessel pulls the cable, chain, and tow-fish along a track, then circles and sails along a parallel track 300 m from the first. This gives about a 100 m overlap in coverage at the far ranges that compensates for tow-fish position errors. From the perspective of the obstruction template, most survey activities involve boating operations with towed cables and equipment that may extend several thousand feet behind the vessel. Except for special vertical cable and deeptow surveys, the zone of involvement does not generally extend very deep. A particular survey may involve field operations lasting from a few days to a few weeks, and although the survey boat is generally moving, it is not able to maneuver quickly. Many side-scan surveys are now being conducted with autonomous underwater vehicles.

4.5 EXPLORATION

More than 1,200 exploration wells have been drilled in water depths of at least 200 m in the Gulf of Mexico. This number includes wells temporarily and permanently abandoned, sidetracked, and wells subsequently completed and placed in production. The location of these wellsites is shown in **Figure 4.2**. While exploration wells have been drilled over a wide range of deepwater locations, most have been drilled in the areas known as Garden Banks, Green Canyon, Mississippi Canyon, and Viosca Knoll.

Some exploration wells are drilled from existing platforms, but most of these wells were drilled from floating drilling rigs. Basic configurations include the so-called semi-submersible and the drillship. These rigs are held on location either by a spread mooring system or by dynamic positioning thrusters. These configurations are illustrated in **Figure 4.3**.

The site of an exploration well may be occupied for a duration of several weeks to several months for each well and more than one well may be drilled at a single surface location. The lateral dimensions of the floating drilling rigs themselves may vary from a hundred meters roughly square for most deepwater semi-submersibles to nearly 250 m in length for modern drillships. While these modern drillships are able to store large quantities of equipment and materials, periodic logistical support is provided to all field operations by supply boats. Helicopters are the main method of transporting personnel to and from deepwater locations.

Most of the current deepwater drilling fleet is of the semi-submersible design. These rigs generally require seagoing tugs for towing between drillsites and for location during mooring and unmooring operations. While many semi-submersibles have on-board thrusters to assist, most rely on a spread mooring system for maintaining position during drilling operations. Large anchor-handling vessels are employed to place and retrieve the anchors and mooring lines. Anchors typically weigh between 10 and 20 tons each and each of the 8 to 12 mooring lines, which are made up of a combination of chain and wire rope, may extend 1.6 to 3.2 km from the rig’s location. In the shallower regions of the study area, each anchor may be deployed and retrieved using a pendant line and buoy, which stays in position above the anchor during drilling operations.

From the perspective of the obstruction template, exploration drilling activities are mostly stationary and may last for up to several months. The portion of the water column that is involved depends mostly on the nature of the station keeping system. For dynamically positioned rigs, lateral dimensions of only a hundred meters are involved throughout the full depth. Floating drilling rigs moored in deep water will involve a roughly circular area of the bottom that ranges from a 1,000 m in diameter in the shallower water depths to 3 to 5 km in diameter as water depth increases. At the surface, only approximately a 100 m are involved unless pendant lines and buoys are used to install and retrieve anchors.

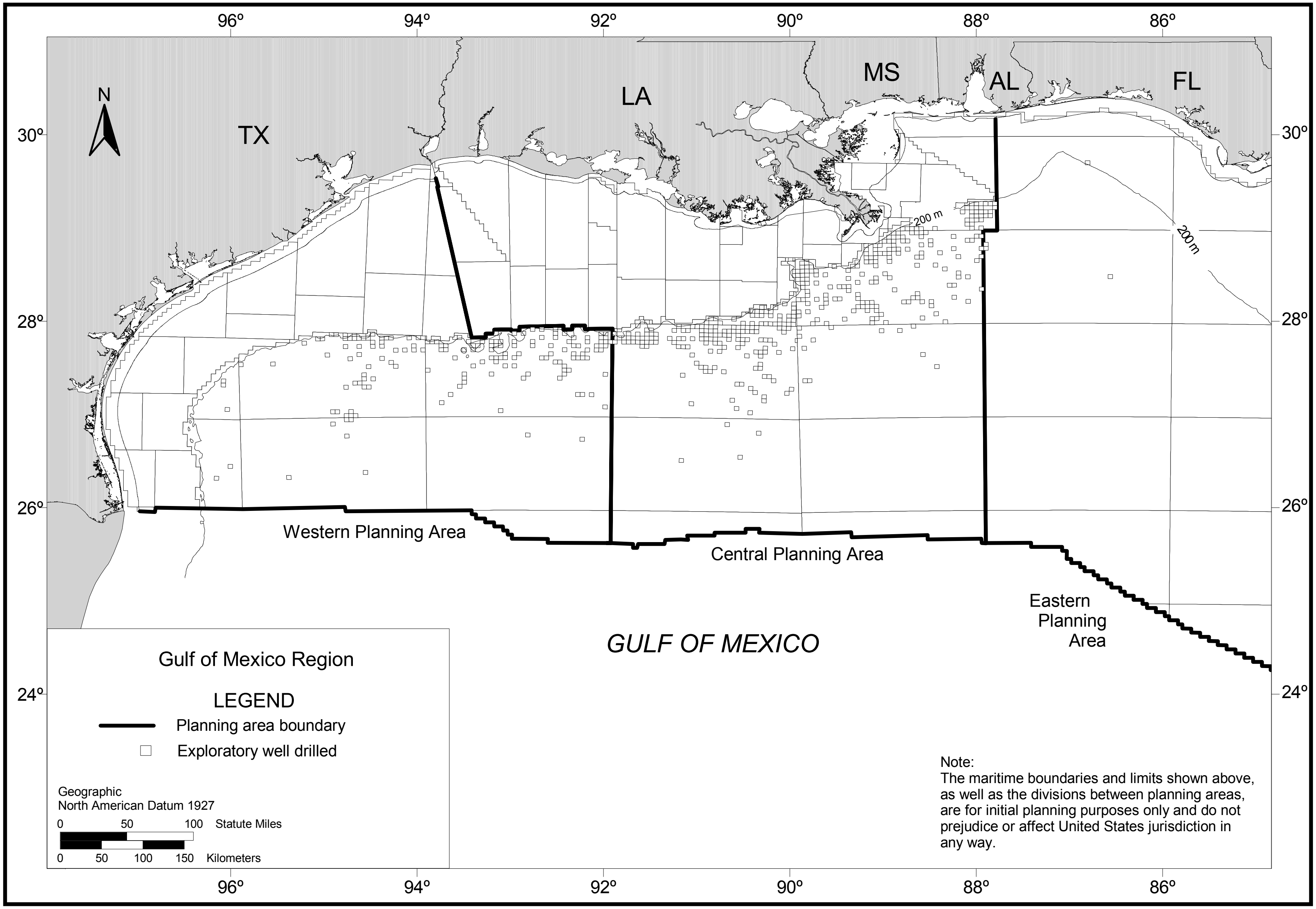

Figure 4.2. Exploratory wells drilled in water depths greater than 200 m in the Gulf of Mexico.

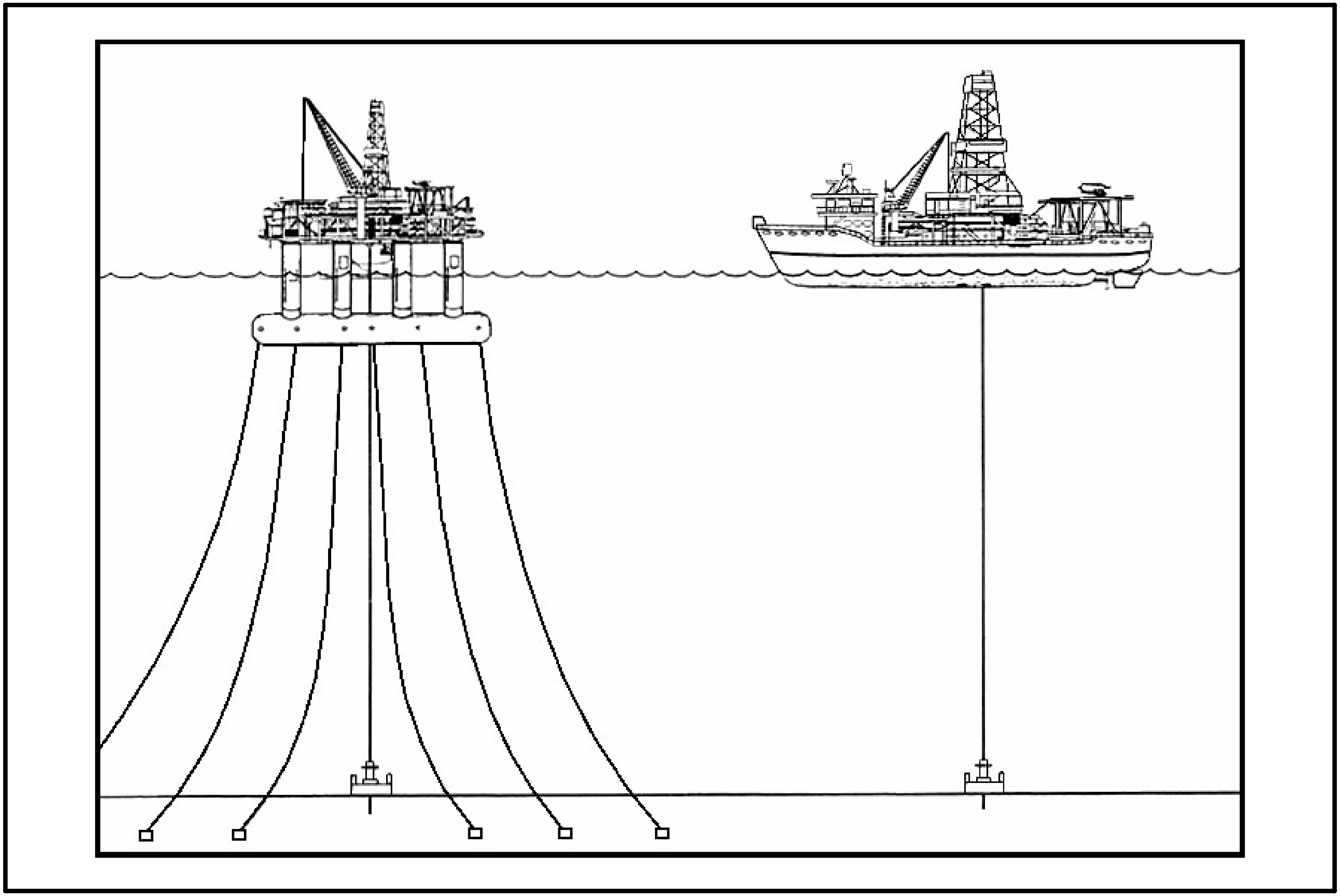

Figure 4.3. Floating exploration drilling rigs used in the Gulf of Mexico.

4.6 DEVELOPMENT

4.6.1 Deepwater Systems

The main field activity associated with the Development stage involves installation of the development system components. A description of these construction activities is given later in this section, but discussion will focus first on the characteristics of various development system alternatives and a description of those deepwater systems that have been installed to date.

As described earlier, a deepwater field is generally developed either as a central processing or host platform or as a satellite field that is tied back to a host platform. Most of the alternative types systems that are in use or being seriously considered for use in deepwater are depicted in **Figure 4.4**.

From the perspective of interaction with fisheries activities, all these systems are fixed in place and for all practical purposes are permanent. The obstruction template introduced in **Section 4.3** (see **Table 4.2**) is extended here in **Table 4.2** to include development systems. These alternative systems are described and referenced extensively in (MMS 2000-015 and Ward 2000 Deepwater Technology), but a brief summary is offered here for continuity.

4.6.2 Platforms

Platforms that have been installed in at least 200 m of water are listed in **Table 4.3**.

The systems grouped in **Figure 4.4** as “bottom supported and vertically moored structures” all have horizontal dimensions of approximately a hundred meters and are generally not more than twice that at the sea bottom. In the obstruction template, they are characterized as Type I – Cylindrical. The fixed platform consists of a jacket (a tall vertical section made of tubular steel members supported by piles driven into the seabed) with a deck placed on top, providing space for crew quarters, a drilling rig, and production facilities. The fixed platform is economically feasible for installation in water depths up to 450 m. All platforms in between 200 and 425 m, except the Lena Compliant Tower, are fixed platforms. Bullwinkle and Alabaster are the two deepest, standing in over 400 m of water.

A compliant tower is a narrow, flexible tower and a piled foundation that can support a conventional deck for drilling and production operations. Unlike the fixed platform, the compliant tower withstands large lateral forces by sustaining significant lateral deflections at the surface, while remaining fixed at its base. Compliant towers are best suited for water depths between 450 and 750 m. In addition to Lena in 300 m of water, the Baldpate and Petronius towers stand in approximately 520 m of water. A tension leg platform (TLP) consists of a floating structure held in place by vertical, tensioned tendons connected to the seafloor by piles. Like the compliant tower, storm waves and currents may cause the TLP to deflect laterally at the surface. In larger storms, offsets may

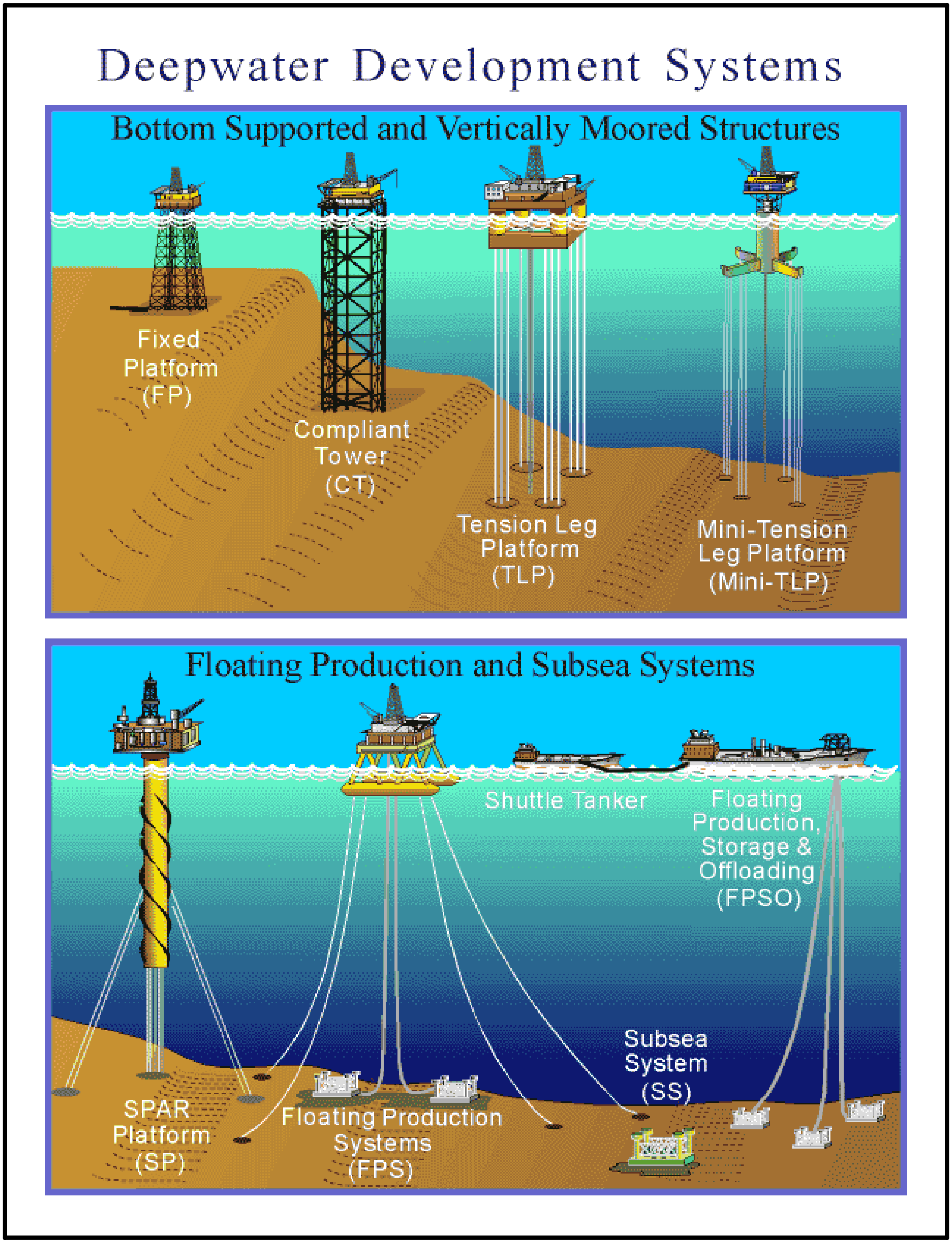

Figure 4.4. Deepwater development systems used in the Gulf of Mexico.

Table 4.2. Obstruction templates – outer continental shelf development systems.

Type	Description	Water Column Interference			Mobility	Duration
		Shallow	Mid-Depth	Bottom		
I	Cylindrical ■ Fixed Platforms ■ TLP's ■ Compliant Towers	Narrow	Narrow	Narrow	Fixed	Permanent
II	Cylindrical -Shallow Spread ■ Guyed Tower ■ Auger TLP ■ SPAR/DDVC	Narrow	■ Narrow ■ Broad ■ Narrow	■ Broad ■ Very Broad ■ Broad	Fixed	Permanent
III	Subsea ■ Satellite Tieback	None	None	Variable	Fixed	Permanent
IV	FPS/FPSO ■ FPS ■ FPSO	■ Narrow ■ Long	Narrow	Very Broad	Fixed	Permanent
V	Pipeline/Flowline Bottom Only ■ Connects Subsea to Host	None	None	Long/Narrow	Fixed	Permanent

Table 4.3. Deepwater platforms.

Block	Field Name	Platform Type Code	Operator Name	Year Installed	Removal Date	Water Depth (m)
EB 110	TEQUILA	FP	PANACO, INC.	1984		201
GC 89	CINAMMON	FP	Apache Corporation	1998		204
VK 817	PHARLAP	FP	Flextrend	1995		205
GB 236	PIMENTO	FP	Chevron U.S.A. Inc.	1980		209
GB 172	SALSA	FP	Shell Companies	1998		211
GB 128	ENCHILADA	FP	Shell Companies	1997		215
GB 189	TICK	FP	Texaco	1991		219
GB 191	PIMENTO	FP	Chevron U.S.A. Inc.	1993		220
VK 780	SPIRIT	FP	Shell Companies	1998		220
GC 18		FP	Exxon Mobil Corporation	1986		229
GC 19	BOXER	FP	Shell Companies	1988		229
EW 873	LOBSTER	FP	Marathon Oil Company	1994		236
EB 165	SNAPPER	FP	PANACO, INC.	1985		263
EB 159	CERVASA	FP	Union of CaL	1982		282
EB 160	LIGERA	FP	Union of CaL	1981		285
MC 280	LENA	FP	Exxon Mobil Corporation	1983		305
MC 194	COGNAC	FP	Shell Companies	1978		312
MC 109	AMBERJACK	FP	BP Amoco Corporation	1991		335
VK 823	VIRGO	FP	Elf Exploration, Inc.	1999		344
VK 989	POMPANO	FP	BP Exploration & Oil Inc.	1994		393
GC 65	BULLWINKLE	FP	Shell Companies	1988		412
GC 29	FPS	FPS	Placid Oil Company	1988	12/31/89	469
GB 260	BALDPATE	CT	Amerada Hess Corporation	1998		502
EW 921	MORPETH EAST	Mini-TLP	British-Borneo USA, Inc.	1998		518
VK 786	PETRONIUS	CT	Texaco	2000		535
GC 184	JOLLIET	TLP	Conoco Inc.	1989		536
VK 826	NEPTUNE	SP	Kerr-McGee	1996		588

Table 4.3. (Continued).

Block	Field Name	Platform Type Code	Operator Name	Year Installed	Removal Date	Water Depth (m)
GB 388	COOPER	FPS	EEX Corporation	1995		639
GC 205	GENESIS	SP	Chevron U.S.A. Inc.	1998		789
GB 426	AUGER	TLP	Shell Companies	1994		872
MC 807	MARS	TLP	Shell Companies	1996		894
VK 956	RAM-POWELL	TLP	Shell Companies	1997		980
VK 915	MARLIN	TLP	Amoco	1999		986
GC 254	ALLEGHENY	Mini-TLP	British-Borneo USA, Inc.	1999		1,004
MC 809	URSA	TLP	Shell Companies	1998		1,158
AC 25	HOOVER	SP	Exxon Mobil Corporation	2000		1,471

CT = Compliant tower.
FP = Fixed platform.
FPS = Floating production systems.
SP = SPAR platform.
TLP = Tension leg platform.

exceed 30 m. Tensioned tendons provide for the use of a TLP in a broad water depth range with limited vertical motion. The larger TLPs have been successfully deployed in water depths approaching 1,200 m. Several TLPs have been installed at sites in between 850 and 1,150 m of water. Smaller TLPs (e.g., the Mini-TLP) have been designed and built as a lower cost alternative for production of smaller deepwater reserves that would be uneconomic to produce using more conventional deepwater production systems. The Morpeth and Allegheny platforms sit in 500 m and nearly 1,000 m of water, respectively. Future applications of the mini-TLP may include use as a utility, satellite, or early production platform for larger deepwater discoveries.

The buoyant column (SPAR) system is one of several floating system alternatives that employ taut or spread mooring systems (Auger is the only TLP that employs a lateral mooring system). All these floating systems, except the FPSO, are relatively narrow at the surface and down to mid-depth in the water column, but spread out to involve a broader extent nearer the bottom. The SPAR configuration involves a large diameter single vertical cylinder supporting a deck. It has a typical fixed platform topside (surface deck with drilling and production equipment), threetypes of risers (production, drilling, and export), and a hull that is moored using a taut catenary system of 6 to 20 lines anchored into the seafloor. The range of application for the SPAR type of system will likely extend beyond that of the TLP – Hoover stands in nearly 1,500 m of water.

To date, Cooper is the only floating production system (FPS) configuration operating in the Gulf of Mexico and there are presently no floating production, storage, and offloading systems (FPSOs) in use. Dimensions of existing deepwater platforms that are relevant to the obstruction template classifications are given in **Table 4.4.**

Table 4.4. Dimensions of existing deepwater platforms relevant to obstruction templates.

Area/ Block	Field Name Operator	Water Depth (m)	Platform Type*	Location	Obstruction Type**	Water Column Dimensions (m)			Comments
						Shallow	Mid-Depth	Bottom	
EB 110	Tequila PANACO	201	FP	82°55'S 22°85'W	I	14 x 41 est	-	56 x 61	
VK 817	Pharlap BP	203	FP	68°89'S 37°48'W	I	14 x 18	-	62 x 70	
GC 089	Cinnamon Shell	205	FP	42°01'N 72°28'E	I	14 x 15	-	72x 65	
GB 236	Pimento Marathon/Chev?	209	FP	24°8'N 39°45'E	I	14 x 15	-	56 x 98	
GB 172	Salsa Shell	211	FP	17°60'N 32°80'W	I	15 x 24	-	70 x 70	

Table 4.4. (Continued).

Area/ Block	Field Name Operator	Water Depth (m)	Platform Type*	Location	Obstruction Type**	Water Column Dimensions (m)			Comments
						Shallow	Mid-Depth	Bottom	
GB 128	Enchilada Shell	215	FP	48°60'N 36°06'W	I	15 x 26	-	62 x 66	
GB 189	Tick Texaco	219	FP	62°50'S 39°00'W	I	14 x 24	-	67 x 67	
GB 191	Pimento Marathon/Chev?	220	FP	62°90'N 43°35'E	I	14 x 46 est		61 x 91 est	
VK 780	Spirit Shell	220	FP	59°6'N 39°87'W	I	24 x 35	-	72 x 70	
GC 019	Boxer Shell	229	FP	70°14'N 60°06'W	I	17 x 27	-	79 x 77	
GC 018	Mobil	232	FP	79°38'S 43°80'E	I	14 x 43	-	70 x 67	
EW 873	Lobster Marathon	234	FP	70°01'S 79°50'W	I	14 x 34	-	76 x 78	
EB 165	Snapper PANACO	262	FP	87°15'N 66°74'E	I	28 x 52	-	76 x 94	
EB 159	Cervaza Union	282	FP	43°55'N 62°10'W	I	18 x 27 est		91 x 91 est	
EB 160	Cervaza Lite Union	287	FP	25°99'N 11°10'E	I	18 x 27 est		91 x 91 est	
MC 280	Lena Exxon	310	FP	10°57'S 17°47'E	II	37 x 37	-	~1,524' Dia	20-5" wire lines
MC 194	Cognac Shell	312	FP	45°0'N 20°0'E	I	25 x 50	-	116 x 122	Standby boat buoys @ ~460 m NE and SW
MC 109	Amberjack BP	344	FP	59°30'N 70°38'E	I	14 x 34	-	98 x 85	
VK 823	Virgo	344	FP	46°88'N 70°2'W	I	14 x 46	-	94 x 102	
VK 989	Pompano BP	393	FP	31°1'S 39°83'E	I	27 x 44	-	122 x 122	
GC 065	Bullwinkle Shell	412	FP	23°70'S 55°38'W	I	41 x 48	-	122 x 146	
GB 260	Baldpate Amerada	502	CT	68°81'S 17°07'W	I	27 x 27	27 x 27	27 x 27	
EW 921	Morpeth Br. Borneo	509	mini-TLP	10°3'S 29°90'Wmm	II	70 m Dia	-	70 m Dia	2 Cat Risers
GC 184	Jolliet Conoco	525	TLP	49°50'S 24°00'E	I	55 x 55 est		55 x 55 est	

Table 4.4. (Continued).

Area/ Block	Field Name Operator	Water Depth (m)	Platform Type*	Location	Obstruction Type**	Water Column Dimensions (m)			Comments
						Shallow	Mid-Depth	Bottom	
VK 786	Petronius Texaco	532	CT	44°25'N 25°21'E	I	18 x 34	-	43 x 43 est.	
VK 826	Neptune Kerr McGee	589	SP	39°06'S 53°25'E	II	22 m Dia		~1,000 m Dia	6 leg 'taut catenary' lines
GB 388	Cooper Eex	698	FPS	15°56'N 19°17'W	II	73 x 73		1,524 m + Dia est.	
GC 205	Genesis Chevron	792	SP	13°52'N 31°20'W	II	37 m Dia	-		
GB 426	Auger Shell	872	TLP	12°00'S 85°0'E	II	88 x 118	~ 10000' Dia	5,500 m Dia	4 x 3 anchor lines w/ sub buoys & Cat Export Risers
MC 807	Mars Shell	894	TLP	36°55'N 56°19'W	I/II	76 x 76		86 x 86	Standby buoy @ 488 m SE and several Cat risers
VK 915	Marlin Amoco	977	TLP	65°5'N 72°22'E	I	67 x 67 est		76 x 76 est	
VK 956	RamPowell Shell	980	TLP	14°14'N 71°39'E	I/II	76 x 76	-	85 x 85	Cat. Export Risers & 2 Standby Buoys @ 457 m NE and SE
GC 254	Allegheny	983	Mini-TLP	26°05'S 17°60'W	I	70 dia est		70 dia est	
MC 809	Ursa Shell	1,158	TLP	58°95'S 35°49'E	I/II	99 x 99		99 x 99	2(+) Cat Risers
AC 25	Hoover Exxon	1,463	Deep Draft Caisson	56°94'S 25°90'E	II	37 m Dia		3,109 m Dia	4 groups of 3 anchor lines

*CT = Compliant tower; FP = Fixed platform; FPS = Floating production systems; SP = SPAR platform; TLP = Tension leg platform.
**I = Cylindrical; II = Cylindrical - Shallow Spread.

4.6.3 Satellites

With the exception of the Jolliet field, in which a small TLP supports wellheads and is tied back to a fixed processing platform in shallow water, all tieback, or satellite, fields employ subsea systems. Configurations vary widely and may consist of single wells, multiple wells, manifolds and other support structures, but all subsea systems share two characteristics:

- components project only a few tens of feet above the bottom; and
- they are connected to a host platform by (generally small diameter) flowlines and umbilicals. Clusters of subsea wells and manifolds are typically spread over an area of as much as several hundred feet on a side, but some fields cover much larger areas. Details of subsea components and layouts are described and referenced extensively in MMS (2000b).

Technology exists to provide subsea pumping and separation, but it has not been applied in the Gulf of Mexico. Thus, oil, gas, water and other produced materials must flow naturally from the reservoir, through the well tubulars, wellhead, manifold, flowline, and riser to the host platform. Chemicals can be injected from the host platform to inhibit the formation of waxes, hydrates, and other contaminants that add to the resistance along the flow path and can even cause the lines to plug. Because of these and other problems, subsea oil satellites are typically no more than 24 km or so from the host platform. Pressure losses have less impact on gas flow and, if hydrate formation can be avoided, longer offsets are possible. The Mensa gas field in Mississippi Canyon Area Block 687 lies more than 80 km from the host platform in West Delta Area Block 143. A total of 52 subsea fields in water depths ranging from just over 200 m to more than 1,524 m of water are listed in **Table 4.5**.

The locations of the platforms and subsea installations listed in **Tables 4.3** and **4.5** are shown in **Figure 4.5**.

4.6.4 Risers and Pipelines

The term “Riser” is used to refer to the component of a pipeline, flowline, or umbilical that connects it to a host platform. These may include large diameter import or export lines for oil or gas or smaller diameter production risers or flowlines from single or clustered subsea wells, or subsea control umbillicals or powerlines. Fixed and pulltube or J-tube risers are used on fixed platforms, whereas top-tension or catenary risers are most common on floating systems. These alternatives are illustrated in **Figure 4.6**. With the exception of the catenary riser, these systems do not extend beyond the footprint of the platform until the riser reaches the seabottom. The catenary riser may extend a considerable distance laterally as water depth increases, but most of this extension is well below the surface of the water.

Table 4.5. Subsea systems.

Block	Field Name	Tieback to	Operator Name	Year Installed	Removal Date	Water Depth (m)
EB 157		EB 110	AGIP	1996		287
EB 158	CERVAZA	EB 159?	UNION	1997		282
EB 945	DAINA B	AC 25	Exxon Mobil	1999		1,414
EB 946	DIANA A	AC 25	Exxon Mobil	1999		1,420
EW 917	LOBSTER	EW 873	MARATHON	1998		364
EW 963	ARNOLD	EW 873	MARATHON	1998		533
EW 991		EW 947	WALTER	1996		233
EW 1006		EW 873	WALTER	1997		574
GB 70	SEASTAR	VER 386	NEWFIELD	1997		229
GB 73		GB 72	Mariner Energy	2000		227
GB 117		GB 72	FLEXTREND	1997		281
GB 161	SPEND A BUCK	GB 72	PENNZENERGY	1999		296
GB 179		HI A 384	WALTER	1997		217
GB 216	PENN STATE	GB 260	AMERADA HESS	1999		444
GB 224	SANTA FE	HI A384	Kerr McGee	1991		226
GB 235	PIMENTO	GB 236	LL & E	1994		239
GB 240	MUSTIQUE	GB 236	Mariner Energy	1996		254
GB 367	DULCIMER	GB 236	Mariner Energy	1999		342
GB 387	SB	GB 388	EEX Corporation	2000		732
GB 602	MACARONI	GB 426	Shell Companies	1999		1,128
GC 20	GYRFALCON	GC 19	Reading & Bates	1999		270
GC 60	YUKON	GC 18	Exxon Mobil	1996		265
GC 110	ROCKY	GC 65	Shell Companies	1996		527
GC 113	ANGUS	GC 65	Shell Companies	1999		609
GC 116	POPEYE	ST 300	Shell Companies	1998		624
GC 136	SHASTA	GC 6	Texaco	1995		262
GC 136	SHASTA	GC 6	Texaco	1995		317
GC 200	TROICA	GC 65	BP	1997		814
GC 298		GC 254	BR. BORNEO	2000		1,009

Table 4.5. (Continued).

Block	Field Name	Tieback to	Operator Name	Year Installed	Removal Date	Water Depth (m)
MC 28	POMPANO II	VK 989	BP	1995		554
MC 292	GEMINI WELLS	??	Texaco	1999		1,036
MC 355	ZINC	MC 397	Exxon Mobil	1993		445
MC 401	DIAMOND	WD 152	Mariner Energy	1993		417
MC 401	DIAMOND	WD 152	Mariner Energy	1993		518
MC 441	ALABASTER	EW 482	ENSEARCH	1993		438
MC 442	ALABASTER	EW 482	ENSEARCH	1993		467
MC 445	DIAMOND	WD 152	Mariner Energy	1994		639
MC 445	DIAMOND	WD 152	Mariner Energy	1994		639
MC 674	BLOOD, SWEAT & TEARS	MC 807	Mariner Energy	1999		826
MC 685	MENSA TEMPLATE	WD 143	Shell Companies	1997		1,615
MC 687	MENSA WELLS	MC 685	Shell Companies	1997		1,614
MC 807	MARS	MC 807	Shell Companies	1996		899
MC 934	EUROPA	MC 807	Shell Companies	1999		1,213
MC 764	KING	MC 807	Shell Companies	1998		1,000
VK 783	TAHOE	MP 252	Shell Companies	1991		454
VK 783	TAHOE	MP 252	Shell Companies	1997		442
VK 825	NEPTUNE	VK 826	Mariner Energy	1999		523
VK 826	NEPTUNE WELLS	VK 826	Kerr McGee	1997		588
VK 828	SE TAHOE	MP 252	Shell Companies	1996		533
VK 862		VK 817	WALTER	1995		325
VK 944	OSIRIS	SP 62	Elf	1998		226
VK 986		VK 900	WALTER	1995		272

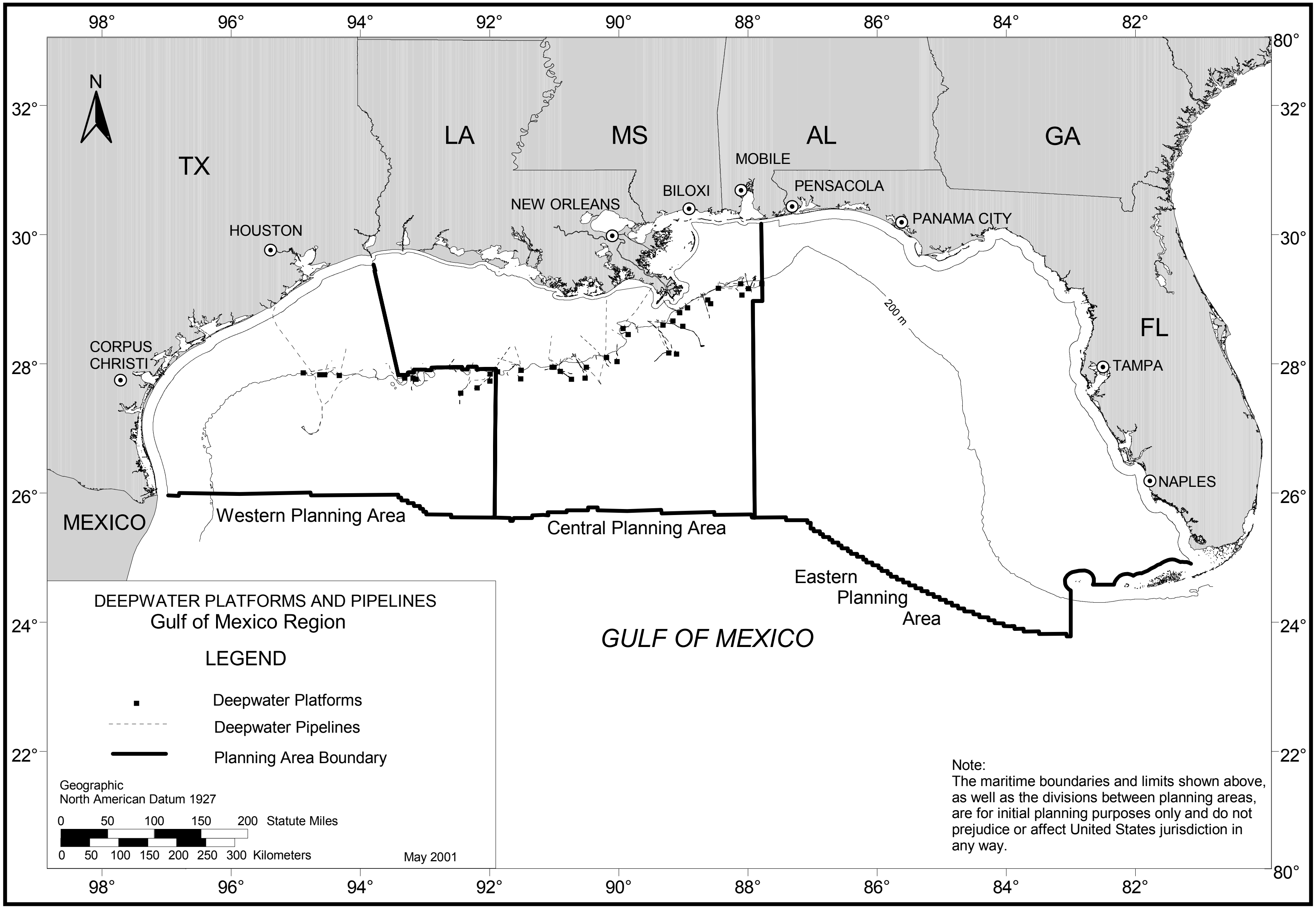

Figure 4.5. Deepwater platform and subsea locations in water depths greater than 200 m in the Gulf of Mexico.

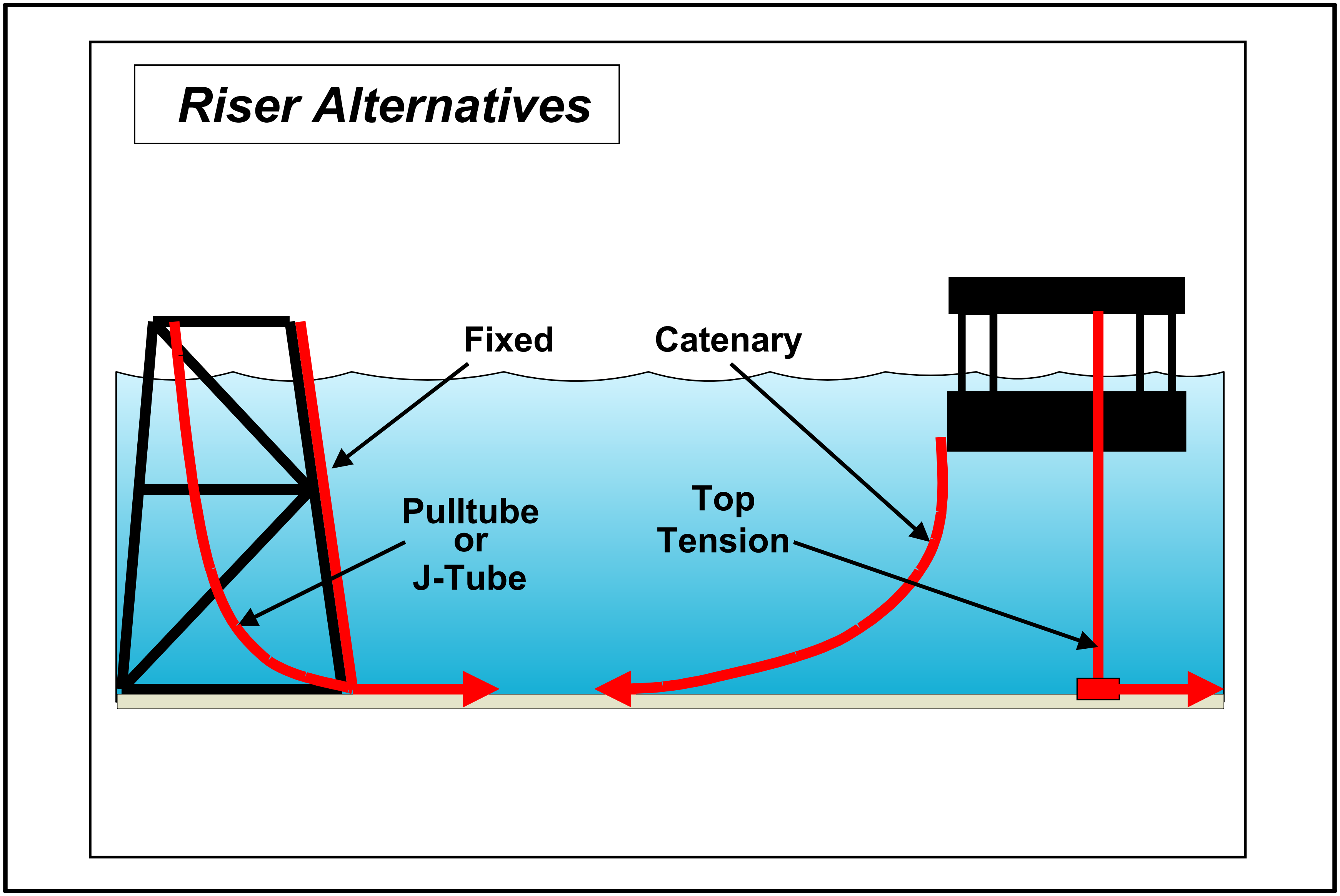

Figure 4.6. Riser alternatives.

A potentially important variation of the catenary riser involves placing buoyancy support at one or more points along the length of the riser. This has the effect of creating a reverse curvature in the riser and it takes on an S-wave, or “lazy wave,” form. These “lazy wave” risers allow the surface platform to move through larger displacements, without overstressing the riser. For this reason, “lazy wave” risers may become a more attractive alternative, if FPS or FPSO systems are used in the Gulf of Mexico.

The flowlines and umbilicals that run between subsea wells and manifolds and their host platform are typically 15 cm or less in diameter and generally sink at least a small distance into soft seafloor. Export or gathering pipelines for oil and gas are more typically 30 to 46 cm in diameter, but are sometimes larger. These lines are often weight coated to ensure they stay on the bottom in their lightest condition. Though they generally sink into the soft seabottom, like flowlines and umbilicals, they too will lie on top of harder bottoms and may even bridge across narrow depressions. Wherever possible, lines will be routed to avoid areas with hard, uneven bottom or unstable sediments

4.6.5 Construction Activities

The term construction is used here to encompass the full range of fabrication, transportation, commissioning, and installation activities associated with creating and installing a deepwater development system. Fabrication of the various components of deepwater systems may take place at a wide range of onshore or coastal locations along the Gulf Coast or anywhere around the world. Commissioning activities might include mating together major platform components (e.g., setting major facilities modules on the hull of a TLP). Although they may take place in open water areas of the Gulf of Mexico (e.g., Auger TLP hull and deck were mated at a location offshore Texas), these commissioning and mating activities will occur at a sheltered, nearshore location. Major components or completed platforms may be transported as a wet tow or as deck cargo to the final installation site from a Gulf Coast fabrication or commissioning site or directly from a location outside the Gulf of Mexico. It is this transportation and the actual installation activities that are most likely to interact with deepwater fishery activities.

The details of transportation and installation activities will vary widely for the different platform and tieback configurations, but many will share important similarities. Installation of a hypothetical FPS with several subsea tiebacks is described here to illustrate nature of the equipment and the activities and the sequence and duration of events. A more detailed description of installing an FPSO is contained in the recently issued Environmental Impact Statement (EIS) (MMS 2001).

There are several separate activities at the field installation site that must be completed before the FPS hull is mobilized. These relate both to the drilling and hookup of the subsea wells and to the preparation of the FPS mooring spread, and include the following:

- Drilling of subsea wells;
- Setting subsea manifolds;

- Laying subsea flowlines, umbilicals and jumpers;
- Laying gas and oil export lines; and
- Setting anchors/piles and bottom chain/wire mooring line segments.

Following completion of these activities, the FPS hull will be towed to site and connected to the mooring spread. Several additional activities remain to be completed before startup:

- Installation of flowline risers;
- Installation of umbilical risers;
- Installation of export pipeline riser;
- Proofloading moorings; and
- Subsea well completions.

The spatial relationships between system components and construction equipment selection will influence the timing and sequence of these activities. The geometry represented in **Figure 4.7** will be used for discussing installation activities. The FPS is centered at least 3,660 m from the nearest subsea well cluster and each well cluster is separated by about the same distance. It is assumed here that all wells will be drilled and completed by a floating drilling rig moored on location by 8 to 12 drag anchors. It is also assumed that the rig will install wellheads and flowline/umbilical jumpers upon completion of each well. The geometry is such that one anchor setting will be sufficient for drilling all three wells for each of three manifold center locations and another setup for completion and hookup of each three-well group. The activities associated with drilling, completion, and hookup of subsea wells are essentially the same as those associated with exploration drilling, as described in **Section 4.5**.

The following activity breakdown and associated construction equipment requirements may be considered representative for installation of an FPS or other moored deepwater system:

- FPS transportation – 3 to 5 tow vessels;
- Mooring anchors and lines – 1 or 2 anchor handling vessels;
- Flowlines and export pipeline – DP pipelaying vessel;
- Umbilicals – DP cable/umbilical vessel; and
- Install manifolds, hook up FPS, install risers, and hook up pipeline DP construction vessel.

Most activities that are carried out below the water surface will rely on electrically powered remotely operated vehicles (ROVs) to provide visual perspective and to perform certain limited work functions.

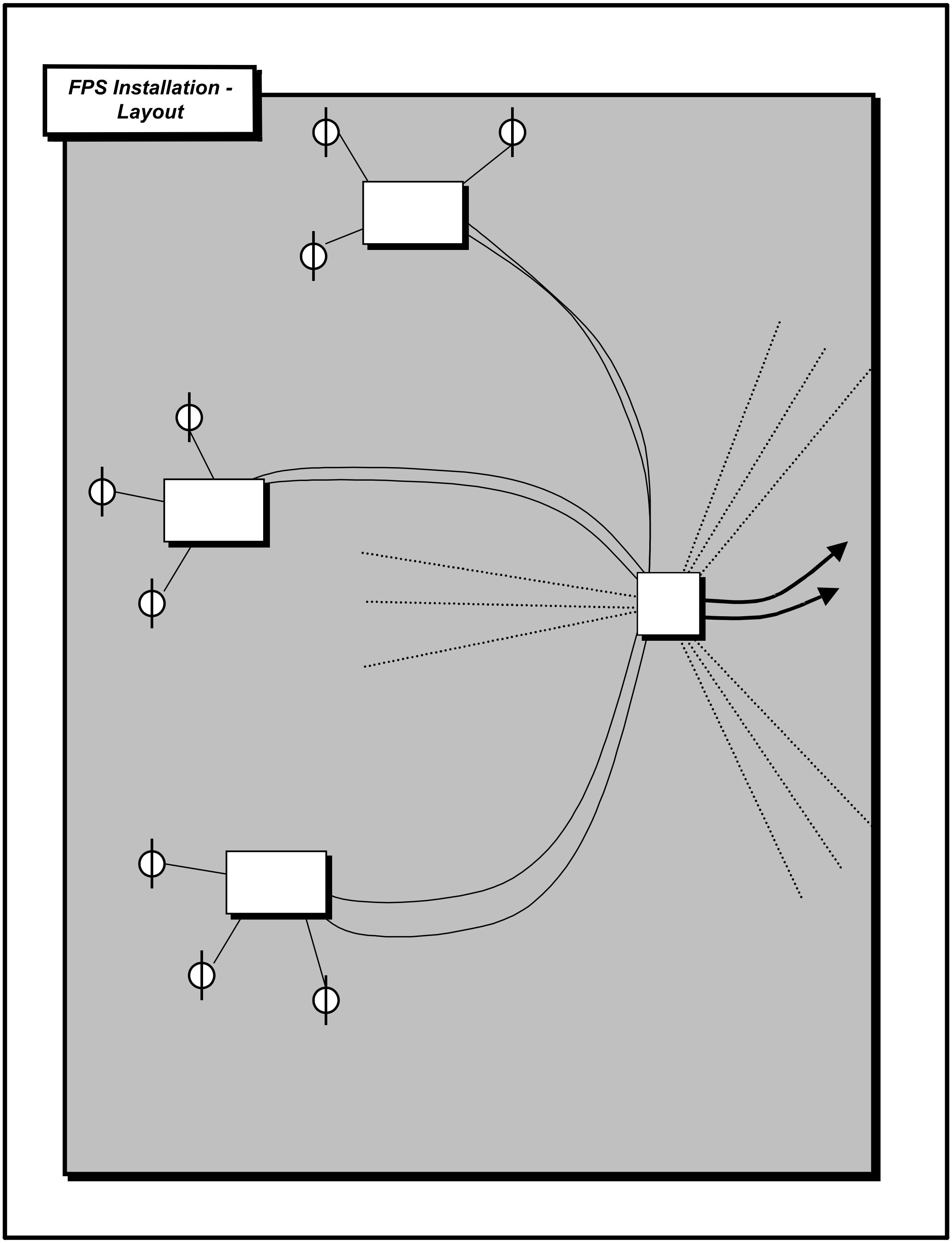

Figure 4.7. Floating production, storage, and offloading installation example.

