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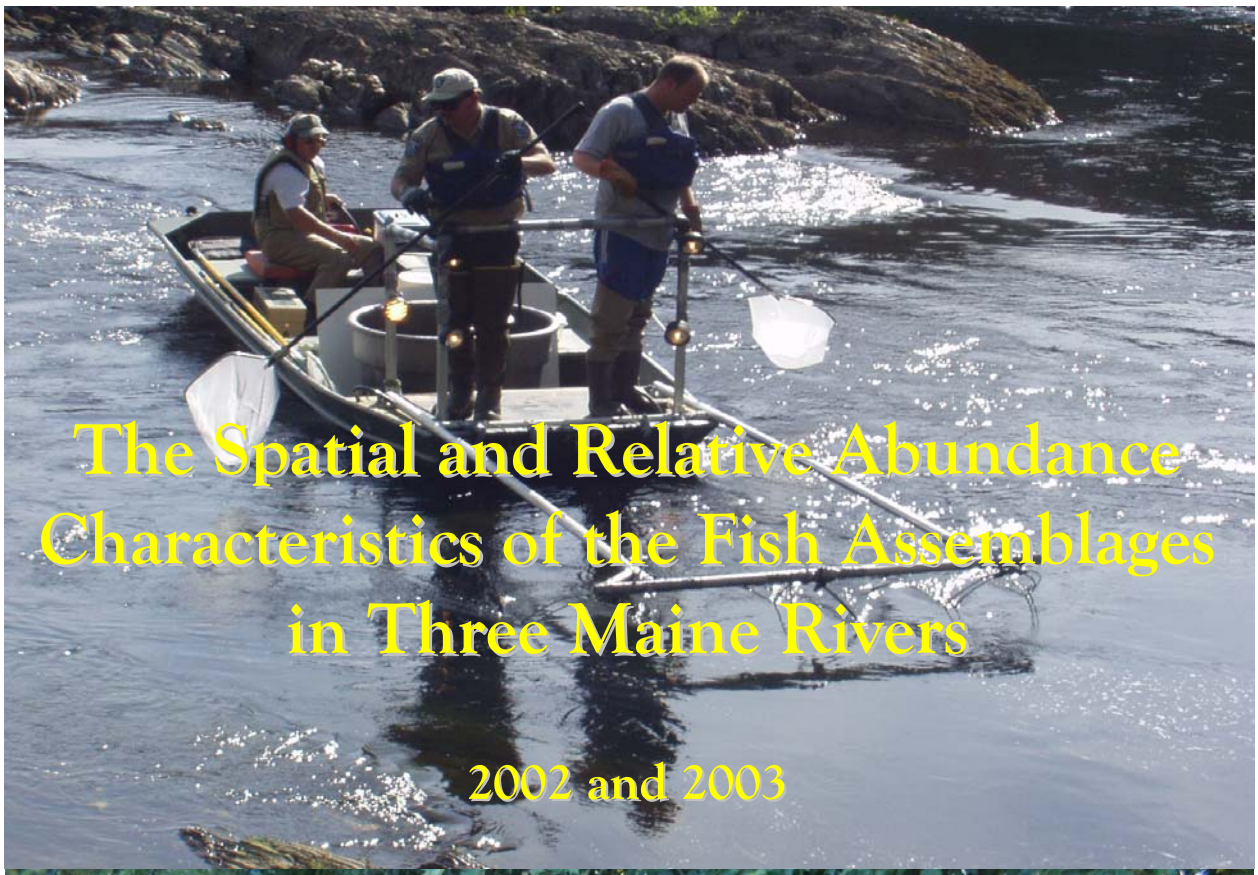

The Spatial and Relative Abundance Characteristics of the Fish Assemblages in Three Maine Rivers

2002 and 2003

Kennebec River: Bingham, ME to Merrymeeting Bay
Androscoggin River: Errol, NH to Merrymeeting Bay
Sebasticook River: Pittsfield, ME to Winslow, ME

Technical Report MBI/12-05-1

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Kennebec River: Bingham, ME to Merrymeeting Bay (2002-3)
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Sebasticook River: Pittsfield, ME to Winslow, ME (2003)

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SUMMARY

A systematic approach to the assessment of fish assemblages in the non-wadeable rivers of Maine and New England was initiated in 2002. Sampling was conducted in the Kennebec River, Androscoggin River, and Sebasticook River mainstems in 2002 and 2003. A single-gear sampling approach was employed using boat mounted electrofishing methods developed and described in a Quality Assurance Project Plan (MBI 2002). The methods were modeled after those previously developed by practitioners in Midwestern and Pacific Northwest rivers and were adapted to Maine rivers after initial testing and development efforts in 2001 and 2002. The result was the development and documentation of a standardized protocol for assessing non-wadeable river fish assemblages and a database about the distribution and abundance of fishes that serves multiple and interacting natural resource and environmental management purposes. Chemical (dissolved oxygen, conductivity) and physical (temperature, qualitative habitat) data were collected alongside the fish assemblage data at each site.

A principal objective of this project is the development of a fish assemblage assessment tool that can be used to systematically assess the status of the non-wadeable rivers and streams of Maine and New England. Such a tool can be used to assess multiple resource management objectives such as the existing status and quality of individual rivers and the effectiveness of management efforts aimed at restoring native fish assemblages including diadromous species. It will complement the existing macroinvertebrate assemblage and periphyton methodologies of Maine DEP (Davies and Tsomides 1997; Davies et al. 1999) and those of the other New England states. Another important and ongoing purpose of the project is the development and testing of the Biological Condition Gradient (BCG; Davies and Jackson 2006), which is a product of the U.S. EPA Tiered Aquatic Life Uses working group (U.S. EPA 2005). The development and testing of biological assessment methods and biological criteria for large rivers is also a principal objective of the EPA National Biocriteria Program and this project is directly tied to that effort. This project fulfilled the methodological tasks and initiated some of the important data analysis tasks for developing a fully functional assessment protocol and index.

Forty (40) fish species and 1 hybrid were collected from the three principal rivers that were intensively sampled in 2002 and 2003. Of these, 29 are considered to be native and the remaining 11 species are introductions outside of their native ranges. We followed the definitions of Halliwell 2005 for designating the non-native status of these species. Some introduced species are purposely managed, some are present due to unintentional and intentional (some illegal) introductions, while others are unknown in terms of their native status. Smallmouth bass *(Micropterus dolomieui)* was the numerically most abundant species followed by American eel *(Anguilla rostrata),* fallfish *(Semotilus corporalis),* redbreast sunfish *(Lepomis auritus),* and white sucker *(Catostomus commersonii).* White sucker predominated in terms of biomass followed by American eel, smallmouth bass, striped bass *(Morone saxatilis),* redbreast sunfish, and common carp *(Cyprinus carpio).* Our collection method produced a median of 11 species (range: 4-19) collected at a 1.0 km sampling site with an average

relative abundance of 508 individuals/km and biomass of 46.1 kg/km. The accounting of fish species in each river is the product of a single-gear protocol and is thus subject to the biases of the methodology. While the majority of species that have either been previously recorded or were expected to occur in these rivers were present, at least two were not collected and several others were captured in relatively low numbers. The occurrence and current status of each of the 40 fish species and others that are also known to occur are described in detail.

The native status, environmental tolerance, target fish classification, and generalized habitat (riverine, impounded, tidal, etc.) occurrence in each of the three study rivers is summarized. This information provides the essential information for summarizing and classifying the autecology of each species for use in the eventual development of fish assemblage assessment tools like the Target Fish Community method and an Index of Biotic Integrity (IBI) for Maine rivers. Each species that was collected in 2002-3 was classified as to native status, environmental tolerance, and fluvial dependency. The occurrence of each species in each of the three river mainstems wais also indicated with regard to occurrence in riverine, impounded, and tidal habitats. Such an inventory is one of the prerequisites for conducting the exploratory analyses that are essential for developing a fish assemblage assessment tool. It will be updated as the statewide database is expanded in the future.

The properties and characteristics of the fish assemblages of each river were portrayed by two types of analyses; 1) composition based on numbers and biomass analyzed by major river and habitat segments (riverine, impounded, tidal), and 2) assemblage indices and the metrics thereof analyzed by river sampling location and between the major habitat types. These analyses were used to gain an initial understanding of the natural and anthropogenic factors that affect assemblage composition in each river. Habitat types were defined as free-flowing riverine, impounded riverine, and tidal fresh/brackish water. Riverine habitats are those that typify natural, unimpeded flows and which offer natural riverine habitat features. These sites consistently exhibited the highest Qualitative Habitat Evaluation Index (QHEI) scores as they offered the widest diversity of habitat characteristic. Impounded riverine habitats consisted of discrete segments where flows and habitat are significantly altered by the ponding of the river by constructed dams. As such some of the naturally occurring riverine characteristics were either eliminated altogether or indirectly affected by the secondary effects of impoundment. These sites consistently exhibited the lowest QHEI scores. A few sites had characteristics intermediate between riverine and impounded habitats and these occurred at the upriver extent of most impoundments. These sites were included with the impounded habitats and in some cases represented outliers in the habitat and assemblage results. Tidal habitats are those influenced by tidal fluctuations and the majority in this study represented freshwater or slightly brackish conditions. These are considered natural habitats, but they exhibited lower QHEI scores due primarily to the prevalence of low gradient characteristics and fine substrates. A slight, but apparent temperature gradient existed in the Kennebec and Androscoggin Rivers, being colder in upstream reaches and warming in a downstream direction.

Salmonids and non-Salmonid cold water fish species were generally restricted to the colder upstream reaches in each river. The Sebasticook River did not exhibit a strong thermal pattern, being warmer throughout the study reach.

Habitat Assessment

Habitat was assessed at each electrofishing site using the Qualitative Habitat Evaluation Index (QHEI; Rankin 1989, 1995) as modified for application to large rivers. Each electrofishing site was assessed to ascertain the diversity and quality of the available aquatic habitat during and immediately after the collection of fish assemblage data. We modified the QHEI for application to large, non-wadeable rivers as part of the exploratory sampling and the ensuing surveys of the Kennebec River in 2002 and the Androscoggin River in 2003.

Kennebec River

The Kennebec River mainstem offered a gradient of habitat quality as determined by QHEI scores and attributes. Free-flowing riverine habitats exhibited the highest scores generally in the 80-90 range. Impounded habitats reflected the loss of riverine habitat attributes scoring in the 50-65 range. Tidal habitats reflected their low gradient character with similar scores of 50-70. There was also a decline in QHEI scores in a downstream direction from the head of tide at Augusta. QHEI scores were highest (>85) at riverine sites in the freshwater segment including one site in the former Edwards Dam impoundment. These sites also exhibited no (0) modified attributes. Three of the riverine sites within the former Edwards Dam impoundment still reflected lingering effects of impoundment indicting that full recovery to riverine conditions was not complete. These sites had QHEI scores ranging from 64.5 to 76 and each had from 1 to 5 modified attributes which included a recovering channel (all), fair-poor development (3), and sparse or no cover (2). The site at RM 6.8 located downstream from the Sidney boat launch also had high/moderate siltation, slow or no flow, and no riffle/run habitat. Some of these are characteristic of low gradient riverine sites, which usually score lower than higher gradient sites. This area of the mainstem had other indications of recovery including a treeless shoreline margin and a distinctive band of grasses, sedges, and bullrushes that grew in the margin formerly inundated by the Edwards impoundment. It will likely take a series of major hydrologic events to more fully recover the riverine habitat in this formerly inundated segment.

Androscoggin River

QHEI scores along the length of the Androscoggin River mainstem reflected a gradient of conditions including high to low gradient riverine, impounded riverine, and tidal habitats. Scores generally ranged from the low 40s to the low 90s. Based on QHEI scores and attributes, there were two distinct types of riverine sites in the Androscoggin River mainstem, high to moderate gradient riverine sites and low gradient riverine sites. Free-flowing, high to moderate gradient riverine habitats exhibited the highest scores generally in the 80-90 range. Low gradient riverine habitats scored in the high 60s to low 70s,

reflecting a comparative lack of current and substrate diversity. Impounded sites reflected the habitat modification it precipitates with scores in the 40s and 50s. This was especially apparent in Gulf Island Pond where all QHEI values were <50 with few good attributes (3-4) in relation to a predominance of modified attributes (4-6). This is typical of the largest run-of-river impoundments where shoreline depths were not only shallow, but extended for several hundred feet away from the shoreline in many areas. Woody debris was a common cover type, but the substrate was composed of sand and silts with little submergent aquatic vegetation. Other mainstem sites that offered a mix of impounded and riverine habitats had QHEI scores that were intermediate between free-flowing riverine and impounded. The tidal influenced sites had slightly higher scores (55-65) than the Kennebec due to better development around more numerous islands and less silt and muck in what were predominantly sand substrates.

Sebasticook River
Habitat in the Sebasticook River reflected extensive modification by impoundment and low gradient characteristics in the available riverine reaches. Only 3 sites had QHEI scores >75 and one was a partially impounded riverine habitat. The mainstem in the study area was affected by 3 major hydropower dams, Ft. Halifax, Benton Falls, and Burnham. Some of the intervening free-flowing reaches were not boatable and were thus not included in this study.

Some patterns emerged in the results of the habitat assessment conducted across the three study rivers. Habitat in all three rivers reflected a range of condition from high/moderate and low gradient riverine, tidal riverine and embayments, and modified riverine due primarily to the effects of run-of-river impoundments. The riverine habitats exhibited the highest median QHEI scores whereas tidal and impounded sites scored about 25-30 points lower. Riverine sites also exhibited more good attributes with a median of 9 compared to 4-5 for tidal and impounded sites. Riverine sites had fewer modified attributes with a median of 0 compared to 5-6 for tidal and impounded sites. Tidal influenced and impounded sites had similar QHEI scores and modified:good ratios, but for very different reasons. The median ratio of modified:good habitat attributes was 0 for free-flowing riverine sites and >1.0-1.5 in tidal and impounded sites. One key difference in these results is that tidal habitats are naturally occurring and impoundments are human-induced, yet each results in a similar quality of river habitat.

Fish Assemblage Composition

Kennebec River
Fish assemblage composition by numbers and weight reflected natural and anthropogenic gradients in the study area between Wyman Dam to Merrymeeting Bay. The highest average numbers and biomass of fish occurred in the riverine segment between Waterville and Augusta. The assemblage was predominated by American eel, smallmouth bass, alewife, redbreast sunfish, fallfish, and white sucker. The tidal segment had the next highest numerical density followed by the impounded segments and the two upstream

riverine segments. Spottail shiner were numerically predominant followed by smallmouth bass, banded killifish, white sucker, American eel, alewife, white perch, white sucker, and redbreast sunfish. The impounded segments were predominated by species tolerant of lentic habitats and included smallmouth bass, redbreast sunfish, largemouth bass, yellow perch. Three species of Salmonidae (brown trout, rainbow trout, and landlocked salmon) were numerically present, but not predominant in the upstream most riverine segment and were virtually absent from the impounded habitats. Composition by biomass reflected a stronger gradient between natural riverine and impounded habitats. The riverine segment between Waterville and Augusta had the highest biomass (105 kg/km) and was nearly twice that of adjacent segments, the riverine habitats between Skowhegan and Waterville and the tidal segment below Augusta. American eel, white sucker, striped bass, and smallmouth bass comprised more than 90% of the assemblage biomass in this segment. Biomass in the tidal segment was comprised mostly of common carp (65%) with white sucker, American eel, and striped bass comprising another 25%. The impounded segments had very low biomass compared to the riverine and tidal segments, some with nearly 16 times less than the riverine segment between Waterville and Augusta. Smallmouth bass and American eel predominated in these habitats.

Androscoggin River

Assemblage composition patterns in the Androscoggin also reflected natural and anthropogenic gradients. The downstream-most impounded and tidal segments exhibited the highest overall numerical abundance. The riverine segments in the upper one-half of the mainstem had somewhat higher numerical densities than the comparable impounded segments (Figure A-3). This pattern was reversed in the lower one-half of the mainstem where impounded segments exhibited higher densities. Smallmouth bass, common shiner, and fallfish were numerically predominant in both riverine and impounded segments in the upper mainstem. Longnose dace were also numerically predominant in the cold water riverine segments between Gorham, NH and Rumford. Spottail shiner emerged in the impounded segments as water temperatures became warmer downstream from Rumford and in the Jay-Livermore Falls area. Gulf Island Pond included a more even distribution of numerically predominant species that added species characteristic of lentic habitats including yellow perch, white perch, pumpkinseed sunfish, and redbreast sunfish in addition to smallmouth and largemouth bass. White sucker emerged in the lower riverine segments. The tidal segment included spottail shiner, American eel, white perch, white sucker, and the presence of alewife and American shad.

The riverine segments generally had 2-3 times the biomass of the impounded segments. The tidal segment had the highest biomass of any segment by 2.5-10 times. Smallmouth bass and white sucker predominated the riverine segments in the upper mainstem and smallmouth bass and fallfish in the impounded segments. Rainbow trout and brown trout were also present, but were not predominant in the cold water segments upstream from Rumford. Smallmouth bass remained predominant in the lower mainstem in both riverine and impounded segments and was joined by white sucker in the riverine segments and species characteristic of lentic habitats such as redbreast sunfish, spottail shiner, yellow

perch, chain pickerel, largemouth bass, and white perch in the impounded segments. American eel were included in selected riverine segments and were present only as large adults. The tidal segment included white sucker (70% by weight) followed by white perch, redbreast sunfish, white perch, common carp, and smallmouth bass.

Sebasticook River
The distribution of species by numbers and biomass was remarkably even and included representation by the same 8-9 species for the riverine and impounded segments. Unlike the Kennebec and Androscoggin River results, both numbers and biomass were higher in the impounded segment by 1.7 and 1.4 times, respectively. The riverine segment was predominated in terms of numbers by redbreast sunfish, largemouth bass, yellow perch, chain pickerel, pumpkinseed sunfish, smallmouth bass, golden shiner, and white sucker. In terms of biomass the assemblage was predominated by white sucker, yellow perch, chain pickerel, smallmouth bass, largemouth bass, redbreast sunfish, brown bullhead, American eel, and white perch. The impounded segment was predominated in terms of numbers by redbreast sunfish, largemouth bass, yellow perch, common shiner, golden shiner, fallfish, pumpkinseed sunfish, smallmouth bass, and white sucker. In terms of biomass the predominant species were white sucker, redbreast sunfish, largemouth bass, yellow perch, smallmouth bass, chain pickerel, pumpkinseed sunfish, and white perch. This predominately lentic assemblage association reflected both the low gradient character of the riverine habitats and the extent of the impounded reaches.

We also used common assemblage parameters such as species richness, numbers, biomass, and the Modified Index of Well-Being (MIwb; Gammon 1976; Yoder and Smith 1999) to examine spatial patterns within and between the three rivers. Selected candidate IBI metrics were also considered and included functional feeding groups (insectivores, omnivores, top carnivores) and %DELT[1] anomalies. We also assessed the presence of introduced species following the definitions of Halliwell (2005). We also analyzed for the metrics of the Target Fish Community approach of Bain and Meixler (2000) following their designations of species as macrohabitat generalists, fluvial dependents, fluvial specialists, and diadromous species. We also added a classification of tidal specialist for species that uniquely occurred in tidal areas.

Baseline Fish Assemblage Parameters

Kennebec River
Species richness ranged from 10 at two upper mainstem sites to 18 in Merrymeeting Bay with most sites ranging from 10-15 species. Species richness showed a net downstream increase, but the change from site to site was variable and did not appear related to any strong relationships with natural or anthropogenic gradients. The longitudinal pattern reflected lower richness in the upper cold water reaches and increased richness mostly via species addition in the downstream, warmer reaches. Non-native species comprised a minor fraction of the assemblage at each site ranging from 0 to 3. In the upper mainstem

[1] %DELT – percentage of all fish with deformities, erosions, lesions, and/or tumors.

this included brown trout and rainbow trout. The number of non-native species increased downstream and reflected the addition of warmwater species that included common carp, white catfish, and black crappie.

Assemblage density (numbers/km) and biomass (kg/km) exhibited an erratic, net increase from upstream to downstream. The results at any single site were sometimes influenced by a few numerous or large species, but generally density and biomass was higher at riverine and tidal sites than impounded sites. The Modified Index of Well-Being (MIwb) normalized much of the variation that is inherent to the measures density and biomass. We also examined for any relationships between the MIwb and QHEI given the strong habitat quality gradient that exists. The MIwb showed some localized changes in selected reaches and segments, but it was not significantly correlated with the QHEI ($r^2 = 0.028$). The MIwb is responsive to severe, acute impacts but is not particularly discriminating about impacts that result in more subtle changes to the fish assemblage (Yoder and Smith 1999). External anomalies on fish was measured by the proportion that had deformities, erosions, lesions, and/or tumors (%DELT) and it did not exceed 2% at any site. Most sites exhibited less than 0.5%, but some exceeded 1.0%. If there was a pattern it was an overall increase in a downstream direction.

Target fish community metrics showed the effect of habitat with macrohabitat generalists dominating impounded sites comprising >80% of the assemblage at most of these sites. QHEI and %macrohabitat generalists was negatively correlated ($r^2 = 0.46$). Fluvial specialist and dependent species predominated at the free-flowing sites and showed a positive, but less pronounced relationship with QHEI. Macrohabitat generalists predominated at the tidal sites downstream from Augusta. Diadromous species occurred mostly as American eel upstream from Waterville and became more prevalent downstream.

Androscoggin River

Species richness ranged from 4 species in Lewiston-Auburn to 19 species at the entrance to Merrymeeting Bay with most sites ranging from 7-13. Excluding the most downstream tidal site, there was only a slight overall increase from upstream to downstream. Non-native species were not a major part of the fauna with 1 or 2 species when they were present; most sites had none. Rainbow and brown trout occurred in the colder upper mainstem and black crappie in the lower mainstem. Common carp occurred in the tidal segment. Density (numbers/km) and biomass (kg/km) increased steadily in a downstream direction with a few erratic values caused primarily by one or two predominant species. An example was the very high density caused by the occurrence of numerous young-of-year spottail shiners in the impoundment downstream from the Jay dam (RM 55.8). The MIwb showed some localized changes in selected reaches and segments, but it was not significantly correlated with the QHEI ($r^2 = 0.001$). The longitudinal trend showed two rather pronounced declines immediately downstream from Berlin and in Lewiston-Auburn. The overall trend was a slight net increase downstream.

The proportion of fish with DELT anomalies was <1% in the mainstem upstream from Gulf Island Pond. %DELT increased markedly to 4% and >4% at two sites, RM 25.2 downstream from the Deer Rips dam and RM 21.9 in Lewiston-Auburn within and downstream of an area impacted by combined sewer overflows (CSOs). The levels quickly returned to near zero; they were slightly elevated in the tidal segment downstream from Brunswick. With the exception of the two sites upstream and within Lewiston-Auburn, none of the results suggest serious impacts.

Target fish community metrics showed the effect of habitat with macrohabitat generalists dominating impounded sites exceeding 80-90% of the assemblage; these values were almost 100% in Gulf Island Pond. QHEI and %macrohabitat generalists was negatively correlated, but not significantly so ($r^2 = 0.22$). Fluvial specialist and dependent species predominated the free-flowing sites in the upper mainstem and also showed a positive, but less pronounced relationship with QHEI. In the lower one-half of the mainstem downstream from Rumford, macrohabitat generalists comprised >60% of the assemblage regardless of habitat type. This persisted downstream to below the Worumbo dam (RM 8.2) where the percentage declined to less than 50-60%. Macrohabitat generalists also predominated the tidal sites downstream from Brunswick. Diadromous species were restricted to the mainstem downstream from Gulf Island Pond mostly in the form of large American eels. The proportion of diadromous species increased downstream from the Worumbo dam and was highest in the tidal segment.

Sebasticook River

Species richness ranged from a low of 6 species in Douglas Pond to a high of 14 species in the Ft. Halifax impoundment with most sites ranging from 11-13. There was steady and net overall increase from upstream to downstream. Non-native species were not a major part of the fauna with 1 species at 5 of the 9 sites. This was represented exclusively by black crappie. Density (numbers/km) and biomass (kg/km) increased in a downstream direction with the highest density occurring at Benton Falls and the highest biomass in the Ft. Halifax impoundment. MIwb values showed an overall increase from upstream to downstream and exhibited a reverse, negative correlation with the QHEI that was not significant ($r^2 = 0.17$). The longitudinal trend did not exhibit any changes that were suggestive of significant impacts. The proportion of fish with DELT anomalies was zero at all except one mainstem site where a very low incidence was observed.

Target fish community metrics showed the effect of the impounded and low gradient riverine habitat with macrohabitat generalists >80% of the assemblage at all except one site. The values were at or just below 100% in Douglas Pond. QHEI and %macrohabitat generalists was negatively correlated, but not significantly so ($r^2 = 0.31$). Fluvial specialist and dependent species were generally less than 10% with the site at Benton Falls reaching 30%. The proportion of diadromous species comprised less than 5-10% of the assemblage at most sites. They were more prevalent in the lower mainstem and were represented by American ell and alewife.

Summary
Some consistent patterns were evident in selected assemblage parameters between the three rivers. Species richness showed a net increase from upstream to downstream being the most demonstrable in the Kennebec and Sebasticook Rivers. Numerical density and biomass also showed overall increases in the same direction and was highly variable from site to site in the Kennebec and Androscoggin. The MIwb did not show any strong impacts, instead showing some localized departures. This observation rules out the existence of any strong acute impacts, but may mask more subtle impacts due to habitat and/or nutrient enrichment. The incidence of external anomalies on fish was usually less than 1%, but did show some localized responses to potential pollution sources in the Androscoggin River.

Perhaps the strongest signal of any of the assemblage parameters examined was exhibited by the target fish community metrics. These tended to show the strongest differences between the major riverine habitat types, particularly between free-flowing riverine and impounded sites. Correlations between the QHEI and these metrics were usually not significant, but the results along the longitudinal continuum may be nonetheless meaningful. The lower one-half of the Androscoggin River mainstem exhibited an unusually high proportion of macrohabitat generalists despite having segments of free-flowing riverine habitat. The Sebasticook River was predominated by macrohabitat generalists throughout the entire mainstem. It may be that the predominance and repetition of impounded habitats extended into these free-flowing sites. Lyons et al. (2001) observed the length of riverine reaches between hydroelectric dams to be correlated with lower IBI scores in Wisconsin Rivers, i.e., more restricted reaches between dams had lower IBI scores. It may also be attributable to the effects of pollution in the form of organic and nutrient enrichment that is apparent in the lower mainstem.

Status of Developing of a Fish Assemblage Index

The principal project goal of initiating the development of a fish assemblage assessment tool for the large, non-wadeable rivers of Maine and New England, specifically a multimetric index or fish index of biotic integrity (IBI), was fulfilled. Ample examples and guidance exist for executing the data collection and analysis process that is needed to develop such an index. Regardless of the methods and techniques used to collect assemblage data, the process for developing an index should follow the seminal works on IBI development, principally Karr et al. (1986), which outlines the developmental steps and considerations. Karr et al. (1986) provides the baseline guidance for IBI metric development and testing and regional and faunal substitution for IBI metrics in the original IBI. Hughes et al. (1998) further organized this approach taking advantage of what had been learned by numerous efforts since the mid-1980s. They detailed requirements that include the measurement and characterization of reference condition, selection and testing of candidate metrics, metric membership within an index, testing of metric performance, IBI variance and power analyses, and independent testing to validate the capacity to detect and quantify impairments. Furthermore, a detailed knowledge of the

regional fish fauna that includes life history, environmental tolerance, and native status is also required, thus it needs to have the input of the regional practitioners.

This project has accomplished important prerequisites that include the development and testing of a standardized data collection method, execution of river segment surveys that are essential to IBI use and application, proving the logistics involved in sampling extended reaches of large rivers, and establishing baseline knowledge about the riverine fish fauna including autecology of species. We were also able to determine if patterns in fish assemblages exist using baseline parameters such as relative abundance (numbers and biomass) and species richness along natural and anthropogenic disturbance gradients. This fulfills the first of several steps that need to be taken towards the development of a fish index of biotic integrity (IBI) for Maine rivers.

This effort will be complete when the geographic scope of coverage in both spatial and temporal terms is complete. This means coverage of all major non-wadeable inland rivers and inclusion of the entire gradient of natural and disturbance conditions, including temperature and habitat gradients. This is needed to capture the breadth of natural variability in the riverine fish fauna and provide a database for testing candidate metrics and evaluating their capacity to detect and quantify the effect of stressors. We expect this to take at least 5-6 years and perhaps longer depending on what currently unsampled rivers reveal. Based on prior experiences, a 5-10 year period is not uncommon for such development al projects.

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ACKNOWLEDGEMENTS

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The Spatial and Relative Abundance Characteristics of the Fish Assemblages in Three Maine Rivers

Kennebec River: Bingham to Merrymeeting Bay (2002)
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INTRODUCTION

A systematic approach to the assessment of fish assemblages in the non-wadeable rivers of Maine and New England was initiated in 2002 by the Midwest Biodiversity Institute and Kleinschmidt Associates. Sampling was conducted in the Kennebec River mainstem between Bingham, ME and Chopps Point at the outlet of Merrymeeting Bay during the summer and early fall months of 2002. This was followed in 2003 by an assessment of the Androscoggin River mainstem between Errol, NH and Merrymeeting Bay, the Sebasticook River between Great Moose Pond near Pittsfield, ME and the mouth at Winslow, ME, and the Kennebec River between Waterville, ME and Augusta, ME. A single-gear approach was employed using boat mounted electrofishing methods described in the Quality Assurance Project Plan (MBI 2002). The methods were modeled after those previously developed by practitioners in Midwestern and Pacific Northwest rivers and adapted to Maine rivers after initial testing and development efforts in 2001 and 2002. This resulted in a standardized protocol for assessing non-wadeable river fish assemblages and a database about the distribution and abundance of fishes that serves multiple and interacting natural resource and environmental management purposes (Figure I-1).

A long term objective is the development of a fish assemblage assessment tool that can be used to systematically assess the status of the non-wadeable rivers and streams of Maine and New England. Such a tool can be used to assess multiple resource management objectives

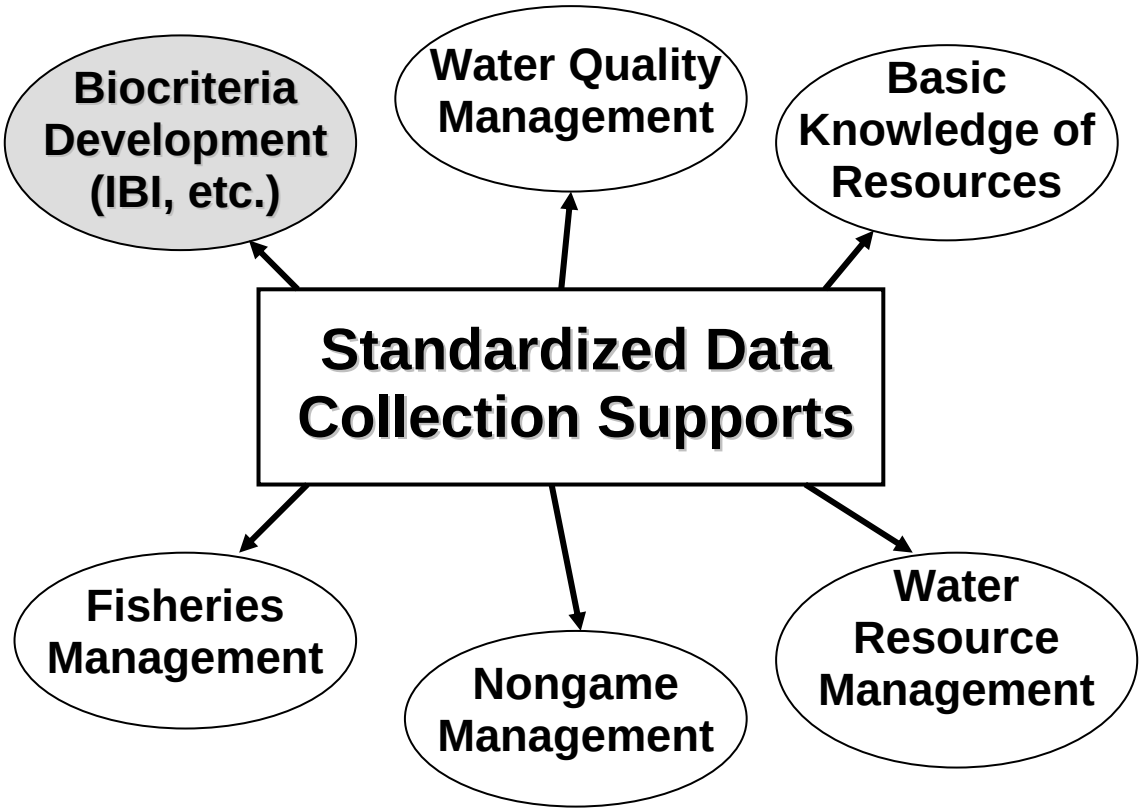

Figure I-1. Multiple and integrated uses of the data and information produced by systematic biological assessment.

such as the existing status and quality of individual rivers and the effectiveness of management efforts aimed at restoring native fish assemblages including diadromous species. It will complement the existing macroinvertebrate assemblage and periphyton methodologies of Maine DEP (Davies and Tsomides 1997; Davies et al. 1999) and those of the other New England states. An ongoing purpose of the project is the development and testing of the U.S. EPA Biological Condition Gradient (BCG), which is a product of the U.S. EPA Tiered Aquatic Life Uses working group (U.S. EPA 2005). The development and testing of biological assessment methods and biological criteria for large rivers is also a principal objective of the EPA National Biocriteria Program and this project is directly tied to that effort.

In addition to the biocriteria related objectives of this study, the baseline information provided about the distribution and abundance of fish species supports important resource management objectives including;

1. restoration and management of diadromous species;
2. management of hydroelectric generating facilities;
3. Atlantic salmon restoration;
4. fisheries management issues; and,
5. documentation and management of introduced species.

The Kennebec River assessment in particular provides insights about the effects of dam removal and post-impoundment changes in the fish assemblage of a large, coastal river. Lastly, this study contributes to the basic understanding of the distribution and abundance of fishes in Maine's large rivers. Comparatively little is known about the status and composition of the large river fish assemblages beyond species of historical and immediate management interest. Of particular interest is the documentation of naturalized and recently introduced species that occur in the same habitats required by fish species that are the focus of management and restoration interest.

METHODS

A cost-effective, doable, and reliable sampling method is essential to any biological assessment program. The selection of a methodology is a fundamental decision or "cornerstone" in using fish assemblages as an environmental monitoring and assessment tool. While a variety of possible methods and techniques are available, the choice of which one(s) to use is influenced by the objectives of the monitoring program and the conditions that exist in the particular study area or region. Regarding the former, the objective of the type of assessment that we are conducting is to employ methods that meet the previously described objectives (i.e., can be accomplished with reasonable cost and effort, is relatively rapid, multiple sites can be sampled each day, etc.). An important goal of this study is to develop and evaluate a fish sampling method that meets these criteria and which produces relative abundance data and a sufficiently representative cross-section of the fish assemblage at a site with a reasonable sampling effort (i.e., 2-3 hours/site). As such this type of assessment is distinguished from the more resource intensive efforts that employ multiple types of sampling gear that attempt to produce estimates of population(s), standing crop, and/or a virtual inventory of all species present. To meet our goals we tested and evaluated the applicability of a single-gear sampling approach that meets the following criteria outlined by Karr et al. (1986). Such a method should be able to:

- monitor biotic integrity at specific sites, within river reaches, and between different sites, reaches, and rivers;
- sample and screen large numbers of sites in order to identify those that require attention;
- assess changes in key fish assemblage parameters and attributes over space and time; and,
- interpret large amounts of data from complex fish assemblages where an objective is to assess biotic integrity.

Meeting these criteria requires a methodology that can be used to sample multiple sites during a day and tens of sites within a summer-early fall seasonal index period measured in weeks. The sampling equipment and platform need to be transportable and permit access to multiple points along the length of mainstem rivers. Such single-gear electrofishing approaches have been successfully tested and used in parts of the U.S. and Canada to fulfill

similar objectives (Yoder and Kulik 2003). Thus it was a primary goal of this project to test and evaluate the potential for application to Maine's rivers. The Quality Assurance Project Plan (QAPP; MBI 2002) describes all field, laboratory, and data management procedures in detail along with the rationale and methodological issues associated with the boat electrofishing protocols on which this study is based. The following is a synopsis of the methods used and their development in the course of this study.

An Electrofishing Protocol for Large Rivers in Maine and New England

This section describes the development process and the essential characteristics of a standardized boat electrofishing protocol applicable to Maine and New England non-wadeable rivers. Based on our experiences in 2002 and 2003, and previously in other regions where similar approaches have been successfully used, this protocol should not only be sufficient for general bioassessment purposes, but also for multiple other resource management purposes. The approach, equipment, and techniques detailed here are those that were tested and applied in 2001-2003. This does not preclude or rule out the use of other designs or equipment to provide supplemental data. However, our primary goal is to produce comparable results in terms of electrofishing catches including numbers, biomass, and composition of the fish assemblage, thus equipment choices, specifications, and execution of the sampling protocol need to take meeting these objectives into account.

Crew Composition and Logistics

A boat electrofishing crew consists of three persons - two netters and a boat driver. The netter's primary responsibility is to capture all fish sighted; the driver's responsibility is to maneuver the boat so as to provide the netters the best opportunities to capture and land stunned fish (the driver may assist in netting stunned fish that appear near the stern or behind the boat). The boat driver also operates the electrofishing unit. Each task requires skill and training, but boat maneuvering requires the most experience to gain adequate proficiency and ensure safe operation. The latter skill was particularly important in the faster flowing sections of the study rivers. In actual practice, the boat driver also functions as the crew leader and should be a skilled professional capable of carrying out and supervising all data collection activities. The netters are usually seasonal technicians with the physical ability to perform all crew member tasks.

The netters are clad in chest waders and wear life jackets and rubber gloves; the driver is also clad in chest waders. Sampling sites are positioned at selected intervals along a contiguous river reach and sampling takes place along the shoreline(s) offering the most diverse macrohabitat features. In other areas of the U.S. this usually includes the gradual outside bends of large rivers (Gammon 1973, 1976), but this is not invariable. Maine's rivers presented many similarities and a few dissimilarities, the latter being manifest in faster current velocities including swift chutes, runs, and rapids and cover types (e.g., large boulders, log cribs, deep runs, bedrock ledges) away from the shoreline that required some adaptations of the existing methods.

A typical sampling day consists of launching the boat at an upstream access point, shuttling the truck and trailer to a downstream retrieval point, and returning to sample sites between the launch and retrieval points by navigating in a downstream direction. Normally, three 1.0 km sites can be sampled each day in river reaches of less than 10 to more than 15 miles in length. If continuous navigation of a river segment was limited or precluded by falls, dams, or other safety concerns, the boat was launched and retrieved from a single access site in proximity to the sampling site. In the three rivers sampled in 2002 and 2003, access was precluded mostly by navigational safety concerns, particularly in some of the very small hydroelectric impoundments in Madison, ME, Berlin, NH, and Livermore Falls, ME. Site location was seldom precluded by a lack of launch or retrieval access, although many locations required what is termed as "rough launching" (Figure I-2). A few sites necessitated hand winching the boat and/or trailer, but most were accessed with the trailer attached to the truck. A four wheel drive truck with the capacity to transport a three-person crew and the electrofishing boat is essential to this type of sampling. Sufficient traction and pulling power is needed to access remote or unimproved access sites. In a few instances, the boat was secured in the river overnight.

Figure I-2. Logistics of boat electrofishing in 2002 and 2003; rough launching of electrofishing boat is required to gain access at many locations.

Equipment Specifications

Boat electrofishing was the method of choice based on its successful application as a single gear method to non-wadeable rivers in other parts of the U.S. and Canada and its successful trial application in selected Maine rivers by Kleinschmidt in 2000-1. A 16' john boat was outfitted for initial testing in 2001 (Figure I-3). This consisted of a design similar to that originated by Gammon (1973, 1976) and used extensively by Ohio EPA since 1979. Electric current generated by a Smith-Root GGP 5.0 generator/pulsator combination is

Figure I-3. Electrofishing boat and towing vehicle specifications and configuration used in the Maine rivers fish assemblage assessment, 2002 and 2003.

in front of the bow. They consisted of gangs of 3/16" stainless steel woven cable; a gang consisted of 4-6 separate strands bundled together. Cathodes (- electrode) consisted of four ¾" diameter flexible stainless steel conduit cut to lengths of 6-8' (or longer for deep sites) and suspended directly from the bow. Wiring from the pulsator to the electrodes is encased in plastic conduit to protect against shorts and electrical shock. A positive pressure foot pedal switch is located on the bow platform and operated by a primary netter. Emergency cutoff switches are located within easy reach of the boat driver on the rear seat and on the 5.0 GPP pulsator unit. Lights are affixed the safety railing to enable night sampling. The electrofishing boat is propelled by a 15 h.p. outboard mounted on the transom.

Electrofishing unit settings were typically governed by relative conductivity. At low conductivity sites (15-40 µs/m^2) the GPP unit settings selected were the high voltage range (500-1000 v) at 120 Hz and 100% of the voltage range to produce 2-4 A. At sites with higher relative conductivity (>40-100 µs/m^2) the same settings at 80-100% of the voltage range produced 5-10A. Higher relative conductivity in excess of 200 µs/m^2 necessitated switching to the low voltage range (maximum = 500 v) at 50-80% of the voltage range to produce 12-18A. The latter situations were rare and occurred at some of the tidal influenced sites and in point source effluent mixing zones. The selection of the 120 Hz pulse frequency was accomplished by trial and error testing in 2001 and initially during the 2002 surveys. This was determined to be the most effective pulse setting based on visual observations of the comparative effectiveness in stunning all fish species. Lower settings (30, 60 Hz) were much less effective and are deemed unsuitable for Maine rivers. Care is taken to avoid injury and all processed fish were examined for visible signs of damage. The selected settings produced very few, if any visible injuries during the 2002-3 surveys.

Field Sampling and Data Recording

Detailed field data recording and sample processing procedures are described in the QAPP (MBI 2002), which is updated annually. Captured fish are immediately placed in an aerated live well for processing. If necessary, fish are anesthetized to minimize trauma and handling stress. Trout and salmon are placed in separate aerated containers and processed first to minimize their holding time. Adult Atlantic salmon that were drawn to the surface during the electrofishing effort were not netted at T >22.0°C, but were identified and their length estimated by sight. The electric current was temporarily interrupted to minimize their exposure. Weights are derived by length/weight relationship data provided by the Maine ASC. Individual fish are identified to species, weighed to the nearest gram, and examined for external anomalies. Species that occur in large numbers are subsampled with a minimum of 15 individuals for large adults and 50 for smaller species and 1+ or 0+ life stages. Most species are distinguished as adults, 1+ (juveniles), or 0+ (young-of-year) in accordance with the criteria in Table I-1. The principal purposes of this differentiation were to increase the accuracy of extrapolations based on subsampling and for potential IBI guild classification. Species of recreational and/or commercial interest are also measured for total length to the nearest mm.

The majority of captured fish are identified to species in the field; however, any uncertainty about the field identification of individual fish requires the retention of voucher specimens for laboratory identification. Fish were preserved in a solution of borax buffered 10% formalin and labeled by date, river, and site designation. Identification is made to the species level in all cases and follows the nomenclature of the American Fisheries Society (Nelson et al. 2004). Immature and post-larval fish less than 15-20 mm in length were generally not included in the sample. This follows the recommendations of Angermier and Karr (1986) and Angermier and Schlosser (1988) that fish of this size not be included in IBI calculations.

All fish that are weighed, whether done individually, in the aggregate, or as subsamples, were examined for the presence of gross external anomalies (Figure I-4). An external anomaly is

Table I -1. Criteria (weight, length, or other) used to determine adult (A), 1+ (juvenile; B), and 0+ (young-of-year; Y) designations for Maine river fish species for the primary purpose of assuring the accuracy of extrapolated total biomass based on subsamples and for IBI guild classification. Not all species were differentiated.

Species	Adult	1+[1]	0+
Sea lamprey *(Petromyzon marinus)*	fully developed[2]	-[2]	ammocoete
American eel *(Anguilla rostrata)*	>500 g		<10 g
Blueback herring *(Alosa aestivalis)*	>100 g		<10 g
Alewife *(Alosa pseudoharengus)*	>100 g		<10 g
American shad *(Alosa sapidissima)*	>100 g		<10 g
Lake chub *(Couesius plumbeus)*	>10 g		<1 g
Common carp *(Cyprinus carpio)*	>1000 g		<50 g
Common shiner *(Luxilis cornutus)*	>10 g		<1 g
Golden shiner *(Notemigonus crysoleucas)*	>100 g		<10 g
Spottail shiner *(Notropis hudsonius)*	>10 g		<1 g
Eastern blacknose dace *(Rhinichthys atratulus)*		not determined	
Longnose dace *(Rhinichthys cataractae)*		not determined	
Creek chub *(Semotilus atromaculatus)*		not determined	
Fallfish *(Semotilus corporalis)*	>50 g		<3 g
Longnose sucker *(Catostomus catostomus)*	>1000 g		<10 g
White sucker *(Catostomus commersonii)*	>1000 g		<10 g
White catfish *(Ameirus catus)*	>100 g		<10 g
Brown bullhead *(Ameirus nebulosus)*	>100 g		<10 g
Northern pike *(Esox lucius)*	>500 g		<10 g
Chain pickerel *(Esox niger)*	>80 g		<10 g
Rainbow trout *(Oncorhynchus mykiss)*	>100 g		<10 g
Atlantic salmon *(Salmo salar)*	>500 mm		<10 g
Landlocked salmon *(Salmo salar sebago)*	>100 g		<10 g
Brown trout *(Salmo trutta)*	>100 g		<10 g
Brook trout *(Salvelinus fontinalis)*	>100 g		<10 g
Burbot *(Lota lota)*	>100 g		<10 g
Banded killifish *(Fundulus diaphanus)*		not determined	
Mummichog *(Fundulus heteroclitus)*		not determined	
Slimy sculpin *(Cottus cognatus)*	>20 g		<2 g
White perch *(Morone americana)*	>100		<10 g
Striped bass *(Morone saxatilis)*	>500 mm		<50 g

[1] Juvenile criteria are <adult, >y-o-y.

[2] Parasitic habitats fully developed in adults; buccal funnel is fully developed in juveniles, but is not yet parasitic.

Table I-1. (continued)

Species	Adult	1+	0+
Rock bass *(Ambloplites rupestris)*	>80 g		<10 g
Redbreast sunfish *(Lepomis auritus)*	>50 g		<5 g
Pumpkinseed sunfish *(Lepomis gibbosus)*	>50 g		<5 g
Smallmouth bass *(Micropterus dolomieui)*	>150 mm		<10 g
Largemouth bass *(Micropterus salmoides)*	>150 mm		<10 g
Black crappie *(Pomoxis nigromaculatus)*	>100 g		<10 g
Yellow perch *(Perca flavescens)*	>50 g		<5 g

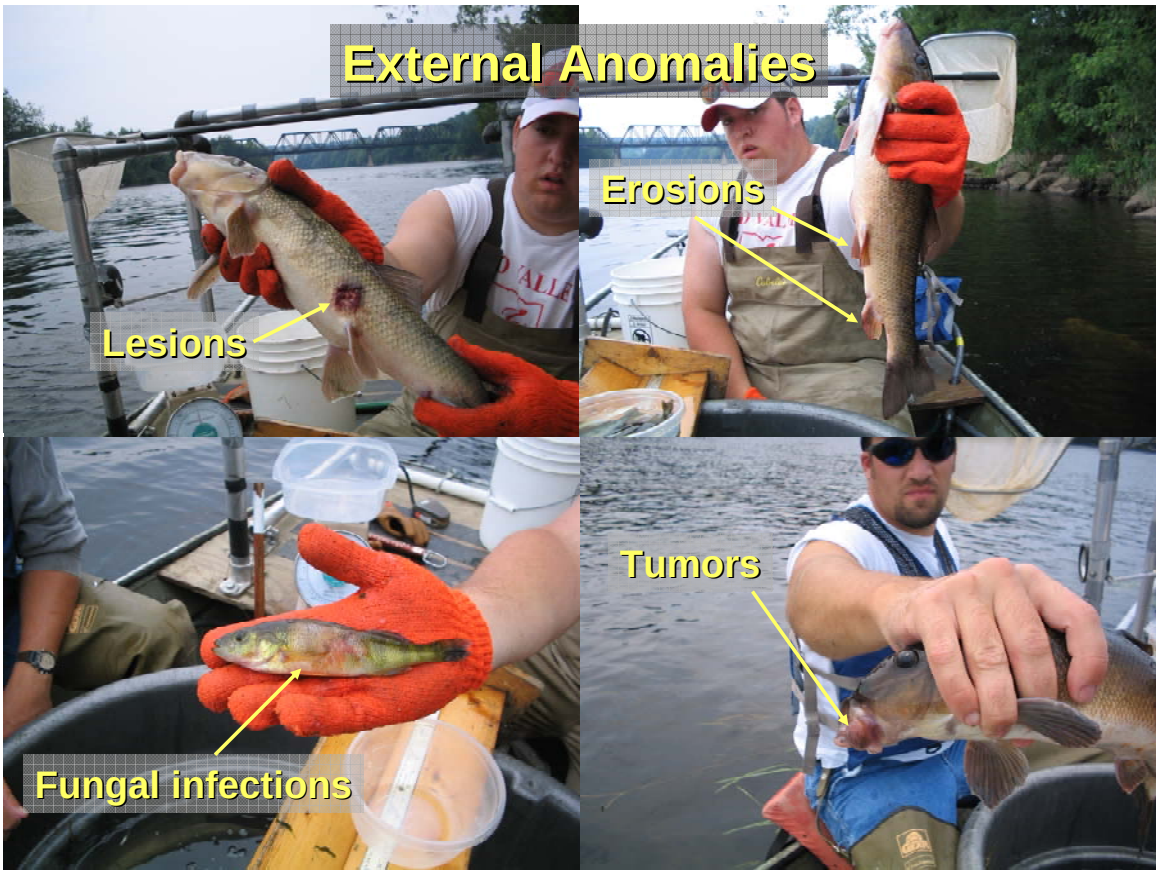

Figure I-4. Some of the most common external anomalies that occurred in the study areas in 2002 and 2003 and which were recorded as part of the data collection.

defined as the presence of a visible skin, extremity (fin, barbell, operculum), skeletal, or subcutaneous disfigurement, and is expressed as the weighted percentage of affected fish

among all fish weighed. Light and heavy infestations are noted for certain types of anomalies and follow the guidance in Ohio EPA (1989) and Sanders et al. (1999).
Physical measurements are also taken in the field during fish sampling and include the sample site distance, GPS derived sampling track, temperature (°C), dissolved oxygen (D.O.; mg/l and % saturation), relative conductivity (μS/cm^2), and the Qualitative Habitat Evaluation Index (QHEI; Rankin 1989, 1995) modified for application to Maine rivers. Conductivity was measured in 2002-3 with an Oakton conductivity meter and D.O. and temperature were recorded with a YSI Model 55 meter. These units were maintained and calibrated in accordance with the QAPP (MBI 2002).

Site distance was determined with a GPS unit. This was done by tracking the cumulative lineal distance as the sampling progressed in a downstream direction. Waypoints were established as necessary to account for the curvature of the shoreline and/or the sampling track that was followed within each site. Each river was designated with a unique alpha code (e.g., Kennebec River = "KEN") and each site with a unique numeric descriptor (e.g., "KEN1"). The upstream end, or beginning of each site was designated "A" and subsequent waypoints were designated B, C, D, and so on. The downstream terminus of each zone was designated with a "Z". This also produced a GPS recorded track that the sampling boat actually followed and can be used to demonstrate how thoroughly a site was sampled (see Figure I-7).

Habitat Assessment
A qualitative evaluation of macrohabitat is made by the fish field crew leader after each location is sampled using the Qualitative Habitat Evaluation Index (QHEI; Rankin 1989, 1995). The QHEI is a physical habitat index designed to provide an empirical, qualitative evaluation of the lotic macrohabitat characteristics that are important to fish assemblages. It consists of a visual estimate of the quality, composition, amount, and extent of substrate, cover, channel, riparian, flow, pool/run/riffle, and gradient variables. It has been shown to correspond predictably with key attributes of fish assemblage quality (Rankin 1989, 1995) and as such is an important tool in the diagnosis of habitat related fish assemblage impairments. The QHEI was originally developed as a rapid assessment tool and in recognition of the constraints associated with the practicalities of conducting a large-scale monitoring program, i.e., the need for a rapid assessment tool that yields meaningful information and which takes advantage of the knowledge and insights of experienced field biologists who conduct the biological assessment. The QHEI has been used widely outside of Ohio and parallel habitat evaluation techniques are in widespread existence throughout the U.S. The QHEI incorporates the types and quality substrate, the types and amounts of instream cover, several characteristics of channel morphology, riparian zone extent and quality, bank stability and condition, and pool-run-riffle quality and characteristics. Slope or gradient is also factored into the QHEI score. We followed the guidance and scoring procedures outlined in Ohio EPA (1989) and Rankin (1989) with some modifications made during 2002 and 2003. These modifications include the addition of large boulder and granitic origin to the substrate metric and impoundment to the channel morphology

and pool/run/riffle metrics. This data is entered, stored, and analyzed in the data management system used by MBI.

Development and Description of a Standardized Electrofishing Protocol

To date most established electrofishing protocols employ sites that generally measure 0.5 kilometers (km) in length. The 0.5 km distance was originally determined by Gammon (1976) and this has been adapted to other agency programs (Ohio EPA 1989a; Yoder and Smith 1999; Emery et al. 2003) that assess biotic integrity. However, others have recommended sampling longer distances. Lyons et al. (2001) samples a one mile reach in Wisconsin's non-wadeable rivers. Hughes et al. (2002) developed a width based formula for determining the length of raft mounted sampling of western U.S. large rivers that results in sites of more than 1-2 km in length. Flotemersch et al. (2004) proposed sampling 1.0 km along opposite shorelines and longer distances up to 2.0 km where depths >4 meters were encountered. What is common to these latter methods is the goal of assessing virtual species richness in addition to biotic integrity. Furthermore, the programs that emphasize the biotic integrity objective sample 2 or 3 times at each site within a seasonal index period while the latter examples sample their sites once per season. When sites are sampled more than once during the summer-early fall index sampling period, individual passes should take place at least three to four weeks apart for a three pass effort and four to six weeks between passes for a two pass effort.

Time spent electrofishing, while not the primary arbiter of effort, is important in the sense that a minimum amount of time should be expended to ensure the thorough sampling of a site. This is especially critical at sites where the risk of under sampling is highest. While sampling effort is based primarily on site length, the amount of time spent electrofishing is an equally important consideration. Time fished can vary depending on current velocity, number of fish captured, and the amounts and types of current and cover. An analysis of the effect of time was conducted by Ohio EPA (1987b; Yoder and Smith 1999) comparing various assemblage parameters (MIwb, numbers, biomass, species richness) that are sensitive to the level of effort expended, from more than 1600 boat electrofishing samples. The results showed that a minimum of 1600-2000 seconds should be spent sampling a 0.5 km boat electrofishing zone. Based on further experience the minimum time was increased to more than 2000-2500 seconds (Yoder and Smith 1999). At sites with numerous downed trees, logs, and other submerged structure sampling times frequently exceeded 3000-3500 seconds. Moderately fast to swift flowing zones can also require more than 2000-2500 seconds to sample since the boat must be maneuvered against and across the current to cover all habitats thoroughly. The key is to sample thoroughly in accordance with these qualitative guidelines.

We followed a stepwise process for the development and testing of a standardized electrofishing protocol in Maine rivers. This included the design of the boat mounted apparatus, initial testing, controlled testing, and initial sampling. The design follows that used by agencies and organizations in the Midwestern U.S., which are based on the design originally used by Gammon (1973, 1976) in the Wabash River, Indiana. This design has been widely adapted and used elsewhere including the northwestern U.S. (Hughes and

Gammon 1987). The platform consists of aluminum john boats rigged with a retractable aluminum boom. We constructed the boat used by this project in 2001 and performed initial testing on the Sebasticook River in the Benton Falls impoundment. Based on our experience with the use of similar equipment elsewhere, the efficiency of the selected design in terms of the capability to capture a sufficient variety and size range of fish appeared satisfactory based on our field observations in 2001.

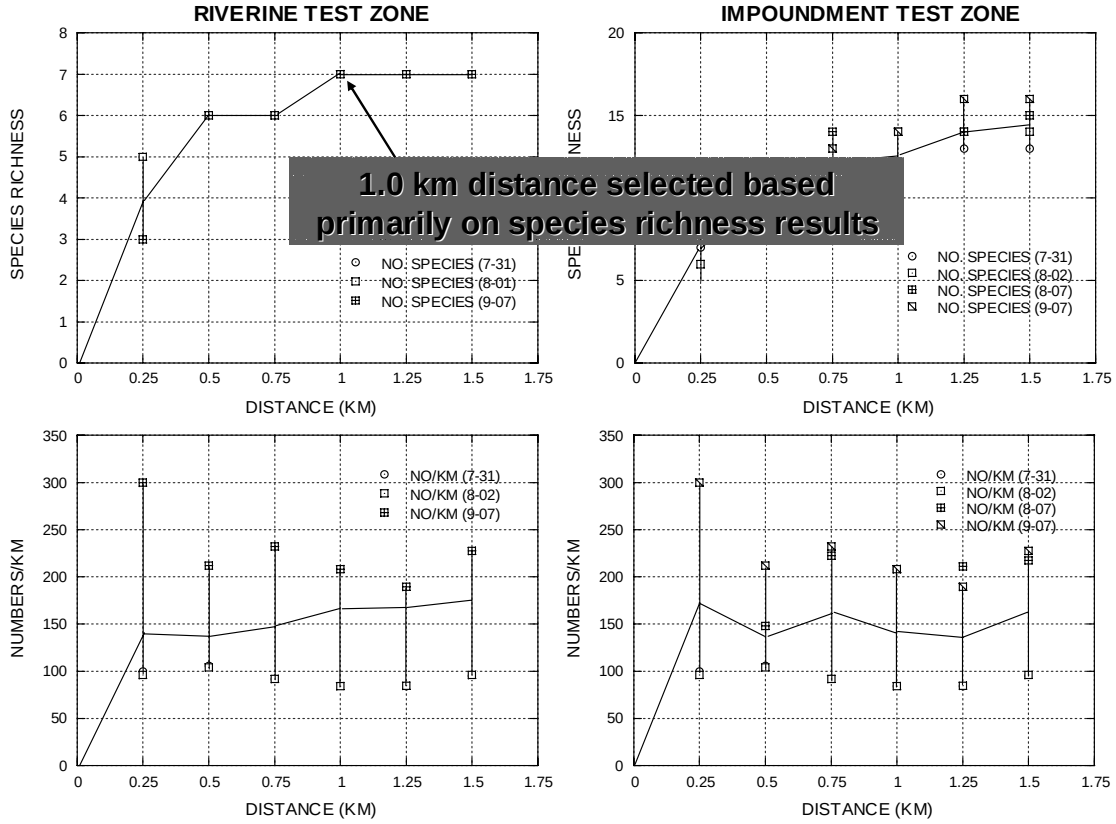

Figure I-5. Results of sampling at the Kennebec River riverine and impoundment test sites sampled in 2002 showing the incremental effect of increased electrofishing distance on the number of species and relative numbers of fish.

The next step was to develop a more rigorous development and testing of a standardized electrofishing protocol. This was accomplished during July-August 2002 by establishing test sites at two locations in the Kennebec River, one free flowing and the other impounded. The test sites consisted of a contiguous 1.5 kilometer (km) long sampling reach subdivided into six 0.25 km sub-zones and a separate 1.0 km long zone located adjacent to each 1.5 km reach. The 1.5 km zones were sampled to determine the effect of sampling distance on baseline catch statistics such as numbers and weight per kilometer and species richness. The goal of this sampling was to determine the minimum distance that would yield reproducible and sufficient data about the resident fish assemblage. This method follows similar designs employed previously by Gammon (1976), Ohio EPA (Ohio EPA 1987; Yoder and Smith 1999; Yoder et al. 2005), and U.S. EPA (Hughes et al. 2002).

The goal is to produce a sufficient sample of the assemblage upon which assemblage assessment tools like the Index of Biotic Integrity (IBI) or Modified Index of Well-being (MIwb) can be reliably calculated and interpreted. Initial analyses of data collected in July suggested that a distance of 1.0 km was appropriate, which is twice the distance of the protocols upon which our methods are based. Thus the survey sites in 2002 consisted of

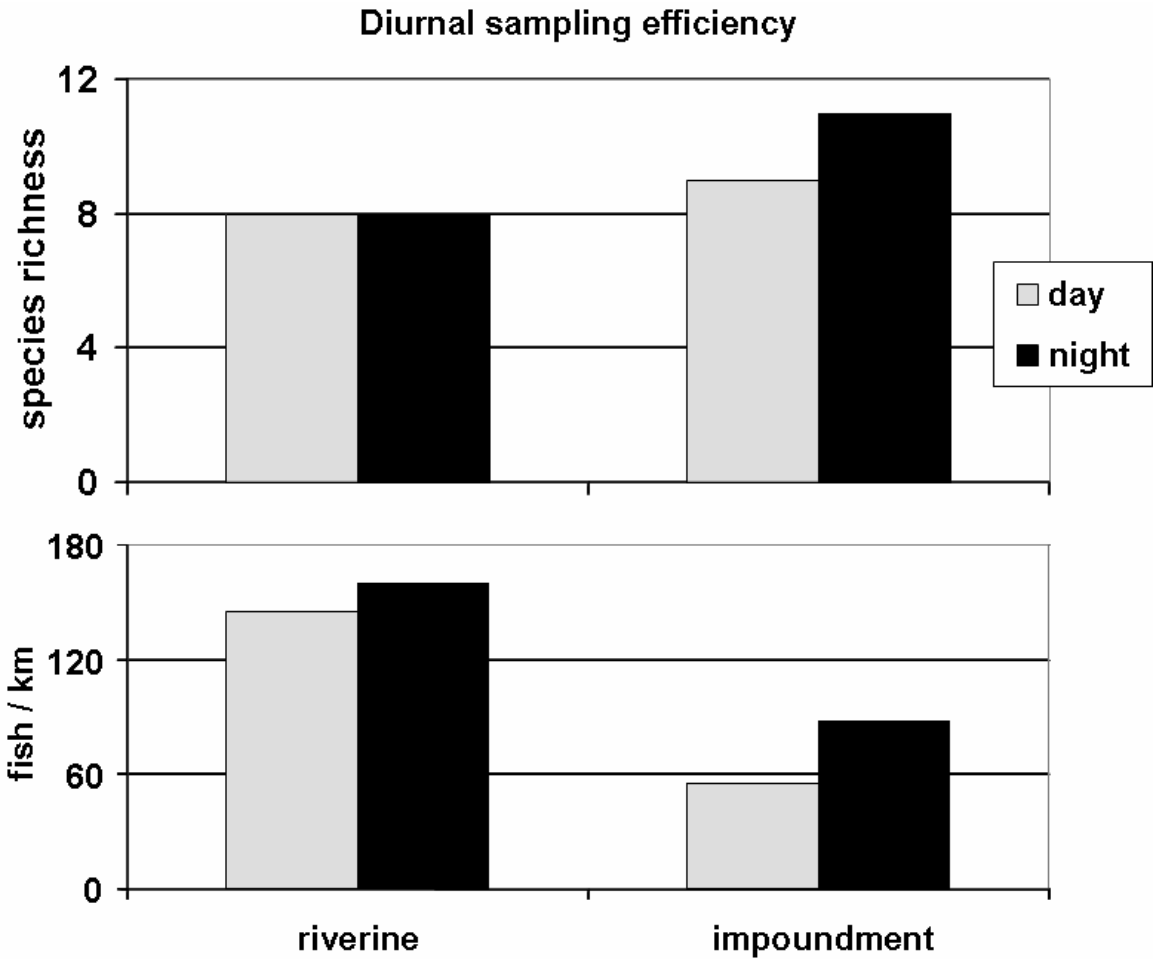

Figure I-6. Results of day vs. night sampling at riverine and impoundment test sites in the Kennebec River in 2002.

two contiguous 0.5 km long sites. This approach was retained in 2003, but all sites were consolidated to 1.0 km in 2004. The data from these sites was combined for the analyses that appear later in this report. The results of the test site sampling are not unlike those found by previous investigators in that species richness increases with distance sampled while relative abundance measures reach a relative asymptote after an initial distance of 0.25-0.50 km (Figure I-5). The inherent characteristics of the Maine river fish fauna dictate that sampling distance take species richness into account since an increase of 0.5 km of effort can add the 1-4 species that could play a critical role in certain IBI metrics. This is

much less of an issue on the more species rich Midwestern rivers where species richness is five fold that of Maine rivers.

The adjacent 1.0 km test sites were used to assess differences between daytime and nighttime sampling. Each of the sites was sampled twice in July 2002 prior to initiating the Kennebec River survey. The differences were most apparent for the impoundment test site, thus all impoundment sites were sampled at night in 2002 (Figure I-6). These differences were not nearly as strong as those observed elsewhere (Sanders 1992; Emery et al. 2004), but it was a conservative approach in the initial year of the project. Day/night differences were much less apparent in the Androscoggin River in 2003, thus impoundment sites were sampled during the daytime.

Conductivity is an important consideration in the operation of the equipment and configuration of the electrode array. Conductivity (µS/cm^2) generally ranged from <50 µS/cm^2 to >150 µS/cm^2, with extremes as low as 15 µS/cm^2 and as high as 717 µS/cm^2 (Figure I-7). Adjustments to the extremes were made by first adjusting the settings of the 5.0 GPP pulsator (high or low voltage range) and secondly by changing the surface area of

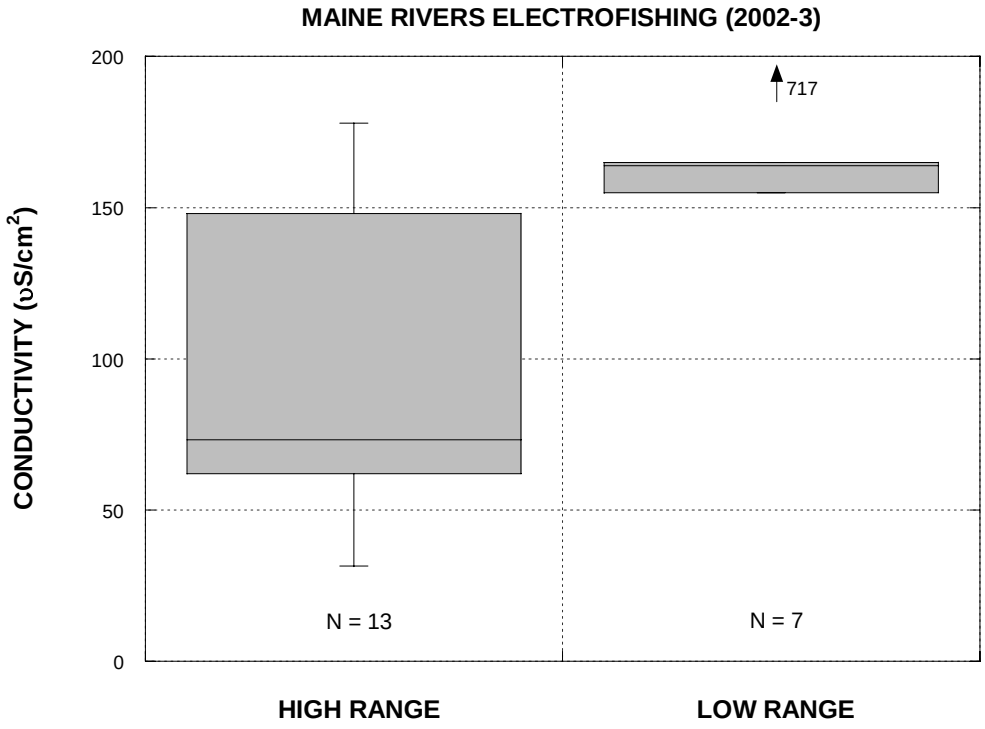

Figure I-7. Electrofishing unit settings and corresponding ranges of conductivities (µS/cm^2) measured at selected sites in the 2002 and 2003 study area.

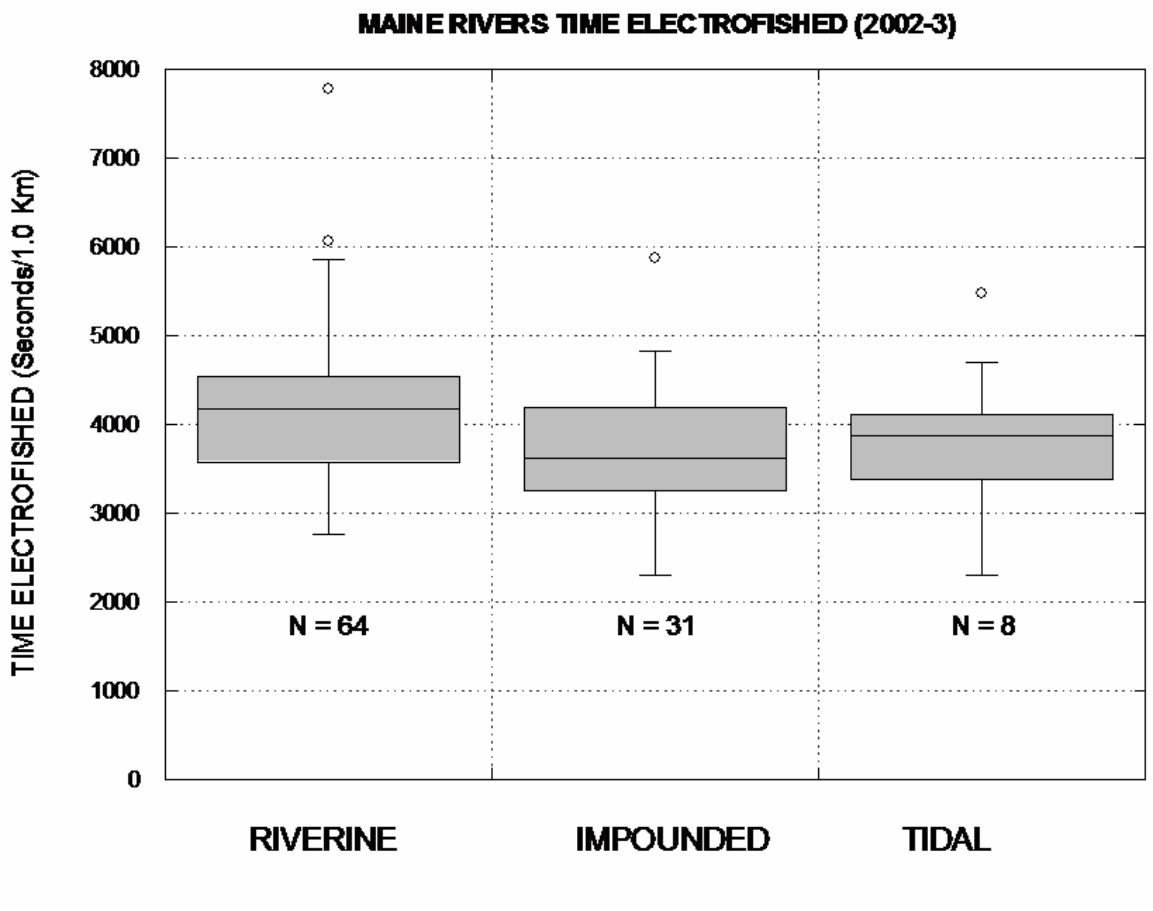

Figure I-8. Frequency analysis of time sampled at all 1.0 km electrofishing sites sampled in the Kennebec, Androscoggin, and Sebasticook Rivers in 2002 and 2003. Major habitat types include riverine (free-flowing), impounded, and tidal freshwater.

the anodes (Table I-2). At low conductivities (<50-60 μS/cm^2) the 5.0 GPP was set to the high voltage range and at moderate to high conductivities (>60 μS/cm^2) it was set at the low range. The % of voltage within the high or low range was adjusted to maximize the amperage reading on the unit. At low conductivities this resulted in 100% of the range producing 2-4 amperes. At moderate to high conductivities this resulted in 50-100% of the range producing 6-12 amperes. At conductivities exceeding 200 μS/cm^2 the anode surface area was reduced by removing the center gang of electrodes.

Time electrofished was analyzed by separating the results between riverine, impounded, and tidal sites (Figure I-8). Riverine sites required the longest time with a median >4000 seconds. Impounded and tidal site sampling times were generally similar with median times of 3500-3800 seconds. The differences are due to the need to maneuver the boat through variable current speeds and habitat types in riverine sites compared to the relatively monotonous pooled and low gradient habitats common to impounded and tidal sites.

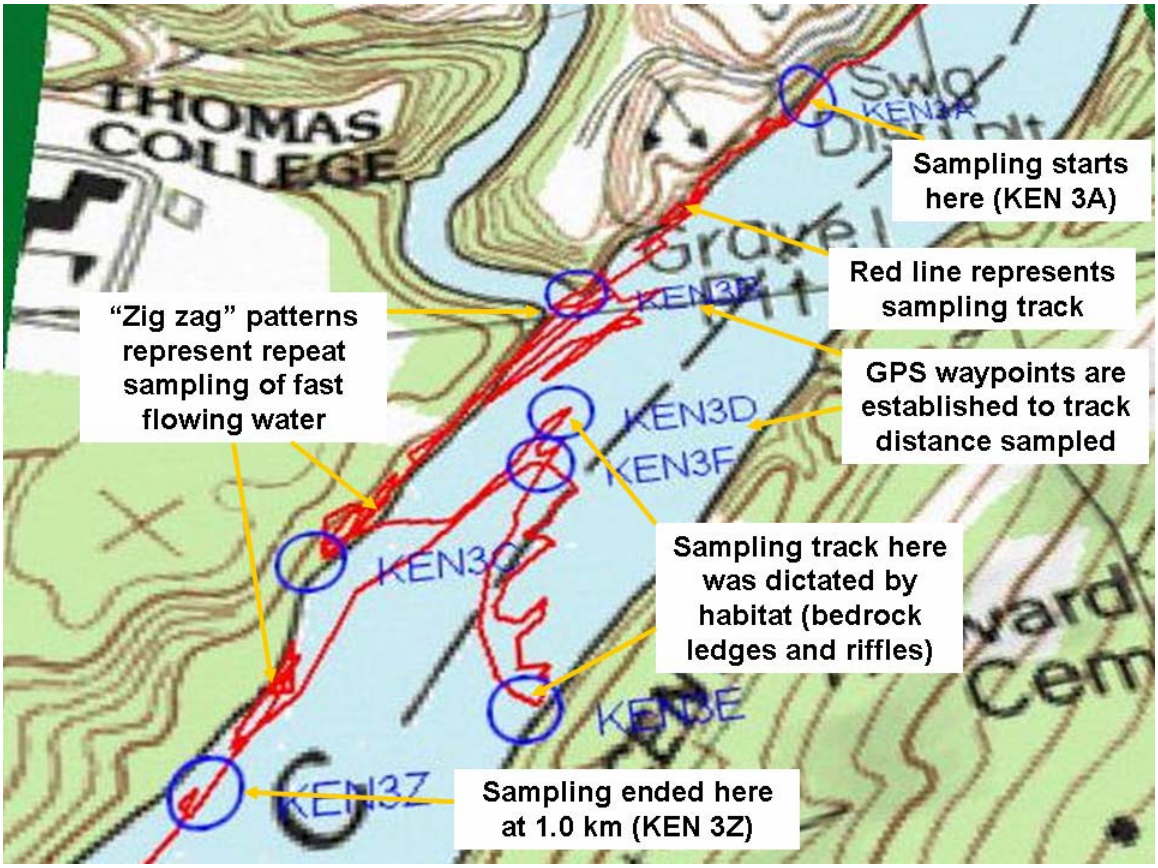

Figure I-9. Track of the electrofishing boat recorded by a GPS unit in the Kennebec River at RM 10.9 on September 9, 2004.