A representative schedule of activities is illustrated in **Figure 4.8**. Details of actual FPS installation schedules will vary, especially when the same construction equipment is selected for different activities (which may be shown here as overlapping in time), but the overall effort will likely by very similar. For most deepwater systems, installation activities at the offshore site will likely extend over a period of 2 or 3 months or more, and if the development wells are subsea, drilling and completion activities may extend over 2 or 3 years.

Details of the logistical support for installation of a deepwater platform will vary widely, depending on the equipment, procedures, and sequencing of field operations. For example, material storage capacities for alternate equipment capable of installing the flowlines and pipeline, and therefore the resupply requirements, are considerably different. The following equipment spreads, timing, and durations offshore are thought to be conservative:

- Two round trip helicopter per week for an 8- to 10-week period;
- One round trip crewboat per week for the same period;
- One cargo barge and attendant 1,200 HP tug on site for same period; and
- One cargo barge and attendant 1,200 HP tug in transit between site and shorebase once per week for same period (24-h tow each way).

The resulting durations of activity, both at the installation site and in transit to and from the shore base, for the various pieces of equipment involved in this hypothetical deepwater installation are summarized in **Figure 4.9** and are considered representative.

4.7 PRODUCING OPERATIONS

After installation of a development platform or tieback satellite is completed, the stage that might be broadly termed “producing operations” begins. This stage may include the following activities and will typically go on for a period that extends into decades:

- completion of pre-drilled wells;
- startup of facilities and pipelines;
- drilling and maintenance of additional wells;
- maintenance of structures and equipment; and
- normal producing operations.

Activities that take place on a platform will have little or no impact on fishery activities beyond the existence of the platform, as described in **Section 4.6**, and periodic visits of supply boats. The frequency of the comings and goings of supply boats will vary widely, but once per week during normal operations is typical. More frequent visits may be expected during initial startup and drilling activities. Typically the supply boat will approach the platform on the side with an outboard crane, preferring the down wind side if there is an option. The boat will back to within a few tens of feet from the side of the platform and stand by while new supplies and materials going to shore are exchanged. The supply boat may be tied off to the platform during this process, which may take several hours.

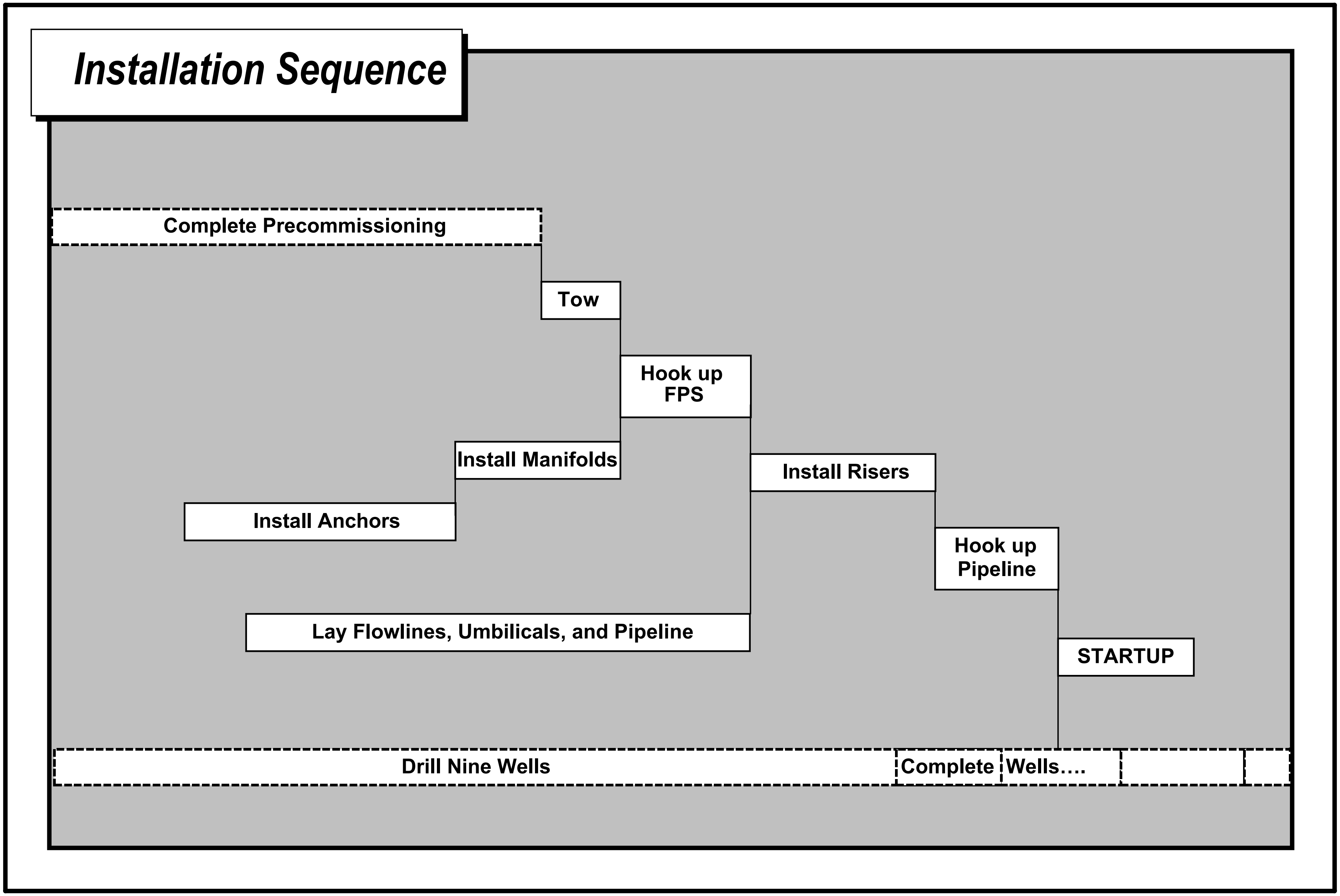

Figure 4.8. Floating production, storage, and offloading installation sequence.

Equipment Durations During FPS Installation

Equipment	Primary Location	1	2	3	4	5	6	7	8	9	10
		Week of Installation									
Anchor Vessels	Installation site	■	■	■	■						
	Transit to/from shorebase	■	■	■	■						
Construction Vessel	Installation site					■	■	■	■	■	■
	Transit to/from shorebase					■					■
Pipe/Flowline Vessel	Installation site	■	■	■							
	Transit to/from shorebase	■			■	■	■	■			
Umbilical Vessel	Installation site				■						
	Transit to/from shorebase			■		■					
Tow Boats	Installation site							■			
	Transit to/from shorebase						■		■		
Logistical Support	Installation site	■	■	■	■	■	■	■	■	■	■
	Transit to/from shorebase	■	■	■	■	■	■	■	■	■	■
Helicopters	Transit to/from shorebase	■	■	■	■	■	■	■	■	■	■

Figure 4.9. Equipment durations during floating production, storage, offloading installation.

Normal producing operations of tieback satellites cause no changes on the water surface, but subsea drilling or maintenance work on wellheads or other subsea components will require mobilization of a drilling rig or other construction vessel. The duration of these activities will vary widely, but the equipment and the general nature of the involvement of the water column will be similar to exploration drilling and installation activities, which are described in **Sections 4.5** and **4.6**, respectively.

4.8 ABANDONMENT

4.8.1 Abandonment Strategy

The abandonment strategy for a deepwater installation is subject to approval by MMS. To date, only the Placid FPS, which was installed in 1988 at Green Canyon Area Block 29, has been abandoned. Current decommissioning rules require the lessee to remove all structures and related underwater obstructions within 1 year after termination of their lease. Complete removal of system components on and below the surface of the bottom sediments will increase dramatically as water depth increases, may require the use of explosives, and may even challenge physical limits of (de)construction capabilities. Further, and perhaps more importantly, activities associated with complete removal of manifolds, anchors, flowlines, and umbilicals would likely increase the risk of human injury and may even produce greater disturbance to the environment than would abandonment in place. The strategy presented in **Table 4.6** is believed to be representative of what will be proposed for future abandonment of deepwater systems (MMS 2000-115).

Table 4.6. Deepwater systems abandonment strategies.

System Component	Abandonment Strategy
Compliant Tower or Platform Jacket and SPAR Hull	Topple/abandon in place (removal for salvage, or move to "rigs to reef" location possible)
TLP, FPS, FPSO Hull	Remove from field for salvage or reuse
Mooring Lines	Abandon in place
Tendon Piles, Anchor Piles, and Anchors	Abandon in place
Subsea Wells	Plug in accordance with 30 CFR 250, Subpart G
Subsea Production Trees	Retrieve
Production, Umbilical, and Export Risers	Remove for salvage
Pipeline	Decommission (cleaned and capped), leave on seafloor
Flowlines and Umbilicals	Decommission (cleaned and capped), leave on seafloor
Well and Umbilical Jumpers	Retrieve
Seafloor Structures (manifold, transponder supports)	Abandon in place or retrieve

4.8.2 Abandonment Activities

Subsea wells will be plugged and abandoned in accordance with 30 CFR 250, Subpart G and wellheads and manifold jumpers will be removed by a floating drilling rig, which will anchor temporarily and be dynamically positioned over each well cluster. Similarly, risers, flowlines, pipelines, umbilicals, manifolds, and jumpers will be flushed as required by regulation prior to the start of any retrieval or abandonment operations. Selection of equipment and procedures to be employed in decommissioning and abandonment activities will depend on many of the same factors that influence selections for installation, including availability and cost of equipment and the nature and sequence of operations. The sequence of decommissioning operations will proceed essentially in reverse of the installation sequence (see **Section 4.6**), but the overall duration of work will be shorter – perhaps as little as 3 or 4 weeks total. As in the case of installation, certain decommissioning activities can be carried out simultaneously. The recently published EIS (MMS 2001) describes the abandonment activities anticipated for an FPSO system in some detail.

4.9 FUTURE OCS ACTIVITIES

4.9.1 Background

Three primary sources are examined as bases for developing indicators of the magnitude and location of future drilling and development activities in the deepwater area of the OCS:

- Historical lease bonus;
- POE/DOCD plan approvals; and
- MMS deepwater development reference document.

Each of these sources of information varies in its value as a predictor of future activities in terms of confidence of the prediction, how specific the predictor is relative to where the activity might occur, as well as how far out into the future the forecast applies.

4.9.2 Lease Bonus

Leases are awarded to the company submitting the highest acceptable lease bonus bid for a particular lease in public sales conducted by the MMS. There are several factors that impact the lease bonus that a company will offer. Some of these, including anticipated future oil and gas prices and the cost of development, will vary from company to company and over time, however at a particular point in time, lease bonus is generally proportional to the expected size of the hydrocarbon volume in the event of successful exploration. Thus the locations of both individual and clusters of leases that receive relatively high bonus bids are expected to be an indicator of where companies will focus future drilling and development activities. Because of the time value of money and changing views of exploration potential, high lease bonuses paid some years ago for properties that have not yet been developed are not considered as strong an indicator of future activity as are more recent bids.

The MMS lease database from July 2000 was used as the source for examining information on lease bonuses paid. For the Gulf of Mexico, this database contains more than 19,000 entries. Of these, approximately 6,300 represent leases involving water depths of at least 200 m. Many of these entries represent leases that are not "active" (i.e., rejected, terminated, expired, relinquished, etc.). As of July 2000 there were approximately 3,800 leases considered "active" (i.e., primary, unit, production, SOP, DSO, or OPER status). Individual lease bonuses of $174, $500, and $5,000 per acre, which correspond to approximately to $1 million, $2.8 million, and $28 million for the standard 5,760 acre Federal lease, were used to screen historical lease bonus information (see **Table 4.7**).

Table 4.7. Deepwater lease bonuses.

Area	Total Leased Blocks	Number of Leases		
		Range 2	Range 3	Range 4
AC	377	27	21	1
AT	415	38	10	0
CC	3	0	0	0
DC	54	12	1	0
DD	7	2	2	0
EB	250	30	12	1
EL	17	0	0	0
EW	37	15	8	0
FM	2	0	0	0
GB	487	72	40	0
GC	562	87	32	0
KC	417	44	17	0
LL	12	1	0	0
LU	32	0	0	0
MC	503	79	54	0
PA	28	4	0	0
PI	52	5	0	0
VK	50	8	5	0
WR	449	49	11	0

Of the approximately 3,800 active deepwater leases, over 600 (about 18 percent) received bonus bids exceeding $1 million. With the exception of Corpus Christi and Port Isabel, where there has been little, if any drilling success to date, all the OCS areas with less than 60 leased blocks are either relatively small in overall extent in the deepwater study area or have experienced legal constraints on leasing. The remaining eight areas have hundreds of leased blocks each. In most of these areas, between approximately 3 and 6 percent of leased blocks received bonus bids in excess of $500 per acre. Interestingly, these include both the relatively nearshore area of East Breaks and Green Canyon Areas, as well as the more distant and deeper water areas of Alaminos Canyon, Atwater Valley, Keathley Canyon, and Walker Ridge Areas. In fact, the two deepwater blocks that received bonus bids in excess of $5,000 per acre are of recent vintage (1998) and are in water depths of approximately 1,500 and 2,900 m. In the Garden Banks Area, which saw the first development in over 610 m and Mississippi Canyon, which boasts several developments beyond 900 m twice the percentage of leases received bonus bids in excess of $500 per acre. The map in **Figure 4.10** better illustrates the aerial spread of bonus bid hotspots. Clearly there are several clusters of relatively high bonuses, but at least moderately high bids are spread across most areas. The exceptions are the very deepwater areas of Atwater Valley, Lund and Walker Ridge.

4.9.3 POE/DOCD Planning

All exploration drilling and development activities in the deepwater Gulf of Mexico require written plans to be submitted by the operator and approved by the MMS. Operators' POEs and DOCDs are perhaps the most direct indicator of future activities. This evaluation is based on plans approved by the MMS between December 1997 and July 2000 – the rationale for this is that older plans are likely either completed or changed. During that period unique plans covering over 400 deepwater lease blocks were approved. The distribution of approved plans by type and OCS area is given in **Table 4.8**.

Table 4.8. Deepwater lease bonus ranges.

Area	Exploration Plans	Development Plans
AC	13	1
AT	27	0
DC	0	2
EB	21	2
EW	19	3
GB	66	12
GC	75	8
KC	12	0
MC	98	15
PI	1	0
VK	13	6
WR	18	0
Totals	363	49

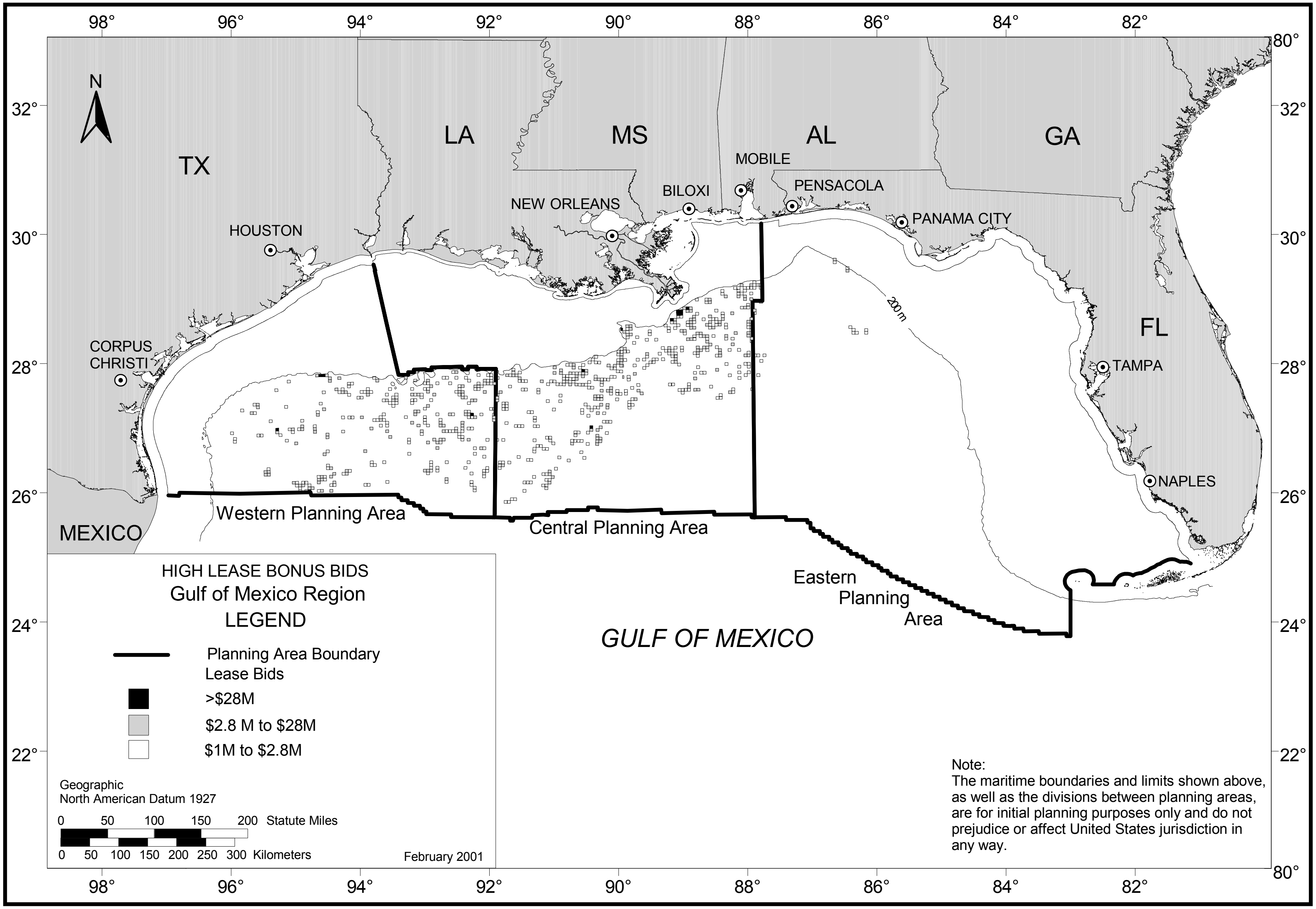

Figure 4.10. Lease blocks in water depths greater than 200 m with high lease bonus bids.

The following observations are based on these data:

- Nearly 90 percent of these lease block plans were for exploratory drilling;
- Of the 49 blocks with development plans, 7 of them involved additional development drilling from existing platforms (i.e., no new platforms or tiebacks) and only 18 are likely to involve field drilling or construction activities beyond mid-2001. Of those, 4 are subsea fields that will be tied back to a single new platform and 12 are subsea tiebacks to existing platforms (see **Figure 4.11**); and
- Of the 363 blocks with approved exploration plans, more than 85 percent contain water at least 450 m deep and 60 percent are at least 900 m deep (see **Figure 4.11**).

Over the two and one-half year period reviewed, by far most of the drilling and construction activities planned for deepwater lease blocks involve temporarily moored or dynamically positioned floating drilling rigs, and the majority of those involve activities in water depths at and beyond 900 m. Finally, a large majority of the planned new development activities during this period involve subsea developments having no surface facilities in the immediate vicinity of the wells, once they are installed.

Since much of the work planned during this period will have been completed by the end of 2000, the information on exploration and development plans described so far serves only as a backdrop to forecasting future activities. The time delay between permit approval and the start of activities at the offshore site may vary widely – from essentially no delay for a POE in which the operator has a drilling rig under contract and available, to a several year delay for the construction and installation of a major development platform. Also, from the time these plans are developed, submitted, and approved, early drilling results, changes in business conditions, new geologic models, and other factors can lead to changes. For these reasons, the following considerations were used in screening approved POEs and DOCDs for indications of future activities in deepwater lease blocks in 2001 and beyond:

- Recognize that operators with few deepwater activities may require 6 to 12 months to obtain a drilling rig contract slot before a planned well can be drilled;
- Treat temporarily abandoned (TA) wells as optimistic results, but recognize that 6 months or more may be required to evaluate early drilling results;
- All permitted exploration wells may not be drilled if early results are disappointing – early wells that are plugged and abandoned (PA) are considered discouraging;

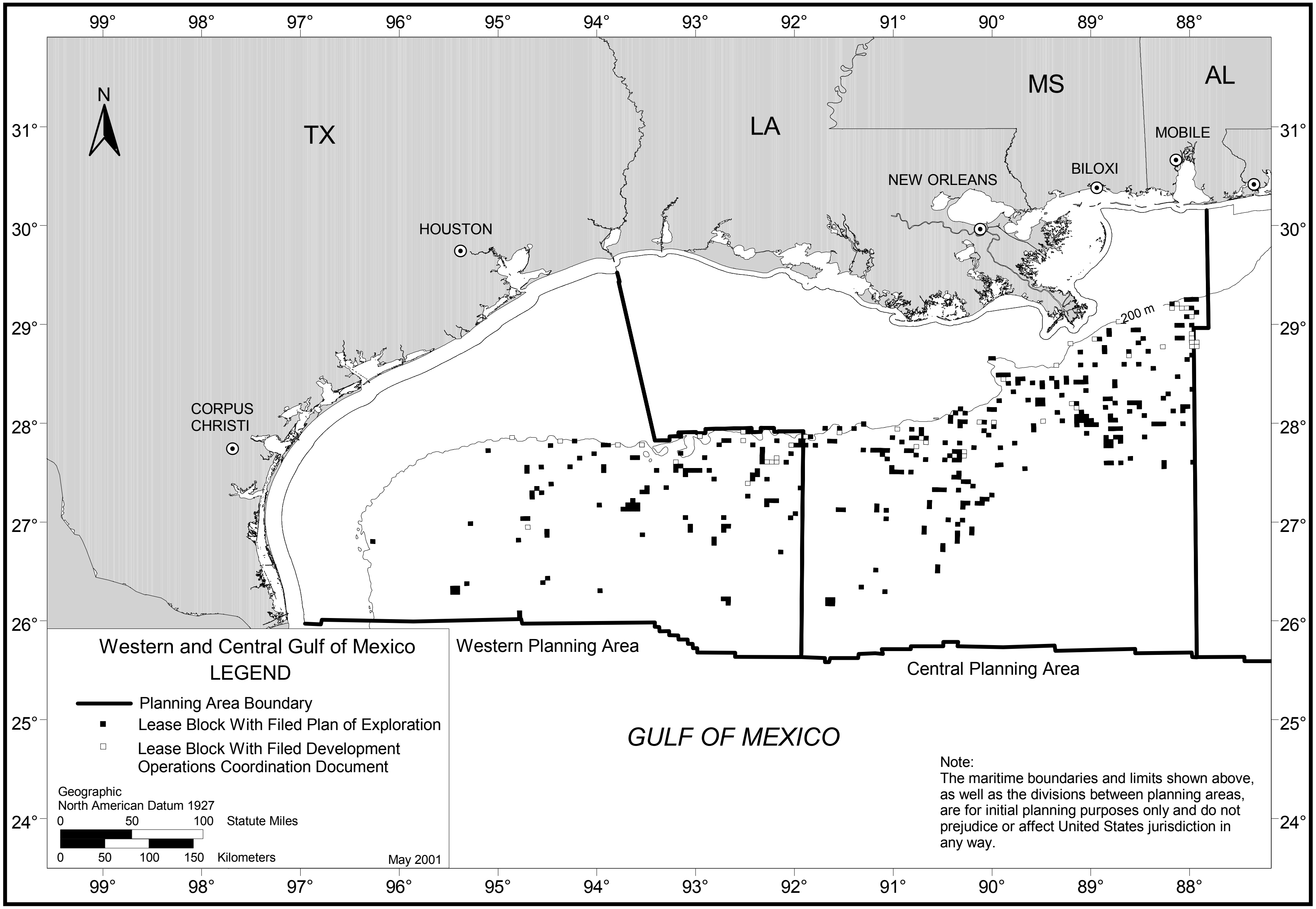

Figure 4.11. Lease blocks in water depths greater than 200 m with filed Plans of Exploration or Development Operations Coordination Documents (Source: Minerals Management Service 2000a).

- Plans for either exploration or development wells that are to be drilled from existing platforms are assumed to result in no significant increased activity. Forecast no future activity (NA) in 2001 and beyond for a DOCD approved before June 1999 if fewer than three subsea wells are required for the planned development; and

- Forecast no exploration activity in 2001 if POE was approved in 1998, but no drilling through early 2000 (i.e., assume plans changed).

With these considerations and the record of drilling activities from the MMS's well database through July 2000, the POE/DOCD plan was reviewed, with the following observations:

- Of the 49 total blocks involved in approved development plans, 18 are expected to experience mobil offshore drilling unit (MODU) drilling activities in 2001 and potentially longer (the remaining 32 block activities planned are expected to either be completed or involve drilling activity from existing permanent platforms);

- Of the total of 363 blocks involved in POEs approved between December 1997 and July 2000, plans involving 95 were approved in 2000 – 135 blocks are identified as likely locations of exploration drilling in 2001/2002; and

- Because of encouraging early exploration results (thru July 2000), future development activities may be expected on as many as 22 blocks – most of these are in Mississippi Canyon Area.

Table 4.9 summarizes the number and location of blocks expected to experience exploration drilling (EA) and construction/development drilling (AD) activities in 2001 and beyond (Note: those indicated under "AD?" represent blocks with approved POEs in which early drilling results appears encouraging; development plans have not been either submitted or approved through July 2000).

This distribution suggests that Mississippi Canyon Area remains the most active area, but that the advance to deeper water is spread over a wide area in the Gulf of Mexico. For plans approved between December 1997 and July 2000, a total of 47 operators are involved in these activities, but more than 20 operators are responsible for exploration and development on at least five blocks. The list of operators and the range of their involvement is summarized in **Table 4.10**.

Table 4.9. Exploration and development activity – 2000/2001.

Area	EA	AD?	AD
Alaminos Canyon	8	-	-
Atwater Valley	10	-	-
De Soto Canyon	-	-	2
East Breaks	11	-	-
Ewing Bank	3	1	2
Garden Banks	19	-	3
Green Canyon	24	4	1
Keathley Canyon	9	-	-
Mississippi Canyon	32	14	7
Port Isabel	1	-	-
Viosca Knoll	6	2	2
Walker Ridge	12	1	-
Totals	117	22	17

EA = Blocks with exploration drilling.
AD? = Blocks with approved Plans of Exploration in which early drilling results appears encouraging; development plans have not been either submitted or approved through July 2000.
AD = Blocks with construction/development drilling.

Table 4.10. Anticipated drilling efforts based on Plans of Exploration (POEs) and Development Operations Coordination Documents (DOCDs).

Operator	POE Blocks	DOCD Blocks
Amerada Hess	20	1
BHP	6	-
BP/Amoco	32	9
British Borneo	13	2
Chevron	30	-
Conoco	15	1
Ensearch	8	4
Elf	16	2
Ker McGee	10	2
Marathon	16	1
Mariner	10	4
Murphy	8	-
Oryx	17	1
Phillips	8	-
Shell	49	7
Texaco	12	1
Union	22	-
Vastar	14	1
Walter	6	2
XOM	10	2
27 Others	>4	

4.9.4 MMS Deepwater Scenario

MMS has recently published an Environmental Assessment (EA) of deepwater operations in the Gulf of Mexico (OCS EIS/EA MMS 2000-001). In preparation of this deepwater EA, the MMS compiled a reference document (OCS EIS/EA MMS 2000-015), which includes a development scenario for the years 1998 through 2007. The projections of activities contained in this scenario are based on a combination of historical data, published information, and interpretations from industry and internal experts. The reader should note that 300 m represents the shallow end of the range of water depths covered by the Deepwater EA scenario, compared with the 200 m limit used in the current study. While it cannot be said with complete confidence that this difference is unimportant in terms of forecasting future OCS activity, it can be said that the zone between 200 and 300 m of water represents only a small portion of the deepwater area and this zone has been extensively explored in the past.

4.9.5 Floating Drilling

Approximately 100 exploration wells have been drilled annually from 1997 through 1999. It is estimated that 60 to 100 exploration (and appraisal) wells will be drilled each year during the period 2001 to 2007 (see **Table 4.11**). This level of drilling activity might be expected to result in 10 to 15 discoveries per year. Perhaps half to two-thirds of those discoveries will lead to developments and some of those will involve subsea development wells. In total, 75 to 120 wells per year are expected to be drilled from floating rigs. As many as 50 floating rigs annually may be active in the Gulf of Mexico during this period.

Table 4.11. Projected deepwater exploration drilling (2001-2007).

Year	Exploration Wells
2001	60-80
2002	60-80
2003	70-100
2004	70-100
2005	70-100
2006	60-80
2007	60-80

4.9.6 New Developments

The MMS scenario projects that 8 to 10 new developments will start up annually through 2007 (see **Table 4.12**). Most of these will be subsea satellite tiebacks, but 20 to 30 will be platform developments involving a range of system configurations. The historical trend of relying on fixed platform, TLP and SPAR systems, that employ platform-based drilling, is expected to continue through the early years of the scenario. Later in the period, as development activities extend to deeper water, floating systems that rely on subsea wells are expected to be employed more often.

Table 4.12. Projected deepwater development startups (2001-2007).

Year	Subsea	TLP	SPAR	Fixed	FPS	FPSO	Total
2001	6	2	2		1		11
2002	6	1	1	1	1	1	11
2003	6	1	1			1	9
2004	6	1		1	1		9
2005	6		1			1	8
2006	6		1	1			8
2007	6	1				1	8

4.9.7 Validity

The MMS scenario described above is believed to be a realistic projection of the overall level of future deepwater OCS activity. It covers a relatively long period into the future, but it doesn't provide a very clear picture as to where activity will occur. Overall, POEs and DOCDs are expected to be very good indicators of activities in the near term future in terms of both confidence and specificity of location. DOCDs may forecast activity at a specific site several years in the future, while POEs are probably only useful in forecasting activities for a period ranging from a few months to as much as a year or two following approval.

5.0 CURRENT AND FUTURE CONFLICTS

5.1 CURRENT CONFLICTS

5.1.1 Domestic Conflicts

The following discussion focuses on interactions between commercial fishing and oil and gas operations within the primary areas in U.S waters where fishing and oil and gas activity overlap: Santa Barbara Channel and southern Santa Maria Basin, and the Gulf of Mexico. Because the Gulf of Mexico fisheries and oil industries have been described extensively in **Sections 3.0** and **4.0** of this report, the reader is referred to those sections for background information. For California, brief descriptions of fishery and oil and gas activities are given along with the analyses of past and current interactions.

The relatively narrow continental shelf and limited productive fishing areas in the Santa Barbara Channel overlap with the oil and gas activities there and compress both activities into a relatively small zone between the shoreline and offshore waters. Although the narrow shelf continues in the Santa Maria Basin, offshore banks and the lack of islands allow commercial fishing, particularly trawling and trolling, to occur further offshore and in deeper water than within the Channel. The emphasis of this report is on interactions in water depths of 200 m or greater, however, in many cases the only interactions reported are from shallower depths.

5.1.1.1 Santa Barbara Channel/Santa Maria Basin, California

The area discussed in this section includes the state and federal ocean waters offshore Ventura, Santa Barbara, and San Luis Obispo Counties, extending from approximately 48 km offshore Pt. Sal south to a point approximately 45 km southwest of Pt. Conception and then east to a point approximately 16 km of Port Hueneme near the eastern edge of Hueneme Canyon. This area encompasses most bottom-founded commercial fishing activities and all of the existing oil and gas platforms and pipelines within the region. Surface fishing efforts (i.e., albacore trolling) do occur further offshore, however, to date, oil and gas production has been limited to water depths of approximately 366 m (**Figure 5.1**). Additional oil and gas operations to the south off Huntington Beach are all in water depths of less than 200 m.

The water depths of the Santa Barbara Channel/Santa Maria Basin area range up to 1,829 m; the seafloor is predominantly sedimentary, although several deepwater rocky seamounts are present. Nearshore areas support kelp beds, founded on both solid and sedimentary habitats, particularly where upwelling occurs around the Channel Islands and along the western, rocky shoreline near Pt. Conception. The maximum water depth within the area of study is 732 m off Pt. Conception.

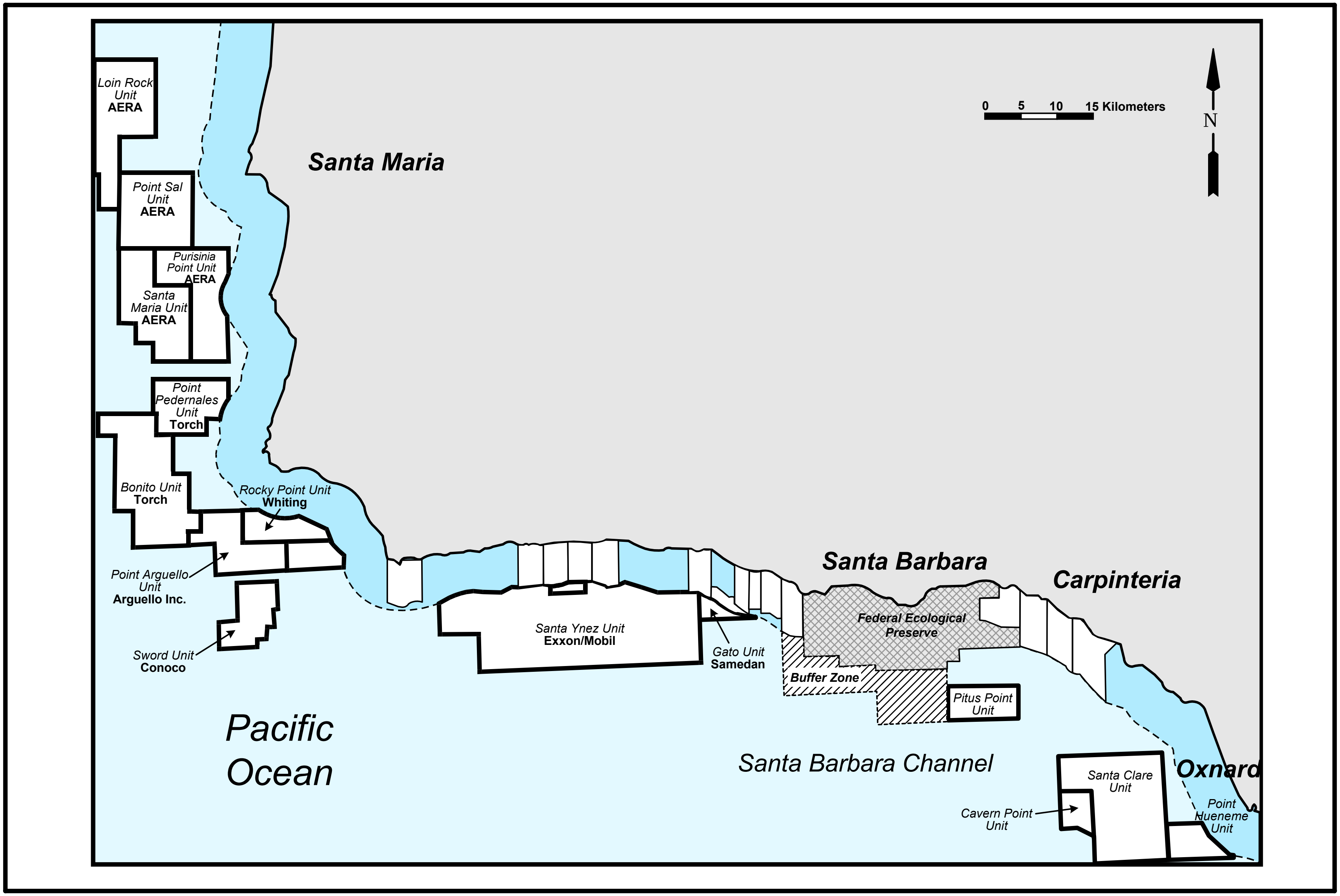

Figure 5.1. Southern California offshore oil and gas development.

Fishery Resources

Through 1985, the California commercial fisheries comprised a mixture of pelagic and demersal fishes and invertebrates (Centaur Associates, Inc. 1981; MBC Applied Environmental Sciences 1989). Historically, northern anchovies, mackerels, squids, and urchins have contributed the majority of the kilograms landed within the state. In southern California, important commercial trawl fisheries through 1985 included shrimps, halibut, flatfishes, rockfishes, and sea cucumbers. Important set gear-target species included halibut, angel sharks, crabs, and lobsters, while divers targeted on abalone and urchins. Drift netting for swordfish and thresher sharks was conducted in mid-Channel and south of the Channel Islands. Since 1985, the Santa Barbara commercial landings for many of those species have decreased and the commercial abalone and urchin fisheries have been closed or substantially reduced. Squid now contributes the largest percentage of the total kilograms caught within the area and landed at the four main Channel ports.

Since 1985, some spot-market fisheries have developed in the area, including hagfish trapping (1990 to 1993). Live trap fishing for shrimp and fish is now more common than in the past. Improvements in on board refrigeration techniques allowed a market for deepwater flatfish, including rex, petrale, English, and dover sole, to develop, particularly in the Santa Maria Basin. Most of these species are trawled in water depths of from 200 to over 610 m in the Santa Maria Basin and on the Santa Lucia Bank, north and west of Pt. Conception. Deepwater rockfish, including two species of *Sebastolobus* (euphemistically named thornyheads) are trawled in similar depths within the same areas. Other deepwater rockfish species are caught with set nets and trawls within and along the submarine canyons west of the area between Pt. Conception and Pt. Arguello in the western Santa Barbara Channel. Commercial trawling in the Santa Barbara Channel is limited to approximately 200 m.

Types of Fishing

Five primary commercial gear types are used in southern California: trawl, set net, drift net, traps/pots, and hook and line; commercial harpooning for swordfish and, historically, diving for urchins and abalone are also utilized. Centaur Associates, Inc. (1984) completed a study that included a series of maps depicting commercial fishing areas within the southern California marine waters. Although some changes in target species have occurred since that time, principal fishing areas have remained relatively constant.

Specifically, trawling operations targeting flatfishes, rockfishes, shrimps, and sea cucumbers occur in water depths of up to 914 m; halibut, shrimps, and sea cucumbers are most common in water depths of 200 m or less. Dover, rex, petrale, English sole, and most species of rockfish are caught in deeper water. Most of the central portion of the Channel is not trawled due to a paucity of marketable resources, possibly due to a well-documented oxygen-poor conditions within the deeper waters there. The study area also includes one of the few areas within California where commercial trawling is allowed inshore of the 3-mile limit. The "California Halibut Trawl Grounds" extend from Pt. Dume (between Los Angeles and Ventura) in the south to Pt. Arguello in the north.

Set gear, including nets (halibut and others) and traps (crab, lobster, and live fish), are most commonly utilized in water depths of from 6 to 76 m, although spot prawn trapping, a relatively recent fishery in the Channel, occurs in water depths in excess of 92 m in rocky areas avoided by trawlers. Seining for baitfish and mackerel, and drift netting for shark and swordfish occur throughout the Channel, while seining for squid commonly occurs closer to shore around the Channel Islands and along most of coastline within the southern Santa Maria Basin. Swordfish driftnetting also occurs in the western Santa Barbara Channel and south of the Channel Islands over the relatively shallow banks off Santa Rosa and Santa Cruz Islands.

Data provided by the California Department of Fish & Game indicate that in 1999 a total of 1,419 commercial fishing licenses were registered in the six main harbors in the area (950 in Port Hueneme, Oxnard, Santa Barbara, and Ventura in the Santa Barbara Channel and 469 in Avila and Morro Bay in the Santa Maria Basin area). For the period 1990 through 1999, the annual average licenses for the four Santa Barbara Channel port's vessels was 1,086, while Avila and Morro Bay combined averaged 705. These numbers are probably an overestimate of the actual number of vessels within the harbors, as many retain licenses for more than one gear type or species. **Table 5.1** lists the average number of commercial licenses, by gear type, for the area's harbors.

Table 5.1. Annual average number of commercial fishing licenses in the six Santa Barbara Channel and Santa Maria Basin harbors, 1990-1999 (Source: California Department of Fish & Game 2000).

Port	Gear Type						
	Line Gear	Other Gear	Gill Net or Purse Seine	Pot or Trap	Troll	Trawl (all types)	Combined Average
Santa Barbara Channel Ports	203	433	150	180	28	92	1,086
Santa Maria Basin Ports	361	65	58	60	96	65	705
Total	564	498	208	240	124	157	1,791
Percent of Combined Average	31	28	12	13	7	9	100

These data indicate that Line Gear-licensed vessels make up the largest average percentage, with Other Gear being the second most common type of commercial license. Annual variations in the number of vessels licensed for each gear type are common (i.e., troll licenses for Santa Maria Basin harbors ranged from 2 in 1992 to 225 in 1997, and in Santa Barbara Harbor from 0 in 1992 to 56 in 1995).

Bottom-founded deepwater commercial fishing activities would most likely be by trawl or set net (included in the Gill Net or Purse Seine category above), although some line gear could focus on deepwater rockfish species in the aforementioned canyons in the western Santa Barbara Channel.

Exploration/Production Activities

According to the Interagency Decommissioning Working Group (IDWG), there are 33 oil facilities offshore California; 10 are in state waters (inshore of the 3-mile limit). Within the Santa Barbara Channel/Santa Maria Basin, 11 platforms and one production island are present. Six of these facilities are in water depths of 200 m or more. Four of the deepwater platforms, *Gail, Hondo, Harmony*, and *Heritage*, are in the Santa Barbara Channel, and two, *Hidalgo* and *Harvest*, are due west of Pt. Conception in the western Santa Barbara Channel/southern Santa Maria Basin (see **Figure 5.1**).

Data Sources and Fisheries Organizations

Santa Barbara County Contingency Fund. To augment the Federal Contingency Fund (FCF), Santa Barbara County (SBC) established the Local Contingency Fund (LCF) to assist fishers in compensation for gear damage or loss within the 3-mile limit. Claims forwarded to the SBC under this program provide much of the database for assessing historical conflicts between commercial fishing and offshore oil and gas operations in this area discussed below.

Assisted by the Joint Oil/Fisheries Liaison Office (Santa Barbara) and funded through payments by the offshore developers, the LCF provides interest-free grants for claims within state waters and/or loans for replacement of gear lost or damaged in federal waters. The “federal water loan” is to be paid back to the LCF when the fisher is reimbursed through the FCF. Thus, the LCF compliments the FCF by providing funds that allow the fisher to replace lost or damaged gear relatively expeditiously. SBC utilizes a subcontracted insurance/claims adjuster company to facilitate payment and to track claims. The LCF initially established a $200,000 account (based on the estimated 40 claims per year and a maximum payment of $5,000 per claim), renewable each year.

The County LCF provides assistance for claims in the marine waters within the SBC boundaries, which extend from the Santa Maria River on the north to the City of Carpinteria on the south, including the northern Channel Islands. To date, neither Ventura County to the south nor San Luis Obispo County to the north have an LCF.

SBC records each claim and then forwards each to a claims adjuster contractor who maintains a log of claims and pursues payment through the LCF. The claims that reach the SBC are those in which the fisher could either not identify or could not obtain compensation from the identified responsible party. While the SBC maintains a list of submitted claims, details on each claim are only available through the contracted claims adjuster.

National Marine Fisheries Service. Data from the NMFS Vessel and Gear Damage Compensation Fund included the listing of location, vessel type, and type of conflict. Records from 1989 through 1999 with locations within the Santa Barbara Channel/Santa Maria Basin were reviewed and are summarized in **Table 5.2**.

Table 5.2. Details on commercial fishing claims (1989-January 2000) from the Santa Barbara Channel/Santa Maria Basin study area (Source: Santa Barbara County 2000).

Year	Gear Type[1]/ Number of Claims	Cause[2]	Water Depth in Meters/Number of Claims
2000 (January only)	NR/1	MSC/1	>200/1
1999	TW/2	BUO/1, PIP/1	<200/2
1998	TW/6, TP/2	MSC/4, CAB/1, UNV/2, UNK/1, PIP/1	<200/8
1997	TW/9, TP/5, NR/1	UNK/4, PIP/2, MSC/3, UNV/4	<200/11 >200/4
1996	TW/3, PT/1	NR/4	<200/4
1995	TW/3, PT/1	MSC/1, NR/3	<200/2 >200/2
1994	TW/2, GN/1	MSC/2, UNK/1	<200/3
1993	TW/1	UNK/1	>200/1
1992	TW/6, GN/1	MSC/2, PIP/1, UNK/4	<200/7
1991	TW/4	NR/2, UNK/1, PLA/1	<200/4
1990	LL/1, TP/1	NR/1, PLA/1	<200/2
1989	TW/9, GN/2	UNK/9, FIX/2	<200/5 >200/6
Total	NR/2, TW/45, GN/4, TP/10	MSC/13, BUO/1, CAB/1, PIP/5, PLA/1, UNK/21, UNV/6	<200/48 >200/14

[1] Gear: TW (Trawl), GN (Gill Net), PT/TP (Pot/Trap), and LL (Long-line), NR (Not Recorded).

[2] Cause: UNK (Unknown), FIX (Fixed Object), MSC (Miscellaneous), PLA (Platform), PIP (Pipeline), CAB (Cables), UNV (Unidentified Vessel), BUO (Buoy), NR (Not Recorded).

Historical Conflicts

From 1988, when the LCF was instituted, through July 1999 a total of 83 claims have been submitted to the SBC; from July 1999 through January 2000, two additional claims have been received (Pfiffer, pers. comm.) **Table 5.3** lists the number of claims by year.

Table 5.3. Number of fisheries claims through the Santa Barbara County Local Contingency Fund (Source: Santa Barbara County 2000).

Year[1]	Number of Claims
1999-January 2000	2
1998-1999	7
1997-1998	14
1996-1997	2
1995-1996	4
1994-1995	6
1993-1994	14
1992-1993	10
1991-1992	8
1990-1991	12
1989-1990	6

[1]Year is from July through July.

SBC logs each entry, but does not maintain information on location for each claim; individual claims are forwarded to the aforementioned claims adjuster contractor. Due to a flood at that contractor's offices, many of the earlier detailed claim records were destroyed. Twenty-two detailed records, 1 in 1994 and 21 from 1997 through January 2000, were reviewed, and information in those records were used to characterize the recent conflicts within the Santa Barbara Channel/Santa Maria Basin.

Table 5.4 lists all claims recorded from 1989 through January 2000; this list combines entries from the SBC claims contractor and the NMFS Contingency Fund (six claims were submitted to both sources).

In many cases, the number of claims for each year in **Table 5.4** are lower than those listed in **Table 5.3**. Since location information was not available from the LCF list and with the loss of much of the data from the claims contractor, the numbers in **Table 5.4** are most likely an underestimate of annual entries, except from 1997 through 1999 where both sources provided location data. Raw data from the two sources are provided in **Appendix A**.

Table 5.2 lists the 62 claims that have information on location, gear type, water depth, and, where available, the cause for the claim.

Table 5.4. Commercial fishing claims (1989-January 2000) from the Santa Barbara Channel/Santa Maria Basin study area (Source: Santa Barbara County 2000).

Year	Number of Claims
January 2000	1
1999	2
1998	8
1997	15
1996	4
1995	4
1994	3
1993	1
1992	7
1991	4
1990	2
1989	11
Total	62

Discussion

Typical of the fishing areas within the study area, 80 percent (48 of 62) of the claims were in water depths of less than 200 m, where most of the commercial fishing, particularly in the Santa Barbara Channel, occurs. The distribution of the claims by gear type, however, is not consistent with the number of commercially licensed fishing vessels in the area. Trawlers, which from 1990 through 1999 comprise an average of 9 percent of the registered vessels at the five major area ports (see **Table 5.1**), accounted for almost 73 percent (45 of 62) of the claims. Conversely, Line Gear, comprising hook and line, and long-line, comprises an annual average of 31 percent of commercial fishing vessels, but had no claims during the period.

As shown in **Table 5.2**, unknown (UNK) causes accounted for almost 34 percent (21 of 62) of the claims, followed by miscellaneous (MSC), which including damage from seafloor debris and "mudding" of trawl nets, with 21 percent (13 of 62). Losses or damage to gear from oil field vessels accounted for 6 of the 62 claims (approximately 10 percent), but were the cause of most of the claims for trap and pot gear.