The key attributes of a protocol for sampling Maine rivers are summarized in Table 1 and are based on the development, testing, and application of the boat electrofishing apparatus, in 2002-3. Lineal distance is the principal basis for expressing sampling effort and therefore relative abundance estimates, for a minimum of 3500-4000 seconds for riverine sites and 3000-3500 seconds for impounded and tidal sites (Table I-2). Sites are sampled in a general downstream direction starting at the upstream beginning of a site and ending at the the downstream terminus. The boat is carefully and systematically maneuvered by motoring or, if necessary, pushing. Riverine sites with a diversity of currents and flow patterns present different challenges than do slower moving impounded or low gradient riverine sites. The boat is maneuvered with, across, and against the current and through different habitats (pools, runs, ledges, woody debris, vegetation beds, etc.) to produce a thorough sampling of a site. Time sampled is a good indicator of just how thoroughly this is executed. This requires frequent turning, backing, shifting (forward, reverse), and changing speed in areas of moderate to extensive cover and varying current velocities. Sampling starts immediately upstream of a run habitat and proceeds downstream through the local extent of this type of habitat. The boat is periodically and quickly turned into the current to position the netter to capture drifting fish, motoring back upstream with the current off, and re-sampling the same area a second and, if

Table I-2. Key characteristics of a boat electrofishing protocol applicable to Maine and New England large river habitats.

Category/Attribute	Riverine Wadeable[a] (Low-Mod. Cond.[b])	Riverine High Gradient (Low Cond.)	Riverine Mod. Gradient (Low Cond.)	Riverine Low Gradient (Mod. Cond.)	Impounded (Low Cond.)	Impounded (Mod. Cond.)	Tidal (High Cond.)
1. Drainage Area	<500 mi^2	<500 mi^2	>500-1000 mi^2	>1000 mi^2	NA	NA	NA
2. Platform	Georator[c] (bank set/towboat)	14' raft[d] 16' johnboat	16' johnboat 14-16' raft	16' johnboat	16' johnboat	16' johnboat	16' johnboat
3. Crew Size	3 persons (2 netters)	2 persons (1 netter)	3 persons (2 netters)	3 persons (2 netters)	3 persons (2 netters)	3 persons (2 netters)	3 persons (2 netters)
4. Electrofishing Unit	GPP 2.5, 5.0[e] or equivalent	GPP 2.5, 5.0 or equivalent	GPP 5.0 or equivalent	GPP 5.0 or equivalent	GPP 5.0 or equivalent	GPP 5.0 or equivalent	GPP 5.0 or
5. Power Source	2500-5000 Watt Alternator	5000 Watt Alternator	5000 Watt Alternator	5000 Watt Alternator	5000 Watt Alternator	5000 Watt Alternator	5000 Watt Alternator
6. Unit Settings[f]	High 120 Hz	High 120 Hz 2-4 Amperes	High 120 Hz 2-4 Amperes	Low or High 120 Hz 4-8 Amperes	High 120 Hz 2-4 Amperes	Low or High 120 Hz 4-8 Amperes	Low 120 Hz >8-15 Amperes
(% of Low or High Range)		(100%)	(100%)	(60-100%)	(100%)	(60-100%)	(50-80%)
7. Anodes[g]	Net Ring	2 gangs	3 gangs	3 gangs	3 gangs	3 gangs	2 gangs
8. Cathodes	rat tail	6'	8'	8'	8'	8'	8'

[a] Wadeable defined as sites where a raft or boat mounted apparatus cannot be used due to shallowness of depth – accessibility is not a criterion.
[b] Typical relative conductivity ranges: Low (15-40 $\mu s/m^2$); Moderate (40 – 200 $\mu s/m^2$); High (>200 $\mu s/m^2$).
[c] Employs a primary net ring as the anode that is operated by the primary netter backed by an assist netter - the unit is either bank set or towed on a small skiff (towboat).
[d] This platform was more extensively tested in Maine in 2005; it has worked well for other investigators in similar settings.
[e] This does not constitute an endorsement of a particular brand or product name and is for methodological identification only.
[f] Unit settings are selected to produce the highest voltage and amperage output; these are what typically worked in each conductivity range and habitat type.
[g] Anodes consist of gangs or multiple strands of wire as described under Equipment Specifications.

Table 1. Continued.

Category/Attribute	Riverine Wadeable[a] (Low-Mod. Cond.[b])	Riverine High Gradient (Low Cond.)	Riverine Mod. Gradient (Low Cond.)	Riverine Low Gradient (Mod. Cond.)	Impounded (Low Cond.)	Impounded (Mod. Cond.)	Tidal (High Cond.)
9. Sampling Direction & Distance	Upstream 0.2-0.5 Km	Downstream 0.5-1.0 Km	Downstream 1.0 Km	Downstream 1.0 Km	Downstream 1.0 Km	Downstream 1.0 Km	Downstream 1.0Km
10. CPUE[h] Basis	Per 0.5 Km	Per Km	Per Km	Per Km	Per Km	Per Km	Per Km
11. Time Sampled[i]	Not tested	3500-4500 s	4000-5500 s	3500-4500 s	3000-4000 s	3000-4000 s	3500-4500 s
12. Time of Day	Day	Day	Day	Day	Day or Night	Day or Night	Day

[h] CPUE = Catch Per Unit Effort; this is the basis for calculating relative abundance estimates.

[i] Typically the *minimum* time required to execute the electrofishing protocol at a 1.0 km site; actual time may be higher in more difficult to sample sites.

needed, a third time. It is necessary to sample these areas two or three times given the difficulties of maneuvering the boat and netting fish in fast flowing water. A sample GPS track of the electrofishing boat in Figure I-9 represents the maneuvering required to obtain a thorough sampling of a riverine site and meet the time sampled requirements. All habitats including pools, runs and riffles, shoals, bedrock ledges, and backwaters are sampled as each occurs within a 1.0 km site. It is essential to sample carefully and methodically, particularly at "difficult" sites where extensive vegetation, boulders, or fast to swift current require skillful and safe maneuvering. In zones with extensive vegetation or boulders the boat is maneuvered in and out of the "pockets" of habitat formed by each. Where water depth exceeds 1.5-2.0 m it is frequently necessary to "wait" for fish to appear near the surface. In fast or swift current it is necessary to conduct quick turns and similar maneuvers in order to place the netters in the best position to capture stunned fish. Electrofishing efficiency is greatly enhanced if the boat and electric field can be kept moving downstream at a pace slightly faster than the current velocity. Fish are usually oriented into the current and must either swim into the approaching electrical field or turn sideways to escape. This latter movement presents an increased voltage gradient making the fish more susceptible to the electric current. Another technique in zones with long sections of fast current reaches is "backing" the boat downstream and intermittently pausing and

Figure I-10. Representative photos of boat electrofishing in the Kennebec and Androscoggin Rivers. Upper Left: Maneuvering the boat among bedrock ledges in moderate current below the Lockwood Dam in Waterville; Upper right: Maneuvering the boat in a fast run among large boulders downstream from Auburn. Lower left: Sampling riffle and gravel shoal habitats near Solon. Lower right: Sampling deep run habitats and around artificial structure upstream from Augusta.

motoring against the current to reach submerged cover and position the netters to capture stunned fish. The driver can assist with netting when large numbers of fish are stunned, such as with large schools of cyprinids or other small species. Attempting to sample extended reaches of fast water in an upstream direction greatly diminishes sampling efficiency. If necessary, the electrofishing boat can be maneuvered by pushing on the transom when the water is too shallow to motor. Photos of representative habitats and sampling techniques appear in Figure I-10.

Sampling and Survey Design

Very few states have developed non-wadeable biological assessment techniques nor have they routinely assessed their non-wadeable rivers and streams. Of the few that do, most employ intensive survey or synoptic designs. Lyons et al. (2001) sampled most of the non-wadeable rivers in Wisconsin over a 6 year period using a synoptic design intended to capture the cross section of non-wadeable streams and rivers throughout the state. The goal of this program was multifaceted and included the development of a standardized and systematic fish assemblage assessment approach and an initial assessment of Wisconsin's non-wadeable rivers. It was done to fulfill a pressing need for a tool to assess the diverse impacts from pollution and other stressors including flow and habitat influences. Following a validation and testing phase, the resulting IBI was used to assess common impacts to the large rivers of Wisconsin. Kovacs et al. (2002) used an IBI developed by Richard (1996) to assess the impacts from pulp mill effluents in Quebec non-wadeable rivers. The intent was to determine the adequacy of Canadian regulations that pertain to pulp mills and the sublethal effects of their effluents. Part of this process includes an assessment of macroinvertebrates and fish in the receiving waters once every 3 years.

Ohio EPA has employed a rotating basin approach consisting of surveys of specific rivers and watersheds since 1980. These surveys are repeated at varying intervals depending on the need for information about spatial and temporal changes, but generally within a 5-10 year time frame. A spatially intensive design is employed to sample fish and macroinvertebrate assemblages in non-wadeable rivers to comprehensively assess major disturbances. This design includes multiple sampling sites upstream, near, and downstream from suspected sources such that results can be analyzed and displayed in a longitudinal context. The survey design and results interpretation relative to disturbance sources are based on that described earlier by Bartsch (1948) and Doudoroff and Warren (1951) to facilitate detection and quantification of varying pollution influences along a river (i.e., delineation of "pollution zones"). Reaches upstream from major sources of disturbance, in areas of immediate impact and potentially acute effects, through zones of increasing or lessening degradation, and zones of recovery are sampled at multiple sites positioned at intervals ranging from 0.5-5.0 miles. A primary goal is to visualize the impact of specific sources in addition to the cumulative effects of multiple sources. Additional tools based on indices like the IBI and MIwb can be used to quantify the extent (longitudinal distance) and severity (departure from a goal or criterion) of the impact within a defined river reach (Yoder et al. 2005).

Mainstem rivers are treated as single assessment units in order to understand how changes take place along a longitudinal continuum with respect to both natural and anthropogenic influences. Important in the delineation of these assessment units are natural features and transitional boundaries (e.g., thermal, ecological, and geological boundaries) and clusters of anthropogenic sources (e.g., major urban/industrial areas, impoundments, etc.). Study units can include up to 150-200 km long river reaches in order to capture all relevant influences, include zones of impact and recovery, and to provide context for interpreting results within a localized reach or at a given location. This design yields a detailed assessment of status, the extent and severity of indicator responses in a particular river reach, and temporal changes. This produces assessments of the severity (departure from the desired state) and extent (lineal extent of the departures) of biological impairments in a river (Yoder et al. 2005).

We followed a combination of the preceding designs, which are similar in many respects in that the goal of each is to produce a dataset capable of providing information for multiple environmental and natural resource management purposes. We did not target specific sources directly, such as discharger mixing zones, but rather bracketed major aggregations of point sources, urban areas, and changes in habitat both natural and man-made, such that sampling sites occurred within 1-3 miles of each other. In monotypic river reaches with few identifiable stressors, sampling sites occurred at 5-10 mile intervals. As such, we sampled 28 sites (1.0 km) in 102 miles of the Kennebec River study area in 2002, 51 sites in 170 miles of the Androscoggin River study area in 2003, and 9 sites in 37 miles of the Sebasticook River study area in 2003.

Data Management and Analysis

Data were analyzed using routines available in the Ohio ECOS data management system that was adapted for use by MBI in this and other fish assemblage assessment projects. Ohio ECOS produces standardized data reports on fish species relative abundance and condition that includes assemblage attributes such as numbers, biomass, functional and tolerance guilds, condition metrics, and compositional expressions. These outputs can also be exported as Excel files. These reports were used to produce the 2004 *Maine River Fish Assemblage Assessment: Interim Report* and the data reported in Appendix A. Relative abundance data is reported as numbers and biomass per kilometer. The types of analyses conducted for this report are exploratory and preliminary to the development of a multimetric index for Maine rivers. Some initial exploration of this development is accomplished by this report, but we expect full development to take additional time and regional data as it has elsewhere. While several types of data expressions and indices are possible, we intend to focus initial and future work on three assessment tools; the modified Index of Well-Being (MIwb), an Index of Biotic Integrity (IBI), and the target fish community approach (Bain and Meixler 2000; Bain et al. 2000). Our goal in this report is to develop the essential underlying components of these indices that include evaluating guild and metric assignments and initial exploratory analyses with preliminary indices. Full

development of the indices and biological criteria will require additional data from other Maine rivers and the identification of appropriate river ecotypes (e.g., cold water, warmwater, mixed cold and warmwater, etc.).

Index of Biotic Integrity (IBI)

A principal objective of our study is to initiate and further enhance a process for developing multimetric indices (i.e., IBI-type) to assessing the non-wadeable rivers of Maine and New England. There is ample precedent for the development of an IBI for non-wadeable rivers on a regional basis. Yoder and Kulik (2003) catalogued the most relevant efforts particularly those that included the in-common challenges of cold water and depauperate fish faunas. Halliwell et al. (1999) described the general issues that an IBI development process for waters of the northeastern U.S. should follow, given the depauperate characteristics of the native fauna and the transition between cold and warmwater assemblages. Karr et al. (1986) originally envisioned that the IBI approach would be applied to a variety of divergent aquatic habitat types and outlined metric substitution criteria to accommodate these ecological realities. The guidance provided by Halliwell et al. (1999) indicates that IBI development should take into account the aquatic habitat type and resident fish assemblages which includes consideration of relatively low native and endemic fish species richness, species origins, the status of introduced species, and the high proportion of generalist feeders in the fauna. Much of the ground work for IBI development has already been laid with the assignment of New England fish species to various tolerance and functional guilds (Halliwell et al. 1999). Our primary goal here is to lay the ground work for IBI development by better understanding the fundamental species status and distribution issues as revealed by the sampling in 2002 and 2003.

Modified Index of Well-Being

Gammon (1976) and Gammon et al. (1981) originally developed and tested the Index of Well-Being (Iwb) as a multiparameter evaluation of large river fish assemblages. The Iwb is based on four measures of diversity, abundance, and biomass and represents an attempt to produce an integrated evaluation of these baseline assemblage attributes. The individual performance of numbers, biomass, and the Shannon index as consistent indicators of the quality of fish communities has historically been disappointing. However, when combined in the Iwb these individual community attributes respond in a more complimentary and intuitively predictable manner. For example, an increase in total numbers and/or biomass caused by one or two predominant species is usually offset by a corresponding decline in the Shannon index. In addition, the $\log_e$ transformation of the numbers and biomass components acts to reduce much of the variability inherent to these parameters alone. Gammon (1976) found the variability of each of the four Iwb components as measured by a coefficient of variation to range from 20-50%, yet the composite variability reflected by the Iwb was only 7%. High numbers and/or biomass is commonly, and at times inaccurately, perceived as a positive attribute of a fish assemblage. High numbers and biomass result in a high Iwb score only if a relative "evenness" is maintained between the abundance of the common species. However, this is not invariable, especially with environmental perturbations which tend to restructure fish assemblages without corresponding decreases in diversity (e.g.,

nutrient enrichment, habitat modification). Fish assemblages in habitat modified streams can frequently exhibit very high numbers, biomass, and moderate species richness. Such assemblages are usually predominated by tolerant species. Species intolerant of such disturbances either decline in abundance or are eliminated altogether. In such cases the Iwb can yield an inflated result that does not reflect true assemblage condition.

A modification of the original Iwb was developed by Ohio EPA (1987b) and further explained by Yoder and Smith 1999). The modified Iwb retains the same computational formula as the original Iwb, but eliminates species designated as highly tolerant or alien and all hybrids from the numbers and biomass metrics; these species are retained in the Shannon index calculations. This modification eliminates the "undesired" effect caused by a high abundance of tolerant species, but retains their "desired" influence in the Shannon indices. The computational formula used is as follows:

Modified Index of Well-Being (MIwb) = 0.5 ln N + 0.5 ln B + H (no.) + H (wt.);
where:

N = CPUE; relative numbers minus species designated highly tolerant (Ohio EPA 1987);
B = CPUE; relative biomass minus species designated highly tolerant (Ohio EPA 1987);
H (no.) = Shannon diversity index based on numbers (version which uses $\log_e$);
H (wt.) = Shannon diversity index based on numbers (version which uses $\log_e$).

We used the MIwb to assess the assemblage level properties of the 2002 and 2003 results as an initial assessment tool. We expect that some modifications may result as metric designations are refined via the IBI development process.

Target Fish Community Approach

Bain and Meixler (2000) and Bain et al. (2000) described a target fish community concept in which a model fish community that reflects the natural condition of a river is developed. This approach was developed for the Quinebaug River in Massachusetts and Connecticut by defining a fish community that is appropriate for a natural river in southern New England by specifying common members, the balance of abundances, species organization, and biological attributes. It employs a percent affinity model (Novak and Bode 1992) to determine the similarity of an unknown assemblage with a reference assemblage that characterizes riverine conditions. An index value of 0-100 is produced and reflects the percent similarity to the target assemblage. The target assemblage is based on least impacted reference tempered by expert judgment.

The theoretical basis of the target community concept is strikingly similar to that for the development of the IBI approach, i.e., the operational definition of biological integrity first developed by Karr and Dudley (1981), the definition of community (i.e., assemblage) attributes, including their proportions and membership, the assignment of fish species to guilds (e.g., macrohabitat generalists, fluvial dependents, and fluvial specialists), and the use of least impacted reference condition to define "natural". Key differences include the data

analysis and assessment procedures in that the target community approach employs a percent affinity model (i.e., similarity matrices) to determine the degree of departure from the target community whereas the IBI relies on the aggregation of metrics calibrated against least impacted reference into an index value. This project presents the opportunity to further evaluate and develop the target community approach in a more species depauperate setting than encountered by Bain and Meixler (2000) and in larger rivers. It will also provide the opportunity to compare, contrast, and further develop both approaches since the data collection issues are essentially identical as are the theoretical underpinnings of the approaches.

Biological Criteria Development

An important objective of this proposal is to contribute to the continued development and use of biological criteria in Maine and New England, specifically in non-wadeable rivers. Biological criteria are numeric values or narrative expressions that describe the reference (least impacted) biological condition of aquatic assemblages inhabiting the waters of a given designated use (U.S. EPA 1990b). While the restoration of most U.S. waters to a pristine state may not be feasible, it is reasonable to base restoration goals upon regional reference conditions that describe the best attainable biological condition and performance (Davis and Simon 1995). Principles for the successful development of numeric biological criteria include developing a reference condition, a regional framework, a characterization of the aquatic assemblage, and a habitat evaluation. This study fulfills an important prerequisite to the development of biological criteria - the standardized collection and analysis of biological assemblage data and the development and calibration of indices of biotic integrity.

Important in the proper development of biological criteria and the accompanying set of assemblage assessment tools like IBI is the foundation of provided by the U.S. EPA Biological condition Gradient (BCG; Davies and Jackson 2006). A U.S. EPA working group developed the underlying concepts as a way to foster the consistent development of biological assessment frameworks and biological criteria development across the U.S. and for a variety of different waterbody types. This concept is also intended to enhance communication, understanding, and visualization of biological condition relative to an absolute gradient of potential biological quality from pristine to extremely degraded (Figure I-11). The measurable axis is biological condition as measured by an index or similar assessment mechanism along the y-axis. It is intended to correspond to the effect of stressors along the x-axis. As such, biological assemblage measures are uniquely positioned on the y-axis and chemical, physical, and biological stressors are positioned on the x-axis.

An important challenge for developing biological criteria for non-wadeable rivers can be the apparent lack of reference analogs, at least compared to that which is more commonly available for wadeable streams. As an alternative, using direct sampling data combined with historical knowledge and reconstruction of historical assemblages is frequently used as a partial substitute for directly measured reference condition (Emery et al. 2002). The BCG is a useful tool for visualizing key assemblage structural and functional attributes in a consistent manner across the gradient of generalized stress. A key issue in the development of a BCG for

the fish assemblages of Maine rivers will be the assumptions about the baseline assemblage. If the guidance of Davies and Jackson (2006) is followed, then the "baseline" is the cold water assemblage that existed prior to the major hydromodifications and landscape changes that were initiated in the 18th and 19th centuries. The specifics of this are dealt with in the Assemblage Assessment section.

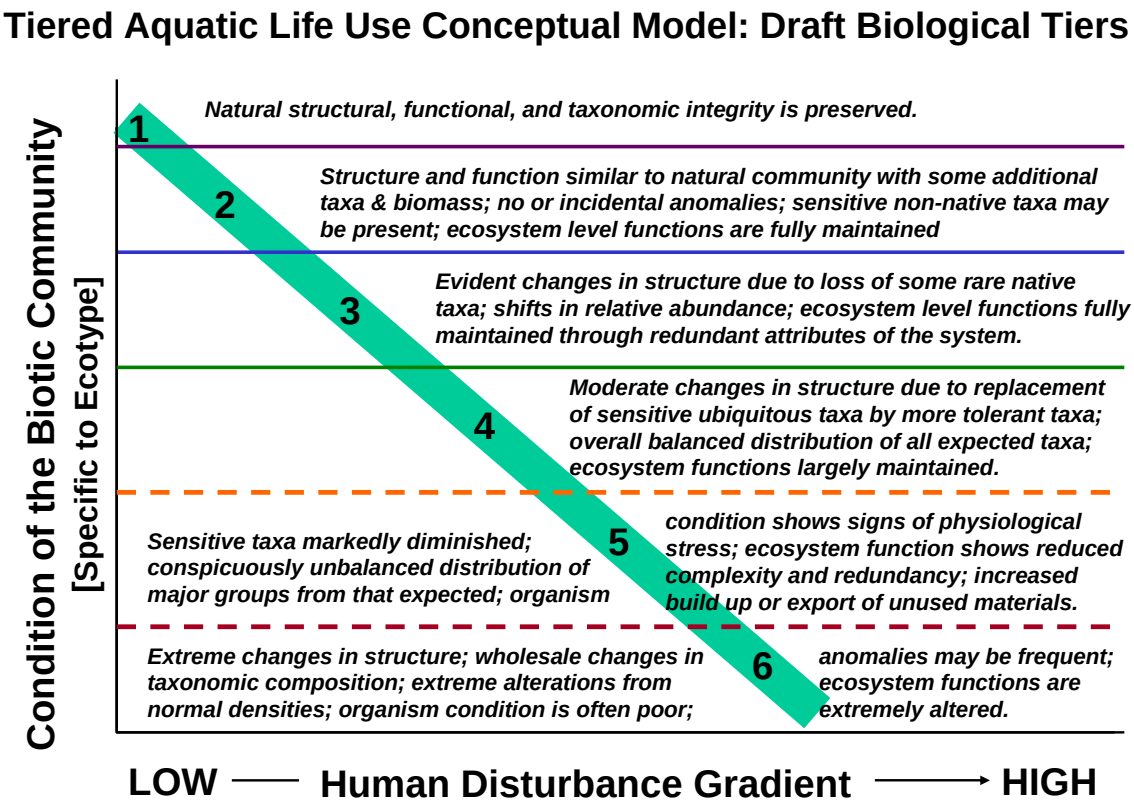

Figure I-11. The Biological Condition Gradient (BCG) conceptual model and descriptive attributes of tiers along a gradient of quality and increasing disturbance (Davies and Jackson 2006).

STUDY AREA DESCRIPTION

This study included three major river mainstems; 1) the Kennebec River from Wyman Dam at Bingham to Chopps Point in Merrymeeting Bay, 2) the Androscoggin River from Errol, NH to Merrymeeting Bay, and 3) the Sebasticook River from lower Great Moose Pond to the Ft. Halifax dam impoundment. Selected tributaries included the Cathance and Sabattus Rivers. Each river was systematically electrofished during a July-September seasonal index period.

Sampling Locations and Major Features

Kennebec River

The Kennebec River originates at the outlet to Indian Pond in north central Maine (Figure A-1). It flows in a general southerly direction through the towns and cities of Bingham, Solon, Anson, Madison, Norridgewock, Skowhegan, Waterville, and Augusta. It has a drainage area of 5893 mi.^{2} measured from Abagadassett Point at the entrance to Merrymeeting Bay. The river transitions from a high gradient cold water river upstream and downstream from Madison to a warmwater river downstream from Skowhegan to Augusta. A 24 mile long mostly freshwater tidal segment exists downstream from Augusta and slightly brackish conditions exist periodically in Merrymeeting Bay and the Cathance River. Sampling locations, dams, point source discharges, and Maine DEP water quality class segments are listed in Table A-1 and depicted in Figure A-1.

Twenty-eight (28) electrofishing zones were located in the Kennebec River study area, 27 in the mainstem and 1 in the Cathance River, in 2002. In 2003, seven (7) sites located in the mainstem between Waterville and Augusta, the two methods test sites near Skowhegan, and 1 site in the Cathance River were also sampled. Two sites, one in the mainstem and the Cathance River site, were new locations. All of the electrofishing zones were 1.0 km in length with the exception of the site at Sevenmile Falls which was 1.15 km in length. In 2002 and 2003, each site was subdivided into adjacent 0.5 km sites, the data from which were eventually combined when the standard protocol was established at 1.0 km.

There are presently eight dams in the immediate study area (Table A-1). The Edwards Dam in Augusta was removed in July 1999 and was located at the head of tide. In addition to serving as a barrier to the free movement of fishes, the dam resulted in an impoundment of approximately 11 miles in length extending upstream to Sixmile Falls near Sidney. The remaining seven dams impound segments of several miles each, the longest being the impoundment formed by the Shawmut Dam upstream from Fairfield. Nine point source discharges are listed in the study area by Maine DEP (2000). Of these, six are municipal wastewater treatment plants (WWTP), two are industrial, and one is a combined industrial and municipal discharge. The paper mills are the largest contributors of BOD and phosphorus. The SAPPI mill comprised 34% of the modeled CBOD loading in the study area followed by the AMSD WWTP (15%) and the Augusta WWTP (11%). Total

Table A-1. Location and description of sampling sites, dams, point sources, and Maine DEP water quality classification segments in the Kennebec River mainstem study area between Wyman Dam and Chopps Point in Merrymeeting Bay, 2002-3.

River Mile	Site Type	Location - Description	Habitat Type	Map Code	Maine DEP Classification		
					Legal Class	Model Result	Year(s) Sampled
75.0	Dam	Wyman Dam & Hydroelectric (FP&L)	-	-	-	-	-
74.7	EF	Immediately dst. Wyman Dam - Bingham	R1	BIN 1	A	B	1992
68.2	EF	Ust. Williams Dam – Solon	I1	BIN 2	A		
67.1	Dam	Williams Dam & Hydroelectric (FP&L)	-	7	-		
66.1	EF	Ust. St. Rt. 8 – Solon (channelized)	R1	ANS 1	A		
64.9	EF	Dst. St. Rt. 8 – Solon	R1	ANS 2	A		
59.3	EF	Ust. N. Anson – above old bridge piers	R1	ANS 5	A		
57.2	EF	Dst. N. Anson – upper Anson impoundment	I1	ANS 3	A		
53.2	EF	Anson - lower Anson impoundment	I1	ANS 4	A		
52.2	Dam	Anson Dam & Hydroelectric (Madison Paper)	-	6	-		
51.6	PS	Anson-Madison WWTP	-	I	A		
51.5	Dam	Abenaki Dam & Hydroelectric (Madison Paper)	-	5	-		
49.9	EF	Dst. Abenaki Dam; ust. Sandy R.	R1	WES 1	B	A	1997
47.6	Trib.	Sandy River	-	-	-		
46.1	EF	Bombazee Rips	R1/I1	WES 4	B		
42.0	PS	Norridgewock WWTP	-	-	-		
38.9	EF	Ust. Skowhegan – lower Weston impoundment	I1	WES 3	B	na	1997
38.1	Dam	Weston Dam & Hydroelectric (FP&L)	-	4	-		
37.2	PS	Skowhegan WWTP	-	-	-		

Table A-1. (continued)

River Mile	Site Type	Location - Description	Habitat Type	Map Code	Maine DEP Classification[1]		
					Legal Class	Model Result	Year(s) Sampled
36.5	EF	Dst. Skowhegan	R1	SKOW 1	B	B	1983
32.1	EF	Hinckley – upper Shawmut impoundment	I1	SHAW 2	B		
29.5	PS	SAPPI Paper Mill	-	F	-		
25.1	EF	Dst. SAPPI – lower Shawmut impoundment	I1	SHAW 4	C	C	1983
24.4	Dam	Shawmut Dam & Hydroelectric (FP&L)	-	3	-		
23.9	EF	Dst. Shawmut Dam	R1	H-K 1			
20.8	EF	Fairfield – Hydro-Kennebec impoundment	I1	H-K 2			
18.9	Dam	Hydro-Kennebec Dam & Hydro. (KC-UAH)	-	2	-		
18.5	EF	Waterville – dst. Hydro-Kennebec Dam	I1/R1	LWD 1			
17.7	Dam	Lockwood Dam & Hydroelectric (FP&L)	-	1	-		
17.4	EF	Waterville – dst. Lockwood Dam	R1	KEN 1			
16.8	Trib.	Sebasticook River	-	-	-		
16.5	EF	Winslow – dst. Sebasticook R.	R1	KEN 2			
15.7	PS	KSTD WWTP	-	E	-		
15.3	Trib.	Mesalonskee Stream	-	-	-		
15.1	EF	Waterville – dst. KSTD WWTP	R1	KEN 3	B	C	1990
11.0	EF	Sixmile Falls	R1	KEN 4	B	B	1992
9.0	EF	North Sidney – ust. Boat launch	R1	KEN 5.1	B		

Table A-1. (continued)

River Mile	Site Type	Location - Description	Habitat Type	Map Code	Maine DEP Classification		
					Legal Class	Model Result	Year(s) Sampled
6.85	EF	Sidney – dst. Boat launch	R2	KEN 5	B		
4.2	EF	Sevenmile Falls	R1	KEN 6	B	C	1992
0.2	PS	Tree Free (Statler)	-	D	-		
0.1	EF	Augusta – Edwards Dam site	R1	KEN 7	B		
0.0	Dam	Edwards Dam (removed)	-	-	-		
-1.9	PS	Augusta WWTP	-	C	-		
-4.3	EF	Hallowell – dst. Boat launch	T1	KEN 8	C	B	1985
-7.0	Trib.	Cobbosseecontee Stream	-	-	-		
-8.3	EF	Pittston – dst. Gardiner boat launch	T1	KEN 9	C	C	1985
-10.0	PS	Gardiner WWTP	-	B	-		
-18.4	PS	Richmond WWTP	-	A	-		
-19.0	EF	Richmond – L. Swan Is./Lovejoy Narrows	T1	KEN 11			
-26.9	EF	Chopps Point	T2	KEN 12			
Cathance River							
3.0	EF	Bowdoinham – ust. boat launch	T2	CAT 2			
1.5	EF	Bowdoinham – dst. boat launch	T2	CAT 1			

EF – electrofishing and qualitative habitat site
PS – point source discharge
R1 – high gradient riverine
R2 – low gradient riverine
I1 – impounded riverine
T1 – freshwater tidal riverine
T2 – brackish tidal embayment or backwater
[1] – based on closest Maine DEP monitoring location

phosphorus contributions were predominated by SAPPI (35%), Kimberly (22%; discontinued), and AMSD (19%).

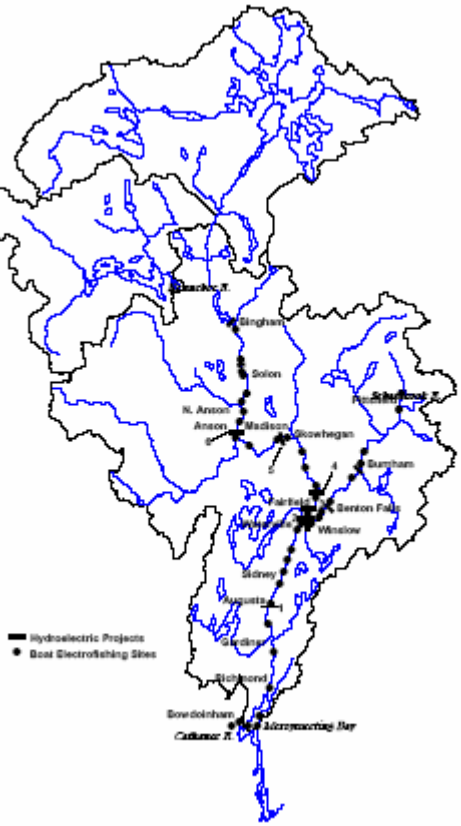

Figure A-1. Map of major towns, hydropower dams and projects, and electrofishing locations in the Kennebec River and Sebasticook River study areas, 2002-3.

Maine DEP water quality classification segments were revised in 1988 and again in 1998-99 (Maine DEP 2000). The classifications within our study area include class A from Wyman Dam (RM 75.0) to the Anson Dam (RM 52.2), class B from downstream from the Anson Dam to the SAPPI discharge (RM 29.5), class C from SAPPI to the KTSD WWTP (RM 15.7), class B from KTSD to Tree Free (RM 0.2), and class C for the remaining tidal segment. The latest model results based on Maine DEP macroinvertebrate assessment appears in Table A-1.

Androscoggin River

The Androscoggin River originates at the outlet of Umbagog Lake near Errol, NH and flows south and east nearly 170 miles to Merrymeeting Bay near Brunswick. River flow is regulated by releases from a series of lakes in the upper watershed with a minimum flow of 1550 cfs at Errol, NH. The mainstem has a long history of being badly polluted by point source discharges, primarily from paper mill effluents in Berlin, NH, Rumford, Jay-Livermore Falls and textile mills in Lewiston-Auburn and Lisbon Falls (Maine DEP 2002). The gross pollution problems caused by these discharges have been greatly reduced to the point where D.O. criteria are met in most of the mainstem. An exception is in the deepest portions of Gulf Island Pond, which is the focus of current modeling and pollution control efforts.

Fifty-one (51) locations were sampled in 2003 - all except one site in the Sabattus River were located on the mainstem (Table A-2 and Figure A-2). One site at the entrance to Merrymeeting Bay was sampled in 2002. All of the electrofishing zones were 1.0 km in length with the exception of the site in the Sabattus River which was 0.5 km in length. Each 1.0 km site was subdivided into adjacent 0.5 km sites, the data from which were eventually combined when the standard protocol was established at 1.0 km.

There exist 22 dams in the study area that impound nearly 50 miles of mainstem in New Hampshire and Maine (Table A-2). All are FERC licensed hydroelectric projects. The largest impoundment is Gulf Island Pond which is nearly 14 miles in length. The Pontook Dam impounds approximately 6 miles of mainstem in New Hampshire. The remaining impoundments are small by comparison impounding less than 0.5-1 mile of river in many cases. Clusters of small impoundments occur in Berlin, NH, Rumford, and the Jay-Livermore Falls area. We were not able to sample some of the smallest impoundments in these areas because of safety and access issues.

Six major point source discharges occur in the study area, three paper mills and three municipal WWTPs. Twelve other discharges, most of which are municipal WWTPs, discharge to the mainstem or to direct tributaries. The three major paper mills contribute most of the CBOD and total phosphorus loading, comprising more than 80% of the former and nearly 80% of the latter (Maine DEP 2002). The issue of most concern to Maine DEP is the D.O. criteria violations in Gulf Island Pond and the implications for point source permitting and hydropower re-licensing. An oxygen diffuser was installed in Gulf Island Pond in 1992 at RM 31.4 in an attempt to meet the D.O. criteria for class C waters. Despite the resulting D.O. improvements, non-attainment of the D.O. criterion in the deepest waters of Gulf Island Pond remains an issue. Some of this is caused by the secondary effects of algal blooms that take place in Gulf Island Pond during the critical summer months (Maine DEP 2002).

Maine DEP classifies the Androscoggin River mainstem class B from the NH-Maine state line to the New Page Mill in Rumford and the remainder downstream as class C. Biomonitoring conducted in 1998 revealed improvements in much of the mainstem with a few sites in non-attainment in the Jay-Livermore Falls area (Maine DEP 1999). The latest results at corresponding sampling sites appears in Table A-2. The New Hampshire DES does not have a tiered classification system and includes most waterbodies under a generally applicable provision to support the protection and propagation of fish and other aquatic life. The entirety of the mainstem is listed by NHDES as impaired for fish tissue contaminants (mercury, PCB, and dioxin) and fecal bacteria. There is essentially no assessment for aquatic life uses.

Sebasticook River

The Sebasticook River is a major tributary to the Kennebec River having its confluence at Winslow just downstream from the Lockwood Dam. It drains 946 square miles. The 2003 study area extended from lower Douglas Pond near Pittsfield to the lower Ft. Halifax impoundment in Winslow (Figure A-1). Nine locations were sampled with the boat electrofishing apparatus and are reported here (Table A-3). This and additional data were also reported by the Sebasticook Watershed Association as part of a Gulf of Maine Council on the Environment (GOMCE) grant, which funded the data collection. We included here to compliment the Kennebec and Androscoggin River fish assemblage assessment.

Table A-2. Location and description of sampling sites, dams, point sources, and Maine DEP water quality classification segments in the Androscoggin River mainstem study area between Errol, NH and Freyer Island at the entrance to Merrymeeting Bay, 2003.

River Mile	Site Type	Location - Description	Habitat Type	Map Code	Maine DEP Classification		
					Legal Class	Model Result	Year(s) Sampled
164.3	EF	Errol, NH – dst. St. Rt. 16	R1	PON1			
158.8	EF	Adjacent to wayside along St. Rt. 16	R1	PON2			
148.1	EF	Pontook impoundment	I1	PON3			
147.0	Dam	Pontook Dam	-	22			
144.7	Hydro.	Pontook Hydroelectric	-	-			
144.7	EF	Dummer, NH – dst. Pontook Bypass	R1	SAW1			
139.2	EF	dst. Stearns Brook	R1	SAW2			
134.1	EF	Sawmill Dam impoundment	I1	SAW3			
133.8	Dam	Sawmill Dam	-	21			
133.4	Dam	Riverside Dam & Hydroelectric	-	20			
133.0	PS	Burgess Paper Mill	-	E			
132.8	Dam	J. Brodie Smith Dam & Hydroelectric	-	19			
132.0	EF	Berlin, NH – Cross Dam impoundment	I1	CRS1			
131.7	Dam	Cross Dam & Hydroelectric	-	18			
131.5	EF	Berlin, NH – Cascade Dam impoundment	I1	CAS1			
131.1	Dam	Cascade Dam & Hydroelectric (Cascade Paper)	-	17			
130.6	PS	Cascade Paper Mill	-	D			
130.5	EF	Berlin, NH – dst. Cascade Paper Mill	R1	CRS1			
128.6	EF	Gorham, NH – Brascan impoundment	I1	CRS3			
128.1	Dam	Brascan Dam & Hydroelectric	-	16			
128.0	EF	Gorham, NH – bypass reach	R1	GOR1			

Table A-2. (continued)

River Mile	Site Type	Location - Description	Habitat Type	Map Code	Maine DEP Classification[1]		
					Legal Class	Model Result	Year(s) Sampled
125.6	Dam	Gorham Dam	-	15			
124.4	EF	Dst. Gorham Dam – adj. Leadmine Rd.	R1	SHL1			
123.4	EF	Shelburne impoundment	I1	SHL2			
122.6	Dam	Shelburne Dam & Hydroelectric	-	14			
119.8	EF	Shelburne, NH – ust./dst. North Rd.	R1	BTH1			
112.8	EF	Gilead – dst. Wild River	R1	BTH2			
103.7	EF	Bethel – dst. U.S. Rt. 2	R1	BTH3	B	B	1998
97.3	EF	Newry – at canoe access; dst. Bear River	R1	BTH4			
88.7	EF	Rumford Corners – dst. St. Rt. 232	R2	BTH5			
83.1	EF	Upper Rumford Falls Dam impoundment	I1	RUM1			
81.0	Dam	Rumford Falls – Upper Dam	-	13			
80.3	Dam	Rumford Falls – Middle Dam	-	12			
80.0	Dam	Rumford Falls – Lower Dam	-	11			
79.3	EF	Rumford – dst. Lower dam; ust. New Page Mill	R1	RUM2A	B	B	1998
78-79.8	PS	New Page Paper Mill	-	C			
78.5	EF	Mexico - dst. New Page Mill	R1	RUM2B-			
76.9	EF	Dixfield – ust. Bridge between Rts. 2 & 108	R1	RUM3	C	B	1998
70.8	EF	Peru – dst. canoe access	R1	RUM4			
66.2	EF	Gilbertville – ust. St. Rt. 140	R2	RIL1	C	A	1995
61.7	EF	Riley Dam impoundment	I1	RIL2	C	C	1995-6
58.6	Dam	Riley Dam & Hydroelecric (Int. Paper)	-	10			
58.4	EF	Dst. Riley dam	R1	JAY1	C	B	1995-6
57.1	EF	Jay Dam impoundment	I1	JAY2	C	na	1995-7

Table A-2. (continued)

River Mile	Site Type	Location - Description	Habitat Type	Map Code	Maine DEP Classification[1]		
					Legal Class	Model Result	Year(s) Sampled
56.2	Dam	Jay Dam & Hydroelectric (Int. Paper)	-	9			
56.3-53.0	PS (3)	Paper Mill discharges (Int. Paper)	-	B			
55.8	EF	Jay – dst. Jay Dam	I1	OTI1	C	na	1995-7
54.0	Dam	Otis Dam & Hydroelectric	-	8			
53.0	Dam	Livermore Falls Dam & Hydro.	-	7			
52.8	EF	Livermore Falls – dst, dam	R1	LIV1	C	B	1994
51.1	EF	North Livermore – adj. island	R1	LIV2			
46.6	EF	Strickland – ust. Loop Rd.	R1	LIV3			
41.2	EF	Turner Falls – dst. St. Rt. 219	R1/I1	GIP1			
38.9	EF	Gulf Island Pond – Ram Island	I1	GIP2			
35.4	EF	Gulf Island Pond – Turner Center	I1	GIP4			
31.4	EF	Gulf Island Pond – at O_2 diffuser	I1	GIP3			
27.9	EF	Gulf Island Pond – lower impoundment	I1	GIP5			
27.2	Dam	Gulf Island Pond Dam & Hydro.	-	6			
26.9	EF	dst. Gulf Island Pond Dam	R1/I1	DRP1			
25.7	Dam	Deer Rips Dam & Hydroelectric	-	5			
25.2	EF	dst. Deer Rips Dam	R1/I1	GST1			
23.0	Dam	Great Stone Dam & Hydroelectric	-	4			
22.6	EF	Auburn – dst. Great Stone Dam	R1	WOR1A			
22.2	Trib.	Little Androscoggin River	-	WOR1B			
21.9	EF	Lewiston – dst. St. Rt. 126	R1	WOR1C	C	C	1998
20.9	PS	Lewiston/Auburn WWTP	-	A			
20.4	EF	Lewiston – dst. WWTP, ust. I-95	R1	WOR2	C	C	1984

Table A-2. (continued)

River Mile	Site Type	Location - Description	Habitat Type	Map Code	Maine DEP Classification[1]		
					Legal Class	Model Result	Year(s) Sampled
16.0	EF	Durham – ust. Durham at boat launch	R2	WOR3	C	B	1998
12.8	EF	Durham – dst. Durham	R1	WOR4			
10.0	Trib.	Sabattus River	-	-			
9.6	EF	Worumbo Dam impoundment	I1	WOR5			
8.2	Dam	Worumbo Dam	-	3			
8.0	EF	Lisbon Falls – dst. Worumbo Dam	R1	PEJ1			
7.0	EF	Pejepscot Dam impoundment	I1	PEJ2			
4.7	Dam	Pejepscot Dam & Hydroelectric	-	2			
4.3	EF	dst. Pejepscot Dam	R1	BRN1	C	C	1984
1.5	EF	dst. I-295	R2	BRN2			
0.0	Dam	Brunswick Dam & Hydroelectric	-	1			
-0.2	EF	Brunswick – dst. Brunswick Dam	T1	AND2			
-1.7	PS	Brunswick WWTP	-	AND1			
-2.6	EF	Cooks Corner – adj. Driscoll Island	T1	-	C	C	1984
-4.9	EF	adj. Freyer Island	T1	MER4			
0.2	EF	Lisbon Falls - Sabattus R. at mouth	I1	-			

EF – electrofishing and qualitative habitat site
PS – point source discharge
R1 – high gradient riverine
R2 – low gradient riverine
I1 – impounded riverine
T1 – freshwater tidal riverine
T2 – brackish tidal embayment or backwater
[1] – based on closest Maine DEP monitoring location

There are four hydropower dams in mainstem portion of the study area. All are FERC licensed hydroelectric power projects. The Ft. Halifax Dam in Winslow is presently under consideration for removal. The remaining dams are required to meet fish passage requirements as part of the overall effort to restore diadromous fish populations, primarily alewife, American shad, and American eel, in the Kennebec basin. Two point source discharges impact the mainstem, the Pittsfield WWTP and the Corrina WWTP via the East Branch. The latter was the source of serious impacts in the 1980s that demonstrated the utility of bioassessment by Maine DEP (Maine DEP 1999). This problem has since been corrected. Maine DEP classifies the mainstem with the study area as class C (Table A-3).

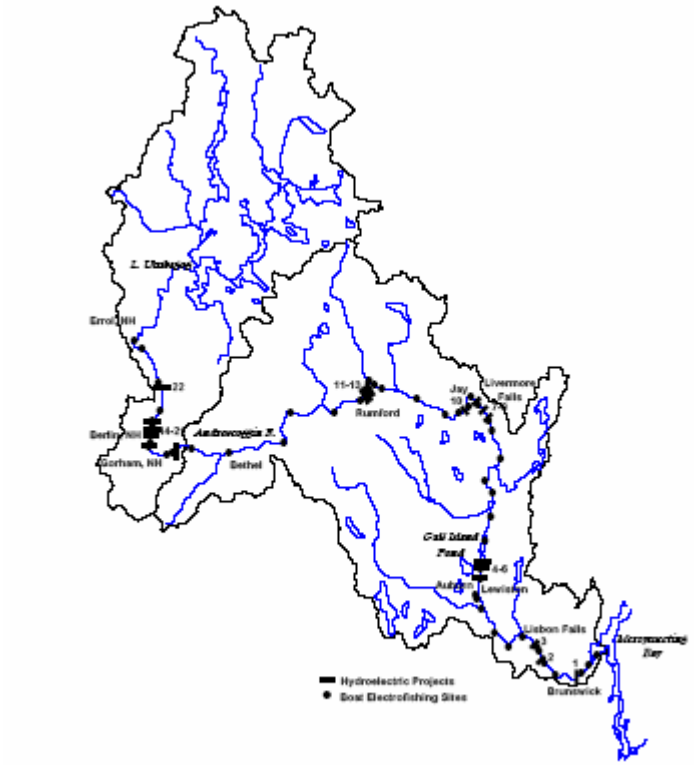

Figure A-2. Map of major towns, dams, and electrofishing locations in the Androscoggin River study area, 2003.

Ambient Chemical/Physical Conditions

Limited water quality data was collected in the three study areas and consisted of field measurements of temperature (°C), dissolved oxygen (D.O.; mg/l), and relative conductivity (µS/cm^2). Grab measurements of each were made at the beginning of each electrofishing zone. At sites with the potential for variability in these parameters (i.e., discharge mixing zones, tributary confluences), multiple measurement were made within a zone as necessary. We did not attempt to document vertical stratification in the deepest impoundments.

Temperature and Conductivity

Water temperature is a critical parameter in Maine rivers for a number of reasons, one of the most important it being a determinant of the type of fish assemblage that can be expected. Relative conductivity is important for determining electrofishing unit settings and electrode array configuration in addition to reflecting the dissolved solids content

Table A-3. Location and description of sampling sites, dams, point sources, and Maine DEP water quality classification segments in the Sebasticook River mainstem study area between Pittsfield and Winslow, 2003.

River Mile	Site Type	Location - Description	Habitat Type	Map Code	Maine DEP Classification		
					Legal Class	Model Result	Year(s) Sampled
36.6	EF	Upper Douglas Pond	I1	DOUG1			
33.8	EF	Lower Douglas Pond	I1	DOUG2			
32.0	Dam	Pioneer Dam	-	4			
29.4	EF	Dst. Pittsfield	R2	SEB2	C	B	1983
28.5	PS	Pittsfield WWTP	-	A			
27.0	EF	Upper Burnham impoundment	R2/I1	SEB3			
26.4	PS	Corrina WWTP via E. Branch Sebasticook	-	-			
22.4	EF	Lower Burnham impoundment	I1	BURN1	C	C	1992
22.1	Dam	Burnham Dam & Hydroelectric (Ridgewood Assoc.)	-	3			
6.3	EF	Benton Falls impoundment	I1/R2	BF1			
6.0	Dam	Benton Falls Dam & Hydroelectric (Benton Falls Assoc.)	-	2			
5.2	EF	Upper Ft. Halifax impoundment	R2/I1	FH1			
4.6	EF	Middle Ft. Halifax impoundment	I1	FH2			
1.1	EF	Lower Ft. Halifax impoundment	I1	FH3			
0.2	Dam	Ft. Halifax Dam & Hydroelectric (FP&L)	-	1			

EF – electrofishing and qualitative habitat site
PS – point source discharge
R1 – high gradient riverine
R2 – low gradient riverine
I1 – impounded riverine
T1 – freshwater tidal riverine
T2 – brackish tidal embayment or backwater
[1] – based on closest Maine DEP monitoring location

which can be influenced by wastewater discharges. It is also a reflection of the natural mineral content of the water and can vary naturally depending on the geology of a watershed.

Kennebec River

Water temperatures were measured during mid-summer and early fall in 2002 and during the early summer in 2003. The August 2002 survey probably yielded the best information about the thermal regime since it included most of the freshwater mainstem during the most critical portion of the summer season. Ambient air temperatures were also high in 2002 exceeding 32°C (89.6°F) on several days. The longitudinal temperature profile along the mainstem showed an overall increase from less than 20°C immediately downstream from Wyman Dam to >25°C at several locations between Shawmut Dam and Gardiner (Figure A-3). July 2003 and September 2002 temperatures were generally <22-23°C.

Relative conductivity (µS/cm^2) was not available from all sampling sites due to the later rejection of measurements that did not pass QA/QC requirements. However, there were sufficient measurements to provide an assessment of the conductivity regime along the mainstem. The value of 35 µS/cm^2 measured at RM 59.4 near N. Anson was representative of the upper mainstem (Figure A-3). Values increased to >50 µS/cm^2 downstream from Madison reflecting point source inputs from the AMSD WWTP. Values increased to 80-110 µS/cm^2 downstream from Shawmut Dam which is likely a response to the SAPPI discharge. Conductivity values then declined to 75-80 µS/cm^2 downstream from Waterville to Augusta. Measurements at 3 locations in Merrymeeting Bay reflected the influence of brackish water with values ranging from 325 µS/cm^2 to 1300 µS/cm^2. Values in the Cathance River at Bowdoinham were 602 µS/cm^2 and 717 µS/cm^2 in 2002 and 2003, respectively.

Androscoggin River

The majority of temperature measurements were taken during August 2003 which represented most of the mainstem. Measurements were also taken during the mid-September sampling that occurred in the lower 80 miles of the mainstem. With the exception of two sites in Berlin, NH, August 2003 water temperatures were <25°C from Errol, NH to Lewiston-Auburn and >25°C for the remainder of the mainstem downstream to Brunswick (Figure A-3). September temperatures were generally around 20°C reflecting the seasonal change from August.

Relative conductivity showed a steady and marked increase from upstream to downstream and reflected inputs by point source discharges (Figure A-3). Values ranged from 28-40 downstream from the Cascade paper Mill discharge (RM 130.6). Conductivity values declined to less than 100 µS/cm^2 with dilution, but remained in the 55-70 µS/cm^2 range downstream to Rumford. Conductivity increased and remained >100 µS/cm^2 in and downstream from Rumford reflected point source discharges from the New Page paper mill. Values increased downstream from Jay to >150 µS/cm^2 and remained in the 150-170 µS/cm^2 range through the remainder of the study area. The site at the entrance to

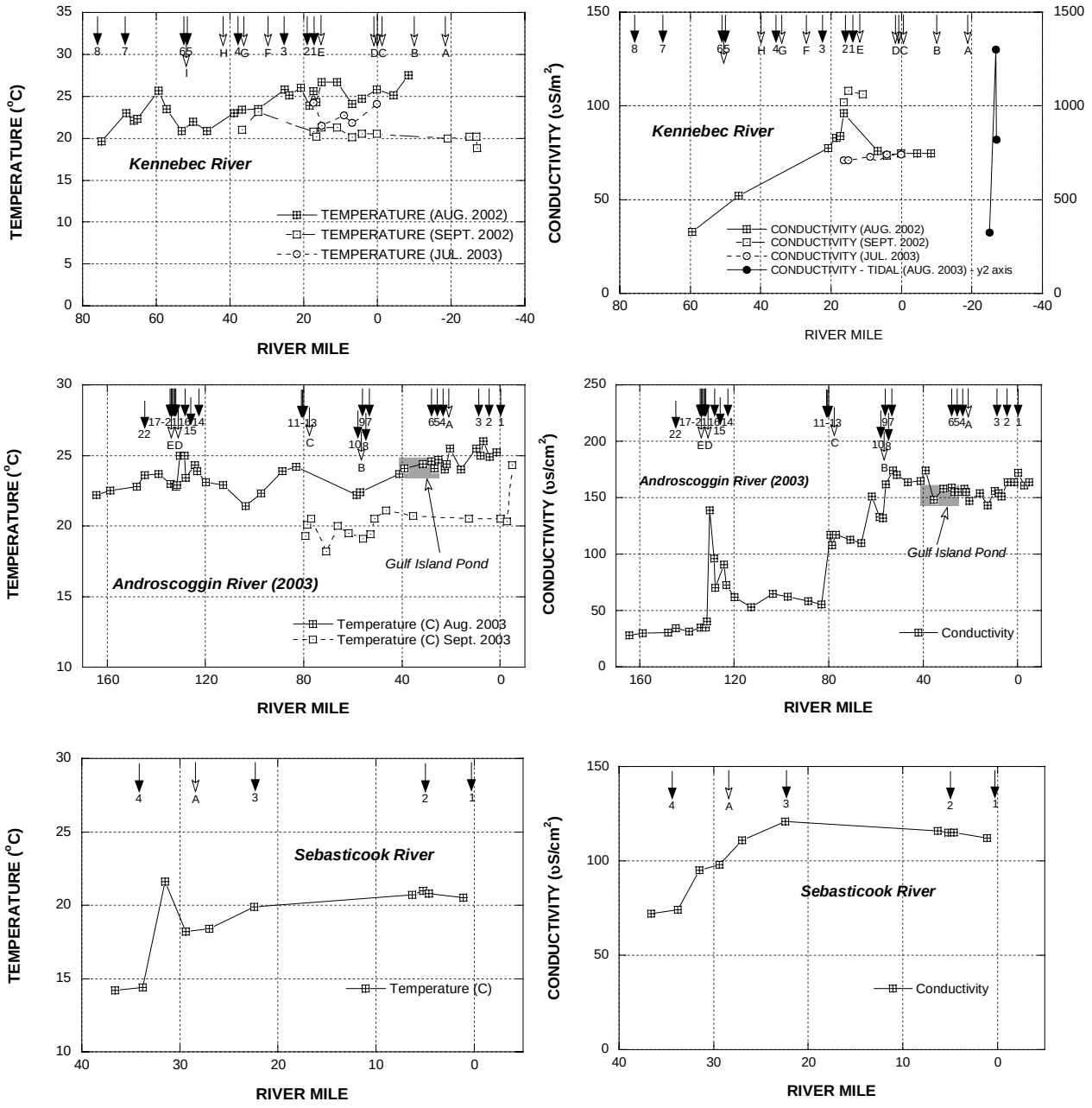

Figure A-3. Upper left: temperature (°C) values measured at electrofishing sites in the Kennebec River during August and September 2002 and July 2003. Upper right: relative conductivity (µS/cm²) values measured at electrofishing sites in the Kennebec River during August and September 2002 and July 2003. Middle left: temperature (°C) values measured at electrofishing sites in the Androscoggin River during August and September 2003. Middle right: relative conductivity (µS/cm²) values measured at electrofishing sites in the Androscoggin River during August and September 2003. Lower left: temperature (°C) values measured at electrofishing sites in the Sebasticook River during October 2003. Lower right: relative conductivity (µS/cm²) values measured at electrofishing sites in the Sebasticook River during October 2003. Letters and numbers denote dams and major point sources (see study area description).

Merrymeeting Bay was not influenced by brackish tidal waters. A value of 178 µS/cm^2 in the Sabattus River was only slightly higher than adjacent mainstem values.

Sebasticook River
Water temperature in the Sebasticook River was measured in early October, hence temperatures at or less than 20°C (Figure A-3). Warmer temperatures would be expected during the summer most likely exceeding 25°C. Relative conductivity increased downstream ranging from 72 µS/cm^2 in lower Douglas Pond to 121 µS/cm^2 in the lower Burnham impoundment (Figure A-4). Values were consistently >100 µS/cm^2 downstream from Pittsfield.

Dissolved Oxygen

Dissolved oxygen (D.O.) is another fundamentally essential parameter for aquatic organisms that we measured during the 2002-3 surveys. All measurements were daytime grabs at the beginning of each electrofishing zone. Multiple measurements were taken at sites with unique characteristics such as discharge mixing zones.

Kennebec River
D.O. concentrations were mostly in the 8-9 mg/l range throughout most of the mainstem in July and August Figure A-4). Values were slightly higher in September 2002 reflecting cooler water temperatures. There were no obvious zones of oxygen decline and certainly

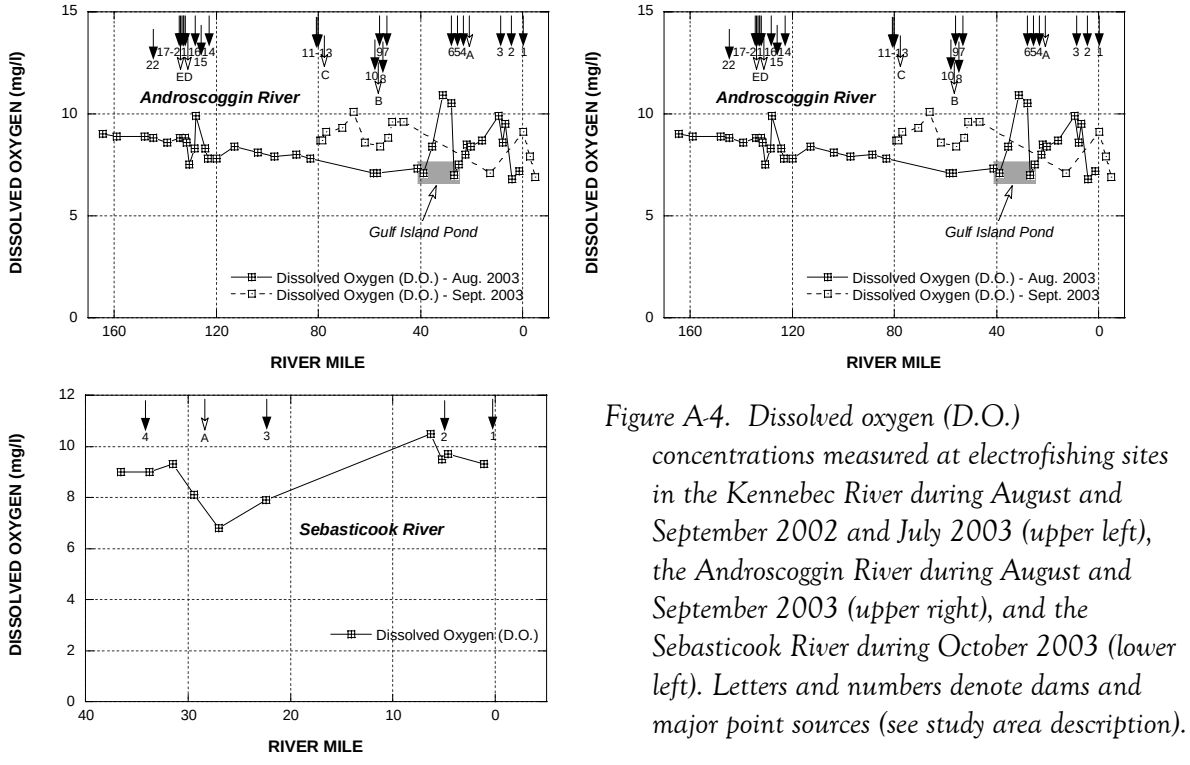

Figure A-4. Dissolved oxygen (D.O.) concentrations measured at electrofishing sites in the Kennebec River during August and September 2002 and July 2003 (upper left), the Androscoggin River during August and September 2003 (upper right), and the Sebasticook River during October 2003 (lower left). Letters and numbers denote dams and major point sources (see study area description).

no areas of depletion. Maine DEP conducted a water quality sampling in 1997 and 1998 and used the data to produce a modeling report (Maine DEP 2000). The results showed attainment of D.O. criteria under modeled critical conditions with the only marginal area occurring downstream from Skowhegan. The measured D.O. values were very similar to those measured in August 2002. The most limiting factors in the freshwater riverine mainstem were algae and plants (i.e., nutrient related), point sources, sediment oxygen demand (SOD), and nonpoint sources. The removal of the Edwards Dam in 1999 was then predicted to have beneficial effects on the D.O. regime. The impact of nutrients on the algal growth and the resulting impacts to the D.O regime were seen as the most important D.O. relevant management issue.

Androscoggin River

D.O concentrations were generally >8.0 from Errol, NH to below Rumford during the August 2003 survey (Figure A-4). Values declined slightly to 7.1 mg/l immediately downstream from the Riley Dam upstream from Jay. Values remained in this range to Turner Falls. D.O. levels increased in Gulf Island Pond with two sites >10 mg/l, an apparent reflection of the secondary effects of nutrient enrichment on algal productivity that is a recognized problem in this waterbody (Maine DEP 2002). D.O. concentrations declined to the 7 mg/l range immediately downstream from Gulf Island Pond, but increased to near 10 mg/l downstream to the Worumbo impoundment, again an apparent reflection of the secondary effects of nutrient enrichment in this segment. The D.O. again declined to 7 mg/l downstream from the Pejepscot Dam to Brunswick. September 2003 measurements reflected the effects of cooler water temperatures with the exception of one comparatively low value (7.1 mg/l) measured at RM 12.8 in Durham. This is a free-flowing site just upstream from the Worumbo impoundment.

Much of the concern with D.O. criteria attainment and non-attainment is in the deepest sections of Gulf Island Pond (Maine DEP), which was not directly assessed by our sampling. The elevated daytime D.O. values observed in the reservoir along with visual observations of algal blooms however are relevant to the sources and interactions that produce D.O. criteria violations in Gulf Island Pond. On one sampling date in September 2003, an algal bloom was observed that necessitated relocating a planned electrofishing site due to poor visibility caused by algal turbidity.

Sebasticook River

D.O. was measured during fish sampling in early October and does not reflect the influence of higher summer temperatures. Nevertheless, some longitudinal patterns were evident (Figure A-4). D.O. values were generally between 9-10 mg/l upstream from Pittsfield and in the Benton Falls and Ft. Halifax impoundments. Concentrations declined to less than 7 mg/l downstream from the Pittsfield WWTP at the RM 27.0 electrofishing location in the upper Burnham impoundment. The D.O. value immediately upstream at RM 29.4 was 8 mg/l. While this may superficially appear to be an impact, more sampling would be required to verify its existence.

HABITAT ASSESSMENT

Habitat was assessed at each electrofishing site using the Qualitative Habitat Evaluation Index (QHEI; Rankin 1989, 1995) as modified for application to large rivers. Each electrofishing site was assessed to ascertain the diversity and quality of the available aquatic habitat during and immediately after the collection of fish assemblage data. We modified the QHEI for application to large, non-wadeable rivers as part of the exploratory sampling and the ensuing surveys of the Kennebec River in 2002 and the Androscoggin River in 2003 (MBI 2002). The QHEI is a visual-based physical habitat index designed to provide an empirical, qualitative evaluation of the lotic macrohabitat characteristics that are important to fish assemblages and other aquatic macrofauna. It is generally correlated with fish assemblage measures of biotic integrity and other assemblage properties including species of management interest (Rankin 1989, 1995). It was developed as a rapid assessment tool and in recognition of the constraints associated with the practicalities of conducting a large-scale monitoring program, i.e., the need for a rapid assessment tool that yields meaningful information and which takes advantage of the knowledge and insights of experienced field biologists who are conducting biological assessments. It has been used widely in the Midwest and similarly designed habitat evaluation techniques are in widespread use throughout the U.S. The QHEI incorporates the types and quality of substrate, the types and amounts of instream cover, channel morphology characteristics, riparian zone extent and quality, bank stability and condition, and pool-run-riffle quality and characteristics. Slope or gradient is also factored into the QHEI. A practical scoring range of 20 to 100 is produced as an index of habitat quality. We followed the guidance and scoring procedures outlined in Ohio EPA (1989) and Rankin (1989) with appropriate modifications made during the Kennebec and Androscoggin River surveys of 2002 and 2003. A QHEI users guide is available in the Quality Assurance Project Plan (QAPP; MBI 2002).

A QHEI habitat assessment form is completed for each 1.0 km fish sampling site. The observations are made at the time of the electrofishing sample by the crew leader with assistance from the other two crew members. The QHEI form is completed by the crew leader at the conclusion of each site. In 2002 and 2003 this entailed delineating the QHEI over two adjunct 0.5 km electrofishing sites, the biological data from which were later combined to provide data over a 1.0 km site distance. The data from the field habitat assessment is entered into a relational database for further analysis.

QHEI Matrix

For the purposes of our study, two specific reports were produced. One report provides a summary of the overall QHEI and component metric scores by sampling location (Appendix C). The second report produces a matrix of "good" and "modified" habitat attributes derived from the QHEI data collection. Rankin (1989) determined sets of specific QHEI attributes that were positively and negatively correlated with a calibrated fish Index of Biotic Integrity (IBI) in Ohio. These attributes include specific components of habitat such as aggregations of substrate types, substrate condition, extent of cover, current

types, channel morphology, etc. Attributes that were positively correlated with high IBI scores are termed "good" attributes and those that were negatively correlated with the IBI are termed "modified" attributes. The resulting number and ratio of modified:good attributes is then used to diagnose habitat related biological impairments and to determine if habitat is a potentially limiting factor (Rankin 1995).

We modified this approach by extracting what we estimated were the most relevant attributes of the modified QHEI for Maine rivers classifying each as "good" (i.e., correspond to high quality riverine habitats) and "modified" (i.e., correspond to modified or degraded riverine habitat). Included in the modifications for application to Maine rivers was the addition of a large boulder substrate type, adding impoundment as a channel morphology attribute, and including its effect in the flow and riffle/run habitat categories. We are treating run-of-river impoundments as an unnatural modification of riverine habitat based on prior experiences with this type of habitat modification on riverine fish assemblages in the Midwest (Lyons et al. 2001; Yoder et al. 2005). Hence, free-flowing riverine habitats are considered the natural, baseline condition for Maine rivers. This is apart from how impoundments may eventually be treated within a tiered use classification scheme, which would only be possible following a more thorough assessment of the fish assemblage data and the derivation and calibration of an IBI type index.

The QHEI matrix developed for Maine rivers presents specific attributes that are extracted from the QHEI database and which correspond to the maintenance of good quality riverine fish assemblages (good attributes) and degraded fish assemblages (modified attributes). For our analyses, 10 good attributes and 13 modified attributes were used. The presence of each attribute at a site is indicated by symbol in the resulting QHEI matrix (Table H-1). In addition, the QHEI site score, the local gradient, the total number of good and modified attributes, and the ratio of modified:good attributes is also provided. Good attributes are those that have been shown to be positively correlated with good quality fish assemblages, i.e., those that correspond to a least impacted reference assemblage; modified attributes are those that are associated with fish assemblages that depart to varying degrees from a reference assemblage and are hence considered to be degraded. The modified:good attributes ratio has been useful in determining the likelihood of a particular site being able to meet biologically-based attainment goals based on habitat as a key controlling factor (Rankin 1995). The empirical relationships between the ratio of habitat attributes and fish assemblage quality were initially established based on stream and river fish assemblage assessments in Ohio (Rankin 1989, 1995). Since we do not yet have sufficient data to empirically develop these same relationships for Maine River fish assemblages, we used best professional judgment and the field observations made in 2002 and 2003 to determine what are good and modified attributes. The QHEI results are portrayed in this study as the QHEI score by river mile, by river habitat segment (riverine, impounded, tidal), and the QHEI matrix.

We plotted modified QHEI scores by sampling site on a longitudinal basis for the purpose of visualizing overall habitat quality in relation to dams and other physical features along

major river reaches. We also extracted a QHEI matrix that shows the occurrence and ratio of "good" and "modified" attributes in addition to the overall QHEI score by sampling site in an upstream to downstream format. Finally, box-and-whisker plots comparing freshwater riverine, impounded, and tidal influenced sites were constructed for each of the major study areas.

Kennebec River

The Kennebec River mainstem between Wyman Dam and Merrymeeting Bay offered a gradient of habitat quality as determined by QHEI scores and attributes (Figure H-1). Free-flowing riverine habitats exhibited the highest scores generally in the 80-90 range. Impounded habitats reflected the loss of riverine habitat attributes scoring in the 50-65 range. Tidal habitats reflected their low gradient character with similar scores of 50-70. There was also a downward pattern in QHEI scores in a downstream direction from the head of tide at Augusta. These results are in agreement with those from other rivers where the QHEI has been applied as the primary habitat assessment tool.

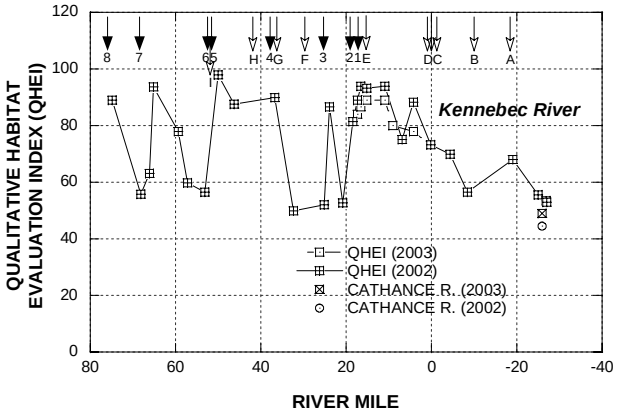

Figure H-1. QHEI scores determined at electrofishing locations in the Kennebec River study area, 2002-3. Letters and numbers denote dams and major point sources (see study area description).

QHEI scores in 2002 were highest (>85) at riverine sites in the freshwater segment including one site in the former Edwards Dam impoundment (Figure H-1). These sites also exhibited no (0) modified attributes (Table H-1). Three of the riverine sites within the former Edwards Dam impoundment still reflected lingering effects of impoundment indicting that full recovery to riverine conditions was not complete. These sites had QHEI scores ranging from 64.5 to 76 and each had from 1 to 5 modified attributes which included a recovering channel (all), fair-poor development (3), and sparse or no cover (2). The site at RM 6.8 located downstream from the Sidney boat launch also had high/moderate siltation, slow or no flow, and no riffle/run habitat. Some of these are characteristic of low gradient riverine sites, which usually score lower than higher gradient sites. This area of the mainstem had other indications of recovery including a treeless shoreline margin and a distinctive band of grasses, sedges, and bullrushes that grew in the margin formerly inundated by the Edwards impoundment. A new site was located upstream from the Sidney boat launch in 2003 at RM 9.0 to better document the lingering effects of the impoundment and the recovery process into the future. The QHEI score was higher (78) at this site, but exhibited 3 modified attributes (sparse/no cover, recovering

Table H-1. QHEI matrix of good and modified habitat attributes at electrofishing sites in the Kennebec, Androscoggin, and Sebasticook Rivers, 2002-3.

Key QHEI Components

River Mile	QHEI	Gradient (ft/mile)	Good Attributes: No Channelization/Recovered	Boulder, Cobble, Gravel Substrates	Silt Free Substrates	Good/Excellent Development	Five or More Substrate Types	Extensive-Moderate Cover	Fast Current/Eddies	Low-Normal Overall Embeddedness	Max Depth > 1 m	Low-Normal Riffle/Run Embeddedness	Good Habitat Attributes	Modified Attributes: Impounded	Channelized or No Recovery	Silt/Muck Substrates	Sparse or No Cover	Max Depth < 70 cm	Recovering Channel	High/Moderate Silt Cover	Fair-Poor Development	Only 1-2 Cover Types	Slow or No Flow	High-Mod Overall Embeddedness	High-Mod Riffle-Run Embeddedness	No Riffle/Run	Total Modified Attributes	Modified: Good Ratio
(50-001)	Kennebec River (ust. Edwards Dam)																											
Year:	2002																											
74.8	**85.0**	4.55	■	■	■	■	■	■	■	■	■	■	10														0	0.00
68.2	**62.0**	0.01					■	■		■	■		4	◆						■		■			■		4	1.00
66.1	**63.0**	15.38		■	■			■		■	■		5	◆		◆	◆			■					■		4	0.80
65.1	**95.5**	15.38	■	■	■	■	■	■	■	■	■	■	10														0	0.00
59.4	**76.0**	11.11	■	■		■	■		■	■	■		8				◆			■				■	■		4	0.50
57.2	**62.0**	0.01					■	■		■	■		4	◆						■		■			■		4	1.00
53.2	**61.0**	0.01	■					■		■	■		5	◆						■		■	■		■		5	1.25
50.0	**97.0**	13.33	■	■	■	■	■	■	■	■	■	■	10														0	0.00
46.2	**87.5**	5.26	■	■		■	■	■		■	■		8														0	0.00
36.7	**88.0**	23.08	■	■	■	■	■	■	■	■	■	■	10														0	0.00
32.3	**57.5**	0.01		■			■	■			■		3	◆			◆			■		■	■		■		6	1.50
25.1	**57.5**	0.01		■			■	■		■			4	◆						■		■			■		4	1.00
23.9	**97.5**	18.18	■	■		■	■	■	■	■	■	■	9														0	0.00
20.8	**61.0**	0.01		■			■	■		■	■		5	◆						■		■			■		4	0.80
18.5	**69.0**	0.01	■	■	■	■	■	■		■	■	■	9	◆						■							2	0.22
17.4	**88.0**	18.75	■	■	■	■	■	■	■	■	■	■	10														0	0.00
16.5	**90.0**	11.11	■	■		■	■	■	■	■	■		9														0	0.00
15.1	**94.0**	22.22	■	■		■	■	■	■	■	■	■	9														0	0.00
11.0	**91.5**	14.63	■	■		■	■	■	■	■	■	■	9														0	0.00
6.8	**64.5**	0.01		■		■	■	■		■	■		6						■	■	■		■			■	5	0.83
4.5	**77.5**	0.99		■		■	■	■		■	■	■	7				◆		■		■						3	0.43
3.9	**87.0**	14.29	■	■		■	■	■	■	■	■	■	9						■								1	0.11
0.1	**76.0**	5.26		■		■	■	■		■	■	■	7				◆		■		■						3	0.43
-4.4	**64.0**	0.01	■	■		■	■	■			■		6				◆			■	■		■	■		■	6	1.00
-8.4	**52.5**	0.01	■			■		■			■		5			◆	◆			■	■		■	■		■	7	1.75
-19.0	**64.0**	0.01	■			■	■	■	■		■		6				◆			■				■		■	4	0.67
-24.8	**55.5**	0.01	■	■			■	■			■		4			◆	◆			■	■		■	■		■	7	1.40
-26.8	**53.5**	0.01	■	■			■				■		3			◆	◆			■	■		■	■		■	7	1.75
-27.0	**53.0**	0.01	■				■	■			■		3			◆	◆			■	■			■		■	6	1.50
Year:	2003																											
17.4	**84.0**	18.75	■	■	■	■	■	■	■	■	■	■	10														0	0.00

Table H-1 (continued).