Existing Mitigation Measures

In addition to the SBC compensation fund, the presence of the Joint Oil/Fisheries Liaison Office (Joint Office), and the California Environmental Quality Act (CEQA) that requires mitigations for potentially significant impacts for offshore operations, several other mitigations are in place. The Joint Office has developed several mitigations that are applied to all aspects of offshore oil activities. The SBC has adopted a consolidation concept that is designed to reduce the number of coastal and onshore oil facilities, including refineries, loading facilities, and supply piers. That consolidation has also resulted in the establishment of vessel traffic corridors that are specified zones that oil-related supply and crew vessels are expected to remain within while in transit from shore to platform or vice versa. While "voluntary" in nature, the corridors were developed through cooperative agreement between the fishing and oil/gas industries. Compensation is usually not available for gear damage that occurs within those corridors if the vessel was within the prescribed corridor when the conflict occurred. In addition to these measures, Coast Guard safety zones have been established around several platforms off southern California.

In the 1980's, the Joint Fisheries/Oil Liaison Office was established by the California/Coastal Operators Group (C/COG), an oil industry committee comprising representatives from the offshore operators. Joint Committee members comprise representatives of the fishing and oil industries, and the committee is directed by the Fisheries Liaison Officer. Located in Santa Barbara, the Joint Committee is a forum for dissemination of relevant information, a source of funding for research studies on issues of mutual interest, and it provides claims assistance to fishers. It has been instrumental in developing mitigations to reduce offshore impacts to the fishing industry and also performs lobbying for fishing interests throughout the state.

The following is a list of some additional mitigation measures that are utilized within the offshore waters of SBC, some of which were developed through the Joint Committee.

- Seismic Operations: A Notice to Fishers is posted in Harbor Master's office of the four major fishing ports of SBC specifying the location and duration of the proposed survey, and the vessel name and call sign. The format of the notice is similar to the U.S. Coast Guard's Local Notice to Mariners. Postings are required to be in place 2 weeks prior to scheduled operations. (Note: Other non-permanent offshore activities also require noticing at the specified ports).

- Exploration Activities: a) A fisheries monitor is contracted to be onsite during drilling and to warn drift net fishers and trawlers of location of rig anchors. b) Compensation is available for areal preclusion during drilling if the fisher can prove he has utilized the area within a specified period of time and can provide "fish tickets" to show the value of his catch. c) Rig anchors are placed in accordance with an approved anchoring plan and anchors are lifted vertically to reduce the chance of seafloor disturbance (i.e., anchor scars or trenches). d) A side-scan sonar survey, designed to identify and locate seafloor debris and anchor scars, is conducted following removal of the exploration drilling rig. Debris is removed and anchor scars are smoothed. A trawl test may be completed to assure site clearance.

- Production Activities: Exploration-related mitigations c) and d) are completed for production activities. In addition, production-related mitigations include: a) Compensation is provided for the "permanent" loss to those fishers who can provide proof of use of the area.

- Abandonment: a) Similar to Exploration and Production mitigations, side-scan sonar surveys and test trawls around the abandoned structure following removal. b) The recently-completed removal of four platforms in the Santa Barbara Channel resulted in debris mounds (shell mounds) located directly below the platforms being left in place. To reduce the chance of trawlers snagging on these features, the responsible oil company provided some trawlers with state-of-the-art differential GPS systems that included the locations of the shell mounds. Ongoing negotiations could result in those trawlers also being provided a "net locator system" designed to locate the trawl net offset from the fishing vessel and to further reduce chances of gear damage due to snagging. No "net locators" have been provided to date. c) All abandonment personnel are to attend fisheries training that utilizes the Western States Petroleum Association Fisheries Training Program. d) Removal shall include the cutting of platform legs and conductors to the specified depth below the natural seafloor to reduce the chances of snagging trawl nets.

5.1.1.2 Gulf of Mexico

The recent history of interactions between the oil and gas and fisheries industries in the Gulf of Mexico was also evaluated by examining the FCF files. The FCF processes gear loss claims made in federal waters of the Gulf of Mexico. The number of claims made from 1989 to 1999 is given in **Table 5.5**. There is a decreasing trend in the number of claims logged over the 11-year period, ranging from a high of 214 in 1989 to a low of 58 in 1999.

Table 5.5. Number of claims filed to the National Marine Fisheries Service Federal Contingency Fund (FCF), 1989 to 1999 (Source: FCF 2000).

Year	Number of Claims
1989	214
1990	204
1991	110
1992	103
1993	126
1994	114
1995	79
1996	71
1997	86
1998	68
1999	58

During this period of record, Gulf of Mexico fishers filed an average of 112 claims per year. A total of 1,233 claims was logged, and the locations of 884 of these for which positions were available were plotted (**Figure 5.2**). Only 10 of these claims (<1 percent) were in water depths greater than 200 m. The gear types responsible for these claims are provided in **Table 5.6**. Bottom trawl was by far the most common gear type involved, accounting for 93 percent of the claims. Gill net and longline accounted for the next highest number of claims, but these were small (1.2 and 0.9 percent, respectively) compared to bottom trawling. This is consistent with the number of vessels trawling as opposed to other kinds of fishing in shelf waters. Also, bottom trawling is most susceptible to hanging on bottom founded structures, hence most of the claims were for pipelines, cables, and other debris. There were seven claims during the period involving longline gear (**Figure 5.2**).

Table 5.6. Details on commercial fishing claims (1989 to 1999) from the Gulf of Mexico.

Year	Gear Type[1]	Cause[2]
1989	GN/10, LL/3, TP/1, TW/196,	BUO/5, CAB/2, FIX/2, MSC/2, PIP/6, PLA/1, PPP/2, SHP/1, SSV/1, UNK/182, UNV/1, WEL/3
1990	GN/2, LL/3, TP/2, TR/1, TW/190	BUO/10, CAB/4, DOV/1, FIX/1, MSC/7, PID/5, PIP/26, PLA/8, PLS/1, PPP/2, UNK/129, WEL/4
1991	LL/1, TW/108,	BUO/1, CAB/1, CAP/1, PIP/12, PLA/3, PPP/1, UNK/74, WEL/1
1992	GN/1, TW/101	BUO/1, BUY/1, CAB/2, CAP/1, DOV/1, MSC/6, PIP/12, PLA/2, PPP/1, ROP/1, RPE/1, UNK/70, WEL/2
1993	LL/1, TW/121	BUO/3, CAB/3, MSC/9, PIP/1, UNK/87, WEL/3
1994	GN/1, LL/1, TW/107	BUO/1, CAB/5, MSC/3, PIP/12, PLA/2, PPP/1, UNK/87, WEL/1
1995	LL/1, PS/1, TW/76	CAB/1, MSC/2, PIP/7, PLA/1, PPP/1, UNK/29
1996	PT/1, TW/68	
1997	LL/1, TW/76	BUO/1, CAB/1, MSC/4, PIP/7, PLA/1, UNK/37, UNV/1, WEL/1
1998	GN/1, PT/1, TW/65	BUO/1, CAB/1, FOV/1, MSC/3, PIP/12, PLA/1, PPF/1, UNV/2, UNK/44
1999	PS/2, TW/52	BAR/1, BUO/1, CAB/2, DOV/1, FIX/2, MSC/6, PIP/9, PLA/2, PPF/1, UNK/33

[1] Gear: GN (Gill Net), LL (Long-line), PT/TP (Pot/Trap), and TW (Trawl).

[2] Cause: BUO (Buoy)m, CAB (Cables), FIX (Fixed Object), MSC (Miscellaneous), NR (Not Recorded), PIP (Pipeline), PLA (Platform), UNV (Unidentified Vessel), and UNK (Unknown).

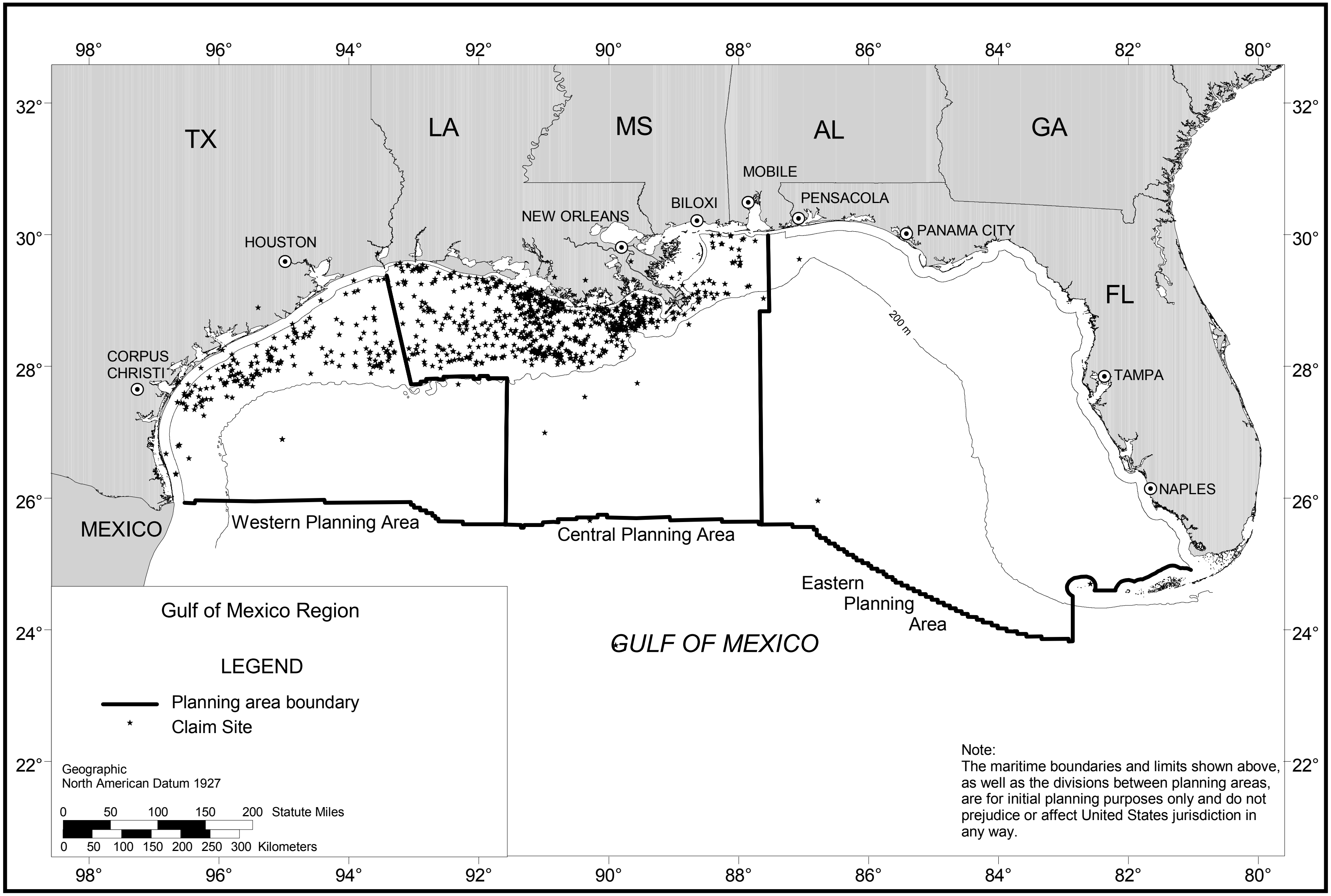

Figure 5.2. Location of claims filed to the Federal Contingency Fund in federal waters of the Gulf of Mexico.

Additional information on interactions in the Gulf of Mexico came from anecdotal and observational accounts. Sources included fishers, vessel owners, tuna buyers, independent researchers, and NMFS employees. These observers indicated that there have been interactions between bluewater fishers and deepwater oil and gas operations. The primary fishing gear type involved in these accounts has been pelagic longline set for tuna. The most common industry activity involved was geophysical surveying. Geophysical vessels tow long streamers (see **Section 4.4**), require considerable right-of-way before making turns, and are reluctant to yield ground while surveying. Unfortunately, few incidents have been formally documented. One incident involving a longline vessel and a geophysical boat with Dr. Barbara Block of Stanford University (pers. comm. 2000) who had chartered a commercial longline vessel to tag tunas for a migratory research project. Steve Loga (pers. comm. 2000), a seafood dealer with Tuna Fresh in Dulac, Louisiana, indicated that at least 1 in 10 boats that he deals with loses gear to a geophysical vessel during every 2-week fishing trip they make. He did not have any documented incidents to relay. Vessel owners began complaining about this over 10 years ago, according to vessel owner Fred Johnson (pers. comm. 2000) of Bayou LaBatre, Alabama. Many of the boat owners are Vietnamese-American, thus radio communication between survey vessels has been a problem. From the geophysical industry (see **Section 4.4**), the marine operations manager for the International Association of Geophysical Contractors, David Crockett (pers. comm. 2000), confirmed that interactions with drifting longlines was a problem during deepwater geophysical surveys. He mentioned that longliners had adapted to the presence of geophysical survey vessels. Some had been observed cutting floats to the mainline, allowing it to sink below the underwater gear of the vessel to avoid loss of gear. Others fishers were observed cutting the mainline portion of the longline that was in the path of survey vessel, to allow the vessel to pass without snagging the line. Once the survey vessel was by the line, they rejoined the cut portion. Not all interactions involving longlines have been with geophysical vessels. In January 1999 a portion of a pelagic longline snagged on the acoustic Doppler current profiler of a dynamically positioned drill ship working in the eastern Gulf. The line was removed without incident.

Existing Mitigation

In the Gulf of Mexico, mitigation measures in place include the NMFS contingency fund and the State of Louisiana's contingency fund. The NMFS contingency fund compensates fishers for gear loss in federal waters. When gear is lost due to a seafloor obstruction, fishers file a claim that includes the coordinates of the obstruction. These coordinates are then entered into a database that compiles all such obstructions. This obstruction database is made available to fishers and future claims made for an existing obstruction are not accepted. An example of the standard claim form used for the NMFS contingency fund is provided in **Appendix B**.

U.S. Coast Guard safety zones established in accordance with the Ports and Waterways Safety Act also stand as existing mitigation between fishing and offshore oil and gas structures in the Gulf of Mexico. The Coast Guard (33 CFR 165.20) defines a safety zone as "a water area, shore area, or water and shore area to which, for safety or environmental purposes, access is limited to authorized persons, vehicles, or vessels. It may be stationary and described by fixed limits or it may be described as a zone around a vessel in motion."

The U.S. Coast Guard has established safety zones for the protection of vessels and structures inside of 12 nmi from shore as determined in accordance with international law. These laws include 33 CFR 160.5 and 33 CFR 165 subpart C. More recently a law known as the OCS Activities Law (33 CFR 147) was formulated when Shell Offshore requested that the U.S. Coast Guard establish safety zones around seven of its platforms due to heavy ship traffic in the vicinity of these platforms and safety concerns for the personnel on board the platforms as well as the surrounding environment. Six of the seven platforms (Auger, Boxer, Bullwinkle, Mars, Ram-Powell, and Ursa) are in deepwater; details such as location, water depth, and structure types are given in **Table 4.4**. The seventh platform, West Delta 143, does not meet the deepwater requirements, but its exposed location adjacent to a safety fairway and volume of throughput necessitated its inclusion. The definition of deepwaters in the Gulf of Mexico encompasses the area from 305-m water depths to the limits of the Exclusive Economic Zone. Navigation in the area of the safety zones includes commerical and recreational fishing vessels. The area also includes the system of traffic separation schemes developed to maintain safe shipping routes. The law 33 CFR 147 states that each platform has a safety zone of 500 m from each point on the structure's outer edge. Vessels less than 33.3 m long are exempt unless they are under tow, or in the case of the Auger platform, fishing. Safety zones (500-m) are also established around two mooring buoys associated with the Mars platform. Vessels exceeding 33.3 m other than tankers or support vessels should not enter the safety zone without clearance from the Vessel Traffic Supervisor. Additional safety zones have been requested by operators of the following platforms: Allegheny, Brutus, Enchilada, Exxon Mobile Hoover, Genesis, and Sir Douglas Morpeth.

5.1.2 International Conflicts

International experience with interactions between fisheries and oil and gas operations was sought from a variety of locales. Initial contacts were made to Maylasia, Indonesia, Australia, Western Africa, Canada, and the United Kingdom. Of these, Canada, Nova Scotia, Australia, and New Guinea responded with information. In many areas it appears that interactions may be occurring but individual fishers deal directly with the operators to resolve claims, therefore there is no official agency to record and archive these claims.

5.1.2.1 Nova Scotia/Newfoundland

Introduction

The Scotian Shelf includes the ocean area south of the island of Nova Scotia that comprises a series of banks from Brown’s Bank to the west to St. Pierre Bank to the east. The southern edge of the shelf drops precipitously and the deeper-water Laurentian Channel bisects the shelf in a north-south direction near the eastern boundary of the region. “The Gully,” a deep-water area near the middle of the study area, bounds the eastern side of Sable Island Bank (see **Figure 5.3**). Most of the offshore exploration and

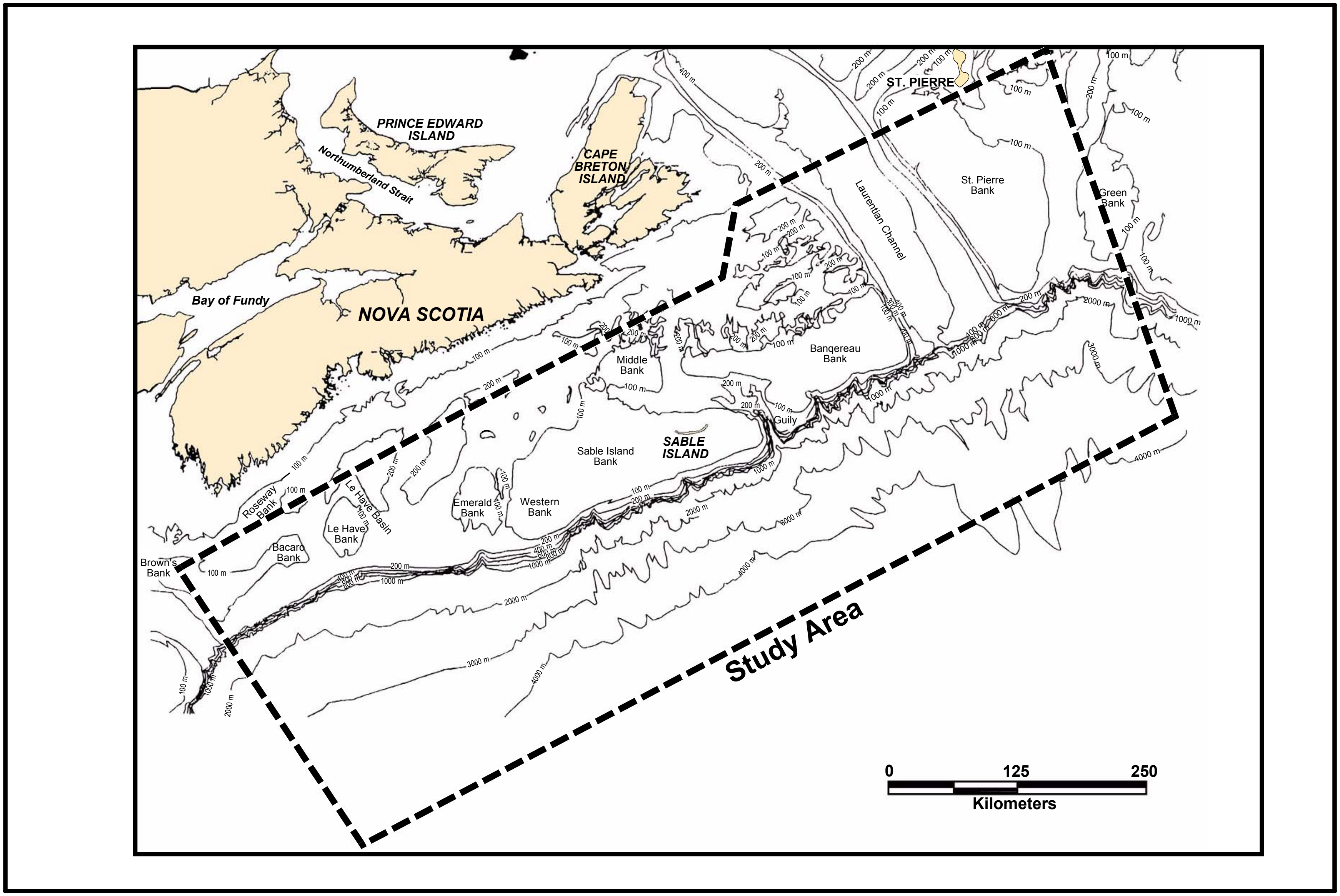

Figure 5.3. Nova Scotia and western Newfoundland study area.

production activities in this area have occurred along the southernmost edge of the Scotian Shelf, while the commercial fishing activities occur throughout the area. Seasonal variations in commercial fishing activities are apparent, with deeper areas generally targeted during the summer months (LGL Limited 1999). The major oil production activity is centered in the Sable Island Area, approximately 193 km southeast of the coastal town of Goldboro, Nova Scotia. **Figure 5.4** shows the onshore and offshore oil and gas fields within the area.

The area of the Newfoundland offshore included in this analysis comprises a 386 km-wide shelf upon which is located the single oil-producing platform, *Hibernia* (approximately 290 km east-southeast of the city of St. Johns).

Location

The area discussed in this section includes ocean waters offshore Nova Scotia and southwestern Newfoundland, extending from the western tip of Nova Scotia and the ocean waters south of Newfoundland to offshore approximately 593 km (see **Figure 5.3**). The area supports demersal and water-column commercial fishing activities; descriptions of the fishing activities are taken from LGL Limited (1999).

Water Depths

Water depths of the Scotian Shelf range up to 3,962 m; a variety of seafloor habitats exist within the study area. Rocky habitats are most common in the nearshore area, replaced by a mixture of sand around the Sable Island and Middle Banks, finer grain sediments on the slopes of most of the banks, and silt and clay in the basins south of Cape Breton Island (the easternmost portion of Nova Scotia). Gravel, pebble, and cobble habitats have been reported on parts of Canso Bank and in the shallower waters of the Scotian Shelf (LGL Limited 1999).

Water depths on the Newfoundland shelf range up to approximately 1,981 m. The seafloor habitats include rock and sand around St. Pierre and Green Banks to silty-sand in the water depths in excess of 91 m (LGL Limited 1999).

Types of Resources

LGL Limited (1999) provides an overview of the commercial fisheries of the Scotian and western Newfoundland shelves and provides catch data for the region from 1993 through 1997. The following is a summary of that discussion, characterizing the major invertebrate and fish resources of commercial interest.

At least 11 invertebrate and 31 fish taxa are listed by LGL Limited (1999) as commercially important in its summary of the catch statistics for the aforementioned five-year period for the Scotian Shelf and Laurentian Channel areas. LGL Limited (1999) compiled a list of the most abundant taxa by calculating the catch for those taxa that contributed at least 1 percent of the total value for the period 1993 through 1997. The 10 taxa with the greatest annual average catch for that period were herring

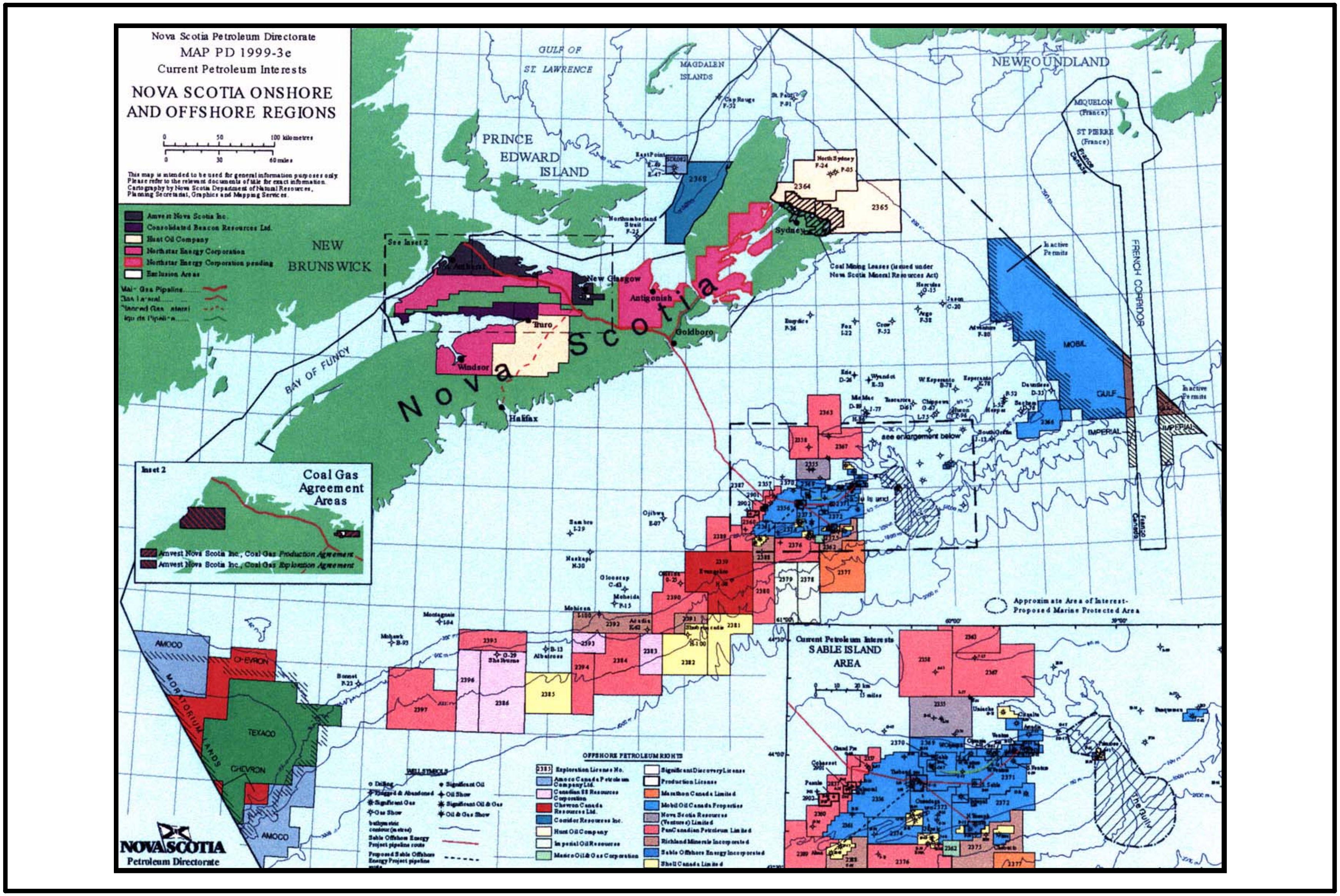

Figure 5.4. Nova Scotia and western Newfoundland oil and gas development.

(annual mean = 14,700 tons), redfish (genus *Sebastes* spp., 11,100 tons), scallops (9,500 tons), lobster (7,500 tons), Atlantic cod (6,700 tons), pollock (5,700 tons), mackerel (5,600 tons), surf clams (4,400 tons), haddock (3,600 tons), and northern shrimp (2,800 tons). Target depths for most of these taxa range from approximately 91 to 914 m, with shallower areas usually fished in the summer.

LGL Limited (1999), citing Mahon's 1997 cluster analyses, also lists six demersal fish groups and locates prime fishing areas for each within the Scotian Shelf/Laurentian Channel area. That analysis indicates that deepwater groups include spiny dogfish, pollock, grenadier, and redfish. Pollock are caught in water depths of from 91 to 914 m with trawls, gill nets, and long lines, while redfish are targeted from 91 to 1,829 m with both bottom and mid-water trawls. Primary fishing areas for pollock and redfish are around Roseway, Le Have, and Bacaro Banks, along the southern (deepwater) edge of the Scotian Shelf, in the "Gully," and along the eastern portion of the Laurentian Channel.

The commercial catch off Newfoundland differs somewhat from that on the Scotian Shelf, comprising fewer taxa and lower annual average catch. The nine most abundant commercial taxa on the Newfoundland study area from 1993 through 1997 were: Atlantic cod (annual mean = 8,000 tons), redfish (7,400 tons), snow crab (5,100 tons), lumpfish roe (2,100 tons), lobster (1,600 tons), sole and scallops (each = 900 tons), skate (600 tons), and Greenland halibut (400 tons).

Types of Fishing

LGL Limited (1999) lists 16 "deepwater" commercial taxa, including two invertebrates and 14 finfish that are targeted within the area described above. **Table 5.7** lists those taxa, the water depths in which they are caught, and the predominant gear type for each. D'Entremont (pers. comm. 1999) stated that deepwater fishing off Nova Scotia targets tuna, silver hake, swordfish, and to a lesser degree halibut and crab.

Exploration/Production Activities

Burley (pers. comm. 1999-2000), indicated that approximately 160 offshore wells had been drilled in the Nova Scotia/Newfoundland area since the 1960's. Of those, only six were in water depths of 183 m or more. Seismic surveys continue throughout the area, particularly in the deepwater portions of the Scotian Shelf. The area supports two production platforms, one within the Hibernia Field off Newfoundland and the other within the Sable Field off Nova Scotia (S. Canning, pers. comm. 2001). The Hibernia area, located in approximately 94 m of water, includes several fields, some of which either have exploration platforms or have reported significant finds. Future developments in the White Rose, Hebron/Ben Nevis, and Terra Nova Fields are planned.

Table 5.7. Deepwater (≥200 m) commercial fishing resources of Nova Scotia and Newfoundland (Source: LGL Limited 1999).

Scientific Name	Common Name	Depth Range Caught (m)	Gear Type(s)
Homarus americanus	Atlantic lobster	100-1,000	Trap, trawl
Pandalus borealis	Northern shrimp	150-200	Trap, trawl
Brosme brosme	Cusk	<100-1,000	Longline
Gadus morhue	Atlantic cod	100-1,000	Trawl
Glyptocephalus cynoglossus	Sole	<100-1,000	Trawl
Hippoglossoides platessoides	Plaice	100-1,000	Trawl
Hippoglossus hippoblosus	Halibut	100-1,500 (most 200-500)	Linguine, trawl
Lamna nasus	Porbeagle shark	100-3,000 (pelagic)	Linguine
Melanogrammus aeglefinus	Haddock	100-1,000	Trawl
Pollachius virens	Pollock	100-1,000	Trawl, gillnet, longline
Raja spp.	Skate	<100-1,100	Trawl
Sebastes spp.	Redfish	100-2,000	Trawl (bottom and mid-water)
Thunnus albacares	Yellowfin tuna	100->4,000 (pelagic)	Longline
T. obesus	Bigeye tuna	200->4,000 (pelagic)	Longline
Urophycis tenuis	White hake	100-1,500	Longline, trawl (shallow only)
Xiphias gladius	Swordfish	200->4,000 (pelagic)	Harpoon

Data Sources and Fisheries Organizations

Sources of data on the existing commercial fishing activities and conflicts included three government/industry agencies that fund various programs to identify fishing areas, assist fishers by noticing upcoming offshore oil industry activities, and compensate gear losses that are not attributable to an offshore operator. A summary of the programs and compensation application forms is provided in the Canadian Association of Petroleum Producers' (CAPP) brochure (see **Appendix C**).

The Canadian Association of Petroleum Producers (CAPP)

CAPP maintains a gear and vessel compensation program designed to receive, process, and pay claims submitted by commercial fishers who are unable to identify a responsible party. Known as the Non-Attributable Gear and Vessel Damage Fund, CAPP has developed this program as an alternative to making a claim through the Canadian Court System, thus expediting the claim and reducing costs to the fisher. Under this program, claims up to $1 million can be made for loss or damage to gear, including vessels, that are a direct result of oil and gas-related activities (seismic, development, production, and decommissioning). If an offshore operator does not have an established claim program, the CAPP Non-Attributable Fund can be used to process an attributable claim.

Canada-Nova Scotia Offshore Petroleum Board (CNSOPB)

The CNSOPB established a Fisheries and Environmental Committee in 1995 to respond to fisheries-related problems associated with an increase in offshore activity and to effect the mandate of the 1986 Canadian-Nova Scotia Offshore Petroleum Resources Accord. The Terms of Reference (TOR) for this committee were developed in 1999. Those TORs focused on the provision of a forum through which oil and gas and fisheries industries could exchange ideas and facilitate better communication between the two industries.

The CNSOPB has developed technical documents that describe a “screening approach” to the assessment of fisheries-related impacts from seismic exploration and that suggest mitigations and operating conditions. The Screening Document for Seismic Exploration identified potential impact areas and resources, set up procedures for the screening process, and established “standard” mitigations for offshore seismic operations. Those mitigations, including closure periods and the prohibition of certain vessel discharges, were designed to augment those identified in project-specific environmental assessments that can be completed prior to larger-scale offshore operations. In addition, that agency has begun a similar approach to exploration drilling. While not maintaining specific records of conflicts, the CNSOPB does track conflicts between the two industries and has provided this study with a listing of recently-reported incidents offshore Nova Scotia decscribed below.

Canada-Newfoundland Offshore Petroleum Board (CNOPB)

Similar to the CNSOPB, this agency focuses on offshore environmental issues off Newfoundland. Like its Nova Scotia counterpart, it does not maintain a detailed list of fishing/oil and gas conflicts, but did provide this study with a summary of incidents that have occurred within the Newfoundland area over the past 10 years.

Historical Conflicts

Burley (pers. comm. 1999-2000) indicated that there have been no reported conflicts between commercial fishing and drilling or production platforms off Newfoundland. Since 1991, however, 20 incidents related to seismic operations have been recorded. **Table 5.8** lists those conflicts.

Table 5.8 Conflicts between fishing and seismic exploration offshore Newfoundland, Canada (1991-1999) (Source: Burley, pers. comm. 2000).

Year	Number of Incidents	Type of Incidents
1991	5	All between nearshore trawlers and fixed gear
1992	12	All between nearshore trawlers and fixed gear
1998	1	Fixed gear
1999	2	Reduced catch reported by trawler and one fixed gear incident

Murphy (pers. comm. 2001) indicated that most of the conflicts offshore Nova Scotia have been between seismic operations; six incidents have occurred over the past 3 years within that area. Those conflicts included interaction between seismic operations and swordfishers (Scotian Shelf, Laurentian Channel, and Grand Banks). A trawler working the Grand Banks area in 1999 reported reduced catch on the day following a seismic survey (Murphy, pers. comm. 2001).

Discussion

Canning (pers. comm. 2001), who has worked as a consultant to the CAPP in developing the non-attributable compensation plan and with several offshore operators to develop fisheries compensation programs for attributable conflicts, indicates that most of the fisheries-oil and gas conflicts have occurred within the exploration areas of the Grand Banks and Scotian Shelf. Because only three projects currently exist within the 800 square mile area, all reported fisheries conflicts have been attributable to one of the operators. According to Canning, to date, no claims have been submitted to CAPP under the non-attributable program.

In addition to the Canadian environmental requirements and project-specific mitigations attached to permits issued for each operation, offshore operators have compensation programs and have established various measures to reduce or eliminate potential conflicts with fishers. Canning stated that "…90 to 95 percent of the conflicts occur between floating gear and seismic operations…". The gear types included in those conflicts included nets and longlines, targeting swordfish and tuna. Fixed gear, including lobster and crab pots, usually fish in water depths less than 200 m, although some trapping does occur in deeper water. Conflicts with fixed gear usually are caused when seismic vessels survey areas where traps are "dense" and no notification of the proposed survey was communicated to the fishers.

Existing Mitigation Measures

All sources contacted during this study indicated that the key mitigation measure in reducing conflicts is *good communication*. The offshore operators and their contractors have adopted several methods of communicating future operations, either through the aforementioned committees or through CAPP.

Other mitigation measures that are currently in place within the Nova Scotia/Newfoundland areas are as follows:

- Planning seismic surveys in a leapfrog pattern by allowing gear to be moved into areas following completion of the survey and avoiding areas of fixed gear use;
- An onboard fisheries observer is present on seismic vessels (required in Nova Scotia);
- Provision of a toll-free phone number for fishers to use to obtain information on future offshore operations;
- Establishing a safety zone around all offshore operations. The size of the safety zones vary with the type of operation (e.g., the *Hibernia* platform has a 2.5 to 3.0 mile safety area, while exploration operations have a 488 m safety area);
- Seismic operations are pre-notified to the fishers at least 6 weeks in advance of the commencement of the survey; and
- Individual operator (attributable) compensation funds as well as the CAPP non-attributable compensation fund for repair and/or replacement of damaged gear and lost revenues.

5.1.2.2 United Kingdom/North Sea

Introduction

The North Sea has long been an important commercial fishing area, and in the 1970's became a major site for offshore oil and gas production. The area supports a variety of fisheries and has been the site of several conflicts between commercial fishing and oil and gas operations. In response to the increasing oil and gas exploration activities, the Fisheries and Offshore Oil Consultative Group (FOOCG) was created in 1974. Since that time, several other fishing/oil industry committees have been created, each with the primary purposes of 1) improving communications between the two industries and 2) providing both the oil and fishing industries with a forum through which they can resolve any interaction problems. FOOCG also provides fishers a source of compensation for damaged gear and lost resources, and for recommending mitigations to reduce the potential impacts of continuing oil and gas exploration and production.

The following discussion provides an overview of the existing resources within the area, a summary of historical conflicts between the two industries, and a listing of existing mitigation measures.

Location

For this study, the North Sea study area is defined as the marine waters bounded on the west by the eastern shoreline of England and Scotland, on the east by the western shorelines of Norway (to the city of Florö at approximately 61^0 40' N) and Denmark, including the northerly Tampen oil and gas fields. Because some gas field development has occurred in the Irish Sea, that water body has also been included in the discussions.

Water Depths

Deepwater areas 200 m exist immediately south of the southern tip of Norway, however the majority of the study area is within water depths of from 30 to 107 m; shallower-water banks (i.e., Dogger Bank and Indefatigable Banks) are present in the southwestern portion of the North Sea. The North and Irish Seas' continental shelves are very narrow, dropping to water depths of approximately 46 m within 1.6 to 3.2 km from shore.

Fisheries Resources

Based on the information provided by the United Kingdom Offshore Operators Association (UKOOA), the North Sea area supports both pelagic and demersal commercial fisheries. Principal resources sought by commercial fishers include pelagic taxa (mackerel and herring) and demersal species (cod, haddock, whiting, saithe, plaice, lemon sole, sole, Norway pout, blue whiting, sand eel, sprat, scallops, and nephrops [shrimp]). Lobster, crab, and whelks are also caught with commercial traps.

The distribution of these taxa is provided in a series of maps developed by the UK government, fishing organizations, and UKOOA (see **Figures 5.5** through **5.8**). These figures indicate that primary fishing and spawning grounds for commercially important taxa are found throughout the study area; particularly important (sensitive) demersal areas include a zone west of the Orkney Islands and north of the Shetland Islands, as well as nearshore areas along the central and at the southwest of the UK (**Figure 5.5**). Important fishing areas for pelagic taxa are also in the shallow waters within the English Channel (**Figure 5.6**). Shrimp trawling is concentrated in the nearshore waters of the northern Irish Sea and in the Sea of the Hebrides, along the northwest coastline of the UK (**Figure 5.7**). Combining all taxa, the areas north and west of the Orkney Islands and south and east of the Shetland Islands appear to be most heavily utilized for commercial fishing (**Figure 5.8**).

Types of Fishing

Rudd (pers. comm. 2000) provided a listing of fisheries conflicts within the study area and a key to the gear types involved. Based on that information, principal demersal fishing methods include bottom trawl, gill and trammel nets, and pots/traps. Mid-water and pelagic gear includes purse seine nets and mid-water trawls (which have all but superceded purse seine netting). **Figure 5.9** shows the static gear (pots and traps) use

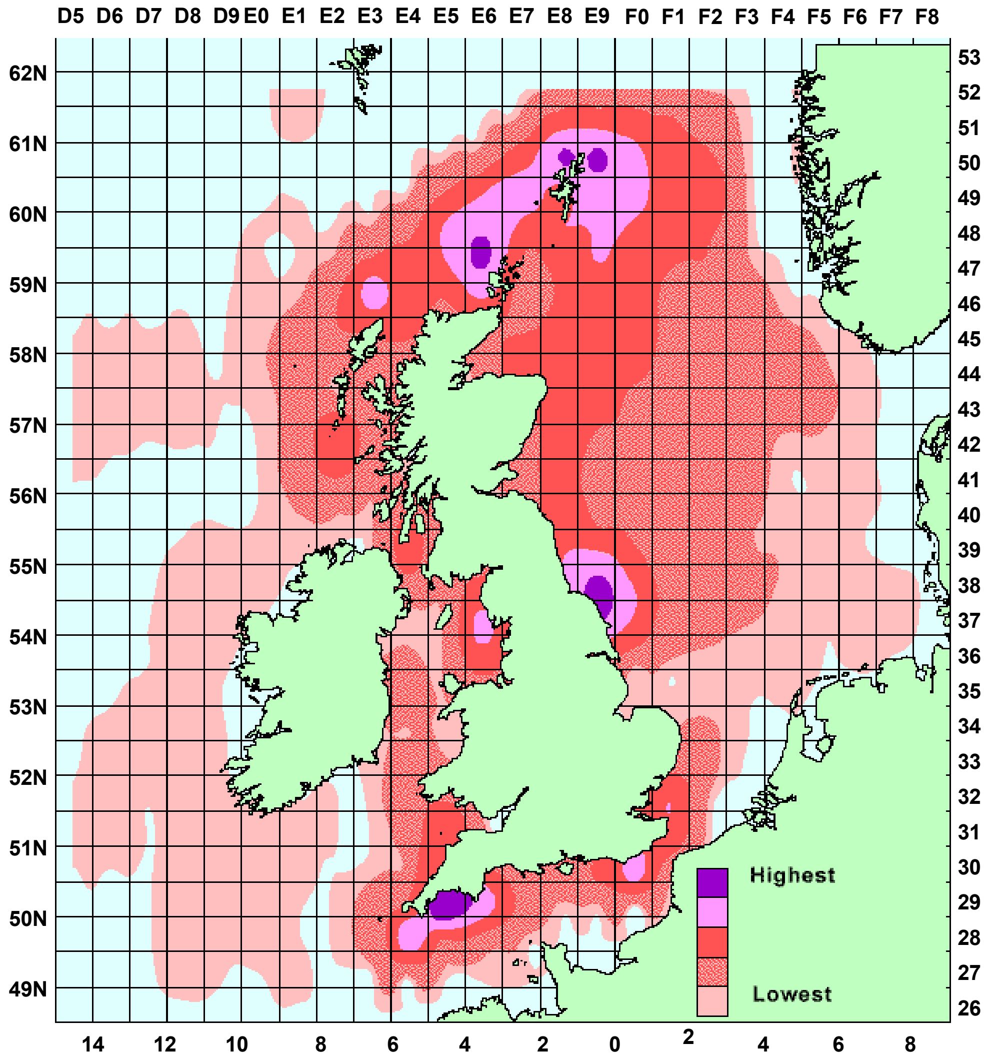

Figure 5.5. Important fishing areas for demersal fish species in British North Sea waters.

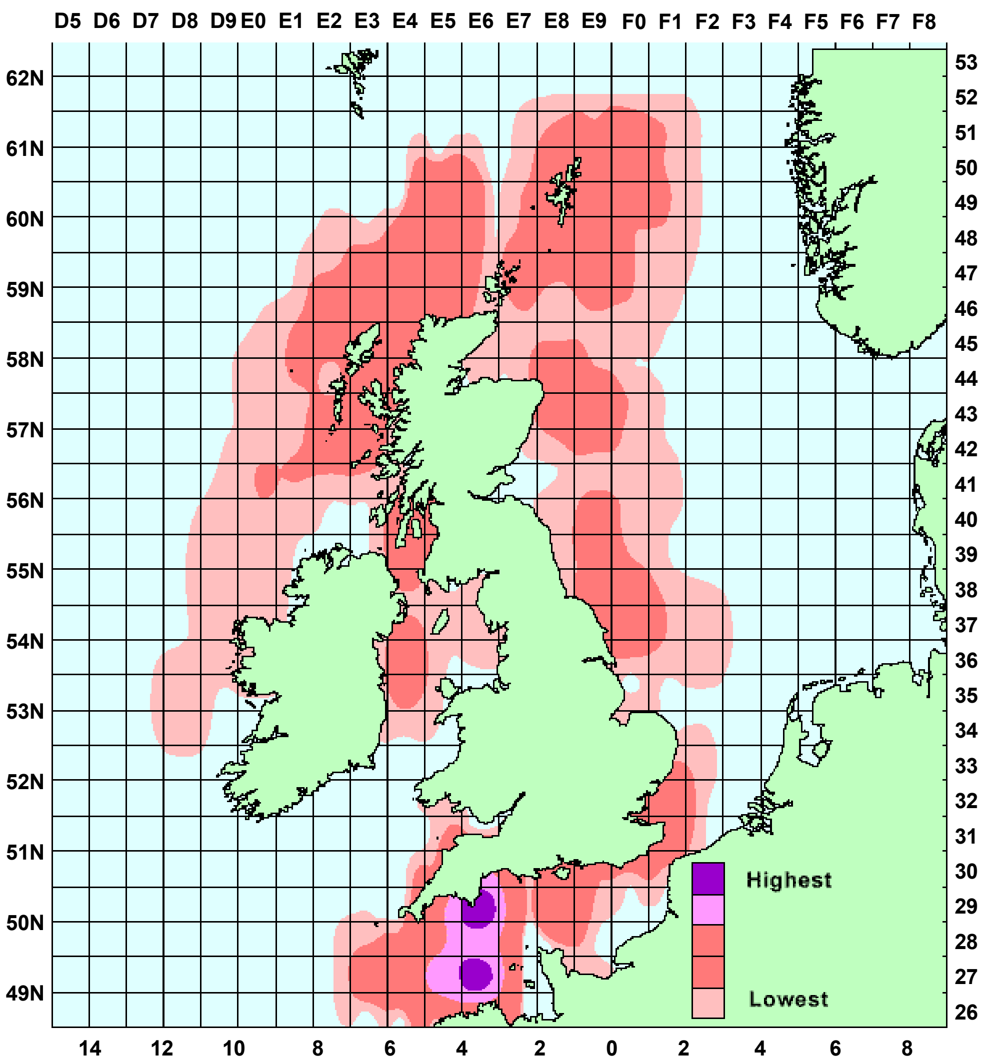

Figure 5.6. Important fishing areas for pelagic fish species in British North Sea waters.

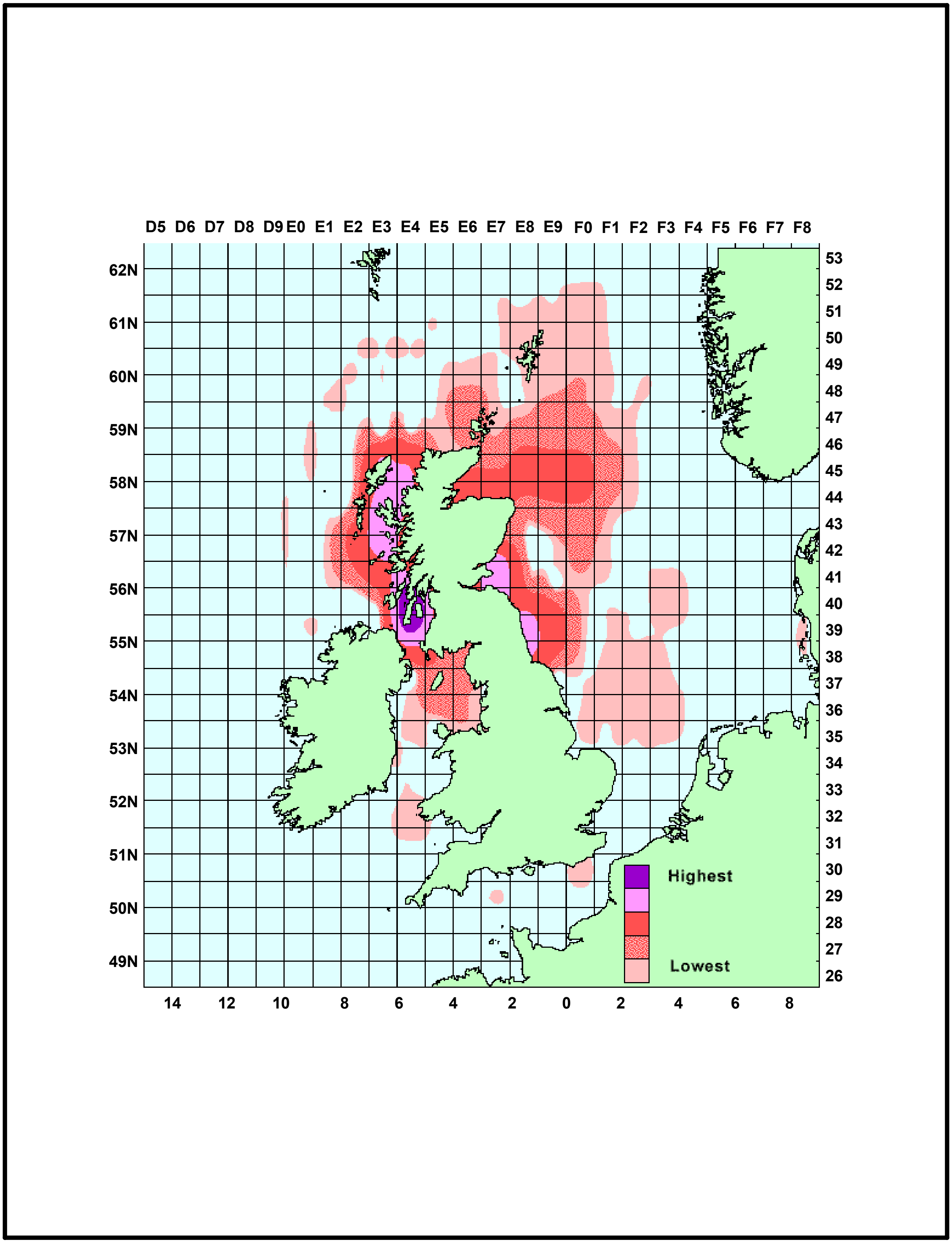

Figure 5.7. Important fishing areas for shrimp trawlers in British North Sea waters.

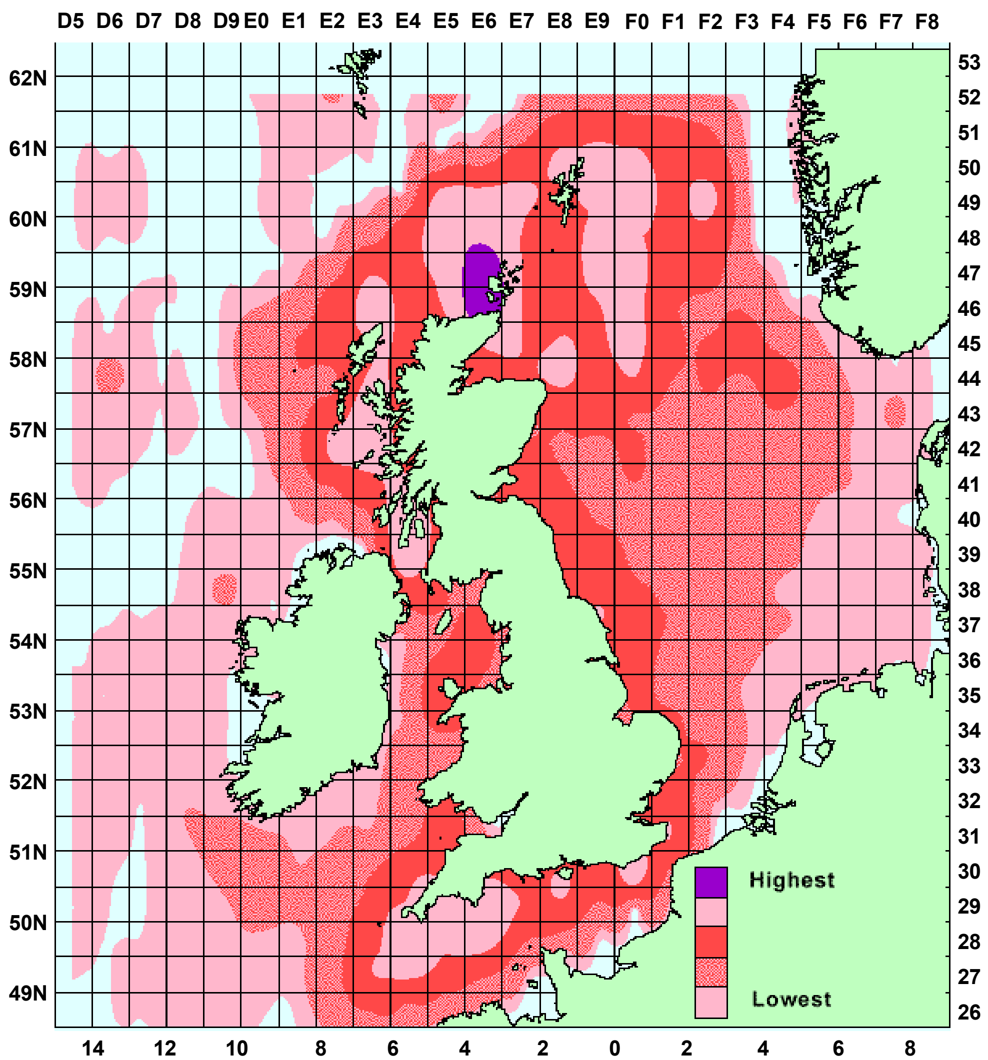

Figure 5.8. Distribution of fisheries based on relative value for all species targeted in British North Sea waters.

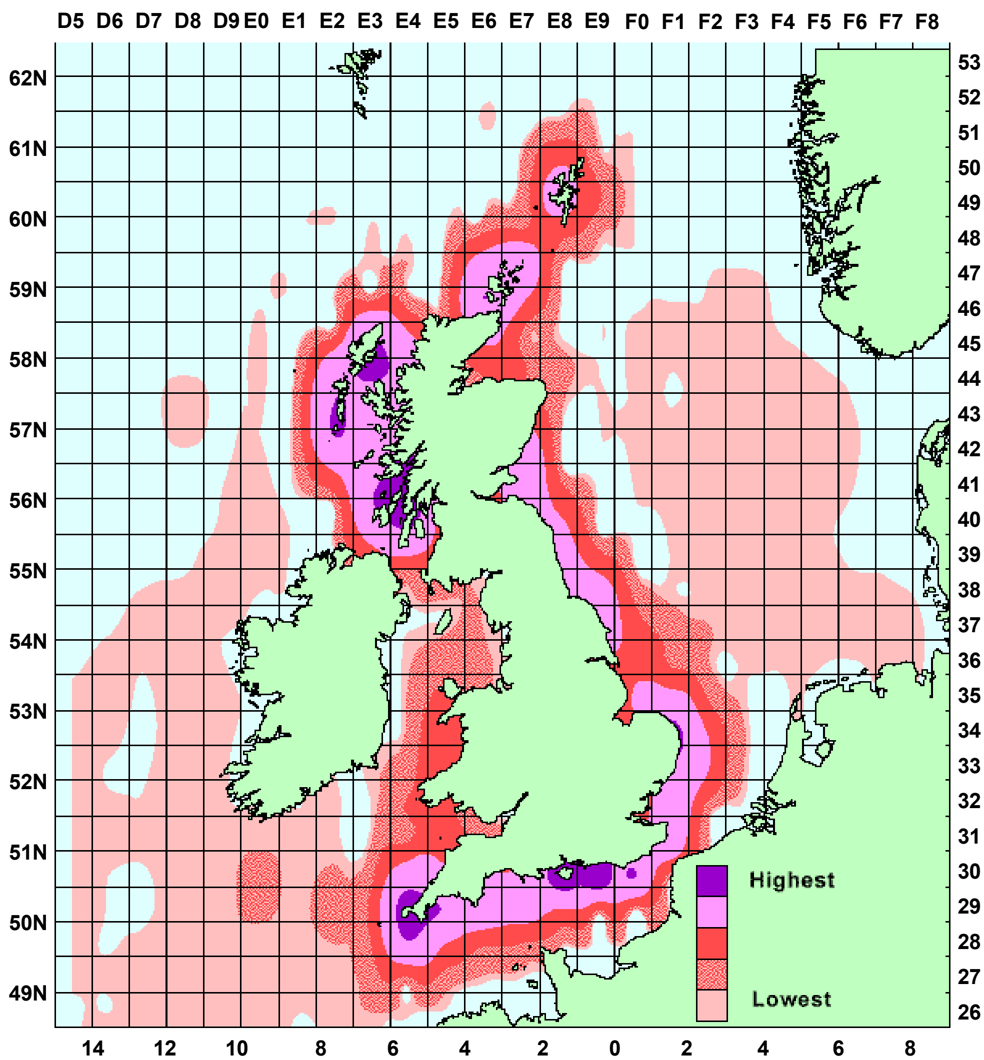

Figure 5.9. Important fishing areas for static gear in British North Sea waters.

within the study area. That figure indicates that static gear use is concentrated in the nearshore areas (water depths of approximately 91 m of less) around the UK.

Assuming the aforementioned conflict data as indicative of the relative usage of each gear type, **Table 5.9** shows the percentage of effort by gear type within the study area.

Table 5.9. Commercial fishing utilization by gear type[1] (1989-2000) (Source: D. Rudd, pers. comm. 2000).

Gear Type	Percentage of Claims
Bottom Trawl	38%
Seine	8%
Pelagic Trawl	<1%
Fixed Nets	<1%
Pots	1%
Scallop Dredge	<1%
Unknown[2]	53%

[1] Percentage based on number of reported conflicts for the period and may not reflect the actual percentage of use within the study area.
[2] No gear type recorded in claim.

Even without eliminating the number of incidents where no gear type was recorded ("Unknown" in **Table 5.9**), it is obvious that bottom trawling accounts for the largest percentage of the activities that have had recorded incidents and, by extrapolation, the most common gear used in the study area. Eliminating the number of claims that were "Unknown" gear types, bottom trawling increases to 78 percent, with seining accounting for 17 percent of the total.

Exploration/Production Activities

The North Sea is divided into several "country zones" (i.e., United Kingdom, Norway, Denmark, etc.). The respective country administers exploration and production activities within those designated zones. The Norwegian and United Kingdom zones are the two largest, designated by a north-south line that generally divides the North Sea in half. Surface platforms, subsea completions, and pipelines occur within relatively distinct concentrations, most located totally or partially within the UK zone (**Figure 5.10**).

Data Sources and Fisheries Organizations

At the initiation of the research and data collection phase of the project, electronic and telephone queries were made to several petroleum and fisheries organizations in the countries that have zones within the North Sea. Those contacts are shown as "personal communications" in the References section at the end of this report. Two of the UK contacts, UKOOA and the National Federation of Fishermen's Organizations (NFFO)

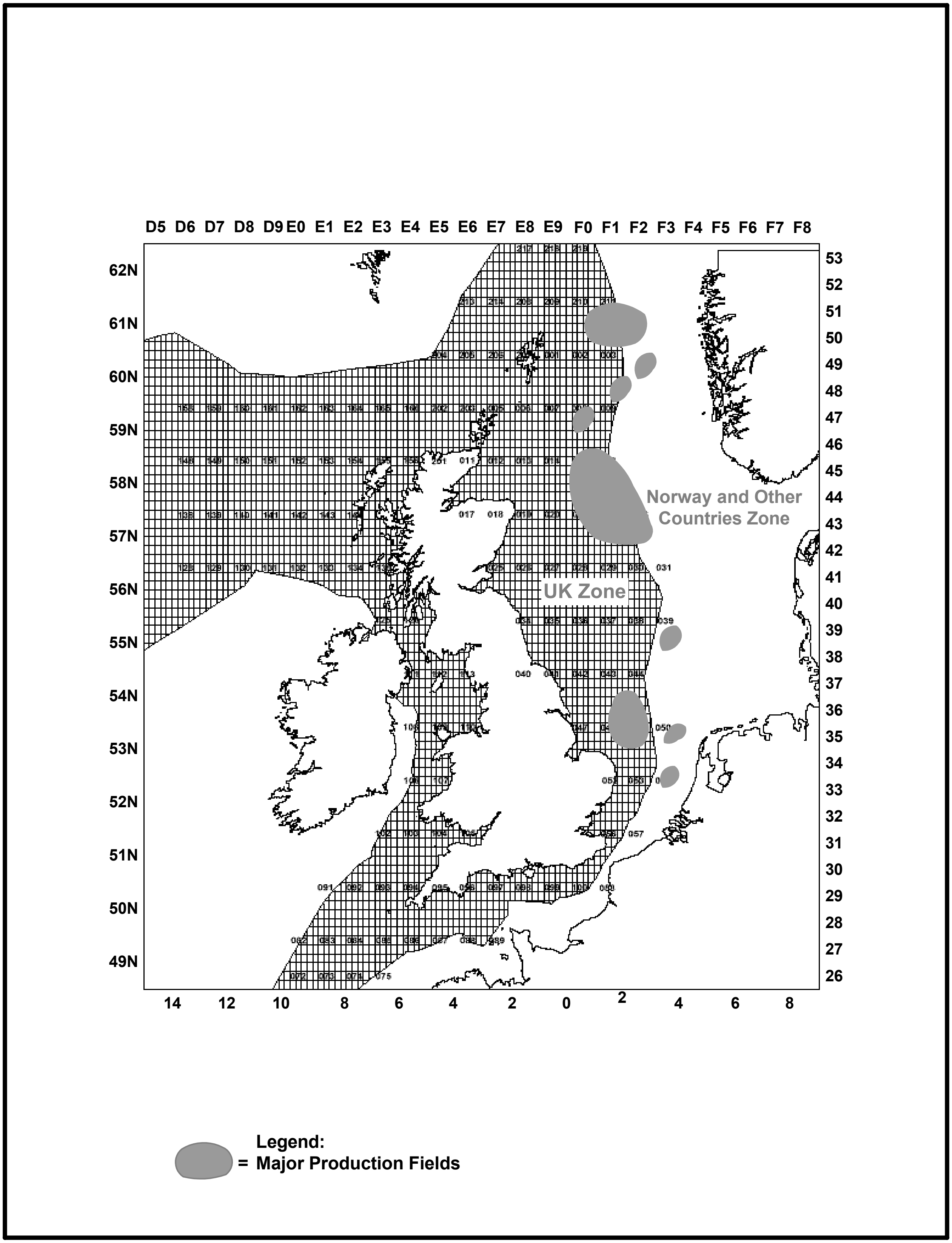

Figure 5.10. United Kingdom oil and gas locations.

provided several data sources and summary information on the existing fisheries and conflicts between oil and gas and commercial fishing within the North Sea. Contacts in Denmark, the Netherlands, and Norway indicated that they kept no records of historical conflicts or that no oil and gas leases existed within their zones. Water depths and information on the location of production fields, pipelines, and country zones were obtained from 1999 editions of British Admiralty Charts of the North Sea and British Isles.

Historical Conflicts

Summary information from Toole, (pers. comm. 2000) indicated that while some "indirect casualties" have occurred between trawlers and pipelines, the Oil and Gas Division of the British Department of Trade and Industry routinely considers spawning grounds and important commercial fishing areas in issuing leases. Information provided by UKOOA and Rudd (pers. comm. 2000) suggest that seismic operations have been the most problematic to fishers. Although platforms and subsea completions preclude a specific area, and pipelines do present the potential for snagging of trawl nets, the wide-ranging geophysical surveys appear to have the greatest potential for conflicts between the survey vessel and fishers within the seismic area. Rudd (pers. comm. 2000) has indicated however, that over recent years this potential conflict has been greatly reduced by utilizing the services of a Fishing Liaison Skipper on board the seismic vessel to liaise with fishermen in the area.

For the 11-year period 1989-2000, UKOOA recorded 1,143 claims within the North Sea area, an average of 95 per year. Rudd (pers. comm. 2000) indicated that record keeping accuracy and completeness has increased since 1995 and over the past 6 years, by recording the geographical location of the incidents.

As shown in **Table 5.9**, no gear type was specified for 53 percent (601 of 1,143) of the UKOOA claims from 1989 through 2000. Of the 542 claims that did identify gear type, bottom trawling accounted for 79 percent (429 of 542) and seining accounted for 17 percent (91 of 542) during that same period.

Of the 1,143 claims recorded over that period, 1,130 identified the actual or potential cause (labeled as "debris categories" in the UKOOA database) of the claim. "No Debris" was noted for 494 claims, the remaining 636 identified the debris type. **Table 5.10** lists the cause of the claims where a debris type was mentioned.

Since claims for bottom trawling and seining accounted for the largest percentage over the period, it is of interest to know what were the principal causes of claims for those gear types. **Table 5.11** lists the cause (debris) listed for two dominant gear types, bottom trawl and seines.

Table 5.10. Percent of claims by cause (debris type) of all reported North Sea conflicts, 1989-2000 (Source: UKOOA 2000).

Debris	Number and Percentage of Claims
No Debris	494 (44%)
Wire, Rope	163 (14%)
Misc.	151 (13%)
Development Related Items (includes pipelines, suspended wells, templates, manifolds, etc.)	116 (10%)
Vessels	71 (6%)
Buoys	48 (4%)
Anchors, Chains	33 (3%)
Scaffolding/Pipes	27 (2%)
Fabrications	23 (2%)
Containers	4 (<1%)

Table 5.11. Cause (debris type) of North Sea conflicts for bottom trawl and seines, 1989-2000.

Debris	Number and Percentage of Claims	
	Bottom Trawl	Seine
No Debris	184 (42%)	42 (46%)
Wire, Rope	67 (16%)	14 (15%)
Misc.	70 (16%)	8 (9%)
Vessels	37 (9%)	7 (8%)
Development Related Items (includes pipelines, suspended wells, templates, manifolds, etc.)	35 (8%)	7 (8%)
Buoys	15 (4%)	6 (7%)
Anchors, Chains	10 (2%)	2 (2%)
Fabrications	10 (2%)	2 (2%)
Scaffolding/Pipes	5 (1%)	2 (2%)
Containers	6 (1%)	1 (1%)
Total	429	91

Discussion

The UKOOA data indicate that trawling conflicts comprise the greatest percentage of reports for the 11-year period and, when the debris type was recorded, Wire and Ropes, and Miscellaneous Debris were the most common cause. Incidents with seining operations were the second most abundant reported conflicts and, like trawling, were most commonly caused by Wire and Ropes. **Table 5.12** lists the number of claims per year. Those data indicate a general decrease in the annual number of claims from 1989 through 2000.

Table 5.12. Number of reported North Sea claims by year (all gear types) (Source: UKOOA 2000).

Year	Number of Claims
1989	108
1990	141
1991	128
1992	123
1993	91
1994	97
1995	89
1996	77
1997	84
1998	79
1999	56
2000	71

The incorporation of various mitigations by UKOOA, particularly since 1995, including the use of UKOOA-provided positional data (see below), and in record keeping (Rudd pers. comm. 2000) may have contributed to the decreasing number of reported conflicts. A listing of the mitigations that are currently in place for North Sea oil and gas operations is provided below.

Existing Mitigations

- In accordance with Petroleum Operations Notice No. 14, a minimum notice 28 days in advance of most proposed seismic activities is required. Seismic operations in sensitive areas require a longer noticing period. Operations must also be noticed to other media, including the Kingfisher Bulletin.
- Quarterly meetings between UKOOA and the NFFO and the Scottish Fishing Federation (SFF) to discuss conflicts and research opportunities.

- A Seabed Information System (SeaFish), comprising a digitized database, is input directly to a fishing vessel's navigation system. That system includes maps of all offshore platforms, pipelines, moorings, safety zones, and other oil-related obstructions. The system was developed by UKOOA and is used by many commercial fishing vessels. Updated computer flashcards are provided to the fishers every few months.
- Installation of the FishSafe system, an extension of the SeaFish system described above, that incorporates a warning/alarm to warn fishers when they are approaching a subsea obstruction. Through the year 2000, UKOOA has installed approximately 300 of the SeaFish and FishSafe systems on commercial fishing vessels.
- A 500-m "exclusion zone" is established around each subsea facility (i.e., manifolds). Locations of all such features are included in the SeaFish system.
- A Fishermen's Compensation Fund, funded by UKOOA and administered by the fishers, is available for lost or damaged gear and loss of fishing time or vessel damage caused by oil-related debris that cannot be attributed to a particular operator.
- A Fisheries Liaison Officer (FLO) is required for each oil company operating in the North Sea. The FLO is the focal point for fishing claims against that company and provides the company with relevant fisheries information within each lease.
- A requirement for a Fishing Liaison Skipper (FLS) to be on board all seismic vessels, and/or the employment of a "picket" or "chase" boat to protect the towed seismic array is in-place. The picket/chase boat can act as the FLS.
- A requirement for all seismic vessel operators to review the Seismic Operations Handbook.

5.1.2.3 Australia and Papua New Guinea

There are two principal offshore oil and gas exploration/production areas in Australia: the Bass Straits/Gippsland Shelf and the Northwest Shelf (see **Figures 5.11** and **5.12**). This Bass Strait area, which includes the Gippsland Shelf, is a shallow coastal sea located in the southeastern portion of Australia, southeast of Melbourne and bordered to the south by Tasmania. Lavering (1994) indicates the seafloor in this area is "largely sand, but silt and clay dominate the central part of Bass Strait and the deeper waters of the Gippsland Shelf." Currents in the area are classified as "strong" and tidal (Jones 1980 cited in Lavering 1994) and temperature and salinities are relatively uniform for most of the year. Current directions are generally southwest-northeast, but can vary with the passing of storm fronts and associated strong winds. Maximum water depths in most of the Bass Strait area range from 40 to approximately 61 m, except in the central portion where water depths of up to 90 m occur. Most of the Gippsland Shelf production facilities are in water depths of 92 m or less, although the Kingfish Platform is in slightly deeper water.

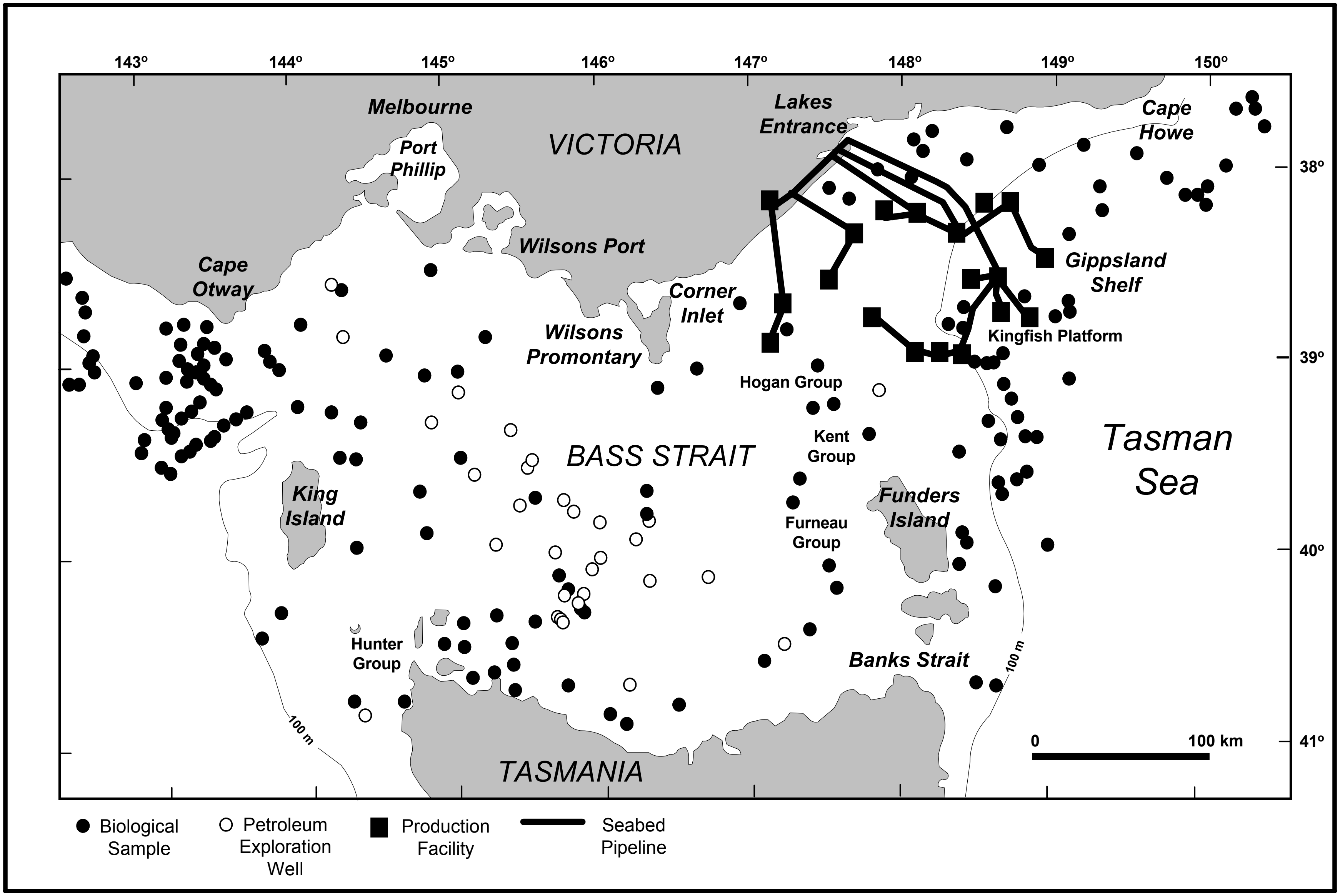

Figure 5.11. Australia Bass Strait and Gippsland Shelf offshore oil and gas operations.

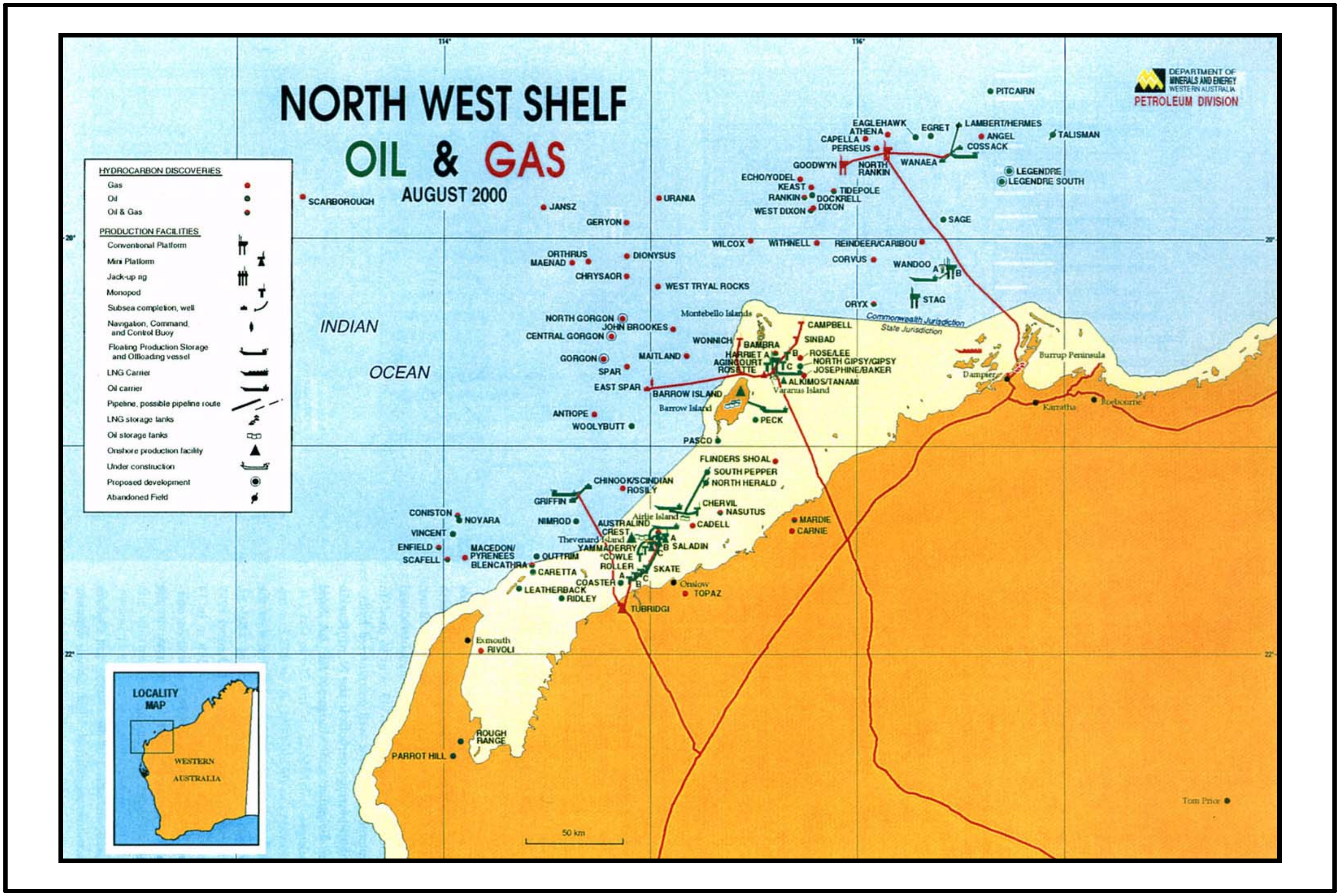

Figure 5.12. Australia northwestern shelf oil and gas activity.

The northern portion of the Northwest Shelf comprises a relatively wide continental shelf, where most of the oil production is occurring, that has water depths of over 200 m in excess of 290 km offshore. The shelf is substantially narrower to the south, where the 200 m isobath is less than 50 km offshore. The prevailing currents in the Northwest shelf are from the east and west; warm tropical waters provide conditions conducive to coral reef development in the nearshore waters.

Types of Fishing

Lavering (1994) characterizes the commercial fisheries of this area as "significant," comprising hard substrate-associated (i.e., abalone), sand-associated (scallops), and fine sediment-associated (shrimp) species, the latter usually trawled for within the estuaries and offshore in water depths up to 40 m. Deeper-water fisheries include squid from 59 to 90 m and trapping for lobster and crab in sandy sedimentary habitats in water depths of from 30 to 79 m. Traps are also used for "giant" and "swimmer" crabs in water depths of up to 421 m.

Within the nearshore marine waters of the North West Shelf (Western Australia), trap, hook and line, and trawling fishing are the most common gear types. Lyne (pers. comm. 2000) indicates that hook and line fishing is relatively unrestricted, but is not currently used as extensively as in the past. Targeting five primary fish species, the trap fishery concentrates in water depths of from 30 to 200 m, while trawlers target shark and the same species as the trap fishers. The depth range for trawling along the North West Shelf is 50 to 200 m.

Exploration/Production Activities

From the early 1970's through 1993, over 150 geophysical surveys and an equal number of exploration wells had been drilled in the Gippsland Shelf that, through 1992, had supplied Australia with over 68 percent of its crude oil (AIP 1993 cited in Lavering 1994). Up to 1994, 16 man-made structures were present on the Gippsland Shelf, the most intensively explored and prolific petroleum-producing area of Australia. Petroleum products are sent to onshore facilities through a series of subsea pipelines (see **Figure 5.11**). Through 1993, 67 geophysical surveys and 30 exploration wells had been completed in the Bass Shelf area, southwest of Gippsland Shelf. As of 1994, no production structures were present on the Bass Shelf (Lavering 1994).

Moore (2000) stated that in the year 2000, 40 new field wildcats were drilled, slightly less than the 44 to 45 per year during 1997 through 1999. Recent deepwater (1,200 m) gas finds at the Gorgon Field and oil finds in the Barrow Sub-basin are some of the deepest in Western Australia and the North West Shelf. **Figure 5.12** shows the existing oil and gas finds, platforms, pipelines, and offshore production facilities on the North West Shelf. While there have been several oil and gas discoveries in relatively deep water, most of the existing subsea completions, platforms, and submarine pipelines are concentrated in water depths of less than 200 m around Montebello, Barrow, and Thevenard Islands. At least three production areas, Griffin (subsea completion, floating production, and pipeline), "East Spare," and the northernmost North Rankin, Goodwyn, and Wanaea Fields (platforms, offshore production, and pipelines) are in water depths exceeding 200 m.

According to Kepsey (pers. comm. 2000) there are no major petroleum activities in the Papua New Guinea marine waters. There is, however, a 2,500 km-long gas pipeline, of which approximately 500 km will be subsea, planned between Queensland to PNG that will pass through some traditional fishing grounds.

Historical Conflicts

In general, fishing and offshore petroleum operations have had few reported conflicts (Mc Donald, pers. comm. 2001) although Lavering (pers. comm. 1999) indicated that two independent research groups are currently studying the effects of seismic operations on fish catch. Initial results of that study suggest that catch levels may be elevated in areas adjacent to the locations of seismic operations offshore southeast Australia, however, final results are not yet available.

McDonald (pers. comm. 2001) researched fisheries conflicts on the North West Shelf between 1990 and 2000 and reported that only three incidents that required formal discussions between fishing and petroleum industries had been reported to various government agencies during that period. Lyne, pers. comm., suggests that most of the information on fishing conflicts is "undocumented" and thus not readily available. The three conflicts that were reported occurred in less than 200 m of water. In 1997, a trawler damaged a wellhead in approximately 122 m of water in the Rankin Field; the other two incidents (1998 and 1999) involved trap fishing within the Rankin Field in 110 m and within the Griffin Field in 125 m of water. All three incidents occurred within the 500 m radius exclusion zone of the surface or subsea installations (McDonald pers. comm. 2001).

Bacon (pers. comm. 1999) indicated that shark fishing interests were concerned over the potential impacts of proposed seismic operations on their fishery. A government-funded study on the potential effects of those operations on the shark fishery is ongoing.

No "major conflicts" between the petroleum sector and the fisheries industry have occurred in PNG (Kepsey, pers. comm. 2000). That source also stated that existing regulations governing the use PNG's marine waters by the two industries are sufficient to reduce or eliminate potential conflicts. Although requested through the Pacific-Australia-New Zealand Branch of the Department of Foreign Affairs, copies of relevant regulations were not provided.

Discussion

The Western Australian Department of Minerals and Energy has established a process through which potential impacts of offshore oil and gas exploration and development are assessed. In addition, that agency has developed two guidance documents (Guidelines on Minimizing Acoustic Disturbance to Marine Fauna and Seismic Surveys in Western Australian Rock Lobster Fishing Grounds) to assist petroleum companies in reducing impacts from those activities. Early communication and in-place agreements between the fishing and petroleum industries appear to have resulted in minimizing conflicts over the last 10 years.

Existing Mitigations

- Consultation between exploration companies and fishing industry representatives prior to initiation offshore activities;
- A 500-m safety zone, precluding fishing within that area, is established around all production facilities;
- A "Marine Notice" is posted prior to initiation of offshore exploration activities; and
- Trawling is precluded within a 5-nmi radius of all production platforms and within 500-m of petroleum pipelines.

5.2 CONFLICT PREDICTION

The potential for future conflicts between the fishing and energy industries in the Gulf of Mexico was predicted using information presented in **Sections 3.0** and **4.0.** Conflicts can impact fisheries by preclusion of fishers from traditional fishing grounds, causing lost fishing time, and damage or loss of gear. Similarly, the offshore energy industry may also experience loss of time, space, and damage to equipment as a result of conflicts with fishers. The basic characteristics of space use by the fisheries discussed in **Section 3.0** are summarized in **Table 5.13**.

Table 5.14 summarizes the fishing activities, primary species sought, fishing season, fishing area, and estimated number of vessels in the fisheries covered in **Section 3.0**. Of the commercial fisheries, the epipelagic fishery using longlines is the most prevalent. This fishery has the most participants (average of 137 vessels) and for this reason alone is most likely to interact with oil and gas activities. Pelagic longlines can occupy considerable portions of sea surface while drifting. The mainline can become entangled on any surface structure it encounters. Bottom longining may be done by as many vessels as surface longlining, but it is likely that most of this fishery takes place in water depths less than or equal to 200 m. The royal red shrimp fishery involves very few fishers (usually less than 10 vessels per year), but the gear used includes large trawl doors and a tickler chain that are in contact with the seafloor while the trawl is operating (Harrington et al. 1988). These trawl components will easily foul or snag pipelines, anchors, manifolds, wellheads, and other debris protruding above the seafloor. In addition, because trawl doors will penetrate the substrate as deep as 2 to 6 cm, even partially buried objects may be snagged. In most situations the trenches created by pipeline laying will cause more damage than the exposed structures. Thus, total bottom area rendered untrawlable by the placement of subsea structures would encompass moorings, anchor spread, drag anchors, flowlines, manifolds, and wellheads.

Table 5.13. Water column utilization, mobility, and duration for bluewater fisheries in the Gulf of Mexico.

Fishery	Water Column Utilization			Mobility	Duration
	Shallow	Mid-depth	Bottom		
PELAGIC Longline	Upper 100 m; Very wide swath	None	None	Low, Passively drifting	12 to 24 hours/set; daylight for tuna, night for swordfish
DEEP REEF • Bottom longline • Bandit reel	• Minimum; only buoy line • Minimum	• Minimum; only buoy line • Minimum	• Stationary across large area • Stationary or drifting over small area	• Low anchored • Highly mobile	• 2 to 6 hours/set; • Very short
INVERTEBRATE • Bottom trawling • Trapping	• Minimum; tow wire only • Minimum; no buoy line	• Minimum; tow wire only • Minimum; no buoy line	• Width of trawl net (10 to 20 m) • Length of trap string (6,000 m)	• Low mobility while trawling • Low grapple hook could snag subsea structures	• Tow may last 1 h; 0.5 h to retrieve • Variable for traps
RECREATIONAL • Surface trolling • Surface drifting	Minimum	Minimum	None	High	Variable

Table 5.14. Summary of bluewater fisheries in the Gulf of Mexico.

Fishery	Gear	Primary Species	Season	Fishing Area	Number of Vessels
Epipelagic	Pelagic longline	• Yellowfin tuna, • Swordfish • Dolphin • Sharks	Year-round, with peak activity in summer	Open Gulf	Average of 137
Deep Reef	• Bottom longline • Bandit reels	• Yellowedge grouper • Tilefish • Snowy grouper • Warsaw grouper	Year-round, weather permitting	Hard bottom, or clayey bottom between 100 and 250 m off Florida, Louisiana, and Texas	Unknown, probably 100
Invertebrates	• Bottom trawl • Trap	• Royal red shrimp • Golden or red crab	Year-round	• Concentrated area off Florida, Alabama and Louisiana between 400 and 500 m • Off southern Florida	• < 10 • 3 or less
Recreational	• Surface trolling • Surface drifting	• Tunas • Billfishes • Dolphins • Wahoo	May to September	Oil and gas structures and natural features from in water depth > 200 m	Approximately 500 gulfwide

Recreational fisheries target essentially the same epipelagic species group sought by the pelagic longliners and have the most vessels, about 500 across the Gulf coast states. We did not attempt an overlap analysis for the recreational fleet; however, a discussion of potential conflicts is provided below.

The estimates of future conflicts actually employed future and current activities and were based on two types of objects: existing structures and lease blocks where future structures or activities might be located (methods are detailed in **Section 2.2**). Future blocks were identified by examining high lease bonus bids and filed POEs and DOCDs (**Section 4.0**). The resulting three data sets were compared to the epipelagic, deep reef, and royal red shrimp fisheries from 1998. We assumed that fishing effort and locations of effort will remain the same in the near future. With the epipelagic fishery we simply inspected the mapped overlaps and judged whether there would be problems based upon the patterns that emerged. With deep reef fish and royal red shrimp fisheries, we examined overlaps and calculated percentage overlaps (the number of lease blocks or existing structures that overlapped a fishing area [depth range band] that could be expected based on broadly defined depth bands and statistical grids). Because most of the activity, both fishing and energy industry, was concentrated in the western and central planning areas, we restricted the map presentations to these planning areas, which allowed for better visual resolution of the GIS figures. The results of the overlap analyses for epipelagic, deep reef, and royal red shrimp fisheries are presented below.

5.2.1 Epipelagic Fishery

Figure 5.13 depicts the overlap between the pelagic longline sets and existing structures. Clearly, there is considerable potential for conflicts, however the practitioners of this fishery use radar and surely must be aware of surface piercing structures. In fact, many of the sets have been made with these structures in place. It is likely that some of these fishers will try to set gear near structures to take advantage of the FAD effect that structures provide. Such efforts would probably involve gear modifications such as shortening the mainline or even using multiple vertical lines. In short, the large fixed structures should be little problem for this fishery as long as they are using radar or have updated information on new platform locations.

In **Figure 5.14**, areas with high lease bonus bids were plotted relative to the pelagic longline sets. Here there is a great potential for interaction given the current fishing practices. The important point about this figure is not that there will be structures erected on these sites, but that it is likely that geophysical surveys will be conducted before and after various exploratory and development activities. Geophysical surveying probably poses the greatest problem for longliners, and will continue to pose problems in the future.

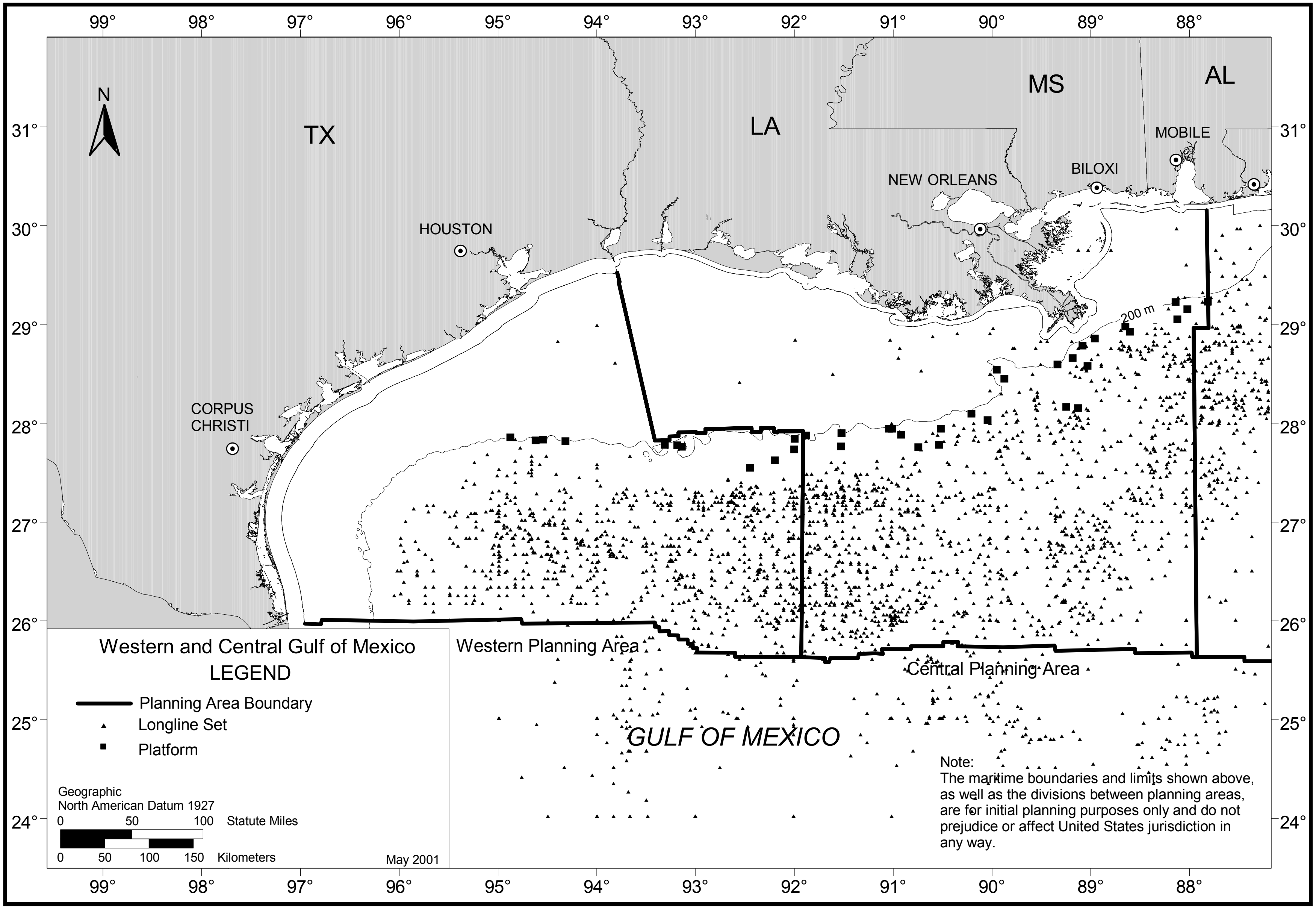

Figure 5.13. Spatial overlap of pelagic longline sets and existing structures (Sources: National Marine Fisheries Service 1999a; Minerals Management Service 2000a).

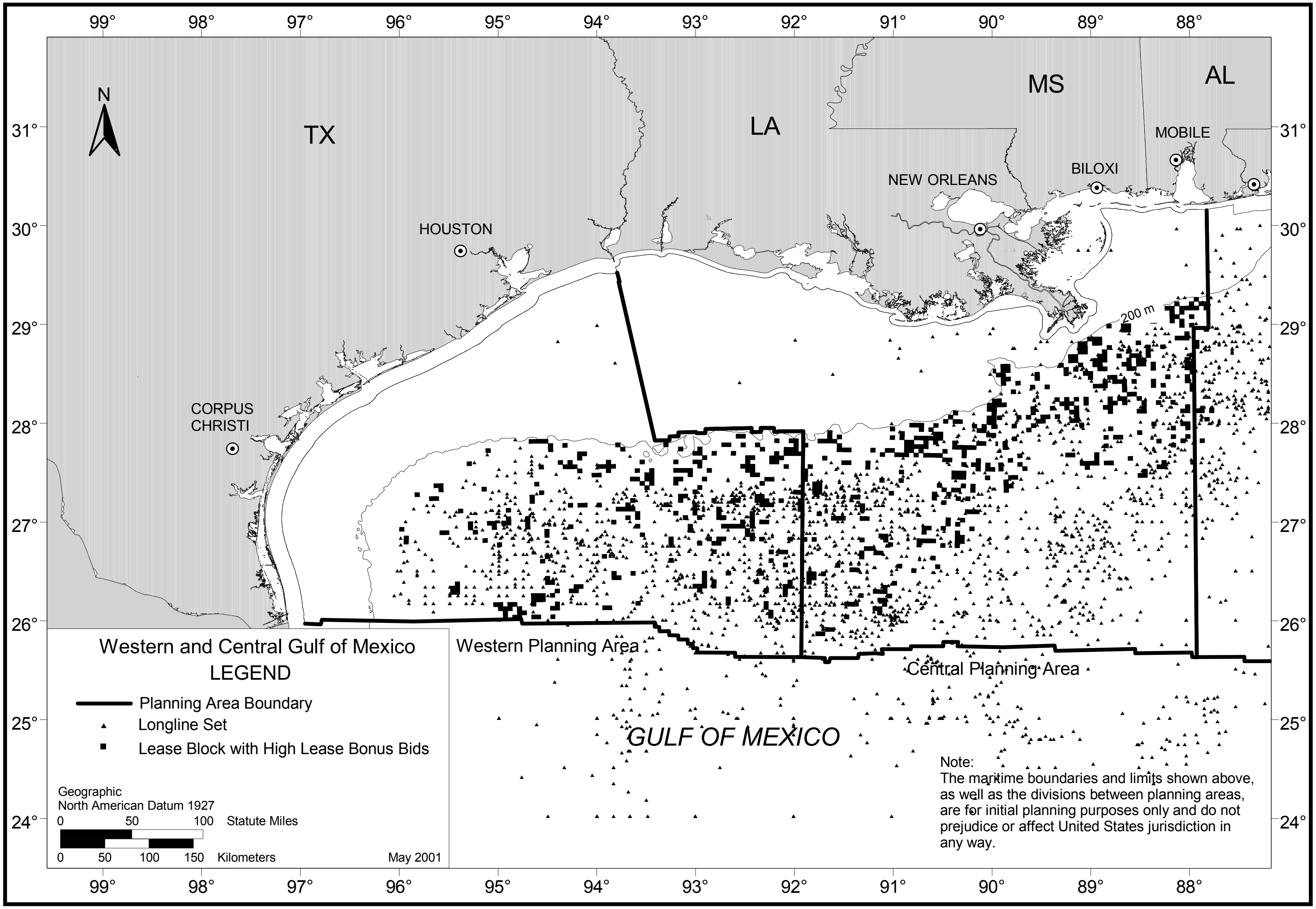

Figure 5.14. Spatial overlap of pelagic longline sets and lease blocks with high lease bonus bids (Sources: National Marine Fisheries Service 1999a; Minerals Management Service 2000a).