River Mile	QHEI	Gradient (ft/mile)	Good Attributes: No Channelization/Recovered	Boulder, Cobble, Gravel Substrates	Silt Free Substrates	Good/Excellent Development	Five or More Substrate Types	Extensive-Moderate Cover	Fast Current/Eddies	Low-Normal Overall Embeddedness	Max Depth > 1 m	Low-Normal Riffle/Run Embeddedness	Good Habitat Attributes	Modified Attributes: Impounded	Channelized or No Recovery	Silt/Muck Substrates	Sparse or No Cover	Max Depth < 70 cm	Recovering Channel	High/Moderate Silt Cover	Fair-Poor Development	Only 1-2 Cover Types	Slow or No Flow	High-Mod Overall Embeddedness	High-Mod Riffle-Run Embeddedness	No Riffle/Run	Total Modified Attributes	Modified: Good Ratio
(50-001) Kennebec River (ust. Edwards Dam)																												
Year: 2003																												
16.5	**86.5**	11.11	■	■	■	■	■	■	■	■	■	■	10														0	0.00
15.1	**90.0**	22.22	■	■	■	■	■	■	■	■	■	■	10														0	0.00
11.0	**90.0**	14.63	■	■	■	■	■	■	■	■	■	■	10														0	0.00
9.0	**80.0**	5.08		■	■	■	■	■	■	■	■	■	9				◆		■		■						3	0.33
4.5	**81.0**	0.99		■	■	■	■	■	■	■	■	■	9						■								1	0.11
0.1	**73.0**	5.26		■		■		■		■	■	■	7				◆		■								2	0.33
(50-002) Cathance River																												
Year: 2002																												
1.5	**49.5**	0.01	■				■	■			■		4		◆		◆		■	■		■	■		■		7	1.75
Year: 2003																												
3.0	**49.0**	0.01	■					■					4		◆				■	■		■	■		■		6	3.00
(50-100) Sebasticook River																												
Year: 2003																												
36.6	**66.5**	0.01		■		■		■		■	■		6		◆					■	■		■	■		■	6	1.20
34.0	**49.5**	0.01				■		■		■	■		4		◆	◆				■	■		■	■		■	7	1.75
33.8	**79.5**	2.50		■		■		■	■			■	7		◆												1	0.20
29.4	**76.0**	11.36	■	■		■		■		■	■		7							■				■	■		3	0.50
27.0	**67.0**	0.01	■			■		■		■	■		6		◆					■	■		■	■			5	1.00
22.4	**54.0**	0.01		■				■		■	■		4		◆	◆				■	■		■	■		■	7	1.75
6.3	**53.0**	0.01	■			■		■		■	■		6		◆	◆				■	■		■	■		■	7	1.40
5.2	**81.0**	14.28	■	■		■		■		■	■	■	8		◆					■	■			■			4	0.57
4.6	**43.5**	0.01						■		■	■		3		◆	◆				■	■		■	■		■	7	2.33
1.1	**50.5**	0.01						■			■		2		◆	◆				■	■		■			■	6	3.00
(60-001) Androscoggin River (ust. Brunswick Dam)																												
Year: 2003																												
164.3	**82.5**	5.80	■		■	■		■		■	■	■	8														0	0.00
158.8	**89.0**	12.50	■	■	■	■	■	■	■	■	■	■	10														0	0.00
148.1	**44.0**	0.01						■		■			3		◆	◆		◆			■		■			■	6	3.00
144.7	**84.0**	17.39	■	■		■	■	■	■	■	■		9							■				■			2	0.22
139.2	**80.5**	3.64	■	■		■	■	■	■		■		7											■	■		2	0.29
134.1	**51.0**	0.01	■				■	■			■		3		◆	◆				■	■		■	■		■	7	1.75
132.0	**59.5**	0.01	■			■		■	■		■	■	7		◆	◆				■	■			■			5	0.83

Table H-1 (continued).

Key QHEI Components

River Mile	QHEI	Gradient (ft/mile)	Good Attributes: No Channelization/Recovered	Boulder, Cobble, Gravel Substrates	Silt Free Substrates	Good/Excellent Development	Five or More Substrate Types	Extensive-Moderate Cover	Fast Current/Eddies	Low-Normal Overall Embeddedness	Max Depth > 1 m	Low-Normal Riffle/Run Embeddedness	Good Habitat Attributes	Modified Attributes: Impounded	Channelized or No Recovery	Silt/Muck Substrates	Sparse or No Cover	Max Depth < 70 cm	Recovering Channel	High/Moderate Silt Cover	Fair-Poor Development	Only 1-2 Cover Types	Slow or No Flow	High-Mod Overall Embeddedness	High-Mod Riffle-Run Embeddedness	No Riffle/Run	Total Modified Attributes	Modified: Good Ratio
(60-001) Androscoggin River (ust. Brunswick Dam)																												
Year: 2003																												
131.5	**65.0**	0.01	■	■		■	■	■		■	■	■	7	◆	◆					■							3	0.38
130.7	**85.0**	50.00	■	■	■	■	■	■	■	■	■	■	10														0	0.00
130.4	**78.0**	28.60	■	■		■	■	■	■	■		■	9									■					1	0.13
128.6	**57.0**	0.01		■			■	■		■	■		5	◆	◆					■			■			■	5	1.00
128.0	**81.0**	0.01		■	■	■	■	■	■	■		■	9						■								1	0.13
124.4	**88.5**	33.33	■	■	■	■	■	■	■	■	■	■	10														0	0.00
123.4	**57.5**	0.01		■			■	■		■	■		4	◆			◆			■			■			■	5	1.00
119.8	**81.5**	12.50	■	■		■	■	■	■	■	■	■	9											■			1	0.11
112.8	**89.5**	15.38	■	■		■	■	■	■	■	■	■	9														0	0.00
103.7	**86.0**	6.25	■	■		■	■	■	■	■	■	■	9														0	0.00
97.3	**82.5**	14.28	■	■	■	■	■	■		■	■		9										■	■			2	0.22
88.7	**78.5**	2.33	■	■			■	■		■	■	■	7				◆			■							2	0.29
83.1	**45.5**	0.01						■			■		2	◆	◆					■	■		■	■		■	7	3.50
79.3	**87.5**	28.57	■	■	■	■	■	■	■	■	■		10											■			1	0.10
78.5	**80.0**	13.33	■	■	■	■		■	■	■	■		10														0	0.00
76.9	**91.0**	18.18	■	■	■	■	■	■	■	■	■		10														0	0.00
70.8	**88.0**	3.92	■	■	■	■	■	■	■	■	■	■	10														0	0.00
66.2	**74.0**	4.35	■	■			■	■		■	■	■	6							■	■			■			3	0.43
61.7	**59.5**	0.01		■			■	■		■	■		4	◆						■	■		■	■	■		6	1.20
58.4	**89.0**	27.03	■	■	■	■	■	■	■	■	■	■	10														0	0.00
57.1	**52.5**	0.01						■		■	■		3	◆						■			■			■	4	1.33
55.8	**48.5**	0.01					■	■		■	■		3	◆									■			■	3	0.75
52.8	**86.0**	14.28	■	■	■	■	■	■	■	■	■	■	10														0	0.00
51.1	**84.0**	11.76	■	■		■	■	■	■	■	■	■	9								■				■		2	0.22
46.6	**93.0**	3.45	■	■	■	■	■	■	■	■	■	■	10														0	0.00
41.2	**81.5**	3.92	■	■	■	■	■	■	■	■	■	■	10														0	0.00
38.9	**44.5**	0.01						■		■	■		3	◆	◆		◆			■			■			■	6	2.00
35.4	**47.0**	0.01						■		■	■		3	◆			◆						■			■	4	1.33
31.4	**45.0**	0.01		■				■					3	◆						■	■		■	■		■	6	3.00
27.9	**47.5**	0.01		■				■		■	■		4	◆	◆					■	■		■			■	6	1.50
26.9	**70.0**	0.01		■		■	■	■	■	■	■	■	8	◆							■						2	0.25

Table H-1 (continued).

Key QHEI Components

River Mile	QHEI	Gradient (ft/mile)	Good Attributes: No Channelization/Recovered	Boulder, Cobble, Gravel Substrates	Silt Free Substrates	Good/Excellent Development	Five or More Substrate Types	Extensive-Moderate Cover	Fast Current/Eddies	Low-Normal Overall Embeddedness	Max Depth > 1 m	Low-Normal Riffle/Run Embeddedness	Good Habitat Attributes	Modified Attributes: Impounded	Channelized or No Recovery	Silt/Muck Substrates	Sparse or No Cover	Max Depth < 70 cm	Recovering Channel	High/Moderate Silt Cover	Fair-Poor Development	Only 1-2 Cover Types	Slow or No Flow	High-Mod Overall Embeddedness	High-Mod Riffle-Run Embeddedness	No Riffle/Run	Total Modified Attributes	Modified: Good Ratio
(60-001) Androscoggin River (ust. Brunswick Dam)																												
Year: 2003																												
25.2	**83.0**	0.01	■	■	■	■	■	■	■	■	■	■	10	◆													1	0.10
22.6	**76.5**	6.45	■	■		■	■	■		■	■	■	8						■								1	0.13
21.9	**86.5**	16.67	■	■		■	■	■	■	■	■	■	9														0	0.00
20.4	**91.0**	19.23	■	■	■	■	■	■	■	■	■	■	10														0	0.00
16.0	**62.5**	0.01	■	■				■		■	■		6							■	■		■	■		■	5	1.00
12.8	**92.0**	3.22	■	■	■	■	■	■	■	■	■		10														0	0.00
9.6	**67.5**	0.01		■	■		■	■		■	■		6	◆					■				■		■		4	0.67
8.0	**88.5**	37.50	■	■	■	■	■	■	■	■	■	■	10														0	0.00
7.0	**58.0**	0.01						■		■	■		3	◆	◆				■				■		■		5	1.67
4.3	**74.5**	25.00	■			■	■	■	■	■	■	■	8														0	0.00
1.5	**69.0**	6.25	■			■		■		■	■	■	7														0	0.00
-0.2	**64.0**	0.01	■		■	■	■	■		■	■		7				◆									■	2	0.29
-2.6	**67.0**	0.01	■			■	■	■		■	■		6				◆									■	2	0.33
-5.1	**53.5**	0.01	■				■				■		2				◆			■	■		■	■		■	6	2.00
(60-100) Sabattus River																												
Year: 2003																												
0.3	**62.5**	0.01	■			■		■		■	■		6	◆	◆								■			■	4	0.80

channel, fair-poor development). No improvement was observed in the QHEI scores at RM 4.2 (78) and RM 0.1 (73) nor were the modified attributes eliminated. It will likely take a series of major hydrologic events to more fully recover the riverine habitat.

QHEI Matrix

Riverine habitats were generally characterized by QHEI scores >80-85, 8-10 good attributes, 0-1 modified attributes, and a modified:good ratio <0.5. A few riverine sites did not measure up to these values mostly because of the degradation of substrates by excessive sedimentation and/or substrate embeddedness. One riverine site in Solon upstream from the Rt. 8 bridge exhibited a highly modified habitat with a QHEI score of 55, only 5 good attributes, 4 modified attributes, and a modified:good ratio of 0.8. This site was channelized in the 1920s to enhance log driving and it has shown little evidence of natural recovery. The QHEI score of 55 reflected the degraded habitat and the loss of one-half of the good attributes. This site exhibited 4 modified attributes including sparse/no cover, maximum depth <0.7 meters, fair/poor development, and no riffle/run habitat.

Impounded habitats were generally characterized by QHEI scores <55-60, 5 or fewer good attributes, 4-5 modified attributes, and modified:good ratios >1.0. These sites reflected the loss of attributes normally present in riverine habitats such as run-riffle habitats and a diversity of current types.

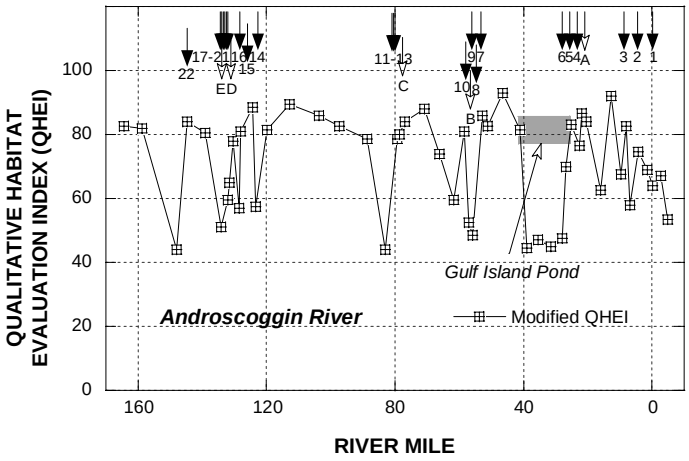

Figure H-2. QHEI scores determined at electrofishing locations in the Androscoggin River study area, 2003. Letters and numbers denote dams and major point sources (see study area description).

QHEI scores in tidal habitat ranged from 49.0 (Cathance R., RM 3.0) to 64.0 at Hallowell (RM -4.4), much lower than the riverine sites and comparable to many of the impounded sites. These sites exhibited 3-6 good attributes, 6-7 modified attributes, and modified:good ratios >1.5-2.0. Modified attributes that were consistently present included silt/muck substrates, sparse/no cover, slow or no flow, and high substrate embeddedness. These are naturally occurring conditions and as such are the baseline from which habitat quality should be assessed.

Androscoggin River

QHEI scores along the length of the Androscoggin River mainstem between Errol, NH and Merrymeeting Bay reflected a gradient of conditions including high to low gradient riverine, impounded riverine, and tidal habitats downstream from Brunswick. Scores

generally ranged from the low 40s to the low 90s (Figure H-2). Based on QHEI scores and attributes, there were two distinct types of riverine sites in the Androscoggin River mainstem, high to moderate gradient riverine sites and low gradient riverine sites. Free-flowing, high to moderate gradient riverine habitats exhibited the highest scores generally in the 80-90 range. Low gradient riverine habitats scored in the high 60s to low 70s, reflecting a comparative lack of current and substrate diversity. Impounded sites reflected the habitat modification it precipitates with scores in the 40s and 50s. This was especially apparent in Gulf Island Pond where all QHEI values were <50 with few good attributes (3-4) in relation to a predominance of modified attributes (4-6). This is typical of the largest run-of-river impoundments where shoreline depths were not only shallow, but extended for several hundred feet away from the shoreline in many areas. Woody debris was a common cover type, but the substrate was composed of sand and silts with little submergent aquatic vegetation. Other mainstem sites that were a mix of impounded and riverine habitats had QHEI scores that were intermediate between free-flowing riverine and impounded. The tidal influenced sites had slightly higher scores (55-65) than the Kennebec due to better development around more numerous islands and less silt and muck in what were predominantly sand substrates.

QHEI Matrix

High to moderate gradient riverine habitats were generally characterized by QHEI scores >80-90, 8-10 good attributes, 0-2 modified attributes, and a modified:good ratio of <0.5. Low gradient riverine sites were generally characterized by QHEI scores >70-90, 6-10 good attributes, 0-5 modified attributes, and a modified:good ratio of <0.5-1.0. Impounded habitats were generally characterized by QHEI scores <45-60, 6 or fewer good attributes, 3-7 modified attributes, and modified:good ratios of 0.5-3.5. These sites, too, reflected the loss of attributes associated with riverine habitats such as run-riffle habitats and a diversity of current types. QHEI scores in tidal habitats ranged from 53.5 at the entrance to Merrymeeting Bay (RM -5.1) to 67 downstream from Brunswick (RM -2.6). These sites exhibited 3-7 good attributes and 2-6 modified attributes.

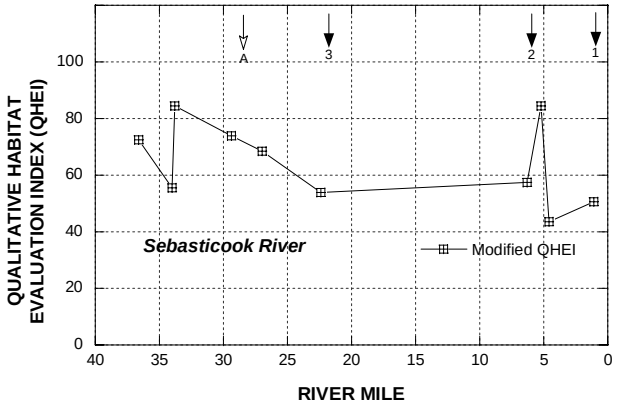

Figure H-3. QHEI scores determined at electrofishing locations in the Sebasticook River study area, 2003. Letters and numbers denote dams and major point sources (see study area description).

Sebasticook River

Habitat in the Sebasticook River reflected extensive modification by impoundment and low gradient characteristics in the available riverine reaches. Only 3 sites had QHEI scores

>75 and one was a partially impounded riverine habitat (Figure H-3). The mainstem in the study area was affected by 3 major hydropower dams, Ft. Halifax, Benton Falls, and Burnham. Some of the intervening free-flowing reaches were not boatable and were thus not included in this study.

QHEI Matrix

Good attributes ranged from 2 to 8 and were outnumbered by modified attributes at five sites, all of which were impounded habitats. The remaining sites ranged from 43.5 to 67 and all were impounded at least partially. Some of the impounded sites scored higher than those the Kennebec and Androscoggin due primarily to more abundant instream cover, particularly in the form of emergent and submergent aquatic vegetation and stable woody debris accumulations. Modified attributes were most prevalent in the lower sections of the impoundments.

Summary

Some patterns emerged in the results of the habitat assessment conducted across the three

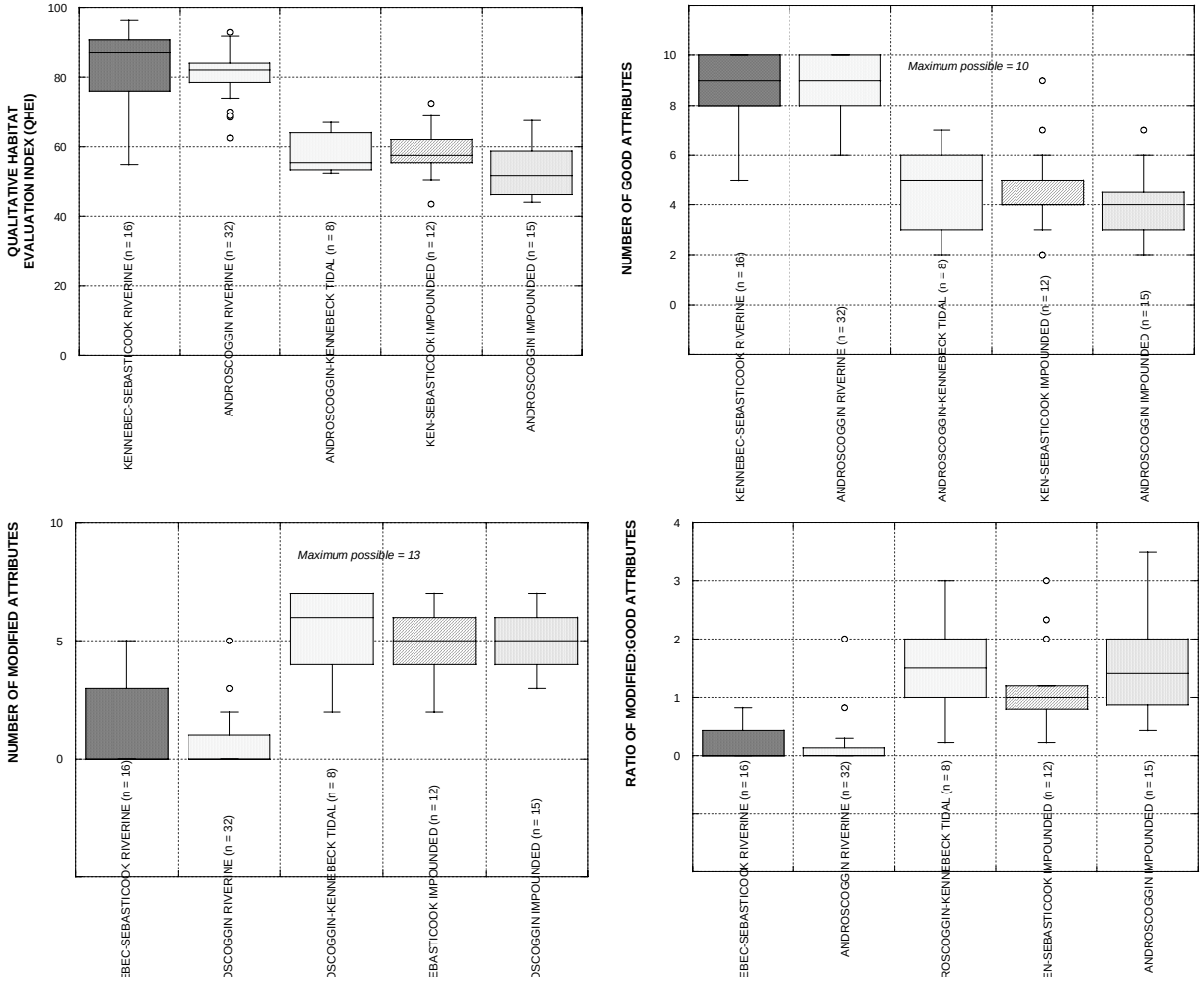

Figure H-4. Box-and-whisker plots of QHEI scores and QHEI attributes based on aggregations of free-flowing riverine, tidal, and impounded riverine habitats in the Kennebec, Androscoggin, and Sebasticook River study areas based on data collected at electrofishing sites in 2002 and 2003.

study rivers. Habitat in all three rivers reflected a range of condition from high/moderate and low gradient riverine, tidal riverine and embayments, and modified riverine due primarily to the effects of run-of-river impoundments. The riverine habitats exhibited the highest median QHEI scores whereas tidal and impounded sites scored about 25-30 points lower (Figure H-4). Riverine sites also exhibited more good attributes with a median of 9 compared to 4-5 for tidal and impounded sites. Conversely, riverine sites had fewer modified attributes with a median of 0 compared to 5-6 for tidal and impounded sites. Tidal influenced and impounded sites had similar QHEI scores and modified:good ratios, but for very different reasons. The median ratio of modified:good habitat attributes was 0 for free-flowing riverine sites and >1.0-1.5 in tidal and impounded sites. One key difference in these results is that tidal habitats are naturally occurring and impoundments are human-induced, yet each results in a similar quality of river habitat. The management implications of this should be obvious.

A principal use of the QHEI and the attendant matrix analyses is to determine the relative contribution of habitat quality to the status of the fish assemblages. Habitat is an important and controlling determinant of fish assemblage characteristics and quality (Rankin 1995). Habitat alone can determine the quality and character of the fish assemblage and deficiencies can frustrate management efforts that focus solely on other factors such as water quality and flow. This tool is also important in determining what type of habitat quality and attributes are essential to maintaining certain types of riverine fish assemblages. It is especially important in determining the potential of a particular river or river reach to support a desired level of biological condition whether or not habitat is a result of natural origins or anthropogenic disturbances. An example of the former is the tidal segments where the habitat, as compared to a baseline of free-flowing riverine, is of a "lower" quality, whereas an example of the latter is the anthropogenically associated effects of impoundment. An argument might be made to adjust the QHEI scores and metrics to account for the natural differences in the tidal segments, but the characteristics of the fish assemblage do tend to reflect the inherent habitat characteristics of tidal influences.

The QHEI has also been a pivotal tool in use attainability analyses, particularly in dealing with anthropogenic caused habitat modifications that cannot be operated in a manner consistent with Clean Water Act goal aquatic life uses. However, this requires developing predictable relationships between the QHEI and its attributes and fish assemblage indices, metrics, and attributes. While relationships with the Maine fish assemblage data have yet to be developed, modified:good attribute ratios >2.0 are generally associated with habitat associated biological impairments where this relationship has been quantified (Rankin 1995).

SPECIES ACCOUNTS

A total of 40 species and 1 hybrid were collected from the three principal study rivers that were electrofished in 2002 and 2003 (see Appendix A for data summaries by river and sampling location). Of these, 29 are considered to be native and the remaining 11 species are introduced (following the definition of Halliwell 2005). Of the latter, some species are purposely managed, some are present due to unintentional and intentional (some illegal) introductions, and others are unknown in terms of their native status. Overall, smallmouth bass *(Micropterus dolomieui)* was the numerically most abundant species followed by American eel *(Anguilla rostrata),* fallfish *(Semotilus corporalis),* redbreast sunfish *(Lepomis auritus),* and white sucker *(Catostomus commersonii).* White sucker predominated in terms of biomass followed by American eel, smallmouth bass, striped bass *(Morone saxatilis),* redbreast sunfish, and common carp *(Cyprinus carpio).* Our method produced a median of 11 (4-19) species collected at a sampling site with an average relative abundance of 508 individuals/km and a biomass 46.1 kg/km.

Plate 1. Adult sea lamprey collected from the Kennebec R. mainstem at Waterville, July 2003.

Our accounting of fish species in each of the three rivers is the product of single-gear sampling and is thus subject to the biases of the methodology. While the majority of species that have either been previously recorded or were expected to occur in these rivers were collected, at least two were not collected and several others were captured in low abundance (see Table S-1). The occurrence and current status of each of the 40 fish species and others that are also known to occur are described as follows (by major family and species order per Hartel et al. 2002).

Family Petromyzondidae (Lampreys)

Sea lamprey *(Petromyzon marinus)*

Sea lamprey was the sole member of this family collected in the 2002-3 surveys. It is a native species in the study area. All except one specimen occurred as juveniles (buccal funnel visible) or ammocoetes (larval stage) and most were collected in the lower Kennebec River (17 ammocoetes, 1 adult). Four juveniles were collected in the Androscoggin River downstream from the Brunswick dam. In the Kennebec River, most of the individuals were collected between Augusta and Waterville in the segment of river formerly inundated by the Edwards Dam impoundment. While this species was able to surmount the Edwards Dam prior to its removal, it has likely increased in abundance following removal.

Family Anguillidae (Freshwater Eels)

American Eel *(Anguilla rostrata)*

American eel is an economically important species that is managed as a commercial fishery in Maine. It occurs in coastal rivers and their tributaries as both immature and adult life stages, with juveniles being the most common. Electrofishing proved to be an effective technique for collecting American eels of all sizes. We differentiated 3 general size classes that *approximate* general life stages; specimens weighing more than 0.5 kg were considered adults, individuals weighing more than 0.01 kg, but less than 0.5 kg were considered juveniles, and those weighing less than 0.01kg were considered young-of-year. These were not intended as definitive life stage determinations, but were done to more accurately determine relative abundance via the sub-sampling techniques we employed.

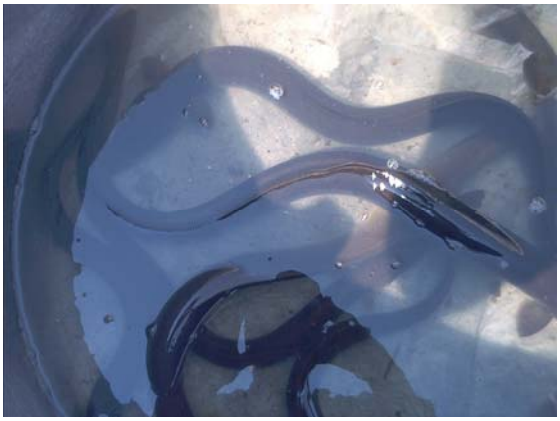

Plate 2. American eels collected from the Kennebec R. mainstem, 2002.

Kennebec River

American eels were most numerous in the lower reaches of the mainstem downstream from the Lockwood Dam in Waterville (Figure S-1). This included adult, juvenile, and y-o-y size stages with the latter two being most numerous. Numerical abundance was highest (200-400/km) between Waterville and Augusta including the segment affected by the Edwards Dam removal. Numerical abundance declined to less than 50-100/km upstream from the Lockwood Dam and y-o-y were absent. In the uppermost reaches of the mainstem only adults were collected.

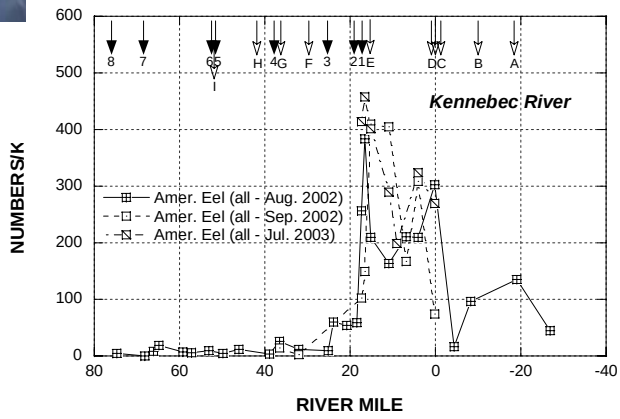

Figure S-1. Relative abundance of American eel (all life stages combined) in the Kennebec R. mainstem in 2002 and 2003. Letters and numbers denote dams and major point sources (see study area description).

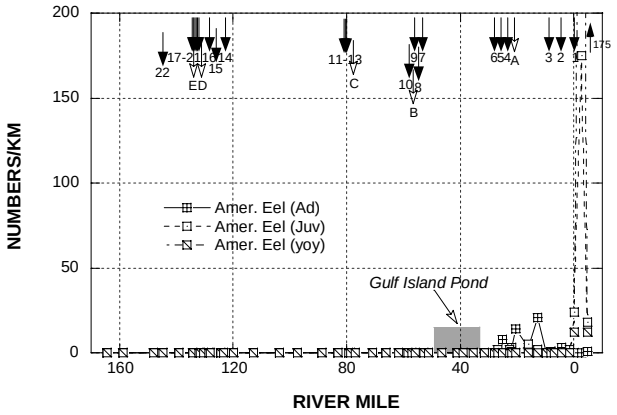

Figure S-2. Relative abundance of American eel (by life stage) in the Androscoggin R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

Androscoggin River

American eels were observed in lesser numbers in the Androscoggin River and occurred in very low numbers upstream from the Brunswick Dam (Figure S-2). The highest abundance was in the form of juveniles at one location in the tidal section of the mainstem downstream from Brunswick (175 individuals/km). Elsewhere numerical abundances were less than 5-20/km. This species was rarely collected upstream from the Lewiston-Auburn area and then only as adults.

Sebasticook River

American eel abundance in the Sebasticook River was generally less than 20-25/km and was comprised largely of juveniles (Figure S-3). No y-o-y were collected. As in the other two rivers, abundance declined to less than 5.0/km with increased distance upstream of the mouth.

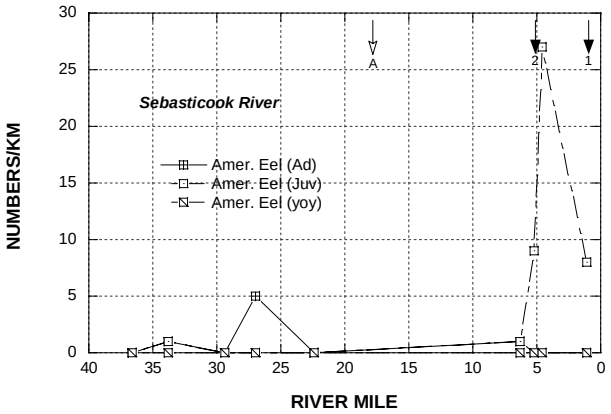

Figure S-3. Relative abundance of American eel (by life stage) in the Sebasticook R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

Plate 3. Adult alewife from the Kennebec R. mainstem at Sevenmile Falls.

Current Status

Numerical abundance of all life stages was highest in the free flowing and/or tidal portions of the Kennebec and Androscoggin Rivers downstream of the downstream-most dams. Their occurrence was limited to lower abundances of juvenile and adults upstream of the downstream-most dams in all three rivers. Both the relative abundance and occurrence of juveniles declined sharply with distance from the first dam or the mouth. Only adults were observed in the uppermost reaches of all three study areas.

Family Clupeidae (Herrings)

Three members of the herring family were collected in the study area in 2002-3; alewife, American shad, and blueback herring. Gizzard shad *(Dorosoma cepedianum)* were collected by a preceding sampling effort immediately downstream from the Lockwood Dam in Waterville in 2001. Their absence from the more intensive 2002-3 surveys suggests that this species has not become established in the lower Kennebec mainstem. It has been documented in southern Maine, thus it remains a potentially invasive species.

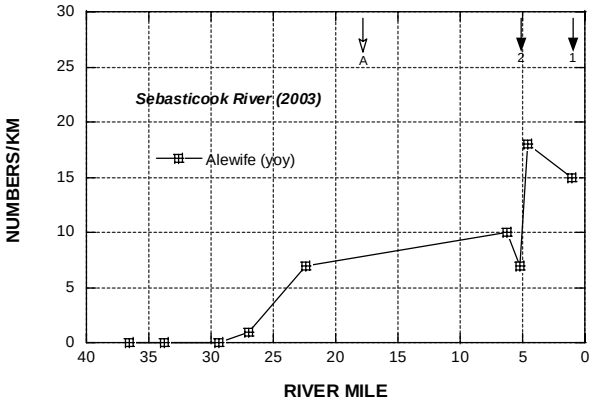

Figure S-4. Relative abundance of alewife young-of-year in the Kennebec R. mainstem in 2002 and 2003. Letters and numbers denote dams and point sources (see study area description).

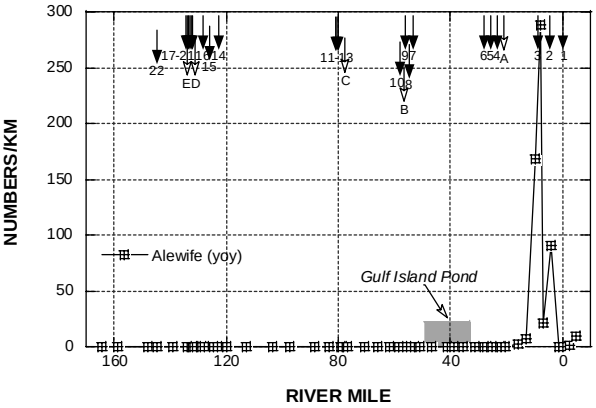

Figure S-5. Relative abundance of alewife young-of-year in the Androscoggin R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

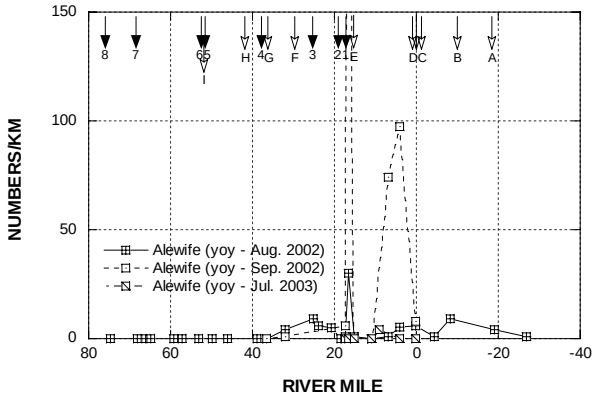

Figure S-6. Relative abundance of alewife young-of-year in the Sebasticook R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

Alewife *(Alosa pseudoharengus)*

This native anadromous species was found in all three rivers being the most numerous and widely distributed in the Kennebec and Sebasticook Rivers. The vast majority of fish collected were young-of-year that were most numerous in the late summer and early fall. Adults were rarely collected due to the seasonally restricted sampling index period.

Kennebec River

Relative numbers were highest in the mainstem downstream from Waterville and this reflected the upriver terminus of free movement from the tidal influenced segment of the mainstem (Figure S-4). While relative abundance was much lower upstream, its presence is a reflection of efforts to reintroduce and reestablish this species to its historical range throughout the Kennebec basin.

Androscoggin River

The occurrence of alewife in the Androscoggin River was restricted to the lower mainstem downstream from Durham (Figure S-5). The pattern of peak relative abundance was similar to the Kennebec R., but the spatial distribution was more restricted. As with the Kennebec R., these were all young-of-year individuals and are evidence of attempts to restore this species to its historical range. No adults were collected nor would many have been expected for the seasonal index period.

Sebasticook River

The Sebasticook River is a major historical alewife production river and is the focus of contemporary restoration efforts (Maine DMR 2003). As in the Kennebec and Androscoggin Rivers, all alewife collected by electrofishing were young-of-year. While

relative abundance was lower in the Sebasticook R. than the other rivers (maximum <20 individuals/km; Figure S-6) this was due mostly to the late collection period in early October. Sampling in the late summer would likely have produced higher numbers. Alewife y-o-y were observed at all except the three upstream-most sites, being most abundant in the lower reaches of the mainstem.

Plate 4. Adult American shad from the Kennebec R. mainstem downstream from the Lockwood Dam in Waterville.

Current Status

Alewife distribution and abundance in the three rivers has been greatly reduced from a historical standpoint. As such, this economically important species is the focus of significant restoration efforts that are focused on re-establishing access to historical spawning areas. Strategies include improving fish passage at existing dams and transporting fish around these migration barriers. Initial success of these efforts is reflected by a small commercial fishery in the lower Sebasticook R. Obviously, the status of alewife is dependent on the success of these efforts.

American Shad *(Alosa sapidissima) and* ***Blueback Herring*** *(Alosa aestivalis)*

American shad and blueback herring are the two other anadromous Clupeidae that were collected in one or more of the three rivers in 2002 and 2003. American shad were collected mostly as young-of-year and from the Kennebec River segment of mainstem immediately downstream from the Lockwood Dam in Waterville where they were the most numerous. One adult was collected in July 2003 at this same location. This species also occurred in the Androscoggin River upstream and downstream from the Brunswick Dam in lesser numbers. It was not collected in the Sebasticook River.

Blueback herring occurred primarily in the tidal influenced segment of the Kennebec River mainstem and were most numerous at the Cathance River sampling site in September 2002. This species was absent from the Androscoggin and Sebasticook River sampling sites.

Current Status

American shad are the focus of a significant restoration effort based on reintroduction of wild fish from southern New England and the presence of y-o-y fish is one result. Adult fish are observed spawning just downstream from the Sebasticook River confluence each spring. Blueback herring are passively managed and their distribution in the Kennebec mirror historic records.

Family Cyprinidae (Minnows)

In terms of number of species, this is the most diverse of all fish families represented in the study rivers. Traditionally, it is also the most overlooked being relegated to the significance of "forage species" by previous fishery focused descriptions of the river fish fauna (Foye et al. 1969). While this is indeed their predominant role in relation to other fish species, this group exhibits a diversity of environmental tolerance and indicator roles within an assemblage assessment process. It is therefore important that assemblage assessment tools appropriately include the various species of this family.

Plate 5. Lake chub collected from the upper Androscoggin River near Gorham, NH, 2003.

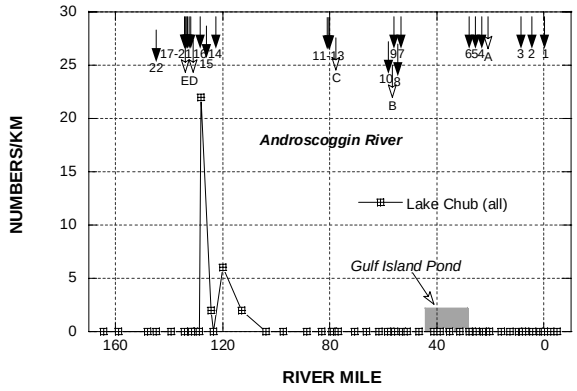

Figure S-7. Relative abundance of lake chub in the Androscoggin R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

Lake chub *(Couesius plumbeus)*

Lake chub occurred in the upper Kennebec and Androscoggin River mainstems being most numerous in the latter. Four individuals collected immediately downstream from the Wyman Dam were the extent of this species occurrence in the Kennebec River. In the upper Androscoggin it occurred between the Gorham Bypass reach and Gilead, ME (Figure S-7) where it reached a peak abundance of >20 individuals/km. The comparatively restricted distribution of this native species in either river can likely be attributed to its preference for cold water and extensive reaches of free-flowing habitat.

Plate 6. Adult common carp collected in the lower Kennebec River near the original introduction location at Richmond, 2002.

Common carp *(Cyprinus carpio)*

Common carp are an invasive alien species that were introduced into the lower Kennebec River near Richmond in 1880 (Halliwell 2005). They are classified by Halliwell (2005) as an exotic species of

intercontinental (European) origin. As such they present a significant threat as an invasive non-native species. Maine DIFW (Foye et al. 1969) considered common carp to be such a threat that removal of the Edwards Dam to benefit native species was discouraged.

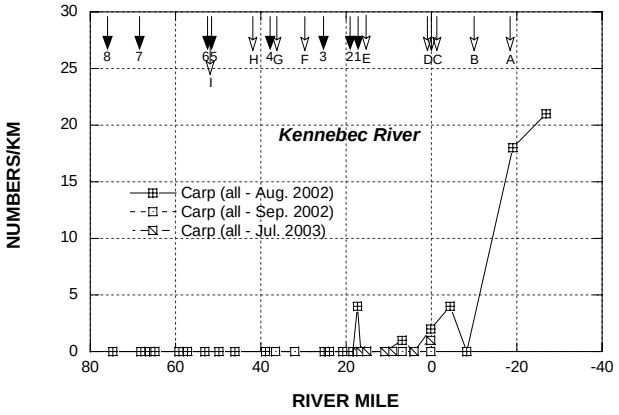

Figure S-8. Relative abundance of common carp in the Kennebec R. mainstem in 2002 and 2003. Letters and numbers denote dams and major point sources (see study area description).

Kennebec River

This species was collected only in the Kennebec River in 2002-3. It was restricted to the mainstem downstream from the Lockwood Dam in Waterville. It occurred in low numbers (<5 individuals/km) between Waterville and Richmond; it was most numerous in the tidal influenced segment below Richmond, in Merrymeeting Bay proper, and the Cathance River (Figure S-8). The habitat and water quality conditions in Merrymeeting Bay and the Cathance River were favorable to this species much moreso than the more riverine habitat and water quality conditions upstream from Augusta. Here the water was naturally more turbid, substrates were composed entirely of fine materials, and the water temperature was the warmest. These areas are also naturally more enriched and the overall conditions are favorable to the wide tolerance and feeding habitats of this species.

Current Status

While common carp have been found upstream of the former Edwards Dam site since its removal in 2001, it has not reached an abundance that would indicate that its occurrence is anything more than as a transient. Water quality and physical habitat conditions in this riverine segment are apparently limiting at present. Outside of Maine, common carp can inhabit and become numerous in moderate gradient riverine habitats provided water quality is "acceptable", i.e., which is a good indication of degraded or enriched conditions. We would suggest here that this species will not expand beyond its current strongholds in the lower Kennebec provided water quality conditions are maintained in the remainder of the mainstem. Warming temperatures and nutrient enrichment are two physical/chemical factors that need to be managed to preclude a secondary range expansion. Under the more polluted conditions of the 1960s

Plate 7. Adult common shiner collected in the upper Androscoggin River in Berlin, NH, 2003.

era this was a legitimate concern, i.e., Maine DIFW's concerns of that era (Foye et al. 1969). However, the successes of post-Clean Water Act pollution controls have been such that those concerns have not materialized since the breaching of the Edwards Dam in 2001. This is reason enough to maintain the water quality improvements achieved in the 1970s and 1980s and maintained through the 1990s.

Common shiner *(Luxilis cornutus)*

The relative abundance of the indigenous common shiner *(Luxilis cornutus)* was highest in the upper segments of the Kennebec and Androscoggin Rivers exceeding 50-100 individuals/km at several sites. It was also collected in the Sebasticook River occurring in similarly high numbers at only one site. It tended towards a preference for cooler temperatures, but was also found in the warmest waters albeit in lower numbers. It was also most numerous in riverine habitats, but it was also found in lower numbers in impounded habitats. Hartel et al. (2005) believe this species has declined in eastern and central Massachusetts presumably the result of development and pollution in the first one-half of the 20th century.

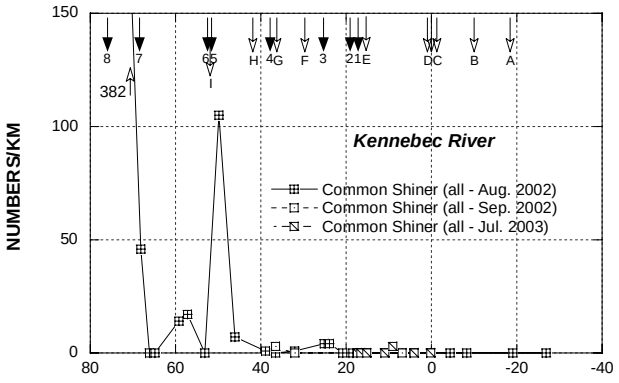

Figure S-9. Relative abundance of common shiner in the Kennebec R. mainstem in 2002 and 2003. Letters and numbers denote dams and major point sources (see study area description).

Kennebec River

The highest numbers of common shiner occurred immediately downstream from the Wyman Dam where 382 individuals/km were collected (Figure S-9). The next highest collection occurred downstream from the Abenaki Dam (>100 individuals/km). Collections were <20-50 individuals/km elsewhere in the upper reaches above Skowhegan. Common shiners were collected downstream to Augusta, but in comparatively low numbers (<5 individuals/km).

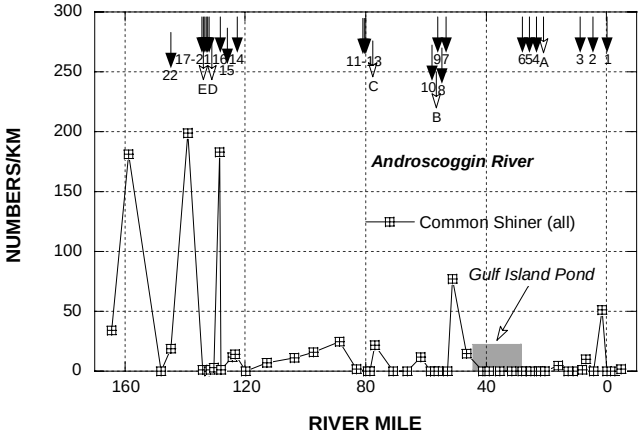

Figure S-10. Relative abundance of common shiner in the Androscoggin R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

Androscoggin River

Relative numbers were highest in the most riverine habitats exceeding 150 individuals/km at three locations upstream from Berlin, NH (Figure S-10). At all other locations except one,

relative numbers declined to <25-50 individuals/km. In the lengthy riverine reaches downstream from the Berlin-Gorham, NH area relative numbers were much reduced seldom exceeding 10-20 individuals/km, a result that extended downstream from the Rumford-Mexico area. It was absent through the Gulf Island Pond reach and downstream to Brunswick, where it occurred in low numbers.

Sebasticook River

Common shiners were collected at two of the nine sampling locations. Nearly 300 individuals/km were collected upstream from the Benton Falls dam. The sampling site includes both riverine and impounded habitats. Nine individuals were collected at a mostly riverine site downstream from Pittsfield.

Current Status

Common shiners were most numerous in the riverine habitats of the upper Kennebec and Androscoggin Rivers. They also occurred in downstream reaches, but in much lower numbers. They were present in abundance at only one Sebasticook River location. Bain and Meixler (2000) classify common shier as a fluvial dependent meaning it is dependent on riverine conditions, but can tolerate impounded habitat conditions. Halliwell et al. (1999) classified the pollution tolerance as intermediate and the thermal regime as cold to warmwater (coolwater). Our results seem to support these assignments. The reduced abundance of common shiner in the Androscoggin River downstream from the Berlin-Gorham, NH area also persisted downstream from the Rumford-Mexico area. Large paper mill discharges occur in each area and the habitat in these reaches is mostly riverine. The pattern was generally the same in the upper Kennebec R., but numbers were very high downstream from Madison which has a mill discharge. This may well be a reflection of the species intermediate tolerance being stimulated by increased enrichment, but adversely affected by impacts beyond enrichment.

Plate 8. Left: adult golden shiner from the Cathance River near Bowdoinham, 2002. Right: golden shiner (upper and lower) bracketing a rudd (center) from the Charles River, MA. (rudd courtesy K. Hartel, Museum of Comparative Zoology, Cambridge, MA).

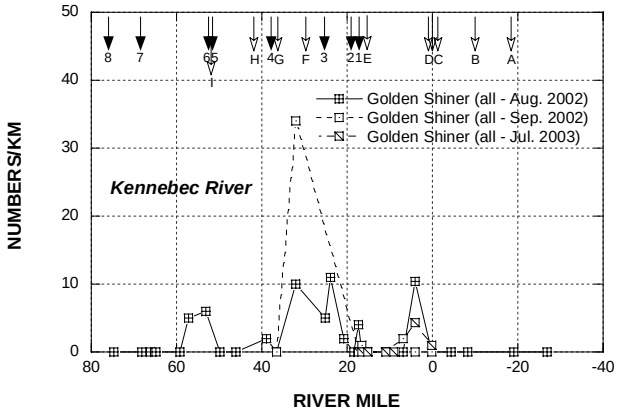

Figure S-11. Relative abundance of golden shiner in the Kennebec R. mainstem in 2002 and 2003. Letters and numbers denote dams and major point sources (see study area description).

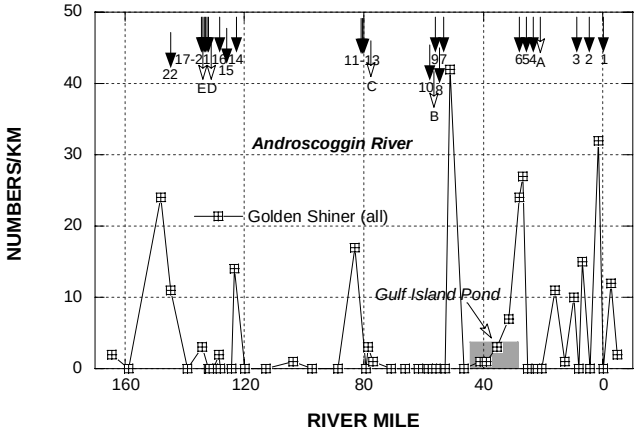

Figure S-12. Relative abundance of golden shiner in the Androscoggin R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

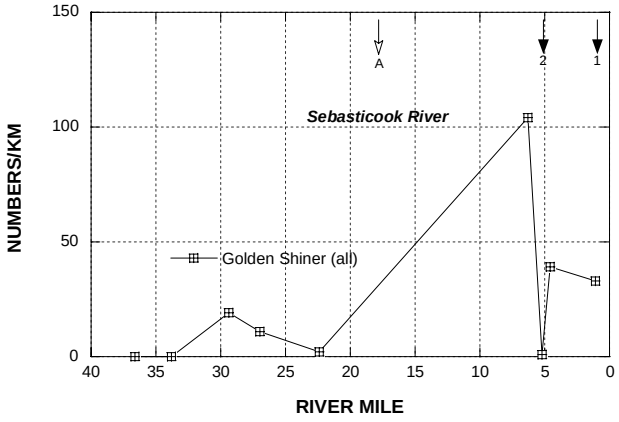

Figure S-13. Relative abundance of golden shiner in the Sebasticook R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

Golden Shiner *(Notemigonus crysoleucas) and* ***Rudd*** *(Scardinius erythrophthalmus)*

Golden shiner (Notemigonus crysoleucas) is a ubiquitous species that can occur in a wide variety of aquatic habitat and water quality conditions. It is widely recognized as being highly tolerant of pollution (Halliwell et al. 1999) and other environmental conditions. It is indigenous to the study area, but has been introduced in other areas of Maine (Halliwell 2005).

Rudd *(Scardinius erythrophthalmus)* is also included here as it is superficially similar to golden shiner with which it can hybridize. They have been collected in Cobbosseecontee Lake which is in the lower Kennebec River watershed. Confirmed specimens were not collected in any of the study rivers. However, a single specimen originally identified as a juvenile golden shiner from the Androscoggin River in the Rattlesnake Dam impoundment upstream from Lewiston was flagged as a possible rudd. However, its verification was indeterminate (Karsten Hartel, personal communication). This species is thought to be more widespread due to its sale and use as a bait species and its frequent misidentification as golden shiner (Halliwell 2005).

Kennebec River

Golden shiner was most common in the impounded habitats of the Kennebec River rarely exceeding 10 individuals/km and occurring mostly as young-of-year and juveniles (Figure S-11). This species occurred mostly between N. Anson and Augusta. It was most numerous in the Cathance River where the highest numbers and largest adults were observed

in 2002 and 2003. The warm, turbid, and slightly brackish waters are apparently ideal habitat for this and other co-occurring species such as common carp and juvenile white sucker.

Androscoggin River

Golden shiner occurred throughout the mainstem being most numerous in the impounded habitats, but this was not invariable. An exception was the highest relative numbers (>40 individuals/km) recorded downstream from Livermore Falls (Figure S-12). At this site, all of the golden shiners were collected along the shoreline opposite the tailrace from the Livermore Falls Dam where there was little or no flow. In the remainder of the mainstem, numeric abundance peaked and fell with the alternating impoundment and riverine habitats that occurred downstream from Gulf Island Pond.

Sebasticook River

Most of the golden shiners collected in the Sebasticook River occurred in the Benton Falls impoundment with lesser numbers in the Ft. Halifax impoundment (Figure S-13). A smaller concentration was also observed downstream from Pittsfield and in the Burnham impoundment.

Current Status

Golden shiner are native to the southern part of Maine and have been transplanted north largely by bait bucket introductions (Halliwell 2005). While this species can be found in a wide variety of aquatic habitats, the strongest populations exist in slow flowing, low gradient habitats where larger adults are more commonly encountered (Hartel et al. 2005). This was certainly underscored by our results in the Cathance River and in some of the run-of-river impoundments. The largest numbers were represented by young-of-year and juvenile life stages and these are also known to occur in smaller streams and riverine habitats. The species is widely used and transported as bait, hence the potential for it to be transplanted beyond its original range. Bain and Meixler (2000) classify golden shiner as a macrohabitat generalist and it is considered to be highly tolerant to general pollution (Halliwell et al. 1999).

Plate 9. Spottail shiner from the lower Kennebec River near Pittston, 2002.

Spottail Shiner *(Notropis hudsonius)*

Kircheis (1994) listed spottail shiner as probably an accidental introduction in Maine. Halliwell (2005) however, lists the status of this species as possibly native in southern Maine, thus its native status is presently undetermined. The species is native to southern New England waters and it prefers lake and large river habitats throughout its native range (Hartel et al. 2005). It was collected in large numbers at certain

locations in both the lower Kennebec and Androscoggin Rivers. No individuals were collected in the Sebasticook River.

Kennebec River

Spottail shiners were restricted to the mainstem of the Kennebec River downstream from the Lockwood Dam in Waterville. They were found at some locations in comparatively high numbers exceeding 100-250 individuals/km at several locations (Figure S-14). These tended to be the sites with more sluggish flow and turbid water conditions in the tidal influenced segment, Merrymeeting Bay, and the Cathance River. This was not invariable as some concentrations occurred at some of the higher gradient riverine sites between Waterville and Augusta.

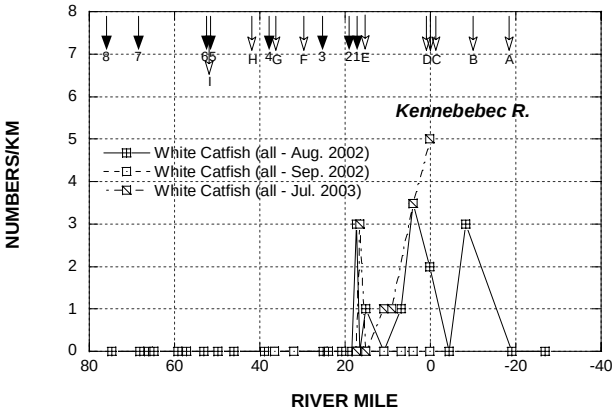

Figure S-14. Relative abundance of spottail shiner in the Kennebec R. mainstem in 2002 and 2003. Letters and numbers denote dams and major point sources (see study area description).

Androscoggin River

The widespread presence of this species in the lower Androscoggin River mainstem was apparently not known until this survey. It was found as far upstream as the Berlin-Gorham, NH and Bethel-Rumford areas, but in comparatively lesser numbers than at other sites (Figure S-15). It was consistently present in the lower one-half of the mainstem between the Jay-Livermore Falls area and the tidal segment where the highest numbers were observed. Relative numbers exceeded 200-400 individuals/km and at one impounded site downstream from Jay more than 1600 individuals/km were collected, consisting mostly of young-of-year and juvenile life stages. Water quality conditions were highly enriched with heavy growths of blue green and green algae and a substrate predominated by silt and sand. A large number (766 individuals/km) of adults were also collected in the lower Sabattus River in Lisbon Falls, which offered impounded habitat with profuse growths of submergent aquatic vegetation and a detritus laden substrate.

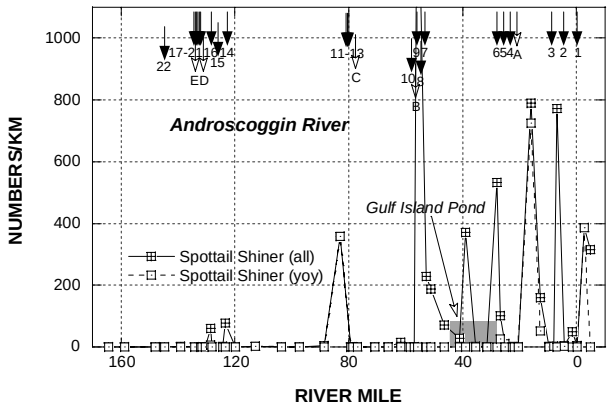

Figure S-15. Relative abundance of spottail shiner (all and y-o-y) in the Androscoggin R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

Current Status

Spottail shiner is represented by reproducing populations in the lower Kennebec River between Waterville and Merrymeeting Bay and in much of the

Androscoggin River with the strongest populations in the lower one-half of the mainstem. It is not present in the Sebasticook River. The highest numbers occurred in low gradient, sluggish flowing habitats characteristic of the tidal influenced reaches of the Kennebec River downstream from Augusta and in the Androscoggin River downstream from Brunswick, Merrymeeting Bay, the Cathance River, and impounded or low gradient riverine habitats located upstream. While the status of this species in terms of its natural occurrence in Maine waters is undetermined (Halliwell 2005), its present spatial distribution with respect to Merrymeeting Bay raises an interesting hypothesis. In the Kennebec River it seems to have emanated from Merrymeeting Bay given its restriction to the connected segment between the bay and the lower mainstem to Waterville. It apparently has not been able to move past the Lockwood Dam and its absence from what would appear to be favorable habitat conditions in the Sebasticook River seem to support this theory. Its presence in most of the Androscoggin River, however, suggests other avenues of origin including natural occurrence and possible introduction via the bait bucket. Either way it is now firmly a part of the fish assemblage in both rivers.

Plate 10. Eastern Blacknose dace (upper) and longnose dace (lower) from the upper Androscoggin R. near Errol, NH, 2003.

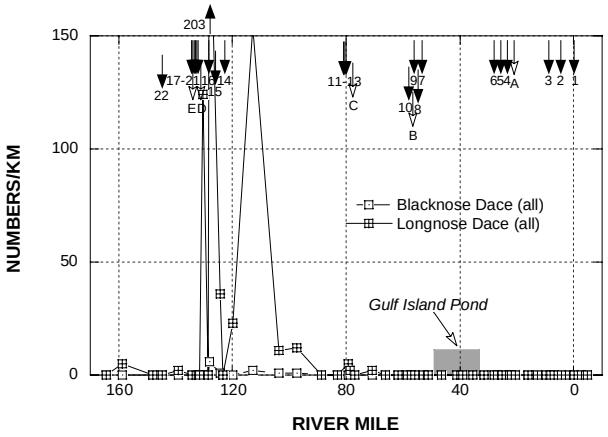

Figure S-16. Relative abundance of longnose dace and Eastern Blacknose dace in the Androscoggin R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

Bain and Meixler (2000) classify the spottail shiner as a macrohabitat generalist and Halliwell et al. (1999) considered it to be intermediate in tolerance to general pollution while Ohio EPA (1987) classified it as moderately tolerant. The latter assignment seems to be supported by the observations of our study.

Longnose Dace *(Rhinichthys cataractae)* and **Eastern Blacknose Dace** *(Rhinichthys atratulus)*

These closely related indigenous species are characteristically found in free-flowing riverine and stream habitats. As such these species are wholly dependent on the natural fluvial characteristics of lotic habitats. Eastern blacknose dace were collected in the Kennebec and Androscoggin Rivers, whereas longnose dace were found only in the Androscoggin River. Neither species was collected from the Sebasticook River study area. Both species were restricted to the upper and colder reaches of the Kennebec and Androscoggin Rivers where maximum measured summer

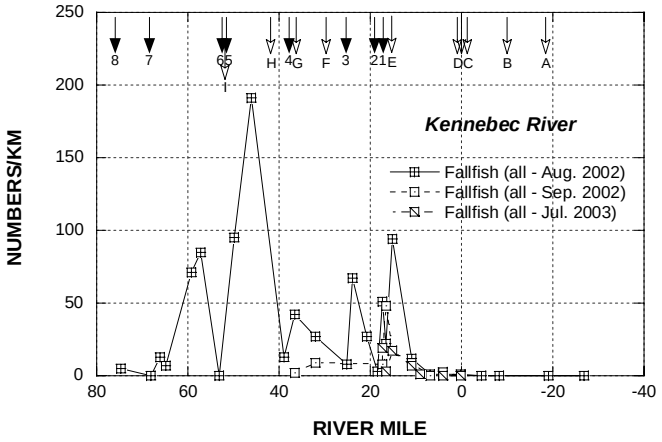

Figure S-17. Relative abundance of fallfish in the Kennebec R. mainstem in 2002 and 2003. Letters and numbers denote dams and major point sources (see study area description).

temperatures were <22-23°C. Both species were virtually absent from the lower reaches with warmer summer temperatures and the more frequent occurrence of impoundments. Longnose dace were numerically predominant over Eastern Blacknose dace in the Androscoggin River reaching maximum relative abundance of more than 150-200 individuals/km (Figure S-16). The absence of longnose dace from the upper Kennebec River was notable as the riverine habitat is not markedly different than where it occurred in the upper Androscoggin River, except for a greater prevalence of impoundments in the upper Kennebec. Eastern Blacknose dace occurred in lower numbers and at only 5 sites with relative abundances <5 individuals/km; an exception was a single site in the upper Kennebec River that yielded 25 individuals/km. The absence of both species in the Sebasticook River was presumably due to lower gradient, more extensive impoundment, and warmer temperatures.

Current Status

Both species are classified as fluvial specialists by Bain and Meixler (2000). Blacknose dace is classified as highly tolerant by Halliwell et al. (19990 and others while longnose dace are intermediate. Prior to 2004, eastern and western blacknose dace were considered subspecies. Now they are considered to be separate species (Nelson et al. 2004). Much of the knowledge used to designate the pollution tolerance of blacknose dace seems to be based on the western subspecies, thus some reconsideration of the highly tolerant designation for the eastern blacknose dace may need to be reevaluated.

Plate 11. Left panel: juvenile creek chub (upper), fallfish (middle), and common shiner (lower) from the upper Kennebec River near Solon, 2002. Right panel: adult fallfish from the Androscoggin R. near Berlin, NH immediately downstream from a pulp mill discharge, 2003.

Creek chub *(Semotilus atromaculatus) and* ***Fallfish*** *(Semotilus corporalis)*
These two superficially similar species have different distributions in the study rivers, one uncommon and the other common. Creek chub occurred only sporadically in the Kennebec (12 individuals) and Androscoggin (4 individuals) Rivers and none were collected in the Sebasticook River. Fallfish were more common occurring in all three rivers.

Kennebec River
Fallfish occurred at most sites in the Kennebec River, but were most numerous between Solon and Waterville occurring mostly as young-of-year and juveniles (Figure S-17). Peak abundance (>50-100 individuals/km) occurred in the upper mainstem between Solon and Skowhegan. Similar numbers occurred upstream and downstream from Waterville. It was found in both riverine and impounded habitats, with young-of-year being more prevalent in the latter. They were sporadic in their occurrence in the tidal influenced reaches.

Androscoggin River
Fallfish were also widespread in their distribution throughout the Androscoggin mainstem (Figure S-18). Peak abundances of >200 individuals/km were attributable to a high proportion of young-of-year in the sample. This seemed to occur irrespective of riverine or impounded habitat conditions. Very few fallfish occurred at sites in Gulf Island Pond, but they did occur in other smaller impoundments. Proximity to pollution discharges did not seem to be a determinant. However, the largest adults collected occurred in the Cascade pulp mill effluent downstream from Berlin, NH.

Sebasticook River
Fallfish were collected in numbers at only two sites in the Sebasticook River the greatest number (150 individuals/km) occurring in the Benton Falls impoundment.

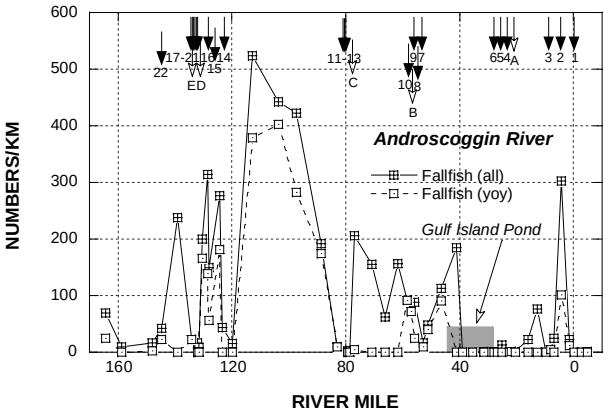

Figure S-18. Relative abundance of fallfish (all life stages and young-of-year) in the Androscoggin R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

Current Status
Bain and Meixler (2005) classify fallfish as a fluvial specialist and Halliwell et al. (2005) consider them to be intermediate in their tolerance to general pollution. We found fallfish to occur in both natural riverine and impounded habitats and to exhibit a wide range of tolerance to all forms of stress, including water quality. Young-of-year and juvenile life stages comprised their numbers in modified habitats while largest adults occurred in areas of poor water quality.

Family Catostomidae (Suckers)

Two species of suckers presently are known to occur in Maine, white sucker *(Catostomus commersonii)* and longnose sucker *(Catostomus catostomus).* The former is more widely distributed and was numerous in many places where it was collected while the latter occurred in a only a few places represented by a few or single individuals.

Longnose sucker *(Catostomus catostomus)*

A total of 10 individuals were collected in the upper Androscoggin River downstream from the Cascade Dam in Berlin, NH to Gilead. It was not numerically abundant at any one site, but the presence of juveniles and young-of-year is evidence of reproduction in this part of the drainage. This species was not found in the Kennebec or Sebasticook Rivers in 2002 or 2003. Its presence in the unimpounded reaches of the upper Androscoggin mainstem is consistent with a preference for cold water and riverine flow conditions (Hartel et al. 2005). The rarity of this species in seemingly suitable habitat in the upper Kennebec may well be a natural phenomenon or possibly the result of the modification of the upper mainstem by several impoundments. Halliwell et al. (1999) considers longnose sucker to be intolerant of general pollution. Bain and Meixler (2000) did not include this species in their classification scheme, but it would seem to fit a fluvial specialist or fluvial dependent at least.

Plate 12. Adult longnose sucker from the Androscoggin R. below Berlin, NH, 2003.

Common white sucker *(Catostomus commersonii)*

White sucker was one of the most commonly observed and numerous species in our study. It is indigenous to Maine streams, rivers, and lakes. It occurred at most every sampling site

Plate 13. Left panel: adult white sucker from the upper Kennebec River near Solon, 2002. Right panel: juvenile white sucker with a heavily eroded caudal fin from Merrymeeting Bay near Bowdoinham, 2002.

and in all reaches and habitat types. Despite their widespread occurrence, there were some interesting patterns in distribution and abundance. Adult white suckers (defined here as individuals >500 g) were found in greater numbers in the swift flowing waters of the deeper runs and chutes in the higher gradient riverine habitats. In contrast, adults were virtually absent in habitats with slow or no current such as low gradient and impounded sites. In these locations, juveniles and young-of-year were more commonly found. These life stages also occurred in the more riverine habitats.

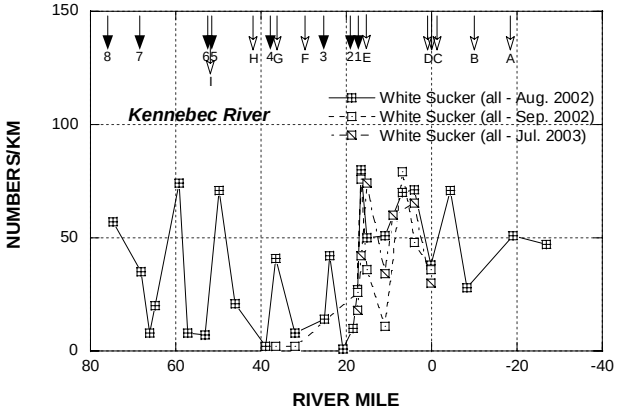

Figure S-19. Relative abundance of white sucker in the Kennebec R. mainstem in 2002 and 2003. Letters and numbers denote dams and major point sources (see study area description).

Kennebec River

White sucker was common throughout the Kennebec River mainstem and occurred in all habitat types and river reaches. Numeric abundance exceeded 50 individuals/km at two sites in the upper mainstem and at many sites downstream from Waterville (Figure S-19). The lowest numbers occurred in impounded habitats and were represented almost exclusively by young-of-year. While it was a prominent part of the fish assemblage in the riverine reaches and habitats, it was also common in the tidal freshwater of the lower mainstem, Merrymeeting Bay, and the Cathance River, juveniles being exclusively represented in the latter.

Androscoggin River

White suckers occurred throughout the Androscoggin River mainstem with numbers fluctuating between riverine and impounded habitats. Maximum numeric density was greater than in the Kennebec exceeding 50-100 individuals/km at some locations, but this was due mostly to large numbers of young-of-year (Fig. S-20). As in the Kennebec, numeric abundance of adults was higher in riverine habitats with juveniles and young-of-year being more numerous in relation to adults in impounded habitats.

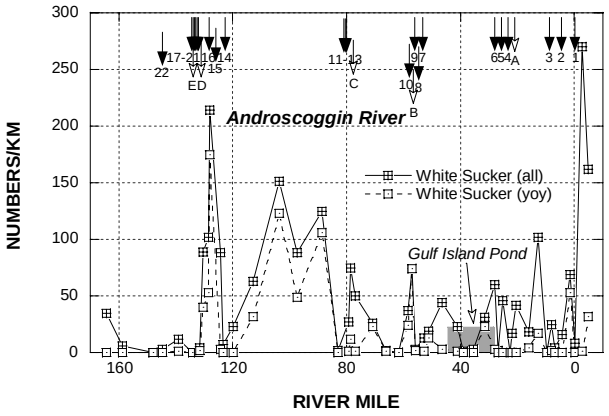

Figure S-20. Relative abundance of white sucker (all life stages and young-of-year) in the Androscoggin R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

Sebasticook River

White suckers occurred at all except one site in the Sebasticook River mainstem being most numerous (50 individuals/km) in the upper Ft. Halifax impoundment. Numeric

abundance ranged from 5-20 individuals/km which was less than in either the Kennebec or Androscoggin Rivers.

Current Status

This is one of the few species that could be expected to occur at every site in the three study rivers and in other large rivers throughout Maine. It is widely considered to be highly tolerant of general pollution (Halliwell et al. 1999), but it is considered to be fluvial dependent (Bain and Meixler 2000). White suckers occurred in a wide range of conditions from cold to warm temperatures, riverine to low gradient to impounded habitats, and clear to turbid water clarity in the three rivers. The largest concentrations of large fish (adults) showed a marked preference for riverine sites with deep run and chute habitat, whereas juveniles and young-of-year occurred in all habitats. Life stage strata will likely be a consideration in the role of this species in an eventual assemblage assessment tool.

Plate 14. Upper left: brown bullhead from the Kennebec River at Waterville. Upper Right: brown bullhead showing dark pigmented barbells. Lower Left: white catfish from the Kennebec River at Waterville. Lower Right: white catfish showing white pigmented barbells.

Family Ictaluridae (Catfishes)

Catfishes are represented in Maine by one indigenous (brown bullhead) and one introduced (white catfish) species. Brown bullhead *(Ameirus nebulosus)* is widely distributed

throughout Maine occurring in a variety of aquatic habitats. White catfish *(Ameirus catus)* were observed in Maine in the early 1980s, primarily in the lower Kennebec River. Channel catfish *(Ictalurus punctatus)* are a third species that were found in a private pond, but were successfully removed and have not been found since (Halliwell 2005).

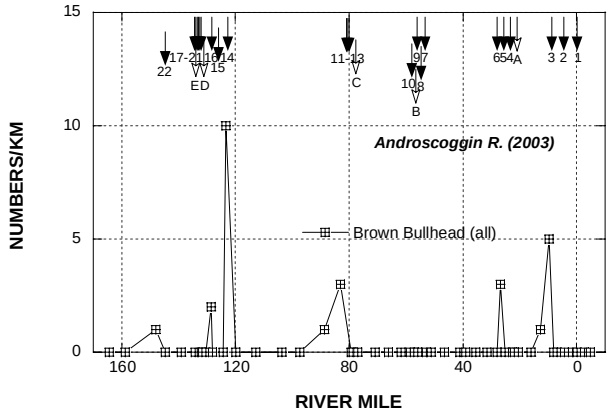

Figure S-21. Relative abundance of brown bullhead in the Androscoggin R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

Brown bullhead *(Ameirus nebulosus)*
Brown bullhead occurred in the Androscoggin and Sebasticook Rivers (Figures S-21 and S-22). Their distribution was spotty and seemed to occur near concentrations of impoundments and point source discharges of organic wastewater. In the Androscoggin River brown bullhead abundance was highest downstream from Berlin, NH, Rumford, Livermore Falls, and Lisbon Falls. In the Sebasticook River, relative abundance was highest in Douglas Pond. No brown bullheads were collected from the Kennebec River in 2002, but a single individual was collected at Waterville in 2003.

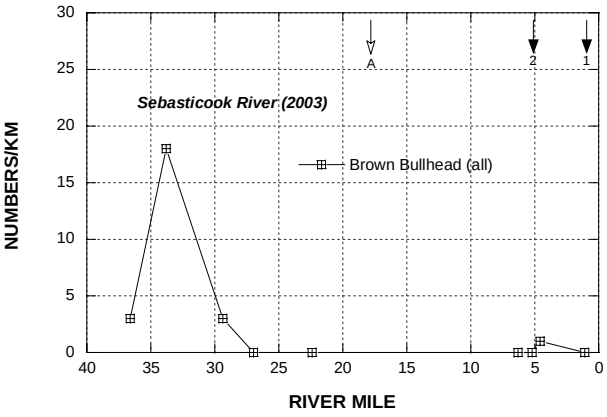

Figure S-22. Relative abundance of brown bullhead in the Sebasticook R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

White catfish *(Ameirus catus)*
White catfish occurred only in the Kennebec River in 2002 and 2003 being most prevalent in the lower mainstem including the tidal reach, Merrymeeting Bay, and the Cathance River (Figure S-23), the latter of which appears to be ideal habitat for this species. It was here that the largest individuals were collected. Five fish in one sample near Bowdoinham in 2003 averaged nearly 700 grams compared to averages of 100-350 grams in the Kennebec R. mainstem. The occurrence of all size classes (adults, juveniles, and young-of-year) was evidence of successful reproduction. This species typically occurs in tidal reaches and brackish water throughout its native range. The origin of this potentially invasive species in Maine is thought to emanate from an original introduction into Merrymeeting Bay and its tributaries where it has become well established (Halliwell 2005). The distribution in the Kennebec is limited to the segments downstream from the Lockwood Dam in Waterville which further suggests its origin in the lower mainstem. We also suspect that this species has been mistakenly identified in the

Kennebec River by fishermen as brown bullhead given the virtual absence of this species in historical accounts and in our database in the lower mainstem.

Current Status

Brown bullhead is an indigenous species that occurred where they were expected with the possible exception of their virtual absence in the Kennebec River. This species is a macrohabitat generalist (Bain and Meixler 2000) and is widely recognized as being highly tolerant to general pollution (Halliwell et al. 1999). White catfish are represented by a reproducing population in the Kennebec River downstream from Waterville to Merrymeeting Bay and its tributaries. Adults, juveniles, and young-of-year were observed throughout the lower mainstem, Merrymeeting Bay, and the Cathance River, the latter offering seemingly ideal habitat for this species. It was not present in the Androscoggin River and it is currently precluded from entering the Sebasticook River by the Ft. Halifax dam. While it was not classified by Bain and Meixler (2000) it would seem to meet the criteria for a macrohabitat generalist. Halliwell et al. (1999) considered it to be intermediate in its tolerance to general pollution, unlike the tolerant status of the other members of the genus *Ameirus*.

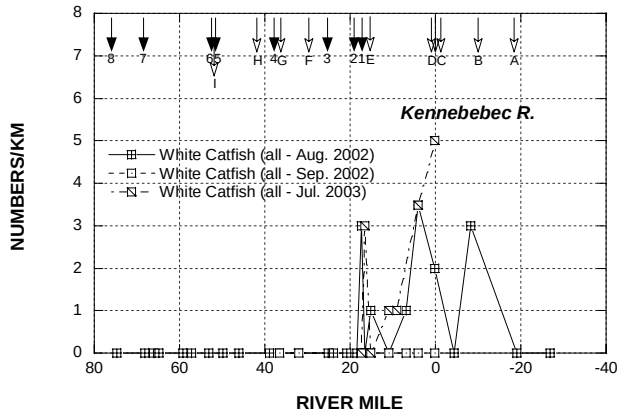

Figure S-23. Relative abundance of white catfish in the Kennebec R. mainstem in 2002-3. Letters and numbers denote dams and major point sources (see study area description).

Plate 15. Northern pike representing two year classes from the Sabattus River in Lisbon, 2003.

Family Esocidae (Pike and Pickerel)

Two esocid species are presently indigenous to Maine waters, chain pickerel and redfin pickerel. Chain pickerel *(Esox niger)* are indigenous to southern Maine and have a marked preference for slow flow or lentic conditions. Redfin pickerel *(Esox americanus)* are known from only one locality in a tributary to the lower Kennebec and are believed to be endemic to Maine (Kircheis 1994). A third esocid, northern pike *(Esox lucius)*

is an intracontinental introduced species (Halliwell 2005). A fourth esocid, muskellunge, now occurs in northern Maine and was not observed in our study area.

Northern pike *(Esox lucius)*

This species is believed to have been introduced to Maine waters as early as 1969 (Halliwell 2005). It has a naturally sustaining population in the Belgrade Lakes the result of an introduction in 1981. It is now reported from 28 waterbodies in the Kennebec, Androscoggin, and coastal drainages (Halliwell 2005). In our 2002 and 2003 surveys, 4 northern pike were collected in the Sabattus River at the mouth in Lisbon and 1 juvenile was collected in the Pejepscot impoundment nearby. The mouth of the Sabattus River offered nearly ideal habitat consisting of lentic conditions and profuse growths of submergent aquatic vegetation. Abundant forage was present in the form of spottail shiner and golden shiner. Evidence of reproduction came in the form of juveniles and adults of at least 3 different year classes. This population is apparently from an illegal introduction or egress from the population in Sabattus Lake near Lewiston.

Plate 16. Chain pickerel from the upper Androscoggin River near Jay, 2003.

Current Status

The potential for this species to spread is uncertain, but the impounded and low gradient conditions in the lower Androscoggin seem to offer favorable habitat. Its piscivorous feeding habits and large size make it a potential threat to native species and efforts are underway to eradicate it from most waters in Maine. Its habits and habitat would classify it as a macrohabitat generalist. Halliwell et al. (1999) considered it to be intolerant to general pollution.

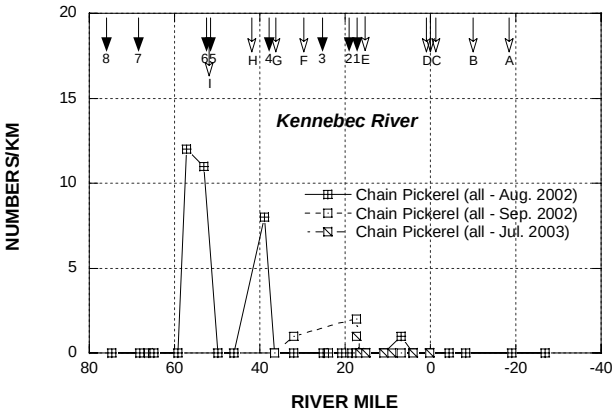

Figure S-24. Relative abundance of chain pickerel in the Kennebec R. mainstem in 2002-3. Letters and numbers denote dams and major point sources (see study area description).

Chain pickerel *(Esox niger)*

Chain pickerel are indigenous to southern Maine and have been introduced to many waters outside of their original range (Halliwell 2005). This species has a decided preference for warmer, slow flowing or lentic habitats that include submergent aquatic vegetation. It occurred in good numbers in all three rivers in 2002 and 2003, mostly as small adults and juveniles.

Kennebec River

Chain pickerel were collected in their highest numbers at three locations, two sites in the Madison impoundment and one site in the Shawmut impoundment (Figure S-24). Relative abundance was 8-12 individuals/km at these locations. Numbers were much lower (1-2 individuals/km) at the remaining and predominantly riverine sites where it occurred upstream and downstream from Waterville to Sidney. It did not occur in the tidal influenced reaches of the lower mainstem or Merrymeeting Bay.

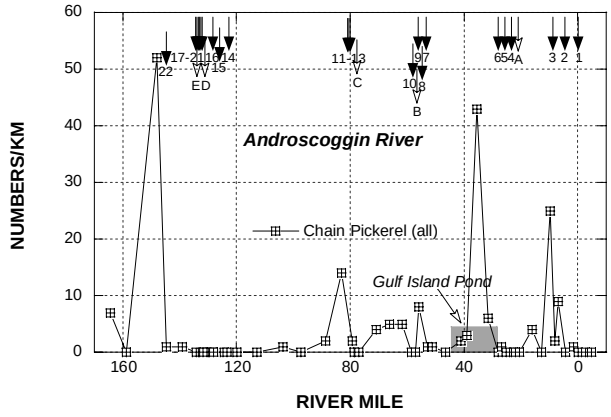

Figure S-25. Relative abundance of chain pickerel in the Androscoggin R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

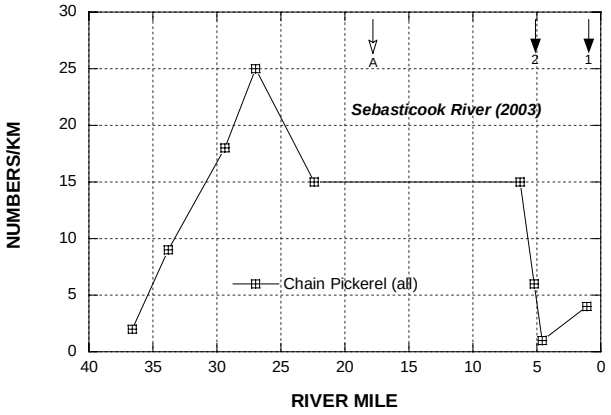

Figure S-26. Relative abundance of chain pickerel in the Sebasticook R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

Androscoggin River

Concentrations of chain pickerel were observed in excess of 10 individuals/km at five locations, the Pontook impoundment upstream from Berlin, NH, the impoundment formed by the upper falls in Rumford, a single site in Gulf Island Pond, the Worumbo impoundment, and the mouth of the Sabattus River in Lisbon (Figure S-25). The highest number occurred in the Pontook impoundment which provided ideal habitat for this species. Here the impoundment includes extensive wetlands that border the open water with abundant submergent aquatic vegetation and other cover. Elsewhere it occurred in lower numbers, but almost always in slow flowing, low gradient riverine sites or impoundments.

Sebasticook River

Chain pickerel occurred at every Sebasticook River sampling site in 2003. The highest numbers occurred in the Burnham impoundment (Figure S-26). Their consistent distribution and abundance is a reflection of the low gradient riverine and impounded habitats of this river.

Current Status

Chain pickerel are a common, but habitat specific occurrence in our study rivers. This species exhibited an expected pattern of being most common in low gradient, slow flowing riverine or impounded habitat conditions. It is a well established part of the fish assemblage of such habitats. It was virtually absent in higher gradient riverine and cold water riverine sites of the Kennebec and Androscoggin rivers. As such it is recognized as a

macrohabitat generalist (Bain And Meixler 2000). It is considered to be intermediate in tolerance of general pollution (Halliwell et al. 1999).

Plate 17. Upper left: brown trout from the Kennebec River near Solon. Upper Right: landlocked Atlantic salmon from the upper Kennebec R. near Solon. Lower Left: rainbow trout from the upper Androscoggin River in Berlin. Lower Right: brook trout from the Allagash R. at Churchill Dam (only one individual was collected from the Androscoggin R.).

Family Salmonidae (Trout and Salmon)

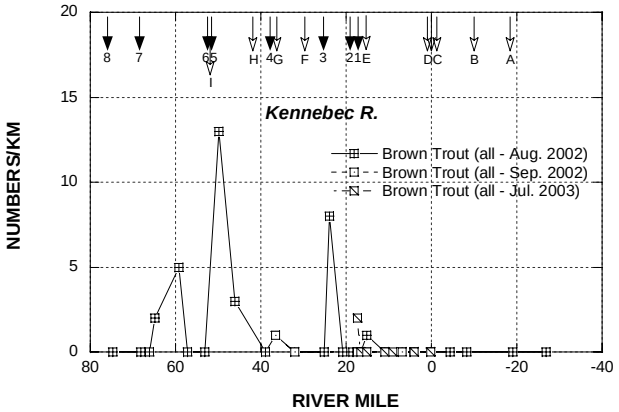

Figure S-27. Relative abundance of brown trout in the Kennebec R. mainstem in 2002-3. Letters and numbers denote dams and major point sources (see study area description).

Four species of Salmonidae were encountered in two of the three rivers during 2002-3 (none were collected in the Sebasticook R.). These include brown trout *(Salmo trutta)*, rainbow trout *(Oncorhynchus mykiss)*, brook trout *(Salvelinus fontinalis)*, and Atlantic salmon *(Salmo salar)*. Atlantic salmon was further delineated to subspecies by including landlocked salmon *(Salmo salar sebago)* in the database. Of these species and subspecies, two are indigenous, two are intercontinental

introduced managed, and one is an interstate introduced managed (Halliwell 2005). Four were collected from both the Kennebec and Androscoggin Rivers with Atlantic salmon being restricted to the Kennebec River.

Brown Trout *(Salmo trutta)*

Brown trout are an introduced species that is managed for recreational purposes in selected Maine streams and rivers. Halliwell (2005) classified it as an exotic of intercontinental origin being first introduced in the late 1800s. It occurred in somewhat higher numbers in the Kennebec R. compared to the Androscoggin R. (Figs. S-27 and S-28) and in the upper reaches of both rivers where water temperatures reflected colder conditions. Brown trout can tolerate warmer temperatures than most Salmonids, but it occurred only very sporadically in the lower reaches of the Kennebec where it is presently stocked. Among the few individuals that were collected in the lower mainstem, all exhibited symptoms of poor health being emaciated and/or having eroded fins. A single, partly digested specimen was retrieved from the same live well in which adult striped bass collected below the Lockwood Dam in Waterville were held and was presumably regurgitated by one of those fish. Evidence of natural reproduction was found in the upper reaches both rivers with the occurrence of y-o-y and juvenile life stages, but comprises less than one-fourth of brown trout in the upper Kennebec (D. Boucher, Maine IF&W, pers. comm.).

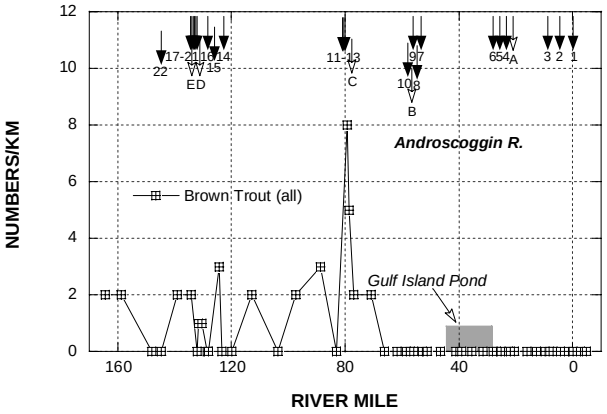

Figure S-28. Relative abundance of brown trout in the Androscoggin R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

Atlantic salmon *(Salmo salar)*

Atlantic salmon are an indigenous salmonid that was rarely encountered in our sampling in the Kennebec River and not at all in the Androscoggin or Sebasticook Rivers. In the Kennebec, two adults were recorded in 2002 at the mouth of Mesalonskee Stream in Waterville and a parr was collected on the Waterville side of the mainstem downstream from the Sebasticook River. Unlike some other Maine salmon rivers, the number of adults that enter the Kennebec are not quantitatively determined. However, evidence of reproductive success is monitored in selected tributaries

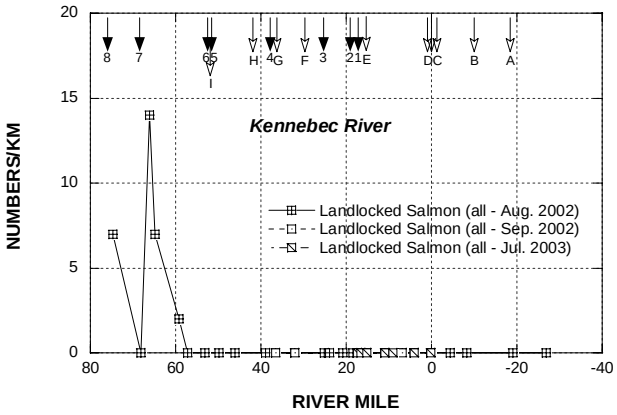

Figure S-29. Relative abundance of landlocked Atlantic salmon in the Kennebec R. mainstem in 2002-3. Letters and numbers denote dams and major point sources (see study area description).

including Bond Brook in Augusta and Mesalonskee Stream in Waterville. Adults entering the Androscoggin are counted at the Brunswick Dam fish passage facility.

Landlocked Atlantic salmon *(Salmo salar sebago)*

Landlocked Atlantic salmon is a subspecies that occurred naturally in four different fresh water bodies in Maine. Since their initial discovery it has been widely introduced and managed for recreational purposes in many Maine lakes and river systems (Halliwell 2005). It was collected in both the Kennebec and Androscoggin Rivers being restricted mostly to the cold water segments. It was most numerous in the upper Kennebec being restricted to the upper most segment between N. Anson and the Wyman Dam (Fig. S-29). Adults, juveniles, and young-of-year were each represented. The latter is evidence of natural reproduction, which comprises most of the fish in the upper Kennebec (D. Boucher, Maine IF&W, pers. comm..). Only four landlocked salmon were collected in the upper Androscoggin, 3 near Errol, NH and one immediately downstream from Berlin, NH.

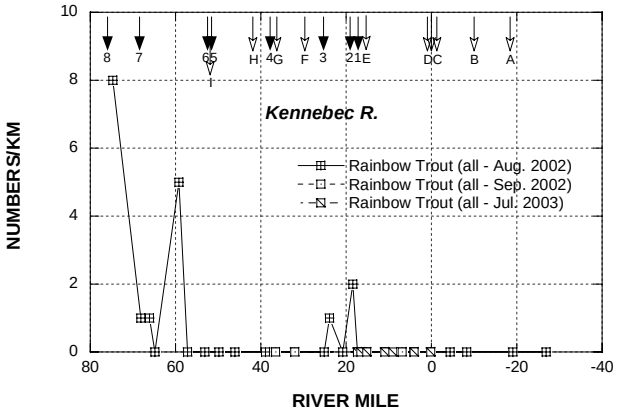

Figure S-30. Relative abundance of rainbow trout in the Kennebec R. mainstem in 2002-3. Letters and numbers denote dams and major point sources (see study area description).

Rainbow Trout *(Oncorhynchus mykiss)*

Rainbow trout are an introduced species of intercontinental origin that is managed for recreational purposes in selected Maine rivers. It occurred in the upper segments of the Kennebec and Androscoggin Rivers and was most numerous in the coldest segments (Figs. S-30 and S-31). Most of the fish are from natural reproduction (D. Boucher, Maine IF&W, pers. comm..). Lower numbers were observed in warmer mid-river segments and these are mostly the result of put-and-take stocking. The largest fish were also collected in the coldest waters in each river. In the Kennebec River this occurred between N. Anson and the Wyman Dam (Fig. S-30). The highest numbers were found immediately downstream from the Wyman Dam and downstream from Solon. In the Androscoggin River it occurred between Errol, NH and the Riley Dam impoundment with the highest numbers observed in Gorham, NH and downstream from Bethel (Fig. S-31).

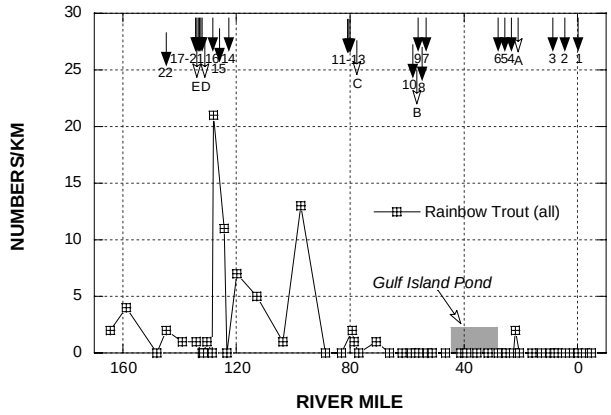

Figure S-31. Relative abundance of rainbow trout in the Androscoggin R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

Brook trout *(Salvelinus fontinalis)*

Brook trout are an indigenous salmonid that was much more widely distributed in Maine rivers and streams than at present. A single brook trout was collected in the Androscoggin River in Berlin in 2003; none were collected at any other sampling location. It presently is not a principal component of the summer-fall fish assemblage in any of the study rivers. It occurs in the upper Androscoggin mainstem during the cooler months of the year, but water temperatures are apparently too warm for this species to frequent the mainstem of either river during the summer months.

Plate 18. Burbot from the upper Kennebec River near Solon, 2002.

Current Status

Most of the salmonid populations in our study area existed as originally introduced, but in some areas are now self-sustaining. This would include brown trout and landlocked salmon in the upper Kennebec River and rainbow trout in the upper Androscoggin River. Atlantic salmon were naturally self-sustaining before their access to spawning areas was precluded by dams in both the Kennebec and Androscoggin Rivers. Restoring their historic access to upriver spawning areas is a major management goal in the Kennebec River (NMFS/USFWS 2005). With the exception Atlantic salmon, all Salmonidae would be considered fluvial specialists or at least fluvial dependents. Bain and Meixler (2000) classified brook trout as a fluvial specialist. Halliwell et al. (1999) classifies all salmonids as being intolerant of general pollution. At this time, temperature and habitat are the most limiting factors to the distribution and abundance of these species in the Kennebec and Androscoggin River mainstems.

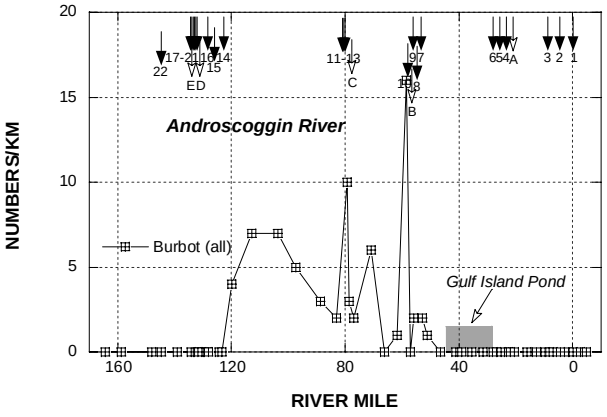

Figure S-32. Relative abundance of burbot in the Androscoggin R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

Family Gadidae (Cods)

Burbot *(Lota lota)*

The single freshwater member of the cod family is the burbot, which is indigenous to Maine waters. They are typically found in cold deepwater lakes and large rivers (Hartel et al. 2002). Our study collected burbot in the Kennebec and Androscoggin Rivers.

Kennebec River

The occurrence of burbot in the Kennebec River was restricted to 10 individuals collected at two adjacent sites downstream from the Williams Dam in Solon. Both had high gradient riverine habitat with one site being modified by channelization. A single individual was collected much further downstream immediately below the Lockwood dam in Waterville.

Androscoggin River

Burbot were more numerous and widely distributed in the Androscoggin River mainstem. They were collected at nearly every site between Shelburne, NH and Turner Falls (Figure S-32). Relative abundance was highest immediately downstream from the Sawmill Dam near Jay. They seemed to occur mostly around large substrates such as large boulders and slabs in the slower current in pools between swifter flowing run and chute habitat.

Plate 19. Adult male banded killifish (left) and mummichog (right) collected in Merrymeeting Bay, 2002.

Current Status

Burbot are an indigenous species that seems to prefer colder temperatures and this was consistent with the observations in the Kennebec and Androscoggin Rivers. They were not classified by Bain and Meixler (2000), but we would propose it as a fluvial dependent. Halliwell et al. (1999) classified this species as being intermediate in tolerance to general pollution.

Family Fundulidae (Topminnows)

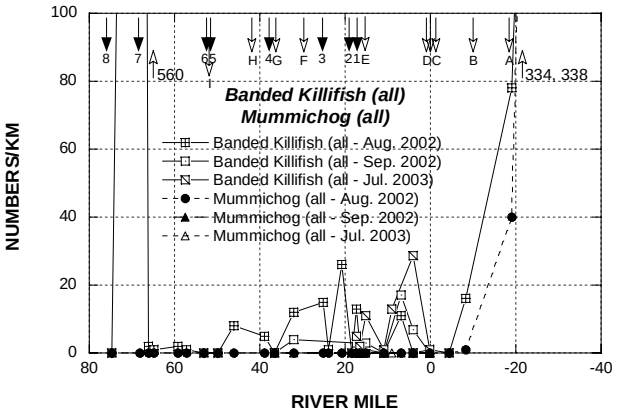

Figure S-33. Relative abundance of banded killifish and mummichog the Kennebec R. mainstem in 2002-3. Letters and numbers denote dams and major point sources (see study area description).

Banded Killifish *(Fundulus diaphanus) and* ***Mummichog*** *(Fundulus heteroclitus)*

Two species of topminnows were collected in our study, banded killifish *(Fundulus diaphanus)* occurring in both the Kennebec and Androscoggin Rivers and mummichog *(Fundulus heteroclitus)* occurring in the Kennebec River. Banded killifish are typically found in a variety of freshwater habitats and they can tolerate low salinity. Mummichog are typically a saltwater species, but can occur in fresh to slightly brackish waters. Both tend to occur in schools and inhabit shallow areas along the shoreline and among submergent aquatic vegetation.

Kennebec River
Banded killifish and mummichog were the most commonly collected in the Kennebec River in 2002. Banded killifish were more widely distributed in the mainstem and also occurred in the tidal reaches of the lower mainstem, Merrymeeting Bay, and the Cathance River. Mummichog was restricted to Merrymeeting Bay where it was as numerous as banded killifish (Figure S-9). Each species inhabited shallow areas along the shoreline being most numerous in the shallow shoreline habitats of Merrymeeting Bay (>300/km). An exception to this was the highest number of banded killifish (560/km) collected in the Williams Dam impoundment which was the highest number collected at any single site in the study area. All of the fish were collected during elevated water levels resulting from night releases at the Wyman Dam located upstream, which resulted in ideal shallow water habitat along the shoreline for this species. Relative numbers of banded killifish were much lower (5-40/km) in the remaining free-flowing, freshwater portion reaches of the mainstem.

Androscoggin River
Only 26 banded killifish were collected in Androscoggin R. in 2003 with 20 occurring downstream from the Brunswick Dam in the tidal reach; no mummichogs were collected. Neither species occurred in the Sebasticook River study area in 2003.

Current Status
Banded killifish are an expected component of a large river fish assemblage and are classified as a macrohabitat generalist by Bain and Meixler (2000). Mummichogs are considered here to be restricted to tidal influenced habitats. Halliwell et al. (1999) considered both to be tolerant to general pollution.

Family Atherinopsidae (Silversides)

A single inland silversides *(Menidia beryllina)* was collected in Merrymeeting Bay at Chopps Point. This species is typically found in the brackish waters of tidal creeks and embayments and can tolerate freshwater (Hartel et al. 2002). It is considered here as a rarely occurring or transient species.

Family Gasterostedidae (Sticklebacks)

Three species of stickleback were collected in the study area in 2002 and 2003. Threespine stickleback *(Gasterosteus aculeatus)* occurred at a single location in the upper Kennebec River. Six individuals collected at a riverine site between Solon and N. Anson is the only occurrence of this species in the study. A single ninespine stickleback *(Pungitius pungitius)* was collected in the Cathance River near Bowdoinham in 2002. This was the sole occurrence of this species in the study. Fourspine stickleback (Apeltes quadracus) was collected from two locations. One occurred in the tidal influenced reach of the lower Androscoggin River at Freyer Island in 2002 and the other in the lower Kennebec River at Sidney in 2002. Sticklebacks appear to be rarely occurring transients in the study area.

Threespine and ninespine sticklebacks are known to occur in both freshwater and brackish water habitats and both are much more common in the coastal salt marshes and tidal creeks of Maine. Fourspine sticklebacks are more common to such brackish waters but they can also be found in tidal freshwaters. All three are considered transients or rarely occurring.

Family Cottidae (Sculpins)

Slimy sculpin *(Cottus cognatus)*

One species of sculpin is indigenous to Maine waters. Slimy sculpin *(Cottus cognatus)* was collected in the upper Kennebec and Androscoggin Rivers. It is a benthic dwelling species that prefers high gradient cold water streams and rivers with coarse substrates, but it can inhabit low gradient streams provided temperature is cold enough (Hartel et al. 2002). Our collection method was effective for this benthic species provided the proper techniques were employed. This involved electrofishing the shallow riffle and gravel shoal areas of each site using a "riffle raking" technique. Bypassing these sub-habitats would risk overlooking this keystone coldwater species.

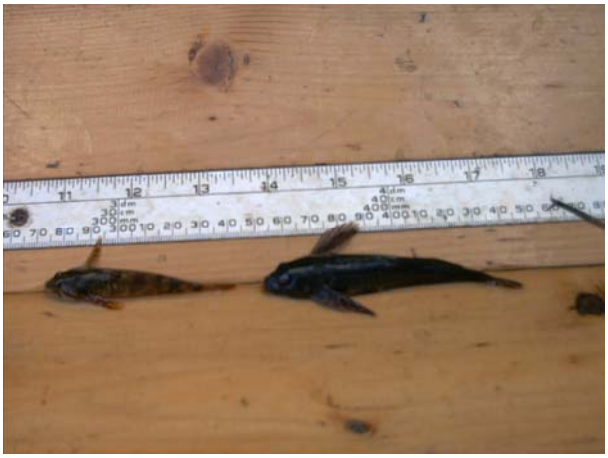

Plate 20. Juvenile (left) and adult (right) slimy sculpin collected in the Kennebec River at Solon, 2002.

Kennebec River

Slimy sculpin were collected at 5 locations in the upper Kennebec River, all riverine habitats between Wyman Dam to downstream from Madison. They were collected in high numbers at only one location. Immediately downstream from the Wyman Dam 28 individuals/km were observed as a mix of young-of-year, juveniles, and adults. The remaining collections yielded 1-3 individuals/km. They were all collected from shallow riffle and gravel shoal habitats.

Androscoggin River

Only two individuals were collected in the upper Androscoggin River, one in a riverine section upstream from Pontook Lake and the other at he confluence of a cold water tributary at Newry. Habitat seemed adequate at several locations in the upper mainstem between Errol, NH to downstream from Rumford, but no slimy sculpins were collected.

Current Status

Slimy sculpin are an indigenous fluvial specialist (Bain and Meixler 2000) that would have been expected in higher numbers at more locations than what we observed in the upper

Kennebec and Androscoggin River mainstems in 2002-2003. The thermal and flow regimes are likely marginal for the wider existence of this species in either river. Halliwell et al. (1999) classify it as intolerant to general pollution. Its low abundance and absence from suitable habitats may also be a reflection of past and present pollution from some of the large point sources, especially in the upper Androscoggin River mainstem.

Plate 21. Upper left: adult striped bass from the lower Kennebec River at Sixmile Falls, September 2002. Upper Right: netting striped bass in fast flowing run habitat in the lower Kennebec River at Sixmile Falls, September 2002. Lower Left: swift chute and run habitat that was typical of high gradient sites in the lower Kennebec River between Waterville and Augusta. Lower Right: adult striped bass collected in the tailwaters of the Lockwood Dam along the Winslow shoreline, 2005.

Family Moronidae (Temperate Basses)

Temperate basses are represented in Maine by two species, striped bass *(Morone saxatilis)* and white perch *(Morone americana)*. Striped bass are an indigenous anadromous species that enters the freshwater sections of coastal rivers and streams, but which are commonly found in coastal marine habitats. They are one of the most sought after game fish in the northeast U.S. that suffered a dramatic population decline in the late 1970s and early

1980s. Management intervention restored some of those losses in the 1990s. White perch are also indigenous to freshwater coastal streams and rivers and in some lakes where landlocked populations can be found. All of these have direct connection to the Gulf of Maine. They have also been perhaps the most widely introduced fish into numerous lakes and ponds and as such represent an intrastate native introduced species in these situations (Halliwell 2005). Both species occurred in high numbers in selected parts of the study area in 2002 and 2003.

Striped bass *(Morone saxatilis)*

Striped bass were restricted to the lower Androscoggin and Kennebec Rivers inhabiting both the tidal fresh and brackish water habitats of these mainstems. It did not occur in the Sebasticook River in 2003.

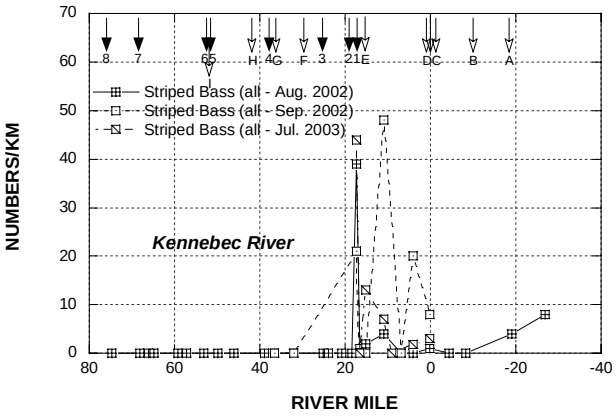

Figure S-34. Relative abundance of striped bass in the Kennebec R. mainstem in 2002-3. Letters and numbers denote dams and major point sources (see study area description).

Kennebec River

Striped bass were the most numerous among the study areas in lower Kennebec River in 2002 and 2003. They were restricted to the mainstem downstream from the Lockwood dam in Waterville (Figure S-34). This species was also present seasonally, i.e., it was collected in all three sampling months, July 2003, August 2002, and September 2002. The highest numbers were collected most consistently in September 2002, which agrees with what is known of the intra-river movements of this species. The highest numbers (>10-40 individuals/km) were observed at sites with areas of swift flow and current variety. In the freshwater mainstem above Augusta, this included the Lockwood dam and power house tailwaters and high gradient sites with deep chutes and "falls" created by bedrock cataracts. They were seldom if ever collected from slow moving pools or at low gradient sites. In the tidal influenced reaches, they occurred in areas of detectable current velocity accentuated by irregular shoreline formations comprised mostly of fractured bedrock. Striped bass occurred primarily as juveniles (defined here as <500 mm total length) and as adults (>500 mm total length). Nine young-of-year striped bass were collected in Merrymeeting Bay at Lovejoy Narrows over sand-silt flats habitat.

Androscoggin River

A total of 14 striped bass were collected at two sites in the tidal freshwater reach of the lower Androscoggin River in 2002 and 2003. One adult and six young-of-year were collected at the mouth at Merrymeeting bay near Freyer Island. The adult was collected along an abandoned bridge abutment and the y-o-y were collected over tidal sand flats. Seven y-o-y were collected in 2003 at the next upstream site located along and between

Cornish and Driscoll Islands near Cooks Corner, which was comprised almost entirely of tidal sand flat habitat. No striped bass were collected upstream either above or below the Brunswick Dam.

Current Status

Striped bass are a major component of the anadromous and lower mainstem river fish assemblages in the Androscoggin and Kennebec Rivers. The removal of the Edwards Dam at Augusta has opened access to 17 miles of riverine freshwater habitat to this species. It is classified as an anadromous species that as juveniles and adults appears to prefer faster flowing waters and tidal sand and silt flats as a y-o-y. Halliwell et al. (1999) consider it to be intolerant of general pollution. Most of the striped bass that are observed in Maine coastal waters are thought to originate largely from migratory populations that reproduce from the Hudson River south to Chesapeake Bay (Bigelow and Schroeder 2002). However, the y-o-y collected by our study may be the product of comparatively limited local reproduction and/or stocking efforts in the 1980s.

Plate 22. Adult white perch from Merrymeeting Bay at Lovejoy Narrows, 2002.

White perch *(Morone americana)*

White perch occurred in all three rivers primarily in their native tidal freshwater habitats and the larger impoundments into which they were likely introduced. They were virtually absent or if present only in very low numbers at riverine sites.

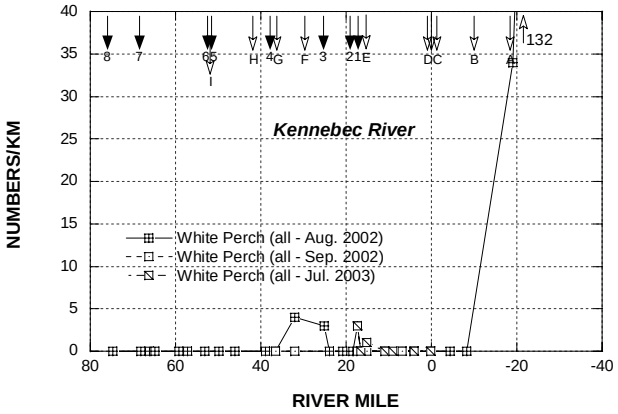

Figure S-35. Relative abundance of white perch in the Kennebec R. mainstem in 2002-3. Letters and numbers denote dams and major point sources (see study area description).

Kennebec River

White perch occurred in low numbers (<5 individuals/km) in the Shawmut impoundment and at two locations downstream from Waterville (Figure S-35). By far the highest numbers occurred in Merrymeeting Bay where adults, juveniles, and young-of-year were observed at Lovejoy Narrows (34 individuals/km) and Chops Point (132 individuals/km) primarily over sand and silt flats in slow or no current. They were also numerous in the Cathance River near Bowdoinham which offered brackish water quality, soft substrates, and turbid water clarity.

Androscoggin River

White perch occurred primarily in the lower mainstem being most numerous in Gulf Island Pond and the tidal freshwater reach downstream from Brunswick (Fig. S-36). Evidence of a reproducing population in Gulf Island Pond came in the form of young-of-year (316 individuals/km) and adults (78 individuals/km) at the downstream most site closest to the dam. White perch also occurred in numbers in the Deer Rips impoundment immediately downstream. Another concentration was observed in the tidal reach at Freyer Island which is a part of the large Merrymeeting bay population. In all cases, the preferred habitat was sand and silt flats formed by tidal fluctuations or impoundment.

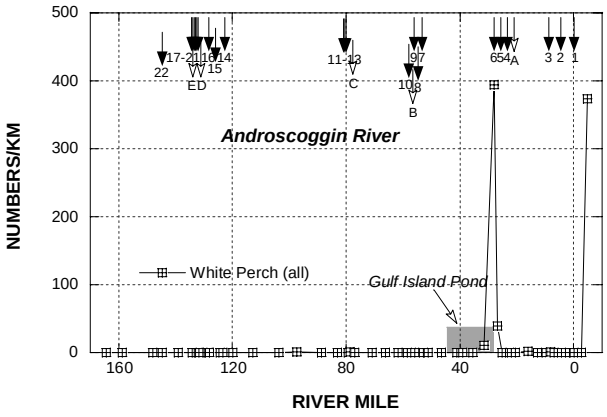

Figure S-36. Relative abundance of white perch in the Androscoggin R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

Sebasticook River

White perch were collected at four sites, all impoundments, in the Sebasticook River in 2003. The highest number (24 individuals/km) were observed in the Benton Falls impoundment.

Current Status

White perch exhibited a decided preference for their native tidal brackish and freshwater habitats and impounded river habitats into which they have been widely introduced (Halliwell 2005). It also validated its classification as a macrohabitat generalist (Bain and Meixler 2000) by adapting well to the modified impounded river habitats. Halliwell et al. (1999) considered it to be intermediate in its tolerance of general pollution.

Family Centrarchidae (Sunfishes)

Plate 23. Juvenile rock bass from the Androscoggin River in Berlin, NH, 2003.

Sunfishes are a widely distributed family throughout the eastern U.S. and Canada. They have been widely stocked and transplanted for fisheries enhancement and most species are highly adaptable for this purpose. There are at least seven species of sunfishes known to occur in Maine waters. Of these only two are indigenous, pumpkinseed *(Lepomis gibbosus)* and redbreast sunfish *(Lepomis auritus)*. Of the remaining five, green sunfish *(Lepomis cyanellus)*, bluegill *(Lepomis macrochirus)*, black crappie *(Pomoxis nigromaculatus)*, smallmouth bass *(Micropterus dolomieui)*,

and largemouth bass *(Micropterus salmoides)* are interstate non-native introduced species (Halliwell 2005). Another centrarchid species, rock bass *(Ambloplites rupestris)*, was collected by our study in the New Hampshire portion of the Androscoggin River nearly to the Maine state border. It would be considered an interstate non-native introduction if it had reached

Plate 24. Left: adult redbreast sunfish from the Kennebec River near Sidney, 2002. Right: multiple redbreast sunfish collected from one portion of a mainstem pool near Sidney, 2002.

Maine waters. Our study collected six centrarchid species of which two are indigenous. Green sunfish and bluegill are recent introductions that were collected from a headwater lake in the Sebasticook watershed, but outside the scope of our study (SRWA 2004).

Rock bass *(Ambloplites rupestris)*

Rock bass were collected from the Androscoggin River between the Sawmill impoundment upstream from Berlin, NH and the Brascan impoundment just upstream from Gorham, NH. A total of 11 individuals were scattered among 4 sites and of these only 1 was of adult size. Based on this data the population is small, but potentially established in NH waters.

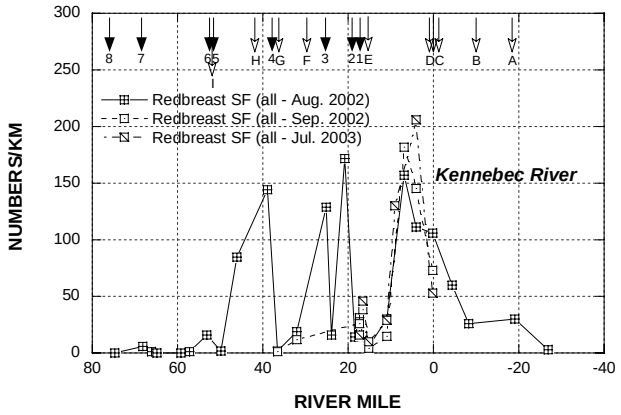

Figure S-37. Relative abundance of redbreast sunfish in the Kennebec R. mainstem in 2002-3. Letters and numbers denote dams and major point sources (see study area description).

Current Status

Rock bass are common in smaller streams and creeks in the heart of its native range and prefer clear, cool waters with hard substrates. It is unclear if it is poised to expand into adjacent waters in Maine, but cold temperatures may be a deterrent to this warmwater species.

Redbreast sunfish *(Lepomis auritus)*

Redbreast sunfish were one of the most commonly collected species in our study. It occurred in abundance in at least portions of each river in 2002 and 2003. It is one of two indigenous centrarchids in Maine waters

(Halliwell 2005). It is known to occur in lakes, ponds, and pools and slow current areas of streams and rivers (Hartel et al. 2002).

Kennebec River

This species occurred at nearly every sampling site in the mainstem with the exception of Merrymeeting Bay and the Cathance River. It reached its highest relative abundance of 100-150 individuals/km in the Williams, Shawmut, and Hydro-Kennebec impoundments (Figure S-37). It was common in the riverine segment downstream from Waterville exceeding 150-200 individuals/km between Sidney and Augusta. While these were in a riverine segment, the sites contained significant pool habitat and large substrates around which this species will congregate. It also occurred downstream into the tidal freshwater section of the mainstem, but at reduced abundance compared to upstream.

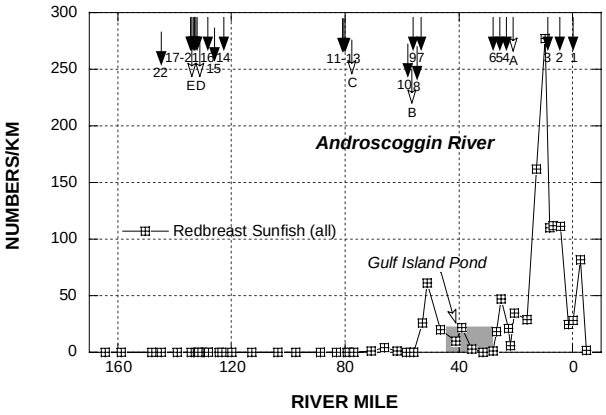

Figure S-38. Relative abundance of redbreast sunfish in the Androscoggin R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

Androscoggin River

Redbreast sunfish occurred primarily in the lower mainstem between Livermore Falls and the tidal freshwater section downstream from Brunswick (Figure S-38). It occurred mostly at low gradient riverine and impounded sites and in the freshwater tidal section. It did not occur in the lower tidal site at the entrance to Merrymeeting Bay. It was virtually absent from the mainstem upstream from the Jay-Livermore Falls area despite the existence of suitable habitat. It occurred only in low numbers in Gulf Island Pond and surpassed 150 individuals/km at only two sites, one a low gradient riverine site and the other an impounded habitat.

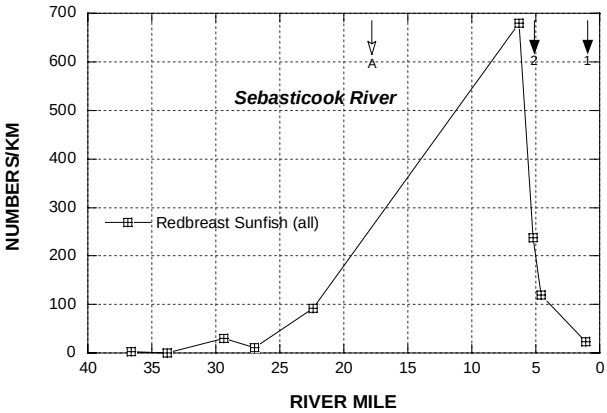

Figure S-39. Relative abundance of redbreast sunfish in the Sebasticook R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

Sebasticook River

Redbreast sunfish occurred in numbers >100 individuals/km at four adjacent sites near Burnham and Benton Falls. The highest abundance recorded in the study (680 individuals/km) occurred in the Benton Falls impoundment (Figure S-39). The Sebasticook River offers some ideal habitat given the prevalence of low gradient riverine and impounded habitat.

Current Status

Redbreast sunfish should be an expected part of a central Maine river fish

assemblage where habitat, flow, water quality, and temperature conditions are suitable. At sites where it was collected it preferred pool with no or slow current and with suitable

Plate 25. Left: adult pumpkinseed sunfish from the Kennebec River near Sidney, 2002. Right: pumpkinseed (left) and redbreast sunfish (right) collected from one portion of a mainstem pool near Sidney, 2002.

cover such as large boulders and submergent vegetation. It was also present in pockets or concentrations of individuals when it was collected in large numbers. It was uncommon or did not occur at all at the high gradient cold water sites nor did it occur in the brackish and turbid waters of Merrymeeting Bay or the Cathance River. Bain and Meixler (2000) classify it as a macrohabitat generalist and Halliwell et al. (1999) considered it to be intermediate to general pollution.

Pumpkinseed *(Lepomis gibbosus)*

Pumpkinseed is the other indigenous centrarchid that occurs widely in lakes, ponds, and the pool and slow current habitats of streams and rivers. They have a decided preference for submergent aquatic vegetation (Hartel et al. 2002), which separates it somewhat from the redbreast sunfish.

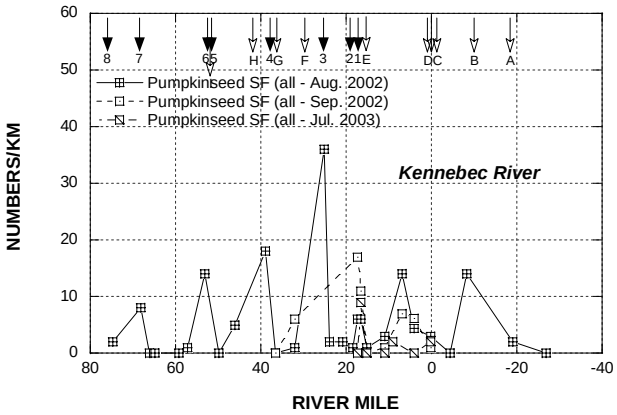

Figure S-40. Relative abundance of pumpkinseed sunfish in the Kennebec R. mainstem in 2002-3. Letters and numbers denote dams and major point sources (see study area description).

Kennebec River

Pumpkinseed was collected at all sites in the Kennebec River with suitable habitat, i.e., slow or no flow with beds of submergent aquatic vegetation. It attained the highest numbers (>10 individuals/km) at impounded sites and riverine sites with sufficient pool and vegetated habitat (Figure S-40). It was collected in much lower numbers or not at all at the high gradient cold water sites and it was barely present in the brackish waters of Merrymeeting Bay and not at all in the turbid Cathance River.

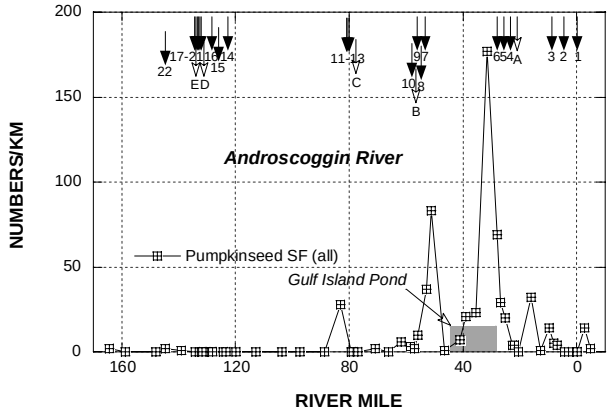

Figure S-41. Relative abundance of pumpkinseed sunfish in the Androscoggin R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

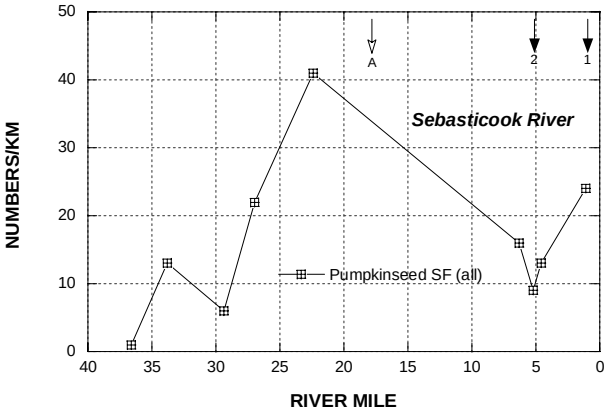

Figure S-42. Relative abundance of redbreast sunfish in the Sebasticook R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

Androscoggin River

As was the case with redbreast sunfish, pumpkinseed was the mist consistently distributed in the lower Androscoggin River mainstem downstream from Livermore Falls-Jay area (Figure S-41). It also occurred in numbers at a single site in the upper Rumford Falls impoundment. It attained the highest relative abundance in Gulf Island Pond (180 individuals/km) and in low gradient riverine sites with its preferred habitat all the way downstream into the tidal freshwater section of the mainstem. It was present in very low numbers at the entrance to Merrymeeting Bay.

Sebasticook River

Pumpkinseed were present at all sites in good numbers (>10 individuals/km) reaching the highest relative abundance (>40 individuals/km) in the lower Burnham impoundment (Fig. S-42). The impounded and low gradient riverine sites offered good habitat for this species particularly where there were extensive beds of submergent aquatic vegetation. It co-occurred at several sites with large concentrations of redbreast sunfish.

Current Status

Pumpkinseed should be an expected species as part of a large river fish assemblage in Maine where habitat, flow, and water quality conditions are suitable. This would include the slow or no current areas of impounded and low gradient riverine habitats with beds of submergent aquatic vegetation. It may tolerate cold water conditions better than redbreast sunfish, but only where the preferred sub-habitats exist. It also declined in numbers in the brackish embayment habitat of Merrymeeting Bay and it was not found at all in the turbid tidal habitat of the Cathance River. Bain and Meixler (2000) classify it as a macrohabitat generalist and Halliwell et al. (1999) considered it to be intermediate in its tolerance of general pollution. It co-occurred at several sites with concentrations of redbreast sunfish where the two species habitat preferences intersected. However, no hybrids were collected despite these two species known hybridization elsewhere (Hartel et al. 2002).

Smallmouth bass *(Micropterus dolomieui)*

Smallmouth bass are an introduced species of intracontinental origin (Halliwell 2005) that

Plate 26. Upper Left: adult smallmouth bass weighing 1.5 kg (3 lbs.) from the Kennebec River in Waterville, 2002. Upper Right: adult smallmouth bass weighing 3 kg (6.5 lbs.) from the Androscoggin River at Livermore Falls, 2003. Lower Right: typical adult smallmouth bass from the Androscoggin River at Lisbon Falls, 2002. Lower Right: young-of-year smallmouth bass collected below the Riley Dam near Jay, 2003.

were legally stocked by the state of Maine in 51 water bodies between 1868 and 1881 (Warner 2005). An initial attempt at stocking fry obtained from New Hampshire failed, but stockings of larger fish shortly thereafter were successful. As such they have established reproducing populations in many lakes, ponds, streams, and rivers in southern and central Maine and have become naturalized. Since the mid-1980s they have been illegally transplanted within the state thus further expanding their range (Warner 2005). Similar introductions have occurred throughout the northeastern U.S. The original rationale for their introduction into Maine waters was to provide sport fishing in waters that contained a non-salmonid fish assemblage consisting of perch (yellow perch, *Perca flavescens),* sunfish *(Lepomis spp.),* and pickerel (chain pickerel; Warner 2005). The original intent was to carefully manage these introductions so as to not adversely impact native salmonid populations. However, the effort to preclude negative impacts of smallmouth bass introductions was not entirely successful as unsupervised private transplanting took place and the expansion of this species proceeded naturally. Presently this species is thought to occur in more than 470 lakes and ponds mostly in the southern and central portions of Maine (Halliwell 2005; Warner 2005). It now provides a significant sport fishery in several lakes and rivers in central and southern Maine, including the rivers that comprise our

study area. Apparent negative effects on native brook trout and cyprinid populations via general competition and direct predation in a number of lakes, streams, and rivers have been and are continuing to be documented (Whittier et al. 1997; Gallagher 2004; Warner 2005). It is also hypothesized that warmer water temperatures will present even more advantageous conditions favoring this species. As such it remains a significant management issue and challenge in Maine rivers. Depicting this species role in an eventual river fish assemblage assessment tool is a significant challenge facing this project and its eventual application in Maine. Smallmouth bass were collected in all three of the rivers in our study. As such it presents an opportunity to more quantitatively determine the status and potential influence of this species within a riverine fish assemblage.

Kennebec River

Smallmouth bass were one of the most widely distributed species in the Kennebec River in

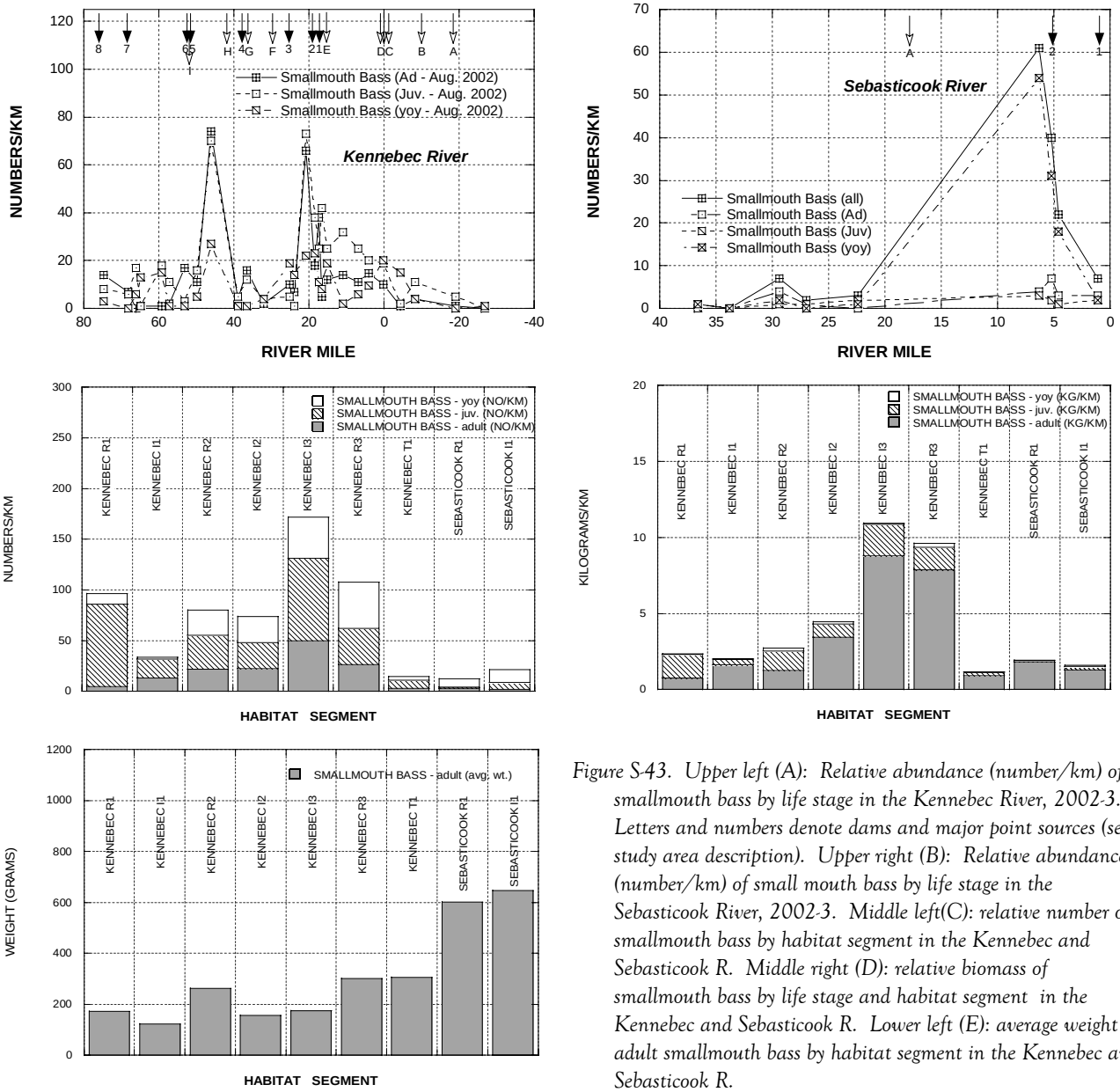

Figure S-43. Upper left (A): Relative abundance (number/km) of smallmouth bass by life stage in the Kennebec River, 2002-3. Letters and numbers denote dams and major point sources (see study area description). Upper right (B): Relative abundance (number/km) of small mouth bass by life stage in the Sebasticook River, 2002-3. Middle left(C): relative number of smallmouth bass by habitat segment in the Kennebec and Sebasticook R. Middle right (D): relative biomass of smallmouth bass by life stage and habitat segment in the Kennebec and Sebasticook R. Lower left (E): average weight of adult smallmouth bass by habitat segment in the Kennebec and Sebasticook R.

2002 and 2003 (Figure S-43). It was collected at every sampling site including the entire mainstem and Merrymeeting Bay. It was absent only from the Cathance River. The highest numbers (>150 individuals/km) occurred in the upper Shawmut impoundment and the riverine segment between Waterville and Augusta (Figure S-43A). It was represented at most sites as adults, juveniles, and young-of-year, the latter being evidence of reproduction occurring throughout much of the mainstem. We analyzed relative abundance data by habitat segment by aggregating riverine and impounded sites by major river segment of which there were seven in the Kennebec River. The highest segment wide abundance occurred in the impounded habitats formed by the Hydro-Kennebec and Lockwood Dams, the lower of which was partially riverine (Figure S-43C). This segment also had the highest proportion as adults in terms of numbers and biomass (Figure S-43D). The proportion of adults increased in a downstream direction to Augusta, after which abundance declined markedly in the tidal influenced habitats. Juveniles and young-of-year predominated in the uppermost riverine segment which was also had the coldest temperatures. The average weight of adult sized smallmouth bass also tended to increase in a downstream direction ranging from <200 grams between Wyman Dam and the Lockwood impoundment in Waterville. Average weight increased slightly to 300 grams in the riverine segment between Waterville and Augusta and in the tidal influenced habitats (Figure S-43E).

Sebsticook River

Smallmouth bass occurred at all except one sampling site in the Sebasticook River in 2003. Upstream from the Benton Falls impoundment, relative numbers were <10 individuals/km (Figure S-43B). The highest numbers (60 individuals/km) in the mainstem study area were collected in the Benton Falls impoundment, predominantly occurring as young-of-year. Overall abundance was slightly higher in the impounded habitats as compared to the riverine habitats and was comprised mostly of juvenile and young-of-year individuals (Figure S-43C). The riverine habitats in the Sebasticook were a low gradient type with predominantly slow or sluggish current velocity. Biomass was predominated by the few adults that were collected (Figure S-43D). The average weight of adults was >600 grams in both habitat segments (Figure S-43E).

Androscoggin River

Smallmouth bass were collected at every sampling site in the Androscoggin R. study area in 2003. Relative numbers were highest between Rumford-Mexico and Jay-Livermore Falls exceeding 300 individuals/km at multiple sites. The samples at these sites were predominated by young-of-year (Fig. S-44A). Elsewhere numbers were generally <50-100 individuals/km. Analysis of the data by river habitat segment showed the highest numbers in the riverine habitats between Rumford and the Riley Dam impoundment upstream from Jay with young-of-year comprising >80% of the average abundance (Fig. S-44B). Young-of-year also predominated numerically in the adjacent impounded and riverine habitats upstream and downstream from Rumford and within and immediately downstream from the Jay-Livermore Falls areas. Adults occurred in every segment and tended to increase downstream reaching their highest numerical and biomass based

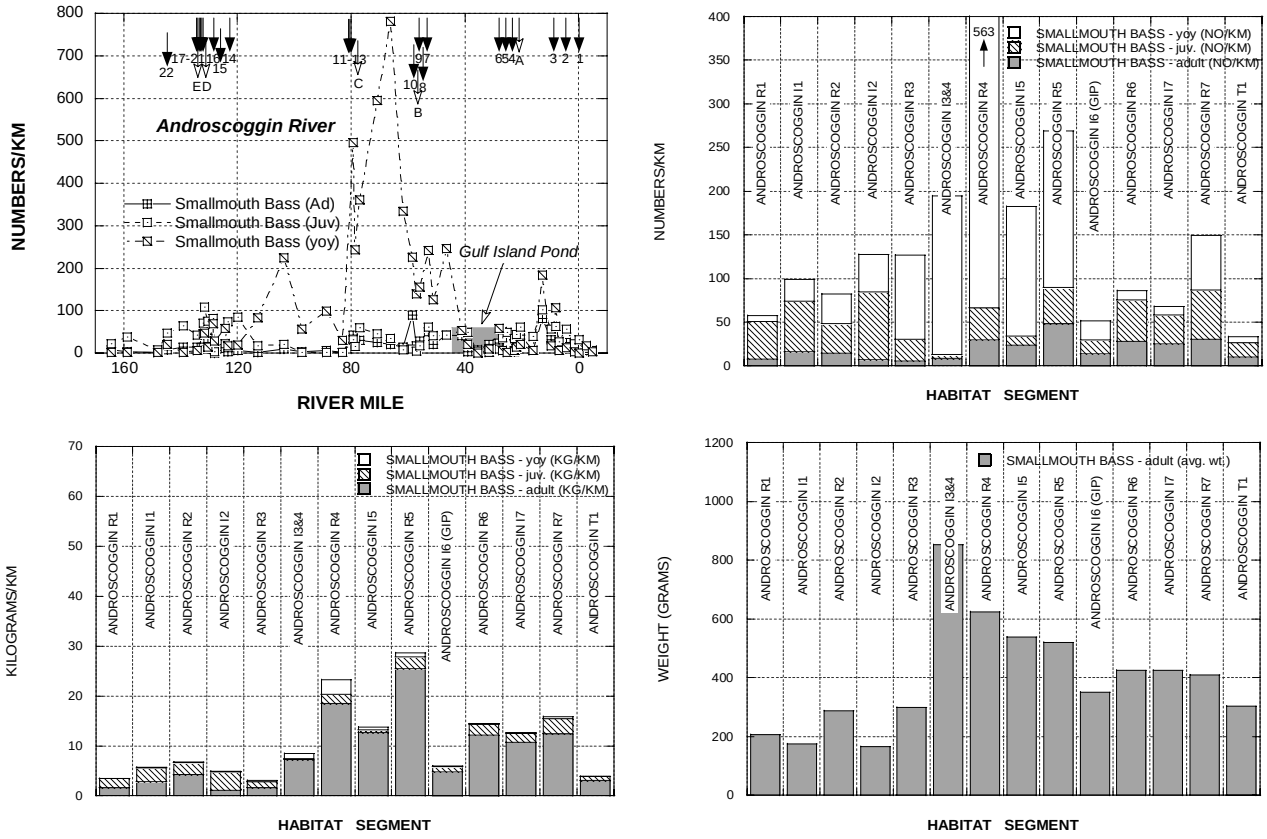

Figure S-44. Upper left (A): Relative abundance (number/km) of smallmouth bass by life stage in the Androscoggin River, 2003. Letters and numbers denote dams and major point sources (see study area description). Upper right (B): relative number of smallmouth bass by life stage and habitat segment in the Androscoggin R. Middle right (C): relative biomass of smallmouth bass by life stage and habitat segment in the Androscoggin R. Lower left (D): average weight of adult smallmouth bass by habitat segment in the Androscoggin R.

abundance in riverine segments downstream from Rumford and the Riley Dam (Figures S-44B and C). Abundance was low in Gulf Island Pond compared to adjacent segments and other impounded segments in the study area as it was in the tidal influenced segment. The average weight of adults was in the 200-300 gram range upstream from Rumford and increased markedly to more than 800 grams in the impounded segments upstream and downstream from Rumford (Figure S-44D). Adult average weight declined to 400-600 grams in a downstream direction in all except the Gulf Island Pond and the tidal influenced segment. In these two segments the average weight was lowest at less than 400 grams.

Current Status

Smallmouth bass are presently a well established and self-sustaining species in all three rivers being found in numbers in all of the riverine and impounded habitats. The most extensive populations in terms of numbers, biomass, and average size of adults occurred in the Androscoggin River mainstem immediately upstream from Rumford and extending downstream through the remainder of the non-tidal mainstem. While it was present as a commonly occurring part of the fish assemblage in the colder segments upstream from Rumford, the numerical abundance and average size of the adults was less than

downstream. The Kennebec River also contains established populations that were numerically more abundant and with larger adults in the warmer middle and lower mainstem segments. The overall relative abundance and average weight of adults (200-300 grams) was lower than the Androscoggin mainstem. The populations in the Sebasticook River were smaller by comparison, but the average size of the adults (>600 grams) was comparable to most of the middle and lower Androscoggin River.

Smallmouth bass are classified as a macrohabitat generalist (Bain And Meixler 2000) and this is supported by our findings. It occurred in a wide variety of riverine and impounded habitats and in cold, warm, and tidal areas. Further analysis of length data and more detailed analysis of key habitat attributes and metrics that were not accomplished here may yield more detailed information about habitat and water quality preferences. Halliwell et al. (1999) considered it to be intermediate in its tolerance of general pollution and it can tolerate marginal water quality conditions.

Plate 27. Adult largemouth bass collected from the Kennebec River at Sidney, 2002.

Largemouth bass *(Micropterus salmoides)*
Largemouth bass are another introduced species of intracontinental (interstate) origin in Maine waters (Halliwell 2005). The first fish were likely introduced as part of the original stockings of smallmouth bass in the late 1800s and they quickly became established in several lakes and ponds of southern and central Maine. They now occur in more than 370 water bodies in Maine and are expanding into new waters either naturally or through illegal stocking. Successful eradication has been accomplished in northern counties where they constitute a threat to native salmonids. This species is commonly thought of as a "lake species", but it is adaptable to riverine environments provided water quality and habitat conditions are suitable. It occurred in parts of all three rivers in 2002 and 2003.

Kennebec River
Largemouth bass were collected in the mainstem from the upper Shawmut impoundment downstream to the tidal freshwater segment exclusive of Chopps Point in Merrymeeting Bay and the Cathance River (Fig. S-45A). They were absent from the collections in the mainstem downstream from Wyman Dam to the first riverine site downstream from Skowhegan. When they were present, the collections were predominated by young-of-year which comprised 80-90% of the total numbers (Figure S-45C). Numeric abundance was highest in impounded segments or low gradient riverine sites. One such latter location was a site near Sidney that has not yet recovered from the previous impounding effect of the

former Edwards dam impoundment. Adults comprised the majority of the biomass where they were present with some individuals weighing more than 1000 grams (Figure S-42D).

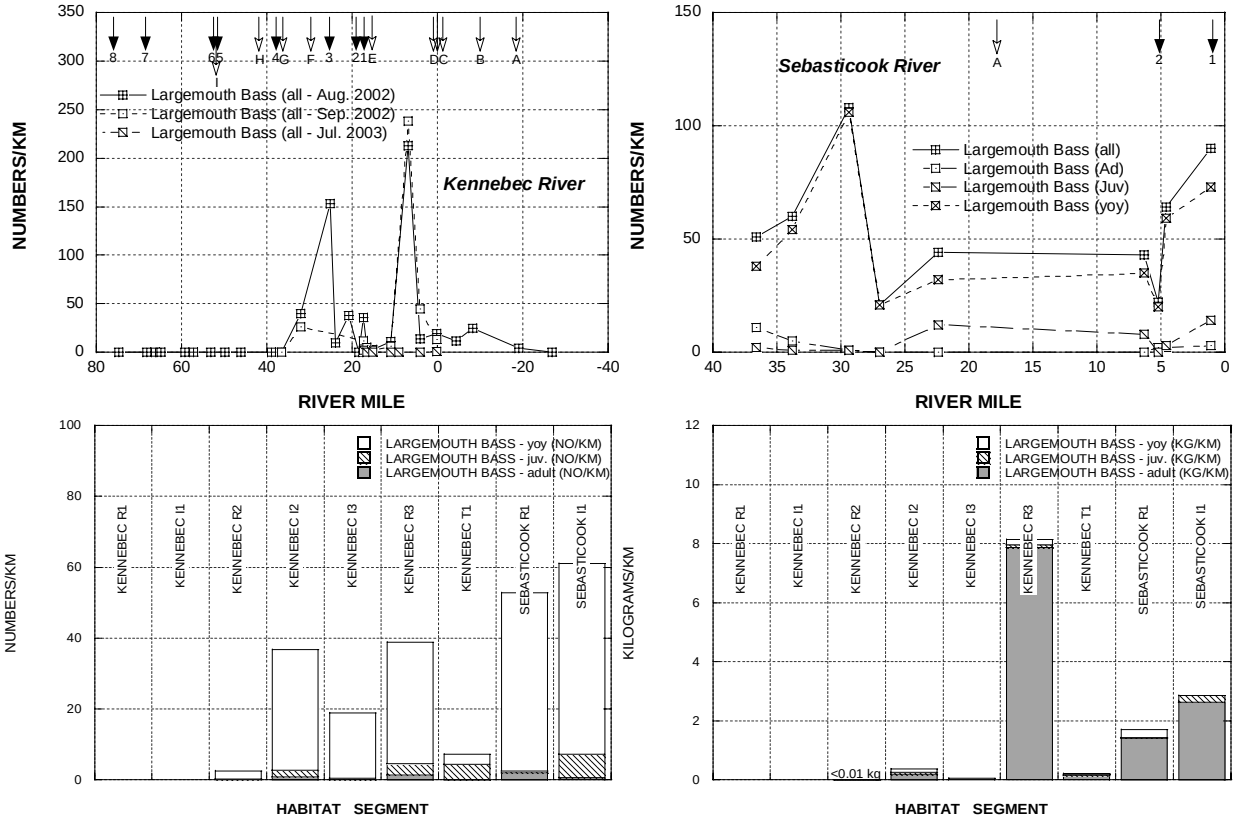

Figure S-45. Upper left (A): Relative abundance (number/km) of largemouth bass in the Kennebec River, 2002-3. Letters and numbers denote dams and major point sources (see study area description). Upper right (B): Relative abundance (number/km) of largemouth bass in the Sebasticook River, 2003. Letters and numbers denote dams and major point sources (see study area description). Lower left (B): relative number of largemouth bass by life stage and habitat segment in the Kennebec and Sebasticook R. Lower right (C): relative biomass of largemouth bass by life stage and habitat segment in the Kennebec and Sebasticook R.

Sebasticook River

Largemouth bass were collected in numbers at each of the nine Sebasticook River sampling locations (Figure S-45B). The highest numbers occurred at a low gradient riverine site downstream from Pittsfield and in the lower Ft. Halifax impoundment. Here, too, the majority of the individuals occurred as young-of-year (Figure S-45C). Total and adult biomass was somewhat higher in the impounded habitats, but good numbers occurred in the low gradient riverine sites (Figure S -45C and D). The average size of the adults ranged from 700 to more than 800 grams in the riverine and impounded segments.

Androscoggin River

Largemouth bass were scattered in their distribution in the Androscoggin River study area in 2003. They were collected primarily as young-of-year with a few juveniles present in the

mainstem upstream from Berlin, NH (Figure S-46A). They were absent in our collections downstream from Gorham, NH and did not reappear until the site at Turner Falls which is at the upper end of Gulf Island Pond. Largemouth reached their highest numbers (40-80

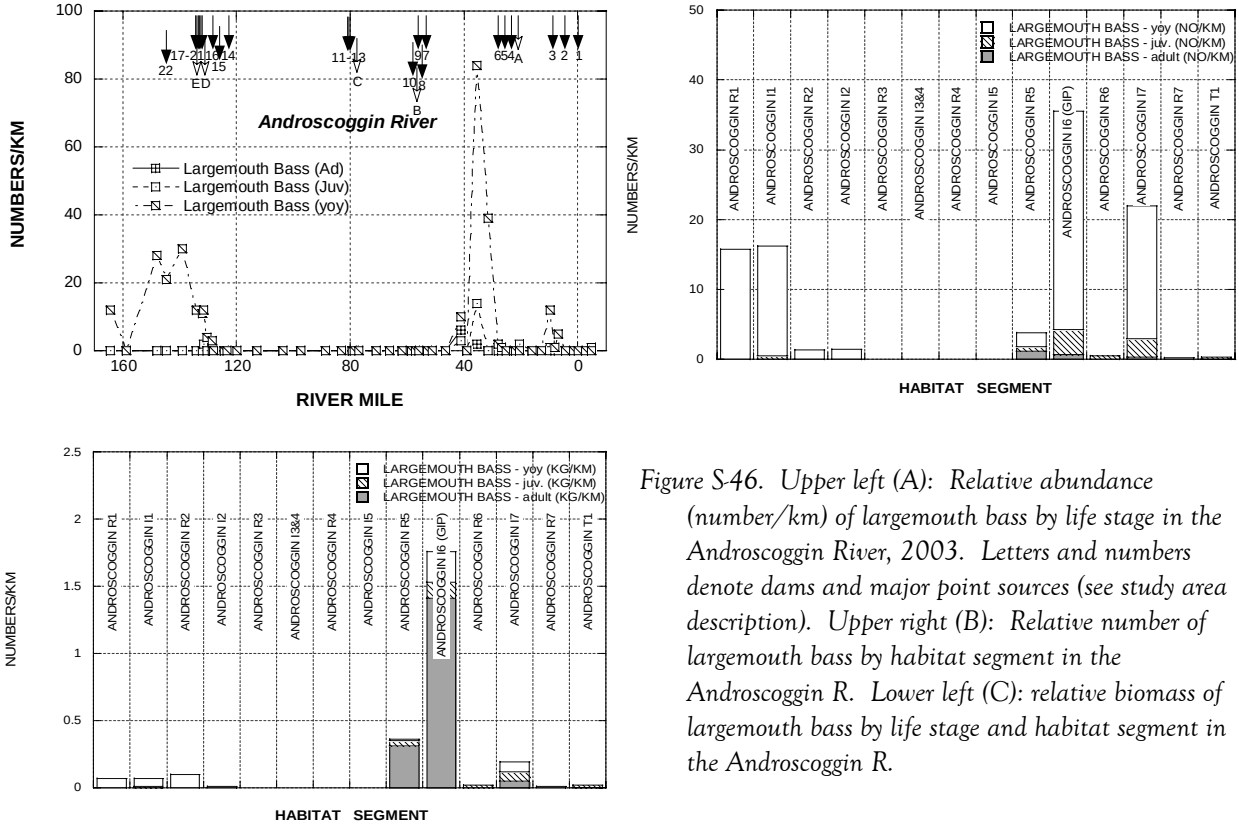

Figure S-46. Upper left (A): Relative abundance (number/km) of largemouth bass by life stage in the Androscoggin River, 2003. Letters and numbers denote dams and major point sources (see study area description). Upper right (B): Relative number of largemouth bass by habitat segment in the Androscoggin R. Lower left (C): relative biomass of largemouth bass by life stage and habitat segment in the Androscoggin R.

individuals/km) in Gulf Island Pond where all three life stages were also found. One adult weighed nearly 3 kg. Gulf Island Pond represented perhaps the most ideal habitat for this species in the study area. The highest numbers and biomass by habitat segment occurred here (Figures S-46B and C). Total numbers and biomass declined downstream, but remained present in each segment including the tidal influenced area. They were most common in the mouth of the Sabattus River which also offered good habitat for this species. Again, they were present mostly as juveniles and young-of-year life stages in these segments.

Current Status

Largemouth bass while present in each study area are well established only where habitat water quality and conditions are acceptable. This species occurred in segments where it might be perceived as a threat to native fish populations, but presently these are predominated by young-of-year and juveniles. It was virtually absent from the high gradient and coldwater habitats of the upper Kennebec River and the Androscoggin River between Gorham, NH and downstream from Rumford. It held its strongest populations in the lower gradient Sebasticook River and the impounded Gulf Island Pond reach of the Androscoggin River mainstem. The presence of largemouth bass upstream from Berlin was restricted largely to the impounded sites especially Pontook Reservoir which except for

cold water temperatures offered ideal habitat as did some of the low gradient riverine sites downstream from Errol, NH. Knowing the specifics about the original introductions in this segment would make the implications of any threats posed by this species easier to evaluate.

Plate 27. Adult black crappie collected from the Kennebec River at Waterville, 2002.

This species exemplified its classification as a macrohabitat generalist (Bain and Meixler 2000) performing best in modified riverine habitats. Halliwell et al. (1999) considered it to be intermediate in its tolerance to general pollution. However, in the Midwestern U.S. it is frequently found as young-of-year and juveniles in highly disturbed stream habitats and it is considered to be moderately tolerant to general pollution by Ohio EPA (1987). It would appear that life stage may be an important consideration in its role as an indicator of environmental quality and a river fish assemblage assessment tool.

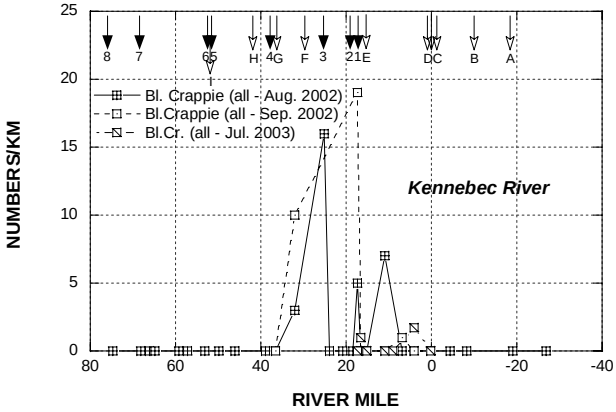

Figure S-47. Relative abundance of black crappie in the Kennebec R. mainstem in 2002-3. Letters and numbers denote dams and major point sources (see study area description).

Black crappie *(Pomoxis nigromaculatus)*
Black crappie *(Pomoxis nigromaculatus)* is an introduced species of intracontinental (interstate) origin in Maine (Halliwell 2005). Originally introduced in the 1920s in southern Maine, they were first introduced into Sebasticook Lake as part of a stocking of largemouth bass. Since that time they have become established in several central Maine lakes and ponds. This species was collected in all three rivers in the 2002-3 study.

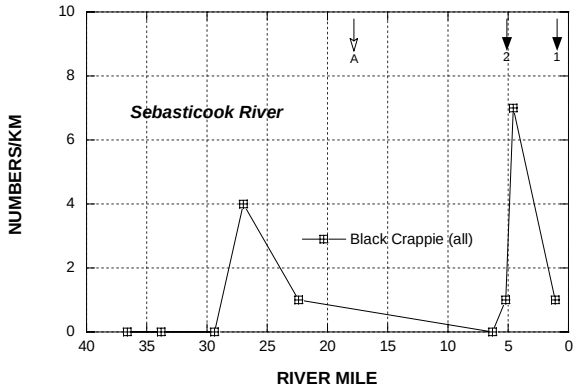

Figure S-48. Relative abundance of black crappie by life stage in the Sebasticook R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

Kennebec River
Black crappie occurred in the mainstem in and downstream from the Shawmut impoundment. They were numerically prominent in that impoundment and immediately downstream from the Lockwood Dam in Waterville (Figure S-47). It was also collected in lower numbers in

the riverine mainstem between Waterville and Augusta. It was entirely absent from the upper mainstem and the tidal influence segments.