The pattern of filed POEs and DOCDs indicates that as with areas of high bonus bids there will be some areas in the future that will overlap with pelagic longline fisheries as they are currently practiced (**Figure 5.15**). As with the high lease bonus areas, these blocks with filed POEs and DOCDs also will be most important with respect to the geophysical surveys that will accompany any exploration or development. This analysis indicates that there will be potential for conflicts in the future.

It is important to note that while the longline sets depicted in the figure appear as small dots, the actual area covered by a drifting 40-km longline can be considerable. To determine the area precluded to surface drifting longline by a single surface piercing structure, the influence of the winds and surface currents as well as set and retrieval time for the gear must be considered. Centaur Associates, Inc. (1981) proposed an approach that estimates a triangular area upcurrent from a surface structure that would be closed to fishing with surface-drifting gear. The apex of the triangle lies at the surface structure; the height of the triangle is estimated as average current velocity times the average duration of gear deployment (and retrieval); and the base of the triangle equals the expected uncertainty in drift orthogonal to the current direction (Centaur Associates, Inc. 1981).

Longline fishers must take into account surface currents when setting their gear in the vicinity of known structures. Surface currents and wind greatly influence the movement of pelagic longlines. A longline deployed upstream of a structure or geophysical survey grid could drift into the structure or survey vessel's path if careful attention is not paid to the current pattern. Surface current speeds in the Gulf of Mexico vary considerably and can range from 0.5 to 3 kn. Surface longlines are allowed to drift for 4 to 5 h before a 10 to 12 h retrieval period (Lopez et al. 1979; Sakagawa et al. 1987). Thus, for a worst-case 3 kn current with 17 h set time, the gear should be 51 nmi upstream of the survey area to prevent a conflict. Given a 0.5 kn current with a 14 h set/retrieval time, the gear should be set at least 7 nmi upstream of the structure of geophysical survey area. Surface longlining occurs throughout the central and Western Planning Areas seaward of the 200-m isobath to the EEZ. This area was estimated to be 70,800 nmi^2. The range of estimate areas precluded by surface piercing structures (51 to 7 nmi^2) relative to the area of the Central and Western Planning Areas is very small.

5.2.2 Deep Reef Fishery

In **Figure 5.16**, the overlap between deep reef fish (tilefish and yellowedge grouper) fishing depth band and existing structures is shown. The most frequented fishing areas were identified by extending the NMFS grids offshore into the depth band. Less than 1 percent of the area in the depth band was occupied by 21 structures (with an assumed 500-m radius around each structure).

Figure 5.17 shows the overlap of lease blocks with high lease bonus bids and the depth band for the key deep reef species, yellowedge grouper and tilefish. The area of all lease blocks (n=121) falling within the fishing depth band accounted for about 14 percent overlap of the area within that depth band. There are nearly 800 lease blocks with high

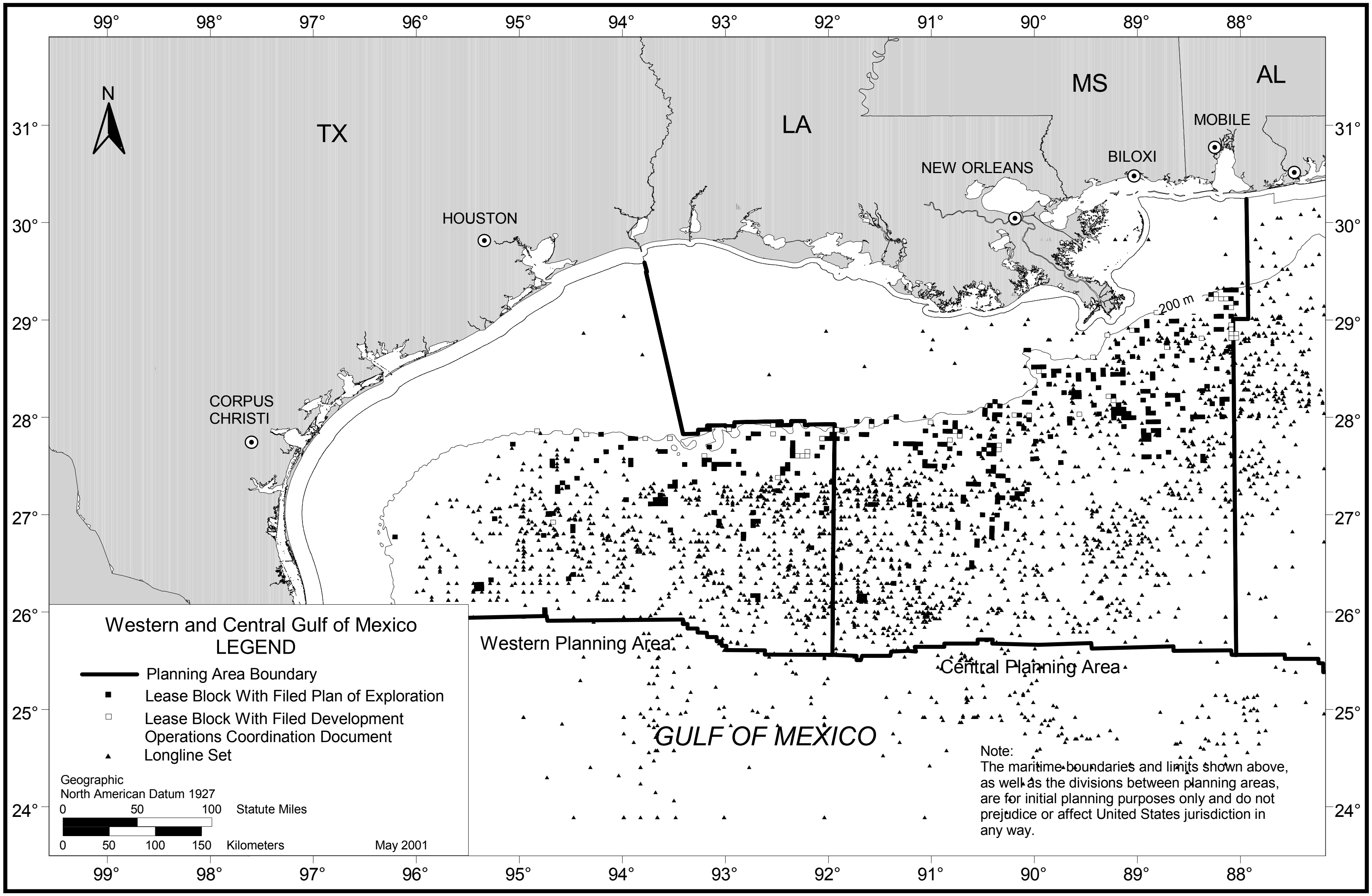

Figure 5.15. Spatial overlap of pelagic longline sets and lease blocks with filed Plans of Exploration and Development Operations Coordination Documents (Sources: National Marine Fisheries Service 1999a; Minerals Management Service 2000a).

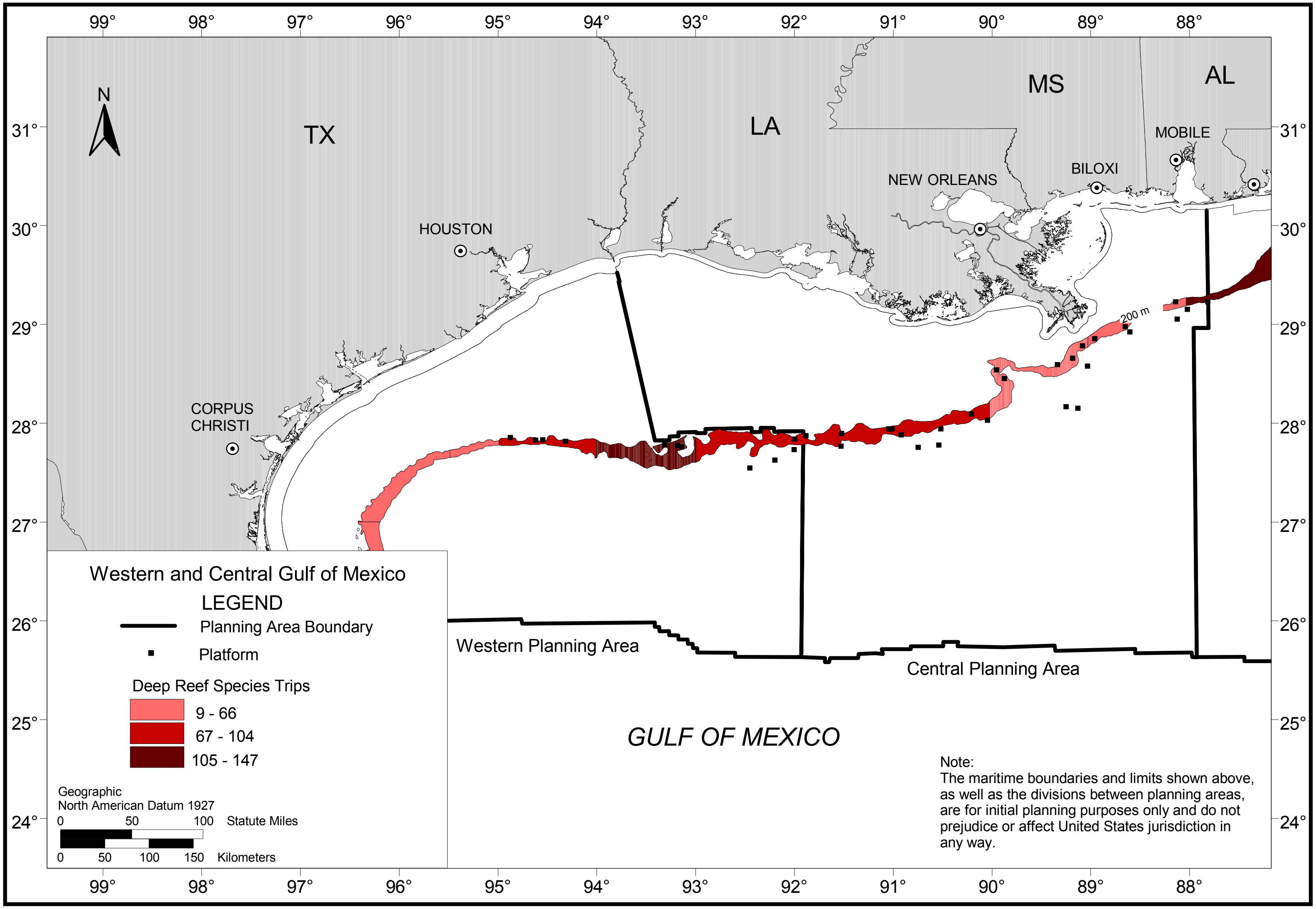

Figure 5.16. Spatial overlap of deep reef effort (number of trips) and existing structures (Sources: National Marine Fisheries Service 1999b; Minerals Management Service 2000a).

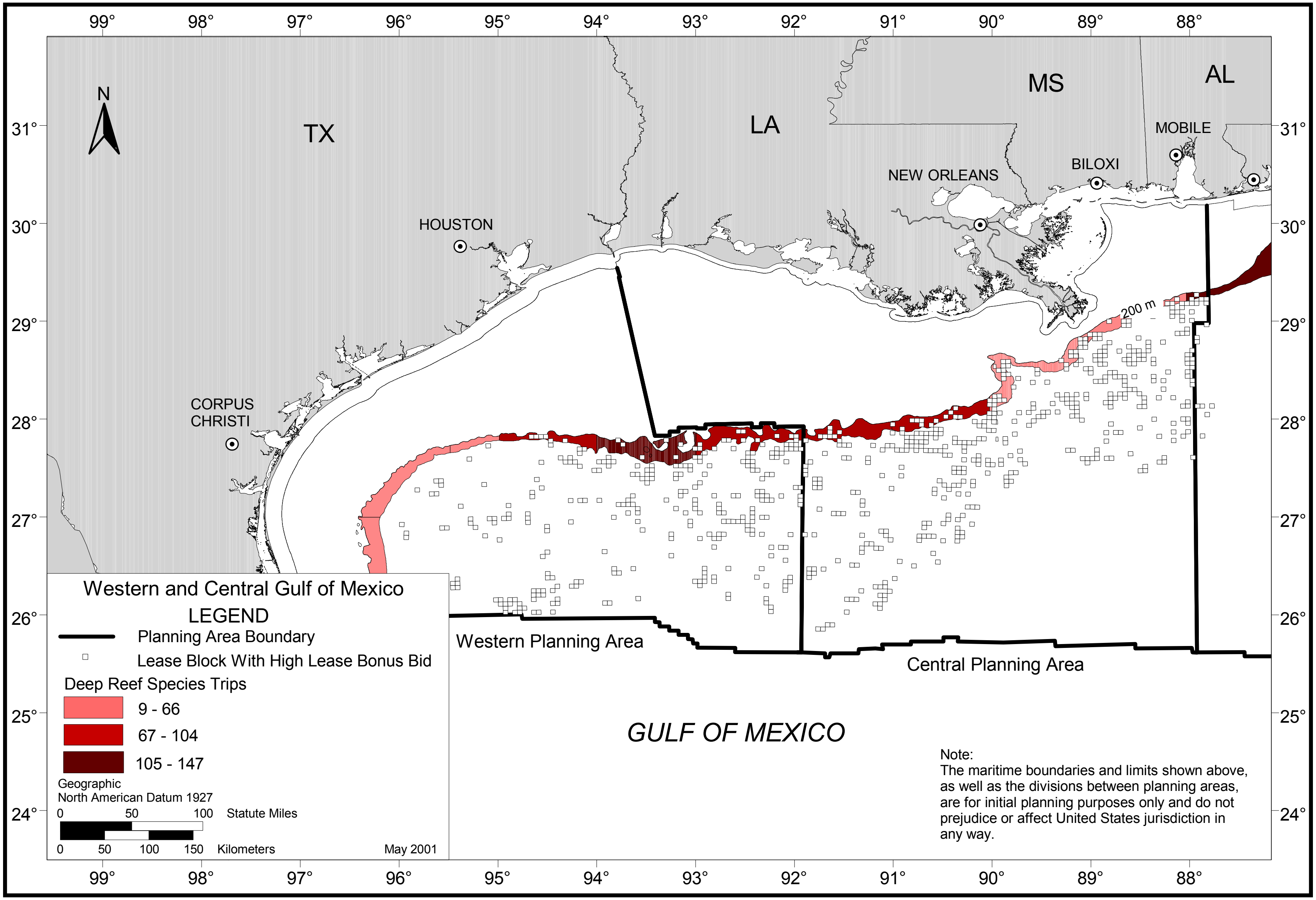

Figure 5.17. Spatial overlap of deep reef effort (number of trips) and lease blocks with high lease bonus bids (Sources: National Marine Fisheries Service 1999b; Minerals Management Service 2000a).

lease bonus bids, so about 15 percent of those fell within the depth band for tilefish and yellowedge grouper.

The distribution of lease blocks with filed POEs and DOCDs relative to the deep reef fish depth band is shown **Figure 5.18**. The overlap identified from this analysis with was about 12 percent for those lease blocks (n=71) with filed POEs and 4 percent for those lease blocks (n=21) with filed DOCDs. There were 363 POEs filed resulting in 20 percent of these falling within the fishing depth band for deep reef species. A total of 49 DOCDs was filed and 43 percent of these were for lease blocks falling within the deep reef depth band.

These analyses show that the deep reef fishery could interact with future oil and gas activities in deepwaters of the Gulf. Deep reef fishers primarily use bottom longlines and bandit reels. Fishers employing these two methods will react differently to fixed structures. Bottom longlines will be set to avoid surface piercing structures (and subsurface portions as well), whereas bandit reel fishers actively seek subsea structures to fish for deepwater species such as snowy and warsaw groupers. Nevertheless, these fisheries will not be active beyond the depth range band used here.

5.2.3 Royal Red Shrimp Fisheries

Royal red shrimp were mostly sought in two areas of the western Gulf, Statistical Grid 10 off Alabama and Grid 21 off Texas (**Figure 5.19**). There were no existing platforms in these two grids, but there were 24 platforms scattered within the entire royal red shrimp depth band that extends continuously from Alabama to the Texas/Mexico border. Existing platforms occupied less than 1 percent of the total area where royal red shrimp were sought.

Lease blocks with high lease bonus bids covered 14 percent of the royal red shrimp depth band **Figure 5.20**. One hundred twenty-one lease blocks (approximately 15 percent of the total) that fell within the fishing depth band represented this area of overlap.

Lease blocks with filed POEs and DOCDs that fell within the royal red shrimp depth band are shown in **Figure 5.21.** The number of blocks with filed POEs that fell within the royal red shrimp depth band was 75. These blocks accounted for 13 percent of the royal red shrimp depth band. There were 23 lease blocks with filed DOCDs in the depth band, which represent 47 percent of all such blocks.

The overlap analyses for the royal red shrimp fisheries indicate that some future conflicts are likely. These analyses are very conservative because all blocks with high lease bonus bids or filed POEs and DOCDs will not be developed at the same time. It is important to remember that the fishing depth bands represent areas that could potentially be used by fishers, but as **Table 5.13** shows, the number of fishers involved in the royal red shrimp fishery is very low annually.

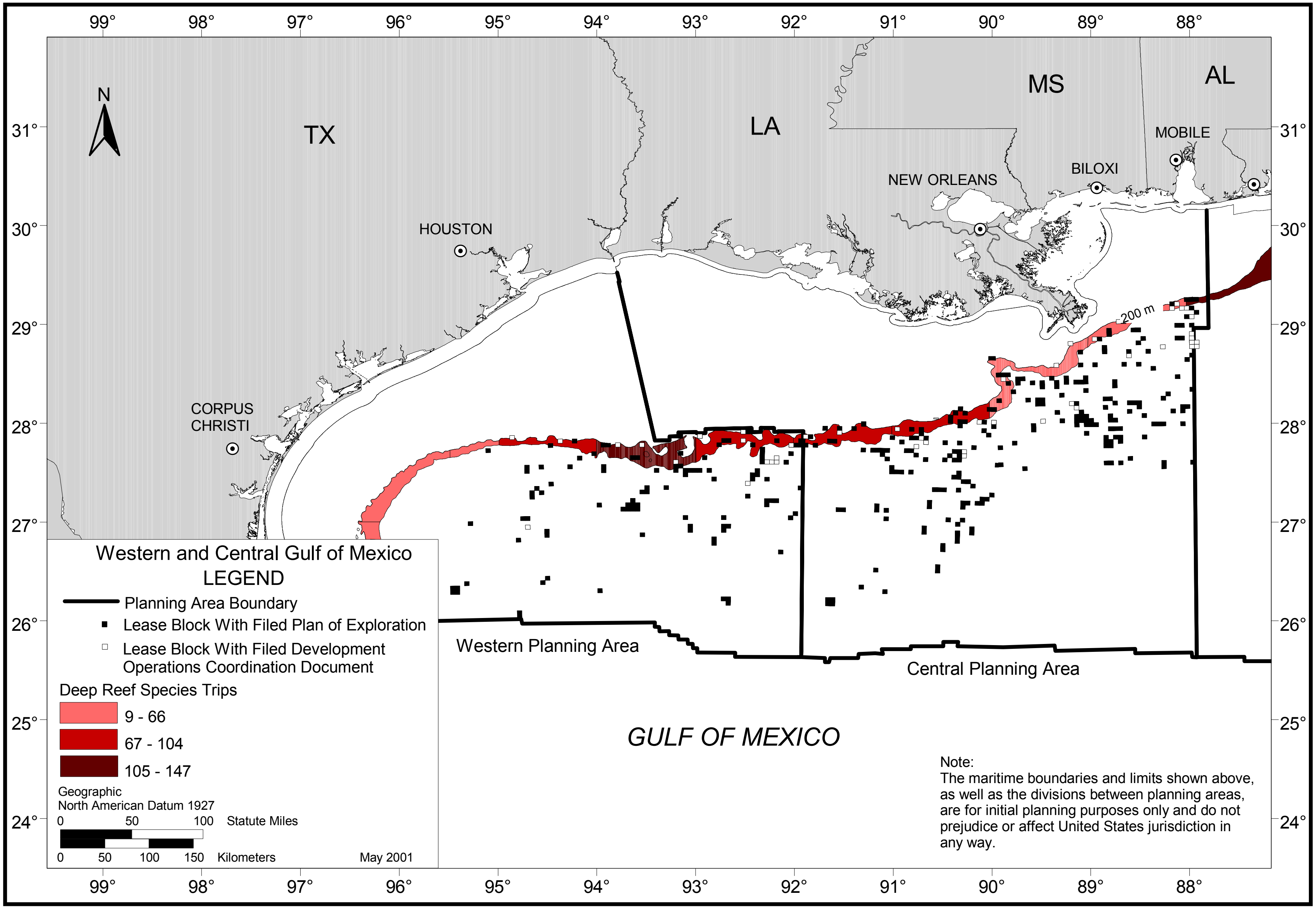

Figure 5.18. Spatial overlap of deep reef effort (number of trips) and lease blocks with filed Plans of Exploration and Development Operations Coordination Documents (Sources: National Marine Fisheries Service 1999b; Minerals Management Service 2000a).

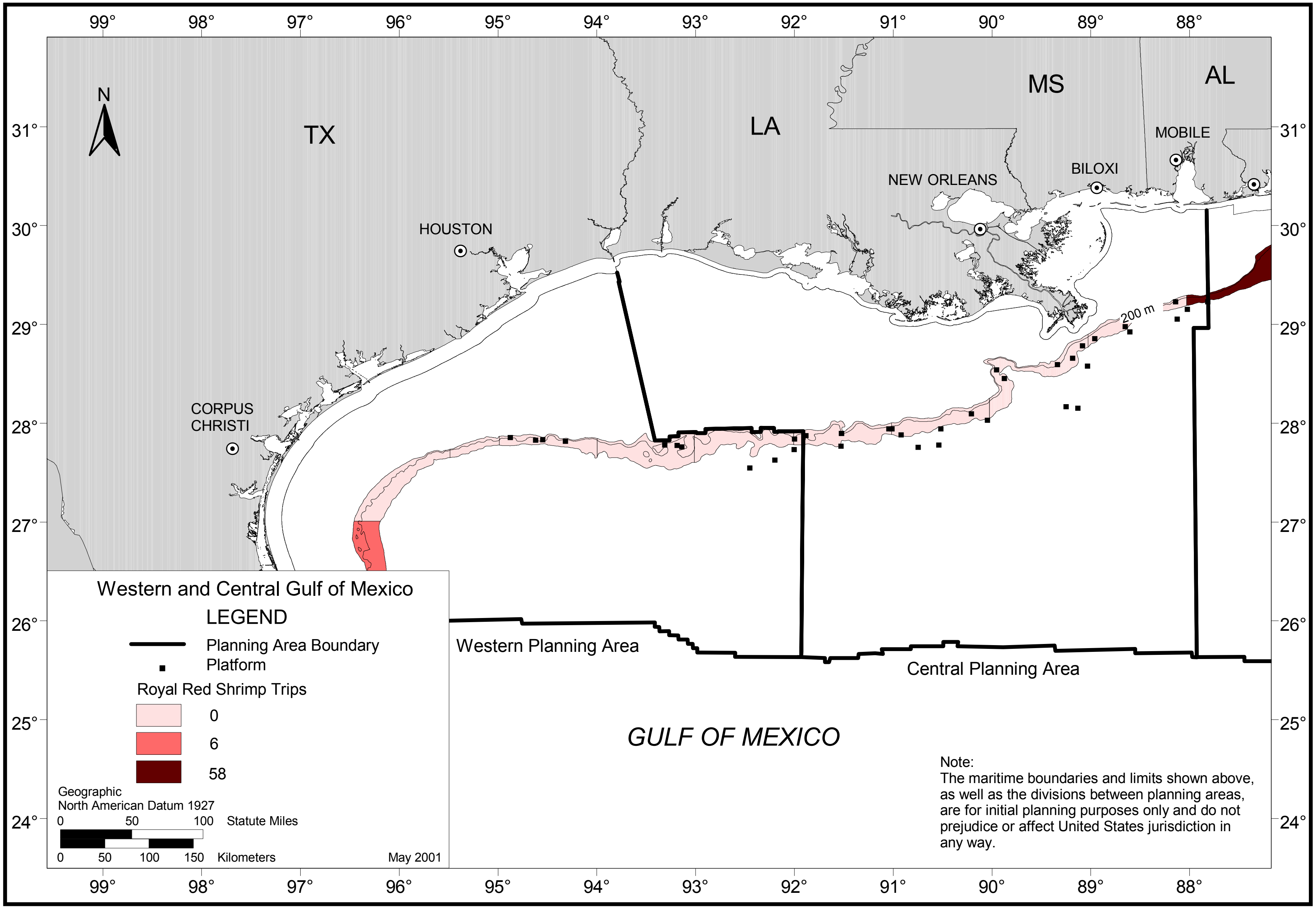

Figure 5.19. Spatial overlap of royal red shrimp effort (number of trips) and existing structures (Sources: National Marine Fisheries Service 1999c; Minerals Management Service 2000a).

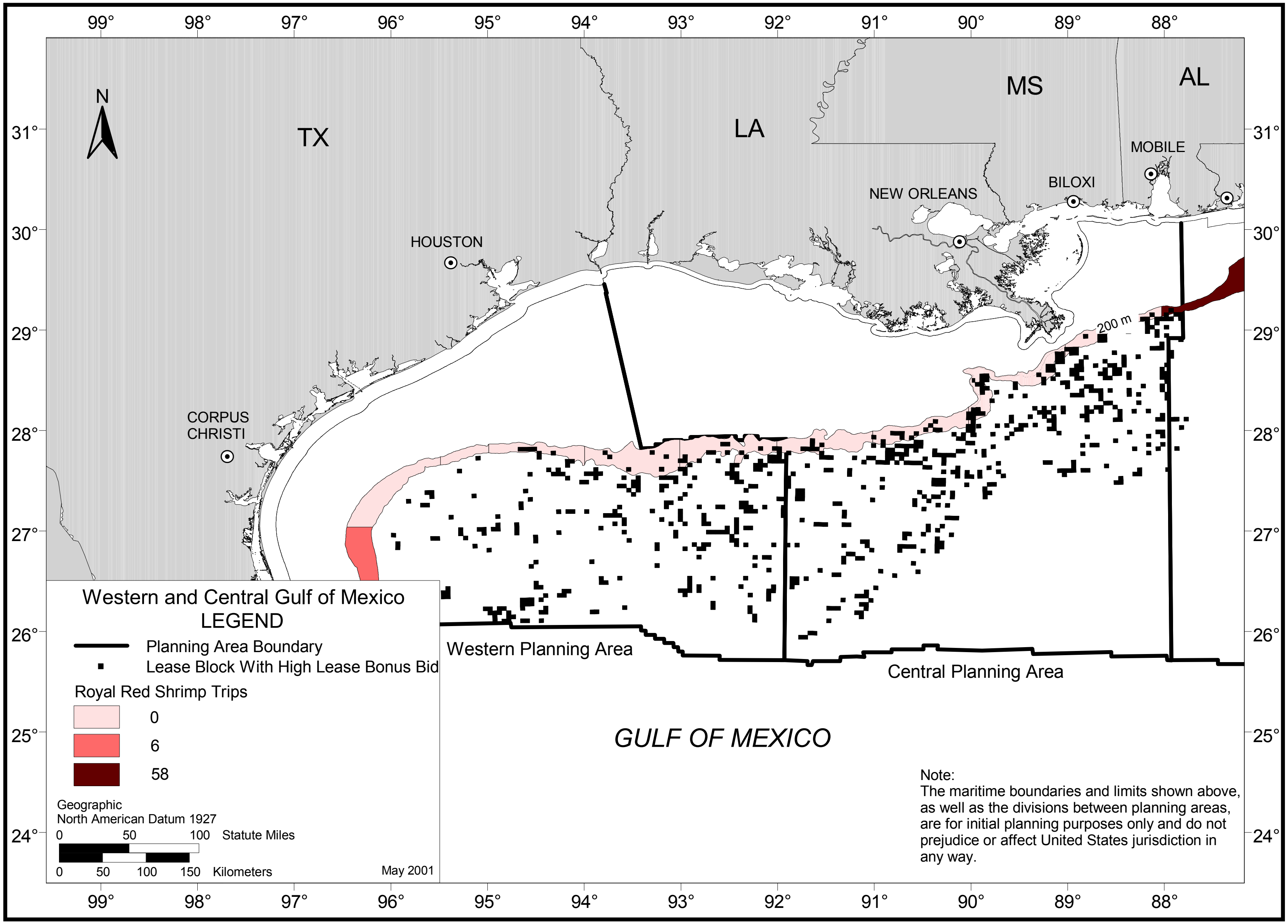

Figure 5.20. Spatial overlap of royal red shrimp effort (number of trips) and lease blocks with high lease bonus bids (Sources: National Marine Fisheries Service 1999c; Minerals Management Service 2000a).

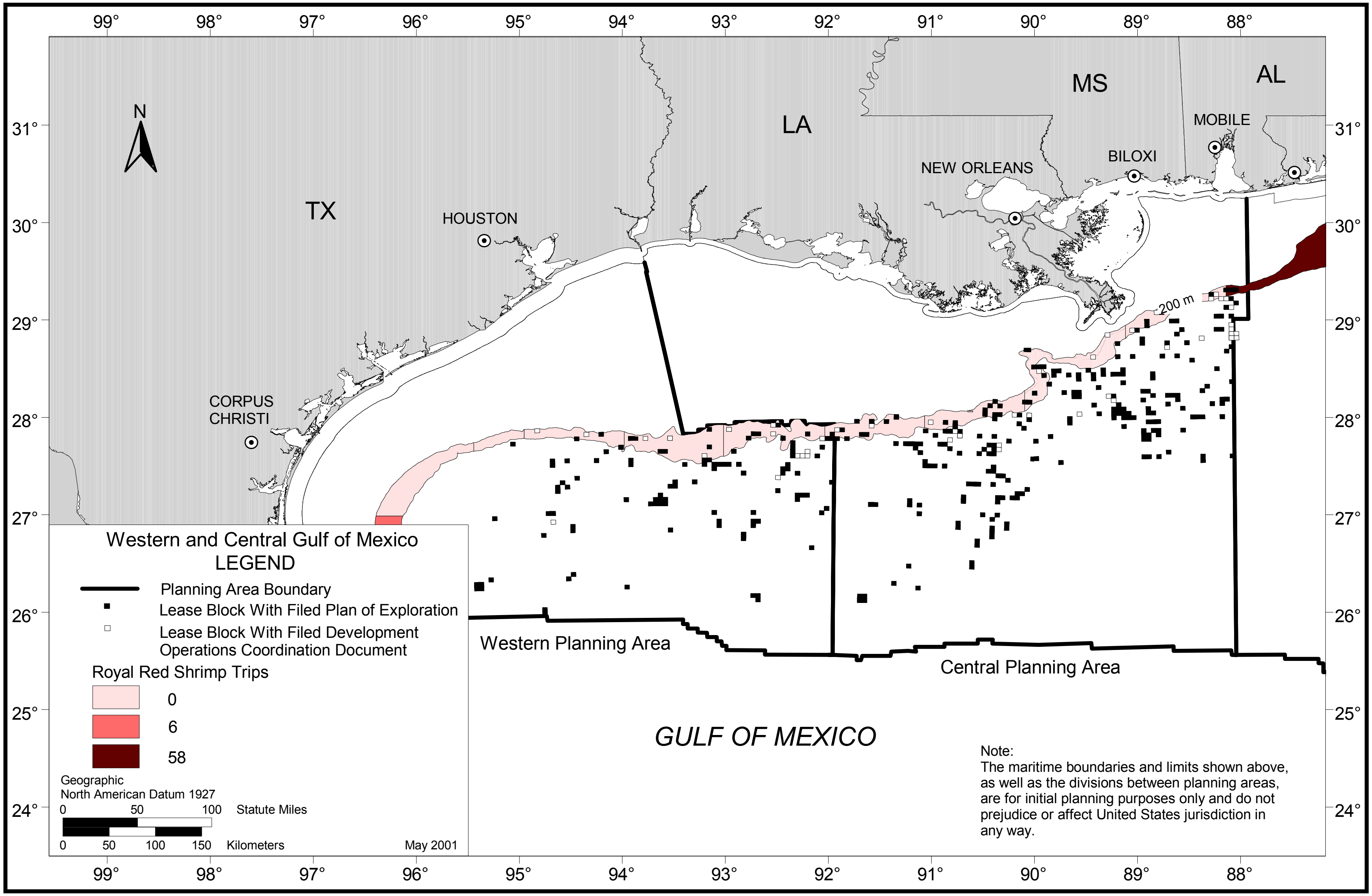

Figure 5.21. Spatial overlap of royal red shrimp effort and lease blocks with filed Plans of Exploration and Development Operations Coordination Documents (Sources: National Marine Fisheries Service 1999c; Minerals Management Service 2000a).

5.2.4 Recreational Fisheries

No formal spatial analyses were performed on the recreational fisheries because the presence of structures will be viewed as a positive impact for this sector. As new, surface piercing structures are erected, recreational fishers will gravitate to them to take advantage of the FAD effect that will certainly happen. Because U.S. Coast Guard-imposed 500-m safety zones around all deepwater subsea or surface-piercing structures apply only to vessels >33.3 m, recreational fishers will likely fish closer to structures, and problems could ensue if the operators are serious about enforcing the regulation.

5.3 FUTURE OF BLUEWATER FISHERIES IN THE GULF OF MEXICO

Deepwater fisheries in some areas of the world have been very productive-orange roughy off new Zealand and Tasmania, scabbard fish off Portugal, and flatfish off Washington and Oregon (Merret and Haedrich 1997) are notable examples. But in the Gulf of Mexico where shallow water fisheries are so productive, there has never been an economically feasible deepwater enterprise except tuna fishing. Development of deepwater fisheries has been favored by funding agencies because they presumably relieve the pressure on shallow water stocks or provide an alternative during seasons when favored species are closed.

Many deepwater species are long-lived, slow growing, and late maturing. These life history characteristics, called life in the slow lane by Musick (1999), limit the sustainable exploitation of deepwater species. In the Gulf of Mexico, there have been some attempts to develop deepwater fisheries for butterfish, royal red shrimp, deepwater crab, and hagfish. None of these has become economically feasible for more than a few vessels. Fishing in deep water is onerous, requiring orders of magnitude more gear (more cable, heavier doors, etc.), greater tolerance of safety risks and rougher weather, longer running time to the fishing grounds, and larger vessels. All of these constraints suggest that deepwater fishing beyond the shelf break is not likely to expand greatly in the Gulf of Mexico in the near future. However, as Moore (2000) has pointed out, deepwater fisheries can start up very quickly, often before management measures can be enacted to prevent stock depletion. The two major fisheries (commercial and recreational) that do occur on bluewater are focused on the same species group, the epipelagic fishes. Commercial longlining is the most active fishery in the deep waters of the Gulf and despite recent regulation (NMFS 1999d), it appears that at least 100 vessels will continue to operate.

6.0 RECOMMENDATIONS OF PROACTIVE MITIGATION BY MMS AND THE FISHING AND OCS ENERGY INDUSTRIES

The goal in developing recommendations was to provide measures, that if implemented, should lessen the relative frequency and severity of interactions between the fishing and energy industries working in deepwater. Although the expectation of achieving zero interaction is not realistic, great savings of time and money (on both sides) may be possible if these recommendations are considered. The following bulleted summaries from the preceding report sections reveal some facts and issues that were helpful in generating the recommendations.

BLUEWATER FISHING:

- Most of the bluewater commercial fishing effort in the Gulf of Mexico is by pelagic longline.
- Secondary fisheries are bottom-founded: bottom longlining, trawling, and trapping.
- Although precise water depths used by the deep reef fishery are unknown, it appears that most bottom longlining occurs in water depths of less than 200 m.
- Trawling for royal red shrimp is conducted by less than 10 fishers per year, and effort is concentrated off the eastern portion of Mississippi Delta.
- Currently, no deepwater crab trappers work north of Tampa in the eastern Gulf.
- As many as 500 recreational fishers per year will travel into water depths of 200 m or greater to fish for epipelagic species in the northern Gulf.
- Recreational fishers will seek out above-surface structures as they are installed.

OIL AND GAS INDUSTRY:

- As many as 50 rigs per year will be employed for exploratory drilling, and 80 to 100 sites will be developed within the bluewater study area.
- Geophysical survey activity will often precede and sometimes follow drilling.
- The total number of permanent structures will be low (40 to 50) compared with the number existing on the shelf.
- In the future, fewer fields will be developed with an above-surface platform; most fields will utilize subsea wells.

DOMESTIC AND INTERNATIONAL CONFLICTS:

- The majority of documented conflicts in non-Gulf of Mexico domestic and international waters have been with bottom-oriented gear such as trawls.

- In all areas investigated, documented interactions in deeper waters (>200 m) are less common than shallow-water incidents.
- Anecdotal information indicates that there have been conflicts between pelagic longliners and geophysical survey vessels in the Gulf of Mexico.
- The very nature of longline fishing, which involves deploying long sets of lines, sometimes 30 to 40 km long, floating at or near the surface to drift in the current and be retrieved sometime later, makes it nearly impossible for any other use of the surface area to avoid interference.
- Both sides in reported incidents cited lack of communication as contributing to the conflict.
- The U.S. Coast Guard has instituted "safe zones" of up to 500 m around all deepwater platforms – this would ostensibly preclude these platforms from use by both recreational and commercial fishing activities.

RECOMMENDATIONS FOR PROACTIVE MITIGATION BY THE MMS AND THE FISHING AND OCS ENERGY INDUSTRIES ARE AS FOLLOWS:

1. **Produce a Guidebook -** A generic guidebook detailing the methods of both the offshore energy and fisheries industries would be helpful for the people in the field. The guidebook should make liberal use of figures and graphics to depict different structures, vessels, and equipment types. The International Association of Geophysical Contractors (IAGC) recently produced an Environmental Manual of Worldwide Geophysical Operations (IAGC 2001). This manual did not cover fisheries issues in any detail. This suggests that some additional information on the fisheries and energy industry equipment and practices is required.

2. **Improve Contingency Fund** - The NMFS federal contingency fund is well known to shrimpers, but apparently not to the longline fleet. If the frequency of alleged interactions between longliners and geophysical vessels is as high as some have claimed, then the number of claims filed has been very low. The existing fund needs to be better understood by the bluewater fishers. Information on filing and documenting a claim should be covered in a generic guidebook (see Recommendation 1 above).

3. **Appoint a Fisheries Liaison Committee** - Liaison committees have worked in other areas such as California and the North Sea. The liaison committee should be composed of representatives of both industries as well as independent parties. Primary functions of the committee would be to facilitate communication and mediate disputes between fishing and the energy industries. Because of the relatively large area encompassed by Gulf of Mexico, a separate liaison person may be needed for each planning area (with one Gulfwide committee). This could also be coordinated through the GMFMC. It is suggested that at least one Vietnamese-American representative be on this committee.

4. **Regulate Geophysical Surveys** - Require notification of future geophysical surveys 3 to 9 weeks prior to the survey. This requirement could be incorporated into the stipulations in the official notice to lessees (NTLs). The notification should be no later than 3 weeks prior to a survey, because 3 weeks is about the longest time any fishing vessel will be at sea. The date, time, vessel contact information, a nautical chart section with the survey area depicted, and location (latitude/longitude and LORAN C) should be given in the notification. In some cases it may be necessary to "leap frog" geophysical surveys in alternating lanes that have been previously cleared of all fixed gear. The lanes would be wide enough to allow meaningful geophysical surveys and provide fishing areas in adjacent lanes.

5. **Improve communication -** This is the simplest but most important recommendation we can offer. Poor communication occurs at several levels. At sea, the standard form of vessel to vessel communication is the Very High Frequency (VHF) radio. The utility of this communication mode is dependent upon the cooperation of the captains involved in the transmission. In the Gulf, there can be significant language barriers as many of the pelagic longliners are non-English speaking. Improving vessel to vessel communications will depend upon the success of broader scale communications.

At a Gulfwide level, communication problems can be improved. Advance notice of offshore activities needs to be distributed to interested parties. A simple and effective network should be established through existing channels. Because of the current regulatory structure of offshore fisheries, there are several vehicles in place: logbook/permit programs, fishery management councils, and independent fisheries organizations. For example, notification of activities could be mailed to holders of pelagic longline and reef fish permits. NMFS already sends newsletters and other information to permit holders on a regular basis. Independent organizations of fishers such as the Bluewater Fisheries Association (pelagic longliners) also could be points of dissemination. All notices should be at least 3 weeks prior to an activity (see Recommendation 4 above). Positions in latitude/longitude and LORAN C should be given, and a section of a nautical chart with the survey area depicted should be provided in the notices. In addition, updated summaries of information from the MMS web page could be mailed out through the network. This could provide long-term indications of where activities and structures will be located.

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APPENDICES

APPENDIX A

GULF OF MEXICO RECREATIONAL BILLFISH CATCH AND EFFORT DATA

Table A-1. Gulf billfishing catch and effort, 1994 to 1998 (Source: NMFS Billfish Survey).

		Blue Marlin				White Marlin			
State/Location	Year	Landings	Releases	Total Catch	Effort	Landings	Releases	Total Catch	Effort
FLORIDA									
Total, 1994-1998		122	160	282	31496	68	151	219	28741
St. Petersburg	1994	2	0		879	2	1		879
	1995	7	4		948	0	2		725
	1996	7	5		985	1	2		788
	1997	0	4		503				
	1998					0	1		158
	Total	**16**	**13**		**3315**	**3**	**6**		**2550**
	Mean	**4**	**3.25**		**828.75**	**0.75**	**1.5**		**637.5**
Treasure Island	1994					0	0		266
	1995	1	1		100				
	Total	**1**	**1**		**100**	**0**	**0**		**266**
	Mean	**1**	**1**		**100**	**0**	**0**		**266**
Clearwater	1994	0	0		296				
	1997	1	0		297				
	1998					1	4		146
	Total	**1**	**0**		**593**	**1**	**4**		**146**
	Mean	**0.5**	**0**		**296.5**	**1**	**4**		**146**
Panama City	1994	6	7		2001	6	8		2001
	1995	10	10		1852	3	15		1993
	1996	6	12		1953	9	9		2060
	1997	6	5		2356	7	9		2223
	1998	4	8		1758	0	4		1565
	Total	**32**	**42**		**9920**	**25**	**45**		**9842**
	Mean	**6.4**	**8.4**		**1984**	**5**	**9**		**1968.4**
Destin	1994	7	5		1046	4	5		1046
	1995	2	4		752	1	3		752
	1996	0	1		514	4	4		522

State/Location	Year	Blue Marlin Landings	Blue Marlin Releases	Blue Marlin Total Catch	Blue Marlin Effort	White Marlin Landings	White Marlin Releases	White Marlin Total Catch	White Marlin Effort
	1997	4	4		206	0	0		206
	1998	0	2		502	0	3		502
	Total	**13**	**16**		**3020**	**9**	**15**		**3028**
	Mean	**2.6**	**3.2**		**604**	**1.8**	**3**		**605.6**
Pensacola	1994	16	34		3234	6	19		1385
	1995	13	19		2985	16	23		2985
	1996	13	17		2777	5	19		2855
	1997	9	9		2758	3	8		2758
	1998	8	9		2794	0	12		2926
	Total	**59**	**88**		**14548**	**30**	**81**		**12909**
	Mean	**11.8**	**17.6**		**2909.6**	**6**	**16.2**		**2581.8**
ALABAMA									
Total, 1994-1998		**39**	**102**	**141**	**15580**	**16**	**112**	**128**	**15531**
Orange Beach	1994	15	11		2747	4	28		2602
	1995	9	28		3060	4	23		3060
	1996	4	26		2842	3	12		2770
	1997	9	18		2915	4	27		3083
	1998	2	16		3574	1	21		3574
	Total	**39**	**99**		**15138**	**16**	**111**		**15089**
	Mean	**7.8**	**19.8**		**3027.6**	**3.2**	**22.2**		**3017.8**
Dauphin Island	1994	0	3		442	0	1		442
	Total	**0**	**3**		**442**	**0**	**1**		**442**
	Mean	**0**	**3**		**442**	**0**	**1**		**442**
MISSISSIPPI									
Total, 1994-1998		**9**	**16**	**25**	**2027**	**0**	**5**	**5**	**2027**
Mississippi	1997	8	8		962	0	2		962
	1998	1	8		1065	0	3		1065
	Total	**9**	**16**		**2027**	**0**	**5**		**2027**

State/Location	Year	Blue Marlin Landings	Releases	Total Catch	Effort	White Marlin Landings	Releases	Total Catch	Effort
	Mean	**4.5**	**8**		**1013.5**	**0**	**2.5**		**1013.5**
LOUISIANA									
Total, 1994-1998		82	500	**582**	31415	15	152	**167**	28582
Grand Isle	**1994**	1	14		809	1	3		624
	1995	2	5		456				
	1996	1	5		548	0	4		548
	1997	2	16		865	0	2		865
	1998	3	16		1280	1	15		1280
	Total	**9**	**56**		**3958**	**2**	**24**		**3317**
	Mean	**1.8**	**11.2**		**791.6**	**0.5**	**6**		**829.25**
South Pass	**1994**	9	79		4515	1	11		3926
	1995	9	112		5887	0	33		4960
	1996	8	100		5091	1	21		5091
	1997	9	73		5261	0	24		5084
	1998	2	47		4071	0	27		3880
	Total	**37**	**411**		**24825**	**2**	**116**		**22941**
	Mean	**7.4**	**82.2**		**4965**	**0.4**	**23.2**		**4588.2**
Freeport	**1994**	19	10		776	1	6		468
	1995	6	13		501	3	1		501
	1996	7	2		466	0	1		466
	1997	4	8		889	7	4		889
	Total	**36**	**33**		**2632**	**11**	**12**		**2324**
	Mean	**9**	**8.25**		**658**	**2.75**	**3**		**581**
TEXAS									
Total, 1994-1998		62	228	290	19984	31	194	225	17819
Galveston	**1998**								
	Total								
	Mean								

State/Location	Year	Blue Marlin Landings	Blue Marlin Releases	Blue Marlin Total Catch	Blue Marlin Effort	White Marlin Landings	White Marlin Releases	White Marlin Total Catch	White Marlin Effort
Port O'Connor	1994	9	24		1159	3	18		1159
	1995	16	32		758	4	8		758
	1996	2	10		742	1	9		742
	1997	10	10		1016	4	3		1016
	1998	2	3		1519	1	11		1519
	Total	**39**	**79**		**5194**	**13**	**49**		**5194**
	Mean	**7.8**	**15.8**		**1038.8**	**2.6**	**9.8**		**1038.8**
Port Aransas	1994	2	3		91				
	1995	2	4		494	1	2		494
	1998	1	2		392	2	2		392
	Total	**5**	**9**		**977**	**3**	**4**		**886**
	Mean	**1.67**	**3**		**325.67**	**1.5**	**2**		**443**
Port Mansfield	1994	0	4		404	1	12		404
	1995	1	1		216	1	0		216
	1996	0	4		430	1	3		430
	1997	0	3		386	1	2		386
	Total	**1**	**12**		**1436**	**4**	**17**		**1436**
	Mean	**0.25**	**3**		**359**	**1**	**4.25**		**359**
Port Isabel	1994	3	32		2383	2	36		1836
	1995	5	27		2842	0	32		2699
	1996	3	35		2720	0	10		1926
	1997	5	15		2502	9	26		2198
	1998	0	18		1885	0	19		1599
	Total	**16**	**127**		**12332**	**11**	**123**		**10258**
	Mean	**3.2**	**25.4**		**2466.4**	**2.2**	**24.6**		**2051.6**
Padre Island	1998	1	1		45	0	1		45
	Total	**1**	**1**		**45**	**0**	**1**		**45**
	Mean	**1**	**1**		**45**	**0**	**1**		**45**
Total # Individuals 1994-1998				1320				744	

State/Location	Year	Sailfish Landings	Sailfish Releases	Sailfish Total Catch	Sailfish Effort	Spearfish Landings	Spearfish Releases	Spearfish Total Catch	Spearfish Effort
FLORIDA									
Total, 1994-1998		35	24	59	21255	0	1	1	1353
St. Petersburg	**1994**	4	0		685				
	1995	1	0		223				
	1996	6	1		995				
	1997	0	4		503				
	1998	0	2		158				
	Total	**11**	**7**		**2564**				
	Mean	**2.2**	**1.4**		**512.8**				
Treasure Island	**1994**	0	0		266				
	1995								
	Total	**0**	**0**		**266**				
	Mean	**0**	**0**		**266**				
Clearwater	**1994**								
	1997	1	0		297				
	1998	2	0		146				
	Total	**3**	**0**		**443**				
	Mean	**1.5**	**0**		**221.5**				
Panama City	**1994**	1	1		1711				
	1995	4	3		1852				
	1996	4	0		1729				
	1997								
	1998	0	2		1346				
	Total	**9**	**6**		**6638**				
	Mean	**2.25**	**1.5**		**1659.5**				
Destin	**1994**	1	0		724				
	1995	1	0		752				
	1996								
	1997	1	0		206				
	1998	0	1		502				