Androscoggin River

Only five individuals were collected at two locations, the impoundment upstream from the Rumford Falls and the lowermost part of Gulf Island Pond. It is questionable if this species has become established as all individuals were represented by juvenile and young-of-year life stages.

Sebasticook River

Black crappie were collected at five of the nine sampling sites, all downstream from the upper Burnham impoundment. Numerical abundance was highest in the upper Burnham and middle Ft. Halifax impoundments (Figure S-48).

Plate 28. Adult yellow perch collected from Merrymeeting Bay at Lovejoy Narrows, 2002.

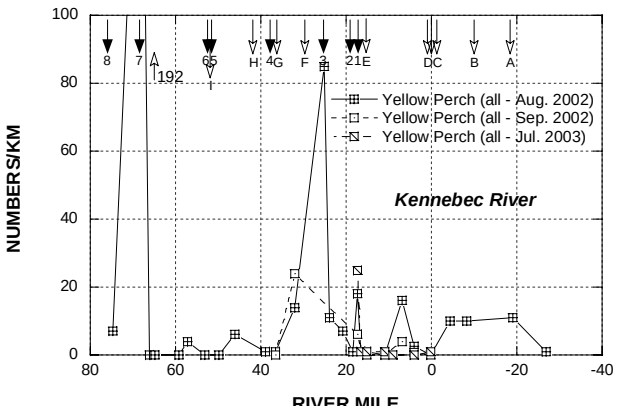

Figure S-49. Relative abundance of yellow perch in the Kennebec R. mainstem in 2002-3. Letters and numbers denote dams and major point sources (see study area description).

Current Status

Black crappie is classified as a macrohabitat generalist by Bain and Meixler (2000) and this is in keeping with our observations. While it occurred sporadically and in specific reaches of the Kennebec and Sebasticook Rivers, it preferred impounded conditions. This species is known to occur in large rivers throughout its range. Its status in the study area is not entirely certain although it appears to be reproducing in the Kennebec and Sebasticook Rivers.

Family Percidae (Perches)

The Percidae are represented by a single native species in Maine, yellow perch *(Perca flavescens)*. Other Percidae representing introduced species of intracontinental (interstate) origin include walleye *(Sander vitreus)* that occur only in the Belgrade lakes at this time (Halliwell 2005). Yellow perch, like their close associate the chain pickerel, are indigenous to southern and central Maine waters, but have been widely introduced into northern lakes, ponds, and streams (Halliwell 2005). Unlike its status in the upper Midwestern U.S., it is not a widely sought after game species in Maine. It is a

part of the association of warm water fish species that apparently justified the original introduction of smallmouth bass in Maine (Warner 2005). This species was collected in all three study rivers in 2002 and 2003.

Kennebec River

Yellow perch were most numerous in impounded habitats and in Merrymeeting Bay and the Cathance River. It occurred in lower numbers at cold and warm riverine and at brackish tidal influenced sites. The highest relative abundance occurred in the Williams (192 individuals/km) and lower Shawmut (85 individuals/km) impoundments (Figure S-49). Elsewhere relative abundance was generally <10-20 individuals/km. It was represented by adults, juveniles, and young-of-year at most sites.

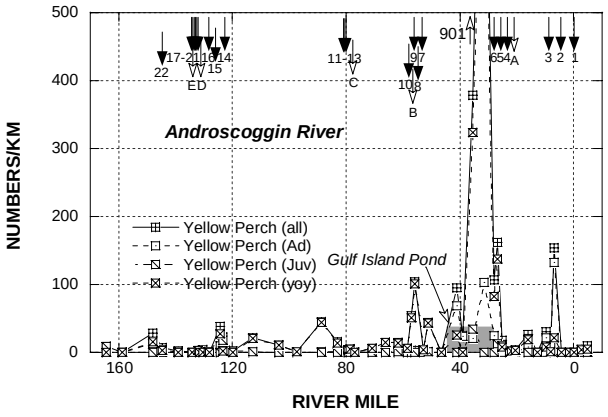

Figure S-50. Relative abundance of yellow perch by life stage in the Androscoggin R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

Androscoggin River

Yellow perch were widely distributed throughout the Androscoggin River mainstem and occurred at all except a few sites (Figure S-50). It reached the highest relative abundance in Gulf Island Pond of 901 individuals/km in the lowermost part of the impoundment. Elsewhere numerical abundance tended to be highest in impoundments and immediately adjacent riverine sites and at low gradient riverine sites. They occurred as adults, juveniles, and young-of-year, the latter being predominant in the larger impoundments (Fig. S-45). They occurred in all habitats with the exception of high gradient cold water sites in the upper mainstem.

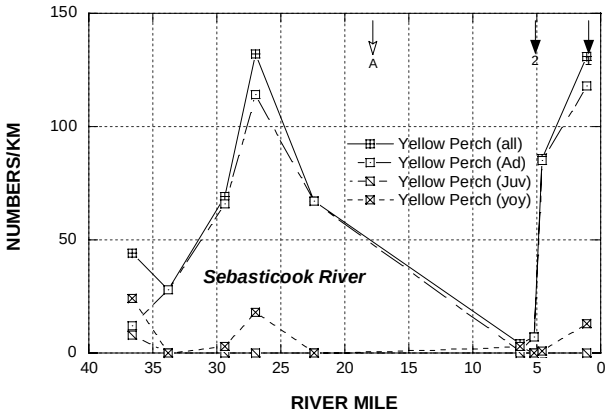

Figure S-51. Relative abundance of yellow perch by life stage in the Sebasticook R. mainstem in 2003. Letters and numbers denote dams and major point sources (see study area description).

Sebasticook River

Yellow perch were numerically abundant at two sites, the upper Burnham impoundment (132 individuals/km) and the lower Ft. Halifax impoundment (131 individuals/km; Figure S-51). It occurred at each of the nine sampling sites predominantly as adults and juveniles, with young-of-year present in low numbers. They occurred in both impounded and low gradient riverine habitats.

Current Status

Yellow perch showed a preference for impounded and low gradient riverine sites and tended to avoid or occur only sporadically

in high gradient cold water habitats. It also occurred in cold and warm water conditions and in tidal influenced segments including the turbid and brackish water sites in Merrymeeting Bay and the Cathance River. This species is likely indigenous to the lower parts of the Kennebec and Androscoggin Rivers. Its occurrence in the upper segments may be the result of earlier introductions. It is likely an indigenous species in the Sebasticook River. It would be an expected part of a warm water riverine fauna in Maine, but may be considered invasive in cold water habitats. This will be a key issue to determine in the later development of an assemblage assessment tool.

Yellow perch exemplified their classification as a macrohabitat generalist (Bain and Meixler 2000) by their wide tolerance of riverine and impounded habitats and their high relative abundance in the latter. They are considered by Halliwell et al. (1999) to be moderately tolerant to general pollution.

Species Account Summary

A summary of all species collected and additional species that have been recently documented in the study area appears in Table S-1. The indigenous status, environmental tolerance, target fish classification, and generalized habitat (riverine, impounded, tidal, etc.) occurrence in each of the three study rivers is summarized. The information in Table S-1 also provides the essential information for summarizing and classifying the autecology of each species for later use in the development of fish assemblage assessment tools like the Target Fish Community method and an Index of Biotic Integrity (IBI) for Maine rivers. Each species that was collected in 2002-3 is classified in Table S-1 as to native status, environmental tolerance, and fluvial dependency. The occurrence of each species in each of the three river mainstems is also indicated with regard to occurrence in riverine, impounded, and tidal habitats. We used the descriptions of native and introduced status in Halliwell (2005) to classify each species. For environmental tolerance we used Halliwell et al. (1999) and Ohio EPA (1987) and found that there was good general agreement between these tow sources. For fluvial dependency we followed the Target Fish Community approach and the designations by Bain and Meixler (2000). This inventory is one of the prerequisites for conducting the exploratory analyses that are essential for developing a fish assemblage assessment tool. It will be updated as the statewide database is expanded in the future.

Table S-1. Fish species collected or known to occur in the Kennebec, Androscoggin, and Sebasticook River study areas based on boat electrofishing conducted during July-September 2002-3 (scientific nomenclature adheres to Nelson et al. 2004).

Species	Native Status[3]	Environmental Tolerance[1] Halliwell	Ohio EPA	Target Fish Classification[4]	Predominant Habitat(s)[2] Kennebec	Androscoggin	Sebasticook	Comments
Petromyzondidae								
Sea lamprey *(Petromyzon marinus)*	N	M	M	A	T1,R1	-	-	Occurred primarily as ammocoetes.
Acipenseridae								
Shortnose sturgeon *(Acipenser brevirostrum)*	N	I	-	A	-	-	-	Not collected in 2002-3.
Atlantic sturgeon *(Acipenser oxyrinchus)*	N	I	-	A	-	-	-	Not collected in 2002-3.
Anguillidae								
American eel *(Anguilla rostrata)*	N	T	-	C	R1-T2	R1,T1	R2,I1	
Clupeidae								
Blueback herring *(Alosa aestivalis)*	N	M	-	A	T1,T2	-	-	
Alewife *(Alosa pseudoharengus)*	N	M	M	A	T1-R2	T1,R1-2	R2,I1	
American shad *(Alosa sapidissima)*	N	M	-	A	R1,T1-2	T1	-	
Gizzard shad *(Dorosoma cepedianum)*	U	T	M	nc [MG]	-	-	-	Collected in Kennebec R. in 2000.
Cyprinidae								
Lake chub *(Couesius plumbeus)*	N	M	-	nc [FS]	R1	R1	-	
Common carp *(Cyprinus carpio)*	E	T	T	MG	T1-2	-	-	
Common shiner *(Luxilis cornutus)*	N	M	M	FD	R1-T1	R1-I1	R2	
Golden shiner *(Notemigonus crysoleucas)*	N	T	T	MG	I1,T1-2	I1	R2,I1	
Spottail shiner *(Notropis hudsonius)*	U	M	P	MG	R2,T1-2	R2,I1,T1	-	
Eastern Blacknose dace *(Rhinichthys atratulus)*	N	T	T	FS	R1	R1	-	
Longnose dace *(Rhinichthys cataractae)*	N	M	I	FS	-	R1	-	
Rudd *(Scardinius erythrophthalmus)*	E	T	-	nc [MG]	-	?	-	Possible specimen – not confirmed.

[1] Halliwell et al. (1999) and Ohio EPA (1987): I – highly intolerant; S – sensitive (moderately intolerant); M – intermediate; P – moderately tolerant; T – highly tolerant.
[2] R1 – high gradient riverine; R2 – low gradient riverine; I1 – impounded riverine; T1 – tidal riverine freshwater; T2 – tidal embayment brackish
[3] After Halliwell (2005): N – native; E – exotic of inter-continental origin; IC – introduced of intracontinental origin; IS – introduced of interstate origin; IM – introduced and managed; U – undetermined origin.
[4] After Bain and Meixler (2000): FS – fluvial specialist; FD – fluvial dependent; MG – macrohabitat generalist.; A – anadromous; C – catadromous; nc – not classified [our classification in brackets].

Creek chub (Semotilus atromaculatus)

Table S-1. continued.

Species	Native Status[7]	Environmental Tolerance[5] Halliwell	Ohio EPA	Target Fish Classification[8]	Predominant Habitat(s)[6] Kennebec	Androscoggin	Sebasticook	Comments
Cyprinidae (continued)								
Creek chub *(Semotilus atromaculatus)*	N	T	T	MG	R1	R1	-	Uncommon in study area.
Fallfish *(Semotilus corporalis)*	N	M	-	FS	R1-I1	R1-I1	I1	Fluvial classification and pollution tolerance may require modification for Maine rivers.
Catostomidae								
Longnose sucker *(Catostomus catostomus)*	N	I	M	nc [FS]	-	R1	-	
White sucker *(Catostomus commersonii)*	N	T	T	FD	R1-T2	R1-T1	R2,I1	Adults preferred riverine run habitat.
Ictaluridae								
White catfish *(Ameiurus catus)*	IC	T	M	MG	R1,T1-2	-	-	
Brown bullhead *(Ameiurus nebulosus)*	N	T	T	MG	-	R2,I1	I1	
Esocidae								
Northern pike *(Esox lucius)*	IC	I	M	nc [MG]	-	I1	-	
Chain pickerel *(Esox niger)*	N,IS	M	M	MG	I1	I1	R2,I1	
Osmeridae								
Rainbow smelt *(Osmerus mordax)*	N	I	M	A	T2	-	-	Rare in study area.
Salmonidae								
Rainbow trout (Oncorhynchus mykiss)	IC	I	I	nc [FD]	R1	R1	-	
Atlantic salmon *(Salmo salar)*	N	I	I	A	R1	-	-	Rare in study area.
Landlocked salmon *(Salmo salar sebago)*	N,IS	I	I	nc [FD]	R1	R1	-	
Brown trout *(Salmo trutta)*	E	I	I	nc [FS}	R1	R1	-	
Brook trout *(Salvelinus fontinalis)*	N	I	I	FS	-	-	-	Rare in study area.

[5] Halliwell et al. (1999) and Ohio EPA (1987): I – highly intolerant; S – sensitive (moderately intolerant); M – intermediate; P – moderately tolerant; T – highly tolerant.
[6] R1 – high gradient riverine; R2 – low gradient riverine; I1 – impounded riverine; T1 – tidal riverine freshwater; T2 – tidal embayment brackish
[7] After Halliwell (2005): N – native; E – exotic of inter-continental origin; IC – introduced of intracontinental origin; IS – introduced of interstate origin; IM – introduced and managed; U – undetermined origin.
[8] After Bain and Meixler (2000): FS – fluvial specialist; FD – fluvial dependent; MG – macrohabitat generalist; A – anadromous; C – catadromous; TS – tidewater specialist; nc – not classified [our classification in brackets].

Table S-1. continued.

Species	Native Status[11]	Environmental Tolerance[9] Halliwell	Ohio EPA	Target Fish Classification[12]	Predominant Habitat(s)[10] Kennebec	Androscoggin	Sebasticook	Comments
Gadidae								
Burbot *(Lota lota)*	N	M	M	nc [FD]	R1	R1	-	
Fundulidae								
Banded killifish *(Fundulus diaphanus)*	N	T	T	MG	R1-T2	T1	-	
Mummichog *(Fundulus heteroclitus)*	N	T	T	nc [TS]	T1-2	T1	-	
Atherinopsidae								
Inland silverside *(Menidia beryllina)*	N	-	-	nc [TS]	T2	-	-	Rare in study area.
Gasterosteidae								
Fourspine stickleback *(Apeltes quadracus)*	N	M	-	nc [TS]	T1-2	-	-	Rare in study area.
Threespine stickleback *(Gasterosteus aculeatus)*	N	M	-	nc	R1	-	-	Rare in study area.
Ninespine stickleback (Pungitius pungitius)	N	M	-	nc	T2	-	-	Rare in study area.
Cottidae								
Slimy sculpin *(Cottus cognatus)*	N	I	-	FS	R1	R1	-	
Moronidae								
White perch *(Morone americana)*	N,IS	M	M	nc [MG]	I1,T1-2	I1,T1	I1	
Striped bass *(Morone saxatilis)*	N	I	-	A	R1,T1-2	T1	-	
Centrarchidae								
Rock bass *(Ambloplites rupestris)*	IC	M	M	nc [MG]	-	I1	-	Restricted to New Hampshire.
Redbreast sunfish *(Lepomis auritus)*	N	M	-	MG	R1-T1	R1-T1	R2,I1	
Green sunfish *(Lepomis cyanellus)*	IC	T	T	MG	-	-	-	Collected in Sebasticook ust. from our study area.

[9] Halliwell et al. (1999) and Ohio EPA (1987): I – highly intolerant; S – sensitive (moderately intolerant); M – intermediate; P – moderately tolerant; T – highly tolerant.
[10] R1 – high gradient riverine; R2 – low gradient riverine; I1 – impounded riverine; T1 – tidal riverine freshwater; T2 – tidal embayment brackish
[11] After Halliwell (2005): N – native; E – exotic of inter-continental origin; IC – introduced of intracontinental origin; IS – introduced of interstate origin; IM – introduced and managed; U – undetermined origin.
[12] After Bain and Meixler (2000): FS – fluvial specialist; FD – fluvial dependent; MG – macrohabitat generalist.; A – anadromous; C – catadromous; nc – not classified [our classification in brackets].

Table S-1. continued.

Species	Native Status[15]	Environmental Tolerance[13] Halliwell	Ohio EPA	Target Fish Classification[16]	Predominant Habitat(s)[14] Kennebec	Androscoggin	Sebasticook	Comments
Centrarchidae (continued)								
Pumpkinseed *(Lepomis gibbosus)*	N	M	M	MG	R2-T1	R2-T1	R2,I1	
Bluegill *(Lepomis macrochirus)*	IC	T	P	MG	-	-	-	Collected in Sebasticook ust. from our study area.
Smallmouth bass *(Micropterus dolomieui)*	IC	M	M	MG	R1-T1	R1-T1	R2,I1	
Largemouth bass *(Micropterus salmoides)*	IC	M	P	MG	R2-T1	I1,T1	R2,I1	
Black crappie *(Pomoxis nigromaculatus)*	IC	M	M	MG	R1,I1	I1	R2,I1	
Percidae								
Yellow perch *(Perca flavescens)*	N,IS	M	M	MG	I1,T1-2	I1,T1	I1	

[13] Halliwell et al. (1999) and Ohio EPA (1987): I – highly intolerant; S – sensitive (moderately intolerant); M – intermediate; P – moderately tolerant; T – highly tolerant.
[14] R1 – high gradient riverine; R2 – low gradient riverine; I1 – impounded riverine; T1 – tidal riverine freshwater; T2 – tidal embayment brackish
[15] After Halliwell (2005): N – native; E – exotic of inter-continental origin; IC – introduced of intracontinental origin; IS – introduced of interstate origin; IM – introduced and managed; U – undetermined origin.
[16] After Bain and Meixler (2000): FS – fluvial specialist; FD – fluvial dependent; MG – macrohabitat generalist.; A – anadromous; C – catadromous; nc – not classified [our classification in brackets].

FISH ASSEMBLAGE PROPERTIES AND CHARACTERISTICS

This section describes the compositional and relative abundance characteristics of the fish assemblages in the Kennebec, Sebasticook, and Androscoggin River study areas. The term "assemblage" has recently replaced the formerly used term "community" in that an assemblage refers to a phylogentically similar group of organisms whereas a community includes all organisms across all phylogenetic groupings (Rinne et al. 2005). Hence the use of the term fish assemblage in this report.

The properties and characteristics of the fish assemblages of each river in the 2002-3 study areas are portrayed by two types of analyses; 1) composition based on numbers and biomass analyzed by major river and habitat segments (riverine, impounded, tidal), and 2) assemblage indices and the metrics thereof analyzed by river sampling location and between the major habitat types. These analyses are an attempt to better understand natural and anthropogenic associated changes in assemblage composition in each river.

Finally, the ultimate goal of the project is to develop an assemblage index based on the Index of Biotic Integrity (IBI: Karr 1981; Karr et al. 1986) modified for application to Maine river fish assemblages. While this will ultimately require data from a wider geographic array of sampling sites and rivers than was accomplished in 2002 and 2003, some valuable insights about patterns in fish assemblages as determined by natural and human affected gradients was gained. We also employed the concepts of the Biological Condition Gradient (BCG; Davies and Jackson 2006) to determine a baseline for Maine river fish assemblages.

Patterns in Assemblage Composition

This was accomplished by determining the proportional occurrence of each species within defined spatial segments of each river and by major habitat type. Habitat types were defined as free-flowing riverine, impounded riverine, and tidal fresh/brackish water. Riverine habitats are those that typify natural, unimpeded flows and which offer natural riverine habitat features. These sites consistently exhibited the highest QHEI scores as they offered the widest diversity of habitat characteristics (see Habitat Assessment section). Impounded riverine habitats consisted of segments of each river where flows and habitat are significantly altered by the ponding of the river by constructed dams. As such some of the naturally occurring riverine characteristics are either eliminated altogether or indirectly affected by the secondary effects of impoundment. These sites consistently exhibited the lowest QHEI scores. A few sites had characteristics of both riverine and impounded habitats and these occurred at the upriver extent of most impoundments. These sites were included with the impounded habitats and in some cases represented outliers in the habitat and assemblage results. Tidal habitats are those influenced by tidal fluctuations and the majority in this study represented freshwater or slightly brackish conditions. These are considered natural habitats, but they exhibited lower QHEI scores due primarily to the prevalence of low gradient characteristics and fine substrates. A slight but apparent

temperature gradient existed in the Kennebec and Androscoggin Rivers, being colder in upstream reaches and warming in a downstream direction. Salmonids and non-Salmonid cold water fish species were generally restricted to the colder upstream reaches in each river. The Sebasticook River did not exhibit a strong thermal pattern, being warmer throughout the study reach.

Major segments representing comparatively homogenous reaches were defined for the Kennebec and Androscoggin Rivers, four for the former and seven for the latter. The Sebasticook was treated as a single entity for this analysis. Riverine, impounded, and tidal sites were then aggregated into habitat segments for each river reach and these are termed habitat segments. Average percent occurrence of species by numbers and weight were then calculated for each habitat segment and depicted in pie charts (Figures A-1 through A-5). The size of each pie was based on the average total numbers/km or total weight (kg)/km of all species within each habitat segment and proportioned between the different segments in each river.

Kennebec River

Fish assemblage composition by numbers and weight reflected natural and anthropogenic gradients in the study area between Wyman Dam to Merrymeeting Bay. The highest average numbers and biomass of fish occurred in the riverine segment between Waterville and Augusta (Figures A-1 and A-2). This included all riverine, impounded, and tidal segments. The assemblage was predominated by American eel, smallmouth bass, alewife, redbreast sunfish, fallfish, and white sucker. The tidal segment had the next highest numerical density followed by the impounded segments and the two upstream riverine segments. Spottail shiner were numerically predominant followed by smallmouth bass, banded killifish, white sucker, American eel, alewife, white perch, white sucker, and redbreast sunfish. The impounded segments were predominated by species tolerant of lentic habitats and included smallmouth bass, redbreast sunfish, largemouth bass, yellow perch. Banded killifish were extremely numerous at one site in the Williams impoundment. Three species of Salmonidae (brown trout, rainbow trout, and landlocked salmon) were numerically present, but not predominant in the upstream most riverine segment and were virtually absent from the impounded habitats.

Composition by biomass reflected an even stronger gradient between natural riverine and impounded habitats. Again, the riverine segment between Waterville and Augusta had the highest biomass (105 kg/km) and was nearly twice that of the nearest segments, the riverine habitats between Skowhegan and Waterville and the tidal segment below Augusta. American eel, white sucker, striped bass, and smallmouth bass comprised more than 90% of the assemblage biomass in this segment. Biomass in the tidal segment was comprised mostly of common carp (65%) with white sucker, American eel, and striped bass comprising another 25%. The impounded segments had very low biomass compared to the riverine and tidal segments, some with nearly 16 times less than the riverine segment between Waterville and Augusta. Smallmouth bass and American eel predominated in these habitats.

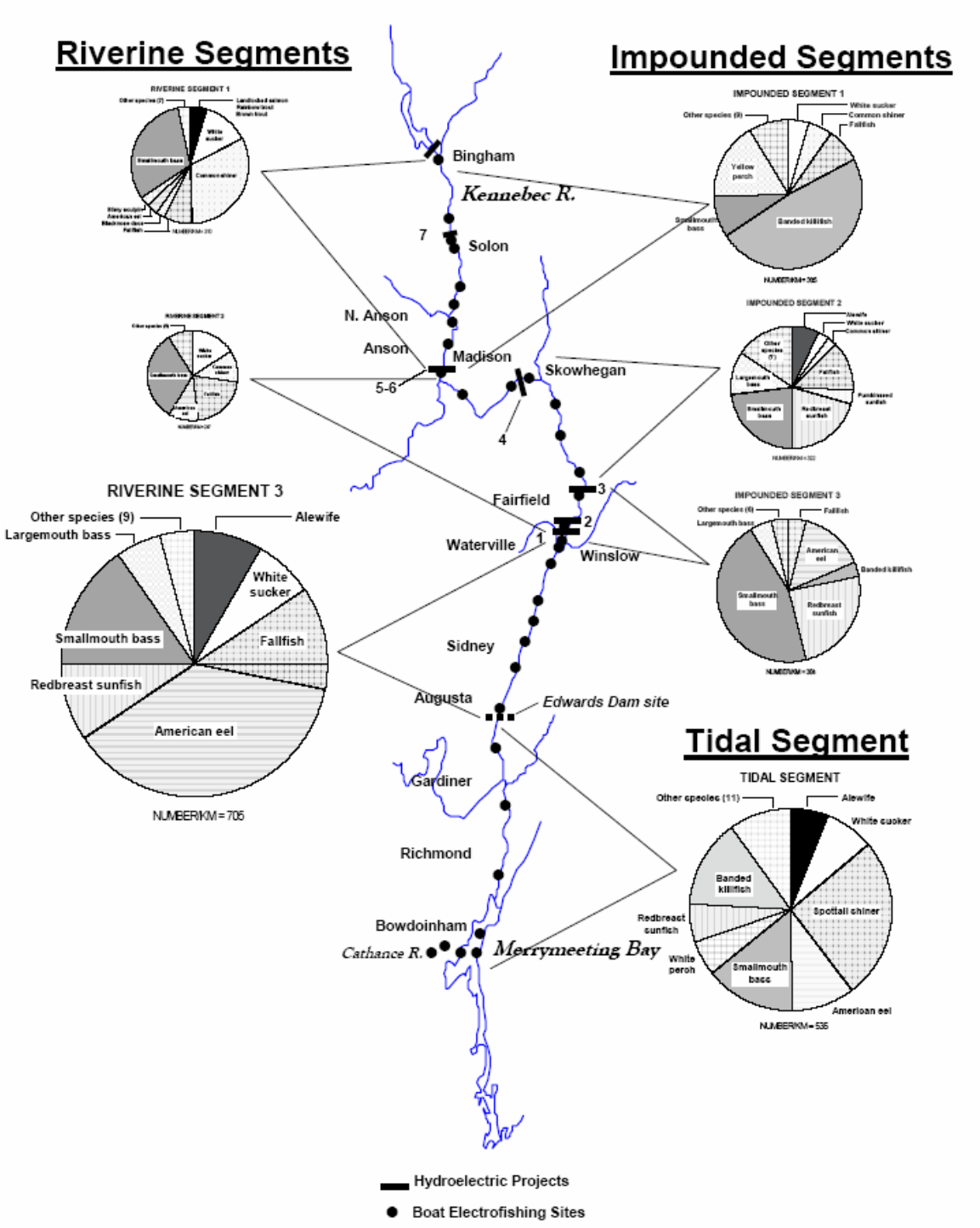

Figure A-1. Fish assemblage composition by major habitat segments (riverine, impounded, tidal) in the Kennebec River between Wyman Dam and Merrymeeting Bay, 2002 based on numbers. The sizes of the pies are proportioned based on the assemblage relative abundance (numbers/km). Electrofishing sites and hydroelectric projects are indicated.

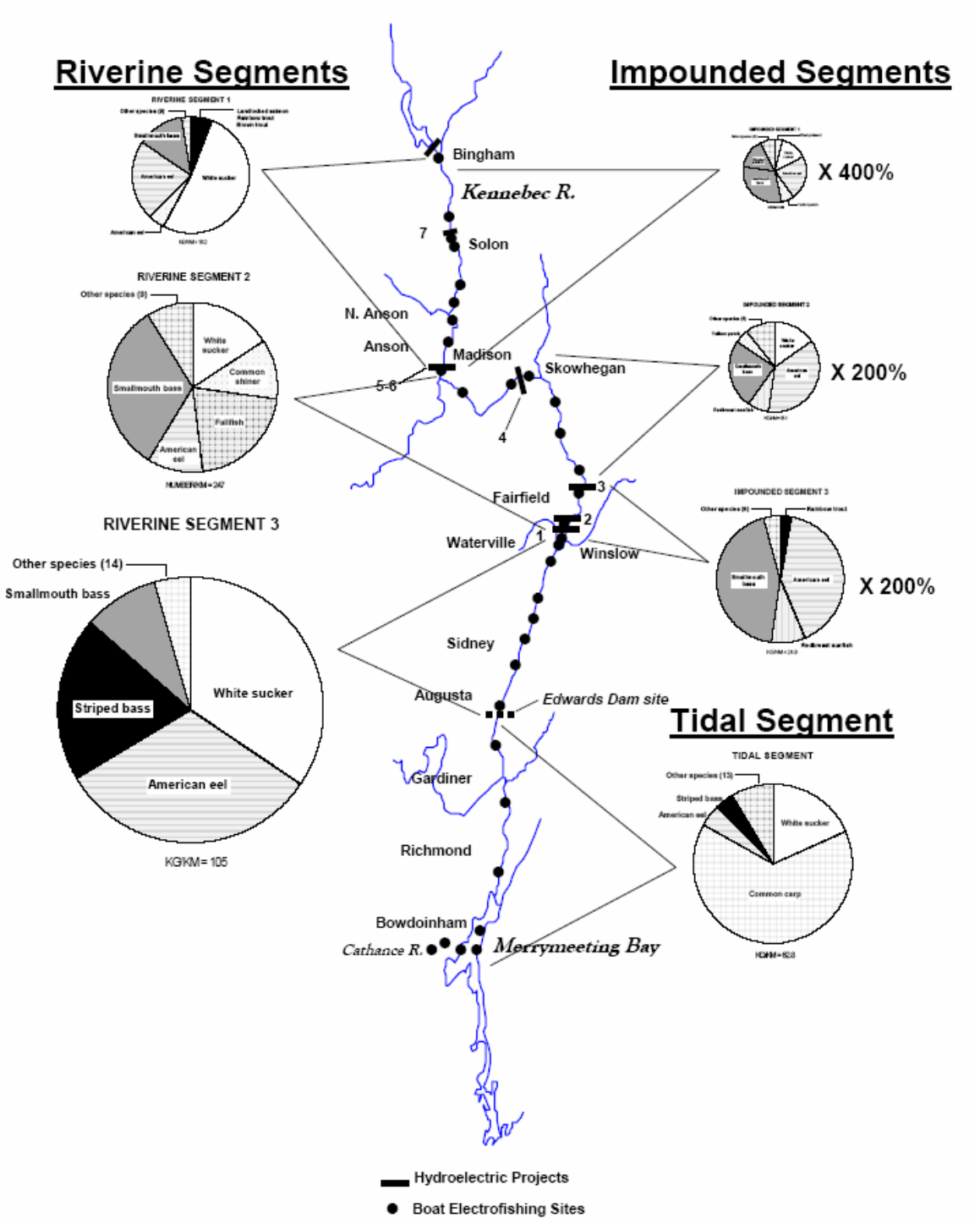

Figure A-2. Fish assemblage composition by major habitat segments (riverine, impounded, tidal) in the Kennebec River between Wyman Dam and Merrymeeting Bay, 2002 based on biomass. The sizes of the pies are proportioned based on the assemblage relative abundance (kg/km). Electrofishing sites and hydroelectric projects are indicated.

Androscoggin River

Similar to the Kennebec R., assemblage composition patterns in the Androscoggin also reflected natural and anthropogenic gradients. The downstream-most impounded and tidal segments exhibited the highest overall numerical abundance. The riverine segments in the upper one-half of the mainstem had somewhat higher numerical densities than the comparable impounded segments (Figure A-3). This pattern was reversed in the lower one-half of the mainstem where impounded segments exhibited higher densities. Smallmouth bass, common shiner, and fallfish were numerically predominant in both riverine and impounded segments in the upper mainstem. Longnose dace were also numerically predominant in the cold water riverine segments between Gorham, NH and Rumford. Spottail shiner emerged in the impounded segments as water temperatures became warmer downstream from Rumford and in the Jay-Livermore Falls area. Gulf Island Pond included a more even distribution of numerically predominant species that added species characteristic of lentic habitats including yellow perch, white perch, pumpkinseed sunfish, and redbreast sunfish in addition to smallmouth and largemouth bass. White sucker emerged in the lower riverine segments. The tidal segment included spottail shiner, American eel, white perch, white sucker, and the presence of alewife and American shad.

In terms of biomass the riverine segments generally had 2-3 times the biomass of the impounded segments. The tidal segment had the highest biomass of any riverine or impounded segment by 2.5-10 times (Figure A-4). Smallmouth bass and white sucker predominated the riverine segments in the upper mainstem and smallmouth bass and fallfish in the impounded segments. Rainbow trout and brown trout were also present, but were not predominant in the cold water segments upstream from Rumford. Smallmouth bass remained predominant in the lower mainstem in both riverine and impounded segments and was joined by white sucker in the riverine segments and species characteristic of lentic habitats such as redbreast sunfish, spottail shiner, yellow perch, chain pickerel, largemouth bass, and white perch in the impounded segments. American eel were included in selected riverine segments and were present only as large adults. The tidal segment included white sucker (70% by weight) followed by white perch, redbreast sunfish, white perch, common carp, and smallmouth bass.

Sebasticook River

The Sebasticook River was treated as a single segment in this analysis with single riverine and impounded habitat segments being delineated (Figure A-5). The distribution of species by numbers and biomass was remarkably even and included representation by the same 8-9 species for the riverine and impounded segments. Unlike the Kennebec and Androscoggin River results, both numbers and biomass were higher in the impounded segment by 1.7 and 1.4 times, respectively. The riverine segment was predominated in terms of numbers by redbreast sunfish, largemouth bass, yellow perch, chain pickerel, pumpkinseed sunfish, smallmouth bass, golden shiner, and white sucker. In terms of biomass the assemblage was predominated by white sucker, yellow perch, chain pickerel, smallmouth bass, largemouth bass, redbreast sunfish, brown bullhead, American eel, and

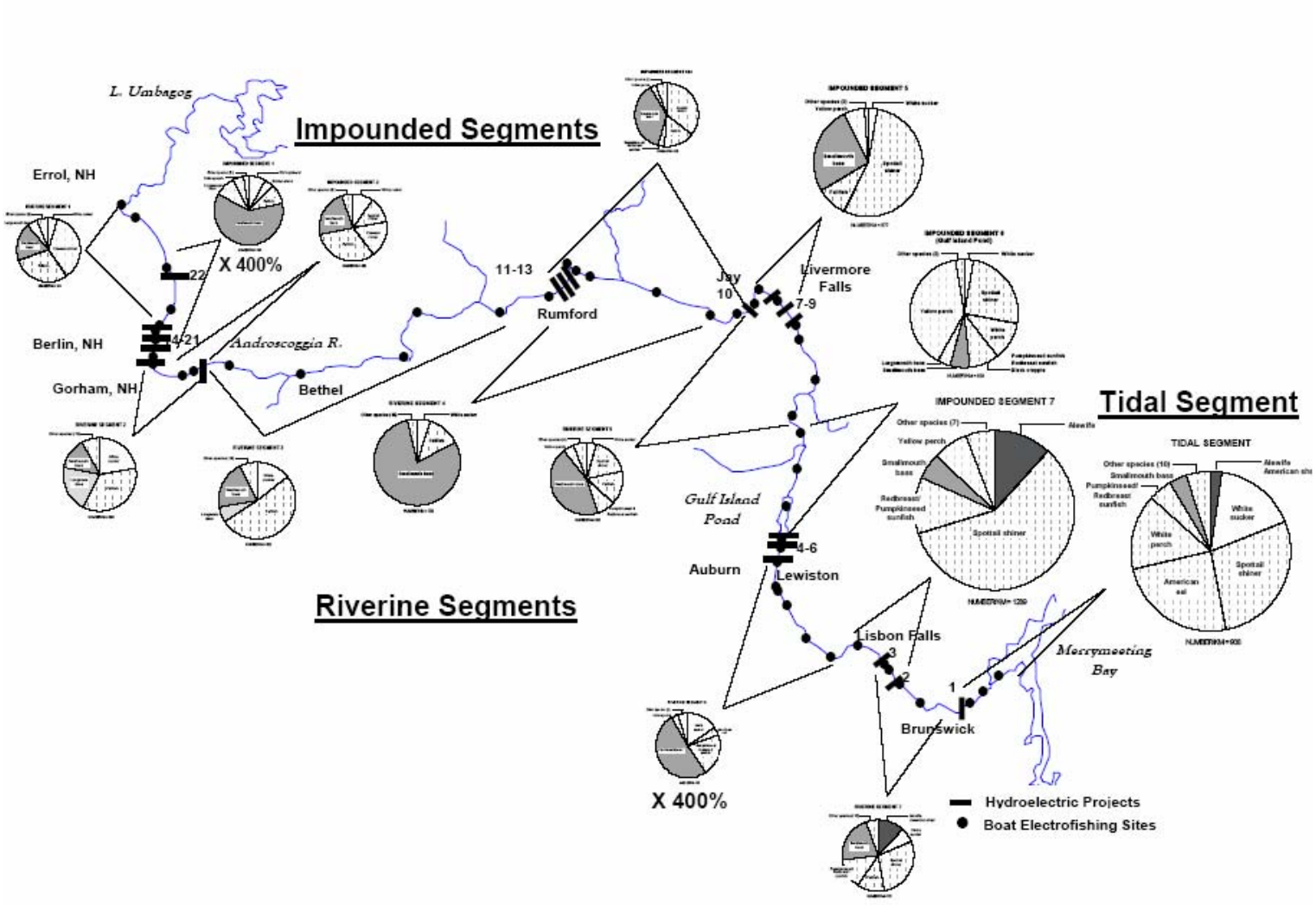

Figure A-3. Fish assemblage composition by major habitat segments (riverine, impounded, tidal) in the Androscoggin River between Errol, NH and Merrymeeting Bay, 2003 based on numbers. The sizes of the pies are proportioned based on the assemblage relative abundance (numbers/km). Electrofishing sites and hydroelectric projects are indicated. Compositional statistics used here also appear in Table A-1.

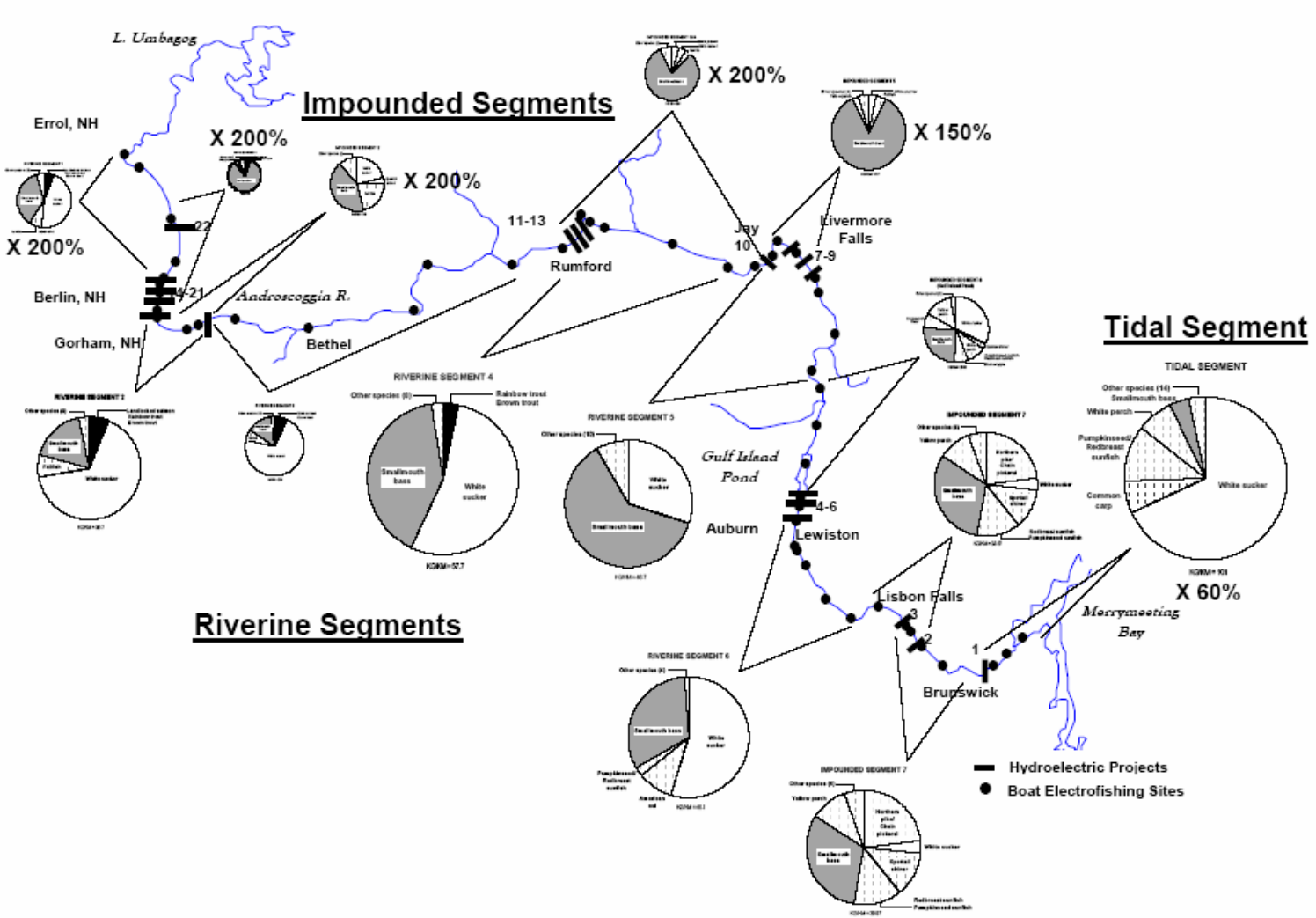

Figure A-4. Fish assemblage composition by major habitat segments (riverine, impounded, tidal) in the Androscoggin River between Errol, NH and Merrymeeting Bay, 2003 based on biomass. The sizes of the pies are proportioned based on the assemblage relative abundance (kg/km). Electrofishing sites and hydroelectric projects are indicated. Compositional statistics used here also appear in Table A-2.

Table A-1. Composition of the fish assemblage in major segments of the Androscoggin River on which the pie charts in Figure A-3 are based.

SPECIES-GROUP	RIVERINE 1 (% NO.) 2003	RIVERINE 1 (%WT.) 2003	RIVERINE 2 (%NO.) 2003	RIVERINE 2 (% WT.) 2003	RIVERINE 3 (% NO.) 2003	RIVERINE 3 (% NO.) 2003	RIVERINE 4 (%	RIVERINE 4 (% WT.) 2003	SPECIES-GROUP
CLUPEIDAE	0	0	0	0	0	0	0	0	**CLUPEIDAE**
Alewife	0	0	0	0	0	0	0	0	Alewife
Blueback	0	0	0	0	0	0	0	0	Blueback
American Shad	0	0	0	0	0	0	0	0	American Shad
SALMONIDAE	1.47	5.69	2.16	6.22	1.07	7.18	0.59	3.27	**SALMONIDAE**
Brown Trout	0.49	1.92	0.23	0.69	0.23	1.9	0.48	2.55	Brown Trout
Rainbow Trout	0.74	2.85	1.87	5.37	0.84	4.21	0.11	0.72	Rainbow Trout
Landlocked Salmon	0.24	0.92	0.06	0.16	0	0	0	0	Landlocked Salmon
Atlantic Salmon	0	0	0	0	0	0	0	0	Atlantic Salmon
ESOCIDAE	0	0	0	0	0.09	0.24	0.31	0.25	ESOCIDAE
Chain Pickerel	0.74	0.57	0	0	0.09	0	0.31	0.25	Chain Pickerel
Northern Pike	0	0	0	0	0	0	0	0	Northern Pike
CATOSTOMIDAE	4.6	45.58	22.3	66.57	14.65	71.49			CATOSTOMIDAE
White Sucker (Ad)	3.04	39.91	6.33	59.84	3.15	66.19	3.84	53.42	White Sucker (Ad)
White Sucker (Juv)	1.48	5.66	3.45	5.94	1.35	4	0.17	0.23	White Sucker (Juv)
White Sucker (YOY)	0.08	0.01	12.32	0.29	9.96	0.88	1.07	0.14	White Sucker (YOY)
White sucker (ALL)	4.6	45.58	22.1	66.07	14.46	71.07	5.08	53.79	**White sucker (ALL)**
Longnose Sucker	0	0	0.23	0.5	0.19	0.42	0	0	Longnose Sucker
TOLERANT MINNOWS	1.07	0.15	0.17	0.05	0.06	0.02	0.11	0.01	TOLERANT MINNOWS
Common Carp	0	0	0	0	0	0	0	0	Common Carp
Golden Shiner	1.07	0.15	0	0	0.03	0.02	0.11	0.01	Golden Shiner
Creek Chub	0	0	0.17	0.05	0.03	0	0	0	Creek Chub
GENERALIST MINNOWS	65.47	10.22	36.47	6.9	53.45	6.09	12.72	1.33	**GENERALIST MINNOWS**
Common Shiner	35.61	2.37	0.91	0.14	1.9	0.08	0.62	0.11	Common Shiner
Spottail Shiner	0.25	0.09	0.23	0.01	0.22	0.04	0	0	Spottail Shiner
Fallfish	29.61	7.76	35.33	6.75	51.33	5.97	12.1	1.22	Fallfish
FLUVIAL MINNOWS	0.58	0.14	20.92	1.08	6.46	0.6	0.25	0.01	FLUVIAL MINNOWS
Blacknose Dace	0	0	0.4	0.02	0.13	0	0	0	Blacknose Dace
Longnose Dace	0.58	0.14	20.52	1.06	6.33	0.6	0.25	0.01	Longnose Dace
ICTALURIDAE	0	0	0	0	0.03	0.1	0	0	ICTALURIDAE
Brown Bullhead	0	0	0	0	0.03	0.1	0	0	Brown Bullhead
White Catfish	0	0	0	0	0	0	0	0	White Catfish
AMERICAN EEL	0	0	0	0	0	0	0	0	AMERICAN EEL
American Eel (Ad)	0	0	0	0	0	0	0	0	American Eel (Ad)
American Eel (Juv)	0	0	0	0	0	0	0	0	American Eel (Juv)
American Eel (YOY)	0	0	0	0	0	0	0	0	American Eel (YOY)
American eel (ALL)	0	0	0	0	0	0	0	0	**American eel (ALL)**
BANDED KILLIFISH	0	0	0	0	0	0	0	0	BANDED KILLIFISH
OTHER COLDWATER	0.08	0.03	1.36	0.24	1.13	1.18	0.59	0.84	OTHER COLDWATER
Lake Chub	0	0	1.36	0.24	0.26	0.13	0	0	Lake Chub
Burbot	0	0	0	0	0.84	1.05	0.59	0.84	Burbot
Slimy Sculpin	0.08	0.03	0	0	0.03	0	0	0	Slimy Sculpin
OTHER ANADROMOUS	0	0	0	0	0.03	0.02	0.03	0.05	OTHER ANADROMOUS
Sea Lamprey	0	0	0	0	0	0	0	0	Sea Lamprey
White Perch	0	0	0	0	0.03	0.02	0.03	0.05	White Perch
Striped bass (YOY)	0	0	0	0	0	0	0	0	Striped bass (YOY)
SUNFISHES (non-Blackbass)	0.41	0.21	0	0	0	0	0.2	0.06	**SUNFISHES (non-Blackbass)**
Pumpkinseed Sunfish	0.41	0.21	0	0	0	0	0.06	0	Pumpkinseed Sunfish
Redbreast Sunfish	0	0	0	0	0	0	0.14	0.06	Redbreast Sunfish
Black Crappie	0	0	0	0	0	0	0	0	Black Crappie
BLACK BASSES	24.09	36.41	14.25	17.61	21.59	13.66	79.27	40.32	BLACK BASSES
Smallmouth Bass (Ad)	2.71	17.45	2.54	11.18	0.9	7.46	4.17	32.04	Smallmouth Bass (Ad)
Smallmouth Bass (Juv.)	14.06	18.18	5.71	5.93	4.02	5.02	5.25	3.34	Smallmouth Bass (Juv.)
Smallmouth Bass (YOY)	2.14	0.11	5.77	0.47	15.49	1.18	69.85	4.94	Smallmouth Bass (YOY)
Smallmouth bass (ALL)	18.91	35.74	14.02	17.58	20.41	13.66	79.27	40.32	**Smallmouth bass (ALL)**
Largemouth Bass (Ad.)	0	0	0	0	0	0	0	0	Largemouth Bass (Ad.)
Largemouth Bass (Juv.)	0	0	0	0	0	0	0	0	Largemouth Bass (Juv.)
Largemouth Bass (YOY)	5.18	0.67	0.23	0.03	0	0	0	0	Largemouth Bass (YOY)
Largemouth bass (ALL)	5.18	0.67	0.23	0.03	0	0	0	0	Largemouth bass (ALL)
YELLOW PERCH	1.48	1	0.52	1.33	2.61	0.46	0.85	0.07	**YELLOW PERCH**
TIDAL SPECIES	0	0	0	0	0	0	0	0	TIDAL SPECIES
Smelt	0	0	0	0	0	0	0	0	Smelt
Three-spine Stickleback	0	0	0	0	0	0	0	0	Three-spine Stickleback
Four-spine Stickleback	0	0	0	0	0	0	0	0	Four-spine Stickleback
Nine-spine Stickleback	0	0	0	0	0	0	0	0	Nine-spine Stickleback
Mummichog	0	0	0	0	0	0	0	0	Mummichog
OTHER SPECIES/HYBRIDS	0	0	0	0	0	0	0	0	**OTHER SPECIES/HYBRIDS**

Table A-1.

RIVERINE 5 (% NO.) 2003	RIVERINE 5 (% WT.) 2003	RIVERINE 6 (% NO.) 2003	RIVERINE 6 (% WT.) 2003	RIVERINE 7 (% NO.) 2003	RIVERINE 7 (% WT.) 2003	TIDAL (% NO.) 2003	TIDAL (% WT.) 2003	SPECIES-GROUP	IMPOUNDED 1 (%NO.) 2003
0	0	0	0	12.01	0.36	2.13	0.07	**CLUPEIDAE**	0
0	0	0	0	11.07	0.35	1.26	0.04	Alewife	0
0	0	0	0	0	0	0	0	Blueback	0
0	0	0	0	0.94	0.01	0.87	0.03	American Shad	0
0	0	0.3	0.35	0	0	0	0	**SALMONIDAE**	0.61
0	0	0	0	0	0	0	0	Brown Trout	0.46
0	0	0.3	0.35	0	0	0	0	Rainbow Trout	0.15
0	0	0	0	0	0	0	0	Landlocked Salmon	0
0	0	0	0	0	0	0	0	Atlantic Salmon	0
0.13	0.41	0	0	0.2	0.09	0	0	ESOCIDAE	7.98
0.13	0.41	0	0	0.2	0.09	0	0	Chain Pickerel	7.98
0	0	0	0	0	0	0	0	Northern Pike	0
4.49	30.08	15.62	54.67	6.56	42.77	16.8	68.16	CATOSTOMIDAE	0.45
3.07	29.84	14.58	53.97	3.31	40.18	8.97	65.68	White Sucker (Ad)	0.15
0.03	0.15	1.04	0.7	1.08	2.47	3.33	1.69	White Sucker (Juv)	0.15
1.39	0.09	0	0	2.17	0.12	4.5	0.79	White Sucker (YOY)	0.15
4.49	30.08	15.62	54.67	6.56	42.77	16.8	68.16	**White sucker (ALL)**	0.45
0	0	0	0	0	0	0	0	Longnose Sucker	0
1.43	0.18	0	0	1.26	0.12	0.71	6.17	TOLERANT MINNOWS	4.14
0	0	0	0	0	0	0.27	6.16	Common Carp	0
1.43	0.18	0	0	1.26	0.12	0.44	0.01	Golden Shiner	4.14
0	0	0	0	0	0	0	0	Creek Chub	0
35.13	1.98	4.32	0.43	42.57	3.2	30.07	1.11	**GENERALIST MINNOWS**	9.97
3.04	0.09	0	0	1.62	0.17	0.11	0.01	Common Shiner	0.31
17.09	0.31	2.08	0.03	28.65	0.9	28.07	1.07	Spottail Shiner	0
15	1.58	2.24	0.4	12.3	2.13	1.89	0.03	Fallfish	9.66
0	0	0	0	0	0	0	0	FLUVIAL MINNOWS	0
0	0	0	0	0	0	0	0	Blacknose Dace	0
0	0	0	0	0	0	0	0	Longnose Dace	0
0	0	0	0	0.03	0	0.09	0.19	ICTALURIDAE	0.15
0	0	0	0	0.03	0	0	0	Brown Bullhead	0.15
0	0	0	0	0	0	0.09	0.19	White Catfish	0
0	0	4.17	9.39	1.09	9.04	24.36	11.14	AMERICAN EEL	0
0	0	3.72	9.04	0.86	8.63	0.03	0.12	American Eel (Ad)	0
0	0	0.45	0.35	0.23	0.41	9.02	10.75	American Eel (Juv)	0
0	0	0	0	0	0	15.31	0.27	American Eel (YOY)	0
0	0	4.17	9.39	1.09	9.04	24.36	11.14	**American eel (ALL)**	0
0	0	0	0	0.17	0.01	0.69	0.02	BANDED KILLIFISH	0
0.63	0.76	0	0	0	0	0	0	OTHER COLDWATER	0
0	0	0	0	0	0	0	0	Lake Chub	0
0.63	0.76	0	0	0	0	0	0	Burbot	0
0	0	0	0	0	0	0	0	Slimy Sculpin	0
0	0	0	0	0.09	0	15.54	7.26	OTHER ANADROMOUS	0
0	0	0	0	0	0	0.23	0.02	Sea Lamprey	0
0	0	0	0	0.09	0	15.31	7.24	White Perch	0
0	0	0	0	0	0	0.45	0.08	Striped bass (YOY)	0
8.19	2.62	20.39	2.72	13.55	7.32	4.81	1.05	**SUNFISHES (non-Blackbass)**	0
4.33	0.88	4.17	0.16	1.08	0.31	0.53	0.12	Pumpkinseed Sunfish	0
3.86	1.74	16.22	2.56	12.47	7.01	4.28	0.93	Redbreast Sunfish	0
0	0	0	0	0	0	0	0	Black Crappie	0
45.06	62.27	51.64	32.18	21.38	36.66	3.57	3.88	BLACK BASSES	70.86
8.07	54.53	16.96	26.89	4.31	28.7	1.07	3.04	Smallmouth Bass (Ad)	9.97
6.84	5.17	28.13	5.19	8.08	7.15	1.81	0.78	Smallmouth Bass (Juv.)	35.43
29.52	1.82	6.25	0.05	8.96	0.81	0.66	0.04	Smallmouth Bass (YOY)	15.49
44.43	61.52	51.34	32.13	21.35	36.66	3.54	3.86	**Smallmouth bass (ALL)**	60.89
0.2	0.65	0	0	0	0	0	0	Largemouth Bass (Ad.)	0
0.1	0.08	0.3	0.05	0	0	0.03	0.02	Largemouth Bass (Juv.)	0.31
0.33	0.02	0	0	0.03	0	0	0	Largemouth Bass (YOY)	9.66
0.63	0.75	0.3	0.05	0.03	0	0.03	0.02	Largemouth bass (ALL)	9.97
4.92	1.69	3.57	0.25	1.09	0.45	0.61	0.1	**YELLOW PERCH**	4.9
0	0	0	0	0	0	0.05	0	TIDAL SPECIES	0
0	0	0	0	0	0	0	0	Smelt	0
0	0	0	0	0	0	0	0	Three-spine Stickleback	0
0	0	0	0	0	0	0.05	0	Four-spine Stickleback	0
0	0	0	0	0	0	0	0	Nine-spine Stickleback	0
0	0	0	0	0	0	0	0	Mummichog	0
0	0	0	0	0	0	0	0	**OTHER SPECIES/HYBRIDS**	0

Table A-1.

IMPOUNDED 1 (%WT.) 2003	IMPOUNDED 2 (%NO.) 2003	IMPOUNDED 2 (%WT.) 2003	IMPOUNDED 3&4 (%NO.) 2003	IMPOUNDED 3&4 (%WT.) 2003	IMPOUNDED 5 (%NO.) 2003	SPECIES-GROUP	IMPOUNDED 5 (%WT.) 2003
0	0	0	0	0	0	**CLUPEIDAE**	0
0	0	0	0	0	0	Alewife	0
0	0	0	0	0	0	Blueback	0
0	0	0	0	0	0	American Shad	0
1.67	0	0	0	0	0	**SALMONIDAE**	0
1.19	0	0	0	0	0	Brown Trout	0
0.48	0	0	0	0	0	Rainbow Trout	0
0	0	0	0	0	0	Landlocked Salmon	0
0	0	0	0	0	0	Atlantic Salmon	0
2.8	0	0	1.8	4.53	0.34	ESOCIDAE	2.21
2.8	0	0	1.8	4.53	0.34	Chain Pickerel	2.21
0	0	0	0	0	0	Northern Pike	0
3.22	9.75	21.06	0.18	4.4	2.83	CATOSTOMIDAE	3.16
3.11	0.27	9.39	0.09	3.79	0.09	White Sucker (Ad)	2.89
0.1	4.74	11.26	0.09	0.61	2.74	White Sucker (Juv)	0.27
0.01	4.74	0.41	0	0	0	White Sucker (YOY)	0
3.22	9.75	21.06	0.18	4.4	2.83	**White sucker (ALL)**	3.16
0	0	0	0	0	0	Longnose Sucker	0
0.26	1.43	1.85	1.61	1.8	0	TOLERANT MINNOWS	0
0	0	0	0	0	0	Common Carp	0
0.26	1.43	1.85	1.61	1.8	0	Golden Shiner	0
0	0	0	0	0	0	Creek Chub	0
2.2	62.02	27.47	52.51	4.48	63.44	**GENERALIST MINNOWS**	5.88
0.13	17.6	2.12	1.33	0.34	0	Common Shiner	0
0	12.43	4.06	35.45	0.92	54.43	Spottail Shiner	1.2
2.07	31.99	21.29	15.73	3.22	9.01	Fallfish	4.68
0	0	0	0	0	0	FLUVIAL MINNOWS	0
0	0	0	0	0	0	Blacknose Dace	0
0	0	0	0	0	0	Longnose Dace	0
0.1	0	0	0.28	0.22	0	ICTALURIDAE	0
0.1	0	0	0.28	0.22	0	Brown Bullhead	0
0	0	0	0	0	0	White Catfish	0
0	0	0	0	0	0	AMERICAN EEL	0
0	0	0	0	0	0	American Eel (Ad)	0
0	0	0	0	0	0	American Eel (Juv)	0
0	0	0	0	0	0	American Eel (YOY)	0
0	0	0	0	0	0	**American eel (ALL)**	0
0	0	0	0	0	0	BANDED KILLIFISH	0
0	0	0	0.28	0.64	0.17	OTHER COLDWATER	0.51
0	0	0	0	0	0	Lake Chub	0
0	0	0	0.28	0.64	0.08	Burbot	0.51
0	0	0	0	0	0	Slimy Sculpin	0
0	0	0	0	0	0	OTHER ANADROMOUS	0
0	0	0	0	0	0	Sea Lamprey	0
0	0	0	0	0	0	White Perch	0
0	0	0	0	0	0	Striped bass (YOY)	0
0	0	0	3.31	2.38	0.52	**SUNFISHES (non-Blackbass)**	0.5
0	0	0	3.22	2.14	0.52	Pumpkinseed Sunfish	0.5
0	0	0	0.09	0.24	0	Redbreast Sunfish	0
0	0	0	0	0	0	Black Crappie	0
84.1	23.06	42.58	36.96	80.24	26.37	BLACK BASSES	85.03
41.79	1.25	10.16	1.61	68.63	3.05	Smallmouth Bass (Ad)	76.71
41.17	13.85	31.29	0.85	2.2	1.88	Smallmouth Bass (Juv.)	4.51
0.97	7.69	1.06	34.5	9.41	21.44	Smallmouth Bass (YOY)	3.81
83.93	22.79	42.51	36.96	80.24	26.37	**Smallmouth bass (ALL)**	85.03
0	0	0	0	0	0	Largemouth Bass (Ad.)	0
0.17	0	0	0	0	0	Largemouth Bass (Juv.)	0
0.9	0.27	0.07	0	0	0	Largemouth Bass (YOY)	0
1.07	0.27	0.07	0	0	0	Largemouth bass (ALL)	0
3.95	2.15	2.62	2.93	1.31	6.34	**YELLOW PERCH**	2.72
0	0	0	0	0	0	TIDAL SPECIES	0
0	0	0	0	0	0	Smelt	0
0	0	0	0	0	0	Three-spine Stickleback	0
0	0	0	0	0	0	Four-spine Stickleback	0
0	0	0	0	0	0	Nine-spine Stickleback	0
0	0	0	0	0	0	Mummichog	0
0	0	0	0	0	0	**OTHER SPECIES/HYBRIDS**	0

Table A-1.

GULF IS. POND - IMP. 6 (%NO.) 2003	GULF IS. POND - IMP. 6 (%WT.) 2003	IMPOUNDED 7 (%WT.) 2003	IMPOUNDED 7 (%WT.) 2003
0	0	11.71	0.95
0	0	11.71	0.95
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
1.45	2.05	1.69	23.14
1.45	2.05	1.45	3.36
0	0	0.24	19.78
2.66	32.12	0.21	3.62
0.98	21.5	0.08	2.28
0.95	10.48	0.13	1.34
0.73	0.14	0	0
2.66	32.12	0.21	3.62
0	0	0	0
0.98	0.55	1.01	0.41
0	0	0	0
0.98	0.55	1.01	0.41
0	0	0	0
25.38	3.41	59.62	13.08
0	0	0.31	0.02
25.32	3.01	58.65	12.54
0.06	0.4	0.66	0.52
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0.23	1.16
0	0	0.23	1.16
0	0	0	0
0	0	0.1	2
0	0	0.05	1.67
0	0	0.05	0.33
0	0	0	0
0	0	0.1	2
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
11.33	8.75	0	0
0	0	0	0
11.33	8.75	0	0
0	0	0	0
8.96	7.04	11.4	13.47
8.12	5.35	0.46	0.53
0.73	1.51	10.94	12.94
0.11	0.18	0	0
9.73	32.28	7.01	31.91
1.54	20.22	1.94	26.96
1.79	4.32	2.61	4.44
2.43	0.4	0.75	0.05
5.76	24.94	5.3	31.45
0.08	5.87	0.03	0.12
0.39	0.49	0.21	0.18
3.5	0.98	1.47	0.16
3.97	7.34	1.71	0.46
39.51	13.8	7.04	10.26
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0

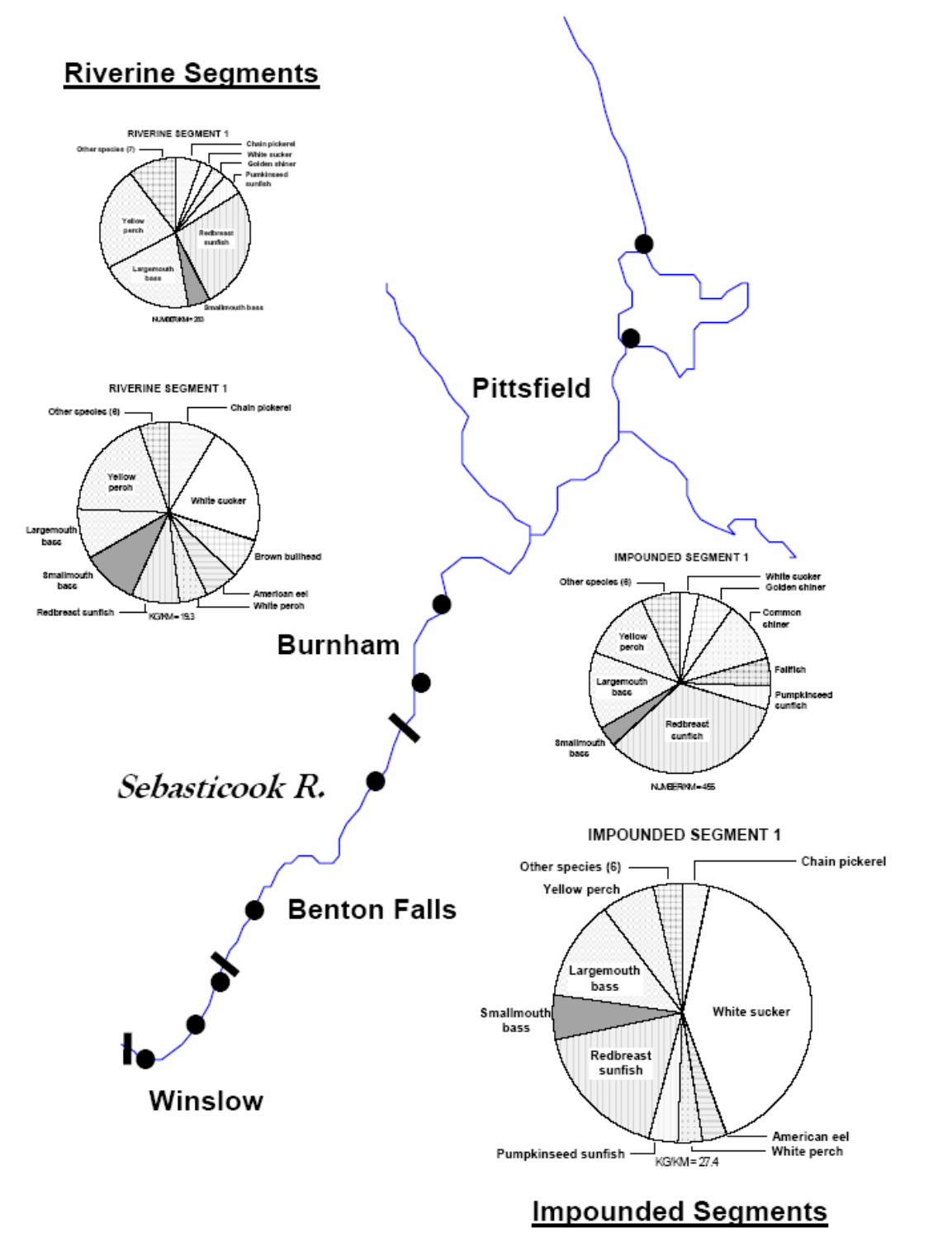

Figure A-5. Fish assemblage composition by major habitat segments (riverine and impounded) in the Sebasticook River between Douglas Pond and Winslow, 2003 based on numbers and biomass. The sizes of the pies are proportioned based on the assemblage relative abundance (number/km and kg/km). Electrofishing sites and hydroelectric projects are indicated.

white perch. The impounded segment was predominated in terms of numbers by redbreast sunfish, largemouth bass, yellow perch, common shiner, golden shiner, fallfish, pumpkinseed sunfish, smallmouth bass, and white sucker. In terms of biomass the predominant species were white sucker, redbreast sunfish, largemouth bass, yellow perch, smallmouth bass, chain pickerel, pumpkinseed sunfish, and white perch. This predominately lentic assemblage association reflected both the low gradient character of the riverine habitats and the extent of the impounded reaches.

Patterns in Assemblage Parameters

We used common assemblage parameters such as species richness, numbers, biomass, and the Modified Index of Well-Being (MIwb; Gammon 1976; Yoder and Smith 1999) to examine spatial patterns within and between the three study rivers. Selected candidate IBI metrics were also considered and included functional feeding groups (insectivores, omnivores, top carnivores) and %DELT[1] anomalies. We also assessed the presence of non-native species, i.e., those that we designated as exotics and of intercontinental origin (Table S-1) following the definitions of Halliwell (2005). The non-native designation does not include non-native species that have become naturalized such as smallmouth and largemouth bass and species of intracontinental origin such as chain pickerel, golden shiner, and white perch. We also analyzed for the metrics of the Target Fish Community approach of Bain and Meixler (2000) following their designations of species as macrohabitat generalists, fluvial dependents, fluvial specialists, and diadromous species. These designations are recorded in Table S-1 and we made assignments for species they did not classify based on our knowledge of life history and habits. We also added a classification of tidal specialist for species that uniquely occurred in tidal areas.

The first set of analyses involved analyzing selected indices, metrics, or attributes at each site as longitudinal plots by distance or river mile in an upstream to downstream direction for each river. The second set of analyses involved aggregating the data by major habitat types and river that included free-flowing riverine (Androscoggin and Kennebec-Sebasticook), open riverine (Kennebec River between Waterville and Augusta), impounded riverine (Androscoggin and Kennebec-Sebasticook), and tidal influenced (Androscoggin and Kennebec combined) habitat types. These were displayed as box-and-whisker plots of each index, metric, or attribute.

Longitudinal Analyses

Longitudinal analyses consist of graphical plots of indices, metrics, and other assemblage attributes by river mile for each individual river mainstem in an upstream to downstream format. The data being the product of the spatially intensive design can be used to comprehensively assess and "visualize" the assemblage responses to naturally occurring gradients and anthropogenic disturbances. The design yields multiple data points positioned in proximity to suspected sources such that results can be analyzed and displayed in a longitudinal context. This sampling design and the interpretation of the

[1] %DELT – percentage of all fish with deformities, erosions, lesions, and/or tumors.

data relative to potential disturbance sources is based on the concept of "pollution zones" originated by Bartsch (1948) and Doudoroff and Warren (1951). As such the severity (i.e., departure from a desired state or condition) and extent (i.e., the proportion of the resource over which the departures occur) of changes can be assessed.

Kennebec River

Species richness ranged from 10 at two upper mainstem sites to 18 in Merrymeeting Bay with most sites ranging from 10-15 species (Figure A-6). Species richness showed a net downstream increase, but the change from site to site was variable and did not appear related to any strong relationships with natural or anthropogenic gradients. The longitudinal pattern reflected lower richness in the upper cold water reaches and increased richness mostly via species addition in the downstream, warmer reaches. Non-native species comprised a minor fraction of the assemblage at each site ranging from 0 to 3. In the upper mainstem this included brown trout and rainbow trout. The number of non-native species increased downstream and reflected the addition of warmwater species that included common carp, white catfish, and black crappie.

Assemblage density (numbers/km) and biomass (kg/km) exhibited an erratic, but net increase from upstream to downstream (Figure A-6). The results at any single site were sometimes influenced by a few numerous or large species, but generally density and biomass was higher at riverine and tidal sites than impounded sites. The Modified Index of Well-Being (MIwb) normalized much of the variation that is inherent to the measures density and biomass. We also examined for any relationships between the MIwb and QHEI given the strong habitat quality gradient that exists. The MIwb showed some localized changes in selected reaches and segments, but it was not significantly correlated with the QHEI (r^2 = 0.028). One notable decline occurred in the mainstem at a free-flowing site just upstream from the Madison impoundment just upstream from N. Anson. This site exhibited embedded substrates and other signs of excess sediments. The mainstem in this area is bordered by agricultural row cropping. Another decline occurred immediately downstream from Skowhegan, immediately upstream from the Lockwood Dam, and in the first tidal site downstream from Hallowell. None of these seem to be spatially correlated with any significant impacts or sources. The MIwb is responsive to severe, acute impacts but is not particularly discriminating about impacts that result in more subtle changes to the fish assemblage (Yoder and Smith 1999). The level of external anomalies on fish was measured by the proportion of fish that had deformities, erosions, lesions, and/or tumors (%DELT) did not exceed 2% at any site. Most sites exhibited less than 0.5%, but some exceeded 1.0% (Figure A-6). If there was any pattern it was an overall increase in a downstream direction. Peak values occurred at impounded, riverine, and tidal sites.

Target fish community metrics were also examined on a longitudinal basis. Here the effect of habitat was more apparent with macrohabitat generalists dominating impounded sites exceeding 80% of the assemblage at most of these sites (Figure A-6). QHEI and %macrohabitat generalists was negatively correlated (r^2 = 0.46). Fluvial specialist

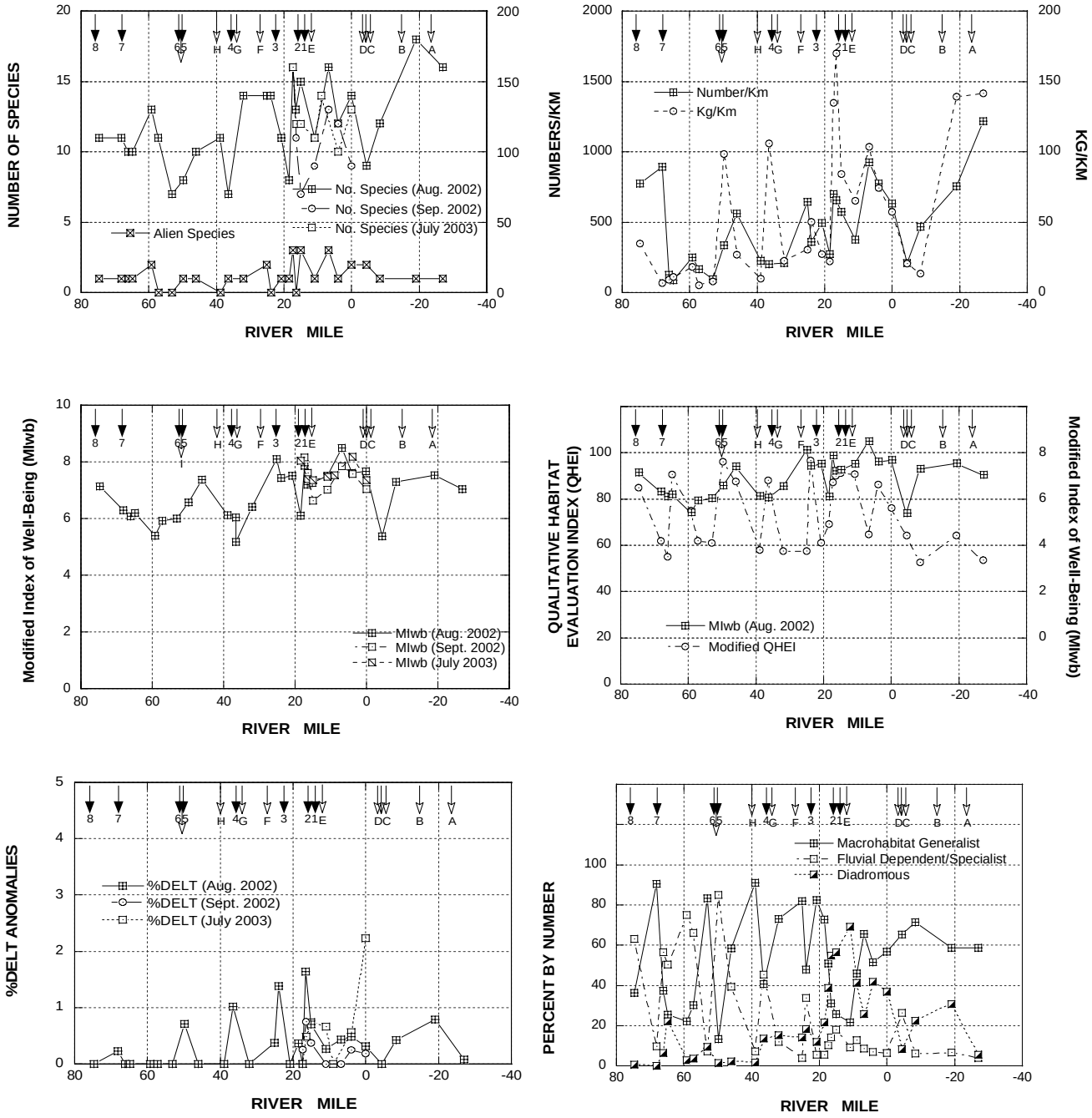

Figure A-6. Longitudinal plots of fish assemblage parameters in the Kennebec River between Wyman Dam and Merrymeeting Bay, 2002. Upper left: species richness and number of non-native species. Upper right: numbers/km and kg/km. Middle left: Modified Index of Well-Being (MIwb). Middle right: MIwb with the QHEI. Lower left: percentage of DELT anomalies. Lower right: Percent composition of macrohabitat generalists, fluvial dependents and specialists, and diadromous species. Letters and numbers denote dams and major point sources (see study area description).

and dependent species predominated at the free-flowing sites and showed a positive, but less pronounced relationship with QHEI. Macrohabitat generalists predominated at the tidal sites downstream from Augusta. Diadromous species occurred mostly as American eel upstream from Waterville and became more prevalent downstream.