State/Location	Year	Sailfish Landings	Sailfish Releases	Sailfish Total Catch	Sailfish Effort	Spearfish Landings	Spearfish Releases	Spearfish Total Catch	Spearfish Effort
	Total	**3**	**1**		**2184**				
	Mean	**0.75**	**0.25**		**546**				
Pensacola	1994	2	3		2521	0	1		1353
	1995	2	0		1755				
	1996	4	3		1463				
	1997	1	1		1433				
	1998	0	3		1988				
	Total	**9**	**10**		**9160**	**0**	**1**		**1353**
	Mean	**1.8**	**2**		**1832**	**0**	**1**		**1353**
ALABAMA									
Total, 1994-1998		5	4	9	7769	1	0	1	586
Orange Beach	1994	3	1		1682				
	1995	1	2		1716				
	1996	0	0		627				
	1997	1	0		1945	1	0		586
	1998	0	1		1799				
	Total	**5**	**4**		**7769**	**1**	**0**		**586**
	Mean	**1**	**0.8**		**1553.8**	**1**	**0**		**586**
Dauphin Island	1994								
	Total								
	Mean								
MISSISSIPPI									
Total, 1994-1998		0	0	0	0	0	1	1	1065
Mississippi	1997								
	1998					0	1		1065
	Total					**0**	**1**		**1065**
	Mean					**0**	**1**		**1065**

State/Location	Year	Sailfish Landings	Sailfish Releases	Sailfish Total Catch	Sailfish Effort	Spearfish Landings	Spearfish Releases	Spearfish Total Catch	Spearfish Effort
LOUISIANA									
Total, 1994-1998		12	28	40	15286	0	2	2	1279
Grand Isle	1994	0	1		624				
	1995	0	1		340				
	1996	0	1		548				
	1997	0	1		865				
	1998								
	Total	**0**	**4**		**2377**				
	Mean	**0**	**1**		**594.25**				
South Pass	1994	0	4		3306	0	1		461
	1995	0	7		2446	0	1		330
	1996	0	3		991				
	1997	0	3		2267	0	0		488
	1998	0	3		1390				
	Total	**0**	**20**		**10400**	**0**	**2**		**1279**
	Mean	**0**	**4**		**2080**	**0**	**0.67**		**426.33**
Freeport	1994	2	0		653				
	1995	3	1		501				
	1996	1	3		466				
	1997	6	0		889				
	Total	**12**	**4**		**2509**				
	Mean	**3**	**1**		**627.25**				
TEXAS									
Total, 1994-1998		112	220	332	20522	0	5	5	3386
Galveston	1998	4	0		36				
	Total	**4**	**0**		**36**				
	Mean	**4**	**0**		**36**				
Port O'Connor	1994	6	4		1159	0	2		1159
	1995	2	4		758				

State/Location	Year	Sailfish Landings	Sailfish Releases	Sailfish Total Catch	Sailfish Effort	Spearfish Landings	Spearfish Releases	Spearfish Total Catch	Spearfish Effort
	1996	2	9		742				
	1997	1	3		1016				
	1998	9	3		1519				
	Total	**20**	**23**		**5194**	**0**	**2**		**1159**
	Mean	**4**	**4.6**		**1038.8**	**0**	**2**		**1159**
Port Aransas	1994	0	1		91				
	1995	2	4		494				
	1998	15	12		392				
	Total	**17**	**17**		**977**				
	Mean	**5.67**	**5.67**		**325.67**				
Port Mansfield	1994	1	1		404				
	1995	6	3		216				
	1996	2	5		430				
	1997	2	3		386				
	Total	**11**	**12**		**1436**				
	Mean	**2.75**	**3**		**359**				
Port Isabel	1994	4	22		2417				
	1995	14	31		2842	0	1		374
	1996	16	40		3010	0	1		319
	1997	8	25		2502	0	1		1397
	1998	22	49		2099	0	0		137
	Total	**64**	**167**		**12870**	**0**	**3**		**2227**
	Mean	**12.8**	**33.4**		**2574**	**0**	**0.75**		**556.75**
Padre Island	1998	0	1		45				
	Total	**0**	**1**		**45**				
	Mean	**0**	**1**		**45**				
Total # Individuals 1994-1998				440				10	

		Bluefin				Yellowfin			
State/Location	Year	Landings	Releases	Total Catch	Effort	Landings	Releases	Total Catch	Effort
FLORIDA									
Total, 1994-1998		0	0	0	0	188	1	189	23453
St. Petersburg	1994					1	0		194
	1995								
	1996					1	0		365
	1997								
	1998					2	0		158
	Total					4	0		717
	Mean					1.33	0		239
Treasure Island	1994								
	1995								
	Total								
	Mean								
Clearwater	1994								
	1997								
	1998								
	Total								
	Mean								
Panama City	1994					4	0		1897
	1995					1	0		1588
	1996					9	0		1398
	1997					9	0		1633
	1998					9	0		1457
	Total					32	0		7973
	Mean					6.4	0		1594.6
Destin	1994					6	0		1046
	1995								
	1996					9	0		514
	1997					2	0		206
	1998					3	0		502

		Bluefin				Yellowfin			
State/Location	Year	Landings	Releases	Total Catch	Effort	Landings	Releases	Total Catch	Effort
	Total					**20**	**0**		**2268**
	Mean					**5**	**0**		**567**
Pensacola	1994					26	1		2528
	1995					22	0		2671
	1996					29	0		2297
	1997					18	0		2172
	1998					37	0		2827
	Total					**132**	**1**		**12495**
	Mean					**26.4**	**0.2**		**2499**
ALABAMA									
Total, 1994-1998		0	0	0	2063	149	3	152	14988
Orange Beach	1994					21	0		2602
	1995	0	0		1136	17	0		2837
	1996	0	0		927	25	0		2842
	1997					27	3		2915
	1998					57	0		3350
	Total	**0**	**0**		**2063**	**147**	**3**		**14546**
	Mean	**0**	**0**		**1031.5**	**29.4**	**0.6**		**2909.2**
Dauphin Island	1994					2	0		442
	Total					**2**	**0**		**442**
	Mean					**2**	**0**		**442**
MISSISSIPPI									
Total, 1994-1998		0	0	0	0	21	0	21	2027
Mississippi	1997					10	0		962
	1998					11	0		1065
	Total					**21**	**0**		**2027**
	Mean					**10.5**	**0**		**1013.5**

State/Location	Year	Bluefin				Yellowfin			
		Landings	Releases	Total Catch	Effort	Landings	Releases	Total Catch	Effort
LOUISIANA									
Total, 1994-1998		0	0	0	0	390	107	497	28310
Grand Isle	1994					2	5		686
	1995					5	1		456
	1996					3	0		548
	1997					5	1		865
	1998					13	4		1280
	Total					**28**	**11**		**3835**
	Mean					**5.6**	**2.2**		**767**
South Pass	1994					56	20		4515
	1995					33	9		5475
	1996					66	22		4392
	1997					104	24		5218
	1998					98	21		4071
	Total					**357**	**96**		**23671**
	Mean					**71.4**	**19.2**		**4734.2**
Freeport	1994					5	0		468
	1995					0	0		336
	1996								
	1997								
	Total					**5**	**0**		**804**
	Mean					**2.5**	**0**		**402**
TEXAS									
Total, 1994-1998		0	0	0	0	183	96	279	17973
Galveston	1998								
	Total								
	Mean								
Port O'Connor	1994					7	1		1159
	1995					7	3		758

State/Location	Year	Bluefin Landings	Bluefin Releases	Bluefin Total Catch	Bluefin Effort	Yellowfin Landings	Yellowfin Releases	Yellowfin Total Catch	Yellowfin Effort
	1996					3	0		742
	1997					1	0		1016
	1998					8	0		1519
	Total					**26**	**4**		**5194**
	Mean					**5.2**	**0.8**		**1038.8**
Port Aransas	1994								
	1995					8	0		494
	1998								
	Total					**8**	**0**		**494**
	Mean					**8**	**0**		**494**
Port Mansfield	1994					5	0		404
	1995					2	7		216
	1996					1	0		430
	1997								
	Total					**8**	**7**		**1050**
	Mean					**2.67**	**2.33**		**350**
Port Isabel	1994					47	39		1734
	1995					15	9		2606
	1996					58	18		2662
	1997					14	7		2334
	1998					7	12		1899
	Total					**141**	**85**		**11235**
	Mean					**28.2**	**17**		**2247**
Padre Island	1998								
	Total								
	Mean								
Total # Individuals 1994-1998				0				1138	
				0				1138	

State/Location	Year	Swordfish Landings	Swordfish Releases	Swordfish Total Catch	Swordfish Effort	Totals Landings	Totals Releases	Totals Total Catch	Totals Effort	Totals CPUE
FLORIDA										
Total, 1994-1998		0	0	0	514	**413**	**337**	**750**	**106812**	**0.007**
St. Petersburg	1994					9	1	10	2637	0.004
	1995					8	6	14	1896	0.007
	1996					15	8	23	3133	0.007
	1997					0	8	8	1006	0.008
	1998					2	3	5	474	0.011
	Total					**34**	**26**	**60**	**9146**	**0.007**
	Mean					**6.8**	**5.2**	**12**	**1829.2**	
Treasure Island	1994					0	0	0	532	0.000
	1995					1	1	2	100	0.020
	Total					**1**	**1**	**2**	**632**	**0.003**
	Mean					**0.5**	**0.5**	**1**	**316**	
Clearwater	1994					0	0	0	296	0.000
	1997					2	0	2	594	0.003
	1998					3	4	7	292	0.024
	Total					**5**	**4**	**9**	**1182**	**0.008**
	Mean					**1.67**	**1.33**	**3**	**394**	
Panama City	1994					17	16	33	7610	0.004
	1995					18	28	46	7285	0.006
	1996					28	21	49	7140	0.007
	1997					22	14	36	6212	0.006
	1998					13	14	27	6126	0.004
	Total					**98**	**93**	**191**	**34373**	**0.006**
	Mean					**19.6**	**18.6**	**38.2**	**6874.6**	
Destin	1994					18	10	28	3862	0.007
	1995					4	7	11	2256	0.005
	1996	0	0		514	13	5	18	2064	0.009
	1997					7	4	11	824	0.013
	1998					3	6	9	2008	0.004

State/Location	Year	Swordfish Landings	Swordfish Releases	Swordfish Total Catch	Swordfish Effort	Totals Landings	Totals Releases	Totals Total Catch	Totals Effort	Totals CPUE
	Total	0	0		514	45	32	77	11014	0.007
	Mean	0	0		514	9	6.4	15.4	2202.8	
Pensacola	1994					50	58	108	11021	0.010
	1995					53	42	95	10396	0.009
	1996					51	39	90	9392	0.010
	1997					31	18	49	9121	0.005
	1998					45	24	69	10535	0.007
	Total					230	181	411	50465	0.008
	Mean					46	36.2	82.2	10093	
ALABAMA										
Total, 1994-1998		0	0	0	0	210	221	431	56517	0.008
Orange Beach	1994					43	40	83	9633	0.009
	1995					31	53	84	11809	0.007
	1996					32	38	70	10008	0.007
	1997					42	48	90	11444	0.008
	1998					60	38	98	12297	0.008
	Total					208	217	425	55191	0.008
	Mean					41.6	43.4	85	11038.2	
Dauphin Island	1994					2	4	6	1326	0.005
	Total					2	4	6	1326	0.005
	Mean					2	4	6	1326	
MISSISSIPPI										
Total, 1994-1998		0	0	0	0	30	22	52	7146	0.007
Mississippi	1997					18	10	28	2886	0.010
	1998					12	12	24	4260	0.006
	Total					30	22	52	7146	0.007
	Mean					15	11	26	3573	

State/Location	Year	Swordfish Landings	Swordfish Releases	Swordfish Total Catch	Swordfish Effort	Totals Landings	Totals Releases	Totals Total Catch	Totals Effort	Totals CPUE
LOUISIANA										
Total, 1994-1998		0	0	0	0	499	789	1288	104872	0.012
Grand Isle	1994					4	23	27	2743	0.010
	1995					7	7	14	1252	0.011
	1996					4	10	14	2192	0.006
	1997					7	20	27	3460	0.008
	1998					17	35	52	3840	0.014
	Total					39	95	134	13487	0.010
	Mean					7.8	19	26.8	2697.4	
South Pass	1994					66	115	181	16723	0.011
	1995					42	162	204	19098	0.011
	1996					75	146	221	15565	0.014
	1997					113	124	237	18318	0.013
	1998					100	98	198	13412	0.015
	Total					396	645	1041	83116	0.013
	Mean					79.2	129	208.2	16623.2	
Freeport	1994					27	16	43	2365	0.018
	1995					12	15	27	1839	0.015
	1996					8	6	14	1398	0.010
	1997					17	12	29	2667	0.011
	Total					64	49	113	8269	0.014
	Mean					16	12.25	28.25	2067.25	
TEXAS										
Total, 1994-1998		0	0	0	0	388	743	1131	79684	0.014
Galveston	1998					4	0	4	36	0.111
	Total					4	0	4	36	0.111
	Mean					4	0	4	36	
Port O'Connor	1994					25	49	74	5795	0.013
	1995					29	47	76	3032	0.025

State/Location	Year	Swordfish Landings	Swordfish Releases	Swordfish Total Catch	Swordfish Effort	Totals Landings	Totals Releases	Totals Total Catch	Totals Effort	Totals CPUE
	1996					8	28	36	2968	0.012
	1997					16	16	32	4064	0.008
	1998					20	17	37	6076	0.006
	Total					**98**	**157**	**255**	**21935**	**0.012**
	Mean					**19.6**	**31.4**	**51**	**4387**	
Port Aransas	1994					2	4	6	182	0.033
	1995					13	10	23	1976	0.012
	1998					18	16	34	1176	0.029
	Total					**33**	**30**	**63**	**3334**	**0.019**
	Mean					**11**	**10**	**21**	**1111.33**	
Port Mansfield	1994					7	17	24	1616	0.015
	1995					10	11	21	864	0.024
	1996					4	12	16	1720	0.009
	1997					3	8	11	1158	0.009
	Total					**24**	**48**	**72**	**5358**	**0.013**
	Mean					**6**	**12**	**18**	**1339.5**	
Port Isabel	1994					56	129	185	8370	0.022
	1995					34	100	134	11363	0.012
	1996					77	104	181	10637	0.017
	1997					36	74	110	10933	0.010
	1998					29	98	127	7619	0.017
	Total					**232**	**505**	**737**	**48922**	**0.015**
	Mean					**46.4**	**101**	**147.4**	**9784.4**	
Padre Island	1998					1	3	4	135	0.030
	Total					**1**	**3**	**4**	**135**	**0.030**
	Mean					**1**	**3**	**4**	**135**	
Total # Individuals 1994-1998				0						

Table A-2. Gulf billfishing tournaments in order by effort (individual years) (Source: NMFS Billfish Survey).

Tourney Name	Location	Year	Effort
PENSACOLA INTERNATIONAL BILLFISH	PENSACOLA, FL	1998	7424
TEXAS INTERNATIONAL FISHING	PORT ISABEL, TX	1997	6985
BAY POINT INVITATIONAL	PANAMA CITY, FL	1994	6844
PENSACOLA INTERNATIONAL BILLFISH	PENSACOLA, FL	1994	6765
BAY POINT INVITATIONAL	PANAMA CITY, FL	1995	6352
POCO BUENO	PORT O'CONNOR, TX	1998	6076
PENSACOLA INTERNATIONAL BILLFISH	PENSACOLA, FL	1995	5840
POCO BUENO	PORT O'CONNOR, TX	1994	5795
TEXAS INTERNATIONAL FISHING	PORT ISABEL, TX	1998	5792
MOBILE BIG GAME FISHING CLUB MEMORIAL DAY	ORANGE BEACH, AL	1995	5680
BAY POINT INVITATIONAL	PANAMA CITY, FL	1996	5592
ORANGE BEACH INVITATIONAL	ORANGE BEACH, AL	1997	5436
ALABAMA INTERNATIONAL	ORANGE BEACH, AL	1998	5408
BAY POINT INVITATIONAL	PANAMA CITY, FL	1998	5384
TEXAS INTERNATIONAL FISHING	PORT ISABEL, TX	1995	5208
TEXAS INTERNATIONAL FISHING	PORT ISABEL, TX	1996	5208
BAY POINT INVITATIONAL	PANAMA CITY, FL	1997	4899
NEW ORLEANS BIG GAME FISHING CLUB INVITATIONAL	SOUTH PASS, LA	1997	4880
NEW ORLEANS BIG GAME FISHING CLUB INVITATIONAL	SOUTH PASS, LA	1994	4848
ORANGE BEACH INVITATIONAL	ORANGE BEACH, AL	1994	4652
PENSACOLA INTERNATIONAL BILLFISH	PENSACOLA, FL	1996	4596
MISSISSIPPI GULF COAST CLASSIC	MISSISSIPPI	1998	4260
TEXAS INTERNATIONAL FISHING	PORT ISABEL, TX	1994	4184
PENSACOLA INTERNATIONAL BILLFISH	PENSACOLA, FL	1997	4136
POCO BUENO	PORT O'CONNOR, TX	1997	4064
MOBILE BIG GAME FISHING CLUB MEMORIAL DAY	ORANGE BEACH, AL	1996	3708
ORANGE BEACH INVITATIONAL	ORANGE BEACH, AL	1996	3648
NEW ORLEANS BIG GAME FISHING CLUB INVITATIONAL	SOUTH PASS, LA	1995	3580
EMPIRE-SOUTH PASS FISHING RODEO	GRAND ISLE, LA	1997	3460
ORANGE BEACH INVITATIONAL	ORANGE BEACH, AL	1995	3363
MOBILE BIG GAME FISHING CLUB MEMORIAL DAY	ORANGE BEACH, AL	1998	3285
BLUE MARLIN CLASSIC	PENSACOLA, FL	1994	3168
GRAND ISLE TARPON RODEO	SOUTH PASS, LA	1997	3112
NEW ORLEANS BIG GAME FISHING CLUB INVITATIONAL	SOUTH PASS, LA	1996	3084
POCO BUENO	PORT O'CONNOR, TX	1995	3032
POCO BUENO	PORT O'CONNOR, TX	1996	2968
NEW ORLEANS BIG GAME FISHING CLUB INVITATIONAL	SOUTH PASS, LA	1998	2934
MOBILE BIG GAME FISHING CLUB LADIES	ORANGE BEACH, AL	1997	2930
MOBILE BIG GAME FISHING CLUB MEMORIAL DAY	ORANGE BEACH, AL	1997	2910
ANNUAL FORT WALTON-DESTIN BILLFISH	DESTIN, FL	1994	2896
MISSISSIPPI GULF COAST CLASSIC	MISSISSIPPI	1997	2886
NEW ORLEANS BIG GAME FISHING CLUB LADIES DAY	SOUTH PASS, LA	1994	2840
MOBILE BIG GAME FISHING CLUB MEMORIAL DAY	ORANGE BEACH, AL	1994	2760
BLUE MARLIN CLASSIC	PENSACOLA, FL	1995	2748
BLUE MARLIN CLASSIC	PENSACOLA, FL	1996	2646
MOBILE BIG GAME FISHING CLUB LADIES	ORANGE BEACH, AL	1996	2508
EMPIRE-SOUTH PASS FISHING RODEO	GRAND ISLE, LA	1994	2496
BLUE MARLIN CLASSIC	PENSACOLA, FL	1997	2463
MOBILE BIG GAME FISHING CLUB LADIES	ORANGE BEACH, AL	1995	2320
NEW ORLEANS BIG GAME FISHING CLUB LADIES DAY	SOUTH PASS, LA	1998	2280
ANNUAL FORT WALTON-DESTIN BILLFISH	DESTIN, FL	1995	2256
EMPIRE-SOUTH PASS FISHING RODEO	GRAND ISLE, LA	1996	2192
SOUTH PASS MEMORIAL DAY	SOUTH PASS, LA	1994	2124

Tourney Name	Location	Year	Effort
ANNUAL FORT WALTON-DESTIN BILLFISH	DESTIN, FL	1996	2056
BATON ROUGE BGFC "Damn Cool"	SOUTH PASS, LA	1995	2056
ANNUAL FORT WALTON-DESTIN BILLFISH	DESTIN, FL	1998	2008
EMPIRE-SOUTH PASS FISHING RODEO	SOUTH PASS, LA	1995	1962
NEW ORLEANS BIG GAME FISHING CLUB SEPTEMBER	SOUTH PASS, LA	1997	1952
GRAND ISLE TARPON RODEO	GRAND ISLE, LA	1998	1950
GENERAL RAY HUFF BILLFISH	SOUTH PASS, LA	1998	1924
EMPIRE-SOUTH PASS FISHING RODEO	GRAND ISLE, LA	1998	1890
SOUTH TEXAS BGFC SEVENTH	PORT ISABEL, TX	1995	1870
BLUE MARLIN CLASSIC	PENSACOLA, FL	1998	1866
NEW ORLEANS BIG GAME FISHING CLUB TAG & RELEASE	SOUTH PASS, LA	1994	1844
MOBILE BIG GAME FISHING CLUB LADIES	ORANGE BEACH, AL	1998	1788
N. O./B. R. BGFC LABOR DAY	SOUTH PASS, LA	1997	1761
GRAND ISLE TARPON RODEO	GRAND ISLE, LA	1994	1758
GRAND ISLE TARPON RODEO	SOUTH PASS, LA	1996	1749
SOUTH PASS MEMORIAL DAY	SOUTH PASS, LA	1996	1749
ANNUAL AUGUST BILLFISH CLASSIC	FREEPORT, TX	1997	1734
PORT MANSFIELD FISHING	PORT MANSFIELD, TX	1996	1720
GENERAL RAY HUFF BILLFISH	SOUTH PASS, LA	1995	1650
PORT MANSFIELD FISHING	PORT MANSFIELD, TX	1994	1616
MARLIN INTERNATIONAL LONESTAR SHOWDOWN	PORT ISABEL, TX	1996	1595
BATON ROUGE BIG GAME FISHING CLUB INVITATIONAL	SOUTH PASS, LA	1994	1560
SOUTH PASS MEMORIAL DAY	SOUTH PASS, LA	1998	1533
NEW ORLEANS BIG GAME FISHING CLUB LADIES DAY	SOUTH PASS, LA	1995	1497
NEW ORLEANS BIG GAME FISHING CLUB LADIES DAY	SOUTH PASS, LA	1996	1497
FL. WEST COAST CHAMIONSHIP, FINALE	ST PETERSBURG, FL	1996	1460
MARLIN INTERNATIONAL LONESTAR SHOWDOWN	PORT ISABEL, TX	1995	1404
NEW ORLEANS BIG GAME FISHING CLUB SEPTEMBER	SOUTH PASS, LA	1996	1404
WATERMELON OPEN	FREEPORT, TX	1996	1398
DEEP SEA ROUNDUP	PORT ARANSAS, TX	1995	1396
MOBILE BIG GAME FISHING CLUB LADIES	ORANGE BEACH, AL	1994	1392
ANNUAL AUGUST BILLFISH CLASSIC	FREEPORT, TX	1994	1380
MARLIN INTERNATIONAL LONESTAR SHOWDOWN	PORT ISABEL, TX	1994	1372
KETCH L	ORANGE BEACH, AL	1998	1368
WATERMELON OPEN	FREEPORT, TX	1995	1344
GULF COAST MASTERS	DAUPHIN ISLAND, LA	1994	1326
OLD SALT	ST PETERSBURG, FL	1996	1269
OLD SALT	ST PETERSBURG, FL	1994	1257
SOUTH PASS MEMORIAL DAY	SOUTH PASS, LA	1995	1254
BATON ROUGE BIG GAME FISHING CLUB	SOUTH PASS, LA	1998	1248
NEW ORLEANS BIG GAME FISHING CLUB TAG & RELEASE	SOUTH PASS, LA	1995	1236
NEW ORLEANS BIG GAME FISHING CLUB TAG & RELEASE	SOUTH PASS, LA	1996	1233
N. O./B. R. BGFC LABOR DAY	SOUTH PASS, LA	1994	1232
NEW ORLEANS BIG GAME FISHING CLUB TAG & RELEASE	SOUTH PASS, LA	1997	1227
SOUTH TEXAS BGFC SEVENTH	PORT ISABEL, TX	1996	1220
MARLIN INTERNATIONAL LONESTAR SHOWDOWN	PORT ISABEL, TX	1997	1188
BATON ROUGE BIG GAME FISHING CLUB	SOUTH PASS, LA	1997	1185
BATON ROUGE BIG GAME FISHING CLUB LADIES	SOUTH PASS, LA	1995	1180
OUTCAST SMALL BOAT BILLFISH	PENSACOLA, FL	1995	1180
N. O./B. R. BGFC LABOR DAY	SOUTH PASS, LA	1995	1179
PORT MANSFIELD FISHING	PORT MANSFIELD, TX	1997	1158
GENERAL RAY HUFF BILLFISH	SOUTH PASS, LA	1997	1134
SOUTH PASS MEMORIAL DAY	SOUTH PASS, LA	1997	1128
BATON ROUGE BGFC "Damn Cool"	SOUTH PASS, LA	1998	1122
N. O./B. R. BGFC LABOR DAY	SOUTH PASS, LA	1996	1112

Tourney Name	Location	Year	Effort
BATON ROUGE BGFC "Damn Cool"	SOUTH PASS, LA	1996	1086
PRATT MARTIN/NEW ORLEANS BGFC FIRST	SOUTH PASS, LA	1997	1076
N. O./B. R. BGFC LABOR DAY	SOUTH PASS, LA	1998	1065
CYPRESS COVE INVITATIONAL BILLFISH TOURNAMENT	SOUTH PASS, LA	1995	1038
GRAND ISLE TARPON RODEO	GRAND ISLE, LA	1995	1020
CYPRESS COVE INVITATIONAL BILLFISH TOURNAMENT	SOUTH PASS, LA	1996	1008
OLD SALT	ST PETERSBURG, FL	1997	1006
POOR MAN'S SHOOTOFF AT PANAMA CITY	PANAMA CITY, FL	1996	993
NEW ORLEANS BIG GAME FISHING CLUB SEPTEMBER	SOUTH PASS, LA	1995	975
PRATT MARTIN/NEW ORLEANS BGFC FIRST	SOUTH PASS, LA	1996	969
SOUTH TEXAS BGFC SEVENTH	PORT ISABEL, TX	1997	968
SOUTH TEXAS BGFC SEVENTH	PORT ISABEL, TX	1994	966
PENSACOLA LADIES	PENSACOLA, FL	1997	951
WATERMELON OPEN	FREEPORT, TX	1997	933
DEEP SEA ROUNDUP	PORT ARANSAS, TX	1998	906
NEW ORLEANS BIG GAME FISHING CLUB SEPTEMBER	SOUTH PASS, LA	1998	897
PRATT MARTIN/NEW ORLEANS BGFC FIRST	SOUTH PASS, LA	1995	891
PORT MANSFIELD FISHING	PORT MANSFIELD, TX	1995	864
FL. WEST COAST CHAMIONSHIP, FINALE	ST PETERSBURG, FL	1995	852
ANNUAL FORT WALTON-DESTIN BILLFISH	DESTIN, FL	1997	824
PENSACOLA LADIES	PENSACOLA, FL	1994	824
FL. WEST COAST CHAMIONSHIP, LEG #3	ST PETERSBURG, FL	1994	798
PENSACOLA LADIES	PENSACOLA, FL	1996	798
ANCHORAGE BILLFISH TOURNAMENT	PANAMA CITY, FL	1995	792
POOR MAN'S SHOOTOFF AT PANAMA CITY	PANAMA CITY, FL	1997	784
PENSACOLA JUNIOR ANGLER'S TOURNAMENT	PENSACOLA, FL	1997	759
MBGFC JUNIOR ANGLER TOURNAMENT	ORANGE BEACH, AL	1994	684
GENERAL RAY HUFF BILLFISH	SOUTH PASS, LA	1996	674
PENSACOLA JUNIOR ANGLER'S TOURNAMENT	PENSACOLA, FL	1994	664
SOUTH TEXAS BGFC SIXTH	PORT ISABEL, TX	1995	652
MONKEY BOAT BILLFISH TOURNAMENT	PENSACOLA, FL	1994	651
PENSACOLA JUNIOR ANGLER'S TOURNAMENT	PENSACOLA, FL	1998	651
SOUTH TEXAS BGFC SECOND	PORT ISABEL, TX	1994	639
OUTCAST SMALL BOAT BILLFISH	PENSACOLA, FL	1994	630
WATERMELON OPEN	FREEPORT, TX	1994	616
SOUTHWEST FISHING CLUB	SOUTH PASS, LA	1995	600
OLD SALT	ST PETERSBURG, FL	1995	598
FL. WEST COAST CHAMPIONSHIP, LEG #2	CLEARWATER, FL	1997	594
FL. WEST COAST CHAMIONSHIP, FINALE	ST PETERSBURG, FL	1994	582
ISLAND MOORINGS PROFESSIONAL BILLFISH TOURNAMENT	PORT ARANSAS, TX	1995	580
POOR MAN'S SHOOTOFF AT PANAMA CITY	PANAMA CITY, FL	1994	558
PENSACOLA JUNIOR ANGLER'S TOURNAMENT	PENSACOLA, FL	1996	555
CYPRESS COVE INVITATIONAL BILLFISH TOURNAMENT	SOUTH PASS, LA	1997	552
GENERAL RAY HUFF BILLFISH	SOUTH PASS, LA	1994	552
SOUTH TEXAS BGFC FINALE (FORMERLY CHIQUITA)	PORT ISABEL, TX	1995	552
SOUTH TEXAS BGFC FINALE (FORMERLY CHIQUITA)	PORT ISABEL, TX	1998	548
HARBOR DOCKS BLUE MARLIN	DESTIN, FL	1994	546
SOUTH TEXAS BGFC SECOND	PORT ISABEL, TX	1996	543
SOUTH TEXAS BGFC FIFTH	PORT ISABEL, TX	1995	540
SOUTH TEXAS BGFC FINALE (FORMERLY CHIQUITA)	PORT ISABEL, TX	1997	540
BUDWISER HIGH ROLLERS BILLFISH	TREASURE ISLAND, FL	1994	532
ANNUAL AUGUST BILLFISH CLASSIC	FREEPORT, TX	1995	495
FL. WEST COAST CHAMIONSHIP, LEG #3	ST PETERSBURG, FL	1998	474
ANCHORAGE BILLFISH TOURNAMENT	PANAMA CITY, FL	1996	448
MBGFC JUNIOR ANGLER TOURNAMENT	ORANGE BEACH, AL	1998	448

Tourney Name	Location	Year	Effort
FL. WEST COAST CHAMIONSHIP, LEG #3	ST PETERSBURG, FL	1995	446
MBGFC JUNIOR ANGLER TOURNAMENT	ORANGE BEACH, AL	1995	446
MONKEY BOAT BILLFISH TOURNAMENT	PENSACOLA, FL	1997	438
OFFSHORE BILLFISH CLASSIC	PANAMA CITY, FL	1998	438
SOUTH TEXAS BGFC THIRD	PORT ISABEL, TX	1996	435
SOUTH TEXAS BGFC SECOND	PORT ISABEL, TX	1995	429
HARBOR DOCKS SUMMER OPEN	DESTIN, FL	1994	420
SOUTH TEXAS BGFC FOURTH	PORT ISABEL, TX	1995	402
OFFSHORE BILLFISH CLASSIC	PANAMA CITY, FL	1997	396
OUTCAST SMALL BOAT BILLFISH	PENSACOLA, FL	1998	396
SOUTH TEXAS BGFC THIRD	PORT ISABEL, TX	1994	396
FL. WEST COAST CHAMIONSHIP, LEG #3	ST PETERSBURG, FL	1996	394
MONKEY BOAT BILLFISH TOURNAMENT	PENSACOLA, FL	1996	387
PRATT MARTIN/NEW ORLEANS BGFC FIRST	SOUTH PASS, LA	1998	382
SOUTH TEXAS BGFC SECOND	PORT ISABEL, TX	1997	376
SOUTH TEXAS BGFC FINALE (FORMERLY CHIQUITA)	PORT ISABEL, TX	1994	375
OUTCAST SMALL BOAT BILLFISH	PENSACOLA, FL	1997	374
SOUTH TEXAS BGFC SIXTH	PORT ISABEL, TX	1997	372
TEXAS BILLFISH OPEN	FREEPORT, TX	1994	369
PORT MANSFIELD SHOOTOUT	PORT ISABEL, TX	1996	362
SOUTH TEXAS BGFC FINALE (FORMERLY CHIQUITA)	PORT ISABEL, TX	1996	338
OUTCAST SMALL BOAT BILLFISH	PENSACOLA, FL	1996	332
SOUTH TEXAS BGFC FOURTH	PORT ISABEL, TX	1994	328
SOUTH TEXAS BGFC SIXTH	PORT ISABEL, TX	1996	324
MONKEY BOAT BILLFISH TOURNAMENT	PENSACOLA, FL	1995	318
PENSACOLA LADIES	PENSACOLA, FL	1995	310
PORT MANSFIELD SHOOTOUT	PORT ISABEL, TX	1995	306
FL. WEST COAST CHAMPIONSHIP, LEG #2	CLEARWATER, FL	1994	296
FL. WEST COAST CHAMPIONSHIP, LEG #2	CLEARWATER, FL	1998	292
SOUTH TEXAS BGFC FIFTH	PORT ISABEL, TX	1996	274
PORT ARANSAS DOCKS	TROLLING	1998	270
PORT MANSFIELD SHOOTOUT	PORT ISABEL, TX	1997	270
MARLIN INTERNATIONAL LONESTAR SHOWDOWN	PORT ISABEL, TX	1998	255
SOUTH TEXAS BGFC FOURTH	PORT ISABEL, TX	1998	243
SOUTH TEXAS BGFC FOURTH	PORT ISABEL, TX	1997	234
GOLDEN MEADOW TARPON RODEO	GRAND ISLE, LA	1995	232
SOUTH TEXAS BGFC FOURTH	PORT ISABEL, TX	1996	218
SOUTH TEXAS BGFC FIFTH	PORT ISABEL, TX	1998	210
ANCHORAGE BILLFISH TOURNAMENT	PANAMA CITY, FL	1994	208
NEW ORLEANS BIG GAME FISHING CLUB LADIES DAY	SOUTH PASS, LA	1997	204
MONKEY BOAT BILLFISH TOURNAMENT	PENSACOLA, FL	1998	198
SOUTH TEXAS BGFC THIRD	PORT ISABEL, TX	1998	198
SOUTH TEXAS BGFC SEVENTH	PORT ISABEL, TX	1998	194
PORT ARANSAS OUTBOARD	PORT ARANSAS, TX	1994	182
MBGFC JUNIOR ANGLER TOURNAMENT	ORANGE BEACH, AL	1997	168
SPORTSMANS BLUE MARLIN TOURNAMENT	ORANGE BEACH, AL	1994	145
MBGFC JUNIOR ANGLER TOURNAMENT	ORANGE BEACH, AL	1996	144
POOR MAN'S SHOOTOFF AT PANAMA CITY	PANAMA CITY, FL	1995	141
PADRE ISLAND DOCKS	TROLLING	1998	135
ANCHORAGE BILLFISH TOURNAMENT	PANAMA CITY, FL	1997	133
SOUTH TEXAS BGFC SECOND	PORT ISABEL, TX	1998	128
GOLDEN MEADOW TARPON RODEO	GRAND ISLE, LA	1994	124
SOUTH TEXAS BGFC FIRST	PORT ISABEL, TX	1996	120
ANCHORAGE BILLFISH TOURNAMENT	PANAMA CITY, FL	1998	111
BUDWISER HIGH ROLLERS BILLFISH	TREASURE ISLAND, FL	1995	100

Tourney Name	Location	Year	Effort
NEW ORLEANS BIG GAME FISHING CLUB SEPTEMBER	SOUTH PASS, LA	1994	88
EMILY HARRISON OFFSHORE CELEBRITY FISHING TOUR.	PENSACOLA, FL	1994	84
POOR MAN'S SHOOTOFF AT PANAMA CITY	PANAMA CITY, FL	1998	82
CELEBRITY SHOOTOUT	PENSACOLA, FL	1996	78
SOUTH TEXAS BGFC SIXTH	PORT ISABEL, TX	1994	76
BATON ROUGE BIG GAME FISHING CLUB LADIES	SOUTH PASS, LA	1997	64
SOUTH TEXAS BGFC SIXTH	PORT ISABEL, TX	1998	51
NEW ORLEANS BGFC LAST/Jesters	SOUTH PASS, LA	1997	43
GALVESTON DOCKS	TROLLING	1998	36
SOUTH TEXAS BGFC FIFTH	PORT ISABEL, TX	1994	34
NEW ORLEANS BIG GAME FISHING CLUB TAG & RELEASE	SOUTH PASS, LA	1998	27
ST PETERSBURG DOCKS	TROLLING	1996	10
DESTIN DOCKS	TROLLING	1996	8
Totals			356614

Table A-3. Gulf billfishing tournaments in order by effort/year (Source: NMFS Billfish Survey).

Tourney	Location	Years held	# of Years held	Total Effort	Effort/year
BAY POINT INVITATIONAL	PANAMA CITY, FL	94-98	5	29071	5814.2
PENSACOLA INTERNATIONAL BILLFISH	PENSACOLA, FL	94-98	5	28761	5752.2
TEXAS INTERNATIONAL FISHING	PORT ISABEL, TX	94-98	5	27377	5475.4
ALABAMA INTERNATIONAL	ORANGE BEACH, AL	98	1	5408	5408.0
POCO BUENO	PORT O'CONNOR, TX	94-98	5	21935	4387.0
ORANGE BEACH INVITATIONAL	ORANGE BEACH, AL	94-97	4	17099	4274.8
NEW ORLEANS BIG GAME FISHING CLUB INVITATIONAL	SOUTH PASS, LA	94-98	5	19326	3865.2
MOBILE BIG GAME FISHING CLUB MEMORIAL DAY	ORANGE BEACH, AL	94-98	5	18343	3668.6
MISSISSIPPI GULF COAST CLASSIC	MISSISSIPPI	97-98	2	7146	3573.0
BLUE MARLIN CLASSIC	PENSACOLA, FL	94-98	5	12891	2578.2
EMPIRE-SOUTH PASS FISHING RODEO	SOUTH PASS, LA	94-98	5	12000	2400.0
MOBILE BIG GAME FISHING CLUB LADIES	ORANGE BEACH, AL	94-98	5	10938	2187.6
ANNUAL FORT WALTON-DESTIN BILLFISH	DESTIN, FL	94-98	5	10040	2008.0
GRAND ISLE TARPON RODEO	SOUTH PASS, LA	94-98	5	9589	1917.8
NEW ORLEANS BIG GAME FISHING CLUB LADIES DAY	SOUTH PASS, LA	94-98	5	8318	1663.6
BATON ROUGE BIG GAME FISHING CLUB INVITATIONAL	SOUTH PASS, LA	94	1	1560	1560.0
SOUTH PASS MEMORIAL DAY	SOUTH PASS, LA	94-98	5	7788	1557.6
BATON ROUGE BGFC "Damn Cool"	SOUTH PASS, LA	95, 96, 98	3	4264	1421.3
KETCH L	ORANGE BEACH, AL	98	1	1368	1368.0
PORT MANSFIELD FISHING	PORT MANSFIELD, TX	94-97	4	5358	1339.5
GULF COAST MASTERS	DAUPHIN ISLAND, LA	94	1	1326	1326.0
N. O./B. R. BGFC LABOR DAY	SOUTH PASS, LA	94-98	5	6349	1269.8
BATON ROUGE BIG GAME FISHING CLUB	SOUTH PASS, LA	97-98	2	2433	1216.5
ANNUAL AUGUST BILLFISH CLASSIC	FREEPORT, TX	94, 95, 97	3	3609	1203.0
GENERAL RAY HUFF BILLFISH	SOUTH PASS, LA	94-98	5	5934	1186.8
MARLIN INTERNATIONAL LONESTAR SHOWDOWN	PORT ISABEL, TX	94-98	5	5814	1162.8
DEEP SEA ROUNDUP	PORT ARANSAS, TX	95, 98	2	2302	1151.0
NEW ORLEANS BIG GAME FISHING CLUB TAG & RELEASE	SOUTH PASS, LA	94-98	5	5567	1113.4
WATERMELON OPEN	FREEPORT, TX	94-97	4	4291	1072.8
NEW ORLEANS BIG GAME FISHING CLUB SEPTEMBER	SOUTH PASS, LA	94-98	5	5316	1063.2
SOUTH TEXAS BGFC SEVENTH	PORT ISABEL, TX	94-98	5	5218	1043.6
OLD SALT	ST PETERSBURG, FL	94-97	4	4130	1032.5
FL. WEST COAST CHAMIONSHIP, FINALE	ST PETERSBURG, FL	94-96	3	2894	964.7
CYPRESS COVE INVITATIONAL BILLFISH TOURNAMENT	SOUTH PASS, LA	95-97	3	2598	866.0
PRATT MARTIN/NEW ORLEANS BGFC FIRST	SOUTH PASS, LA	95-98	4	3318	829.5
PENSACOLA LADIES	PENSACOLA, FL	94-97	4	2883	720.8
PENSACOLA JUNIOR ANGLER'S TOURNAMENT	PENSACOLA, FL	94, 96, 97, 98	4	2629	657.3
BATON ROUGE BIG GAME FISHING CLUB LADIES	SOUTH PASS, LA	95, 97	2	1244	622.0
SOUTHWEST FISHING CLUB	SOUTH PASS, LA	95	1	600	600.0
OUTCAST SMALL BOAT BILLFISH	PENSACOLA, FL	94-98	5	2912	582.4
ISLAND MOORINGS PROFESSIONAL BILLFISH TOURNAMENT	PORT ARANSAS, TX	95	1	580	580.0
HARBOR DOCKS BLUE MARLIN	DESTIN, FL	94	1	546	546.0
FL. WEST COAST CHAMIONSHIP, LEG #3	ST PETERSBURG, FL	94, 95, 96, 98	4	2112	528.0
POOR MAN'S SHOOTOFF AT PANAMA CITY	PANAMA CITY, FL	94-98	5	2558	511.6
SOUTH TEXAS BGFC FINALE (FORMERLY CHIQUITA)	PORT ISABEL, TX	94-98	5	2353	470.6
SOUTH TEXAS BGFC SECOND	PORT ISABEL, TX	94-98	5	2115	423.0
HARBOR DOCKS SUMMER OPEN	DESTIN, FL	94	1	420	420.0
OFFSHORE BILLFISH CLASSIC	PANAMA CITY, FL	97-98	2	834	417.0
MONKEY BOAT BILLFISH TOURNAMENT	PENSACOLA, FL	94-98	5	1992	398.4
FL. WEST COAST CHAMPIONSHIP, LEG #2	CLEARWATER, FL	94, 97, 98	3	1182	394.0
MBGFC JUNIOR ANGLER TOURNAMENT	ORANGE BEACH, AL	94-98	5	1890	378.0
TEXAS BILLFISH OPEN	FREEPORT, TX	94	1	369	369.0
SOUTH TEXAS BGFC THIRD	PORT ISABEL, TX	94, 96, 98	3	1029	343.0
ANCHORAGE BILLFISH TOURNAMENT	PANAMA CITY, FL	94-98	5	1692	338.4
BUDWISER HIGH ROLLERS BILLFISH	TREASURE ISLAND, FL	94-95	2	632	316.0
PORT MANSFIELD SHOOTOUT	PORT ISABEL, TX	95-97	3	938	312.7
SOUTH TEXAS BGFC SIXTH	PORT ISABEL, TX	94-98	5	1475	295.0
SOUTH TEXAS BGFC FOURTH	PORT ISABEL, TX	94-98	5	1425	285.0
PORT ARANSAS DOCKS	TROLLING	98	1	270	270.0
SOUTH TEXAS BGFC FIFTH	PORT ISABEL, TX	94-98	5	1058	211.6
PORT ARANSAS OUTBOARD	PORT ARANSAS, TX	94	1	182	182.0
GOLDEN MEADOW TARPON RODEO	GRAND ISLE, LA	94-95	2	356	178.0
SPORTSMANS BLUE MARLIN TOURNAMENT	ORANGE BEACH, AL	94	1	145	145.0
PADRE ISLAND DOCKS	TROLLING	98	1	135	135.0
SOUTH TEXAS BGFC FIRST	PORT ISABEL, TX	96	1	120	120.0
EMILY HARRISON OFFSHORE CELEBRITY FISHING TOUR.	PENSACOLA, FL	94	1	84	84.0
CELEBRITY SHOOTOUT	PENSACOLA, FL	96	1	78	78.0
NEW ORLEANS BGFC LAST/Jesters	SOUTH PASS, LA	97	1	43	43.0
GALVESTON DOCKS	TROLLING	98	1	36	36.0
ST PETERSBURG DOCKS	TROLLING	96	1	10	10.0
DESTIN DOCKS	TROLLING	96	1	8	8.0
Totals				356614	

Table A-4. Total no. of individuals caught by year, species and state (Sources: NMFS Marine Recreational Fishery Statistics Survey).

1994	West Florida	Alabama	Mississippi	Louisiana	Texas	Total
BARRACUDAS	36,369			1,801		38,170
DOLPHINS	300,257	1,286		66,930	8,100	376,573
DRUMS			49,546	47,819	2,800	100,165
GRUNTS	201,721	5,966	1,442			209,129
JACKS	209,547	30,639	3,621	24,011	100	267,918
PORGIES	80,934	26,075	9,949	15,934		132,892
SEA BASSES	491,424	3,361	1,298	3,378		499,461
SHARKS	24,029		4,600	14,511	200	43,340
SKATES/RAYS	3,014					3,014
SNAPPERS	751,885	338,376	49,764	228,537	32,600	1,401,162
TRIGGERFISHES/FILEFISHES	294,585	65,500	2,390	25,030	800	388,305
TUNAS AND MACKERELS	322,733	11,124	35,270	4,348	6,100	379,575
OTHER SPECIES	66,624	8,969	931	19,692	7,600	103,816
Total	2,783,122	491,296	158,811	451,991	58,300	3,943,520

1995	West Florida	Alabama	Mississippi	Louisiana	Texas	Total
BARRACUDAS	75,399			469		75,868
DOLPHINS	415,546				5,900	421,446
DRUMS	39,495	5,479	18,880	108,711	11,800	184,365
GRUNTS	282,734	112,014	514	230		395,492
JACKS	38,838	16,455	1,141	16,657	300	73,391
PORGIES	127,705	15,429	27,463	18,463		189,060
SEA BASSES	827,359	44,028	469	1,458		873,314
SHARKS	6,285	357	8,480	21,485	1,200	37,807
SKATES/RAYS	764					764
SNAPPERS	507,789	530,758	28,391	284,713	70,100	1,421,751
TRIGGERFISHES/FILEFISHES	164,576	136,813	2,217	30,088	4,100	337,794
TUNAS AND MACKERELS	453,538	19,276	41,656	10,503	11,800	536,773
OTHER SPECIES	51,049	10,682	1,195	8,102	14,600	85,628
Total	2,991,077	891,291	130,406	500,879	119,800	4,633,453

1996	West Florida	Alabama	Mississippi	Louisiana	Texas	Total
BARRACUDAS	117,181	116				117,297
DOLPHINS	210,992			1,242	8,900	221,134
DRUMS	2,563	6,274	78,722	45,508	2,300	135,367
GRUNTS	103,393	13,343	40	122		116,898
JACKS	100,704	22,518	4,338	8,653	900	137,113
PORGIES	191,812	14,462	27,999	4,979		239,252
SEA BASSES	430,631	17,365	1,252	2,278		451,526
SHARKS	8,939	252	10,082	8,275	1,000	28,548
SKATES/RAYS	671		137			808
SNAPPERS	430,125	537,357	22,927	153,228	66,500	1,210,137
TRIGGERFISHES/FILEFISHES	59,717	80,478	5,668	5,073	8,100	159,036
TUNAS AND MACKERELS	465,423	17,724	36,183	7,499	19,500	546,329
OTHER SPECIES	52,822	1,842	1,015	13,579	6,900	76,158
Total	2,174,973	711,731	188,363	250,436	114,100	3,439,603

1997	West Florida	Alabama	Mississippi	Louisiana	Texas	Total
BARRACUDAS	49,911					49,911
DOLPHINS	604,670	120	203	34,937	9,200	649,130
DRUMS	5,307	853	2,194	82,544	3,800	94,698
GRUNTS	177,674	15,487	321			193,482
JACKS	113,931	8,444	11,072	12,655	1,300	147,402
PORGIES	46455	11,856	19,937	8,809		87,057
SEA BASSES	503,980	13,700	713	474		518,867
SHARKS	7,370		6,315	3,762	1,700	19,147
SKATES/RAYS	175			212	800	1,187
SNAPPERS	847,170	797,309	955	83,348	86,000	1,814,782
TRIGGERFISHES/FILEFISHES	69,568	75,752	1,780	2,662	4,500	154,262
TUNAS AND MACKERELS	525,536	11,069	16,820	6,798	27,700	587,923
OTHER SPECIES	37,889	212	14,812	9,069	12,200	74,182
Total	2,989,636	934,802	75,122	245,270	147,200	4,392,030

1998	West Florida	Alabama	Mississippi	Louisiana	Texas	Total
BARRACUDAS	51,337					51,337
DOLPHINS	477,935	957		34	7,400	486,326
DRUMS	15,797	1,298	102,286	43,508	1,700	164,589
GRUNTS	203,148	4,190	272			207,610
JACKS	160,150	5,205	5,108	3,579	900	174,942
PORGIES	66,182	4,156	31,077	75		101,490
SEA BASSES	685,613	15,144	463	706		701,926
SHARKS	7,357	350	10,792	2,229	3,500	24,228
SKATES/RAYS	318					318
SNAPPERS	1,221,869	607,934	27,763	46,508	67,800	1,971,874
TRIGGERFISHES/FILEFISHES	80,653	66,279	779	3,322	2,900	153,933
TUNAS AND MACKERELS	382,330	15,227	56,259	10,343	27,000	491,159
OTHER SPECIES	42,679	1,327	3,385	2,413	9,300	59,104
Total	3,395,368	722,067	238,184	112,717	120,500	4,588,836
Grand Totals	14,334,176	3,751,187	790,886	1,561,293	559,900	20,997,442

Table A-5. Gulf billfishing tournaments in order by total catch (individual years) (Sources: NMFS Billfish Survey).

Tourney Name	Location	Year	Landings	Releases	Total Catch
TEXAS INTERNATIONAL FISHING	PORT ISABEL, TX	1998	25	72	97
TEXAS INTERNATIONAL FISHING	PORT ISABEL, TX	1994	35	44	79
POCO BUENO	PORT O'CONNOR, TX	1995	29	47	76
POCO BUENO	PORT O'CONNOR, TX	1994	25	49	74
MARLIN INTERNATIONAL LONESTAR SHOWDOWN	PORT ISABEL, TX	1994	13	55	68
TEXAS INTERNATIONAL FISHING	PORT ISABEL, TX	1997	29	27	56
NEW ORLEANS BIG GAME FISHING CLUB INVITATIONAL	SOUTH PASS, LA	1997	32	21	53
ORANGE BEACH INVITATIONAL	ORANGE BEACH, AL	1997	17	35	52
TEXAS INTERNATIONAL FISHING	PORT ISABEL, TX	1995	24	28	52
TEXAS INTERNATIONAL FISHING	PORT ISABEL, TX	1996	22	30	52
BLUE MARLIN CLASSIC	PENSACOLA, FL	1994	28	23	51
PENSACOLA INTERNATIONAL BILLFISH	PENSACOLA, FL	1995	32	17	49
PENSACOLA INTERNATIONAL BILLFISH	PENSACOLA, FL	1996	29	19	48
ALABAMA INTERNATIONAL	ORANGE BEACH, AL	1998	25	20	45
NEW ORLEANS BIG GAME FISHING CLUB INVITATIONAL	SOUTH PASS, LA	1994	11	34	45
ORANGE BEACH INVITATIONAL	ORANGE BEACH, AL	1994	15	29	44
NEW ORLEANS BIG GAME FISHING CLUB INVITATIONAL	SOUTH PASS, LA	1996	12	30	42
BAY POINT INVITATIONAL	PANAMA CITY, FL	1995	15	24	39
POCO BUENO	PORT O'CONNOR, TX	1998	20	17	37
NEW ORLEANS BIG GAME FISHING CLUB SEPTEMBER	SOUTH PASS, LA	1996	17	20	37
ORANGE BEACH INVITATIONAL	ORANGE BEACH, AL	1995	15	21	36
POCO BUENO	PORT O'CONNOR, TX	1996	8	28	36
NEW ORLEANS BIG GAME FISHING CLUB LADIES DAY	SOUTH PASS, LA	1998	17	19	36
GRAND ISLE TARPON RODEO	SOUTH PASS, LA	1997	20	15	35
PENSACOLA INTERNATIONAL BILLFISH	PENSACOLA, FL	1998	28	6	34
PENSACOLA INTERNATIONAL BILLFISH	PENSACOLA, FL	1994	15	19	34
ORANGE BEACH INVITATIONAL	ORANGE BEACH, AL	1996	15	19	34
EMPIRE-SOUTH PASS FISHING RODEO	SOUTH PASS, LA	1995	6	28	34
POCO BUENO	PORT O'CONNOR, TX	1997	16	16	32
NEW ORLEANS BIG GAME FISHING CLUB LADIES DAY	SOUTH PASS, LA	1994	6	26	32
N. O./B. R. BGFC LABOR DAY	SOUTH PASS, LA	1997	10	22	32
GRAND ISLE TARPON RODEO	GRAND ISLE, LA	1998	11	20	31
SOUTH TEXAS BGFC SEVENTH	PORT ISABEL, TX	1996	15	16	31
MOBILE BIG GAME FISHING CLUB MEMORIAL DAY	ORANGE BEACH, AL	1995	10	20	30
NEW ORLEANS BIG GAME FISHING CLUB INVITATIONAL	SOUTH PASS, LA	1998	11	19	30
BLUE MARLIN CLASSIC	PENSACOLA, FL	1995	11	19	30
GENERAL RAY HUFF BILLFISH	SOUTH PASS, LA	1998	10	20	30
BATON ROUGE BGFC "Damn Cool"	SOUTH PASS, LA	1998	15	15	30
BAY POINT INVITATIONAL	PANAMA CITY, FL	1996	17	12	29
MISSISSIPPI GULF COAST CLASSIC	MISSISSIPPI	1997	18	10	28
BLUE MARLIN CLASSIC	PENSACOLA, FL	1996	16	12	28
N. O./B. R. BGFC LABOR DAY	SOUTH PASS, LA	1996	9	19	28
EMPIRE-SOUTH PASS FISHING RODEO	GRAND ISLE, LA	1997	7	20	27
BLUE MARLIN CLASSIC	PENSACOLA, FL	1998	15	12	27
N. O./B. R. BGFC LABOR DAY	SOUTH PASS, LA	1998	15	12	27
EMPIRE-SOUTH PASS FISHING RODEO	GRAND ISLE, LA	1994	3	23	26
SOUTH TEXAS BGFC FINALE (FORMERLY CHIQUITA)	PORT ISABEL, TX	1996	17	9	26
DEEP SEA ROUNDUP	PORT ARANSAS, TX	1998	9	16	25
SOUTH TEXAS BGFC SECOND	PORT ISABEL, TX	1996	16	9	25
BAY POINT INVITATIONAL	PANAMA CITY, FL	1994	15	9	24
MISSISSIPPI GULF COAST CLASSIC	MISSISSIPPI	1998	12	12	24
NEW ORLEANS BIG GAME FISHING CLUB SEPTEMBER	SOUTH PASS, LA	1997	11	13	24
PORT MANSFIELD FISHING	PORT MANSFIELD, TX	1994	7	17	24

Tourney Name	Location	Year	Landings	Releases	Total Catch
BATON ROUGE BIG GAME FISHING CLUB	SOUTH PASS, LA	1997	11	13	24
PRATT MARTIN/NEW ORLEANS BGFC FIRST	SOUTH PASS, LA	1996	6	18	24
PRATT MARTIN/NEW ORLEANS BGFC FIRST	SOUTH PASS, LA	1995	4	20	24
BATON ROUGE BGFC "Damn Cool"	SOUTH PASS, LA	1995	3	20	23
ANNUAL AUGUST BILLFISH CLASSIC	FREEPORT, TX	1997	12	11	23
N. O./B. R. BGFC LABOR DAY	SOUTH PASS, LA	1994	3	20	23
NEW ORLEANS BIG GAME FISHING CLUB SEPTEMBER	SOUTH PASS, LA	1998	18	5	23
BAY POINT INVITATIONAL	PANAMA CITY, FL	1998	11	11	22
BAY POINT INVITATIONAL	PANAMA CITY, FL	1997	14	8	22
GRAND ISLE TARPON RODEO	GRAND ISLE, LA	1994	17	5	22
BATON ROUGE BIG GAME FISHING CLUB INVITATIONAL	SOUTH PASS, LA	1994	16	6	22
MARLIN INTERNATIONAL LONESTAR SHOWDOWN	PORT ISABEL, TX	1995	1	21	22
NEW ORLEANS BIG GAME FISHING CLUB INVITATIONAL	SOUTH PASS, LA	1995	6	15	21
MOBILE BIG GAME FISHING CLUB MEMORIAL DAY	ORANGE BEACH, AL	1997	17	4	21
EMPIRE-SOUTH PASS FISHING RODEO	GRAND ISLE, LA	1998	6	15	21
WATERMELON OPEN	FREEPORT, TX	1995	10	11	21
PORT MANSFIELD FISHING	PORT MANSFIELD, TX	1995	10	11	21
PENSACOLA INTERNATIONAL BILLFISH	PENSACOLA, FL	1997	13	7	20
MOBILE BIG GAME FISHING CLUB MEMORIAL DAY	ORANGE BEACH, AL	1996	6	13	19
KETCH L	ORANGE BEACH, AL	1998	12	7	19
NEW ORLEANS BIG GAME FISHING CLUB TAG & RELEASE	SOUTH PASS, LA	1996	3	16	19
MOBILE BIG GAME FISHING CLUB MEMORIAL DAY	ORANGE BEACH, AL	1994	17	1	18
NEW ORLEANS BIG GAME FISHING CLUB LADIES DAY	SOUTH PASS, LA	1996	6	12	18
ANNUAL FORT WALTON-DESTIN BILLFISH	DESTIN, FL	1996	12	5	17
MOBILE BIG GAME FISHING CLUB LADIES	ORANGE BEACH, AL	1998	10	7	17
DEEP SEA ROUNDUP	PORT ARANSAS, TX	1995	10	7	17
GENERAL RAY HUFF BILLFISH	SOUTH PASS, LA	1997	6	11	17
CYPRESS COVE INVITATIONAL BILLFISH TOURNAMENT	SOUTH PASS, LA	1995	6	11	17
TEXAS BILLFISH OPEN	FREEPORT, TX	1994	9	8	17
MOBILE BIG GAME FISHING CLUB MEMORIAL DAY	ORANGE BEACH, AL	1998	13	3	16
MOBILE BIG GAME FISHING CLUB LADIES	ORANGE BEACH, AL	1997	8	8	16
GRAND ISLE TARPON RODEO	SOUTH PASS, LA	1996	13	3	16
PORT MANSFIELD FISHING	PORT MANSFIELD, TX	1996	4	12	16
ANNUAL AUGUST BILLFISH CLASSIC	FREEPORT, TX	1994	9	7	16
NEW ORLEANS BIG GAME FISHING CLUB TAG & RELEASE	SOUTH PASS, LA	1997	7	9	16
MARLIN INTERNATIONAL LONESTAR SHOWDOWN	PORT ISABEL, TX	1997	3	13	16
N. O./B. R. BGFC LABOR DAY	SOUTH PASS, LA	1995	1	15	16
MOBILE BIG GAME FISHING CLUB LADIES	ORANGE BEACH, AL	1995	5	10	15
MOBILE BIG GAME FISHING CLUB LADIES	ORANGE BEACH, AL	1996	9	5	14
EMPIRE-SOUTH PASS FISHING RODEO	GRAND ISLE, LA	1996	4	10	14
NEW ORLEANS BIG GAME FISHING CLUB TAG & RELEASE	SOUTH PASS, LA	1994	5	9	14
GENERAL RAY HUFF BILLFISH	SOUTH PASS, LA	1995	6	8	14
WATERMELON OPEN	FREEPORT, TX	1996	8	6	14
MARLIN INTERNATIONAL LONESTAR SHOWDOWN	PORT ISABEL, TX	1996	0	13	13
NEW ORLEANS BIG GAME FISHING CLUB SEPTEMBER	SOUTH PASS, LA	1995	2	11	13
SOUTH TEXAS BGFC SEVENTH	PORT ISABEL, TX	1997	0	13	13
GENERAL RAY HUFF BILLFISH	SOUTH PASS, LA	1994	6	7	13
SOUTH PASS MEMORIAL DAY	SOUTH PASS, LA	1996	0	12	12
NEW ORLEANS BIG GAME FISHING CLUB LADIES DAY	SOUTH PASS, LA	1995	2	10	12
MOBILE BIG GAME FISHING CLUB LADIES	ORANGE BEACH, AL	1994	8	4	12
BATON ROUGE BIG GAME FISHING CLUB LADIES	SOUTH PASS, LA	1995	4	8	12
SOUTH PASS MEMORIAL DAY	SOUTH PASS, LA	1997	5	7	12
CYPRESS COVE INVITATIONAL BILLFISH TOURNAMENT	SOUTH PASS, LA	1996	8	4	12
PENSACOLA JUNIOR ANGLER'S TOURNAMENT	PENSACOLA, FL	1994	7	5	12
SOUTH TEXAS BGFC FINALE (FORMERLY CHIQUITA)	PORT ISABEL, TX	1995	4	8	12

Tourney Name	Location	Year	Landings	Releases	Total Catch
SOUTH TEXAS BGFC THIRD	PORT ISABEL, TX	1996	1	11	12
SOUTH TEXAS BGFC SECOND	PORT ISABEL, TX	1995	3	9	12
ANNUAL FORT WALTON-DESTIN BILLFISH	DESTIN, FL	1994	9	2	11
ANNUAL FORT WALTON-DESTIN BILLFISH	DESTIN, FL	1995	4	7	11
SOUTH PASS MEMORIAL DAY	SOUTH PASS, LA	1998	10	1	11
FL. WEST COAST CHAMIONSHIP, FINALE	ST PETERSBURG, FL	1996	8	3	11
PORT MANSFIELD FISHING	PORT MANSFIELD, TX	1997	3	8	11
PRATT MARTIN/NEW ORLEANS BGFC FIRST	SOUTH PASS, LA	1997	6	5	11
ANNUAL FORT WALTON-DESTIN BILLFISH	DESTIN, FL	1997	7	4	11
POOR MAN'S SHOOTOFF AT PANAMA CITY	PANAMA CITY, FL	1997	6	5	11
HARBOR DOCKS SUMMER OPEN	DESTIN, FL	1994	6	5	11
SOUTH TEXAS BGFC FOURTH	PORT ISABEL, TX	1995	1	10	11
BLUE MARLIN CLASSIC	PENSACOLA, FL	1997	9	1	10
GRAND ISLE TARPON RODEO	GRAND ISLE, LA	1995	5	5	10
POOR MAN'S SHOOTOFF AT PANAMA CITY	PANAMA CITY, FL	1996	6	4	10
FL. WEST COAST CHAMIONSHIP, FINALE	ST PETERSBURG, FL	1995	5	5	10
PENSACOLA LADIES	PENSACOLA, FL	1994	6	4	10
WATERMELON OPEN	FREEPORT, TX	1994	9	1	10
MONKEY BOAT BILLFISH TOURNAMENT	PENSACOLA, FL	1995	6	4	10
ANNUAL FORT WALTON-DESTIN BILLFISH	DESTIN, FL	1998	3	6	9
BATON ROUGE BIG GAME FISHING CLUB	SOUTH PASS, LA	1998	2	7	9
GENERAL RAY HUFF BILLFISH	SOUTH PASS, LA	1996	1	8	9
SOUTH TEXAS BGFC FINALE (FORMERLY CHIQUITA)	PORT ISABEL, TX	1998	2	7	9
SOUTH TEXAS BGFC FIFTH	PORT ISABEL, TX	1995	0	9	9
SOUTH TEXAS BGFC THIRD	PORT ISABEL, TX	1994	1	8	9
PORT ARANSAS DOCKS	TROLLING	1998	9	0	9
SOUTH PASS MEMORIAL DAY	SOUTH PASS, LA	1994	1	7	8
OLD SALT	ST PETERSBURG, FL	1997	0	8	8
SOUTH TEXAS BGFC SEVENTH	PORT ISABEL, TX	1994	0	8	8
PENSACOLA JUNIOR ANGLER'S TOURNAMENT	PENSACOLA, FL	1997	2	6	8
MBGFC JUNIOR ANGLER TOURNAMENT	ORANGE BEACH, AL	1994	3	5	8
MONKEY BOAT BILLFISH TOURNAMENT	PENSACOLA, FL	1994	4	4	8
SOUTH TEXAS BGFC SECOND	PORT ISABEL, TX	1994	6	2	8
POOR MAN'S SHOOTOFF AT PANAMA CITY	PANAMA CITY, FL	1994	2	6	8
CYPRESS COVE INVITATIONAL BILLFISH TOURNAMENT	SOUTH PASS, LA	1997	3	5	8
SOUTH TEXAS BGFC SECOND	PORT ISABEL, TX	1997	3	5	8
SOUTH TEXAS BGFC SEVENTH	PORT ISABEL, TX	1995	0	7	7
OLD SALT	ST PETERSBURG, FL	1996	2	5	7
SOUTH PASS MEMORIAL DAY	SOUTH PASS, LA	1995	1	6	7
NEW ORLEANS BIG GAME FISHING CLUB TAG & RELEASE	SOUTH PASS, LA	1995	0	7	7
ANCHORAGE BILLFISH TOURNAMENT	PANAMA CITY, FL	1995	3	4	7
SOUTH TEXAS BGFC FOURTH	PORT ISABEL, TX	1994	1	6	7
FL. WEST COAST CHAMPIONSHIP, LEG #2	CLEARWATER, FL	1998	3	4	7
GULF COAST MASTERS	DAUPHIN ISLAND, LA	1994	2	4	6
OLD SALT	ST PETERSBURG, FL	1994	5	1	6
WATERMELON OPEN	FREEPORT, TX	1997	5	1	6
ISLAND MOORINGS PROFESSIONAL BILLFISH TOURNAMENT	PORT ARANSAS, TX	1995	3	3	6
HARBOR DOCKS BLUE MARLIN	DESTIN, FL	1994	3	3	6
ANNUAL AUGUST BILLFISH CLASSIC	FREEPORT, TX	1995	2	4	6
ANCHORAGE BILLFISH TOURNAMENT	PANAMA CITY, FL	1996	3	3	6
MONKEY BOAT BILLFISH TOURNAMENT	PENSACOLA, FL	1997	3	3	6
SOUTH TEXAS BGFC FIFTH	PORT ISABEL, TX	1996	0	6	6
PORT ARANSAS OUTBOARD	PORT ARANSAS, TX	1994	2	4	6
SOUTH TEXAS BGFC FIRST	PORT ISABEL, TX	1996	4	2	6
OUTCAST SMALL BOAT BILLFISH	PENSACOLA, FL	1995	4	1	5

Tourney Name	Location	Year	Landings	Releases	Total Catch
SOUTH TEXAS BGFC SIXTH	PORT ISABEL, TX	1995	1	4	5
OUTCAST SMALL BOAT BILLFISH	PENSACOLA, FL	1994	2	3	5
FL. WEST COAST CHAMIONSHIP, LEG #3	ST PETERSBURG, FL	1998	2	3	5
SOUTH TEXAS BGFC SIXTH	PORT ISABEL, TX	1997	0	5	5
OUTCAST SMALL BOAT BILLFISH	PENSACOLA, FL	1996	2	3	5
SOUTH TEXAS BGFC FOURTH	PORT ISABEL, TX	1998	0	5	5
SOUTH TEXAS BGFC FOURTH	PORT ISABEL, TX	1997	0	5	5
SOUTH TEXAS BGFC FIFTH	PORT ISABEL, TX	1998	0	5	5
BATON ROUGE BGFC "Damn Cool"	SOUTH PASS, LA	1996	0	4	4
PENSACOLA LADIES	PENSACOLA, FL	1997	3	1	4
PENSACOLA JUNIOR ANGLER'S TOURNAMENT	PENSACOLA, FL	1998	1	3	4
SOUTHWEST FISHING CLUB	SOUTH PASS, LA	1995	1	3	4
FL. WEST COAST CHAMIONSHIP, LEG #3	ST PETERSBURG, FL	1995	3	1	4
FL. WEST COAST CHAMIONSHIP, LEG #3	ST PETERSBURG, FL	1996	4	0	4
MONKEY BOAT BILLFISH TOURNAMENT	PENSACOLA, FL	1996	1	3	4
SOUTH TEXAS BGFC FINALE (FORMERLY CHIQUITA)	PORT ISABEL, TX	1994	0	4	4
PORT MANSFIELD SHOOTOUT	PORT ISABEL, TX	1995	0	4	4
PORT MANSFIELD SHOOTOUT	PORT ISABEL, TX	1997	0	4	4
GOLDEN MEADOW TARPON RODEO	GRAND ISLE, LA	1995	2	2	4
SOUTH TEXAS BGFC FOURTH	PORT ISABEL, TX	1996	0	4	4
SOUTH TEXAS BGFC THIRD	PORT ISABEL, TX	1998	1	3	4
PADRE ISLAND DOCKS	TROLLING	1998	1	3	4
GALVESTON DOCKS	TROLLING	1998	4	0	4
PENSACOLA LADIES	PENSACOLA, FL	1996	2	1	3
SOUTH TEXAS BGFC FINALE (FORMERLY CHIQUITA)	PORT ISABEL, TX	1997	1	2	3
MBGFC JUNIOR ANGLER TOURNAMENT	ORANGE BEACH, AL	1995	1	2	3
OFFSHORE BILLFISH CLASSIC	PANAMA CITY, FL	1998	1	2	3
PORT MANSFIELD SHOOTOUT	PORT ISABEL, TX	1996	2	1	3
SOUTH TEXAS BGFC SIXTH	PORT ISABEL, TX	1996	0	3	3
MARLIN INTERNATIONAL LONESTAR SHOWDOWN	PORT ISABEL, TX	1998	0	3	3
MBGFC JUNIOR ANGLER TOURNAMENT	ORANGE BEACH, AL	1996	2	1	3
NEW ORLEANS BIG GAME FISHING CLUB SEPTEMBER	SOUTH PASS, LA	1994	2	1	3
FL. WEST COAST CHAMIONSHIP, LEG #3	ST PETERSBURG, FL	1994	2	0	2
FL. WEST COAST CHAMPIONSHIP, LEG #2	CLEARWATER, FL	1997	2	0	2
FL. WEST COAST CHAMIONSHIP, FINALE	ST PETERSBURG, FL	1994	2	0	2
PENSACOLA JUNIOR ANGLER'S TOURNAMENT	PENSACOLA, FL	1996	1	1	2
MBGFC JUNIOR ANGLER TOURNAMENT	ORANGE BEACH, AL	1998	0	2	2
OFFSHORE BILLFISH CLASSIC	PANAMA CITY, FL	1997	2	0	2
OUTCAST SMALL BOAT BILLFISH	PENSACOLA, FL	1998	1	1	2
PRATT MARTIN/NEW ORLEANS BGFC FIRST	SOUTH PASS, LA	1998	2	0	2
NEW ORLEANS BIG GAME FISHING CLUB LADIES DAY	SOUTH PASS, LA	1997	1	1	2
MONKEY BOAT BILLFISH TOURNAMENT	PENSACOLA, FL	1998	0	2	2
SOUTH TEXAS BGFC SEVENTH	PORT ISABEL, TX	1998	1	1	2
SOUTH TEXAS BGFC SECOND	PORT ISABEL, TX	1998	0	2	2
BUDWISER HIGH ROLLERS BILLFISH	TREASURE ISLAND, FL	1995	1	1	2
BATON ROUGE BIG GAME FISHING CLUB LADIES	SOUTH PASS, LA	1997	1	1	2
OUTCAST SMALL BOAT BILLFISH	PENSACOLA, FL	1997	1	0	1
PENSACOLA LADIES	PENSACOLA, FL	1995	0	1	1
ANCHORAGE BILLFISH TOURNAMENT	PANAMA CITY, FL	1994	0	1	1
MBGFC JUNIOR ANGLER TOURNAMENT	ORANGE BEACH, AL	1997	0	1	1
SPORTSMANS BLUE MARLIN TOURNAMENT	ORANGE BEACH, AL	1994	0	1	1
ANCHORAGE BILLFISH TOURNAMENT	PANAMA CITY, FL	1997	0	1	1
EMILY HARRISON OFFSHORE CELEBRITY FISHING TOUR.	PENSACOLA, FL	1994	0	1	1
SOUTH TEXAS BGFC SIXTH	PORT ISABEL, TX	1994	0	1	1
NEW ORLEANS BGFC LAST/Jesters	SOUTH PASS, LA	1997	0	1	1

Tourney Name	Location	Year	Landings	Releases	Total Catch
SOUTH TEXAS BGFC FIFTH	PORT ISABEL, TX	1994	0	1	1
ST PETERSBURG DOCKS	TROLLING	1996	1	0	1
DESTIN DOCKS	TROLLING	1996	1	0	1
OLD SALT	ST PETERSBURG, FL	1995	0	0	0
BUDWISER HIGH ROLLERS BILLFISH	TREASURE ISLAND, FL	1994	0	0	0
FL. WEST COAST CHAMPIONSHIP, LEG #2	CLEARWATER, FL	1994	0	0	0
POOR MAN'S SHOOTOFF AT PANAMA CITY	PANAMA CITY, FL	1995	0	0	0
GOLDEN MEADOW TARPON RODEO	GRAND ISLE, LA	1994	0	0	0
ANCHORAGE BILLFISH TOURNAMENT	PANAMA CITY, FL	1998	1	1	0
POOR MAN'S SHOOTOFF AT PANAMA CITY	PANAMA CITY, FL	1998	0	0	0
CELEBRITY SHOOTOUT	PENSACOLA, FL	1996	0	0	0
SOUTH TEXAS BGFC SIXTH	PORT ISABEL, TX	1998	0	0	0
NEW ORLEANS BIG GAME FISHING CLUB TAG & RELEASE	SOUTH PASS, LA	1998	0	0	0
Totals			1554	2112	3664

Table A-6. Gulf billfishing tournaments in order by CPUE (Sources: NMFS Billfish Survey).

Tourney	Location	Years held	# of Years held	Total Catch	Total Effort	CPUE
DESTIN DOCKS	TROLLING	96	1	1	8	0.125
GALVESTON DOCKS	TROLLING	98	1	4	36	0.111
ST PETERSBURG DOCKS	TROLLING	96	1	1	10	0.100
SOUTH TEXAS BGFC FIRST	PORT ISABEL, TX	96	1	6	120	0.050
TEXAS BILLFISH OPEN	FREEPORT, TX	94	1	17	369	0.046
PORT ARANSAS DOCKS	TROLLING	98	1	9	270	0.033
PORT ARANSAS OUTBOARD	PORT ARANSAS, TX	94	1	6	182	0.033
PADRE ISLAND DOCKS	TROLLING	98	1	4	135	0.030
HARBOR DOCKS SUMMER OPEN	DESTIN, FL	94	1	11	420	0.026
SOUTH TEXAS BGFC SECOND	PORT ISABEL, TX	94-98	5	55	2115	0.026
SOUTH TEXAS BGFC THIRD	PORT ISABEL, TX	94, 96, 98	3	25	1029	0.024
NEW ORLEANS BGFC LAST/Jesters	SOUTH PASS, LA	97	1	1	43	0.023
SOUTH TEXAS BGFC FINALE (FORMERLY CHIQUITA)	PORT ISABEL, TX	94-98	5	54	2353	0.023
SOUTH TEXAS BGFC FOURTH	PORT ISABEL, TX	94-98	5	32	1425	0.022
MARLIN INTERNATIONAL LONESTAR SHOWDOWN	PORT ISABEL, TX	94-98	5	122	5814	0.021
SOUTH TEXAS BGFC FIFTH	PORT ISABEL, TX	94-98	5	21	1058	0.020
N. O./B. R. BGFC LABOR DAY	SOUTH PASS, LA	94-98	5	126	6349	0.020
NEW ORLEANS BIG GAME FISHING CLUB SEPTEMBER	SOUTH PASS, LA	94-98	5	100	5316	0.019
PRATT MARTIN/NEW ORLEANS BGFC FIRST	SOUTH PASS, LA	95-98	4	61	3318	0.018
DEEP SEA ROUNDUP	PORT ARANSAS, TX	95, 98	2	42	2302	0.018
MONKEY BOAT BILLFISH TOURNAMENT	PENSACOLA, FL	94-98	5	30	1992	0.015
CYPRESS COVE INVITATIONAL BILLFISH TOURNAMENT	SOUTH PASS, LA	95-97	3	37	2598	0.014
BATON ROUGE BIG GAME FISHING CLUB INVITATIONAL	SOUTH PASS, LA	94	1	22	1560	0.014
GENERAL RAY HUFF BILLFISH	SOUTH PASS, LA	94-98	5	83	5934	0.014
KETCH L	ORANGE BEACH, AL	98	1	19	1368	0.014
BATON ROUGE BIG GAME FISHING CLUB	SOUTH PASS, LA	97-98	2	33	2433	0.014
PORT MANSFIELD FISHING	PORT MANSFIELD, TX	94-97	4	72	5358	0.013
BATON ROUGE BGFC "Damn Cool"	SOUTH PASS, LA	95, 96, 98	3	57	4264	0.013
ANNUAL AUGUST BILLFISH CLASSIC	FREEPORT, TX	94, 95, 97	3	45	3609	0.012
TEXAS INTERNATIONAL FISHING	PORT ISABEL, TX	94-98	5	336	27377	0.012
NEW ORLEANS BIG GAME FISHING CLUB LADIES DAY	SOUTH PASS, LA	94-98	5	100	8318	0.012
EMILY HARRISON OFFSHORE CELEBRITY FISHING TOUR.	PENSACOLA, FL	94	1	1	84	0.012
GRAND ISLE TARPON RODEO	SOUTH PASS, LA	94-98	5	114	9589	0.012
WATERMELON OPEN	FREEPORT, TX	94-97	4	51	4291	0.012
PORT MANSFIELD SHOOTOUT	PORT ISABEL, TX	95-97	3	11	938	0.012
SOUTH TEXAS BGFC SEVENTH	PORT ISABEL, TX	94-98	5	61	5218	0.012
POCO BUENO	PORT O'CONNOR, TX	94-98	5	255	21935	0.012
POOR MAN'S SHOOTOFF AT PANAMA CITY	PANAMA CITY, FL	94-98	5	29	2558	0.011
BLUE MARLIN CLASSIC	PENSACOLA, FL	94-98	5	146	12891	0.011
BATON ROUGE BIG GAME FISHING CLUB LADIES	SOUTH PASS, LA	95, 97	2	14	1244	0.011
GOLDEN MEADOW TARPON RODEO	GRAND ISLE, LA	94-95	2	4	356	0.011
HARBOR DOCKS BLUE MARLIN	DESTIN, FL	94	1	6	546	0.011
ISLAND MOORINGS PROFESSIONAL BILLFISH TOURNAMENT	PORT ARANSAS, TX	95	1	6	580	0.010
EMPIRE-SOUTH PASS FISHING RODEO	SOUTH PASS, LA	94-98	5	122	12000	0.010
NEW ORLEANS BIG GAME FISHING CLUB TAG & RELEASE	SOUTH PASS, LA	94-98	5	56	5567	0.010
PENSACOLA JUNIOR ANGLER'S TOURNAMENT	PENSACOLA, FL	94, 96, 97, 98	4	26	2629	0.010
NEW ORLEANS BIG GAME FISHING CLUB INVITATIONAL	SOUTH PASS, LA	94-98	5	191	19326	0.010
ORANGE BEACH INVITATIONAL	ORANGE BEACH, AL	94-97	4	166	17099	0.010
SOUTH TEXAS BGFC SIXTH	PORT ISABEL, TX	94-98	5	14	1475	0.009
MBGFC JUNIOR ANGLER TOURNAMENT	ORANGE BEACH, AL	94-98	5	17	1890	0.009
ANCHORAGE BILLFISH TOURNAMENT	PANAMA CITY, FL	94-98	5	15	1692	0.009
ALABAMA INTERNATIONAL	ORANGE BEACH, AL	98	1	45	5408	0.008
FL. WEST COAST CHAMIONSHIP, FINALE	ST PETERSBURG, FL	94-96	3	23	2894	0.008
FL. WEST COAST CHAMPIONSHIP, LEG #2	CLEARWATER, FL	94, 97, 98	3	9	1182	0.008
MISSISSIPPI GULF COAST CLASSIC	MISSISSIPPI	97-98	2	52	7146	0.007
FL. WEST COAST CHAMIONSHIP, LEG #3	ST PETERSBURG, FL	94, 95, 96, 98	4	15	2112	0.007
SPORTSMANS BLUE MARLIN TOURNAMENT	ORANGE BEACH, AL	94	1	1	145	0.007
MOBILE BIG GAME FISHING CLUB LADIES	ORANGE BEACH, AL	94-98	5	74	10938	0.007
SOUTHWEST FISHING CLUB	SOUTH PASS, LA	95	1	4	600	0.007
PENSACOLA INTERNATIONAL BILLFISH	PENSACOLA, FL	94-98	5	185	28761	0.006
SOUTH PASS MEMORIAL DAY	SOUTH PASS, LA	94-98	5	50	7788	0.006
PENSACOLA LADIES	PENSACOLA, FL	94-97	4	18	2883	0.006
OUTCAST SMALL BOAT BILLFISH	PENSACOLA, FL	94-98	5	18	2912	0.006
OFFSHORE BILLFISH CLASSIC	PANAMA CITY, FL	97-98	2	5	834	0.006
ANNUAL FORT WALTON-DESTIN BILLFISH	DESTIN, FL	94-98	5	59	10040	0.006
MOBILE BIG GAME FISHING CLUB MEMORIAL DAY	ORANGE BEACH, AL	94-98	5	104	18343	0.006
OLD SALT	ST PETERSBURG, FL	94-97	4	21	4130	0.005
BAY POINT INVITATIONAL	PANAMA CITY, FL	94-98	5	136	29071	0.005
GULF COAST MASTERS	DAUPHIN ISLAND, FL	94	1	6	1326	0.005
BUDWISER HIGH ROLLERS BILLFISH	TREASURE ISLAND, FL	94-95	2	2	632	0.003
CELEBRITY SHOOTOUT	PENSACOLA, FL	96	1	0	78	0.000
Totals				3664	356814	

APPENDIX B

NOAA FEDERAL CONTINGENCY FUND CLAIM FORMS

NOAA FORM 88-166
(3-84)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

OMB APPROVED NO. 0648-0082
EXPIRES 11-30-86

FISHERMEN'S CONTINGENCY FUND 15-DAY REPORT

NOTE: No compensation may be awarded unless a completed application form has been received (Title IV--The Fishermen's Contingency Fund--of the Outer Continental Shelf Lands Act Amendments of 1978.

INSTRUCTIONS

1. In order to gain a presumption that the damage or loss for which you will file a FCF claim was caused by an item related to OCS oil and gas activities, you must submit the information required by this form to the National Marine Fisheries Service *within 15 days after the date your vessel first returned to port after discovering such damage or loss.* You may report your damage or loss while at sea by contacting the National Marine Fisheries Service Regional Office by radiotelephone and providing the required information. Telephone numbers for each regional office are as follows:

Southeast Region (Gulf of Mexico & Atlantic)--(813) 893-3272
Southwest Region (Pacific)------------------------(213) 548-2478
Northeast Region (Atlantic)------------------------(617) 281-3224
Northwest Region (Pacific)-------------------------(206) 527-6127
Alaska Region-------------------------------------(907) 586-7224

2. If you radiotelephone the information to meet the 15-day deadline, you should also confirm the radiotelephone report by sending a completed copy of this form *as soon as possible after you return to port* to the Financial Services Division, National Marine Fisheries Service, 1335 East-West Hwy., Silver Springs, MD 20910 PHONE: (202) 427-2396

3. Please remember that in addition to this 15-day report, you must also send a *completed claim* to the Financial Services Division, NMFS, at the above address *within 60 days after the damage was first discovered.* Please call or write that office or your regional office if you need advice on how to submit a complete claim.

NAME	SOCIAL SECURITY NO.	DATE
ADDRESS		PHONE NO.
VESSEL'S NAME	COAST GUARD OR STATE REGISTRATION NUMBER	

LOCATION OF OBSTRUCTION *(Use Loran C or the next best available method of position fixing.)*

DESCRIPTION OF THE NATURE OF DAMAGE OR LOSS

DATE AND TIME OF DISCOVERY OF DAMAGE OR LOSS

DATE VESSEL FIRST RETURNED TO PORT *(Unless 15-Day Report was made before vessel returned)*

REMARKS

NOAA FORM 88-164
(3-84)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

OMB APPROVED
NO. 0648-0082
Expires 11-30-86

FISHERMEN'S CONTINGENCY FUND CLAIM APPLICATION

INSTRUCTIONS TO CLAIMANTS

I. GENERAL

The Fishermen's Contingency Fund is authorized by Title IV of the Outer Continental Shelf Lands Act Amendments of 1978. Its purpose is to compensate commercial fishermen for damage or loss caused by obstructions associated with oil and gas activities on the Outer Continental Shelf (OSC). The Program is administered by the National Marine Fisheries Service, Financial Services Division, 1335 East-West Hwy., Silver Spring MD 20910.

PRESUMPTION OF CAUSATION

A presumption that the damage or loss was caused by items associated with oil and gas activities on the OCS is allowed if you report the damage or loss to the National Marine Fisheries Service within 15 days after the date your vessel first returns to port. If all the criteria of a 15-day report are fulfilled, you need not establish the nature of the damage. If a complete report is not submitted within the 15 day period, the presumption will not be allowed and you will have to prove that the obstruction causing the damage was related to OCS oil and gas activities.

FILING YOUR CLAIM

You must file, in writing, a complete and accurate claim within 90 days after the date you first discovered your damage or loss. The term 'filed' means delivered in person, or mailed (as determined by the date of the postmark) to the Chief, FSD, address above. The Chief, FSD, suggests that claims be sent by registered or certified mail, return receipt requested so you will have a record of receipt of your claim.

FAILURE TO MEET FILING REQUIREMENTS

The Chief, FSD, may reject your claim if it does not meet the filing requirements. If your claim is rejected, the Chief, FSD, will give you written notice of the reasons for rejection within 30 days after the date on which your claim was filed. If you don't refile an acceptable claim within 30 days after the date of this written notice, you are not eligible for Fund compensation unless there are extenuating circumstances.

AGGREGATING CLAIMS

If more than one commercial fisherman suffers loss or damage from the same incident (for example, when several members of the crew lose income due to loss of fishing time), their losses should be included in one claim and submitted on their behalf by the owner or operator of the commercial fishing vessel involved.

AMENDMENT TO CLAIMS

You may amend your claim at any time before the Chief, FSD, issues an initial determination.

II. WHAT CAN BE CLAIMED

You may file for actual and consequential damages as follows:

(1) Actual Damage:

(a) The lesser of the gear's repair or replacement cost, and

(b) The reasonable replacement cost for lost fishing gear.

(2) Consequential Damage:

(a) RESULTING ECONOMIC LOSS: You may claim for gross income loss resulting from time lost because of not being able to fish, or having to reduce fishing effort, during the period before the damaged or lost fishing gear is repaired or replaced and available for use. This period must be reasonable. It begins on the date of the casualty and stops on the date the damage could reasonably have been remedied by repair or replacement.

(b) ATTORNEY, CPA, CONSULTANT FEES: You may claim for reasonable fees paid to an attorney, CPA, or other consultant for the preparation of your claim. The Chief, FSD, will determine what amounts are reasonable. You will not be compensated for these fees if the claim is denied.

(c) OTHER: You may claim for any other consequential damage or loss, (except personal injury) incurred as a consequence of the fishing gear damage or loss.

III. NEGLIGENCE OF CLAIMANT

An award will be reduced to the extent that the damage or loss was caused by your negligence or fault. Basic grounds for finding a claimant negligent or at fault are listed in the FCF Regulations. Negligence of the owner or operator of fishing gear will affect crew-member awards to the same extent that it affects an award to the owner or operator.

IV. INSURANCE PROCEEDS

An award will be reduced by the amount of any compensation you are entitled to receive from insurance.

V. PENALTY FOR FALSE CLAIMS

Any person who files a fraudulent claim is subject to prosecution under 18 U.S.C. sections 2187 and 1001, each of which, upon conviction, imposes a penalty of not more than $10,000 fine and 5 years imprisonment, or both.

VI. DOCUMENTATION REQUIRED

Here is a checklist of documents which must be submitted with your claim:

(1) With your claim for actual damage:

(a) Proof that you purchased the fishing gear damaged or lost. Submit copies of the best evidence available, e.g., sales receipts, affidavits, cancelled checks, or other evidence; and

(b) Receipts or estimates showing repair or replacement costs.

(i) If you replace your gear or have it repaired before filing your claim, submit a copy of the itemized invoice or receipt for the replacement or repair cost. If you usually repair or construct your own gear, you may submit a detailed estimate of your own repair or construction cost; include receipts for materials used.

(ii) If you have not replaced or had your gear repaired before you file your claim, submit one estimate from a commercial fishing gear repair or supply company of the present replacement or repair (whichever applies) cost of the damaged or lost fishing gear. (NOTE: The Chief, Financial Services Division, may require the submission of a second-source estimate.)

(2) With your claim for consequential damages:

(a) In the case of claims for resulting economic loss, a statement of the amount claimed and the basis for that amount with supporting documentation as follows:

(i) Trip tickets for the three vessel trips immediately before the trip during which the casualty was discovered and for the vessel trip immediately following the trip during which the casualty occurred.

(ii) A statement of the amount of time involved on each of the vessel trips (or if the casualty involves fixed gear, a statement of the number of gear units hauled on each of these vessel trips).

(iii) A statement of the amount of time lost from fishing because of the damage or loss and a full explanation of why this time period is reasonable.

(b) Compensation for resulting economic loss will be based on 50 percent of the gross income lost, as estimated by the Chief, FSD, as a result of not being able to fish; or having to fish at a reduced level of effort during the period before the damaged or lost fishing gear is repaired or replaced and available for use. The period begins on the date of the casualty and stops on the date the damage or loss could reasonably have been remedied by repair or replacement. Appropriate documentation may consist of purchase orders, bills of lading, or statements from commercial repair or supply sources.

(3) In the case of amounts claimed for other consequential damages resulting from the casualty, the claim must include a full description of what each amount represents with suitable documentation.

(4) Photographs (if available) of the obstruction and of any damage to your gear.

(5) The name and mailing address (phone number if available) of each person, if any, to whom you have given oral or written notice that such person caused or may have caused the damage or loss, together with a copy of any written notice given each such person and a statement whether each such person has paid or will pay you for any portion of the damage or loss.

INSTRUCTIONS CONTINUE ON NEXT PAGE.

INSTRUCTIONS (Cont'd.)

VII NMFS PROCESSING OF CLAIMS

The National Marine Fisheries Service will process your claim and mail a written initial determination to you within 60 days of the date it is complete with regard to the information required for compensation from the Fund. An initial determination will state (i) if the claim is disapproved, the reason for disapproval, or (ii) if the claim is approved, the amount of compensation and the basis on which amount was determined. If you disagree with the initial determination, you or any other interested person who submitted evidence relating to the initial determination, may request a review of the initial determination. Your written request must be postmarked within 30 days of the date of the initial determination and must fully state your reason(s) for disagreement. If no request for initial review is submitted within 30 days, the initial determination will become a final determination. If a petition for review of an initial determination is timely filed, the Assistant Administrator, NMFS, or his designee will conduct a review of the initial determination, and issue a final determination within 60 days after the day on which the request for review of the initial determination was received.

VIII. PAYMENT OF AWARD FOR CLAIM

(1) When an initial determination becomes final the Chief, FSD, shall immediately disburse the amount awarded if you:

(a) State in writing that you will not petition for review of the initial determination; and

(b) Sign an agreement to repay all or any part of the amount of the award if, the amount of an award should for any reason be subsequently reduced.

If you do not submit the agreements specified above, the Chief, FSD, will not disburse the amount of your award until expiration of 30 days after the issuance of the initial determination.

IX SUBROGATION

Upon payment of a claim, the Chief, FSD, must obtain a subrogation agreement signed by you which:

(1) Assigns to the Fund your rights against third parties; and

(2) Provides that you will assist the Fund in any reasonable way to pursue these rights.

NOTE: The agreements specified above (Settlement and Subrogation) will be mailed to you along with the Initial Determination. If you accept the Initial Determination the amount of your award will be disbursed immediately upon receipt of the signed agreements.

NOAA FORM 88-164 (3-84)

NOAA FORM 88-164
(3-84)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

OMB APPROVED NO. 0648-0082
EXPIRES 11-30-86

FISHERMEN'S CONTINGENCY FUND CLAIM APPLICATION

PROPERTY LOSS

CLAIMANT'S NAME

PHONE

STREET ADDRESS

SOCIAL SECURITY NO.

CITY STATE ZIP

☐ VESSEL OWNER ☐ VESSEL OPERATOR ☐ OWNER/OPERATOR

VESSEL NAME AND COAST GUARD OR STATE REGISTRATION NO

HOME PORT

VESSEL TYPE

TONNAGE

LOCATIONAL COORDINATES OF OBSTRUCTION *(Use Loran C or the next best available method of position fixing.)*

IF OBSTRUCTION WAS DRAGGED, AT WHAT LOCATION WAS IT LEFT?

DESCRIBE OBSTRUCTION OR, IF YOU DIDN'T SEE IT, ITS NATURE

AMOUNT CLAIMED

I AM CLAIMING THE FOLLOWING AMOUNTS FOR DAMAGE AND/OR LOSS:

GEAR LOSS	$
GEAR DAMAGE	
VESSEL LOSS OR DAMAGE.	
ECONOMIC LOSS	
FUEL	
OTHER EXPENSES	
TOTAL	

DID YOU FILE 15-DAY REPORT? *(NOAA Form 88-166)* ☐ NO ☐ YES — DATE FILED

DID YOU RECOVER THE OBSTRUCTION? ☐ NO ☐ YES *If so, KEEP IT AS EVIDENCE.*

WAS A SURFACE MARKER ATTACHED TO OR NEAR THE OBSTRUCTION? ☐ YES ☐ NO

DO YOU HAVE PHOTOS OF THE OBSTRUCTION OR DAMAGE? ☐ NO ☐ YES *If so, ATTACH TO CLAIM.*

WHY DO YOU BELIEVE THE OBSTRUCTION IS ASSOCIATED WITH OIL AND GAS ACTIVITIES ON THE FEDERAL OUTER CONTINENTAL SHELF RATHER THAN WITH NATURAL CAUSES, OTHER OCEAN USERS, OR OIL AND GAS ACTIVITIES WITHIN STATE WATERS?

CIRCUMSTANCES OF DAMAGE OR LOSS

DATE OF INCIDENT	TIME OF DAY	WATER DEPTH
VISIBILITY	VESSEL'S SPEED	DIRECTION

ACTIVITY OF VESSEL (Explain the vessel's activity at the time, how captain and crew responded, attempts made to retrieve gear, extent of damage, what crew did after incident. For example, did vessel continue fishing or return to port? If it returned, why? How much time did the incident involve?

NAMES OF OTHER VESSELS IN THE VICINITY AT TIME OF INCIDENT

Each claim must contain statements from any material witnesses to the casualty. These may be from crew members or any other person who may have relevant information to substantiate both the fact and the nature of the casualty. Statements should describe the basic circumstances under which the casualty occurred and any knowledge as to the probable or known cause of the casualty.