Androscoggin River

Species richness ranged from a low of 4 species in Lewiston-Auburn to a high of 19 species at the entrance to Merrymeeting Bay with most sites ranging from 7-13 (Figure A-7). Excluding the most downstream tidal site, there was only a slight overall increase from upstream to downstream. Non-native species were not a major part of the fauna with 1 or 2 species when they were present; most sites had none. Rainbow and brown trout occurred in the colder upper mainstem and black crappie in the lower mainstem. A few common carp occurred in the tidal segment. Density (numbers/km) and biomass (kg/km) increase steadily in a downstream direction with a few erratic values caused primarily by one or two predominant species. An example was the very high density caused by the occurrence of numerous young-of-year spottail shiners in the impoundment downstream from the Jay dam (RM 55.8).

The Modified Index of Well-Being (MIwb) normalized much of the variation that is inherent to the measures density and biomass. We also examined for any relationships between the MIwb and QHEI given the strong habitat quality gradient that exists. The MIwb showed some localized changes in selected reaches and segments, but it was not significantly correlated with the QHEI ($r^2 = 0.001$). The longitudinal trend showed two rather pronounced declines immediately downstream from Berlin and in Lewiston-Auburn. The overall trend was a slight net increase downstream.

The proportion of fish with DELT anomalies was <1% in the mainstem upstream from Gulf Island Pond. %DELT increased markedly to 4% and >4% at two sites, RM 25.2 downstream from the Deer Rips dam and RM 21.9 in Lewiston-Auburn within and downstream of an area impacted by combined sewer overflows (CSOs). The levels quickly returned to near zero. %DELT were slightly elevated in the tidal segment downstream from Brunswick. With the exception of the two sites upstream and within Lewiston-Auburn, none of the results suggest serious impacts.

Target fish community metrics also showed the effect of habitat with macrohabitat generalists dominating impounded sites exceeding 80-90% of the assemblage at most of these sites (Figure A-6). The values were almost 100% in Gulf Island Pond. QHEI and %macrohabitat generalists was negatively correlated, but not significantly so ($r^2 = 0.22$). Fluvial specialist and dependent species predominated the free-flowing sites in the upper mainstem and also showed a positive, but less pronounced relationship with QHEI. In the lower one-half of the mainstem downstream from Rumford, macrohabitat generalists comprised at least 60% of the assemblage regardless of habitat type. This persisted downstream to below the Worumbo dam (RM 8.2) where the percentage declined to less than 50-60%. Macrohabitat generalists also predominated the tidal sites downstream from

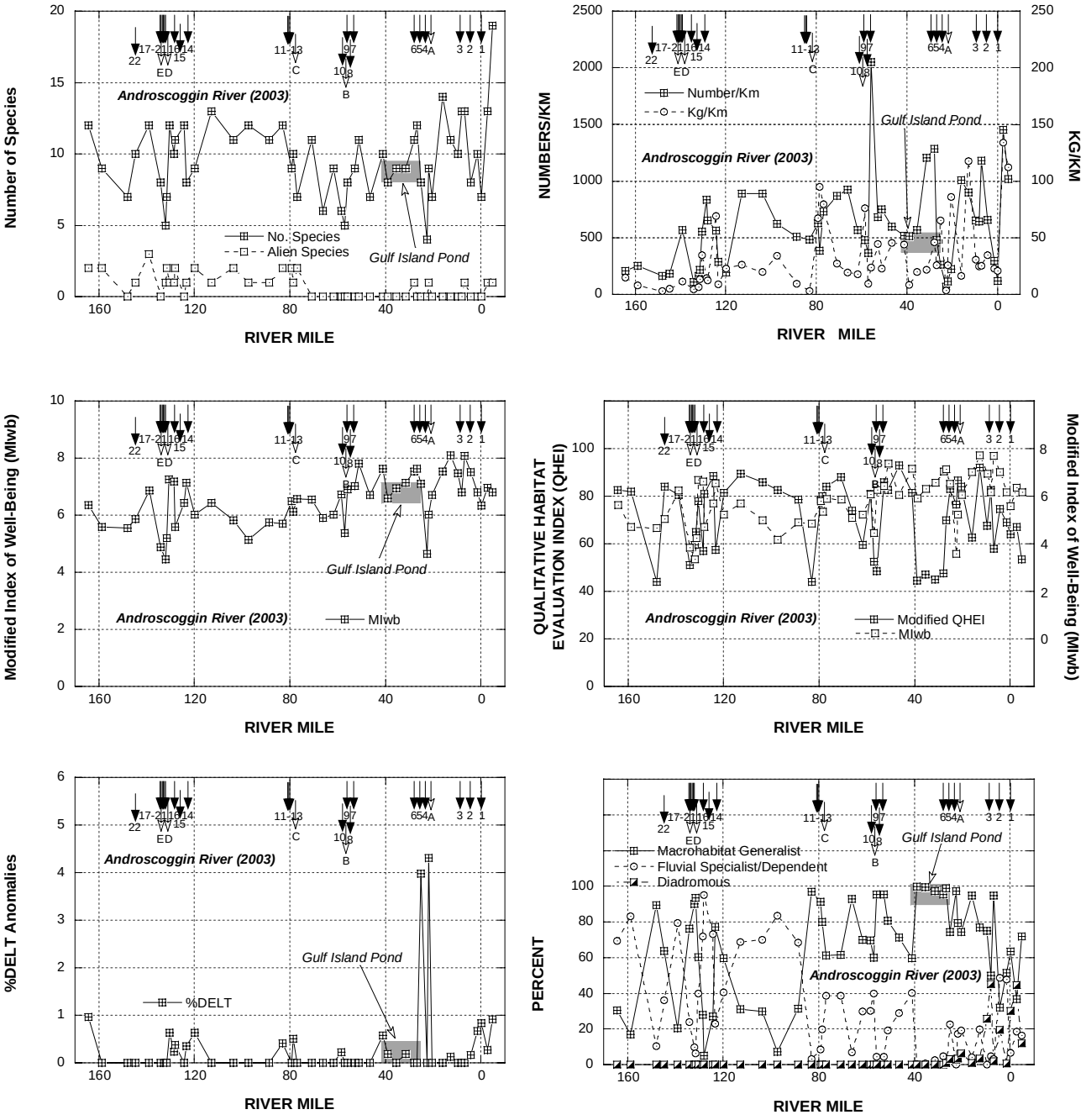

Figure A-7. Longitudinal plots of fish assemblage parameters in the Androscoggin River between Errol, NH and Merrymeeting Bay, 2003. Upper left: species richness and number of non-native species. Upper right: numbers/km and kg/km. Middle left: Modified Index of Well-Being (MIwb). Middle right: MIwb with the QHEI. Lower left: percentage of DELT anomalies. Lower right: Percent composition of macrohabitat generalists, fluvial dependents and specialists, and diadromous species. Letters and numbers denote dams and major point sources (see study area description).

Brunswick. Diadromous species were restricted to the mainstem downstream from Gulf Island Pond mostly in the form of large American eels. The proportion of diadromous species increased downstream from the Worumbo dam and was highest in the tidal segment.

Sebasticook River

Species richness ranged from a low of 6 species in Douglas Pond to a high of 14 species in the Ft. Halifax impoundment with most sites ranging from 11-13 (Figure A-8). There was steady and net overall increase from upstream to downstream. Non-native species were not a major part of the fauna with 1 species at 5 of the 9 sites. This was represented exclusively by black crappie. Density (numbers/km) and biomass (kg/km) increased in a downstream direction with the highest density occurring at Benton Falls and the highest biomass in the Ft. Halifax impoundment. The Modified Index of Well-Being (MIwb) normalized the variation that is inherent to the measures density and biomass and showed an overall increase from upstream to downstream. The MIwb showed a reverse, negative correlation with the QHEI that was not significant ($r^2 = 0.17$). The longitudinal trend did not exhibit any changes that were suggestive of significant impacts. The proportion of fish with DELT anomalies was zero at all except one mainstem site where a very low incidence was observed.

Target fish community metrics showed the effect of the impounded and low gradient riverine habitat with macrohabitat generalists dominating exceeding 80% of the assemblage at all except one site (Figure A-8). The values were at or just below 100% in Douglas Pond. QHEI and %macrohabitat generalists was negatively correlated, but not significantly so ($r^2 = 0.31$). Fluvial specialist and dependent species were generally less than 10% with the site at Benton Falls reaching 30%. The proportion of diadromous species comprised less than 5-10% of the assemblage at most sites. They were more prevalent in the lower mainstem and were represented by American ell and alewife.

Summary

Some consistent patterns were evident in selected assemblage parameters between the three rivers. Species richness showed a net increase from upstream to downstream being the most demonstrable in the Kennebec and Sebasticook Rivers. Numerical density and biomass also showed overall increases in the same direction and was highly variable from site to site in the Kennebec and Androscoggin. The MIwb did not show any strong impacts, instead showing some localized departures. This observation rules out the existence of any strong acute impacts, but may mask more subtle impacts due to habitat and/or nutrient enrichment. The incidence of external anomalies on fish was usually less than 1%, but did show some localized responses to potential pollution sources in the Androscoggin River.

Perhaps the strongest signal of any of the assemblage parameters examined was exhibited by the target fish community metrics. These tended to show the strongest differences between the major riverine habitat types, particularly between free-flowing riverine and

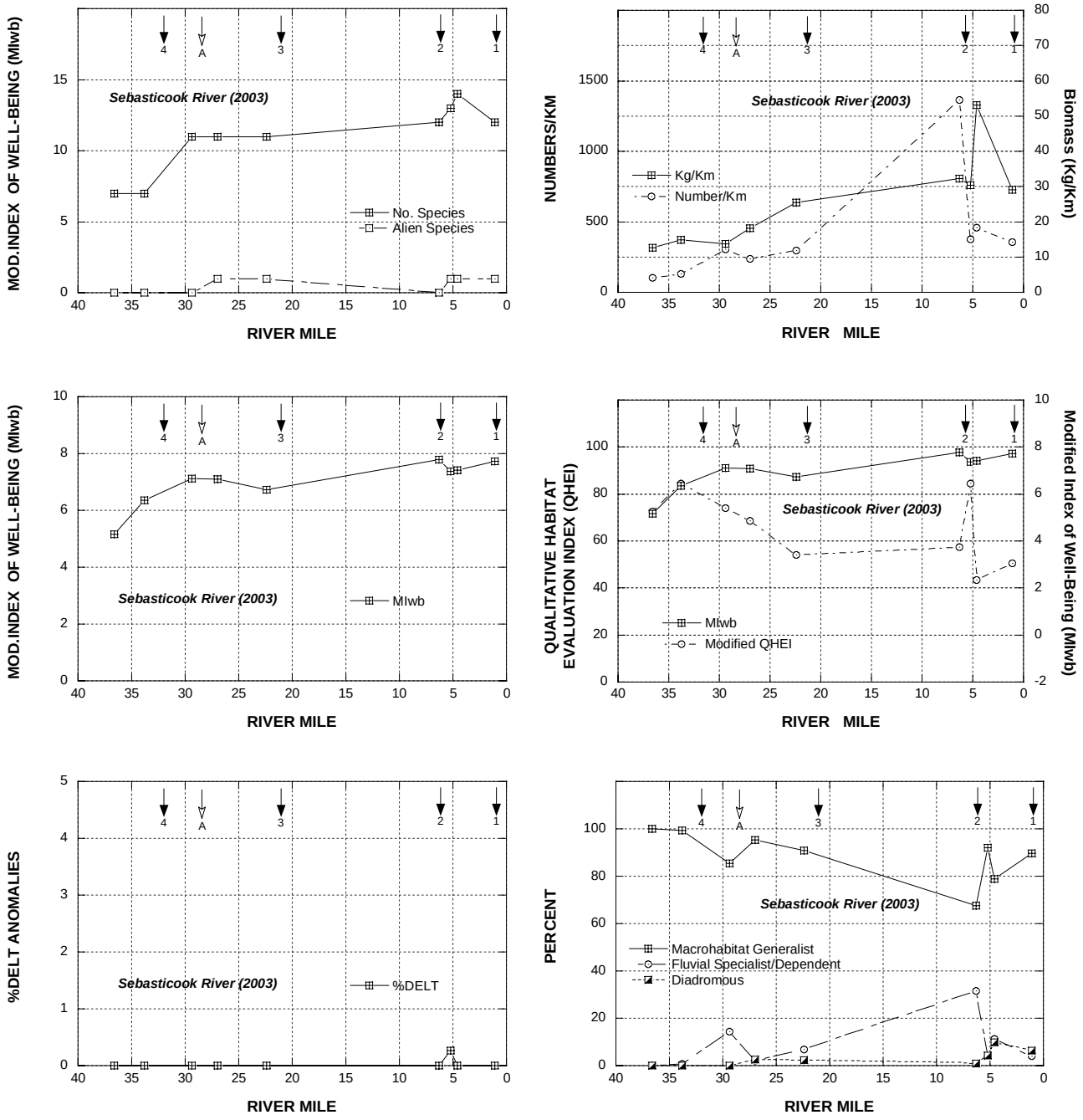

Figure A-8. Longitudinal plots of fish assemblage parameters in the Sebasticook River between Pittsfield and Winslow, 2003. Upper left: species richness and number of non-native species. Upper right: numbers/km and kg/km. Middle left: Modified Index of Well-Being (MIwb). Middle right: MIwb with the QHEI. Lower left: percentage of DELT anomalies. Lower right: Percent composition of macrohabitat generalists, fluvial dependents and specialists, and diadromous species. Letters and numbers denote dams and major point sources (see study area description).

impounded sites. Correlations between the QHEI and these metrics were usually not significant, but the results along the longitudinal continuum may be nonetheless meaningful. The lower one-half of the Androscoggin River mainstem exhibited an unusually high proportion of macrohabitat generalists despite having segments of free-flowing riverine habitat. The Sebasticook River was predominated by macrohabitat generalists throughout the entire mainstem. It may be that the predominance and repetition of impounded habitats extended into these free-flowing sites. Lyons et al. (2001) observed the length of riverine reaches between hydroelectric dams to be correlated with lower IBI scores in Wisconsin Rivers, i.e., more restricted reaches between dams had lower IBI scores. It may also be attributable to the effects of pollution in the form of organic and nutrient enrichment that is apparent in the lower mainstem. These and other exploratory analyses of assemblage parameters and potential metrics are pre-requisite to meeting the IBI development goal of this project.

Habitat Segment Analyses

Habitat segment analyses consisted of aggregating assemblage parameter data by major habitat type (free-flowing riverine, impounded, fresh and brackish tidal) by major mainstem segments. We aggregated data for free-flowing riverine and impounded sites for the Androscoggin River, combined the Kennebec and Sebasticook Rivers, and the Kennebec River segment between Waterville and Augusta termed open riverine; we combined the Androscoggin and Kennebec River tidal segments for a total of six aggregations of habitat type and river segments. Box-and-whisker plots were constructed for the same assemblage parameters that were analyzed for the longitudinal analyses. The discussion of the results is arranged by parameter.

Species Richness

Species richness was similar between the six aggregations of habitat type and river segmentation (Figure A-9). Median richness was highest in the tidal habitats (13) and lowest in the Androscoggin impounded habitats (9). Hence species richness was similar between habitat types and segments revealing little about assemblage variation against this gradient.

Numerical Density

Numerical density expressed as the total number of individuals/km also showed little marked variation between the habitat types and segments. Median density was highest in the open riverine segment of the Kennebec River, but was nearly the same in the tidal habitats, the Androscoggin riverine, and Androscoggin impounded habitats (Figure A-9). Median density was lowest in the Kennebec-Sebasticook riverine and impounded habitats. The variation in density was different within each aggregation being highest in the tidal habits and the Androscoggin impoundments. Still, no clear pattern was evident and is possibly obscured by the lumping of all size classes.

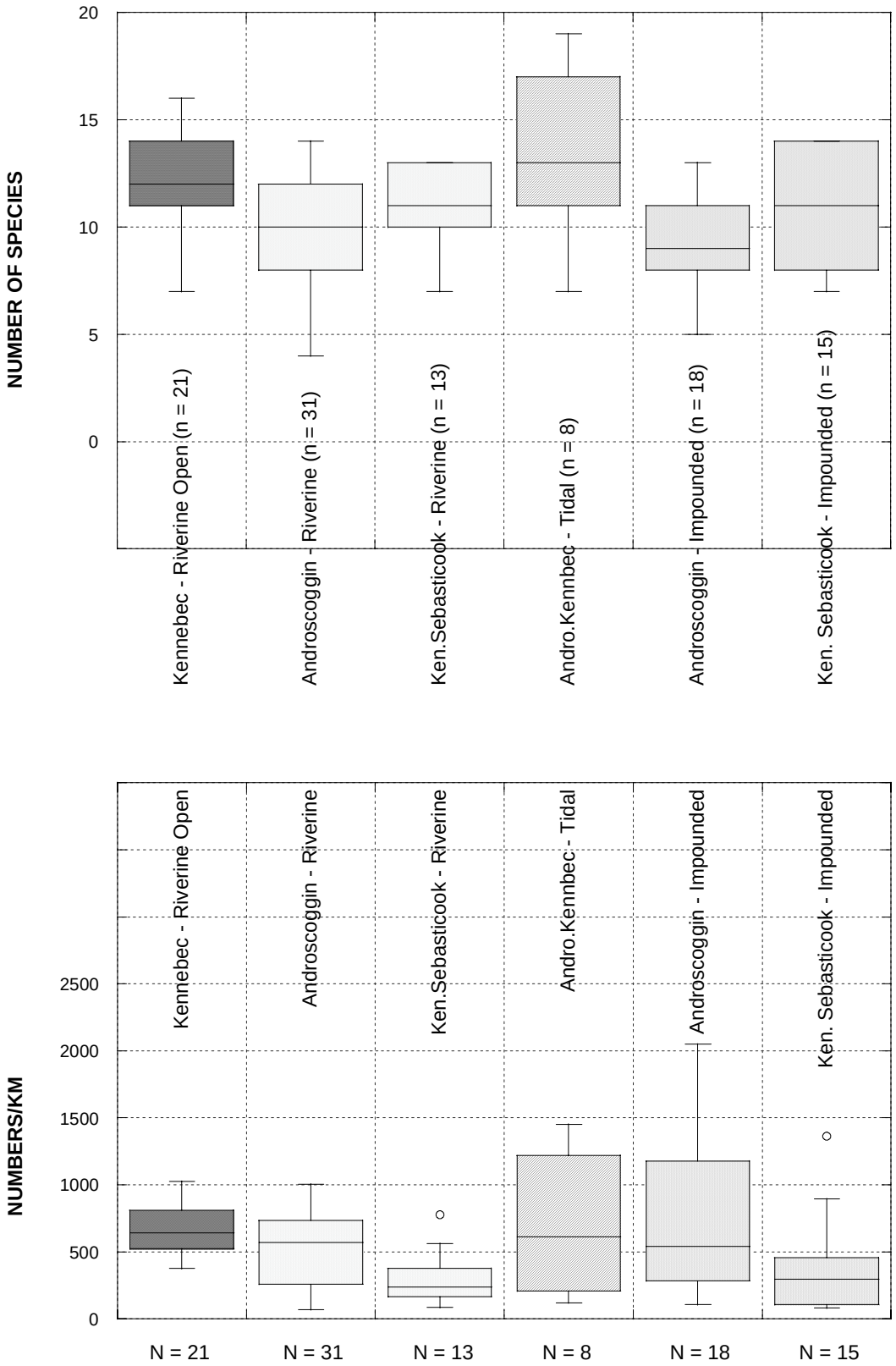

Figure A-9. Box-and-whisker plots of species richness (upper) and numerical density (numbers/km; lower) aggregated by major habitat type and river segment.

Biomass

Some differences between the aggregations of habitat types and rivers were evident in this parameter. Biomass was consistently higher in the open riverine segment of the Kennebec River (Figure A-10). This was not entirely due to the access granted to diadromous species by the Ed wards Dam removal, but also included native and naturalized river species. The tidal segments had a slightly higher median biomass, but also showed wide variation between sites. The impounded habitats showed the lowest biomass which distinguished this habitat type.

Modified Index of Well-Being (MIwb)

The MIwb normalized the density and biomass variations of the preceding analyses. The open riverine segment of the Kennebec exhibited the highest index values with 25th percentile values either exceeding or being similar to the 75th percentile values of the other habitat type and segment aggregations (Figure A-10). The other habitat type and river segment aggregations were similar in their data distributions and variation.

DELT Anomalies

The percentage of DELT anomalies was not extensive in any river and the results may well reflect least impacted background conditions at most sites. The highest median values of less than 0.5% occurred in the open riverine segment of the Kennebec River and the tidal segments (Figure A-11). No patterns with habitat type were apparent.

Target Fish Community Metrics

The target fish community metrics seemed to distinguish the gradient of habitat especially between the free-flowing riverine and impounded habitats. The proportion of macrohabitat generalists was highest in the two impounded habitat segments of the Androscoggin and Kennebec-Sebasticook with median values of 80-90% (Fig. A-11). This was followed by the tidal segment which exceeded 60%. The riverine habitats in the Androscoggin River had higher proportion of generalists than the open segment of the Kennebec or the remainder of the Kennebec excluding the Sebasticook. Including the Sebasticook segments greatly increased the proportion of generalists to more than 80%. This reflects in a different analysis and aggregation of the data the potential influence of the density of impoundments along a river mainstem. From this analysis it would appear that a riverine fish assemblage should have less than 50% macrohabitat generalists, perhaps fewer in high quality reaches. The proportion of fluvial specialist and dependent species generally was the opposite of the generalists, with some exceptions (Figure A-12). This metric was highest in the Kennebec riverine segments with the Sebasticook excluded. Including the Sebasticook, which was overwhelmingly predominated by generalists, greatly widened the variation of this metric. The proportion of diadromous species was highest in the open riverine segment of the Kennebec and the tidal segments (Figure A-12). The proportion of these species by their access to the open segment offset the proportion of fluvial specialists and dependents.

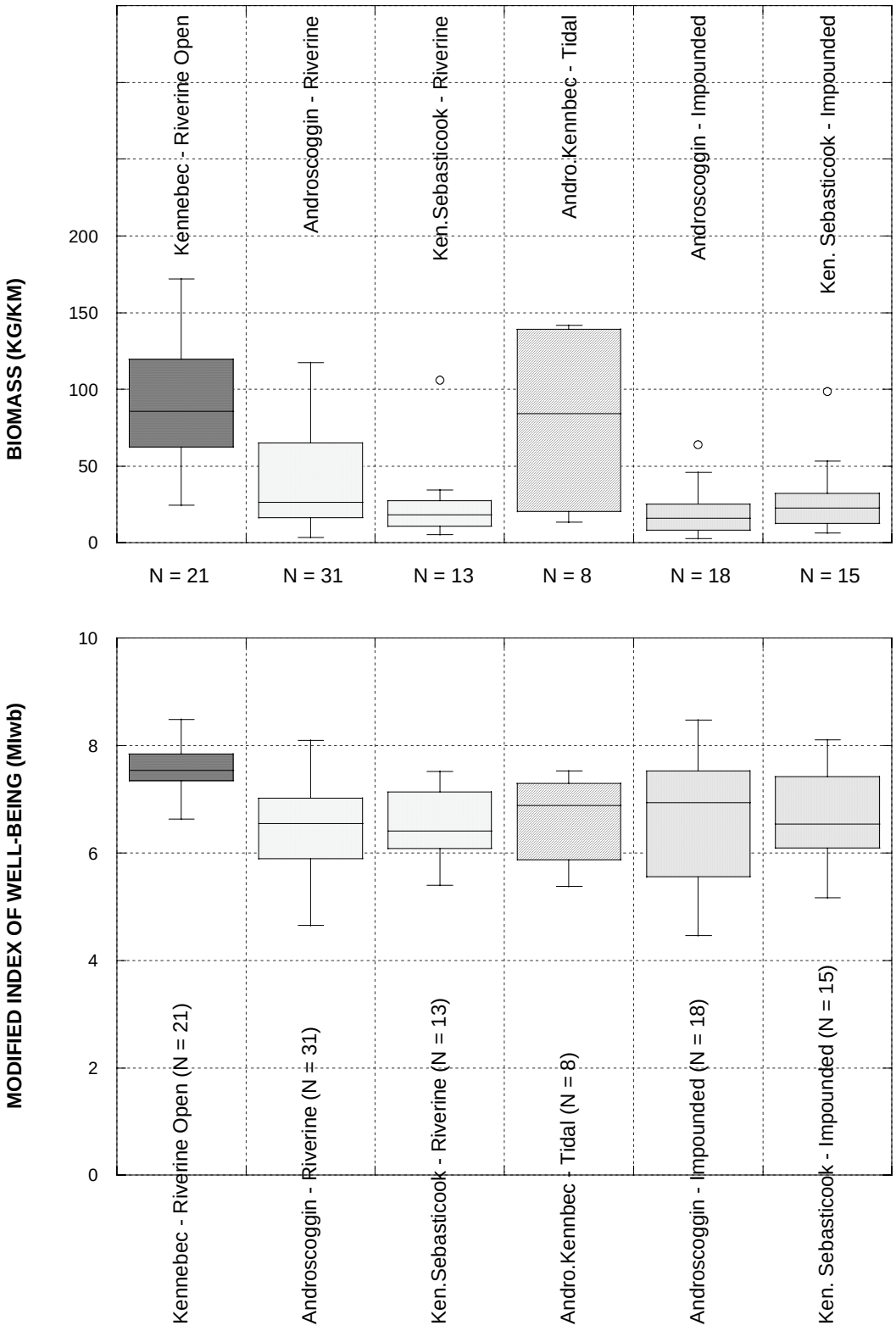

Figure A-10. Box-and-whisker plots of biomass (upper) and the Modified Index of Well-Being (MIwb; lower) aggregated by major habitat type and river segment.

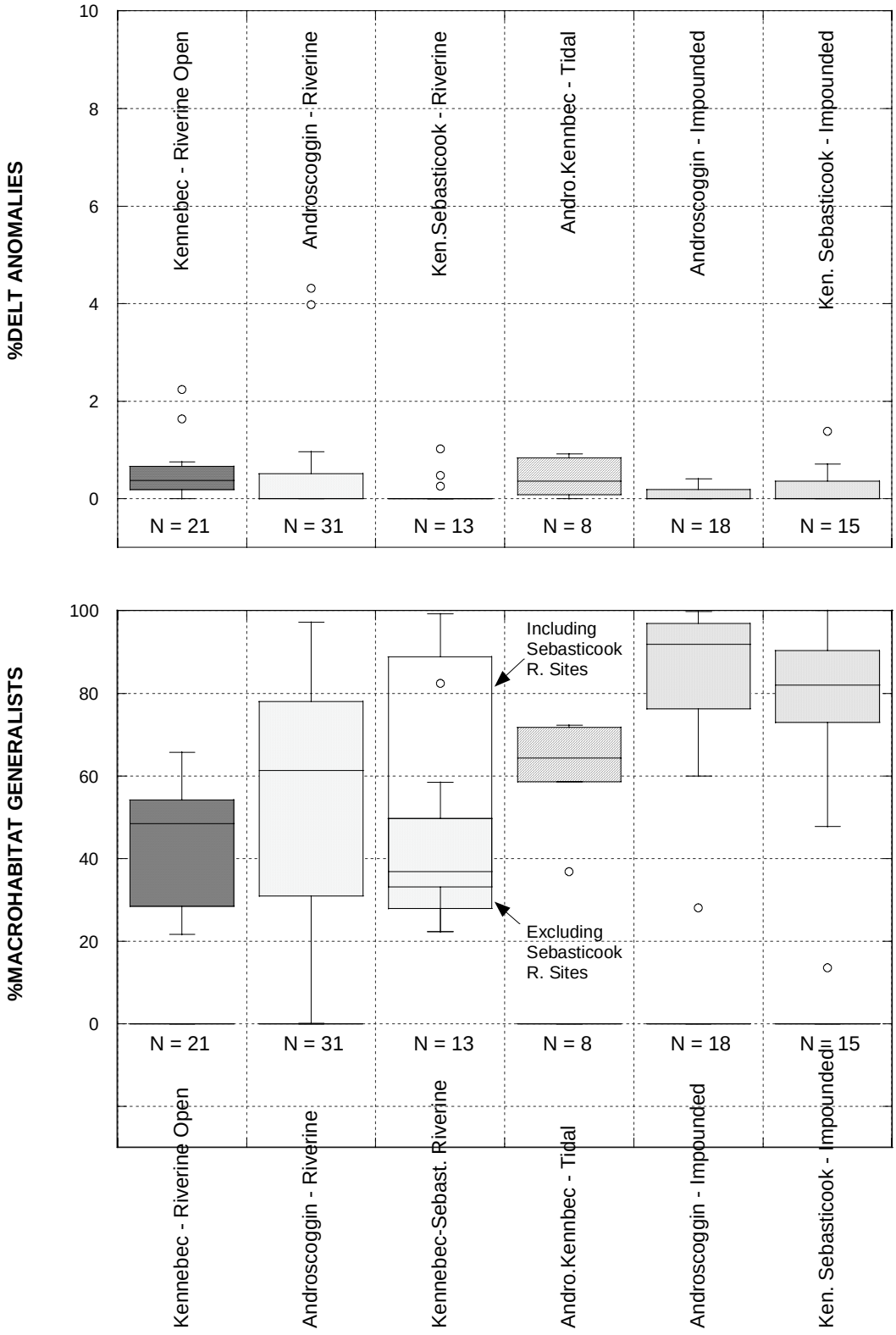

Figure A-11. Box-and-whisker plots of %DELT anomalies (upper) and the proportion of macrohabitat generalists (lower) aggregated by major habitat type and river segment.

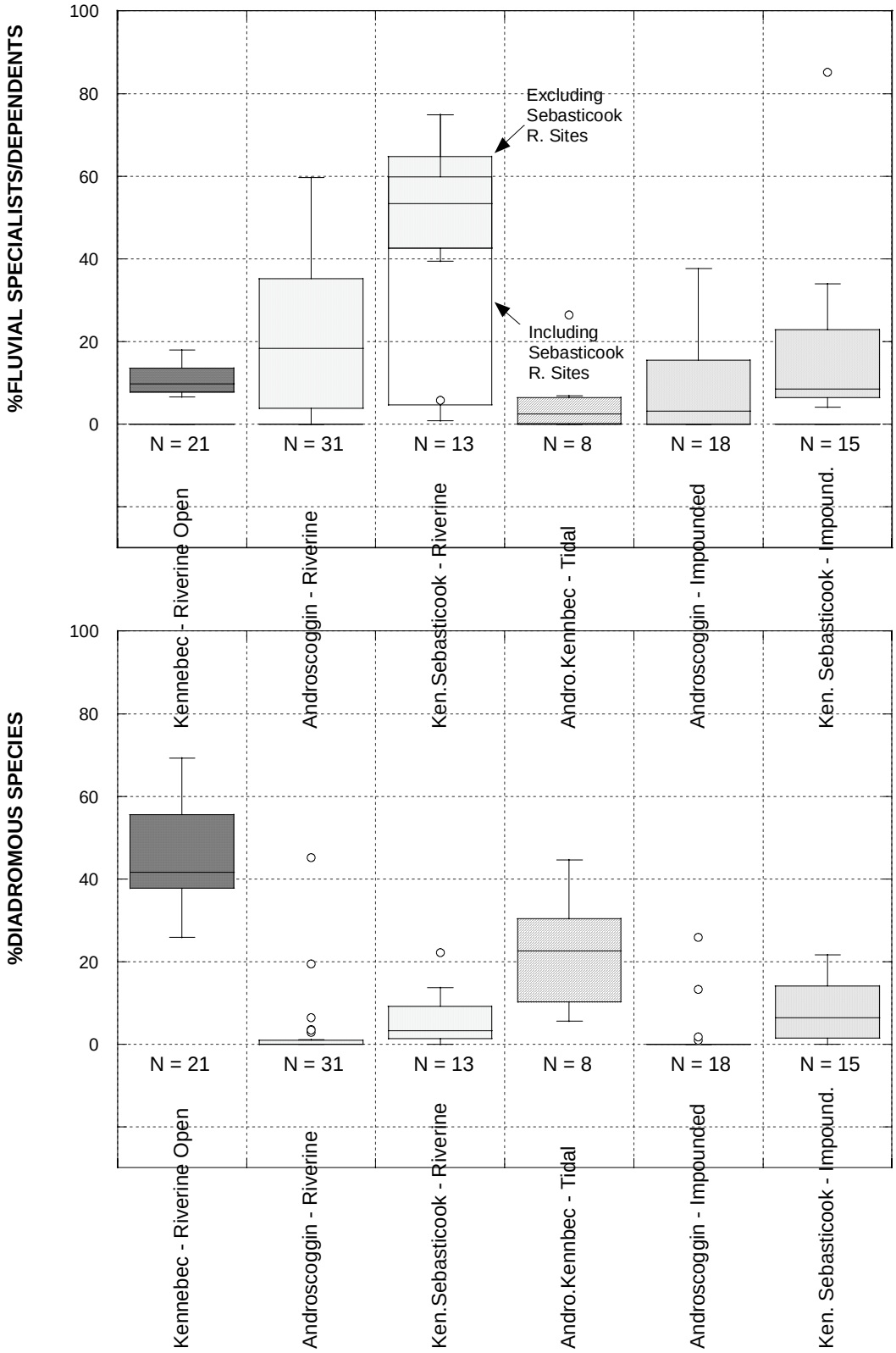

Figure A-12. Box-and-whisker plots of the proportion of fluvial specialists and dependents (upper) and the proportion of diadromous species (lower) aggregated by major habitat type and river segment.

Summary
The analyses by habitat and river segment showed that only certain parameters and metrics reflected the gradient of natural and human-induced differences in macrohabitat. Traditional assemblage measures such as species richness, numerical density, and the MIwb were not particularly revealing about these differences. Biomass and the target fish community metrics showed stronger differences along this gradient. Lower biomass and a high proportion of macrohabitat generalists were especially indicative of impounded or impoundment influenced riverine habitats. In contrast fluvial specialists and dependents reflected the highest quality riverine habitats and reaches. Diadromous species, as expected, were highest in the segments where fish had free access to and from tidal areas. This analysis will be useful in the selection and calibration of IBI metrics.

DEVELOPMENT OF A FISH ASSEMBLAGE ASSESSMENT INDEX

A principal goal of this project has been the eventual development of a fish assemblage assessment tool for the large, non-wadeable rivers of Maine and New England, specifically a multimetric index or fish index of biotic integrity (IBI). Ample examples and guidance exist for executing a data collection and analysis process that result in the development of such an index. Regardless of the methods and techniques used to collect assemblage data, the process for developing an index should follow the seminal works on IBI development, principally Karr et al. (1986), which outlines the developmental steps and considerations. Karr et al. (1986) provides the baseline guidance for IBI metric development and testing and regional and faunal substitution for IBI metrics in the original IBI. Hughes et al. (1998) further organized this approach taking advantage of what had been learned by numerous efforts since the mid-1980s. They detailed requirements that include the measurement and characterization of reference condition, selection and testing of candidate metrics, metric membership within an index, testing of metric performance, IBI variance and power analyses, and independent testing to validate the capacity to detect and quantify impairments. Furthermore, a detailed knowledge of the regional fish fauna that includes life history, environmental tolerance, and native status is also required, thus it needs to have the input of the regional practitioners.

This project has accomplished important prerequisites that include the development and testing of a standardized data collection method, execution of river segment surveys that are essential to IBI use and application, proving the logistics involved in sampling extended reaches of large rivers, and establishing baseline knowledge about the riverine fish fauna including autecology of species. We were also able to determine if patterns in fish assemblages exist using baseline parameters such as relative abundance (numbers and biomass) and species richness along natural and anthropogenic disturbance gradients. This fulfills the first of several steps that need to be taken towards the development of a fish index of biotic integrity (IBI) for Maine rivers.

This effort will be complete when the geographic scope of coverage in both spatial and temporal terms is complete. This means coverage of all major non-wadeable inland rivers and inclusion of the entire gradient of natural and disturbance conditions, including temperature and habitat gradients. This is needed to capture the breadth of natural variability in the riverine fish fauna and provide a database for testing candidate metrics and evaluating their capacity to detect and quantify the effect of stressors. We expect this to take at least 5-6 years and perhaps longer depending on what currently unsampled rivers reveal. Based on prior experiences, a 5-10 year period is not uncommon for such development al projects.

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The Spatial and Relative Abundance Characteristics of the Fish Assemblages in Three Maine Rivers

Kennebec River: Bingham to Merrymeeting Bay (2002)
Kennebec River: Waterville to Augusta (2003)
Androscoggin River: Lake Umbagog to Merrymeeting Bay (2003)
Sebasticook River: Pittsfield to Winslow (2003)

Appendix A

Species Summaries by River, River Segment, and Sampling Location

Catalog of Fish Samples

River Mile	Date	Samp Type	Dist Fished	Latitude/Longitude	Draing Area	Source	Invld Samp	No of Species	Location
50-001	Kennebec River (ust. Edwards Dam)								
74.70	08/09/2002	A	1.00			01		11	
68.20	08/09/2002	A	1.00			01		10	
66.10	08/08/2002	A	1.00			01		10	
64.90	08/08/2002	A	1.00			01		10	
59.30	08/15/2002	A	1.00			01		13	
57.20	08/08/2002	A	1.00			01		11	
53.20	08/08/2002	A	1.00			01		7	
49.90	08/07/2002	A	1.00			01		8	
46.10	09/21/2002	A	1.00			01		10	
38.90	08/08/2002	A	1.00			01		11	
36.50	08/01/2002	A	1.00			01		7	
36.50	09/07/2002	A	1.00			01		7	
32.10	08/02/2002	A	1.00			01		11	
32.10	08/07/2002	A	1.00			01		14	
32.10	09/07/2002	A	1.00			01		13	
25.10	08/10/2002	A	1.00			01		14	
23.90	08/08/2002	A	1.00			01		14	
20.80	08/11/2002	A	1.00			01		11	
18.50	08/11/2002	A	1.00			01		8	
17.40	07/10/2003	A	1.00			01		16	
17.40	08/14/2002	A	1.00			01		16	
17.40	09/24/2002	A	1.00			01		16	
16.50	08/12/2002	A	1.00			01		13	
16.50	09/22/2002	A	1.00			01		11	
16.50	07/12/2003	A	1.00			01		12	
15.10	08/12/2002	A	1.00			01		15	
15.10	09/22/2002	A	1.00			01		7	
15.10	07/12/2003	A	1.00			01		12	
11.00	08/12/2002	A	1.00			01		11	
11.00	09/22/2002	A	1.00			01		9	
11.00	07/12/2003	A	1.00			01		11	
9.00	07/15/2003	A	1.00			01		14	
6.85	08/13/2002	A	1.00			01		16	
6.85	09/23/2002	A	1.00			01		13	
4.20	07/15/2003	A	1.15			01		10	
4.00	08/13/2002	A	1.15			01		12	
4.00	09/23/2002	A	1.15			01		12	
0.10	08/13/2002	A	1.00			01		14	
0.10	09/23/2002	A	1.00			01		9	
0.10	07/15/2003	A	1.00			01		13	
50-002	Cathance River								
3.00	09/12/2003	A	1.00			01		12	
1.50	08/16/2002	A	1.00			01		17	
50-100	Sebasticook River								
36.60	10/14/2003	A	1.00			01		7	
33.80	10/14/2003	A	1.00			01		7	

River Mile	Date	Samp Type	Dist Fished	Latitude/Longitude	Draing Area	Source	Invld Samp	No of Species	Location
50-100	Sebasticook River								
29.40	09/30/2003	A	1.00			01		11	
27.00	09/30/2003	A	1.00			01		11	
22.40	09/19/2003	A	1.00			01		11	
6.30	09/18/2003	A	1.00			01		12	
5.20	09/17/2003	A	1.00			01		13	
4.60	09/18/2003	A	1.00			01		14	
1.10	09/18/2003	A	1.00			01		12	
51-001	Kennebec River (dst. Edwards Dam)								
26.90	09/26/2002	A	1.00			01		16	
19.00	09/24/2002	A	1.00			01		18	
8.30	08/14/2002	A	1.00			01		12	
4.30	08/05/2002	A	1.00			01		9	
4.30	08/16/2002	A	1.00			01		9	
60-001	Androscoggin River								
97.30	08/14/2003	A	1.00			01		12	
88.70	08/14/2003	A	1.00			01		11	
83.10	08/14/2003	A	1.00			01		12	
79.30	09/08/2003	A	1.00			01		9	
78.50	09/08/2003	A	1.00			01		10	
76.90	09/08/2003	A	1.00			01		7	
70.80	09/09/2003	A	1.00			01		11	
66.20	09/09/2003	A	1.00			01		6	
61.70	09/09/2003	A	1.00			01		9	
58.40	08/02/2003	A	1.00			01		6	
57.10	08/02/2003	A	1.00			01		5	
55.80	09/10/2003	A	1.00			01		8	
52.80	09/11/2003	A	1.00			01		9	
51.10	09/11/2003	A	1.00			01		11	
46.60	09/11/2003	A	1.00			01		7	
41.20	08/01/2003	A	1.00			01		10	
38.90	08/01/2003	A	1.00			01		8	
35.40	09/07/2003	A	1.00			01		9	
31.40	08/02/2003	A	1.00			01		9	
27.90	07/31/2003	A	1.00			01		11	
26.90	07/26/2003	A	1.00			01		12	
25.20	07/26/2003	A	1.00			01		8	
22.60	07/27/2003	A	1.00			01		4	
21.90	07/27/2003	A	1.00			01		9	
20.40	07/27/2003	A	1.00			01		7	
16.00	07/30/2003	A	1.00			01		14	
12.80	09/07/2003	A	1.00			01		11	
9.60	07/30/2003	A	1.00			01		10	
8.00	07/31/2003	A	1.00			01		13	
7.00	07/31/2003	A	1.00			01		13	
4.30	07/25/2003	A	1.00			01		8	
1.50	07/25/2003	A	1.00			01		10	

Catalog of Fish Samples

River Mile	Date	Samp Type	Dist Fished	Latitude/Longitude	Draing Area	Source	Invld Samp	No of Species	Location
61-001	Androscoggin River								
2.60	09/12/2003	A	1.00			01		13	
0.20	07/25/2003	A	1.00			01		7	

River Code: **50-001**	Stream: **Kennebec River (Bingham to Augusta)**	River Segment Totals
Mile Range: **0.10**		Date Range: 08/01/2002
Thru: **74.70**		Thru: 09/24/2002
Dist Fished: 33.30 km	Basin:	No of Passes: 33	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Sea Lamprey (Y)	NA	PF	N	M	2	0.06	0.01	0.00	0.00	6.00
Alewife (A)	NA	PI	M	P	4	0.11	0.02	0.02	0.03	173.25
Alewife (C)	NA	PI	M	P	9	0.27	0.06	0.00	0.00	3.50
Alewife (Y)	NA	PI	M	P	854	24.91	5.29	0.24	0.40	9.50
Blueback Herring (Y)	NA	PI			13	0.39	0.08	0.00	0.00	1.23
American Shad (Y)	NA	PI			2	0.06	0.01	0.00	0.00	1.50
Brown Trout (A)	IMC	TC	N	I	29	0.88	0.19	0.43	0.73	486.38
Brown Trout (B)	IMC	TC	N	I	4	0.12	0.03	0.00	0.00	18.25
Brown Trout (Y)	IMC	TC	N	I	1	0.03	0.01	0.00	0.00	3.00
Rainbow Trout (A)	IMC	TC	N	I	12	0.36	0.08	0.09	0.15	237.67
Rainbow Trout (B)	IMC	TC	N	I	6	0.18	0.04	0.00	0.01	23.33
Atlantic Salmon (A)	NA	TC		I	2	0.06	0.01	0.07	0.11	1,100.00
Landlocked Salmon (A)	IMC	TC		I	12	0.36	0.08	0.07	0.11	180.67
Landlocked Salmon (B)	IMC	TC		I	11	0.33	0.07	0.01	0.01	19.36
Landlocked Salmon (Y)	IMC	TC		I	14	0.42	0.09	0.00	0.00	6.79
Lake Trout X Brook Trout (A)					1	0.03	0.01	0.00	0.01	135.00
Chain Pickerel (A)	NW	TC	M	P	11	0.33	0.07	0.13	0.22	396.18
Chain Pickerel (Y)	NW	TC	M	P	24	0.73	0.15	0.01	0.01	7.92
White Sucker (A)	NCL	GF	S	T	606	18.06	3.84	19.32	32.92	1,065.49
White Sucker (B)	NCL	GF	S	T	403	12.02	2.55	0.77	1.32	64.28
White Sucker (Y)	NCL	GF	S	T	134	4.01	0.85	0.02	0.04	5.21
Common Carp (A)	IA	GF	M	T	7	0.21	0.05	1.12	1.91	5,292.86
Golden Shiner (B)	NW	GF	M	T	29	0.83	0.18	0.01	0.02	14.03
Golden Shiner (C)	NW	GF	M	T	2	0.06	0.01	0.00	0.00	7.00
Golden Shiner (Y)	NW	GF	M	T	63	1.91	0.41	0.00	0.01	2.05
Blacknose Dace (C)	NCL	GF	S	T	36	1.09	0.23	0.00	0.00	1.50
Creek Chub (C)	NCL	GF	N	T	9	0.27	0.06	0.00	0.00	5.44
Common Shiner (C)	NCL	GF	S	P	584	17.70	3.76	0.13	0.21	7.12
Spottail Shiner (C)	IA	WC	M	P	1,080	31.02	6.59	0.20	0.34	6.50
Fallfish (C)	NCL	GF		P	941	28.50	6.05	0.27	0.46	9.55
Lake Chub (C)	NC	GF			4	0.12	0.03	0.00	0.00	10.50
White Catfish (A)	IA	TC	C	P	12	0.35	0.07	0.08	0.13	221.50
White Catfish (B)	IA	TC	C	P	2	0.06	0.01	0.00	0.01	64.50
White Catfish (Y)	IA	TC	C	P	3	0.09	0.02	0.00	0.00	1.00
American Eel (A)	NCT	TC	M	T	600	18.04	3.83	10.50	17.88	580.23
American Eel (B)	NCT	TC	M	T	2,958	87.48	18.59	7.02	11.96	79.94
American Eel (Y)	NCT	TC	M	T	186	5.58	1.18	0.05	0.08	8.22
Eastern Banded Killifish (C)	NW	WC	M	T	697	21.09	4.48	0.05	0.09	2.47
Burbot (C)	NC	TC	S	P	11	0.33	0.07	0.03	0.05	92.82
Striped Bass (A)	NA	TC	M	I	146	4.33	0.92	8.72	14.85	2,021.76
Striped Bass (B)	NA	TC	M	I	1	0.03	0.01	0.02	0.03	560.00
White Perch (A)	NA	TC	M	P	17	0.52	0.11	0.10	0.16	185.18
White Perch (B)	NA	TC	M	P	1	0.03	0.01	0.00	0.00	58.00
Black Crappie (A)	IA	TC	C	P	47	1.42	0.30	0.40	0.69	283.89
Black Crappie (B)	IA	TC	C	P	3	0.09	0.02	0.00	0.00	19.00
Black Crappie (Y)	IA	TC	C	P	11	0.33	0.07	0.00	0.00	2.64
Smallmouth Bass (A)	IA	TC	C	M	748	22.38	4.75	5.34	9.10	240.71

River: 50-001 Kennebec River (ust. Edwards Dam)

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Smallmouth Bass (B)	IA	TC	C	M	1,336	40.10	8.52	1.28	2.18	31.95
Smallmouth Bass (Y)	IA	TC	C	M	965	29.01	6.16	0.16	0.27	5.55
Largemouth Bass (A)	IA	TC	C	P	25	0.75	0.16	0.20	0.34	264.14
Largemouth Bass (B)	IA	TC	C	P	66	1.99	0.42	0.05	0.09	25.35
Largemouth Bass (Y)	IA	TC	C	P	808	24.24	5.15	0.11	0.18	4.43
Pumpkinseed Sunfish (C)	NW	GF	C	P	183	5.50	1.17	0.15	0.26	27.74
Redbreast Sunfish (C)	NW	GF	C	M	1,608	47.56	10.10	1.14	1.94	24.02
Yellow Perch (A)	NCL	C	M		139	4.21	0.89	0.23	0.40	55.38
Yellow Perch (B)	NCL	C	M		147	4.44	0.94	0.08	0.14	18.12
Yellow Perch (C)	NCL	C	M		119	3.61	0.77	0.07	0.11	18.57
Yellow Perch (Y)	NCL	C	M		15	0.45	0.10	0.00	0.00	3.07
Slimy Sculpin (C)	NC	BI		I	34	1.03	0.22	0.00	0.01	4.02
Three-spine Stickleback (C)	NCL	WC			6	0.18	0.04	0.00	0.00	0.67
	Stream Total				15,803	470.70		58.70		
	Number of Species				32					
	Number of Hybrids				1					

River Code: **50-001**	Stream: **Kennebec River (Waterville to Augusta)**	River Segment Totals
Mile Range: **0.10**		Date Range: 07/10/2003
Thru: **18.50**		Thru: 07/15/2003
Dist Fished: 7.15 km	Basin: No of Passes: 7	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Sea Lamprey (A)	NA	PF	N	M	1	0.14	0.02	0.08	0.10	585.00
Sea Lamprey (Y)	NA	PF	N	M	16	2.29	0.39	0.01	0.01	3.00
Alewife (A)	NA	PI	M	P	4	0.57	0.10	0.08	0.10	145.25
Alewife (Y)	NA	PI	M	P	4	0.57	0.10	0.00	0.00	2.00
American Shad (A)	NA	PI			1	0.14	0.02	0.21	0.25	1,450.00
Brown Trout (A)	IMC	TC	N	I	2	0.29	0.05	0.08	0.10	284.50
Atlantic Salmon (Y)	NA	TC		I	1	0.14	0.02	0.00	0.00	2.00
Chain Pickerel (A)	NW	TC	M	P	1	0.14	0.02	0.13	0.16	900.00
White Sucker (A)	NCL	GF	S	T	199	27.80	4.75	25.56	30.87	916.46
White Sucker (B)	NCL	GF	S	T	28	3.89	0.66	0.91	1.10	233.82
White Sucker (Y)	NCL	GF	S	T	106	14.49	2.48	0.02	0.02	1.33
Common Carp (A)	IA	GF	M	T	1	0.14	0.02	0.61	0.74	4,300.00
Golden Shiner (B)	NW	GF	M	T	1	0.14	0.02	0.00	0.00	20.00
Golden Shiner (Y)	NW	GF	M	T	5	0.62	0.11	0.00	0.00	3.40
Blacknose Dace (C)	NCL	GF	S	T	1	0.14	0.02	0.00	0.00	2.00
Common Shiner (C)	NCL	GF	S	P	3	0.43	0.07	0.00	0.00	8.33
Spottail Shiner (B)	IA	WC	M	P	4	0.57	0.10	0.00	0.01	7.50
Spottail Shiner (C)	IA	WC	M	P	59	8.34	1.42	0.03	0.04	4.20
Fallfish (A)	NCL	GF		P	25	3.57	0.61	0.27	0.32	74.68
Fallfish (B)	NCL	GF		P	22	3.14	0.54	0.03	0.03	8.05
White Catfish (A)	IA	TC	C	P	14	1.93	0.33	0.67	0.81	345.79
Brown Bullhead (A)	NW	GF	C	T	1	0.14	0.02	0.05	0.06	330.00
American Eel (A)	NCT	TC	M	T	94	13.28	2.27	5.81	7.01	438.64
American Eel (B)	NCT	TC	M	T	1,703	236.89	40.48	16.64	20.10	70.25
American Eel (Y)	NCT	TC	M	T	607	86.32	14.75	0.47	0.57	5.48
Eastern Banded Killifish (C)	NW	WC	M	T	66	8.81	1.51	0.02	0.03	2.52
Striped Bass (A)	NA	TC	M	I	28	3.96	0.68	10.87	13.13	2,741.07
Striped Bass (B)	NA	TC	M	I	41	5.86	1.00	3.81	4.60	650.83
White Perch (A)	NA	TC	M	P	4	0.57	0.10	0.08	0.10	144.75
Black Crappie (A)	IA	TC	C	P	2	0.25	0.04	0.03	0.03	105.00
Black Crappie (B)	IA	TC	C	P	1	0.14	0.02	0.06	0.08	440.00
Smallmouth Bass (A)	IA	TC	C	M	217	29.96	5.12	11.02	13.30	368.44
Smallmouth Bass (B)	IA	TC	C	M	324	43.94	7.51	2.33	2.82	53.08
Smallmouth Bass (Y)	IA	TC	C	M	65	9.02	1.54	0.04	0.05	4.84
Largemouth Bass (A)	IA	TC	C	P	2	0.29	0.05	0.11	0.14	392.00
Largemouth Bass (Y)	IA	TC	C	P	1	0.14	0.02	0.00	0.00	4.00
Pumpkinseed Sunfish (C)	NW	GF	C	P	13	1.86	0.32	0.05	0.06	25.62
Redbreast Sunfish (A)	NW	GF	C	M	171	24.43	4.17	1.03	1.24	41.96
Redbreast Sunfish (C)	NW	GF	C	M	349	45.44	7.76	1.36	1.64	30.10
Redbreast Sunfish (Y)	NW	GF	C	M	1	0.14	0.02	0.00	0.00	5.00
Yellow Perch (A)	NCL	C	M		27	3.86	0.66	0.31	0.37	79.30
Yellow Perch (B)	NCL	C	M		1	0.14	0.02	0.01	0.01	45.00
Yellow Perch (Y)	NCL	C	M		1	0.14	0.02	0.00	0.00	3.00
Four-spine Stickleback (C)	NT	WC			1	0.14	0.02	0.00	0.00	1.00
	Stream Total				4,218	585.22		82.81		
	Number of Species				26					
	Number of Hybrids				0					

River Code: **50-100**	Stream: **Sebasticook River (Pittsfield to Waterville)**	River Segment Totals
Mile Range: **1.10**		Date Range: 09/17/2003
Thru: **36.60**		Thru: 10/14/2003
Dist Fished: 9.00 km	Basin: No of Passes: 9	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	58	6.44	1.60	0.05	0.18	7.24
Chain Pickerel (A)	NW	TC	M	P	60	6.67	1.65	1.11	4.36	167.17
Chain Pickerel (B)	NW	TC	M	P	8	0.89	0.22	0.03	0.13	36.25
Chain Pickerel (Y)	NW	TC	M	P	27	3.00	0.74	0.02	0.09	7.70
White Sucker (A)	NCL	GF	S	T	105	11.67	2.89	8.90	34.85	762.76
White Sucker (B)	NCL	GF	S	T	8	0.89	0.22	0.20	0.79	228.13
White Sucker (Y)	NCL	GF	S	T	7	0.78	0.19	0.00	0.02	5.71
Golden Shiner (A)	NW	GF	M	T	4	0.44	0.11	0.03	0.11	62.50
Golden Shiner (B)	NW	GF	M	T	76	8.44	2.09	0.10	0.40	12.16
Golden Shiner (Y)	NW	GF	M	T	129	14.33	3.55	0.02	0.08	1.36
Common Shiner (C)	NCL	GF	S	P	9	1.00	0.25	0.00	0.00	1.11
Common Shiner (Y)	NCL	GF	S	P	290	32.22	7.98	0.02	0.09	0.74
Fallfish (A)	NCL	GF		P	5	0.56	0.14	0.03	0.12	55.00
Fallfish (Y)	NCL	GF		P	156	17.33	4.29	0.02	0.09	1.40
Brown Bullhead (A)	NW	GF	C	T	25	2.78	0.69	0.70	2.72	250.25
American Eel (A)	NCT	TC	M	T	7	0.78	0.19	0.42	1.65	542.86
American Eel (B)	NCT	TC	M	T	46	5.11	1.27	0.67	2.62	130.73
White Perch (A)	NA	TC	M	P	46	5.11	1.27	0.99	3.87	193.59
Black Crappie (A)	IA	TC	C	P	8	0.89	0.22	0.07	0.28	79.38
Black Crappie (B)	IA	TC	C	P	3	0.33	0.08	0.01	0.02	16.67
Black Crappie (Y)	IA	TC	C	P	3	0.33	0.08	0.00	0.01	6.00
Smallmouth Bass (A)	IA	TC	C	M	22	2.44	0.61	1.41	5.53	577.27
Smallmouth Bass (B)	IA	TC	C	M	12	1.33	0.33	0.36	1.40	268.75
Smallmouth Bass (Y)	IA	TC	C	M	109	12.11	3.00	0.10	0.38	8.00
Largemouth Bass (A)	IA	TC	C	P	24	2.67	0.66	2.14	8.38	802.08
Largemouth Bass (B)	IA	TC	C	P	41	4.56	1.13	0.15	0.59	33.29
Largemouth Bass (Y)	IA	TC	C	P	438	48.67	12.05	0.44	1.71	8.99
Pumpkinseed Sunfish (A)	NW	GF	C	P	122	13.56	3.36	0.63	2.45	46.19
Pumpkinseed Sunfish (C)	NW	GF	C	P	14	1.56	0.39	0.09	0.36	58.70
Pumpkinseed Sunfish (Y)	NW	GF	C	P	9	1.00	0.25	0.00	0.01	1.33
Redbreast Sunfish (A)	NW	GF	C	M	1,042	115.78	28.67	3.72	14.58	32.16
Redbreast Sunfish (C)	NW	GF	C	M	107	11.89	2.94	0.32	1.24	26.69
Redbreast Sunfish (Y)	NW	GF	C	M	47	5.22	1.29	0.01	0.03	1.49
Yellow Perch (A)	NCL	C	M		498	55.33	13.70	2.71	10.63	49.05
Yellow Perch (B)	NCL	C	M		8	0.89	0.22	0.02	0.09	25.00
Yellow Perch (Y)	NCL	C	M		62	6.89	1.71	0.03	0.13	4.81
	Stream Total				3,635	403.89		25.54		
	Number of Species				15					
	Number of Hybrids				0					

River Code: **51-001**	Stream: **Kennebec River (Augusta to Chops Pt.)**	River Segment Totals
Mile Range: **-4.30**		Date Range: 08/05/2002
Thru: **-26.90**		Thru: 09/26/2002
Dist Fished: 5.00 km	Basin: No of Passes: 5	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Sea Lamprey (Y)	NA	PF	N	M	1	0.20	0.04	0.00	0.00	3.00
Alewife (Y)	NA	PI	M	P	25	5.00	0.90	0.02	0.03	3.68
Blueback Herring (Y)	NA	PI			3	0.60	0.11	0.00	0.00	1.67
American Shad (Y)	NA	PI			100	20.00	3.62	0.05	0.08	2.57
Rainbow Smelt (Y)	NA	GF	M	I	1	0.20	0.04	0.00	0.00	3.00
White Sucker (A)	NCL	GF	S	T	93	18.60	3.36	12.81	19.96	688.82
White Sucker (B)	NCL	GF	S	T	8	1.60	0.29	0.24	0.38	151.38
White Sucker (Y)	NCL	GF	S	T	110	22.00	3.98	0.26	0.41	11.93
Common Carp (A)	IA	GF	M	T	41	8.20	1.48	38.01	59.21	4,635.80
Common Carp (C)	IA	GF	M	T	1	0.20	0.04	0.83	1.29	4,150.00
Creek Chub (C)	NCL	GF	N	T	1	0.20	0.04	0.00	0.00	14.00
Spottail Shiner (C)	IA	WC	M	P	701	140.20	25.35	0.92	1.43	6.57
White Catfish (C)	IA	TC	C	P	5	1.00	0.18	0.11	0.17	111.00
American Eel (A)	NCT	TC	M	T	2	0.40	0.07	0.18	0.28	450.00
American Eel (B)	NCT	TC	M	T	259	51.80	9.37	3.14	4.89	60.54
American Eel (Y)	NCT	TC	M	T	38	7.60	1.37	0.08	0.12	10.11
Eastern Banded Killifish (C)	NW	WC	M	T	432	86.40	15.62	0.19	0.29	2.18
Mummichog (C)	NT	GF		T	429	85.80	15.52	0.22	0.34	2.52
Northern Silverside (C)	NT	WC		I	1	0.20	0.04	0.00	0.00	3.00
Striped Bass (A)	NA	TC	M	I	11	2.20	0.40	2.42	3.77	1,099.64
Striped Bass (Y)	NA	TC	M	I	1	0.20	0.04	0.00	0.00	10.00
White Perch (A)	NA	TC	M	P	37	7.40	1.34	1.36	2.12	183.84
White Perch (B)	NA	TC	M	P	1	0.20	0.04	0.01	0.01	40.00
White Perch (Y)	NA	TC	M	P	108	21.60	3.91	0.10	0.16	4.79
Smallmouth Bass (A)	IA	TC	C	M	18	3.60	0.65	1.10	1.71	305.06
Smallmouth Bass (B)	IA	TC	C	M	48	9.60	1.74	0.25	0.39	26.09
Smallmouth Bass (Y)	IA	TC	C	M	22	4.40	0.80	0.01	0.02	2.77
Largemouth Bass (A)	IA	TC	C	P	1	0.20	0.04	0.17	0.26	840.00
Largemouth Bass (B)	IA	TC	C	P	25	5.00	0.90	0.05	0.09	10.92
Largemouth Bass (Y)	IA	TC	C	P	17	3.40	0.61	0.02	0.04	6.65
Pumpkinseed Sunfish (C)	NW	GF	C	P	16	3.20	0.58	0.08	0.13	25.38
Redbreast Sunfish (C)	NW	GF	C	M	177	35.40	6.40	1.15	1.79	32.37
Yellow Perch (A)	NCL	C	M		22	4.40	0.80	0.36	0.56	81.55
Yellow Perch (C)	NCL	C	M		9	1.80	0.33	0.05	0.07	26.44
Yellow Perch (Y)	NCL	C	M		1	0.20	0.04	0.00	0.01	18.00
Stream Total					2,765	553.00		64.20		
Number of Species					21					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin R. (Errol, NH - Brunswick, ME)**	River Segment Totals
Mile Range: **1.50**		Date Range: 07/25/2003
Thru: **164.30**		Thru: 09/11/2003
Dist Fished: 48.00 km	Basin: No of Passes: 48	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	577	12.02	2.06	0.02	0.08	1.98
American Shad (Y)	NA	PI			33	0.69	0.12	0.00	0.00	0.42
Brown Trout (A)	IMC	TC	N	I	35	0.73	0.13	0.23	0.77	321.54
Brown Trout (B)	IMC	TC	N	I	2	0.04	0.01	0.00	0.01	59.00
Rainbow Trout (A)	IMC	TC	N	I	67	1.40	0.24	0.30	0.99	217.02
Rainbow Trout (B)	IMC	TC	N	I	7	0.15	0.03	0.01	0.03	55.00
Rainbow Trout (Y)	IMC	TC	N	I	1	0.02	0.00	0.00	0.00	5.00
Landlocked Salmon (A)	IMC	TC		I	2	0.04	0.01	0.01	0.02	144.00
Landlocked Salmon (B)	IMC	TC		I	2	0.04	0.01	0.01	0.02	129.00
Chain Pickerel (A)	NW	TC	M	P	45	0.94	0.16	0.16	0.53	174.13
Chain Pickerel (B)	NW	TC	M	P	109	2.27	0.39	0.04	0.14	19.16
Chain Pickerel (Y)	NW	TC	M	P	46	0.96	0.16	0.00	0.01	3.04
Northern Pike (B)	IA	TC	M	I	1	0.02	0.00	0.00	0.01	80.00
White Sucker (A)	NCL	GF	S	T	736	15.33	2.63	12.45	40.70	811.75
White Sucker (B)	NCL	GF	S	T	263	5.48	0.94	0.71	2.32	129.42
White Sucker (Y)	NCL	GF	S	T	842	17.54	3.01	0.05	0.18	3.08
Longnose Sucker (A)	NC	BI	S	I	1	0.02	0.00	0.01	0.02	330.00
Longnose Sucker (B)	NC	BI	S	I	8	0.17	0.03	0.02	0.05	91.75
Longnose Sucker (Y)	NC	BI	S	I	1	0.02	0.00	0.00	0.00	4.00
Golden Shiner (A)	NW	GF	M	T	42	0.88	0.15	0.01	0.04	13.72
Golden Shiner (B)	NW	GF	M	T	76	1.58	0.27	0.03	0.09	17.74
Golden Shiner (C)	NW	GF	M	T	1	0.02	0.00	0.00	0.00	10.00
Golden Shiner (Y)	NW	GF	M	T	133	2.77	0.48	0.01	0.04	4.85
Blacknose Dace (C)	NCL	GF	S	T	11	0.23	0.04	0.00	0.00	3.00
Longnose Dace (C)	NCL	BI	S	M	576	12.00	2.06	0.04	0.14	3.47
Creek Chub (C)	NCL	GF	N	T	4	0.08	0.01	0.00	0.00	17.00
Common Shiner (A)	NCL	GF	S	P	16	0.33	0.06	0.01	0.02	15.19
Common Shiner (C)	NCL	GF	S	P	713	14.85	2.55	0.05	0.16	3.27
Common Shiner (Y)	NCL	GF	S	P	173	3.60	0.62	0.00	0.01	0.51
Spottail Shiner (A)	IA	WC	M	P	161	3.35	0.58	0.03	0.10	9.10
Spottail Shiner (C)	IA	WC	M	P	4,142	86.29	14.81	0.12	0.40	1.42
Spottail Shiner (Y)	IA	WC	M	P	1,175	24.48	4.20	0.02	0.05	0.67
Fallfish (A)	NCL	GF		P	567	11.81	2.03	0.57	1.85	47.98
Fallfish (B)	NCL	GF		P	1,564	32.58	5.59	0.18	0.59	5.57
Fallfish (C)	NCL	GF		P	238	4.96	0.85	0.02	0.07	4.02
Fallfish (Y)	NCL	GF		P	2,316	48.25	8.28	0.06	0.20	1.30
Lake Chub (C)	NC	GF			32	0.67	0.11	0.01	0.03	13.34
Brown Bullhead (A)	NW	GF	C	T	24	0.50	0.09	0.07	0.23	140.08
Brown Bullhead (Y)	NW	GF	C	T	2	0.04	0.01	0.00	0.00	2.50
American Eel (A)	NCT	TC	M	T	57	1.19	0.20	0.76	2.49	641.28
American Eel (B)	NCT	TC	M	T	13	0.27	0.05	0.04	0.13	145.23
Eastern Banded Killifish (C)	NW	WC	M	T	6	0.13	0.02	0.00	0.00	3.00
Burbot (C)	NC	TC	S	P	71	1.48	0.25	0.12	0.38	79.51
White Perch (A)	NA	TC	M	P	79	1.65	0.28	0.17	0.54	100.63
White Perch (Y)	NA	TC	M	P	370	7.71	1.32	0.01	0.05	1.80
Black Crappie (B)	IA	TC	C	P	1	0.02	0.00	0.00	0.00	38.00
Black Crappie (C)	IA	TC	C	P	3	0.06	0.01	0.00	0.01	46.00

River: 60-001 Androscoggin River

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Black Crappie (Y)	IA	TC	C	P	1	0.02	0.00	0.00	0.00	5.00
Rock Bass (A)	IA	TC	C	P	1	0.02	0.00	0.00	0.01	190.00
Rock Bass (B)	IA	TC	C	P	7	0.15	0.03	0.00	0.01	20.71
Rock Bass (Y)	IA	TC	C	P	3	0.06	0.01	0.00	0.00	8.33
Smallmouth Bass (A)	IA	TC	C	M	1,056	22.00	3.78	9.63	31.47	437.51
Smallmouth Bass (B)	IA	TC	C	M	1,863	38.81	6.66	2.02	6.60	52.00
Smallmouth Bass (Y)	IA	TC	C	M	5,301	110.44	18.95	0.55	1.79	4.95
Largemouth Bass (A)	IA	TC	C	P	10	0.21	0.04	0.15	0.50	729.10
Largemouth Bass (B)	IA	TC	C	P	21	0.44	0.08	0.02	0.05	37.43
Largemouth Bass (Y)	IA	TC	C	P	287	5.98	1.03	0.03	0.11	5.60
Pumpkinseed Sunfish (A)	NW	GF	C	P	148	3.08	0.53	0.11	0.35	35.01
Pumpkinseed Sunfish (B)	NW	GF	C	P	2	0.04	0.01	0.00	0.00	10.00
Pumpkinseed Sunfish (C)	NW	GF	C	P	235	4.90	0.84	0.15	0.49	30.88
Pumpkinseed Sunfish (Y)	NW	GF	C	P	202	4.21	0.72	0.01	0.02	1.23
Redbreast Sunfish (A)	NW	GF	C	M	368	7.67	1.32	0.28	0.92	36.76
Redbreast Sunfish (B)	NW	GF	C	M	1	0.02	0.00	0.00	0.00	8.00
Redbreast Sunfish (C)	NW	GF	C	M	689	14.35	2.46	0.57	1.87	39.89
Redbreast Sunfish (Y)	NW	GF	C	M	44	0.92	0.16	0.00	0.00	1.57
Yellow Perch (A)	NCL	C	M		460	9.58	1.64	0.50	1.63	52.03
Yellow Perch (B)	NCL	C	M		102	2.13	0.36	0.08	0.25	35.36
Yellow Perch (Y)	NCL	C	M		1,823	37.98	6.52	0.13	0.42	3.41
Slimy Sculpin (C)	NC	BI		I	2	0.04	0.01	0.00	0.00	5.50
	Stream Total				27,970	582.71		30.59		
	Number of Species				30					
	Number of Hybrids				0					

River Code: **61-001**	Stream: **Androscoggin River (Tidal estuary)**	River Segment Totals
Mile Range: **-0.20**		Date Range: 07/25/2003
Thru: **-2.60**		Thru: 09/12/2003
Dist Fished: 2.00 km	Basin: No of Passes: 2	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Sea Lamprey (Y)	NA	PF	N	M	4	2.00	0.25	0.02	0.03	10.67
Alewife (Y)	NA	PI	M	P	1	0.50	0.06	0.00	0.00	5.00
White Sucker (A)	NCL	GF	S	T	191	95.50	12.15	61.54	79.38	644.39
White Sucker (B)	NCL	GF	S	T	86	43.00	5.47	0.76	0.98	17.70
White Sucker (Y)	NCL	GF	S	T	1	0.50	0.06	0.01	0.01	20.00
Common Carp (A)	IA	GF	M	T	1	0.50	0.06	1.35	1.74	2,700.00
Golden Shiner (Y)	NW	GF	M	T	12	6.00	0.76	0.01	0.01	0.83
Spottail Shiner (C)	IA	WC	M	P	5	2.50	0.32	0.02	0.03	8.00
Spottail Shiner (Y)	IA	WC	M	P	386	193.00	24.55	0.13	0.17	0.67
White Catfish (A)	IA	TC	C	P	2	1.00	0.13	0.17	0.22	170.00
American Eel (B)	NCT	TC	M	T	199	99.50	12.66	8.25	10.64	82.88
American Eel (Y)	NCT	TC	M	T	452	226.00	28.75	0.28	0.36	1.22
Eastern Banded Killifish (C)	NW	WC	M	T	20	10.00	1.27	0.03	0.04	3.26
Striped Bass (Y)	NA	TC	M	I	7	3.50	0.45	0.06	0.08	17.71
Smallmouth Bass (A)	IA	TC	C	M	16	8.00	1.02	2.28	2.95	285.42
Smallmouth Bass (B)	IA	TC	C	M	43	21.50	2.74	1.10	1.41	50.93
Smallmouth Bass (Y)	IA	TC	C	M	17	8.50	1.08	0.04	0.05	4.71
Pumpkinseed Sunfish (C)	NW	GF	C	P	14	7.00	0.89	0.18	0.23	25.33
Redbreast Sunfish (A)	NW	GF	C	M	82	41.00	5.22	1.02	1.32	24.88
Redbreast Sunfish (C)	NW	GF	C	M	16	8.00	1.02	0.19	0.24	23.13
Redbreast Sunfish (Y)	NW	GF	C	M	12	6.00	0.76	0.01	0.01	1.67
Yellow Perch (A)	NCL	C	M		1	0.50	0.06	0.08	0.10	150.00
Yellow Perch (Y)	NCL	C	M		4	2.00	0.25	0.02	0.02	8.00
Stream Total					1,572	786.00		77.53		
Number of Species					14					
Number of Hybrids					0					

River Code: **50-001**	Stream: **Kennebec River (dst. Wyman Dam)**	Sample Date: **2002**
River Mile: **74.70**	Location:	Date Range: 08/09/2002
Time Fished: 1714 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Rainbow Trout (A)	IMC	TC	N	I	8	8.00	1.03	0.96	2.76	119.38
Landlocked Salmon (A)	IMC	TC		I	4	4.00	0.51	0.67	1.92	166.25
Landlocked Salmon (Y)	IMC	TC		I	3	3.00	0.39	0.01	0.02	2.67
White Sucker (A)	NCL	GF	S	T	22	22.00	2.83	16.53	47.73	751.25
White Sucker (B)	NCL	GF	S	T	35	35.00	4.50	2.97	8.58	84.86
Common Shiner (C)	NCL	GF	S	P	382	382.00	49.16	3.11	8.99	8.15
Fallfish (C)	NCL	GF		P	5	5.00	0.64	0.21	0.61	42.40
Lake Chub (C)	NC	GF			4	4.00	0.51	0.04	0.12	10.50
American Eel (A)	NCT	TC	M	T	4	4.00	0.51	2.58	7.44	643.75
American Eel (B)	NCT	TC	M	T	1	1.00	0.13	0.31	0.90	310.00
Smallmouth Bass (A)	IA	TC	C	M	14	14.00	1.80	1.87	5.39	133.29
Smallmouth Bass (B)	IA	TC	C	M	255	255.00	32.82	5.11	14.76	20.05
Smallmouth Bass (Y)	IA	TC	C	M	3	3.00	0.39	0.00	0.01	1.33
Pumpkinseed Sunfish (C)	NW	GF	C	P	2	2.00	0.26	0.01	0.02	4.00
Yellow Perch (C)	NCL	C	M		7	7.00	0.90	0.16	0.45	22.43
Slimy Sculpin (C)	NC	BI		I	28	28.00	3.60	0.11	0.31	3.82
Mile Total					777	777.00		34.63		
Number of Species					11					
Number of Hybrids					0					

River Code: **50-001**	Stream: **Kennebec River (ust. Williams Dam)**	Sample Date: **2002**
River Mile: **68.20**	Location:	Date Range: 08/09/2002
Time Fished: 2711 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Rainbow Trout (B)	IMC	TC	N	I	1	1.00	0.11	0.06	0.94	62.00
Lake Trout X Brook Trout (A)					1	1.00	0.11	0.14	2.04	135.00
White Sucker (B)	NCL	GF	S	T	13	13.00	1.45	0.29	4.42	22.46
White Sucker (Y)	NCL	GF	S	T	22	22.00	2.46	0.07	1.10	3.32
Blacknose Dace (C)	NCL	GF	S	T	3	3.00	0.34	0.01	0.08	1.67
Creek Chub (C)	NCL	GF	N	T	1	1.00	0.11	0.01	0.18	12.00
Common Shiner (C)	NCL	GF	S	P	46	46.00	5.15	0.25	3.77	5.43
Eastern Banded Killifish (C)	NW	WC	M	T	560	560.00	62.64	1.30	19.68	2.32
Smallmouth Bass (A)	IA	TC	C	M	7	7.00	0.78	0.55	8.38	79.14
Smallmouth Bass (B)	IA	TC	C	M	34	34.00	3.80	0.80	12.04	23.41
Pumpkinseed Sunfish (C)	NW	GF	C	P	8	8.00	0.89	0.13	1.98	16.38
Redbreast Sunfish (C)	NW	GF	C	M	6	6.00	0.67	0.03	0.42	4.67
Yellow Perch (B)	NCL	C	M		80	80.00	8.95	0.92	13.91	11.50
Yellow Perch (C)	NCL	C	M		112	112.00	12.53	2.05	31.05	18.33
Mile Total					894	894.00		6.61		
Number of Species					10					
Number of Hybrids					1					