NAMES AND ADDRESSES OF WITNESSES WHOSE STATEMENTS ARE ATTACHED *(List and check appropriate box.)*

NAME		ADDRESS	PHONE
NAME	☐ CREW MEMBER ☐ OTHER	ADDRESS	PHONE
NAME	☐ CREW MEMBER ☐ OTHER	ADDRESS	PHONE
NAME	☐ CREW MEMBER ☐ OTHER	ADDRESS	PHONE

All claims for fishing vessel or gear casualties must include invoices, receipts, affidavits, cancelled checks, or other acceptable documentation showing proof of purchase of each item claimed.

KIND OF PROOF OF PURCHASE ATTACHED

All claims must include an estimate or a receipt for the repair or replacement cost of each item claimed. The estimate or receipt must be from a commercial source unless the gear is repaired or constructed by the applicant. In that case, an itemized list of repair or replacement costs may be submitted in place of a receipt or an estimate from a commercial source.

KIND OF DOCUMENTATION OF REPAIR OR REPLACEMENT COSTS ATTACHED

ECONOMIC LOSS CLAIMED

Provide the following data for the calculation of your claim for economic loss: The dates of the trip tickets for the *three trips before that of the casualty* (or if these are not available, three trips closest in time to the casualty); the number of pounds of fish caught (or gear units deployed) on each trip; the number of hours spent fishing (or gear units hauled) on each trip; and the amount you received in payment for the catch on each trip. *Attach copies of the three trip tickets.*

INCLUSIVE DATES DATE OF TRIP TICKET FROM TO	NO. POUNDS FISH CAUGHT (No. units deployed)	NO. days SPENT FISHING (No. units hauled)	$ VALUE OF CATCH
1			$
2			
3			
TOTAL			$
AVERAGE			$

AVERAGE INCOME day

PROVIDE THE FOLLOWING DATA FOR THE COMPENSABLE PERIOD STARTING WITH THE DATE OF THE CASUALTY AND CONTINUING THROUGH THE DATE OF COMPLETION OF REPAIR OR REPLACEMENT.

DATE OF TRIP TICKET	NO. LBS. FISH CAUGHT (Units deployed)	HRS. SPENT FISHING (Units hauled)	$ VALUE OF CATCH	NO. days LOST (No. units out of commission)	GROSS INCOME LOSS FOR TRIP
(Date of casualty) 1			$		$
2					
3					
4					
5 TOTAL			$		$
6 AVERAGE			$	X	X
7 TOTAL CLAIMED FOR ECONOMIC LOSS 50% of total gross income loss)					$

EXPLAIN YOUR METHOD AND FACTS IN DETERMINING THE AMOUNT YOU ARE CLAIMING FOR ECONOMIC LOSS FOR THE COMPENSABLE PERIOD BETWEEN THE DATE OF THE CASUALTY AND THE DATE OF COMPLETION OF REPAIR OR REPLACEMENT.

☐ *Continued on last page.*

FUEL *(Complete this section even if you are not claiming for extra fuel consumed as a result of the incident.)*

DOLLAR AMOUNT CLAIMED FOR EXTRA FUEL CONSUMPTION	NUMBER OF DAYS YOUR FISHING TRIPS USUALLY LAST
ON THE TRIP OF THE INCIDENT, HOW MANY HOURS OF RUNNING TIME WERE USED TO GO FROM YOUR PORT TO FISHING SITE?	ON THE TRIP OF THE INCIDENT, HOW MANY HOURS OF RUNNING TIME WERE USED TO GO FROM FISHING SITE BACK TO PORT?
HOW MANY EXTRA HOURS OF RUNNING TIME ARE YOU CLAIMING AS A RESULT OF THE INCIDENT?	HOW MANY DAYS HAD YOU BEEN FISHING WHEN THE INCIDENT OCCURRED?
HOW MANY GALLONS OF FUEL DOES YOUR VESSEL BURN PER HOUR GOING TO AND FROM FISHING SITES?	WHAT PRICE PER GALLON *(Receipts must be submitted)* DID YOU PAY FOR THE FUEL BURNED ON THE TRIP OF THE INCIDENT?

EXPLAIN HOW YOU CALCULATED THE AMOUNT YOU'RE CLAIMING FOR EXTRA FUEL CONSUMPTION

☐ *Continued on last page.*

OTHER EXPENSES

List below any other expenses you have incurred as a result of the incident for which your claim is filed. Submit with your claim.

ITEM	AMOUNT
TOTAL	

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I _________________________ (CLAIMANT'S NAME), a U.S. citizen, am the [ ] OWNER [ ] OPERATOR of the _________________________ (VESSEL'S NAME) and have read all of the foregoing statements and supporting documents relating to this claim, and to the best of my knowledge all statements and documents are true and correct.

SIGNATURE	DATE

CRIMINAL PENALTY FOR FRAUDULENT CLAIM. Any person who files a fraudulent claim is subject to criminal prosecution under 18 U.S.C. Sections 284 and 1001, each of which, upon conviction, imposes a penalty of not more than a $10,000 fine and 5 years imprisonment, or both.

REMARKS AND ADDITIONAL INFORMATION

NOAA FORM 88-164 (3-84)

CLAIMED LOSSES

(Fishermen's Contingency Fund Claim Application) (Cont'd.)

CLAIM NUMBER

INSTRUCTIONS: List each item of gear for which this claim is filed. In the appropriate spaces, indicate the quantity, size, and material of construction of each item; whether it was lost, damaged, or destroyed; its date of purchase, purchase price, and replacement or repair cost. Do not write in shaded columns.

FOR AGENCY USE ONLY

ITEM NO.	QUANTITY	SIZE	ITEM (Indicate material of construction.)	LOST, DAMAGED, OR DESTROYED	DATE OF PURCHASE	PURCHASE PRICE	REPLACEMENT COST	REPAIR COST	AMOUNT ALLOWED	REMARKS

NOAA FORM 88-164 (3-84)

APPENDIX C

CANADIAN ASSOCIATION OF PETROLEUM PRODUCERS LOSS CLAIM FORMS AND INFORMATION

CAPP Commercial Fisheries Compensation Program for Loss Resulting from Non-Attributable Gear and Vessel Damage
Guide for Damage Reports and Claims (for Fish Harvesters)

The CAPP Commercial Fisheries Compensation Program for Loss Resulting from Non-Attributable Gear and Vessel Damage has been established to provide compensation to commercial fish harvesters, aquaculturalists and processors who sustain loss as a result of damage to fishing gear or vessels caused by oil and gas exploration and development activities on Canada's East Coast where the responsible operator is not known. The Program is an alternative to making a claim through other means, such as the Petroleum Boards or the Courts.

This Guide outlines the steps fish harvesters should take to report an incident and begin a claim under the Program. (Fish processors should see the Claim Guide for Fish Processors; harvesting-processing firms should follow both Guides and complete all forms referenced.) All potential claimants should read the document entitled *Canadian Association of Petroleum Producers Commercial Fisheries Compensation Program for Loss Resulting from Non-Attributable Gear and Vessel Damage* which fully describes Program coverage, eligible claims and incident reporting procedures.

Reporting an Incident. If you discover damage that you believe was caused by oil and gas exploration and development activities but the source is unknown, you should

1. take all reasonable action to prevent further or continuing damage, without risking the safety of the vessel or crew;
2. if it can be done safely, secure any materials (e.g. debris), or other information (photo of damage) which may be used as evidence to document the incident and/or support a claim;
3. as soon as possible after discovering the damage, and no later than 72 hours afterwards, contact one of CAPP's Regional Offices

Phone:	NS: 902-420-9084	Nfld: 709-724-4200
Fax:	NS: 902-491-2980	Nfld: 709-724-4225
Email:	walsh@ns.capp.ca *or*	barnes@nf.capp.ca

4. complete a ***Damage Report Form*** as soon as possible.

Making a Claim. If you want to make a claim for losses resulting from the incident, you should

1. secure any documents or records (e.g., fish plant settlement sheet/buyer's sales slip) which might be used as evidence to support a claim; and
2. complete a ***Loss Claim Form*** for Fish Harvesters.

It is important that you complete all relevant parts of the forms so that your claim can be processed as quickly as possible. You can submit these forms separately or both together by fax or to:

CAPP (Nova Scotia)	CAPP (Newfoundland)
Suite 230	Suite 905, Scotia Centre
1801 Hollis Street	235 Water Street
Halifax, NS B3J 3N4	St. John's, NF A1C 1B6

Eligible Claims (Fish Harvesters). Claims are *not* eligible under this Program if they are for damage which occurred because of being in a designated Safety Zone, or have been started against CAPP or an operator through another process (e.g. the Courts). No part of a claim may be for loss of life or personal injury.

Who Should Make the Claim (Fish Harvesters). Those eligible to make a claim under this Program are either: 1. the operator or owner of the Canadian Fishing Vessel (CFV) involved in the incident (sustaining damage and/or using the gear that was damaged), 2. the holder of the DFO commercial fishing licence related to the lost or damaged gear, or 3. the owner of the fishing enterprise/ company. If not the same person, you will need to decide together who should make the claim.

If you aren't sure about your eligibility under the Program, or don't know who should make the claim, contact CAPP as soon as possible.

CAPP LOSS CLAIM FORM
(for use by Fish Harvesters)

Do not write in this space
____

(24/02/99)

1. Person making this claim: ____________

Position/Title ____________

Telephone/Fax No: ____________ / ____________

Address: ____________

____

2. Fish harvesting firm/enterprise: ____________

Address: ____________

____

Telephone/Fax No: ____________ / ____________

3. Brief description of loss/damage incident: ____________

____

____

4. Date of incident: ____________

5. Damage Report filed by: ____________

6. Date Damage Report form filed: ____________

(Note: A Damage Report must have been filed previously or at the same time as this Claim.)

7. Name of fishing vessel involved: ____________

8. CFV No: ____________

Are you representing other Claimants in a joint claim? Yes ☐ No ☐

Are you being represented by another Claimant in a joint claim? Yes ☐ No ☐

If yes, by whom are you being represented? ____________

Valuation of Claim

Please itemize losses and costs you are claiming. (You will also be asked to support the value of this claim by providing purchase receipts / catch records, wage reports, etc.) Use additional sheets if necessary:

A. Damaged and/or Lost Vessel and Gear	Amount Claimed
Total claimed	

B. Expenses and/or lost revenue (if claiming for lost wages or shares, include names, FIN, addresses and telephone numbers of all persons included).	Amount Claimed
Total	

Note: this claim must be signed by a qualified Claimant (see Guide and other Program documents).

I hereby certify that the above information is, to the best of my knowledge, full and accurate in every detail, and make claim to CAPP for compensation for the losses described.

Signed by: At: On:

(Signature *Place* *Date)*

CAPP LOSS CLAIM FORM
(for use by Fish Processors)

Do not write in this space

(24/02/99)

1. Person making this claim: ______________________

Position/Title ______________________

Telephone/Fax No: ____________ / ____________

Address: ______________________

____

2. Fish processing firm: ______________________

Address: ______________________

____

Telephone/Fax No: ____________ / ____________

Processing Permit No: ______________________

Plant locations affected: ____________ ____________

____________ ____________

3. Date of incident: ______________________

Damage Report filed by: ______________________

Date Damage Report form filed: ______________________

4. Name of fishing vessel(s) involved: ______________________

____

CFV No(s): ______________________

____

Are you representing other Claimants in a joint claim? Yes ☐ No ☐

Are you being represented by another Claimant in a joint claim? Yes ☐ No ☐

If yes, by whom are you being represented? ______________________

Please describe why and how the processing operation suffered loss as a result of the gear/vessel damage incident:

Describe measures taken to find alternative suppliers, or other measures taken to stop or limit the loss:

Valuation of Claim

Please itemize the losses you are claiming. (You will also be asked to support the value of this claim by providing past purchase and sales records / wage reports, etc.) Use separate sheets if necessary:

Fisheries-related losses (if claiming for lost wages, include names and SINs of all persons included).	Amount Claimed
Total	

Note: this claim must be signed by a qualified Claimant (see Guide and other Program documents).

I hereby certify that the above information is, to the best of my knowledge, full and accurate in every detail, and make claim to CAPP for compensation for the losses described.

Signed by: At: On:

(Signature *Place* *Date)*

CAPP DAMAGE REPORT FORM

(24/02/99)

Do not write in this space

____

Preliminary Report ☐ Final Report ☐ Date of Report: ______________________

1. Person completing this Report: ______________________

Position ______________________

Telephone/Fax No: ____________ / ____________

Address: ______________________

____

2. Skipper at time of incident: ______________________

Telephone/Fax No: ____________ / ____________

Address: ______________________

____

3. Name of fishing vessel: ______________________

CFV No: ______________________

Vessel Owner: ______________________

Owner Address: ______________________

____

4. Licence or Permit holder's name (of gear and/or vessel involved) ______________________

Position ______________________

Licence / Permit Held (+ No.) ______________________

Telephone/Fax No: ____________ / ____________

Address: ______________________

____

5. Person who will be making the claim for this incident (if known) ______________________________

Date of the loss/damage incident: ______________________________

Approximate time of the incident: ______________________________

Location of the incident or discovery: ______________________________

Lat: ______________ Long: ______________

Wind / weather / visibility / sea state at time of incident or discovery:

Draw a sketch/diagram showing the position of your vessel/gear in relation to the vessel, debris, etc., which caused the damage (use separate sheet if necessary):

Describe the type of loss or damage sustained (e.g. quantity & description of gear damaged or affected):

Describe how the incident occurred (use separate sheet if necessary):

Describe measures you took to recover gear, or to stop or limit the damage or loss:

Names of other vessels in the area at the time of the incident (if known):

_____________________ _____________________ _____________________

_____________________ _____________________ _____________________

How was CAPP initially contacted (including time, name of contact)?

Was Canadian Coast Guard / DFO informed? Yes ☐ No ☐

If Yes, who was contacted? __________________________ When? ______________

Identify any witnesses, debris collected, evidence of the damage (e.g. photographs) or other information you have about the incident (use separate sheet if necessary):

I hereby certify that the above information is, to the best of my knowledge, full and accurate in every detail.

Signed by:

______________________________ *at:* ______________________________

Signature Place

on: _________________ .

Date

Canadian Association of Petroleum Producers Commercial Fisheries Compensation Program for Loss Resulting from Non-Attributable Gear and Vessel Damage Guide for Damage Reports and Claims (for Fish Processors)

The CAPP Canadian Association of Petroleum Producers Commercial Fisheries Compensation Program for Loss Resulting from Non-Attributable Gear and Vessel Damage has been established to provide compensation to commercial fish harvesters and processors who sustain loss as a result of damage to fishing gear or vessels caused by oil and gas exploration and development activities on Canada's East Coast where the responsible operator is not known. The Program is an alternative to making a claim through other means, such as the Petroleum Boards or the Courts.

This Guide outlines the steps fish processors should take to report an incident and begin a claim under the Program. (Fish harvesters should see the Claim Guide for Fish Harvesters; harvesting-processing firms should follow both Guides and complete all forms referenced.) All potential claimants should read the document entitled *Canadian Association of Petroleum Producers Commercial Fisheries Compensation Program for Loss Resulting from Non-Attributable Gear and Vessel Damage* which fully describes Program coverage, eligible claims and incident reporting procedures.

Making a Claim. If you want to make a claim for losses resulting from the incident, you should

1. secure any documents or records (e.g. fish plant settlement sheet/buyer's sales slip) which might be used as evidence to support a claim;
2. determine whether the harvester sustaining the damage has reported the incident and filed a ***Damage Report Form***; and
3. complete a ***Loss Claim Form for Fish Processors***.

If for some reason the Harvester who sustained the damage has not filed a Damage Report, inform CAPP immediately and give the full particulars to the best of your knowledge (attach a separate sheet). You should also contact the harvester and ask him/her to supply information about the incident as quickly as possible, if a Damage Report has not already been filed with CAPP.

It is important that you complete all relevant parts of the form so that your claim can be processed as quickly as possible. Submit fax or mail the form to:

CAPP (Nova Scotia) Suite 230 1801 Hollis Street Halifax, NS B3J 3N4	CAPP (Newfoundland) Suite 905, Scotia Centre 235 Water Street St. John's, NF A1C 1B6

Eligible Claims (Fish Processors). Claims are *not* eligible under this Program if they are for damage which occurred because of a vessel being in a designated Safety Zone, or have been started against CAPP or an operator through another process (such as the Courts).

Who Should Make the Claim (Fish Processors). Processors eligible to make a claim under this Program are either: 1. the licensed operator of the fish processing facility affected, or 2. the owner of the fish processing enterprise/company. If not the same person, you will need to decide together who should make the claim. If you aren't sure about your eligibility under the Program, or don't know who should make the claim, contact CAPP as soon as possible at

Phone:	NS: 902-420-9084	Nfld: 709-724-4200
Fax:	NS: 902-491-2980	Nfld: 709-724-4225
Email:	walsh@ns.capp.ca *or*	barnes@nf.capp.ca

NOTICE OF CLAIM
TO THE CAPP COMPENSATION APPEAL BOARD

(24/02/99)

This is a request by the undersigned that the CAPP Compensation Appeal Board (the Appeal Board) proceed with a binding claim resolution process as specified in the Canadian Association of Petroleum Producers (CAPP) *Commercial Fisheries Compensation Program for Loss Resulting from Non-Attributable Gear and Vessel Damage* in the matter of a claim for an incident which occurred on (date) ____________ involving ______________________________ brought by (Name:) ________________________, (Title/Position:) __________________ of (Ship/Firm:) __________________________ based in __________________ against the Canadian Association of Petroleum Producers. The incident is described in the accompanying Damage Report Form (if available) signed by ____________________, dated ____________; and the losses claimed are described in the accompanying Loss Claim Form signed by ______________, dated __________.

CLAIMANT TAKE NOTE: You have other options for making a claim against CAPP or an operator, such as proceedings in the Courts, or to the Canada-Newfoundland Offshore Petroleum Board (CNOPB) or the Canada-Nova Scotia Offshore Petroleum Board (CNSOPB) as provided for pursuant to the relevant Atlantic Accord Implementation Act and Guidelines. By signing this Notice of Claim, you agree to give up your right to make a claim through any other process (except as allowed under the Program) and agree to be bound by the Appeal Board's decision concerning the validity and the amount of the claim, and by the other provisions and conditions specified in the Program documents.

I understand and agree that this is a submission to a binding claim resolution process, as specified in the Program, of all matters arising between the parties with respect to the Claim under the provisions of the relevant *Arbitration Act* unless otherwise specified in the Program, and that this submission is irrevocable by me. I hereby specifically waive any right to any other remedy including my right to make a claim through the Courts or to the Petroleum Board, except as allowed under the Program. The same rules bind CAPP.

I agree that the Appeal Board has all the powers conferred on an arbitrator under the *Arbitration Act*, and understand that this Act also shall be followed with respect to procedure. The Chairperson shall be responsible for and shall have full authority to determine all procedural matters, complying where necessary with the relevant *Arbitration Act*.

Signed by:

______________________________ *at:* ______________________________
(signature of Claimant) (place)

on: ______________.
(date)

Witnesses: ______________________ ______________________

PLEASE READ CAREFULLY
BEFORE SUBMITTING THE NOTICE OF CLAIM
TO THE COMPENSATION APPEAL BOARD

Please read the full text of the Canadian Association of Petroleum Producers (CAPP) *Commercial Fisheries Compensation Program for Loss Resulting from Non-Attributable Gear and Vessel Damage*. ***If you need assistance with any part of that document, with making a claim to CAPP, or completing the Notice of Claim, please contact the Secretary to the Compensation Appeal Board at ***.***

A claim to the Compensation Board can only be made if you have first made a claim directly to CAPP and have not been able to reach agreement about any or all aspects of the Claim.

It is your responsibility to submit a properly completed, signed and witnessed Notice of Claim within 45 days of receiving CAPP's written rejection of your claim or the claim amount.

You may submit it by hand, or by certified/registered mail, to the Secretary of the Compensation Appeal Board:

Name
Address
Telephone, Fax, Email

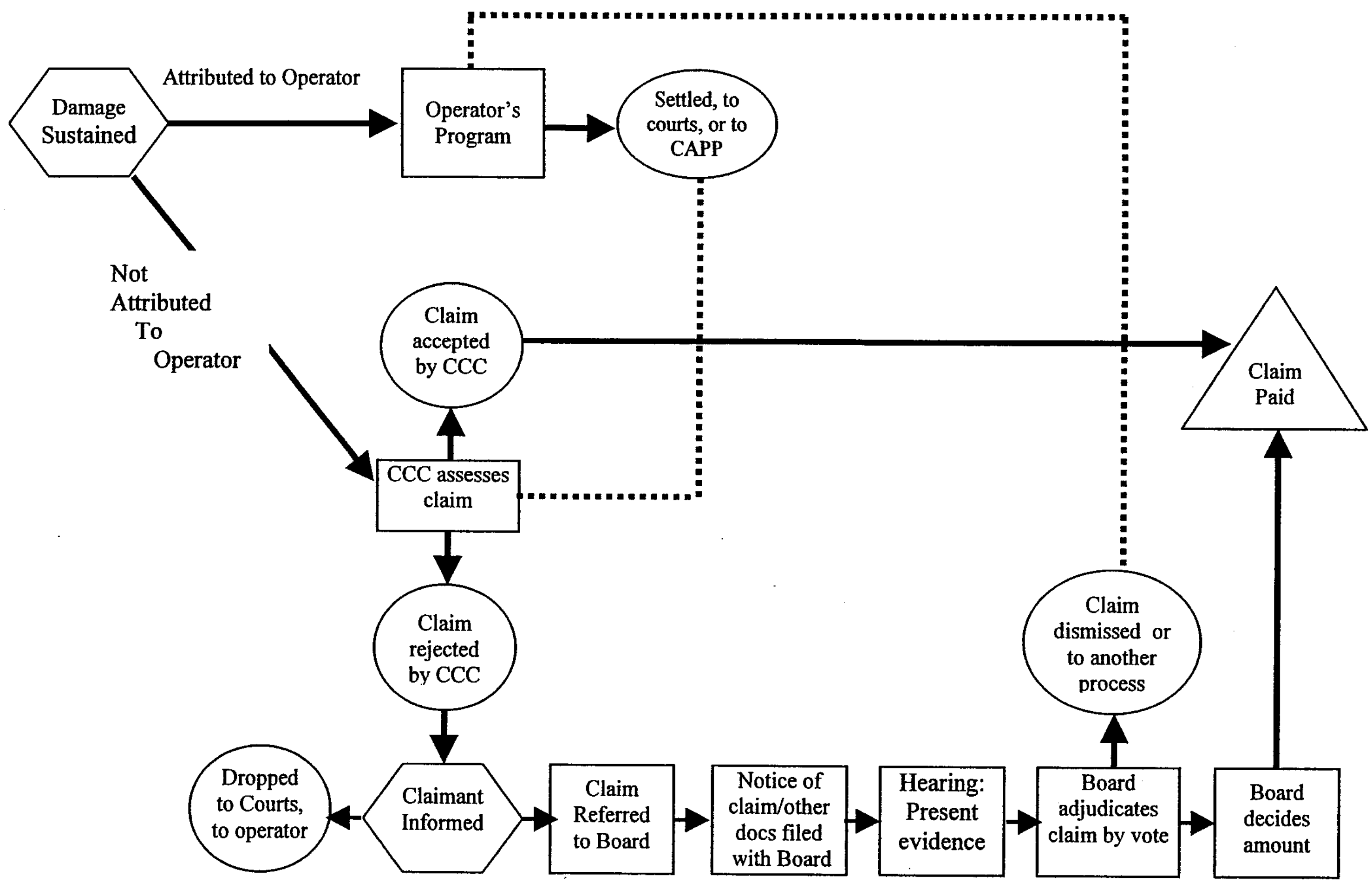
The Notice of Claim may also be submitted by fax as long as a signed original is delivered within three working days afterwards.

The Notice of Claim must also be accompanied by the following items (don't forget to keep copies for yourself):

1. a copy of the original Damage Report, submitted to CAPP (if available)
2. a copy of the original Claim Form(s) submitted to CAPP, and
3. a copy of CAPP's written decision.

Please note that awards for amounts in excess of CDN $1,000,000 cannot be settled by the Appeal Board without the consent of CAPP.

CAPP Gear & Vessel Compensation Program Claims Process



Canadian Association of Petroleum Producers

Commercial Fisheries Compensation Program for Loss Resulting from Non-Attributable Gear and Vessel Damage

What is the CAPP Program for Non-Attributable Gear & Vessel Damage?

The Program is designed to compensate the commercial fishing industry for any damage to gear or vessels caused by oil and gas exploration and development activities on Canada's East Coast where the responsible operator is not known – that is, in cases where the damage is *non-attributable*.

The Program has been prepared by the Canadian Association of Petroleum Producers (CAPP) as an alternative to making a claim through the Courts. Although claims for loss or damage can be made through the courts, this Program offers a simpler, faster and less-expensive way to receive appropriate compensation.

Who Can Use the Program?

The Program is for commercial fishers, aquaculturalists and fish processors who believe that their fishing vessel or gear was lost or damaged because of oil and gas-related activities, and where the petroleum operator responsible for causing the damage cannot be identified. In addition, the CAPP program could be used to process an attributable damage claim where the operator does not have an established attributable damage program.

When is the Program in Effect?

The Program will operate while there is any petroleum-related exploration (including seismic surveys), development, production or decommissioning activity in Canada's East Coast offshore area. Claims can be made up to one year after the termination of all such activities. Claims made before this can be carried through to completion.

What Losses Are Covered?

This Program covers loss of, or damage to, any fishing or aquaculture gear, including fishing vessels, if the loss is a direct result of oil and gas-related activities. This includes repairing, cleaning or replacing fishing gear or vessels, as well as towing, dry-docking charges and the cost of renting a substitute vessel. The Program also provides compensation for lost income resulting from lost or damaged gear.

Claims for loss of life or personal injury, or for any losses valued at more than $1,000,000, cannot be made through this Program. Claims may not be made under this Program for loss sustained as a result of a vessel being in a designated or statutory safety zone.

If Your Gear or Vessel is Damaged

If you believe your gear or vessel has been damaged because of oil and gas-related activities or debris, and if it is safe to do so, you should:

1. do what you need to prevent further damage,
2. retrieve any materials (e.g. pieces of debris) that would show the cause or the kind of damage,
3. use a Damage Report form to record information (e.g. time, location, weather conditions, location of other vessels) about the incident. (This form is available from CAPP).

If it is possible and safe, fishers are also expected to try to continue fishing following an incident.

Starting a Claim

If you know which petroleum operator was responsible for the damage, your claim should proceed through that operator's compensation program, following the operator's claim process. (You can contact CAPP to find out whether or not the operator has a gear and vessel damage compensation program.) If the responsible operator is not known, a claim can be initiated under the CAPP program.

To start a claim, as soon as possible after discovering the damage, and no later than 72 hours afterwards, you must

1. Contact one of CAPP's Regional Offices

Phone: NS: (902) 420-9084 NF: (709) 724-4200

Fax: NS: (902) 491-2980 NF: (709) 724-4225

Email: walsh@ns.capp.ca *or* barnes@nf.capp.ca
(Copies of the required reports and forms are available from the CAPP offices and will soon be available on CAPP's home page at www.capp.ca)

2. Deliver, mail or fax a copy of the Damage Report Form to the nearest CAPP location within 48 hours (addresses are on the Claim Guide forms, or on the CAPP home page at www.capp.ca).

3. As soon as possible after this, complete a Loss Claim Form and submit it as indicated on that form. (This form is available from CAPP.)

Evidence

After your Damage Report and Claim Form have been submitted to CAPP, you will be contacted to discuss the claim. You may also be asked to supply more information or evidence to support your claim.

It is your responsibility to show that gear was damaged or lost and that it was caused by oil and gas-related activities.

As soon as possible, you should collect any supporting documents (e.g. fish plant settlement sheet/buyer's sales slip, photographs of damage) you may need to support your claim or the amount of the claim.

Settling the Claim

There are two ways a claim can be settled under this Program. The first is to reach an agreement directly with CAPP through the CAPP Compensation Committee.

CAPP will work with you to reach an agreement about the claim and a mutually acceptable payment amount. If such an agreement is reached, CAPP will pay you within 14 days of signing a release form.

If an agreement can not be reached, CAPP will explain its reasons for rejecting your claim in writing.

The Compensation Appeal Board

If CAPP rejects your claim, you can choose to have the claim decided by the Program's Compensation Appeal Board – a special independent appeal board established under this Program. This Appeal Board is made up of representatives of the petroleum and fishing industries and an independent Chairperson selected with the agreement of fishing industry representatives.

A claim can only be taken to the Compensation Appeal Board after you have gone through the claim process directly with CAPP and if you have not been able to reach an agreement. To start this process, you must complete and submit a Notice of Claim form within 45 days of receiving CAPP's letter rejecting your claim. (This form is available from CAPP.) You must ensure that a copy of your original Damage Report and Claim forms, and any proof you submitted to CAPP are sent to the Board as well.

By submitting the Notice of Claim, you agree to be bound by the Compensation Appeal Board's decision. CAPP is similarly bound.

Within 14 days of receiving the Notice of Claim, the Appeal Board Chairperson will set a date for a hearing. At the hearing, you will have the opportunity to explain your claim and why you feel it is justified. You may also be asked questions by a CAPP representative or by Appeal Board members. You may have witnesses appear for you, and you (or your representative) can question any witnesses CAPP brings forward. The Appeal Board may also consult with outside experts, or request more information from you or from CAPP.

The hearing will continue until the Appeal Board is satisfied that it has sufficient information to have a full understanding of the claim and is ready to make a decision. The Appeal Board will then decide if the claim is valid and, if so, how much CAPP should pay.

Decisions and Payment

All parties will be notified in writing of the Appeal Board's determination and the reasons for its decision.

If the Appeal Board decides that CAPP should pay, CAPP will do so within 14 days of the decision, and you must sign an End of Claim Release form.

A decision of the Appeal Board is final, unless new evidence which was not available at the time of the Hearing becomes available after the decision.

If this happens, the Board will meet first to decide if the claim will be re-heard.

A request for a re-hearing must be made within one year of the Appeal Board's original decision and within the term of the Program.

The findings of the Appeal Board may not be introduced as evidence in any Court case or in any other proceedings without the written agreement of both parties.

Please note: This is a summary of the Program components and operation. For a full description of the Program you should get a copy of the document "Canadian Association of Petroleum Producers Commercial Fisheries Compensation Program for Loss Resulting from Non-Attributable Gear and Vessel Damage". This, and copies of the various forms, are available by contacting CAPP at the numbers noted above.

FISHERIES AND OFFSHORE OIL CONSULTATIVE GROUP (FOOCG)

During the early stages of North Sea oil and gas exploration it was recognised that the fishing industry could be affected in various ways by offshore oil activities, and that friction between the industries could arise. FOOCG was set up in 1974 by the Government following discussions with the fishing and offshore oil industries to serve as a forum for discussion of such problems, fears and misunderstandings.

FOOCG is chaired by a senior official from the Scottish Office Industry Department and the Secretariat is provided by the Scottish Executive Rural Affairs Department (SERAD). Membership is drawn from the UK fisheries organisations, UKOOA and the relevant Government departments and agencies.

FOOCG's instigation of informal meetings between the companies, fishing organisations and Government departments during the development of individual fields has been particularly useful. The guidance notes supporting the *Petroleum and Submarine Pipelines Act 1975* require consultations with the fishing industry prior to the issue of a Pipeline Works authorisation to construct and use a submarine pipeline. Although there may not be a statutory requirement for such formal consultations in respect of installations, subsea completions, templates, wellheads or similar developments, fishing organisations are consulted at the early planning stages. However, there are instances where formal consultations are required, e.g. Application for a safety zone, licence under *the Food and Environment Protection Act 1985 (FEPA),* etc. There is a requirement under *the Petroleum Act 1987* to consult with fishermen on any proposal for the decommissioning of an installation or pipeline.

FOOCG has initiated a number of other useful developments, e.g. the joint financing by SERAD and UKOOA of the production of suspended wellhead information cards ("Yellow Card") and the production of Booklets describing Seismic Activity at Sea and Fishing Techniques, all with the aim of improving understanding between the two industries.

UKOOA discuss and agree any general policy matters with those fishing organisations either directly or through FOOCG, and any such discussions or agreements are reported on at FOOCG meetings. Where a new fishing organisation wishes to join FOOCG, it is customary practice for the fishing organisations themselves make the decision. It is, however, considered to be the responsibility of the fishermen's representative bodies on FOOCG to disseminate any information outwards to all fishermen, including members of Associations not represented at FOOCG, and to individuals who are not members of a particular association.

The organisations currently represented on FOOCG are listed below.

Organisations Represented at FOOCG

Government Organisations

Department of Trade and Industry (DTI), Oil and Gas Division *[formerly Department of Energy (Den)]*
Health and Safety Executive (HSE), Offshore Safety Division (OSD)
Scottish Executive Rural Affairs Department (SERAD)
Scottish Fisheries Protection Agency (SFPA)
Marine Laboratory (SERAD - based at Aberdeen)
Ministry of Agriculture, Fisheries and Food (MAFF)
Sea Fisheries Inspectorate (SFI)
Department of Environment, Transport and the Regions (DETR)
[formerly Department of Transport (DTp)]
Marine & Coastguard Agency (MCA)
Ministry of Defence (MoD)
Hydrographic Office
Department of Agriculture for Northern Ireland (DANI), Fisheries Division

Fishing Organisations

Scottish Fishermen's Federation (SFF)
National Federation of Fishermen's Organisations (NFFO)
Federation of Highlands and Islands Fishermen (FHIF)
Orkney Fisheries Association
Northern Ireland Fish Producers Organisation
Anglo-North Irish Fish Producers Organisation
Local Sea Fishery Committees *[Only in England and Wales]*

Oil Industry

UK Offshore Operators Association (UKOOA)

Observers

International Association of Geophysical Contractors (IAGC)

Yellow Card

Kingfisher Charts issue the Yellow Card mentioned above, a department within the SeaFish Authority (funded by fishermen from levies and government). The Yellow Card is issued free to fishermen twice per year and contains the geographical co-ordinates of suspended wellheads and subsea production installations on the UK Continental Shelf. In addition, The Yellow Card is supplemented by the "Fortnightly Bulletin". This publication, again issued free to fishermen, is published every two weeks and contains up-to date information on suspended wellheads and subsea installations. In addition it provides information on mobile drilling rig positions, forthcoming seismic and construction/field development activity.

FishSafe System

A system has been developed, with backing and sponsorship from UKOOA that provides digitised information to fishermen on board their fishing vessels. This comprises a small monitor and interface into the fishing vessel's plotting system. FishSafe will contain data on pipelines, suspended wellheads and subsea installations in addition to any other subsea obstruction that could prove hazardous if snagged. Kingfisher is providing the digitised information which is in turn provided by the oil companies. The novel approach of this system means that is compatible with the different makes of plotters used by fishermen as the interface is between the navigation system and plotter. FishSafe provides an audible alarm when a fishing vessel approaches close to an obstruction that has been logged into the system thus allowing the skipper to take evasive action to keep clear the obstruction.

It is hoped that in future paper systems such as the Yellow Card will be superseded with digital information that could be provided on disk or the Internet.

Fishing Claims

<u>Background</u>

Each oil company is required to nominate a Fisheries Liaison Officer (FLO). The FLO acts as the single point within an oil company to deal with fishing matters. One of the roles of the FLO is to deal with fishing claims.

Twice a year the FLO's meet at a UKOOA Fisheries Liaison Committee meeting. This committee, one of a number of specialist committees set up by UKOOA, allows FLO's to discuss fisheries business and to action any initiatives that are thought necessary to promote a good relationship with the fishing industry.

<u>Fishing Claim System</u>

UKOOA produced a three-part form to be completed by a fisherman who has snagged a seabed fastener that he considers may be oil related. Part I of the form allows the fisherman to input information such as position of incident, type of fishing being undertaken, description of the snagged object (if known) and other general information regarding the incident. An Appendix to Part I contains a narrative section that allows the claimant to provide information pertaining to the incident. Part II of the form is completed with the amount being claimed. This is sub-divided into loss/damage of gear, damage to vessel/machinery and loss of fishing time as a result of the incident. These forms are completed by the claimant with the assistance of the local fishery officer who countersigns the form. In addition, the fishery officer states the average earnings from other vessels in the area at the time of the incident to assist the FLO to assess loss of fishing time.

The original claim form is sent to the Fishing Co-ordinator at UKOOA whilst the one other duplicate is sent to the Aberdeen Fishery Office. The local fishery office and claimant retains a duplicate copy.

The UKOOA Fishing Co-ordinator reviews each claims and makes the following checks:

- Identifies the offshore license area where the incident occurred and the owner of that license
- Plots position of incident and ascertains whether any pipeline, suspended wellhead or subsea installation could have acted as the fastener
- Checks the UKOOA database to ascertain whether any other incidents have occurred in the close vicinity of the incident

- Forwards the claim to the oil company FLO in question and advises all other parties of that action

See below for flow charts.

Should the incident have occurred in an unallocated license block, the claim is forwarded to the UKOOA Compensation Fund Secretariat.

In the event that the oil company in question accepts the claim an offer is made to the claimant using the Part III of the claims form. Again duplicates are copied to those persons mentioned above. Once an offer has been made, any negotiation is conducted between the oil company and claimant; the claimant cannot forward the claim to the Fund if he is unhappy with the offer. It must be settled between the two parties.

In the event the oil company in question rejects the claim the claimant can send the claim to the Fund for its assessment.

UKOOA Compensation Fund

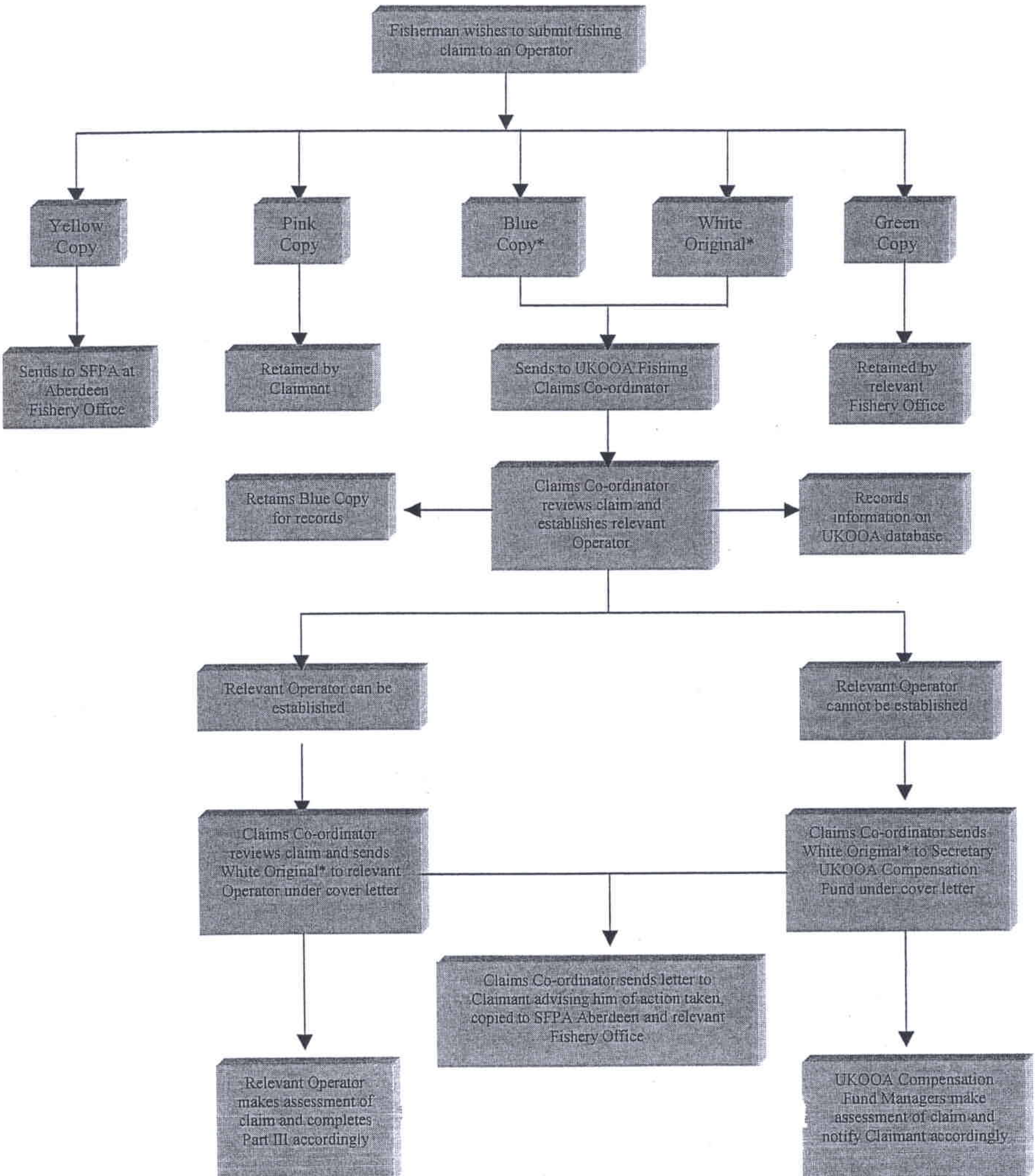
The Fund was established some years ago by UKOOA with the object of having a committee to deal with fishing claims that had either been rejected by oil companies or for claims that had occurred in unallocated license blocks.

The fund comprises a Management Committee drawn solely from the fishing industry. The Committee is made up of representatives from the Scottish Fishermen's Federation (SFF) and the National Federation of fishermen's Organisations (NFFO). The Chairman and Secretary are provided by the SFF who are paid a management fee by UKOOA for the management of the Fund and travel expenses. The Management Committee totals approximately six representatives. In addition, a representative of the Aberdeen Fishery Office and the UKOOA Fishing Claims C-ordinator attend Fund meetings as observers.

Submission and Assessment of Fishing Claims

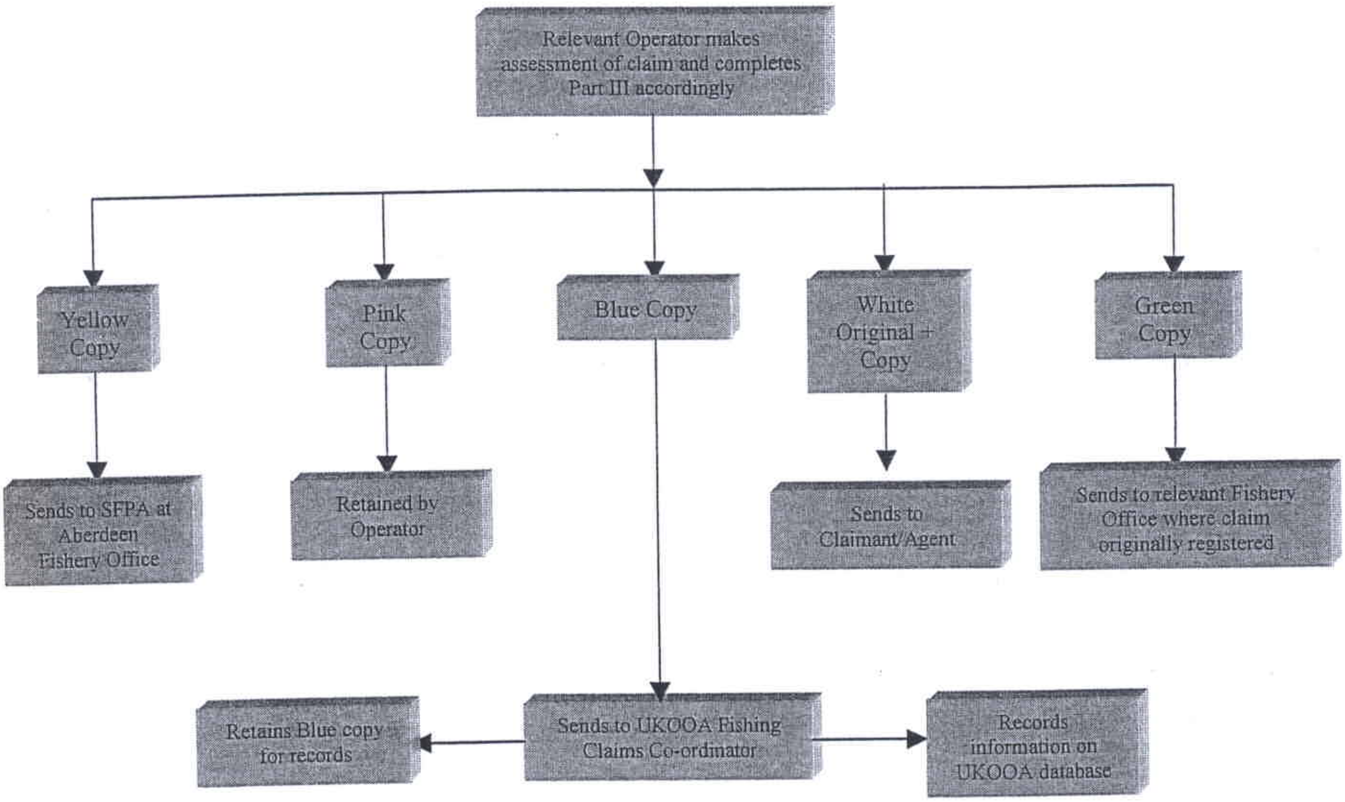
Flowchart for Distribution and Assessment

Part I, Part I Appendix "A", Part II



Flowchart for Distribution and Assessment

Part III



Funding of the UKOOA Compensation Fund

UKOOA provides the funding for the Compensation Fund. At the end of each meeting the Fund Secretary makes a cash-call to UKOOA for the sum that has been agreed to meet those fishing claims that have been accepted. Therefore, the Compensation Fund has no "balance" at the end of each year.

To enable UKOOA to fund the Compensation Fund, an estimate is made within UKOOA for the amount of money that will be required for the following year's cash-calls. This is of course not easy as, at that stage, it cannot be determined how many claims will be directed to the Fund and accepted. Therefore, the estimate is based on the number of claims dealt with in the present year and the figure adjusted to what could be expected for the following year – following a trend.

Oil companies fund UKOOA annually based on a formula that takes into account the acreage, production platforms, pipelines and other producing systems. Each year UKOOA submits a budget to the UKOOA Council for approval and included in this budget is an element for the Compensation Fund.

Operation of the UKOOA Compensation Fund

The Fund meets on average three to four times each year and is autonomous. It has no input from UKOOA in its dealings with fishing claims. The Fund aims to deal with approximately 20+ claims at each meeting.

The two observers are able to provide advice to the Management on areas within their own sphere e.g. the Fishing Claims Co-ordinator can provide advice on oil industry techniques and offshore marine information.

Should the Fund Management reject a claim, the rejection is final and, unless there are exceptional circumstances, the claimant has no further recourse other than to take legal action against an oil company. This has never happened.

Reputation of Compensation Fund

The Fund is seen as a success story. Paramount to this success is the Fund's autonomy. Fishermen see the Fund as a backstop for claims that have been rejected but recognise that their own peers are judging them. The Fund Management, in recognising its unique status, tends to be firm with claimants - but always fair. The annual financial reports over the years have shown the oil companies tend to reject more claims than the Fund. However, whilst the Fund accepts more claims, individual payments to claimants are lower than individual oil companies – averaging at the lower end of the scale at between 20%-30%.

From UKOOA's viewpoint, the fact that fishermen are allowed to manage a Committee that is funded entirely by the oil companies, with no UKOOA input, has demonstrated to the fishing industry a high degree of trust. This in turn has developed into a good relationship with fishing organisations. The arrangement is supported by government bodies dealing with fisheries matters as they do not become directly involved in fishing claims – operationally or financially.

D.T. Rudd
24/2/00

The Department of the Interior Mission

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

The Minerals Management Service Mission

As a bureau of the Department of the Interior, the Minerals Management Service's (MMS) primary responsibilities are to manage the mineral resources located on the Nation's Outer Continental Shelf (OCS), collect revenue from the Federal OCS and onshore Federal and Indian lands, and distribute those revenues.

Moreover, in working to meet its responsibilities, the **Offshore Minerals Management Program** administers the OCS competitive leasing program and oversees the safe and environmentally sound exploration and production of our Nation's offshore natural gas, oil and other mineral resources. The MMS **Minerals Revenue Management** meets its responsibilities by ensuring the efficient, timely and accurate collection and disbursement of revenue from mineral leasing and production due to Indian tribes and allottees, States and the U.S. Treasury.

The MMS strives to fulfill its responsibilities through the general guiding principles of: (1) being responsive to the public's concerns and interests by maintaining a dialogue with all potentially affected parties and (2) carrying out its programs with an emphasis on working to enhance the quality of life for all Americans by lending MMS assistance and expertise to economic development and environmental protection.