River Code: **50-001**	Stream: **Kennebec River (Solon; ust. Rt. 8)**	Sample Date: **2002**
River Mile: **66.10**	Location:	Date Range: 08/08/2002
Time Fished: 1722 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Rainbow Trout (A)	IMC	TC	N	I	1	1.00	0.79	0.11	1.17	107.00
Landlocked Salmon (B)	IMC	TC		I	11	11.00	8.73	0.21	2.33	19.36
Landlocked Salmon (Y)	IMC	TC		I	3	3.00	2.38	0.02	0.19	5.67
White Sucker (A)	NCL	GF	S	T	1	1.00	0.79	1.00	10.95	1,000.00
White Sucker (Y)	NCL	GF	S	T	7	7.00	5.56	0.06	0.68	8.86
Blacknose Dace (C)	NCL	GF	S	T	29	29.00	23.02	0.04	0.44	1.38
Fallfish (C)	NCL	GF		P	13	13.00	10.32	0.09	0.96	6.74
American Eel (A)	NCT	TC	M	T	8	8.00	6.35	6.50	71.15	812.50
Eastern Banded Killifish (C)	NW	WC	M	T	2	2.00	1.59	0.01	0.07	3.00
Burbot (C)	NC	TC	S	P	6	6.00	4.76	0.55	6.03	91.83
Smallmouth Bass (B)	IA	TC	C	M	36	36.00	28.57	0.54	5.89	14.94
Smallmouth Bass (Y)	IA	TC	C	M	8	8.00	6.35	0.01	0.11	1.25
Redbreast Sunfish (C)	NW	GF	C	M	1	1.00	0.79	0.00	0.03	3.00
Mile Total					126	126.00		9.14		
Number of Species					10					
Number of Hybrids					0					

River Code: **50-001**	Stream: **Kennebec River (Solon; dst. Rt. 8)**	Sample Date: **2002**
River Mile: **64.90**	Location:	Date Range: 08/08/2002
Time Fished: 1022 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Brown Trout (A)	IMC	TC	N	I	2	2.00	2.33	0.64	5.86	320.00
Landlocked Salmon (A)	IMC	TC		I	7	7.00	8.14	1.43	13.10	204.29
White Sucker (A)	NCL	GF	S	T	3	3.00	3.49	2.99	27.38	996.33
White Sucker (B)	NCL	GF	S	T	17	17.00	19.77	0.37	3.41	21.88
Blacknose Dace (C)	NCL	GF	S	T	3	3.00	3.49	0.01	0.06	2.33
Fallfish (C)	NCL	GF		P	7	7.00	8.14	0.06	0.55	8.57
American Eel (B)	NCT	TC	M	T	19	19.00	22.09	4.72	43.27	248.56
Eastern Banded Killifish (C)	NW	WC	M	T	1	1.00	1.16	0.00	0.04	4.00
Burbot (C)	NC	TC	S	P	4	4.00	4.65	0.43	3.92	107.00
Smallmouth Bass (A)	IA	TC	C	M	1	1.00	1.16	0.12	1.05	115.00
Smallmouth Bass (B)	IA	TC	C	M	7	7.00	8.14	0.12	1.12	17.43
Smallmouth Bass (Y)	IA	TC	C	M	13	13.00	15.12	0.01	0.09	0.77
Slimy Sculpin (C)	NC	BI		I	2	2.00	2.33	0.02	0.15	8.00
Mile Total					86	86.00		10.92		
Number of Species					10					
Number of Hybrids					0					

River Code: **50-001**	Stream: **Kennebec River (ust. N. Anson)**	Sample Date: **2002**
River Mile: **59.30**	Location:	Date Range: 08/15/2002
Time Fished: 2215 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Brown Trout (B)	IMC	TC	N	I	4	4.00	1.59	0.07	0.40	18.25
Brown Trout (Y)	IMC	TC	N	I	1	1.00	0.40	0.00	0.02	3.00
Rainbow Trout (B)	IMC	TC	N	I	5	5.00	1.99	0.08	0.43	15.60
Landlocked Salmon (A)	IMC	TC		I	1	1.00	0.40	0.07	0.40	73.00
Landlocked Salmon (Y)	IMC	TC		I	8	8.00	3.19	0.07	0.39	8.75
White Sucker (A)	NCL	GF	S	T	13	13.00	5.18	13.70	75.67	1,053.85
White Sucker (B)	NCL	GF	S	T	61	61.00	24.30	0.17	0.92	2.72
Blacknose Dace (C)	NCL	GF	S	T	1	1.00	0.40	0.00	0.01	2.00
Creek Chub (C)	NCL	GF	N	T	6	6.00	2.39	0.02	0.11	3.33
Common Shiner (C)	NCL	GF	S	P	14	14.00	5.58	0.05	0.30	3.86
Fallfish (C)	NCL	GF		P	71	71.00	28.29	0.14	0.75	1.92
American Eel (B)	NCT	TC	M	T	7	7.00	2.79	2.10	11.60	300.00
Eastern Banded Killifish (C)	NW	WC	M	T	2	2.00	0.80	0.00	0.02	1.50
Smallmouth Bass (A)	IA	TC	C	M	3	3.00	1.20	1.12	6.17	372.33
Smallmouth Bass (B)	IA	TC	C	M	27	27.00	10.76	0.48	2.63	17.63
Smallmouth Bass (Y)	IA	TC	C	M	18	18.00	7.17	0.02	0.10	1.00
Slimy Sculpin (C)	NC	BI		I	3	3.00	1.20	0.01	0.06	3.67
Three-spine Stickleback (C)	NCL	WC			6	6.00	2.39	0.00	0.02	0.67
	Mile Total				251	251.00		18.11		
	Number of Species				13					
	Number of Hybrids				0					

River Code: **50-001**	Stream: **Kennebec River (dst. N. Anson)**	Sample Date: **2002**
River Mile: **57.20**	Location:	Date Range: 08/08/2002
Time Fished: 1635 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Chain Pickerel (Y)	NW	TC	M	P	12	12.00	7.23	0.10	1.97	8.56
White Sucker (A)	NCL	GF	S	T	1	1.00	0.60	0.48	9.22	483.00
White Sucker (Y)	NCL	GF	S	T	7	7.00	4.22	0.01	0.21	1.57
Golden Shiner (C)	NW	GF	M	T	2	2.00	1.20	0.01	0.27	7.00
Golden Shiner (Y)	NW	GF	M	T	3	3.00	1.81	0.01	0.17	3.00
Common Shiner (C)	NCL	GF	S	P	17	17.00	10.24	0.06	1.18	3.65
Fallfish (C)	NCL	GF		P	85	85.00	51.20	0.35	6.68	4.12
American Eel (A)	NCT	TC	M	T	2	2.00	1.20	1.45	27.69	725.00
American Eel (B)	NCT	TC	M	T	4	4.00	2.41	1.35	25.78	337.50
Eastern Banded Killifish (C)	NW	WC	M	T	1	1.00	0.60	0.00	0.06	3.00
Smallmouth Bass (A)	IA	TC	C	M	6	6.00	3.61	1.10	20.97	183.00
Smallmouth Bass (B)	IA	TC	C	M	16	16.00	9.64	0.25	4.77	15.63
Smallmouth Bass (Y)	IA	TC	C	M	4	4.00	2.41	0.01	0.13	1.75
Pumpkinseed Sunfish (C)	NW	GF	C	P	1	1.00	0.60	0.00	0.06	3.00
Redbreast Sunfish (C)	NW	GF	C	M	1	1.00	0.60	0.00	0.08	4.00
Yellow Perch (B)	NCL	C	M		3	3.00	1.81	0.04	0.69	12.00
Yellow Perch (Y)	NCL	C	M		1	1.00	0.60	0.00	0.06	3.00
Mile Total					166	166.00		5.24		
Number of Species					11					
Number of Hybrids					0					

River Code: **50-001**	Stream: **Kennebec River (Madison; ust. Anson Dam)**	Sample Date: **2002**
River Mile: **53.20**	Location:	Date Range: 08/08/2002
Time Fished: 1785 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Chain Pickerel (A)	NW	TC	M	P	7	7.00	7.29	0.63	7.95	89.71
Chain Pickerel (Y)	NW	TC	M	P	4	4.00	4.17	0.02	0.22	4.33
White Sucker (A)	NCL	GF	S	T	2	2.00	2.08	0.03	0.38	15.00
White Sucker (B)	NCL	GF	S	T	5	5.00	5.21	1.84	23.31	368.40
Golden Shiner (Y)	NW	GF	M	T	6	6.00	6.25	0.02	0.20	2.67
American Eel (B)	NCT	TC	M	T	9	9.00	9.38	1.63	20.56	180.56
Smallmouth Bass (A)	IA	TC	C	M	27	27.00	28.13	3.23	40.91	119.74
Smallmouth Bass (B)	IA	TC	C	M	5	5.00	5.21	0.11	1.43	22.60
Smallmouth Bass (Y)	IA	TC	C	M	1	1.00	1.04	0.00	0.04	3.00
Pumpkinseed Sunfish (C)	NW	GF	C	P	14	14.00	14.58	0.19	2.35	13.29
Redbreast Sunfish (C)	NW	GF	C	M	16	16.00	16.67	0.21	2.64	13.06
Mile Total					96	96.00		7.90		
Number of Species					7					
Number of Hybrids					0					

River Code: **50-001**	Stream: **Kennebec River (dst. Abenaki Dam)**	Sample Date: **2002**
River Mile: **49.90**	Location:	Date Range: 08/07/2002
Time Fished: 733 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Brown Trout (A)	IMC	TC	N	I	13	13.00	3.88	9.19	9.33	707.23
White Sucker (A)	NCL	GF	S	T	68	68.00	20.30	71.36	72.39	1,049.41
White Sucker (Y)	NCL	GF	S	T	3	3.00	0.90	0.01	0.01	1.67
Common Shiner (C)	NCL	GF	S	P	105	105.00	31.34	0.60	0.60	5.67
Fallfish (C)	NCL	GF		P	95	95.00	28.36	0.74	0.75	7.75
American Eel (A)	NCT	TC	M	T	5	5.00	1.49	8.90	9.03	1,780.00
Smallmouth Bass (A)	IA	TC	C	M	16	16.00	4.78	7.25	7.36	453.25
Smallmouth Bass (B)	IA	TC	C	M	22	22.00	6.57	0.51	0.52	23.36
Smallmouth Bass (Y)	IA	TC	C	M	5	5.00	1.49	0.01	0.01	1.80
Redbreast Sunfish (C)	NW	GF	C	M	2	2.00	0.60	0.01	0.01	4.00
Slimy Sculpin (C)	NC	BI		I	1	1.00	0.30	0.00	0.00	3.00
Mile Total					335	335.00		98.58		
Number of Species					8					
Number of Hybrids					0					

River Code: **50-001**	Stream: **Kennebec River (Bombazee Rips)**	Sample Date: **2002**
River Mile: **46.10**	Location:	Date Range: 09/21/2002
Time Fished: 2686 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Brown Trout (A)	IMC	TC	N	I	3	3.00	0.53	0.99	3.67	328.67
White Sucker (A)	NCL	GF	S	T	5	5.00	0.89	4.60	17.10	920.00
White Sucker (B)	NCL	GF	S	T	16	16.00	2.84	0.10	0.35	5.94
Common Shiner (C)	NCL	GF	S	P	7	7.00	1.24	0.01	0.03	1.00
Fallfish (C)	NCL	GF		P	191	191.00	33.93	0.48	1.80	2.53
American Eel (A)	NCT	TC	M	T	4	4.00	0.71	2.70	10.04	675.00
American Eel (B)	NCT	TC	M	T	8	8.00	1.42	0.64	2.38	80.00
Eastern Banded Killifish (C)	NW	WC	M	T	8	8.00	1.42	0.02	0.07	2.50
Smallmouth Bass (A)	IA	TC	C	M	82	82.00	14.56	10.68	39.70	130.20
Smallmouth Bass (B)	IA	TC	C	M	90	90.00	15.99	3.56	13.22	39.50
Smallmouth Bass (Y)	IA	TC	C	M	53	53.00	9.41	0.71	2.63	13.37
Pumpkinseed Sunfish (C)	NW	GF	C	P	5	5.00	0.89	0.20	0.74	40.00
Redbreast Sunfish (C)	NW	GF	C	M	85	85.00	15.10	1.82	6.76	21.38
Yellow Perch (A)	NCL	C	M		1	1.00	0.18	0.25	0.93	250.00
Yellow Perch (B)	NCL	C	M		5	5.00	0.89	0.16	0.58	31.25
Mile Total					563	563.00		26.90		
Number of Species					10					
Number of Hybrids					0					

River Code: **50-001**	Stream: **Kennebec River (ust. Weston Dam)**	Sample Date: **2002**
River Mile: **38.90**	Location:	Date Range: 08/08/2002
Time Fished: 1772 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Chain Pickerel (Y)	NW	TC	M	P	8	8.00	3.56	0.07	0.71	8.75
White Sucker (Y)	NCL	GF	S	T	2	2.00	0.89	0.00	0.04	2.00
Golden Shiner (Y)	NW	GF	M	T	2	2.00	0.89	0.02	0.18	9.00
Common Shiner (C)	NCL	GF	S	P	1	1.00	0.44	0.02	0.18	18.00
Fallfish (C)	NCL	GF		P	13	13.00	5.78	0.07	0.71	5.38
American Eel (A)	NCT	TC	M	T	4	4.00	1.78	5.80	59.17	1,450.00
Eastern Banded Killifish (C)	NW	WC	M	T	5	5.00	2.22	0.01	0.08	1.60
Smallmouth Bass (A)	IA	TC	C	M	8	8.00	3.56	0.96	9.81	120.25
Smallmouth Bass (B)	IA	TC	C	M	15	15.00	6.67	0.31	3.18	20.80
Smallmouth Bass (Y)	IA	TC	C	M	4	4.00	1.78	0.01	0.05	1.25
Pumpkinseed Sunfish (C)	NW	GF	C	P	18	18.00	8.00	0.21	2.15	11.72
Redbreast Sunfish (C)	NW	GF	C	M	144	144.00	64.00	2.11	21.56	14.68
Yellow Perch (A)	NCL	C	M		1	1.00	0.44	0.21	2.14	210.00
Mile Total					225	225.00		9.80		
Number of Species					11					
Number of Hybrids					0					

River Code: **50-001**	Stream: **Kennebec River (dst. Skowhegan)**	Sample Date: **2002**
River Mile: **36.50**	Location:	Date Range: 08/01/2002
Time Fished: 1350 sec	Drainage:	Thru: 09/07/2002
Dist Fished: 2.00 km	Basin: No of Passes: 2	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Brown Trout (A)	IMC	TC	N	I	2	1.00	0.68	0.17	0.28	167.50
White Sucker (A)	NCL	GF	S	T	38	19.00	13.01	32.12	53.25	1,690.53
White Sucker (B)	NCL	GF	S	T	5	2.50	1.71	0.16	0.27	64.80
Common Shiner (C)	NCL	GF	S	P	3	1.50	1.03	0.01	0.01	5.00
Fallfish (C)	NCL	GF		P	44	22.00	15.07	0.70	1.17	31.95
American Eel (A)	NCT	TC	M	T	36	18.00	12.33	20.65	34.24	1,147.42
American Eel (B)	NCT	TC	M	T	2	1.00	0.68	0.04	0.07	40.00
American Eel (Y)	NCT	TC	M	T	2	1.00	0.68	0.02	0.04	23.50
Smallmouth Bass (A)	IA	TC	C	M	48	24.00	16.44	4.65	7.72	193.92
Smallmouth Bass (B)	IA	TC	C	M	79	39.50	27.05	1.68	2.78	42.44
Smallmouth Bass (Y)	IA	TC	C	M	29	14.50	9.93	0.08	0.14	5.69
Redbreast Sunfish (C)	NW	GF	C	M	3	1.50	1.03	0.02	0.03	12.33
Yellow Perch (B)	NCL	C	M		1	0.50	0.34	0.01	0.02	23.00
	Mile Total				292	146.00		60.32		
	Number of Species				8					
	Number of Hybrids				0					

River Code: **50-001**	Stream: **Kennebec R. (upper Shawmut Impoundment)**	Sample Date: **2002**
River Mile: **32.10**	Location:	Date Range: 08/02/2002
Time Fished: 1863 sec	Drainage:	Thru: 09/07/2002
Dist Fished: 3.00 km	Basin: No of Passes: 3	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	59	19.67	11.80	0.15	1.09	7.66
Chain Pickerel (A)	NW	TC	M	P	1	0.33	0.20	0.07	0.50	205.00
White Sucker (A)	NCL	GF	S	T	3	1.00	0.60	0.87	6.34	873.33
White Sucker (B)	NCL	GF	S	T	1	0.33	0.20	0.06	0.42	174.00
White Sucker (Y)	NCL	GF	S	T	9	3.00	1.80	0.01	0.04	1.89
Golden Shiner (Y)	NW	GF	M	T	44	14.67	8.80	0.03	0.18	1.70
Common Shiner (C)	NCL	GF	S	P	1	0.33	0.20	0.00	0.00	1.00
Fallfish (C)	NCL	GF		P	45	15.00	9.00	0.24	1.75	16.01
American Eel (A)	NCT	TC	M	T	14	4.67	2.80	7.40	53.72	1,585.00
American Eel (B)	NCT	TC	M	T	3	1.00	0.60	0.20	1.42	195.33
Eastern Banded Killifish (C)	NW	WC	M	T	17	5.67	3.40	0.01	0.08	2.06
White Perch (A)	NA	TC	M	P	12	4.00	2.40	0.76	5.50	189.25
Black Crappie (B)	IA	TC	C	P	3	1.00	0.60	0.02	0.14	19.00
Black Crappie (Y)	IA	TC	C	P	10	3.33	2.00	0.01	0.06	2.50
Smallmouth Bass (A)	IA	TC	C	M	28	9.33	5.60	1.81	13.11	193.43
Smallmouth Bass (B)	IA	TC	C	M	42	14.00	8.40	0.35	2.53	24.90
Smallmouth Bass (Y)	IA	TC	C	M	33	11.00	6.60	0.04	0.26	3.27
Largemouth Bass (A)	IA	TC	C	P	1	0.33	0.20	0.34	2.45	1,012.00
Largemouth Bass (B)	IA	TC	C	P	3	1.00	0.60	0.05	0.37	50.33
Largemouth Bass (Y)	IA	TC	C	P	64	21.33	12.80	0.05	0.33	2.16
Pumpkinseed Sunfish (C)	NW	GF	C	P	12	4.00	2.40	0.12	0.84	29.08
Redbreast Sunfish (C)	NW	GF	C	M	41	13.67	8.20	0.30	2.21	22.22
Yellow Perch (A)	NCL	C	M		29	9.67	5.80	0.84	6.08	86.66
Yellow Perch (B)	NCL	C	M		15	5.00	3.00	0.07	0.49	13.47
Yellow Perch (Y)	NCL	C	M		10	3.33	2.00	0.01	0.08	3.20
	Mile Total				500	166.67		13.77		
	Number of Species				15					
	Number of Hybrids				0					

River Code: **50-001**	Stream: **Kennebec River (ust. Shawmut Dam)**	Sample Date: **2002**
River Mile: **25.10**	Location:	Date Range: 08/10/2002
Time Fished: 1819 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	82	82.00	12.69	0.37	1.20	4.45
White Sucker (A)	NCL	GF	S	T	11	11.00	1.70	9.04	29.65	822.00
White Sucker (B)	NCL	GF	S	T	1	1.00	0.15	0.07	0.22	68.00
White Sucker (Y)	NCL	GF	S	T	2	2.00	0.31	0.01	0.03	4.00
Golden Shiner (Y)	NW	GF	M	T	5	5.00	0.77	0.01	0.02	1.20
Common Shiner (C)	NCL	GF	S	P	4	4.00	0.62	0.00	0.01	1.00
Fallfish (C)	NCL	GF		P	8	8.00	1.24	0.08	0.27	10.38
American Eel (A)	NCT	TC	M	T	9	9.00	1.39	8.01	26.26	890.00
Eastern Banded Killifish (C)	NW	WC	M	T	15	15.00	2.32	0.06	0.18	3.73
White Perch (A)	NA	TC	M	P	2	2.00	0.31	0.38	1.24	188.50
White Perch (B)	NA	TC	M	P	1	1.00	0.15	0.06	0.19	58.00
Black Crappie (A)	IA	TC	C	P	16	16.00	2.48	0.90	2.96	56.44
Smallmouth Bass (A)	IA	TC	C	M	15	15.00	2.32	3.71	12.16	247.24
Smallmouth Bass (B)	IA	TC	C	M	7	7.00	1.08	0.16	0.52	22.71
Smallmouth Bass (Y)	IA	TC	C	M	65	65.00	10.06	0.11	0.34	1.62
Largemouth Bass (A)	IA	TC	C	P	4	4.00	0.62	0.19	0.63	48.25
Largemouth Bass (B)	IA	TC	C	P	8	8.00	1.24	0.25	0.81	30.86
Largemouth Bass (Y)	IA	TC	C	P	141	141.00	21.83	0.44	1.43	3.08
Pumpkinseed Sunfish (C)	NW	GF	C	P	36	36.00	5.57	1.04	3.41	28.86
Redbreast Sunfish (C)	NW	GF	C	M	129	129.00	19.97	3.32	10.87	25.69
Yellow Perch (A)	NCL	C	M		85	85.00	13.16	2.32	7.60	27.28
	Mile Total				646	646.00		30.50		
	Number of Species				14					
	Number of Hybrids				0					

River Code: **50-001**	Stream: **Kennebec River (dst. Shawmut Dam)**	Sample Date: **2002**
River Mile: **23.90**	Location:	Date Range: 08/08/2002
Time Fished: 2028 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	6	6.00	1.67	0.03	0.05	4.50
Brown Trout (A)	IMC	TC	N	I	8	8.00	2.22	2.69	5.37	336.00
Rainbow Trout (A)	IMC	TC	N	I	1	1.00	0.28	0.35	0.69	346.00
White Sucker (A)	NCL	GF	S	T	13	13.00	3.61	7.54	15.05	580.00
White Sucker (B)	NCL	GF	S	T	11	11.00	3.06	1.03	2.06	93.91
White Sucker (Y)	NCL	GF	S	T	18	18.00	5.00	0.07	0.15	4.06
Golden Shiner (B)	NW	GF	M	T	11	11.00	3.06	0.18	0.35	16.00
Common Shiner (C)	NCL	GF	S	P	4	4.00	1.11	0.04	0.08	9.50
Fallfish (C)	NCL	GF		P	67	67.00	18.61	0.54	1.08	8.04
American Eel (A)	NCT	TC	M	T	60	60.00	16.67	28.79	57.47	479.81
Eastern Banded Killifish (C)	NW	WC	M	T	1	1.00	0.28	0.01	0.02	8.00
Smallmouth Bass (A)	IA	TC	C	M	23	23.00	6.39	6.29	12.56	273.52
Smallmouth Bass (B)	IA	TC	C	M	33	33.00	9.17	1.23	2.46	37.27
Smallmouth Bass (Y)	IA	TC	C	M	65	65.00	18.06	0.64	1.28	9.86
Largemouth Bass (B)	IA	TC	C	P	1	1.00	0.28	0.01	0.02	10.00
Largemouth Bass (Y)	IA	TC	C	P	9	9.00	2.50	0.03	0.07	3.67
Pumpkinseed Sunfish (C)	NW	GF	C	P	2	2.00	0.56	0.08	0.15	37.50
Redbreast Sunfish (C)	NW	GF	C	M	16	16.00	4.44	0.32	0.63	19.75
Yellow Perch (B)	NCL	C	M		10	10.00	2.78	0.24	0.48	24.00
Yellow Perch (Y)	NCL	C	M		1	1.00	0.28	0.00	0.00	2.00
Mile Total					360	360.00		50.09		
Number of Species					14					
Number of Hybrids					0					

River Code: **50-001**	Stream: **Kennebec R. (ust. Hydro-Kennebec Dam)**	Sample Date: **2002**
River Mile: **20.80**	Location:	Date Range: 08/11/2002
Time Fished: 2728 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	5	5.00	1.01	0.03	0.09	5.00
White Sucker (Y)	NCL	GF	S	T	1	1.00	0.20	0.00	0.01	2.00
Golden Shiner (Y)	NW	GF	M	T	2	2.00	0.40	0.00	0.01	1.50
Fallfish (C)	NCL	GF		P	27	27.00	5.45	0.06	0.23	2.33
American Eel (A)	NCT	TC	M	T	19	19.00	3.84	9.33	33.97	490.91
American Eel (B)	NCT	TC	M	T	35	35.00	7.07	2.20	8.01	62.86
Eastern Banded Killifish (C)	NW	WC	M	T	26	26.00	5.25	0.05	0.19	2.04
Smallmouth Bass (A)	IA	TC	C	M	66	66.00	13.33	9.10	33.14	137.89
Smallmouth Bass (B)	IA	TC	C	M	73	73.00	14.75	1.87	6.81	25.63
Smallmouth Bass (Y)	IA	TC	C	M	22	22.00	4.44	0.02	0.07	0.82
Largemouth Bass (B)	IA	TC	C	P	1	1.00	0.20	0.04	0.15	42.00
Largemouth Bass (Y)	IA	TC	C	P	37	37.00	7.47	0.07	0.25	1.89
Pumpkinseed Sunfish (C)	NW	GF	C	P	2	2.00	0.40	0.03	0.10	14.00
Redbreast Sunfish (C)	NW	GF	C	M	172	172.00	34.75	4.12	14.99	23.93
Yellow Perch (A)	NCL	C	M		7	7.00	1.41	0.54	1.97	77.14
	Mile Total				495	495.00		27.46		
	Number of Species				11					
	Number of Hybrids				0					

River Code: **50-001**	Stream: **Kennebec R. (dst. Hydro-Kennebec Dam)**	Sample Date: **2002**
River Mile: **18.50**	Location:	Date Range: 08/11/2002
Time Fished: 2464 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Rainbow Trout (A)	IMC	TC	N	I	2	2.00	0.73	1.44	6.46	722.00
White Sucker (A)	NCL	GF	S	T	2	2.00	0.73	0.79	3.53	395.00
White Sucker (B)	NCL	GF	S	T	4	4.00	1.47	0.35	1.55	86.50
White Sucker (Y)	NCL	GF	S	T	4	4.00	1.47	0.01	0.04	2.50
Fallfish (C)	NCL	GF		P	3	3.00	1.10	0.02	0.08	6.00
American Eel (A)	NCT	TC	M	T	16	16.00	5.86	6.80	30.41	425.00
American Eel (B)	NCT	TC	M	T	43	43.00	15.75	1.97	8.81	45.83
Smallmouth Bass (A)	IA	TC	C	M	34	34.00	12.45	8.47	37.87	249.03
Smallmouth Bass (B)	IA	TC	C	M	89	89.00	32.60	2.27	10.14	25.47
Smallmouth Bass (Y)	IA	TC	C	M	60	60.00	21.98	0.12	0.55	2.06
Pumpkinseed Sunfish (C)	NW	GF	C	P	1	1.00	0.37	0.02	0.07	15.00
Redbreast Sunfish (C)	NW	GF	C	M	14	14.00	5.13	0.10	0.42	6.79
Yellow Perch (B)	NCL	C	M		1	1.00	0.37	0.01	0.06	14.00
	Mile Total				273	273.00		22.36		
	Number of Species				8					
	Number of Hybrids				0					

River Code: **50-001**	Stream: **Kennebec R. (dst. Lockwood Dam)**	Sample Date: **2003**
River Mile: **17.40**	Location:	Date Range: 07/10/2003
Time Fished: 2865 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Sea Lamprey (A)	NA	PF	N	M	1	1.00	0.15	0.59	0.42	585.00
American Shad (A)	NA	PI			1	1.00	0.15	1.45	1.03	1,450.00
Brown Trout (A)	IMC	TC	N	I	2	2.00	0.31	0.57	0.41	284.50
Chain Pickerel (A)	NW	TC	M	P	1	1.00	0.15	0.90	0.64	900.00
White Sucker (A)	NCL	GF	S	T	13	13.00	1.99	16.58	11.80	1,275.00
White Sucker (B)	NCL	GF	S	T	5	5.00	0.76	1.41	1.01	282.80
Spottail Shiner (C)	IA	WC	M	P	1	1.00	0.15	0.01	0.01	10.00
Fallfish (A)	NCL	GF		P	7	7.00	1.07	0.33	0.24	47.14
Fallfish (B)	NCL	GF		P	12	12.00	1.83	0.08	0.06	6.67
Brown Bullhead (A)	NW	GF	C	T	1	1.00	0.15	0.33	0.24	330.00
American Eel (A)	NCT	TC	M	T	19	19.00	2.91	9.26	6.60	487.50
American Eel (B)	NCT	TC	M	T	189	189.00	28.90	16.00	11.39	84.64
American Eel (Y)	NCT	TC	M	T	206	206.00	31.50	1.10	0.78	5.33
Eastern Banded Killifish (C)	NW	WC	M	T	5	5.00	0.76	0.03	0.02	5.00
Striped Bass (A)	NA	TC	M	I	22	22.00	3.36	53.00	37.75	2,409.09
Striped Bass (B)	NA	TC	M	I	22	22.00	3.36	13.79	9.82	626.59
White Perch (A)	NA	TC	M	P	3	3.00	0.46	0.51	0.37	171.33
Smallmouth Bass (A)	IA	TC	C	M	47	47.00	7.19	17.99	12.81	382.67
Smallmouth Bass (B)	IA	TC	C	M	40	40.00	6.12	2.64	1.88	66.05
Smallmouth Bass (Y)	IA	TC	C	M	14	14.00	2.14	0.24	0.17	17.14
Largemouth Bass (A)	IA	TC	C	P	2	2.00	0.31	0.78	0.56	392.00
Redbreast Sunfish (A)	NW	GF	C	M	16	16.00	2.45	0.93	0.67	58.38
Yellow Perch (A)	NCL	C	M		25	25.00	3.82	1.90	1.36	76.12
	Mile Total				654	654.00		140.41		
	Number of Species				16					
	Number of Hybrids				0					

River Code: **50-001**	Stream: **Kennebec River (dst. Lockwood Dam)**	Sample Date: **2002**
River Mile: **17.40**	Location:	Date Range: 08/14/2002
Time Fished: 6370 sec	Drainage:	Thru: 09/24/2002
Dist Fished: 2.00 km	Basin: No of Passes: 2	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	11	5.50	0.99	0.06	0.04	11.18
Chain Pickerel (A)	NW	TC	M	P	2	1.00	0.18	1.14	0.74	1,137.50
White Sucker (A)	NCL	GF	S	T	42	21.00	3.78	36.75	23.95	1,749.83
White Sucker (B)	NCL	GF	S	T	6	3.00	0.54	0.71	0.46	235.33
White Sucker (Y)	NCL	GF	S	T	5	2.50	0.45	0.01	0.01	4.00
Common Carp (A)	IA	GF	M	T	4	2.00	0.36	11.55	7.53	5,775.00
Golden Shiner (B)	NW	GF	M	T	4	2.00	0.36	0.03	0.02	14.50
Spottail Shiner (C)	IA	WC	M	P	5	2.50	0.45	0.01	0.00	2.80
Fallfish (C)	NCL	GF		P	59	29.50	5.31	0.40	0.26	13.63
White Catfish (A)	IA	TC	C	P	6	3.00	0.54	0.86	0.56	285.00
White Catfish (Y)	IA	TC	C	P	3	1.50	0.27	0.00	0.00	1.00
American Eel (A)	NCT	TC	M	T	51	25.50	4.59	12.56	8.18	492.43
American Eel (B)	NCT	TC	M	T	255	127.50	22.95	4.15	2.70	32.52
American Eel (Y)	NCT	TC	M	T	54	27.00	4.86	0.15	0.09	5.37
Eastern Banded Killifish (C)	NW	WC	M	T	16	8.00	1.44	0.02	0.01	2.59
Burbot (C)	NC	TC	S	P	1	0.50	0.09	0.02	0.01	42.00
Striped Bass (A)	NA	TC	M	I	60	30.00	5.40	59.80	38.97	1,993.29
White Perch (A)	NA	TC	M	P	3	1.50	0.27	0.25	0.16	166.67
Black Crappie (A)	IA	TC	C	P	24	12.00	2.16	2.69	1.75	223.75
Smallmouth Bass (A)	IA	TC	C	M	102	51.00	9.18	15.31	9.98	300.16
Smallmouth Bass (B)	IA	TC	C	M	114	57.00	10.26	2.50	1.63	43.82
Smallmouth Bass (Y)	IA	TC	C	M	132	66.00	11.88	0.31	0.20	4.71
Largemouth Bass (A)	IA	TC	C	P	11	5.50	0.99	1.41	0.92	256.95
Largemouth Bass (B)	IA	TC	C	P	28	14.00	2.52	0.24	0.15	16.86
Largemouth Bass (Y)	IA	TC	C	P	9	4.50	0.81	0.02	0.01	3.56
Pumpkinseed Sunfish (C)	NW	GF	C	P	23	11.50	2.07	0.53	0.35	46.22
Redbreast Sunfish (C)	NW	GF	C	M	57	28.50	5.13	0.90	0.59	31.58
Yellow Perch (A)	NCL	C	M		16	8.00	1.44	0.93	0.61	116.63
Yellow Perch (B)	NCL	C	M		7	3.50	0.63	0.17	0.11	48.57
Yellow Perch (Y)	NCL	C	M		1	0.50	0.09	0.00	0.00	4.00
	Mile Total				1,111	555.50		153.45		
	Number of Species				19					
	Number of Hybrids				0					

River Code: **50-001**	Stream: **Kennebec R. (dst. Sebasticook R.)**	Sample Date: **2002**
River Mile: **16.50**	Location:	Date Range: 08/12/2002
Time Fished: 3470 sec	Drainage:	Thru: 09/22/2002
Dist Fished: 2.00 km	Basin: No of Passes: 2	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (A)	NA	PI	M	P	1	0.50	0.06	0.08	0.06	160.00
Alewife (Y)	NA	PI	M	P	336	168.00	21.11	1.96	1.35	11.65
Blueback Herring (Y)	NA	PI			2	1.00	0.13	0.00	0.00	1.00
White Sucker (A)	NCL	GF	S	T	148	74.00	9.30	82.48	56.92	1,114.60
White Sucker (B)	NCL	GF	S	T	8	4.00	0.50	0.57	0.39	142.88
Golden Shiner (Y)	NW	GF	M	T	1	0.50	0.06	0.00	0.00	2.00
Spottail Shiner (C)	IA	WC	M	P	99	49.50	6.22	0.55	0.38	11.19
Fallfish (C)	NCL	GF		P	70	35.00	4.40	0.76	0.52	21.69
American Eel (A)	NCT	TC	M	T	205	102.50	12.88	32.75	22.60	319.52
American Eel (B)	NCT	TC	M	T	311	155.50	19.54	17.69	12.21	113.77
American Eel (Y)	NCT	TC	M	T	18	9.00	1.13	0.12	0.08	12.93
Eastern Banded Killifish (C)	NW	WC	M	T	2	1.00	0.13	0.00	0.00	2.00
Striped Bass (A)	NA	TC	M	I	1	0.50	0.06	0.35	0.24	700.00
Smallmouth Bass (A)	IA	TC	C	M	69	34.50	4.33	4.86	3.35	140.74
Smallmouth Bass (B)	IA	TC	C	M	70	35.00	4.40	1.06	0.73	30.27
Smallmouth Bass (Y)	IA	TC	C	M	169	84.50	10.62	0.64	0.44	7.59
Largemouth Bass (A)	IA	TC	C	P	2	1.00	0.13	0.04	0.03	42.00
Largemouth Bass (B)	IA	TC	C	P	2	1.00	0.13	0.04	0.03	41.00
Largemouth Bass (Y)	IA	TC	C	P	6	3.00	0.38	0.02	0.01	6.17
Pumpkinseed Sunfish (C)	NW	GF	C	P	17	8.50	1.07	0.19	0.13	22.53
Redbreast Sunfish (C)	NW	GF	C	M	53	26.50	3.33	0.73	0.50	27.44
Yellow Perch (Y)	NCL	C	M		2	1.00	0.13	0.00	0.00	2.50
Mile Total					1,592	796.00		144.89		
Number of Species					14					
Number of Hybrids					0					

River Code: **50-001**	Stream: **Kennebec River (dst. Sebasticook R.)**	Sample Date: **2003**
River Mile: **16.50**	Location:	Date Range: 07/12/2003
Time Fished: 1962 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Sea Lamprey (Y)	NA	PF	N	M	1	1.00	0.15	0.01	0.01	8.00
Atlantic Salmon (Y)	NA	TC		I	1	1.00	0.15	0.00	0.00	2.00
White Sucker (A)	NCL	GF	S	T	40	40.00	6.13	41.18	46.36	1,029.41
White Sucker (B)	NCL	GF	S	T	2	2.00	0.31	0.26	0.30	131.50
Fallfish (A)	NCL	GF		P	3	3.00	0.46	0.17	0.19	55.67
White Catfish (A)	IA	TC	C	P	3	3.00	0.46	1.31	1.48	437.67
American Eel (A)	NCT	TC	M	T	21	21.00	3.22	9.74	10.96	463.64
American Eel (B)	NCT	TC	M	T	330	330.00	50.54	23.98	27.00	72.66
American Eel (Y)	NCT	TC	M	T	107	107.00	16.39	0.56	0.62	5.19
Eastern Banded Killifish (C)	NW	WC	M	T	2	2.00	0.31	0.01	0.01	5.00
Black Crappie (B)	IA	TC	C	P	1	1.00	0.15	0.44	0.50	440.00
Smallmouth Bass (A)	IA	TC	C	M	15	15.00	2.30	5.65	6.36	376.67
Smallmouth Bass (B)	IA	TC	C	M	56	56.00	8.58	2.65	2.98	47.25
Smallmouth Bass (Y)	IA	TC	C	M	15	15.00	2.30	0.01	0.01	0.63
Pumpkinseed Sunfish (C)	NW	GF	C	P	9	9.00	1.38	0.22	0.25	24.56
Redbreast Sunfish (A)	NW	GF	C	M	46	46.00	7.04	2.53	2.85	54.98
Yellow Perch (A)	NCL	C	M		1	1.00	0.15	0.11	0.12	108.00
Mile Total					653	653.00		88.81		
Number of Species					12					
Number of Hybrids					0					

River Code: **50-001**	Stream: **Kennebec River (dst. St. Rt. 137)**	Sample Date: **2002**
River Mile: **15.10**	Location:	Date Range: 08/12/2002
Time Fished: 4374 sec	Drainage:	Thru: 09/22/2002
Dist Fished: 2.00 km	Basin: No of Passes: 2	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	1	0.50	0.09	0.00	0.00	5.00
Brown Trout (A)	IMC	TC	N	I	1	0.50	0.09	0.13	0.17	262.00
Atlantic Salmon (A)	NA	TC		I	2	1.00	0.18	1.10	1.40	1,100.00
White Sucker (A)	NCL	GF	S	T	79	39.50	7.15	44.38	56.61	1,123.63
White Sucker (B)	NCL	GF	S	T	7	3.50	0.63	0.08	0.10	21.71
Spottail Shiner (C)	IA	WC	M	P	107	53.50	9.68	0.43	0.55	8.10
Fallfish (C)	NCL	GF		P	111	55.50	10.05	0.73	0.93	13.19
White Catfish (A)	IA	TC	C	P	1	0.50	0.09	0.14	0.17	270.00
American Eel (A)	NCT	TC	M	T	25	12.50	2.26	4.46	5.69	357.00
American Eel (B)	NCT	TC	M	T	525	262.50	47.51	14.15	18.05	53.91
American Eel (Y)	NCT	TC	M	T	68	34.00	6.15	0.27	0.34	7.81
Eastern Banded Killifish (C)	NW	WC	M	T	4	2.00	0.36	0.02	0.02	8.00
Striped Bass (A)	NA	TC	M	I	1	0.50	0.09	1.35	1.72	2,700.00
Striped Bass (B)	NA	TC	M	I	1	0.50	0.09	0.28	0.36	560.00
Smallmouth Bass (A)	IA	TC	C	M	57	28.50	5.16	9.42	12.01	330.52
Smallmouth Bass (B)	IA	TC	C	M	49	24.50	4.43	1.07	1.36	43.65
Smallmouth Bass (Y)	IA	TC	C	M	49	24.50	4.43	0.18	0.22	7.16
Largemouth Bass (B)	IA	TC	C	P	4	2.00	0.36	0.05	0.06	23.25
Largemouth Bass (Y)	IA	TC	C	P	1	0.50	0.09	0.00	0.01	8.00
Pumpkinseed Sunfish (C)	NW	GF	C	P	1	0.50	0.09	0.00	0.00	7.00
Redbreast Sunfish (C)	NW	GF	C	M	10	5.00	0.90	0.16	0.20	31.32
Yellow Perch (B)	NCL	C	M		1	0.50	0.09	0.01	0.02	25.00
	Mile Total				1,105	552.50		78.41		
	Number of Species				15					
	Number of Hybrids				0					

River Code: **50-001**	Stream: **Kennebec River (dst. St. Rt. 137)**	Sample Date: **2003**
River Mile: **15.10**	Location:	Date Range: 07/12/2003
Time Fished: 3924 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Sea Lamprey (Y)	NA	PF	N	M	4	4.00	0.67	0.02	0.01	3.75
Alewife (A)	NA	PI	M	P	1	1.00	0.17	0.11	0.11	107.00
White Sucker (A)	NCL	GF	S	T	51	51.00	8.53	48.77	48.13	956.25
White Sucker (B)	NCL	GF	S	T	2	2.00	0.33	0.82	0.81	410.00
White Sucker (Y)	NCL	GF	S	T	21	21.00	3.51	0.02	0.02	0.75
Spottail Shiner (C)	IA	WC	M	P	9	9.00	1.51	0.06	0.06	6.67
Fallfish (A)	NCL	GF		P	7	7.00	1.17	0.39	0.38	55.71
Fallfish (B)	NCL	GF		P	10	10.00	1.67	0.10	0.10	9.70
American Eel (A)	NCT	TC	M	T	10	10.00	1.67	4.42	4.36	441.67
American Eel (B)	NCT	TC	M	T	248	248.00	41.47	13.29	13.11	53.57
American Eel (Y)	NCT	TC	M	T	143	143.00	23.91	0.84	0.83	5.87
Eastern Banded Killifish (C)	NW	WC	M	T	11	11.00	1.84	0.03	0.02	2.25
Striped Bass (A)	NA	TC	M	I	1	1.00	0.17	12.50	12.34	12,500.00
Striped Bass (B)	NA	TC	M	I	12	12.00	2.01	7.72	7.62	643.67
White Perch (A)	NA	TC	M	P	1	1.00	0.17	0.07	0.06	65.00
Smallmouth Bass (A)	IA	TC	C	M	22	22.00	3.68	9.99	9.86	454.27
Smallmouth Bass (B)	IA	TC	C	M	32	32.00	5.35	1.77	1.74	55.25
Smallmouth Bass (Y)	IA	TC	C	M	2	2.00	0.33	0.00	0.00	1.00
Redbreast Sunfish (A)	NW	GF	C	M	9	9.00	1.51	0.38	0.38	42.22
Redbreast Sunfish (Y)	NW	GF	C	M	1	1.00	0.17	0.01	0.00	5.00
Yellow Perch (B)	NCL	C	M		1	1.00	0.17	0.05	0.04	45.00
	Mile Total				598	598.00		101.32		
	Number of Species				12					
	Number of Hybrids				0					

River Code: **50-001**	Stream: **Kennebec River (Six Mile Falls)**	Sample Date: **2002**
River Mile: **11.00**	Location:	Date Range: 08/12/2002
Time Fished: 2173 sec	Drainage:	Thru: 09/22/2002
Dist Fished: 2.00 km	Basin: No of Passes: 2	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Sea Lamprey (Y)	NA	PF	N	M	1	0.50	0.11	0.00	0.00	8.00
White Sucker (A)	NCL	GF	S	T	37	18.50	4.10	14.29	12.19	772.16
White Sucker (B)	NCL	GF	S	T	8	4.00	0.89	0.76	0.65	190.00
White Sucker (Y)	NCL	GF	S	T	17	8.50	1.88	0.04	0.04	5.00
Spottail Shiner (C)	IA	WC	M	P	3	1.50	0.33	0.02	0.01	10.00
Fallfish (C)	NCL	GF		P	21	10.50	2.33	0.11	0.09	10.05
American Eel (A)	NCT	TC	M	T	25	12.50	2.77	8.35	7.12	668.00
American Eel (B)	NCT	TC	M	T	537	268.50	59.47	33.05	28.20	123.08
American Eel (Y)	NCT	TC	M	T	7	3.50	0.78	0.05	0.04	13.14
Striped Bass (A)	NA	TC	M	I	52	26.00	5.76	49.96	42.63	1,921.57
Black Crappie (A)	IA	TC	C	P	7	3.50	0.78	3.54	3.02	1,010.00
Smallmouth Bass (A)	IA	TC	C	M	28	14.00	3.10	4.10	3.50	292.96
Smallmouth Bass (B)	IA	TC	C	M	77	38.50	8.53	2.11	1.80	54.90
Smallmouth Bass (Y)	IA	TC	C	M	17	8.50	1.88	0.05	0.04	5.53
Largemouth Bass (Y)	IA	TC	C	P	17	8.50	1.88	0.06	0.05	7.24
Pumpkinseed Sunfish (C)	NW	GF	C	P	4	2.00	0.44	0.04	0.03	19.00
Redbreast Sunfish (C)	NW	GF	C	M	45	22.50	4.98	0.68	0.58	30.42
Mile Total					903	451.50		117.20		
Number of Species					11					
Number of Hybrids					0					

River Code: **50-001**	Stream: **Kennebec River (Six Mile Falls)**	Sample Date: **2003**
River Mile: **11.00**	Location:	Date Range: 07/12/2003
Time Fished: 1962 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Sea Lamprey (Y)	NA	PF	N	M	7	7.00	1.56	0.01	0.01	1.00
White Sucker (A)	NCL	GF	S	T	11	11.00	2.44	10.50	17.30	954.55
White Sucker (B)	NCL	GF	S	T	4	4.00	0.89	0.66	1.08	163.75
White Sucker (Y)	NCL	GF	S	T	19	19.00	4.22	0.02	0.03	0.83
Spottail Shiner (B)	IA	WC	M	P	4	4.00	0.89	0.03	0.05	7.50
Spottail Shiner (C)	IA	WC	M	P	2	2.00	0.44	0.01	0.01	3.00
Fallfish (A)	NCL	GF		P	7	7.00	1.56	0.47	0.77	67.14
White Catfish (A)	IA	TC	C	P	1	1.00	0.22	0.15	0.25	153.00
American Eel (A)	NCT	TC	M	T	29	29.00	6.44	10.54	17.36	363.33
American Eel (B)	NCT	TC	M	T	241	241.00	53.56	12.20	20.11	50.63
American Eel (Y)	NCT	TC	M	T	20	20.00	4.44	0.07	0.12	3.67
Eastern Banded Killifish (C)	NW	WC	M	T	1	1.00	0.22	0.00	0.00	3.00
Striped Bass (A)	NA	TC	M	I	3	3.00	0.67	6.25	10.30	2,083.33
Striped Bass (B)	NA	TC	M	I	4	4.00	0.89	2.33	3.83	581.25
Smallmouth Bass (A)	IA	TC	C	M	40	40.00	8.89	14.57	24.01	364.25
Smallmouth Bass (B)	IA	TC	C	M	25	25.00	5.56	1.69	2.78	67.60
Smallmouth Bass (Y)	IA	TC	C	M	2	2.00	0.44	0.00	0.01	2.00
Redbreast Sunfish (A)	NW	GF	C	M	29	29.00	6.44	1.06	1.75	36.61
Yellow Perch (A)	NCL	C	M		1	1.00	0.22	0.13	0.21	130.00
Mile Total					450	450.00		60.68		
Number of Species					11					
Number of Hybrids					0					

River Code: **50-001**	Stream: **Kennebec River (North Sidney)**	Sample Date: **2003**
River Mile: **9.00**	Location:	Date Range: 07/15/2003
Time Fished: 2250 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Sea Lamprey (Y)	NA	PF	N	M	4	4.00	0.79	0.02	0.04	4.50
Alewife (A)	NA	PI	M	P	3	3.00	0.59	0.47	1.18	158.00
Alewife (Y)	NA	PI	M	P	4	4.00	0.79	0.01	0.02	2.00
White Sucker (A)	NCL	GF	S	T	24	24.00	4.72	14.75	36.87	614.58
White Sucker (B)	NCL	GF	S	T	7	7.00	1.38	2.13	5.32	304.29
White Sucker (Y)	NCL	GF	S	T	29	29.00	5.71	0.02	0.05	0.76
Blacknose Dace (C)	NCL	GF	S	T	1	1.00	0.20	0.00	0.00	2.00
Common Shiner (C)	NCL	GF	S	P	3	3.00	0.59	0.03	0.06	8.33
Spottail Shiner (C)	IA	WC	M	P	35	35.00	6.89	0.11	0.27	3.09
Fallfish (A)	NCL	GF		P	1	1.00	0.20	0.51	1.27	510.00
White Catfish (A)	IA	TC	C	P	1	1.00	0.20	0.17	0.42	170.00
American Eel (A)	NCT	TC	M	T	7	7.00	1.38	2.80	7.00	400.00
American Eel (B)	NCT	TC	M	T	167	167.00	32.87	9.39	23.48	56.25
American Eel (Y)	NCT	TC	M	T	25	25.00	4.92	0.10	0.25	4.00
Eastern Banded Killifish (C)	NW	WC	M	T	13	13.00	2.56	0.04	0.09	2.75
Smallmouth Bass (A)	IA	TC	C	M	17	17.00	3.35	4.42	11.06	260.24
Smallmouth Bass (B)	IA	TC	C	M	27	27.00	5.31	1.11	2.77	41.11
Smallmouth Bass (Y)	IA	TC	C	M	7	7.00	1.38	0.01	0.02	1.43
Pumpkinseed Sunfish (C)	NW	GF	C	P	2	2.00	0.39	0.02	0.05	11.00
Redbreast Sunfish (A)	NW	GF	C	M	51	51.00	10.04	1.67	4.17	32.75
Redbreast Sunfish (C)	NW	GF	C	M	79	79.00	15.55	2.22	5.55	28.09
Four-spine Stickleback (C)	NT	WC			1	1.00	0.20	0.00	0.00	1.00
Mile Total					508	508.00		40.00		
Number of Species					14					
Number of Hybrids					0					

River Code: **50-001**	Stream: **Kennebec River (dst. Sidney)**	Sample Date: **2002**
River Mile: **6.85**	Location:	Date Range: 08/13/2002
Time Fished: 5705 sec	Drainage:	Thru: 09/23/2002
Dist Fished: 2.00 km	Basin: No of Passes: 2	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Sea Lamprey (Y)	NA	PF	N	M	1	0.50	0.06	0.00	0.00	4.00
Alewife (Y)	NA	PI	M	P	75	37.50	4.24	0.42	0.66	11.25
American Shad (Y)	NA	PI			2	1.00	0.11	0.00	0.00	1.50
Chain Pickerel (A)	NW	TC	M	P	1	0.50	0.06	0.63	0.98	1,250.00
White Sucker (B)	NCL	GF	S	T	143	71.50	8.08	5.21	8.13	72.90
White Sucker (Y)	NCL	GF	S	T	6	3.00	0.34	0.04	0.06	12.00
Common Carp (A)	IA	GF	M	T	1	0.50	0.06	1.48	2.30	2,950.00
Golden Shiner (B)	NW	GF	M	T	2	1.00	0.11	0.01	0.02	13.50
Creek Chub (C)	NCL	GF	N	T	2	1.00	0.11	0.01	0.01	8.50
Spottail Shiner (C)	IA	WC	M	P	221	110.50	12.49	0.80	1.25	7.25
Fallfish (C)	NCL	GF		P	1	0.50	0.06	0.00	0.00	1.00
White Catfish (A)	IA	TC	C	P	1	0.50	0.06	0.07	0.11	144.00
American Eel (A)	NCT	TC	M	T	52	26.00	2.94	33.38	52.07	1,283.65
American Eel (B)	NCT	TC	M	T	325	162.50	18.37	10.58	16.51	65.13
American Eel (Y)	NCT	TC	M	T	1	0.50	0.06	0.02	0.03	39.00
Eastern Banded Killifish (C)	NW	WC	M	T	28	14.00	1.58	0.06	0.10	4.46
Black Crappie (Y)	IA	TC	C	P	1	0.50	0.06	0.00	0.00	4.00
Smallmouth Bass (A)	IA	TC	C	M	12	6.00	0.68	2.67	4.17	445.52
Smallmouth Bass (B)	IA	TC	C	M	43	21.50	2.43	0.78	1.22	36.37
Smallmouth Bass (Y)	IA	TC	C	M	20	10.00	1.13	0.05	0.08	5.30
Largemouth Bass (A)	IA	TC	C	P	4	2.00	0.23	0.78	1.21	388.50
Largemouth Bass (B)	IA	TC	C	P	14	7.00	0.79	0.18	0.28	25.51
Largemouth Bass (Y)	IA	TC	C	P	433	216.50	24.48	1.01	1.57	4.66
Pumpkinseed Sunfish (C)	NW	GF	C	P	21	10.50	1.19	0.38	0.59	35.71
Redbreast Sunfish (C)	NW	GF	C	M	339	169.50	19.16	5.26	8.21	31.05
Yellow Perch (B)	NCL	C	M		20	10.00	1.13	0.27	0.43	27.25
	Mile Total				1,769	884.50		64.09		
	Number of Species				19					
	Number of Hybrids				0					

River Code: **50-001**	Stream: **Kennebec River (Seven Mile Falls)**	Sample Date: **2003**
River Mile: **4.20**	Location:	Date Range: 07/15/2003
Time Fished: 8737 sec	Drainage:	
Dist Fished: 1.15 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker (A)	NCL	GF	S	T	34	29.57	3.65	23.01	26.81	778.13
White Sucker (B)	NCL	GF	S	T	6	5.22	0.64	1.00	1.17	191.67
White Sucker (Y)	NCL	GF	S	T	35	30.44	3.76	0.07	0.09	2.40
Golden Shiner (Y)	NW	GF	M	T	5	4.35	0.54	0.02	0.02	3.40
Spottail Shiner (C)	IA	WC	M	P	5	4.35	0.54	0.03	0.04	7.80
White Catfish (A)	IA	TC	C	P	4	3.48	0.43	1.16	1.35	333.75
American Eel (A)	NCT	TC	M	T	8	6.96	0.86	3.90	4.54	560.00
American Eel (B)	NCT	TC	M	T	343	298.26	36.84	20.84	24.28	69.86
American Eel (Y)	NCT	TC	M	T	21	18.26	2.26	0.06	0.07	3.06
Eastern Banded Killifish (C)	NW	WC	M	T	33	28.70	3.54	0.06	0.07	1.97
Striped Bass (A)	NA	TC	M	I	2	1.74	0.21	4.35	5.07	2,500.00
Black Crappie (A)	IA	TC	C	P	2	1.74	0.21	0.18	0.21	105.00
Smallmouth Bass (A)	IA	TC	C	M	56	48.70	6.02	18.95	22.08	389.09
Smallmouth Bass (B)	IA	TC	C	M	126	109.57	13.53	5.73	6.68	52.30
Smallmouth Bass (Y)	IA	TC	C	M	14	12.17	1.50	0.03	0.03	2.07
Redbreast Sunfish (C)	NW	GF	C	M	237	206.09	25.46	6.46	7.52	31.33
Mile Total					931	809.57		85.82		
Number of Species					10					
Number of Hybrids					0					

River Code: **50-001**	Stream: **Kennebec River (Seven Mile Falls)**	Sample Date: **2002**
River Mile: **4.20**	Location:	Date Range: 08/13/2002
Time Fished: 6452 sec	Drainage:	Thru: 09/23/2002
Dist Fished: 2.30 km	Basin: No of Passes: 2	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (A)	NA	PI	M	P	3	1.30	0.14	0.23	0.24	177.67
Alewife (Y)	NA	PI	M	P	244	106.09	11.79	0.92	0.96	8.71
White Sucker (A)	NCL	GF	S	T	77	33.48	3.72	26.58	27.58	793.81
White Sucker (B)	NCL	GF	S	T	48	20.87	2.32	1.43	1.48	68.26
White Sucker (Y)	NCL	GF	S	T	12	5.22	0.58	0.06	0.06	10.58
Golden Shiner (B)	NW	GF	M	T	12	5.22	0.58	0.06	0.07	12.17
Spottail Shiner (C)	IA	WC	M	P	433	188.26	20.92	1.15	1.20	6.12
Fallfish (C)	NCL	GF		P	4	1.74	0.19	0.01	0.01	5.75
White Catfish (A)	IA	TC	C	P	4	1.74	0.19	0.23	0.24	133.50
American Eel (A)	NCT	TC	M	T	35	15.22	1.69	5.64	5.86	370.71
American Eel (B)	NCT	TC	M	T	545	236.96	26.33	16.22	16.83	68.45
American Eel (Y)	NCT	TC	M	T	15	6.52	0.72	0.07	0.07	10.00
Eastern Banded Killifish (C)	NW	WC	M	T	8	3.48	0.39	0.01	0.01	2.63
Striped Bass (A)	NA	TC	M	I	23	10.00	1.11	25.16	26.11	2,515.80
Smallmouth Bass (A)	IA	TC	C	M	73	31.74	3.53	12.67	13.15	399.11
Smallmouth Bass (B)	IA	TC	C	M	97	42.17	4.69	1.71	1.77	40.43
Smallmouth Bass (Y)	IA	TC	C	M	59	25.65	2.85	0.11	0.12	4.37
Largemouth Bass (A)	IA	TC	C	P	2	0.87	0.10	0.16	0.17	184.00
Largemouth Bass (B)	IA	TC	C	P	2	0.87	0.10	0.05	0.05	56.50
Largemouth Bass (Y)	IA	TC	C	P	63	27.39	3.04	0.23	0.24	8.49
Pumpkinseed Sunfish (C)	NW	GF	C	P	12	5.22	0.58	0.21	0.21	39.33
Redbreast Sunfish (C)	NW	GF	C	M	295	128.26	14.25	3.38	3.51	26.36
Yellow Perch (B)	NCL	C	M		4	1.74	0.19	0.07	0.07	40.50
Mile Total					2,070	900.00		96.34		
Number of Species					14					
Number of Hybrids					0					

River Code: **50-001**	Stream: **Kennebec River (Edwards Dam site)**	Sample Date: **2002**
River Mile: **0.10**	Location:	Date Range: 08/13/2002
Time Fished: 3348 sec	Drainage:	Thru: 09/23/2002
Dist Fished: 2.00 km	Basin: No of Passes: 2	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (C)	NA	PI	M	P	9	4.50	0.77	0.02	0.03	3.50
Alewife (Y)	NA	PI	M	P	35	17.50	3.00	0.12	0.22	6.74
Blueback Herring (Y)	NA	PI			11	5.50	0.94	0.01	0.01	1.27
White Sucker (A)	NCL	GF	S	T	41	20.50	3.51	16.93	31.28	825.61
White Sucker (B)	NCL	GF	S	T	14	7.00	1.20	0.15	0.27	21.14
White Sucker (Y)	NCL	GF	S	T	19	9.50	1.63	0.06	0.12	6.78
Common Carp (A)	IA	GF	M	T	2	1.00	0.17	5.50	10.16	5,500.00
Spottail Shiner (C)	IA	WC	M	P	212	106.00	18.15	0.38	0.69	3.54
Fallfish (C)	NCL	GF		P	1	0.50	0.09	0.00	0.00	2.00
White Catfish (B)	IA	TC	C	P	2	1.00	0.17	0.06	0.12	64.50
American Eel (A)	NCT	TC	M	T	26	13.00	2.23	3.91	7.23	300.96
American Eel (B)	NCT	TC	M	T	329	164.50	28.17	12.17	22.50	73.99
American Eel (Y)	NCT	TC	M	T	21	10.50	1.80	0.07	0.14	6.98
Eastern Banded Killifish (C)	NW	WC	M	T	1	0.50	0.09	0.00	0.00	1.00
Striped Bass (A)	NA	TC	M	I	9	4.50	0.77	7.20	13.30	1,599.44
Smallmouth Bass (A)	IA	TC	C	M	29	14.50	2.48	4.52	8.35	311.62
Smallmouth Bass (B)	IA	TC	C	M	56	28.00	4.79	1.00	1.85	35.81
Smallmouth Bass (Y)	IA	TC	C	M	136	68.00	11.64	0.35	0.65	5.20
Largemouth Bass (A)	IA	TC	C	P	1	0.50	0.09	0.28	0.52	566.00
Largemouth Bass (B)	IA	TC	C	P	3	1.50	0.26	0.05	0.10	35.33
Largemouth Bass (Y)	IA	TC	C	P	28	14.00	2.40	0.08	0.14	5.39
Pumpkinseed Sunfish (C)	NW	GF	C	P	4	2.00	0.34	0.04	0.07	20.00
Redbreast Sunfish (C)	NW	GF	C	M	179	89.50	15.33	1.21	2.23	13.49
Mile Total					1,168	584.00		54.11		
Number of Species					14					
Number of Hybrids					0					

River Code: **50-001**	Stream: **Kennebec River (Edwards Dam site)**	Sample Date: **2003**
River Mile: **0.10**	Location:	Date Range: 07/15/2003
Time Fished: 4275 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker (A)	NCL	GF	S	T	26	26.00	6.13	24.15	38.57	928.85
White Sucker (B)	NCL	GF	S	T	2	2.00	0.47	0.12	0.18	57.50
White Sucker (Y)	NCL	GF	S	T	2	2.00	0.47	0.00	0.00	1.50
Common Carp (A)	IA	GF	M	T	1	1.00	0.24	4.30	6.87	4,300.00
Golden Shiner (B)	NW	GF	M	T	1	1.00	0.24	0.02	0.03	20.00
Spottail Shiner (C)	IA	WC	M	P	7	7.00	1.65	0.03	0.04	3.57
White Catfish (A)	IA	TC	C	P	5	5.00	1.18	1.87	2.99	374.00
American Eel (B)	NCT	TC	M	T	185	185.00	43.63	20.81	33.24	112.50
American Eel (Y)	NCT	TC	M	T	85	85.00	20.05	0.60	0.95	7.00
Eastern Banded Killifish (C)	NW	WC	M	T	1	1.00	0.24	0.00	0.00	3.00
Striped Bass (B)	NA	TC	M	I	3	3.00	0.71	2.85	4.55	950.00
Smallmouth Bass (A)	IA	TC	C	M	20	20.00	4.72	5.54	8.85	277.00
Smallmouth Bass (B)	IA	TC	C	M	18	18.00	4.25	0.75	1.20	41.76
Smallmouth Bass (Y)	IA	TC	C	M	11	11.00	2.59	0.02	0.03	1.82
Largemouth Bass (Y)	IA	TC	C	P	1	1.00	0.24	0.00	0.01	4.00
Pumpkinseed Sunfish (C)	NW	GF	C	P	2	2.00	0.47	0.09	0.14	45.00
Redbreast Sunfish (A)	NW	GF	C	M	20	20.00	4.72	0.60	0.96	30.00
Redbreast Sunfish (C)	NW	GF	C	M	33	33.00	7.78	0.86	1.37	26.06
Yellow Perch (Y)	NCL	C	M		1	1.00	0.24	0.00	0.00	3.00
Mile Total					424	424.00		62.61		
Number of Species					13					
Number of Hybrids					0					

River Code: **51-001**	Stream: **Kennebec River (Hallowell)**	Sample Date: **2002**
River Mile: **4.30**	Location:	Date Range: 08/05/2002
Time Fished: 3933 sec	Drainage:	Thru: 08/16/2002
Dist Fished: 2.00 km	Basin: No of Passes: 2	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	4	2.00	1.24	0.01	0.06	4.25
White Sucker (A)	NCL	GF	S	T	2	1.00	0.62	0.78	5.92	782.50
White Sucker (B)	NCL	GF	S	T	1	0.50	0.31	0.05	0.36	94.00
White Sucker (Y)	NCL	GF	S	T	82	41.00	25.47	0.26	1.94	6.27
Common Carp (A)	IA	GF	M	T	2	1.00	0.62	5.20	39.31	5,200.00
Common Carp (C)	IA	GF	M	T	1	0.50	0.31	2.08	15.69	4,150.00
Spottail Shiner (C)	IA	WC	M	P	22	11.00	6.83	0.04	0.28	3.41
White Catfish (C)	IA	TC	C	P	2	1.00	0.62	0.11	0.85	112.00
American Eel (B)	NCT	TC	M	T	16	8.00	4.97	0.49	3.70	61.09
American Eel (Y)	NCT	TC	M	T	7	3.50	2.17	0.10	0.72	27.14
Eastern Banded Killifish (C)	NW	WC	M	T	4	2.00	1.24	0.01	0.04	2.50
Smallmouth Bass (A)	IA	TC	C	M	5	2.50	1.55	0.50	3.76	198.80
Smallmouth Bass (B)	IA	TC	C	M	17	8.50	5.28	0.33	2.49	38.82
Smallmouth Bass (Y)	IA	TC	C	M	15	7.50	4.66	0.02	0.14	2.40
Largemouth Bass (A)	IA	TC	C	P	1	0.50	0.31	0.42	3.18	840.00
Largemouth Bass (B)	IA	TC	C	P	1	0.50	0.31	0.01	0.08	22.00
Largemouth Bass (Y)	IA	TC	C	P	12	6.00	3.73	0.04	0.30	6.58
Redbreast Sunfish (C)	NW	GF	C	M	118	59.00	36.65	2.65	20.06	44.97
Yellow Perch (A)	NCL	C	M		1	0.50	0.31	0.03	0.23	62.00
Yellow Perch (C)	NCL	C	M		9	4.50	2.80	0.12	0.90	26.44
	Mile Total				322	161.00		13.23		
	Number of Species				11					
	Number of Hybrids				0					

River Code: **51-001**	Stream: **Kennebec River (Pittston)**	Sample Date: **2002**
River Mile: **8.30**	Location:	Date Range: 08/14/2002
Time Fished: 2018 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	9	9.00	1.93	0.03	0.22	3.33
White Sucker (A)	NCL	GF	S	T	4	4.00	0.86	3.85	28.20	962.50
White Sucker (Y)	NCL	GF	S	T	24	24.00	5.14	0.70	5.13	29.17
Spottail Shiner (C)	IA	WC	M	P	201	201.00	43.04	1.45	10.64	7.23
White Catfish (C)	IA	TC	C	P	3	3.00	0.64	0.33	2.42	110.33
American Eel (B)	NCT	TC	M	T	87	87.00	18.63	4.65	34.06	53.43
American Eel (Y)	NCT	TC	M	T	9	9.00	1.93	0.09	0.68	10.33
Eastern Banded Killifish (C)	NW	WC	M	T	16	16.00	3.43	0.02	0.12	1.06
Mummichog (C)	NT	GF		T	1	1.00	0.21	0.00	0.01	1.00
Smallmouth Bass (A)	IA	TC	C	M	6	6.00	1.28	0.63	4.59	104.33
Smallmouth Bass (B)	IA	TC	C	M	26	26.00	5.57	0.50	3.63	19.09
Smallmouth Bass (Y)	IA	TC	C	M	6	6.00	1.28	0.01	0.07	1.67
Largemouth Bass (B)	IA	TC	C	P	22	22.00	4.71	0.15	1.12	6.95
Largemouth Bass (Y)	IA	TC	C	P	3	3.00	0.64	0.02	0.12	5.33
Pumpkinseed Sunfish (C)	NW	GF	C	P	14	14.00	3.00	0.36	2.65	25.86
Redbreast Sunfish (C)	NW	GF	C	M	26	26.00	5.57	0.27	1.97	10.33
Yellow Perch (A)	NCL	C	M		10	10.00	2.14	0.60	4.36	59.50
Mile Total					467	467.00		13.65		
Number of Species					12					
Number of Hybrids					0					

River Code: **51-001**	Stream: **Kennebec River (Lovejoy Narrows)**	Sample Date: **2002**
River Mile: **19.00**	Location:	Date Range: 09/24/2002
Time Fished: 3119 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Sea Lamprey (Y)	NA	PF	N	M	1	1.00	0.13	0.00	0.00	3.00
Alewife (Y)	NA	PI	M	P	4	4.00	0.53	0.02	0.01	4.75
Blueback Herring (Y)	NA	PI			1	1.00	0.13	0.00	0.00	1.00
American Shad (Y)	NA	PI			87	87.00	11.49	0.21	0.15	2.44
Rainbow Smelt (Y)	NA	GF	M	I	1	1.00	0.13	0.00	0.00	3.00
White Sucker (A)	NCL	GF	S	T	51	51.00	6.74	34.25	24.60	671.47
Common Carp (A)	IA	GF	M	T	18	18.00	2.38	85.31	61.28	4,739.32
Spottail Shiner (C)	IA	WC	M	P	244	244.00	32.23	1.39	1.00	5.71
American Eel (A)	NCT	TC	M	T	2	2.00	0.26	0.90	0.65	450.00
American Eel (B)	NCT	TC	M	T	112	112.00	14.80	5.55	3.99	49.58
American Eel (Y)	NCT	TC	M	T	21	21.00	2.77	0.08	0.06	4.00
Eastern Banded Killifish (C)	NW	WC	M	T	78	78.00	10.30	0.11	0.08	1.43
Mummichog (C)	NT	GF		T	40	40.00	5.28	0.15	0.11	3.77
Striped Bass (A)	NA	TC	M	I	3	3.00	0.40	1.54	1.11	513.67
Striped Bass (Y)	NA	TC	M	I	1	1.00	0.13	0.01	0.01	10.00
White Perch (A)	NA	TC	M	P	24	24.00	3.17	4.20	3.02	175.08
White Perch (B)	NA	TC	M	P	1	1.00	0.13	0.04	0.03	40.00
White Perch (Y)	NA	TC	M	P	9	9.00	1.19	0.04	0.03	4.67
Smallmouth Bass (A)	IA	TC	C	M	7	7.00	0.92	3.87	2.78	553.00
Smallmouth Bass (B)	IA	TC	C	M	5	5.00	0.66	0.10	0.07	19.20
Largemouth Bass (B)	IA	TC	C	P	2	2.00	0.26	0.10	0.07	49.00
Largemouth Bass (Y)	IA	TC	C	P	2	2.00	0.26	0.02	0.01	9.00
Pumpkinseed Sunfish (C)	NW	GF	C	P	2	2.00	0.26	0.04	0.03	22.00
Redbreast Sunfish (C)	NW	GF	C	M	30	30.00	3.96	0.14	0.10	4.63
Yellow Perch (A)	NCL	C	M		11	11.00	1.45	1.14	0.82	103.36
Mile Total					757	757.00		139.22		
Number of Species					18					
Number of Hybrids					0					

River Code: **51-001**	Stream: **Kennebec River (Chopps Point)**	Sample Date: **2002**
River Mile: **26.90**	Location:	Date Range: 09/26/2002
Time Fished: 1950 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	8	8.00	0.66	0.03	0.02	3.25
Blueback Herring (Y)	NA	PI			2	2.00	0.16	0.00	0.00	2.00
American Shad (Y)	NA	PI			13	13.00	1.07	0.05	0.03	3.46
White Sucker (A)	NCL	GF	S	T	36	36.00	2.95	24.40	17.22	677.78
White Sucker (B)	NCL	GF	S	T	7	7.00	0.57	1.12	0.79	159.57
White Sucker (Y)	NCL	GF	S	T	4	4.00	0.33	0.10	0.07	24.50
Common Carp (A)	IA	GF	M	T	21	21.00	1.72	94.36	66.60	4,493.33
Creek Chub (C)	NCL	GF	N	T	1	1.00	0.08	0.01	0.01	14.00
Spottail Shiner (C)	IA	WC	M	P	234	234.00	19.20	1.68	1.19	7.19
American Eel (B)	NCT	TC	M	T	44	44.00	3.61	4.50	3.18	102.27
American Eel (Y)	NCT	TC	M	T	1	1.00	0.08	0.02	0.01	17.00
Eastern Banded Killifish (C)	NW	WC	M	T	334	334.00	27.40	0.80	0.57	2.40
Mummichog (C)	NT	GF		T	388	388.00	31.83	0.93	0.66	2.39
Northern Silverside (C)	NT	WC		I	1	1.00	0.08	0.00	0.00	3.00
Striped Bass (A)	NA	TC	M	I	8	8.00	0.66	10.56	7.45	1,319.38
White Perch (A)	NA	TC	M	P	13	13.00	1.07	2.60	1.84	200.00
White Perch (Y)	NA	TC	M	P	99	99.00	8.12	0.48	0.34	4.80
Smallmouth Bass (Y)	IA	TC	C	M	1	1.00	0.08	0.02	0.01	15.00
Redbreast Sunfish (C)	NW	GF	C	M	3	3.00	0.25	0.02	0.01	5.00
Yellow Perch (Y)	NCL	C	M		1	1.00	0.08	0.02	0.01	18.00
	Mile Total				1,219	1,219.00		141.68		
	Number of Species				16					
	Number of Hybrids				0					

River Code: **50-002**	Stream: **Cathance River (dst. Bowdoinham)**	Sample Date: **2002**
River Mile: **1.50**	Location:	Date Range: 08/16/2002
Time Fished: 956 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	45	45.00	13.27	0.08	0.15	1.84
Blueback Herring (Y)	NA	PI			6	6.00	1.77	0.01	0.01	1.00
American Shad (Y)	NA	PI			13	13.00	3.83	0.02	0.04	1.62
White Sucker (B)	NCL	GF	S	T	27	27.00	7.96	2.14	3.80	79.26
Common Carp (A)	IA	GF	M	T	16	16.00	4.72	50.37	89.44	3,148.21
Golden Shiner (B)	NW	GF	M	T	9	9.00	2.65	0.23	0.41	25.56
Golden Shiner (C)	NW	GF	M	T	15	15.00	4.42	0.60	1.06	39.67
Creek Chub (C)	NCL	GF	N	T	2	2.00	0.59	0.02	0.04	10.00
Common Shiner (C)	NCL	GF	S	P	1	1.00	0.29	0.00	0.01	4.00
Spottail Shiner (C)	IA	WC	M	P	104	104.00	30.68	0.68	1.21	6.57
American Eel (B)	NCT	TC	M	T	13	13.00	3.83	0.36	0.64	27.77
Eastern Banded Killifish (C)	NW	WC	M	T	10	10.00	2.95	0.05	0.08	4.60
Mummichog (C)	NT	GF		T	13	13.00	3.83	0.04	0.08	3.31
White Perch (B)	NA	TC	M	P	33	33.00	9.73	0.32	0.57	9.79
Pumpkinseed Sunfish (C)	NW	GF	C	P	1	1.00	0.29	0.04	0.07	38.00
Redbreast Sunfish (C)	NW	GF	C	M	7	7.00	2.06	0.11	0.20	16.14
Yellow Perch (C)	NCL	C	M		23	23.00	6.78	1.24	2.20	53.83
Nine-spine Stickleback (C)	NCL	WC			1	1.00	0.29	0.00	0.00	1.00
Mile Total					339	339.00		56.32		
Number of Species					17					
Number of Hybrids					0					

River Code: **50-002**	Stream: **Cathance River (ust. Bowdoinham)**	Sample Date: **2003**
River Mile: **3.00**	Location:	Date Range: 09/12/2003
Time Fished: 3379 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	8	8.00	0.77	0.02	0.02	2.75
Blueback Herring (Y)	NA	PI			121	121.00	11.69	0.18	0.15	1.45
White Sucker (A)	NCL	GF	S	T	81	81.00	7.83	46.69	41.06	576.47
White Sucker (B)	NCL	GF	S	T	126	126.00	12.17	28.98	25.48	230.00
White Sucker (Y)	NCL	GF	S	T	213	213.00	20.58	2.59	2.27	12.14
Common Carp (A)	IA	GF	M	T	6	6.00	0.58	21.70	19.08	3,616.67
Common Carp (Y)	IA	GF	M	T	1	1.00	0.10	0.10	0.09	100.00
Golden Shiner (A)	NW	GF	M	T	110	110.00	10.63	2.54	2.24	23.12
Spottail Shiner (C)	IA	WC	M	P	160	160.00	15.46	0.63	0.55	3.93
White Catfish (A)	IA	TC	C	P	5	5.00	0.48	3.43	3.02	686.00
American Eel (B)	NCT	TC	M	T	2	2.00	0.19	0.09	0.08	45.00
Eastern Banded Killifish (C)	NW	WC	M	T	32	32.00	3.09	0.09	0.07	2.66
Mummichog (C)	NT	GF		T	7	7.00	0.68	0.03	0.02	3.86
White Perch (A)	NA	TC	M	P	23	23.00	2.22	3.72	3.27	161.74
White Perch (Y)	NA	TC	M	P	109	109.00	10.53	0.69	0.60	6.29
Yellow Perch (A)	NCL	C	M		21	21.00	2.03	2.18	1.92	103.71
Yellow Perch (Y)	NCL	C	M		10	10.00	0.97	0.08	0.07	7.78
Mile Total					1,035	1,035.00		113.72		
Number of Species					12					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (Errol, NH)**	Sample Date: **2003**
River Mile: **164.30**	Location:	Date Range: 08/04/2003
Time Fished: 2029 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Brown Trout (A)	IMC	TC	N	I	2	2.00	0.97	0.20	1.36	100.00
Rainbow Trout (A)	IMC	TC	N	I	2	2.00	0.97	0.11	0.73	53.50
Landlocked Salmon (A)	IMC	TC		I	1	1.00	0.49	0.10	0.68	100.00
Chain Pickerel (B)	NW	TC	M	P	7	7.00	3.40	0.20	1.37	28.86
White Sucker (A)	NCL	GF	S	T	28	28.00	13.59	8.38	56.83	299.14
White Sucker (B)	NCL	GF	S	T	7	7.00	3.40	1.02	6.95	146.29
Golden Shiner (Y)	NW	GF	M	T	2	2.00	0.97	0.00	0.01	0.50
Common Shiner (C)	NCL	GF	S	P	34	34.00	16.50	0.13	0.91	3.94
Fallfish (A)	NCL	GF		P	44	44.00	21.36	1.60	10.82	36.25
Fallfish (Y)	NCL	GF		P	25	25.00	12.14	0.00	0.03	0.16
Smallmouth Bass (A)	IA	TC	C	M	8	8.00	3.88	1.78	12.05	222.00
Smallmouth Bass (B)	IA	TC	C	M	22	22.00	10.68	0.92	6.22	41.64
Smallmouth Bass (Y)	IA	TC	C	M	1	1.00	0.49	0.00	0.03	4.00
Largemouth Bass (Y)	IA	TC	C	P	12	12.00	5.83	0.04	0.24	3.00
Pumpkinseed Sunfish (C)	NW	GF	C	P	2	2.00	0.97	0.04	0.26	19.50
Yellow Perch (B)	NCL	C	M		9	9.00	4.37	0.22	1.52	24.89
	Mile Total				206	206.00		14.74		
	Number of Species				12					
	Number of Hybrids				0					

River Code: **60-001**	Stream: **Androscoggin River (Wayside Park)**	Sample Date: **2003**
River Mile: **158.80**	Location:	Date Range: 08/04/2003
Time Fished: 3764 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Brown Trout (A)	IMC	TC	N	I	2	2.00	0.79	0.43	5.60	216.00
Rainbow Trout (A)	IMC	TC	N	I	4	4.00	1.57	0.74	9.64	186.00
Landlocked Salmon (B)	IMC	TC		I	2	2.00	0.79	0.26	3.34	129.00
White Sucker (A)	NCL	GF	S	T	6	6.00	2.36	3.60	46.63	600.00
Longnose Dace (C)	NCL	BI	S	M	5	5.00	1.97	0.04	0.47	7.20
Common Shiner (C)	NCL	GF	S	P	181	181.00	71.26	0.03	0.35	0.15
Fallfish (B)	NCL	GF		P	10	10.00	3.94	0.06	0.75	5.80
Smallmouth Bass (A)	IA	TC	C	M	3	3.00	1.18	1.25	16.23	417.67
Smallmouth Bass (B)	IA	TC	C	M	38	38.00	14.96	1.30	16.81	34.16
Smallmouth Bass (Y)	IA	TC	C	M	2	2.00	0.79	0.00	0.05	2.00
Slimy Sculpin (C)	NC	BI		I	1	1.00	0.39	0.01	0.13	10.00
Mile Total					254	254.00		7.72		
Number of Species					9					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (Pontook Lake)**	Sample Date: **2003**
River Mile: **148.10**	Location:	Date Range: 08/04/2003
Time Fished: 3160 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Chain Pickerel (A)	NW	TC	M	P	9	9.00	5.56	0.65	22.84	72.22
Chain Pickerel (Y)	NW	TC	M	P	43	43.00	26.54	0.11	4.01	2.65
Golden Shiner (Y)	NW	GF	M	T	24	24.00	14.81	0.05	1.58	1.88
Fallfish (C)	NCL	GF		P	15	15.00	9.26	0.01	0.35	0.67
Fallfish (Y)	NCL	GF		P	2	2.00	1.23	0.00	0.11	1.50
Brown Bullhead (A)	NW	GF	C	T	1	1.00	0.62	0.03	0.91	26.00
Smallmouth Bass (A)	IA	TC	C	M	2	2.00	1.23	0.40	14.05	200.00
Smallmouth Bass (B)	IA	TC	C	M	8	8.00	4.94	0.48	16.83	59.88
Smallmouth Bass (Y)	IA	TC	C	M	1	1.00	0.62	0.00	0.07	2.00
Largemouth Bass (Y)	IA	TC	C	P	28	28.00	17.28	0.05	1.65	1.68
Yellow Perch (A)	NCL	C	M		13	13.00	8.02	1.02	35.84	78.46
Yellow Perch (Y)	NCL	C	M		16	16.00	9.88	0.05	1.76	3.13
Mile Total					162	162.00		2.85		
Number of Species					7					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (Dummer, NH)**	Sample Date: **2003**
River Mile: **144.70**	Location:	Date Range: 08/07/2003
Time Fished: 2280 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Rainbow Trout (B)	IMC	TC	N	I	2	2.00	1.08	0.08	1.66	41.50
Chain Pickerel (Y)	NW	TC	M	P	1	1.00	0.54	0.01	0.20	10.00
White Sucker (B)	NCL	GF	S	T	3	3.00	1.62	0.54	10.75	178.67
Golden Shiner (Y)	NW	GF	M	T	11	11.00	5.95	0.06	1.16	5.27
Common Shiner (C)	NCL	GF	S	P	19	19.00	10.27	0.12	2.33	6.11
Fallfish (B)	NCL	GF		P	20	20.00	10.81	0.09	1.80	4.50
Fallfish (Y)	NCL	GF		P	23	23.00	12.43	0.01	0.22	0.48
Smallmouth Bass (A)	IA	TC	C	M	8	8.00	4.32	1.40	27.99	174.50
Smallmouth Bass (B)	IA	TC	C	M	47	47.00	25.41	2.44	48.99	51.97
Smallmouth Bass (Y)	IA	TC	C	M	21	21.00	11.35	0.03	0.64	1.50
Largemouth Bass (Y)	IA	TC	C	P	21	21.00	11.35	0.08	1.60	3.81
Pumpkinseed Sunfish (C)	NW	GF	C	P	2	2.00	1.08	0.02	0.48	12.00
Yellow Perch (B)	NCL	C	M		4	4.00	2.16	0.10	2.01	25.00
Yellow Perch (Y)	NCL	C	M		3	3.00	1.62	0.01	0.18	3.00
Mile Total					185	185.00		4.99		
Number of Species					10					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (Stearns Brook)**	Sample Date: **2003**
River Mile: **139.20**	Location:	Date Range: 08/07/2003
Time Fished: 1708 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Brown Trout (B)	IMC	TC	N	I	2	2.00	0.35	0.12	1.02	59.00
Rainbow Trout (A)	IMC	TC	N	I	1	1.00	0.18	0.18	1.55	180.00
Chain Pickerel (Y)	NW	TC	M	P	1	1.00	0.18	0.01	0.09	10.00
White Sucker (A)	NCL	GF	S	T	3	3.00	0.53	3.60	31.09	1,200.00
White Sucker (B)	NCL	GF	S	T	8	8.00	1.40	0.65	5.61	81.25
White Sucker (Y)	NCL	GF	S	T	1	1.00	0.18	0.00	0.03	4.00
Longnose Dace (C)	NCL	BI	S	M	2	2.00	0.35	0.02	0.16	9.00
Common Shiner (C)	NCL	GF	S	P	199	199.00	34.85	0.65	5.60	3.25
Spottail Shiner (C)	IA	WC	M	P	3	3.00	0.53	0.03	0.29	11.33
Fallfish (A)	NCL	GF		P	4	4.00	0.70	0.44	3.77	109.00
Fallfish (B)	NCL	GF		P	234	234.00	40.98	0.84	7.21	3.57
Smallmouth Bass (A)	IA	TC	C	M	14	14.00	2.45	2.39	20.60	170.36
Smallmouth Bass (B)	IA	TC	C	M	64	64.00	11.21	2.44	21.04	38.06
Smallmouth Bass (Y)	IA	TC	C	M	2	2.00	0.35	0.00	0.03	1.50
Largemouth Bass (Y)	IA	TC	C	P	30	30.00	5.25	0.14	1.24	4.80
Pumpkinseed Sunfish (C)	NW	GF	C	P	1	1.00	0.18	0.02	0.16	18.00
Yellow Perch (B)	NCL	C	M		2	2.00	0.35	0.06	0.52	30.00
Mile Total					571	571.00		11.58		
Number of Species					12					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (ust. Sawmill Dam)**	Sample Date: **2003**
River Mile: **134.10**	Location:	Date Range: 08/12/2003
Time Fished: 1810 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Brown Trout (A)	IMC	TC	N	I	2	2.00	1.83	0.21	4.54	107.00
Rainbow Trout (A)	IMC	TC	N	I	1	1.00	0.92	0.13	2.76	130.00
Golden Shiner (Y)	NW	GF	M	T	3	3.00	2.75	0.03	0.55	8.67
Common Shiner (C)	NCL	GF	S	P	1	1.00	0.92	0.02	0.34	16.00
Fallfish (Y)	NCL	GF		P	22	22.00	20.18	0.06	1.34	2.86
Rock Bass (B)	IA	TC	C	P	1	1.00	0.92	0.02	0.47	22.00
Rock Bass (Y)	IA	TC	C	P	2	2.00	1.83	0.02	0.32	7.50
Smallmouth Bass (A)	IA	TC	C	M	15	15.00	13.76	2.48	52.56	165.20
Smallmouth Bass (B)	IA	TC	C	M	43	43.00	39.45	1.61	34.23	37.52
Smallmouth Bass (Y)	IA	TC	C	M	7	7.00	6.42	0.07	1.48	10.00
Largemouth Bass (Y)	IA	TC	C	P	12	12.00	11.01	0.07	1.44	5.64
Mile Total					109	109.00		4.72		
Number of Species					8					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (ust. Cross Dam)**	Sample Date: **2003**
River Mile: **132.00**	Location:	Date Range: 08/09/2003
Time Fished: 2588 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Fallfish (B)	NCL	GF		P	15	15.00	9.20	0.07	1.06	4.53
Fallfish (C)	NCL	GF		P	1	1.00	0.61	0.00	0.03	2.00
Rock Bass (Y)	IA	TC	C	P	1	1.00	0.61	0.01	0.16	10.00
Smallmouth Bass (A)	IA	TC	C	M	15	15.00	9.20	2.45	38.34	163.47
Smallmouth Bass (B)	IA	TC	C	M	71	71.00	43.56	3.75	58.63	52.82
Smallmouth Bass (Y)	IA	TC	C	M	46	46.00	28.22	0.06	0.91	1.25
Largemouth Bass (Y)	IA	TC	C	P	11	11.00	6.75	0.05	0.78	4.55
Yellow Perch (Y)	NCL	C	M		3	3.00	1.84	0.01	0.09	2.00
Mile Total					163	163.00		6.40		
Number of Species					5					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (ust. Cascade Dam)**	Sample Date: **2003**
River Mile: **131.50**	Location:	Date Range: 08/13/2003
Time Fished: 2086 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Brown Trout (A)	IMC	TC	N	I	1	1.00	0.46	0.11	0.82	110.00
White Sucker (A)	NCL	GF	S	T	1	1.00	0.46	0.85	6.37	850.00
White Sucker (B)	NCL	GF	S	T	1	1.00	0.46	0.03	0.21	28.00
White Sucker (Y)	NCL	GF	S	T	2	2.00	0.92	0.00	0.03	2.00
Common Shiner (C)	NCL	GF	S	P	1	1.00	0.46	0.02	0.15	20.00
Fallfish (A)	NCL	GF		P	5	5.00	2.29	0.36	2.71	72.40
Fallfish (B)	NCL	GF		P	3	3.00	1.38	0.05	0.34	15.33
Rock Bass (A)	IA	TC	C	P	1	1.00	0.46	0.19	1.42	190.00
Smallmouth Bass (A)	IA	TC	C	M	33	33.00	15.14	6.08	45.55	184.23
Smallmouth Bass (B)	IA	TC	C	M	109	109.00	50.00	5.40	40.44	49.52
Smallmouth Bass (Y)	IA	TC	C	M	47	47.00	21.56	0.13	1.00	2.86
Largemouth Bass (B)	IA	TC	C	P	2	2.00	0.92	0.05	0.34	23.00
Largemouth Bass (Y)	IA	TC	C	P	12	12.00	5.50	0.08	0.61	6.73
Mile Total					218	218.00		13.35		
Number of Species					7					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (dst. Cascade Mill)**	Sample Date: **2003**
River Mile: **130.50**	Location:	Date Range: 08/05/2003
Time Fished: 1631 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Brown Trout (A)	IMC	TC	N	I	1	1.00	0.18	0.43	1.25	433.00
Rainbow Trout (A)	IMC	TC	N	I	1	1.00	0.18	0.93	2.70	932.00
Landlocked Salmon (A)	IMC	TC		I	1	1.00	0.18	0.19	0.54	188.00
White Sucker (A)	NCL	GF	S	T	9	9.00	1.62	10.69	30.95	1,187.56
White Sucker (B)	NCL	GF	S	T	40	40.00	7.22	2.90	8.40	72.53
White Sucker (Y)	NCL	GF	S	T	40	40.00	7.22	0.08	0.23	1.97
Longnose Sucker (A)	NC	BI	S	I	1	1.00	0.18	0.33	0.96	330.00
Longnose Dace (C)	NCL	BI	S	M	124	124.00	22.38	0.59	1.69	4.72
Creek Chub (C)	NCL	GF	N	T	1	1.00	0.18	0.01	0.02	8.00
Common Shiner (C)	NCL	GF	S	P	3	3.00	0.54	0.10	0.28	32.33
Fallfish (A)	NCL	GF		P	34	34.00	6.14	3.20	9.26	94.06
Fallfish (Y)	NCL	GF		P	166	166.00	29.96	0.15	0.45	0.93
Smallmouth Bass (A)	IA	TC	C	M	34	34.00	6.14	8.92	25.83	262.38
Smallmouth Bass (B)	IA	TC	C	M	76	76.00	13.72	5.63	16.29	74.04
Smallmouth Bass (Y)	IA	TC	C	M	15	15.00	2.71	0.19	0.54	12.33
Largemouth Bass (Y)	IA	TC	C	P	4	4.00	0.72	0.03	0.09	8.00
Yellow Perch (B)	NCL	C	M		4	4.00	0.72	0.18	0.51	44.25
Mile Total					554	554.00		34.54		
Number of Species					12					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (ust. Gorham Dam)**	Sample Date: **2003**
River Mile: **128.60**	Location:	Date Range: 08/05/2003
Time Fished: 1592 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker (A)	NCL	GF	S	T	2	2.00	0.24	1.46	10.25	727.50
White Sucker (B)	NCL	GF	S	T	47	47.00	5.64	2.33	16.41	49.57
White Sucker (Y)	NCL	GF	S	T	53	53.00	6.35	0.10	0.67	1.79
Golden Shiner (B)	NW	GF	M	T	2	2.00	0.24	0.05	0.32	22.50
Common Shiner (A)	NCL	GF	S	P	16	16.00	1.92	0.24	1.71	15.19
Common Shiner (Y)	NCL	GF	S	P	167	167.00	20.02	0.07	0.51	0.44
Spottail Shiner (A)	IA	WC	M	P	54	54.00	6.47	0.42	2.99	7.86
Spottail Shiner (Y)	IA	WC	M	P	7	7.00	0.84	0.01	0.05	1.00
Fallfish (A)	NCL	GF		P	175	175.00	20.98	2.05	14.40	11.68
Fallfish (Y)	NCL	GF		P	139	139.00	16.67	0.14	0.97	0.99
Brown Bullhead (A)	NW	GF	C	T	2	2.00	0.24	0.33	2.35	167.00
Rock Bass (B)	IA	TC	C	P	6	6.00	0.72	0.12	0.87	20.50
Smallmouth Bass (A)	IA	TC	C	M	10	10.00	1.20	1.85	13.04	185.10
Smallmouth Bass (B)	IA	TC	C	M	81	81.00	9.71	4.83	34.00	59.60
Smallmouth Bass (Y)	IA	TC	C	M	69	69.00	8.27	0.19	1.33	2.75
Largemouth Bass (Y)	IA	TC	C	P	3	3.00	0.36	0.02	0.11	5.00
Yellow Perch (Y)	NCL	C	M		1	1.00	0.12	0.00	0.03	4.00
Mile Total					834	834.00		14.20		
Number of Species					10					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin R. (Gorham Bypass Reach)**	Sample Date: **2003**
River Mile: **128.00**	Location:	Date Range: 08/12/2003
Time Fished: 4531 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Rainbow Trout (A)	IMC	TC	N	I	21	21.00	3.22	2.54	20.28	121.06
White Sucker (A)	NCL	GF	S	T	28	28.00	4.29	7.08	56.46	252.78
White Sucker (B)	NCL	GF	S	T	11	11.00	1.68	0.76	6.09	69.45
White Sucker (Y)	NCL	GF	S	T	175	175.00	26.80	0.26	2.03	1.46
Longnose Sucker (B)	NC	BI	S	I	2	2.00	0.31	0.10	0.77	48.00
Blacknose Dace (C)	NCL	GF	S	T	6	6.00	0.92	0.03	0.22	4.50
Longnose Dace (C)	NCL	BI	S	M	203	203.00	31.09	0.47	3.78	2.33
Creek Chub (C)	NCL	GF	N	T	2	2.00	0.31	0.06	0.44	27.50
Common Shiner (Y)	NCL	GF	S	P	1	1.00	0.15	0.00	0.01	1.00
Spottail Shiner (C)	IA	WC	M	P	1	1.00	0.15	0.01	0.06	7.00
Fallfish (A)	NCL	GF		P	1	1.00	0.15	0.04	0.34	42.00
Fallfish (B)	NCL	GF		P	34	34.00	5.21	0.43	3.41	12.59
Fallfish (C)	NCL	GF		P	57	57.00	8.73	0.04	0.35	0.77
Fallfish (Y)	NCL	GF		P	57	57.00	8.73	0.06	0.50	1.11
Lake Chub (C)	NC	GF			22	22.00	3.37	0.26	2.04	11.64
Smallmouth Bass (B)	IA	TC	C	M	3	3.00	0.46	0.24	1.91	80.00
Smallmouth Bass (Y)	IA	TC	C	M	29	29.00	4.44	0.16	1.31	5.66
Mile Total					653	653.00		12.54		
Number of Species					11					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (Leadmine Rd.)**	Sample Date: **2003**
River Mile: **124.40**	Location:	Date Range: 08/09/2003
Time Fished: 1519 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Brown Trout (A)	IMC	TC	N	I	3	3.00	0.53	0.37	0.53	122.00
Rainbow Trout (A)	IMC	TC	N	I	10	10.00	1.78	2.67	3.87	267.00
Rainbow Trout (B)	IMC	TC	N	I	1	1.00	0.18	0.09	0.13	88.00
White Sucker (A)	NCL	GF	S	T	75	75.00	13.35	51.70	74.91	689.30
White Sucker (B)	NCL	GF	S	T	10	10.00	1.78	3.23	4.68	323.20
White Sucker (Y)	NCL	GF	S	T	3	3.00	0.53	0.01	0.01	1.67
Longnose Sucker (B)	NC	BI	S	I	1	1.00	0.18	0.16	0.23	160.00
Blacknose Dace (C)	NCL	GF	S	T	1	1.00	0.18	0.00	0.00	1.00
Longnose Dace (C)	NCL	BI	S	M	36	36.00	6.41	0.17	0.25	4.72
Common Shiner (C)	NCL	GF	S	P	12	12.00	2.14	0.06	0.09	5.27
Spottail Shiner (C)	IA	WC	M	P	3	3.00	0.53	0.01	0.01	3.00
Fallfish (A)	NCL	GF		P	20	20.00	3.56	2.32	3.36	115.79
Fallfish (B)	NCL	GF		P	75	75.00	13.35	1.16	1.68	15.43
Fallfish (Y)	NCL	GF		P	181	181.00	32.21	0.42	0.61	2.31
Lake Chub (C)	NC	GF			2	2.00	0.36	0.02	0.03	10.00
Smallmouth Bass (A)	IA	TC	C	M	11	11.00	1.96	4.06	5.88	368.82
Smallmouth Bass (B)	IA	TC	C	M	22	22.00	3.91	1.02	1.48	46.36
Smallmouth Bass (Y)	IA	TC	C	M	58	58.00	10.32	0.19	0.28	3.30
Yellow Perch (A)	NCL	C	M		10	10.00	1.78	1.31	1.89	130.70
Yellow Perch (Y)	NCL	C	M		28	28.00	4.98	0.06	0.09	2.14
Mile Total					562	562.00		69.01		
Number of Species					12					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin R. (Shelburne Impoundment)**	Sample Date: **2003**
River Mile: **123.40**	Location:	Date Range: 08/13/2003
Time Fished: 2086 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker (A)	NCL	GF	S	T	1	1.00	0.35	0.70	8.01	700.00
White Sucker (B)	NCL	GF	S	T	6	6.00	2.11	0.25	2.90	42.40
Golden Shiner (B)	NW	GF	M	T	14	14.00	4.91	0.38	4.35	27.14
Common Shiner (C)	NCL	GF	S	P	14	14.00	4.91	0.17	1.94	12.14
Spottail Shiner (C)	IA	WC	M	P	78	78.00	27.37	0.50	5.72	6.41
Fallfish (A)	NCL	GF		P	26	26.00	9.12	2.50	28.59	96.15
Fallfish (B)	NCL	GF		P	18	18.00	6.32	0.20	2.32	11.28
Brown Bullhead (A)	NW	GF	C	T	10	10.00	3.51	0.56	6.36	55.60
Smallmouth Bass (A)	IA	TC	C	M	4	4.00	1.40	0.48	5.49	120.00
Smallmouth Bass (B)	IA	TC	C	M	74	74.00	25.96	2.35	26.88	31.76
Smallmouth Bass (Y)	IA	TC	C	M	17	17.00	5.96	0.05	0.62	3.18
Yellow Perch (A)	NCL	C	M		3	3.00	1.05	0.17	1.89	55.00
Yellow Perch (B)	NCL	C	M		18	18.00	6.32	0.43	4.87	23.67
Yellow Perch (Y)	NCL	C	M		2	2.00	0.70	0.01	0.07	3.00
Mile Total					285	285.00		8.74		
Number of Species					8					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin R. (Shelburne - North Rd.)**	Sample Date: **2003**
River Mile: **119.80**	Location:	Date Range: 08/08/2003
Time Fished: 2112 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Rainbow Trout (A)	IMC	TC	N	I	7	7.00	3.59	2.09	9.13	298.57
White Sucker (A)	NCL	GF	S	T	20	20.00	10.26	14.38	62.81	718.75
White Sucker (B)	NCL	GF	S	T	3	3.00	1.54	0.32	1.42	108.00
Longnose Sucker (B)	NC	BI	S	I	4	4.00	2.05	0.44	1.92	110.00
Longnose Dace (C)	NCL	BI	S	M	23	23.00	11.79	0.06	0.28	2.78
Fallfish (A)	NCL	GF		P	4	4.00	2.05	0.24	1.07	61.00
Fallfish (B)	NCL	GF		P	11	11.00	5.64	0.06	0.26	5.45
Lake Chub (C)	NC	GF			6	6.00	3.08	0.13	0.55	21.00
Burbot (C)	NC	TC	S	P	4	4.00	2.05	0.15	0.65	37.00
Smallmouth Bass (A)	IA	TC	C	M	7	7.00	3.59	0.98	4.27	139.71
Smallmouth Bass (B)	IA	TC	C	M	85	85.00	43.59	3.85	16.80	45.24
Smallmouth Bass (Y)	IA	TC	C	M	19	19.00	9.74	0.04	0.17	2.00
Yellow Perch (B)	NCL	C	M		2	2.00	1.03	0.15	0.67	77.00
Mile Total					195	195.00		22.89		
Number of Species					9					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (Gilead, ME)**	Sample Date: **2003**
River Mile: **112.80**	Location:	Date Range: 08/08/2003
Time Fished: 1794 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Brown Trout (A)	IMC	TC	N	I	2	2.00	0.22	0.36	1.35	179.00
Rainbow Trout (A)	IMC	TC	N	I	2	2.00	0.22	0.29	1.11	147.00
Rainbow Trout (B)	IMC	TC	N	I	3	3.00	0.34	0.19	0.73	64.67
White Sucker (A)	NCL	GF	S	T	23	23.00	2.58	17.99	67.94	782.11
White Sucker (B)	NCL	GF	S	T	8	8.00	0.90	0.49	1.84	60.88
White Sucker (Y)	NCL	GF	S	T	32	32.00	3.59	0.09	0.34	2.83
Longnose Sucker (B)	NC	BI	S	I	1	1.00	0.11	0.04	0.14	38.00
Longnose Sucker (Y)	NC	BI	S	I	1	1.00	0.11	0.00	0.02	4.00
Blacknose Dace (C)	NCL	GF	S	T	2	2.00	0.22	0.00	0.01	1.50
Longnose Dace (C)	NCL	BI	S	M	151	151.00	16.93	0.54	2.04	3.57
Common Shiner (C)	NCL	GF	S	P	7	7.00	0.78	0.02	0.08	3.14
Spottail Shiner (Y)	IA	WC	M	P	2	2.00	0.22	0.00	0.00	0.50
Fallfish (A)	NCL	GF		P	23	23.00	2.58	1.42	5.38	61.91
Fallfish (B)	NCL	GF		P	122	122.00	13.68	1.32	4.97	10.78
Fallfish (Y)	NCL	GF		P	379	379.00	42.49	0.39	1.49	1.04
Lake Chub (C)	NC	GF			2	2.00	0.22	0.03	0.09	12.50
Burbot (C)	NC	TC	S	P	7	7.00	0.78	0.50	1.90	71.86
Smallmouth Bass (A)	IA	TC	C	M	2	2.00	0.22	1.93	7.29	965.00
Smallmouth Bass (B)	IA	TC	C	M	17	17.00	1.91	0.61	2.32	36.13
Smallmouth Bass (Y)	IA	TC	C	M	84	84.00	9.42	0.20	0.77	2.43
Yellow Perch (B)	NCL	C	M		1	1.00	0.11	0.02	0.06	17.00
Yellow Perch (Y)	NCL	C	M		21	21.00	2.35	0.03	0.13	1.62
Mile Total					892	892.00		26.48		
Number of Species					13					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin R. (Bethel - dst. US Rt. 2)**	Sample Date: **2003**
River Mile: **103.70**	Location:	Date Range: 08/14/2003
Time Fished: 2182 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Rainbow Trout (B)	IMC	TC	N	I	1	1.00	0.11	0.02	0.10	20.00
Chain Pickerel (A)	NW	TC	M	P	1	1.00	0.11	0.21	1.07	210.00
White Sucker (A)	NCL	GF	S	T	13	13.00	1.46	10.37	52.70	797.54
White Sucker (B)	NCL	GF	S	T	15	15.00	1.68	1.83	9.32	122.27
White Sucker (Y)	NCL	GF	S	T	123	123.00	13.80	0.42	2.16	3.45
Golden Shiner (B)	NW	GF	M	T	1	1.00	0.11	0.02	0.09	18.00
Blacknose Dace (C)	NCL	GF	S	T	1	1.00	0.11	0.00	0.01	1.00
Longnose Dace (C)	NCL	BI	S	M	11	11.00	1.23	0.03	0.16	2.91
Common Shiner (C)	NCL	GF	S	P	11	11.00	1.23	0.03	0.13	2.36
Fallfish (A)	NCL	GF		P	5	5.00	0.56	1.34	6.82	268.40
Fallfish (B)	NCL	GF		P	35	35.00	3.93	0.48	2.43	13.66
Fallfish (Y)	NCL	GF		P	403	403.00	45.23	0.45	2.28	1.11
Burbot (C)	NC	TC	S	P	7	7.00	0.79	0.27	1.37	38.57
Smallmouth Bass (A)	IA	TC	C	M	9	9.00	1.01	2.54	12.92	282.44
Smallmouth Bass (B)	IA	TC	C	M	20	20.00	2.24	1.00	5.06	49.80
Smallmouth Bass (Y)	IA	TC	C	M	224	224.00	25.14	0.62	3.16	2.78
Yellow Perch (Y)	NCL	C	M		11	11.00	1.23	0.04	0.21	3.82
Mile Total					891	891.00		19.67		
Number of Species					11					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (Newry Access)**	Sample Date: **2003**
River Mile: **97.30**	Location:	Date Range: 08/14/2003
Time Fished: 1722 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Brown Trout (A)	IMC	TC	N	I	2	2.00	0.32	1.06	3.10	530.00
Rainbow Trout (A)	IMC	TC	N	I	12	12.00	1.92	2.14	6.25	178.00
Rainbow Trout (Y)	IMC	TC	N	I	1	1.00	0.16	0.01	0.01	5.00
White Sucker (A)	NCL	GF	S	T	38	38.00	6.09	27.76	81.17	730.43
White Sucker (B)	NCL	GF	S	T	1	1.00	0.16	0.39	1.14	390.00
White Sucker (Y)	NCL	GF	S	T	49	49.00	7.85	0.17	0.49	3.46
Blacknose Dace (C)	NCL	GF	S	T	1	1.00	0.16	0.00	0.00	1.00
Longnose Dace (C)	NCL	BI	S	M	12	12.00	1.92	0.04	0.12	3.33
Common Shiner (C)	NCL	GF	S	P	16	16.00	2.56	0.02	0.06	1.25
Fallfish (B)	NCL	GF		P	141	141.00	22.60	0.18	0.52	1.26
Fallfish (Y)	NCL	GF		P	282	282.00	45.19	0.27	0.80	0.97
Burbot (C)	NC	TC	S	P	5	5.00	0.80	0.18	0.52	35.80
White Perch (Y)	NA	TC	M	P	1	1.00	0.16	0.02	0.06	20.00
Smallmouth Bass (A)	IA	TC	C	M	4	4.00	0.64	1.71	4.99	426.50
Smallmouth Bass (B)	IA	TC	C	M	1	1.00	0.16	0.07	0.21	72.00
Smallmouth Bass (Y)	IA	TC	C	M	56	56.00	8.97	0.18	0.53	3.24
Yellow Perch (Y)	NCL	C	M		1	1.00	0.16	0.01	0.02	8.00
Slimy Sculpin (C)	NC	BI		I	1	1.00	0.16	0.00	0.00	1.00
Mile Total					624	624.00		34.20		
Number of Species					12					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (Rumford Corner)**	Sample Date: **2003**
River Mile: **88.70**	Location:	Date Range: 08/14/2003
Time Fished: 1375 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Brown Trout (A)	IMC	TC	N	I	3	3.00	0.59	0.72	7.70	238.67
Chain Pickerel (B)	NW	TC	M	P	2	2.00	0.39	0.06	0.62	29.00
White Sucker (A)	NCL	GF	S	T	4	4.00	0.79	4.00	43.02	1,000.00
White Sucker (B)	NCL	GF	S	T	15	15.00	2.95	1.46	15.72	97.47
White Sucker (Y)	NCL	GF	S	T	106	106.00	20.83	0.31	3.34	2.93
Creek Chub (C)	NCL	GF	N	T	1	1.00	0.20	0.01	0.05	5.00
Common Shiner (C)	NCL	GF	S	P	25	25.00	4.91	0.03	0.29	1.09
Spottail Shiner (A)	IA	WC	M	P	5	5.00	0.98	0.04	0.47	8.80
Fallfish (B)	NCL	GF		P	18	18.00	3.54	0.44	4.71	24.33
Fallfish (Y)	NCL	GF		P	174	174.00	34.18	0.14	1.48	0.79
Brown Bullhead (A)	NW	GF	C	T	1	1.00	0.20	0.11	1.20	112.00
Burbot (C)	NC	TC	S	P	3	3.00	0.59	0.09	0.91	28.33
Smallmouth Bass (A)	IA	TC	C	M	6	6.00	1.18	1.24	13.33	206.67
Smallmouth Bass (B)	IA	TC	C	M	2	2.00	0.39	0.12	1.29	60.00
Smallmouth Bass (Y)	IA	TC	C	M	99	99.00	19.45	0.29	3.09	2.90
Yellow Perch (A)	NCL	C	M		1	1.00	0.20	0.06	0.67	62.00
Yellow Perch (Y)	NCL	C	M		44	44.00	8.64	0.19	2.09	4.42
Mile Total					509	509.00		9.30		
Number of Species					11					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (ust. Rumford Falls)**	Sample Date: **2003**
River Mile: **83.10**	Location:	Date Range: 08/14/2003
Time Fished: 1613 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Chain Pickerel (A)	NW	TC	M	P	7	7.00	1.44	0.74	24.20	105.71
Chain Pickerel (B)	NW	TC	M	P	7	7.00	1.44	0.06	1.90	8.29
White Sucker (A)	NCL	GF	S	T	1	1.00	0.21	0.80	26.16	800.00
White Sucker (B)	NCL	GF	S	T	1	1.00	0.21	0.13	4.19	128.00
Golden Shiner (B)	NW	GF	M	T	17	17.00	3.50	0.38	12.43	22.35
Common Shiner (C)	NCL	GF	S	P	2	2.00	0.41	0.00	0.07	1.00
Spottail Shiner (Y)	IA	WC	M	P	359	359.00	73.87	0.14	4.58	0.39
Fallfish (Y)	NCL	GF		P	9	9.00	1.85	0.00	0.13	0.44
Brown Bullhead (A)	NW	GF	C	T	3	3.00	0.62	0.05	1.50	15.33
Burbot (C)	NC	TC	S	P	2	2.00	0.41	0.02	0.52	8.00
Black Crappie (Y)	IA	TC	C	P	1	1.00	0.21	0.01	0.16	5.00
Smallmouth Bass (A)	IA	TC	C	M	2	2.00	0.41	0.40	13.15	201.00
Smallmouth Bass (B)	IA	TC	C	M	1	1.00	0.21	0.02	0.78	24.00
Smallmouth Bass (Y)	IA	TC	C	M	30	30.00	6.17	0.12	3.79	3.85
Pumpkinseed Sunfish (A)	NW	GF	C	P	3	3.00	0.62	0.07	2.39	24.33
Pumpkinseed Sunfish (Y)	NW	GF	C	P	25	25.00	5.14	0.01	0.26	0.33
Yellow Perch (A)	NCL	C	M		2	2.00	0.41	0.07	2.35	36.00
Yellow Perch (Y)	NCL	C	M		14	14.00	2.88	0.04	1.44	3.14
Mile Total					486	486.00		3.06		
Number of Species					12					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin R. (Rumford - dst. Lower Dam)**	Sample Date: **2003**
River Mile: **79.30**	Location:	Date Range: 09/08/2003
Time Fished: 3831 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Brown Trout (A)	IMC	TC	N	I	8	8.00	1.27	2.92	4.33	365.00
Rainbow Trout (A)	IMC	TC	N	I	2	2.00	0.32	1.10	1.63	550.00
Chain Pickerel (A)	NW	TC	M	P	1	1.00	0.16	0.06	0.09	62.00
Chain Pickerel (Y)	NW	TC	M	P	1	1.00	0.16	0.01	0.01	6.00
White Sucker (A)	NCL	GF	S	T	26	26.00	4.13	33.80	50.18	1,300.00
White Sucker (Y)	NCL	GF	S	T	1	1.00	0.16	0.01	0.02	12.00
Longnose Dace (C)	NCL	BI	S	M	5	5.00	0.79	0.02	0.03	4.00
Fallfish (C)	NCL	GF		P	2	2.00	0.32	0.02	0.03	11.50
Burbot (C)	NC	TC	S	P	10	10.00	1.59	0.82	1.21	81.67
Smallmouth Bass (A)	IA	TC	C	M	42	42.00	6.67	24.47	36.33	582.67
Smallmouth Bass (B)	IA	TC	C	M	32	32.00	5.08	1.70	2.52	53.13
Smallmouth Bass (Y)	IA	TC	C	M	496	496.00	78.73	2.41	3.58	4.87
Yellow Perch (Y)	NCL	C	M		4	4.00	0.63	0.02	0.03	4.50
	Mile Total				630	630.00		67.36		
	Number of Species				9					
	Number of Hybrids				0					

River Code: **60-001**	Stream: **Androscoggin River (Mexico, ME)**	Sample Date: **2003**
River Mile: **78.50**	Location:	Date Range: 09/08/2003
Time Fished: 1642 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Brown Trout (A)	IMC	TC	N	I	5	5.00	1.29	2.38	2.50	475.00
Rainbow Trout (A)	IMC	TC	N	I	1	1.00	0.26	0.78	0.82	780.00
White Sucker (A)	NCL	GF	S	T	61	61.00	15.72	64.54	68.02	1,058.06
White Sucker (B)	NCL	GF	S	T	2	2.00	0.52	0.14	0.15	70.00
White Sucker (Y)	NCL	GF	S	T	12	12.00	3.09	0.19	0.20	15.91
Golden Shiner (Y)	NW	GF	M	T	3	3.00	0.77	0.02	0.02	6.00
Longnose Dace (C)	NCL	BI	S	M	2	2.00	0.52	0.01	0.01	5.50
Fallfish (A)	NCL	GF		P	2	2.00	0.52	0.05	0.05	25.00
Fallfish (C)	NCL	GF		P	1	1.00	0.26	0.02	0.02	21.00
Burbot (C)	NC	TC	S	P	3	3.00	0.77	0.45	0.47	149.33
White Perch (A)	NA	TC	M	P	1	1.00	0.26	0.15	0.16	150.00
Smallmouth Bass (A)	IA	TC	C	M	30	30.00	7.73	23.48	24.74	782.50
Smallmouth Bass (B)	IA	TC	C	M	16	16.00	4.12	0.86	0.90	53.44
Smallmouth Bass (Y)	IA	TC	C	M	244	244.00	62.89	1.78	1.88	7.30
Yellow Perch (Y)	NCL	C	M		5	5.00	1.29	0.05	0.05	9.60
Mile Total					388	388.00		94.89		
Number of Species					10					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (ust. Dixfield)**	Sample Date: **2003**
River Mile: **76.90**	Location:	Date Range: 09/08/2003
Time Fished: 1921 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Brown Trout (A)	IMC	TC	N	I	2	2.00	0.27	0.69	0.86	345.00
White Sucker (A)	NCL	GF	S	T	47	47.00	6.41	54.15	67.87	1,152.22
White Sucker (B)	NCL	GF	S	T	2	2.00	0.27	0.40	0.50	200.00
White Sucker (Y)	NCL	GF	S	T	1	1.00	0.14	0.02	0.02	18.00
Golden Shiner (C)	NW	GF	M	T	1	1.00	0.14	0.01	0.01	10.00
Common Shiner (C)	NCL	GF	S	P	22	22.00	3.00	0.31	0.39	14.00
Fallfish (A)	NCL	GF		P	44	44.00	6.00	1.42	1.78	32.27
Fallfish (B)	NCL	GF		P	157	157.00	21.42	0.48	0.60	3.07
Fallfish (Y)	NCL	GF		P	5	5.00	0.68	0.02	0.03	4.00
Burbot (C)	NC	TC	S	P	2	2.00	0.27	0.29	0.36	145.00
Smallmouth Bass (A)	IA	TC	C	M	30	30.00	4.09	17.58	22.04	586.13
Smallmouth Bass (B)	IA	TC	C	M	59	59.00	8.05	2.28	2.86	38.64
Smallmouth Bass (Y)	IA	TC	C	M	361	361.00	49.25	2.14	2.68	5.93
Mile Total					733	733.00		79.80		
Number of Species					7					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (Peru, ME)**	Sample Date: **2003**
River Mile: **70.80**	Location:	Date Range: 09/09/2003
Time Fished: 1711 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Brown Trout (A)	IMC	TC	N	I	2	2.00	0.23	1.38	5.04	690.00
Rainbow Trout (A)	IMC	TC	N	I	1	1.00	0.11	0.20	0.73	200.00
Chain Pickerel (B)	NW	TC	M	P	4	4.00	0.46	0.25	0.91	62.50
White Sucker (A)	NCL	GF	S	T	1	1.00	0.11	1.10	4.02	1,100.00
White Sucker (B)	NCL	GF	S	T	2	2.00	0.23	0.11	0.42	57.00
White Sucker (Y)	NCL	GF	S	T	23	23.00	2.64	0.19	0.69	8.23
Longnose Dace (C)	NCL	BI	S	M	2	2.00	0.23	0.01	0.04	5.00
Fallfish (A)	NCL	GF		P	5	5.00	0.57	0.75	2.75	150.40
Fallfish (B)	NCL	GF		P	150	150.00	17.24	0.42	1.55	2.82
Burbot (C)	NC	TC	S	P	6	6.00	0.69	0.88	3.22	147.17
Smallmouth Bass (A)	IA	TC	C	M	26	26.00	2.99	15.24	55.64	586.15
Smallmouth Bass (B)	IA	TC	C	M	45	45.00	5.17	3.06	11.18	68.05
Smallmouth Bass (Y)	IA	TC	C	M	594	594.00	68.28	3.69	13.46	6.20
Pumpkinseed Sunfish (C)	NW	GF	C	P	2	2.00	0.23	0.01	0.02	3.00
Redbreast Sunfish (C)	NW	GF	C	M	1	1.00	0.11	0.06	0.23	62.00
Yellow Perch (Y)	NCL	C	M		6	6.00	0.69	0.03	0.12	5.50
	Mile Total				870	870.00		27.39		
	Number of Species				11					
	Number of Hybrids				0					

River Code: **60-001**	Stream: **Androscoggin River (ust. St. Rt. 140)**	Sample Date: **2003**
River Mile: **66.20**	Location:	Date Range: 09/09/2003
Time Fished: 3552 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Chain Pickerel (A)	NW	TC	M	P	5	5.00	0.54	0.40	2.08	80.00
White Sucker (A)	NCL	GF	S	T	1	1.00	0.11	0.58	3.02	580.00
White Sucker (Y)	NCL	GF	S	T	1	1.00	0.11	0.01	0.04	8.00
Fallfish (A)	NCL	GF		P	1	1.00	0.11	0.12	0.63	120.00
Fallfish (B)	NCL	GF		P	62	62.00	6.70	0.20	1.05	3.24
Smallmouth Bass (A)	IA	TC	C	M	20	20.00	2.16	11.70	60.98	585.00
Smallmouth Bass (B)	IA	TC	C	M	34	34.00	3.68	1.75	9.12	51.47
Smallmouth Bass (Y)	IA	TC	C	M	782	782.00	84.54	4.24	22.09	5.42
Redbreast Sunfish (C)	NW	GF	C	M	4	4.00	0.43	0.10	0.52	25.00
Yellow Perch (Y)	NCL	C	M		15	15.00	1.62	0.09	0.47	6.00
Mile Total					925	925.00		19.19		
Number of Species					6					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (Riley Impoundment)**	Sample Date: **2003**
River Mile: **61.70**	Location:	Date Range: 09/09/2003
Time Fished: 3536 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Chain Pickerel (B)	NW	TC	M	P	5	5.00	0.88	0.16	0.89	32.00
Common Shiner (C)	NCL	GF	S	P	12	12.00	2.11	0.07	0.39	5.83
Spottail Shiner (C)	IA	WC	M	P	15	15.00	2.64	0.05	0.30	3.60
Fallfish (A)	NCL	GF		P	3	3.00	0.53	0.21	1.16	70.00
Fallfish (B)	NCL	GF		P	154	154.00	27.07	0.47	2.58	3.03
Burbot (C)	NC	TC	S	P	1	1.00	0.18	0.12	0.66	120.00
Smallmouth Bass (A)	IA	TC	C	M	15	15.00	2.64	14.10	78.02	940.00
Smallmouth Bass (B)	IA	TC	C	M	8	8.00	1.41	0.44	2.43	55.00
Smallmouth Bass (Y)	IA	TC	C	M	334	334.00	58.70	1.87	10.36	5.61
Pumpkinseed Sunfish (C)	NW	GF	C	P	6	6.00	1.05	0.37	2.05	61.67
Redbreast Sunfish (C)	NW	GF	C	M	1	1.00	0.18	0.05	0.28	50.00
Yellow Perch (B)	NCL	C	M		1	1.00	0.18	0.04	0.22	40.00
Yellow Perch (Y)	NCL	C	M		14	14.00	2.46	0.12	0.66	8.57
Mile Total					569	569.00		18.07		
Number of Species					9					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (dst. Riley Dam)**	Sample Date: **2003**
River Mile: **58.40**	Location:	Date Range: 08/02/2003
Time Fished: 4388 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker (A)	NCL	GF	S	T	13	13.00	2.71	13.74	17.99	1,056.67
White Sucker (Y)	NCL	GF	S	T	24	24.00	5.01	0.06	0.08	2.57
Fallfish (Y)	NCL	GF		P	92	92.00	19.21	0.13	0.16	1.36
Burbot (C)	NC	TC	S	P	16	16.00	3.34	1.09	1.42	67.92
Smallmouth Bass (A)	IA	TC	C	M	89	89.00	18.58	60.32	79.00	677.80
Smallmouth Bass (B)	IA	TC	C	M	10	10.00	2.09	0.36	0.47	36.00
Smallmouth Bass (Y)	IA	TC	C	M	226	226.00	47.18	0.62	0.82	2.76
Pumpkinseed Sunfish (C)	NW	GF	C	P	3	3.00	0.63	0.03	0.04	9.00
Yellow Perch (Y)	NCL	C	M		6	6.00	1.25	0.02	0.02	2.83
Mile Total					479	479.00		76.36		
Number of Species					6					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (Jay Impoundment)**	Sample Date: **2003**
River Mile: **57.10**	Location:	Date Range: 08/02/2003
Time Fished: 3699 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker (Y)	NCL	GF	S	T	74	74.00	20.27	0.13	1.37	1.76
Fallfish (Y)	NCL	GF		P	72	72.00	19.73	0.10	1.01	1.34
Smallmouth Bass (A)	IA	TC	C	M	18	18.00	4.93	8.46	89.31	469.94
Smallmouth Bass (B)	IA	TC	C	M	5	5.00	1.37	0.26	2.75	52.00
Smallmouth Bass (Y)	IA	TC	C	M	140	140.00	38.36	0.27	2.89	1.96
Pumpkinseed Sunfish (C)	NW	GF	C	P	2	2.00	0.55	0.03	0.33	15.50
Yellow Perch (A)	NCL	C	M		3	3.00	0.82	0.09	0.96	30.33
Yellow Perch (Y)	NCL	C	M		51	51.00	13.97	0.13	1.37	2.55
Mile Total					365	365.00		9.47		
Number of Species					5					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (dst. Jay Dam)**	Sample Date: **2003**
River Mile: **55.80**	Location:	Date Range: 09/10/2003
Time Fished: 3612 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Chain Pickerel (A)	NW	TC	M	P	8	8.00	0.39	0.76	3.22	95.00
White Sucker (A)	NCL	GF	S	T	1	1.00	0.05	0.68	2.88	680.00
White Sucker (Y)	NCL	GF	S	T	2	2.00	0.10	0.01	0.03	4.00
Spottail Shiner (C)	IA	WC	M	P	1,633	1,633.00	79.66	0.00	0.00	0.00
Fallfish (A)	NCL	GF		P	60	60.00	2.93	2.43	10.29	40.51
Fallfish (B)	NCL	GF		P	3	3.00	0.15	0.01	0.04	3.33
Fallfish (Y)	NCL	GF		P	25	25.00	1.22	0.09	0.37	3.48
Burbot (C)	NC	TC	S	P	2	2.00	0.10	0.12	0.51	60.00
Smallmouth Bass (A)	IA	TC	C	M	29	29.00	1.41	16.91	71.56	583.10
Smallmouth Bass (B)	IA	TC	C	M	17	17.00	0.83	0.80	3.39	47.06
Smallmouth Bass (Y)	IA	TC	C	M	156	156.00	7.61	0.76	3.19	4.84
Pumpkinseed Sunfish (A)	NW	GF	C	P	3	3.00	0.15	0.08	0.32	25.00
Pumpkinseed Sunfish (C)	NW	GF	C	P	2	2.00	0.10	0.07	0.30	35.00
Pumpkinseed Sunfish (Y)	NW	GF	C	P	5	5.00	0.24	0.01	0.03	1.67
Yellow Perch (A)	NCL	C	M		3	3.00	0.15	0.20	0.85	66.67
Yellow Perch (Y)	NCL	C	M		101	101.00	4.93	0.72	3.04	7.11
Mile Total					2,050	2,050.00		23.63		
Number of Species					8					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (dst. Livermore Falls)**	Sample Date: **2003**
River Mile: **52.80**	Location:	Date Range: 09/11/2003
Time Fished: 2713 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Chain Pickerel (A)	NW	TC	M	P	1	1.00	0.15	0.06	0.13	60.00
White Sucker (A)	NCL	GF	S	T	12	12.00	1.76	10.27	23.10	855.83
White Sucker (Y)	NCL	GF	S	T	1	1.00	0.15	0.01	0.03	12.00
Spottail Shiner (C)	IA	WC	M	P	228	228.00	33.48	0.33	0.75	1.46
Fallfish (B)	NCL	GF		P	6	6.00	0.88	0.02	0.04	3.33
Fallfish (Y)	NCL	GF		P	10	10.00	1.47	0.02	0.05	2.40
Burbot (C)	NC	TC	S	P	2	2.00	0.29	0.38	0.85	190.00
Smallmouth Bass (A)	IA	TC	C	M	51	51.00	7.49	27.57	62.01	540.67
Smallmouth Bass (B)	IA	TC	C	M	61	61.00	8.96	3.03	6.81	49.67
Smallmouth Bass (Y)	IA	TC	C	M	242	242.00	35.54	1.21	2.72	4.99
Pumpkinseed Sunfish (C)	NW	GF	C	P	37	37.00	5.43	0.60	1.36	16.30
Redbreast Sunfish (C)	NW	GF	C	M	26	26.00	3.82	0.90	2.03	34.67
Yellow Perch (Y)	NCL	C	M		4	4.00	0.59	0.05	0.11	12.50
	Mile Total				681	681.00		44.47		
	Number of Species				9					
	Number of Hybrids				0					

River Code: **60-001**	Stream: **Androscoggin River (East Livermore)**	Sample Date: **2003**
River Mile: **51.10**	Location:	Date Range: 09/11/2003
Time Fished: 1862 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Chain Pickerel (B)	NW	TC	M	P	1	1.00	0.13	0.04	0.18	40.00
White Sucker (A)	NCL	GF	S	T	6	6.00	0.80	4.38	19.24	730.00
White Sucker (Y)	NCL	GF	S	T	13	13.00	1.73	0.09	0.40	7.10
Golden Shiner (B)	NW	GF	M	T	1	1.00	0.13	0.02	0.10	22.00
Golden Shiner (Y)	NW	GF	M	T	41	41.00	5.46	0.38	1.67	9.27
Common Shiner (C)	NCL	GF	S	P	77	77.00	10.25	0.19	0.84	2.48
Spottail Shiner (C)	IA	WC	M	P	188	188.00	25.03	0.24	1.06	1.28
Fallfish (A)	NCL	GF		P	6	6.00	0.80	0.41	1.79	68.00
Fallfish (B)	NCL	GF		P	2	2.00	0.27	0.04	0.17	19.00
Fallfish (Y)	NCL	GF		P	40	40.00	5.33	0.09	0.38	2.15
Burbot (C)	NC	TC	S	P	1	1.00	0.13	0.30	1.32	300.00
Smallmouth Bass (A)	IA	TC	C	M	20	20.00	2.66	10.11	44.39	505.26
Smallmouth Bass (B)	IA	TC	C	M	41	41.00	5.46	2.48	10.89	60.49
Smallmouth Bass (Y)	IA	TC	C	M	126	126.00	16.78	0.63	2.78	5.03
Pumpkinseed Sunfish (A)	NW	GF	C	P	66	66.00	8.79	1.14	5.00	17.26
Pumpkinseed Sunfish (Y)	NW	GF	C	P	17	17.00	2.26	0.02	0.07	0.94
Redbreast Sunfish (C)	NW	GF	C	M	58	58.00	7.72	1.67	7.33	28.77
Redbreast Sunfish (Y)	NW	GF	C	M	3	3.00	0.40	0.01	0.04	3.00
Yellow Perch (B)	NCL	C	M		1	1.00	0.13	0.01	0.04	10.00
Yellow Perch (Y)	NCL	C	M		43	43.00	5.73	0.53	2.31	12.21
Mile Total					751	751.00		22.77		
Number of Species					11					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (Strickland)**	Sample Date: **2003**
River Mile: **46.60**	Location:	Date Range: 09/11/2003
Time Fished: 4057 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker (A)	NCL	GF	S	T	41	41.00	6.87	27.20	59.65	663.41
White Sucker (Y)	NCL	GF	S	T	3	3.00	0.50	0.04	0.09	13.33
Common Shiner (C)	NCL	GF	S	P	15	15.00	2.51	0.02	0.04	1.33
Spottail Shiner (C)	IA	WC	M	P	72	72.00	12.06	0.10	0.22	1.39
Fallfish (A)	NCL	GF		P	22	22.00	3.69	1.92	4.20	87.14
Fallfish (Y)	NCL	GF		P	91	91.00	15.24	0.32	0.70	3.48
Smallmouth Bass (A)	IA	TC	C	M	43	43.00	7.20	11.40	24.99	265.00
Smallmouth Bass (B)	IA	TC	C	M	43	43.00	7.20	2.67	5.86	62.09
Smallmouth Bass (Y)	IA	TC	C	M	246	246.00	41.21	1.64	3.60	6.67
Pumpkinseed Sunfish (Y)	NW	GF	C	P	1	1.00	0.17	0.00	0.00	2.00
Redbreast Sunfish (A)	NW	GF	C	M	11	11.00	1.84	0.28	0.60	25.00
Redbreast Sunfish (B)	NW	GF	C	M	1	1.00	0.17	0.01	0.02	8.00
Redbreast Sunfish (Y)	NW	GF	C	M	8	8.00	1.34	0.01	0.03	1.63
Mile Total					597	597.00		45.60		
Number of Species					7					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (dst. Turner Falls)**	Sample Date: **2003**
River Mile: **41.20**	Location:	Date Range: 08/01/2003
Time Fished: 5539 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Chain Pickerel (A)	NW	TC	M	P	2	2.00	0.39	0.86	1.93	427.50
White Sucker (A)	NCL	GF	S	T	21	21.00	4.06	14.06	31.82	669.67
White Sucker (B)	NCL	GF	S	T	1	1.00	0.19	0.35	0.78	345.00
White Sucker (Y)	NCL	GF	S	T	1	1.00	0.19	0.00	0.01	3.00
Golden Shiner (B)	NW	GF	M	T	1	1.00	0.19	0.02	0.04	16.00
Spottail Shiner (C)	IA	WC	M	P	29	29.00	5.61	0.04	0.09	1.38
Fallfish (A)	NCL	GF		P	35	35.00	6.77	0.43	0.96	12.14
Fallfish (C)	NCL	GF		P	150	150.00	29.01	0.34	0.76	2.24
Smallmouth Bass (A)	IA	TC	C	M	41	41.00	7.93	17.87	40.42	435.73
Smallmouth Bass (B)	IA	TC	C	M	52	52.00	10.06	3.52	7.96	67.65
Smallmouth Bass (Y)	IA	TC	C	M	53	53.00	10.25	0.14	0.32	2.65
Largemouth Bass (A)	IA	TC	C	P	6	6.00	1.16	1.53	3.45	254.33
Largemouth Bass (B)	IA	TC	C	P	3	3.00	0.58	0.18	0.41	60.00
Largemouth Bass (Y)	IA	TC	C	P	10	10.00	1.93	0.04	0.09	3.75
Pumpkinseed Sunfish (C)	NW	GF	C	P	7	7.00	1.35	0.28	0.64	40.43
Redbreast Sunfish (C)	NW	GF	C	M	10	10.00	1.93	1.20	2.71	119.80
Yellow Perch (A)	NCL	C	M		69	69.00	13.35	3.34	7.56	48.43
Yellow Perch (Y)	NCL	C	M		26	26.00	5.03	0.02	0.05	0.88
	Mile Total				517	517.00		44.20		
	Number of Species				10					
	Number of Hybrids				0					

River Code: **60-001**	Stream: **Androscoggin R. (dst. Ram Island - GIP)**	Sample Date: **2003**
River Mile: **38.90**	Location:	Date Range: 08/01/2003
Time Fished: 1767 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Chain Pickerel (A)	NW	TC	M	P	3	3.00	0.58	0.57	6.86	190.00
White Sucker (B)	NCL	GF	S	T	1	1.00	0.19	0.40	4.81	400.00
Golden Shiner (Y)	NW	GF	M	T	1	1.00	0.19	0.00	0.01	1.00
Spottail Shiner (C)	IA	WC	M	P	371	371.00	72.04	0.38	4.55	1.02
Smallmouth Bass (A)	IA	TC	C	M	3	3.00	0.58	1.02	12.21	338.33
Smallmouth Bass (B)	IA	TC	C	M	48	48.00	9.32	2.99	35.97	62.29
Smallmouth Bass (Y)	IA	TC	C	M	20	20.00	3.88	0.09	1.08	4.50
Pumpkinseed Sunfish (C)	NW	GF	C	P	21	21.00	4.08	0.56	6.76	26.76
Redbreast Sunfish (C)	NW	GF	C	M	22	22.00	4.27	1.06	12.75	48.18
Yellow Perch (A)	NCL	C	M		24	24.00	4.66	1.23	14.74	51.04
Yellow Perch (B)	NCL	C	M		1	1.00	0.19	0.02	0.26	22.00
Mile Total					515	515.00		8.31		
Number of Species					8					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin R. (Turner Center - GIP)**	Sample Date: **2003**
River Mile: **35.40**	Location:	Date Range: 09/07/2003
Time Fished: 1757 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Chain Pickerel (A)	NW	TC	M	P	1	1.00	0.18	0.67	3.35	665.00
Chain Pickerel (B)	NW	TC	M	P	42	42.00	7.38	0.63	3.15	14.88
White Sucker (A)	NCL	GF	S	T	3	3.00	0.53	1.77	8.92	590.00
Golden Shiner (B)	NW	GF	M	T	3	3.00	0.53	0.05	0.23	15.33
Spottail Shiner (C)	IA	WC	M	P	2	2.00	0.35	0.00	0.02	2.00
Smallmouth Bass (A)	IA	TC	C	M	8	8.00	1.41	3.62	18.24	452.50
Smallmouth Bass (B)	IA	TC	C	M	5	5.00	0.88	0.39	1.96	78.00
Largemouth Bass (A)	IA	TC	C	P	2	2.00	0.35	5.50	27.71	2,750.00
Largemouth Bass (B)	IA	TC	C	P	14	14.00	2.46	0.47	2.37	33.57
Largemouth Bass (Y)	IA	TC	C	P	84	84.00	14.76	0.60	3.02	7.14
Pumpkinseed Sunfish (A)	NW	GF	C	P	9	9.00	1.58	1.04	5.24	115.56
Pumpkinseed Sunfish (B)	NW	GF	C	P	2	2.00	0.35	0.02	0.10	10.00
Pumpkinseed Sunfish (Y)	NW	GF	C	P	12	12.00	2.11	0.04	0.18	2.92
Redbreast Sunfish (C)	NW	GF	C	M	3	3.00	0.53	0.32	1.59	105.00
Yellow Perch (A)	NCL	C	M		21	21.00	3.69	1.80	9.07	85.71
Yellow Perch (B)	NCL	C	M		34	34.00	5.98	1.50	7.56	44.12
Yellow Perch (Y)	NCL	C	M		324	324.00	56.94	1.45	7.30	4.47
Mile Total					569	569.00		19.85		
Number of Species					9					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin R. (O_2 Diffuser - GIP)**	Sample Date: **2003**
River Mile: **31.40**	Location:	Date Range: 08/02/2003
Time Fished: 2000 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Chain Pickerel (B)	NW	TC	M	P	6	6.00	0.50	0.10	0.46	16.67
White Sucker (A)	NCL	GF	S	T	6	6.00	0.50	3.72	17.24	620.17
White Sucker (B)	NCL	GF	S	T	2	2.00	0.17	0.88	4.08	440.00
White Sucker (Y)	NCL	GF	S	T	23	23.00	1.91	0.12	0.53	5.00
Golden Shiner (B)	NW	GF	M	T	3	3.00	0.25	0.02	0.10	7.33
Golden Shiner (Y)	NW	GF	M	T	4	4.00	0.33	0.01	0.06	3.00
Fallfish (A)	NCL	GF		P	1	1.00	0.08	0.05	0.21	45.00
White Perch (Y)	NA	TC	M	P	11	11.00	0.91	0.04	0.19	3.73
Smallmouth Bass (A)	IA	TC	C	M	21	21.00	1.74	8.51	39.43	405.18
Smallmouth Bass (B)	IA	TC	C	M	2	2.00	0.17	0.19	0.88	95.00
Smallmouth Bass (Y)	IA	TC	C	M	9	9.00	0.75	0.05	0.21	5.00
Largemouth Bass (Y)	IA	TC	C	P	39	39.00	3.24	0.32	1.46	8.08
Pumpkinseed Sunfish (A)	NW	GF	C	P	36	36.00	2.99	1.70	7.87	47.17
Pumpkinseed Sunfish (Y)	NW	GF	C	P	141	141.00	11.70	0.18	0.82	1.26
Yellow Perch (A)	NCL	C	M		103	103.00	8.55	3.76	17.43	36.51
Yellow Perch (Y)	NCL	C	M		798	798.00	66.22	1.95	9.03	2.44
	Mile Total				1,205	1,205.00		21.58		
	Number of Species				9					
	Number of Hybrids				0					

River Code: **60-001**	Stream: **Androscoggin R. (ust. Gulf Island Dam)**	Sample Date: **2003**
River Mile: **27.90**	Location:	Date Range: 07/31/2003
Time Fished: 2090 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker (A)	NCL	GF	S	T	26	26.00	2.02	15.11	32.78	580.96
White Sucker (B)	NCL	GF	S	T	31	31.00	2.41	8.76	19.02	282.68
White Sucker (Y)	NCL	GF	S	T	3	3.00	0.23	0.02	0.04	5.67
Golden Shiner (A)	NW	GF	M	T	6	6.00	0.47	0.33	0.71	54.17
Golden Shiner (B)	NW	GF	M	T	18	18.00	1.40	0.13	0.27	6.94
Spottail Shiner (C)	IA	WC	M	P	532	532.00	41.40	2.50	5.43	4.70
Fallfish (C)	NCL	GF		P	1	1.00	0.08	0.34	0.73	338.00
White Perch (A)	NA	TC	M	P	78	78.00	6.07	7.80	16.93	100.00
White Perch (Y)	NA	TC	M	P	316	316.00	24.59	0.54	1.18	1.72
Black Crappie (B)	IA	TC	C	P	1	1.00	0.08	0.04	0.08	38.00
Black Crappie (C)	IA	TC	C	P	3	3.00	0.23	0.14	0.30	46.00
Smallmouth Bass (A)	IA	TC	C	M	23	23.00	1.79	6.23	13.51	270.74
Smallmouth Bass (B)	IA	TC	C	M	9	9.00	0.70	0.57	1.23	62.78
Smallmouth Bass (Y)	IA	TC	C	M	58	58.00	4.51	0.25	0.54	4.31
Largemouth Bass (A)	IA	TC	C	P	1	1.00	0.08	0.13	0.27	125.00
Largemouth Bass (Y)	IA	TC	C	P	2	2.00	0.16	0.02	0.05	10.50
Pumpkinseed Sunfish (C)	NW	GF	C	P	69	69.00	5.37	1.59	3.46	23.10
Redbreast Sunfish (C)	NW	GF	C	M	1	1.00	0.08	0.08	0.16	75.00
Yellow Perch (A)	NCL	C	M		25	25.00	1.95	1.33	2.89	53.32
Yellow Perch (Y)	NCL	C	M		82	82.00	6.38	0.19	0.41	2.33
Mile Total					1,285	1,285.00		46.08		
Number of Species					11					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (dst. Gulf Island Dam)**	Sample Date: **2003**
River Mile: **26.90**	Location:	Date Range: 07/26/2003
Time Fished: 2215 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Chain Pickerel (A)	NW	TC	M	P	1	1.00	0.21	0.18	0.72	184.00
White Sucker (A)	NCL	GF	S	T	2	2.00	0.42	2.10	8.21	1,050.00
Golden Shiner (Y)	NW	GF	M	T	27	27.00	5.61	0.03	0.11	1.04
Spottail Shiner (C)	IA	WC	M	P	76	76.00	15.80	0.06	0.25	0.83
Spottail Shiner (Y)	IA	WC	M	P	26	26.00	5.41	0.02	0.06	0.62
Brown Bullhead (A)	NW	GF	C	T	3	3.00	0.62	1.05	4.11	350.67
American Eel (A)	NCT	TC	M	T	2	2.00	0.42	1.60	6.25	800.00
American Eel (B)	NCT	TC	M	T	2	2.00	0.42	0.37	1.44	184.00
White Perch (Y)	NA	TC	M	P	39	39.00	8.11	0.06	0.21	1.42
Smallmouth Bass (A)	IA	TC	C	M	50	50.00	10.40	11.71	45.77	234.24
Smallmouth Bass (B)	IA	TC	C	M	37	37.00	7.69	2.36	9.23	63.84
Smallmouth Bass (Y)	IA	TC	C	M	6	6.00	1.25	0.01	0.05	2.33
Largemouth Bass (Y)	IA	TC	C	P	1	1.00	0.21	0.01	0.02	6.00
Pumpkinseed Sunfish (A)	NW	GF	C	P	22	22.00	4.57	0.80	3.11	36.19
Pumpkinseed Sunfish (C)	NW	GF	C	P	6	6.00	1.25	2.40	9.38	400.00
Pumpkinseed Sunfish (Y)	NW	GF	C	P	1	1.00	0.21	0.00	0.01	2.00
Redbreast Sunfish (C)	NW	GF	C	M	18	18.00	3.74	1.15	4.49	63.88
Yellow Perch (A)	NCL	C	M		12	12.00	2.49	0.99	3.87	82.50
Yellow Perch (B)	NCL	C	M		13	13.00	2.70	0.44	1.72	33.85
Yellow Perch (Y)	NCL	C	M		137	137.00	28.48	0.25	0.98	1.83
Mile Total					481	481.00		25.59		
Number of Species					12					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (dst. Deer Rips Dam)**	Sample Date: **2003**
River Mile: **25.20**	Location:	Date Range: 07/26/2003
Time Fished: 2084 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker (A)	NCL	GF	S	T	46	46.00	17.62	39.77	61.05	864.52
Spottail Shiner (C)	IA	WC	M	P	12	12.00	4.60	0.06	0.09	5.08
Fallfish (A)	NCL	GF		P	4	4.00	1.53	0.57	0.87	142.00
Fallfish (B)	NCL	GF		P	9	9.00	3.45	0.14	0.21	15.56
American Eel (A)	NCT	TC	M	T	8	8.00	3.07	4.00	6.14	500.00
Smallmouth Bass (A)	IA	TC	C	M	47	47.00	18.01	15.29	23.47	325.21
Smallmouth Bass (B)	IA	TC	C	M	49	49.00	18.77	2.76	4.23	56.25
Smallmouth Bass (Y)	IA	TC	C	M	1	1.00	0.38	0.01	0.01	5.00
Pumpkinseed Sunfish (C)	NW	GF	C	P	20	20.00	7.66	0.20	0.31	10.00
Redbreast Sunfish (C)	NW	GF	C	M	47	47.00	18.01	1.98	3.03	42.04
Yellow Perch (B)	NCL	C	M		10	10.00	3.83	0.36	0.55	36.00
Yellow Perch (Y)	NCL	C	M		8	8.00	3.07	0.02	0.02	2.00
	Mile Total				261	261.00		65.14		
	Number of Species				8					
	Number of Hybrids				0					

River Code: **60-001**	Stream: **Androscoggin River (dst. Gr. Stone Dam)**	Sample Date: **2003**
River Mile: **22.60**	Location:	Date Range: 07/27/2003
Time Fished: 1959 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
American Eel (B)	NCT	TC	M	T	2	2.00	2.78	0.60	16.52	300.00
Smallmouth Bass (A)	IA	TC	C	M	4	4.00	5.56	0.76	20.92	190.00
Smallmouth Bass (B)	IA	TC	C	M	35	35.00	48.61	1.60	44.04	45.71
Smallmouth Bass (Y)	IA	TC	C	M	6	6.00	8.33	0.02	0.52	3.20
Pumpkinseed Sunfish (C)	NW	GF	C	P	4	4.00	5.56	0.03	0.88	8.00
Redbreast Sunfish (C)	NW	GF	C	M	21	21.00	29.17	0.62	17.12	29.62
Mile Total					72	72.00		3.63		
Number of Species					4					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (dst. St. Rt. 126)**	Sample Date: **2003**
River Mile: **21.90**	Location:	Date Range: 07/27/2003
Time Fished: 1709 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Rainbow Trout (A)	IMC	TC	N	I	2	2.00	1.72	0.64	2.47	317.50
White Sucker (A)	NCL	GF	S	T	12	12.00	10.34	10.72	41.66	893.33
White Sucker (B)	NCL	GF	S	T	5	5.00	4.31	0.90	3.50	180.00
Spottail Shiner (C)	IA	WC	M	P	2	2.00	1.72	0.00	0.01	1.00
Fallfish (Y)	NCL	GF		P	1	1.00	0.86	0.00	0.01	2.00
American Eel (A)	NCT	TC	M	T	3	3.00	2.59	3.20	12.43	1,066.67
American Eel (B)	NCT	TC	M	T	1	1.00	0.86	0.03	0.12	30.00
Smallmouth Bass (A)	IA	TC	C	M	20	20.00	17.24	7.49	29.10	374.45
Smallmouth Bass (B)	IA	TC	C	M	44	44.00	37.93	1.95	7.59	44.36
Smallmouth Bass (Y)	IA	TC	C	M	14	14.00	12.07	0.03	0.11	2.00
Pumpkinseed Sunfish (C)	NW	GF	C	P	4	4.00	3.45	0.05	0.20	13.00
Redbreast Sunfish (C)	NW	GF	C	M	6	6.00	5.17	0.72	2.80	120.00
Yellow Perch (Y)	NCL	C	M		2	2.00	1.72	0.01	0.02	2.50
	Mile Total				116	116.00		25.74		
	Number of Species				9					
	Number of Hybrids				0					

River Code: **60-001**	Stream: **Androscoggin R. (dst. Lewiston/Auburn)**	Sample Date: **2003**
River Mile: **20.40**	Location:	Date Range: 07/27/2003
Time Fished: 4365 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker (A)	NCL	GF	S	T	40	40.00	17.94	46.88	54.57	1,172.00
White Sucker (B)	NCL	GF	S	T	2	2.00	0.90	0.37	0.43	183.00
Fallfish (C)	NCL	GF		P	1	1.00	0.45	0.02	0.03	22.00
American Eel (A)	NCT	TC	M	T	14	14.00	6.28	9.10	10.59	650.00
Smallmouth Bass (A)	IA	TC	C	M	43	43.00	19.28	24.97	29.07	580.79
Smallmouth Bass (B)	IA	TC	C	M	61	61.00	27.35	3.05	3.55	50.00
Smallmouth Bass (Y)	IA	TC	C	M	21	21.00	9.42	0.04	0.05	2.10
Largemouth Bass (B)	IA	TC	C	P	2	2.00	0.90	0.09	0.10	45.00
Redbreast Sunfish (C)	NW	GF	C	M	35	35.00	15.70	1.31	1.52	37.39
Yellow Perch (B)	NCL	C	M		1	1.00	0.45	0.06	0.06	55.00
Yellow Perch (Y)	NCL	C	M		3	3.00	1.35	0.01	0.01	4.00
Mile Total					223	223.00		85.90		
Number of Species					7					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (Durham Access)**	Sample Date: **2003**
River Mile: **16.00**	Location:	Date Range: 07/30/2003
Time Fished: 1916 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	2	2.00	0.20	0.01	0.06	5.00
Chain Pickerel (B)	NW	TC	M	P	4	4.00	0.40	0.17	1.03	42.50
White Sucker (A)	NCL	GF	S	T	3	3.00	0.30	2.44	14.76	814.00
White Sucker (B)	NCL	GF	S	T	11	11.00	1.09	1.88	11.34	170.55
White Sucker (Y)	NCL	GF	S	T	4	4.00	0.40	0.01	0.04	1.50
Golden Shiner (Y)	NW	GF	M	T	11	11.00	1.09	0.04	0.24	3.64
Common Shiner (Y)	NCL	GF	S	P	5	5.00	0.50	0.02	0.09	3.00
Spottail Shiner (A)	IA	WC	M	P	65	65.00	6.46	0.76	4.58	11.66
Spottail Shiner (Y)	IA	WC	M	P	725	725.00	72.07	0.51	3.10	0.71
Fallfish (A)	NCL	GF		P	6	6.00	0.60	0.73	4.39	121.17
Fallfish (B)	NCL	GF		P	17	17.00	1.69	0.28	1.69	16.47
American Eel (A)	NCT	TC	M	T	3	3.00	0.30	2.70	16.32	900.00
American Eel (B)	NCT	TC	M	T	5	5.00	0.50	0.69	4.15	137.20
Eastern Banded Killifish (C)	NW	WC	M	T	2	2.00	0.20	0.01	0.04	3.00
White Perch (Y)	NA	TC	M	P	2	2.00	0.20	0.00	0.01	1.00
Smallmouth Bass (A)	IA	TC	C	M	6	6.00	0.60	2.48	15.01	414.00
Smallmouth Bass (B)	IA	TC	C	M	40	40.00	3.98	1.47	8.88	36.72
Smallmouth Bass (Y)	IA	TC	C	M	7	7.00	0.70	0.01	0.07	1.71
Pumpkinseed Sunfish (C)	NW	GF	C	P	32	32.00	3.18	0.53	3.18	16.43
Redbreast Sunfish (A)	NW	GF	C	M	29	29.00	2.88	1.12	6.79	38.76
Yellow Perch (A)	NCL	C	M		8	8.00	0.80	0.65	3.91	80.86
Yellow Perch (Y)	NCL	C	M		19	19.00	1.89	0.05	0.31	2.74
	Mile Total				1,006	1,006.00		16.55		
	Number of Species				14					
	Number of Hybrids				0					

River Code: **60-001**	Stream: **Androscoggin River (Durham)**	Sample Date: **2003**
River Mile: **12.80**	Location:	Date Range: 09/07/2003
Time Fished: 6892 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	7	7.00	0.78	0.09	0.07	12.14
White Sucker (A)	NCL	GF	S	T	81	81.00	8.99	54.76	46.59	676.06
White Sucker (B)	NCL	GF	S	T	4	4.00	0.44	0.87	0.74	217.50
White Sucker (Y)	NCL	GF	S	T	17	17.00	1.89	0.15	0.13	8.82
Golden Shiner (B)	NW	GF	M	T	1	1.00	0.11	0.04	0.03	40.00
Spottail Shiner (C)	IA	WC	M	P	107	107.00	11.88	0.24	0.20	2.23
Spottail Shiner (Y)	IA	WC	M	P	52	52.00	5.77	0.10	0.09	1.95
Fallfish (A)	NCL	GF		P	4	4.00	0.44	0.32	0.27	80.00
Fallfish (B)	NCL	GF		P	73	73.00	8.10	0.20	0.17	2.68
Brown Bullhead (Y)	NW	GF	C	T	1	1.00	0.11	0.00	0.00	2.00
American Eel (A)	NCT	TC	M	T	21	21.00	2.33	12.35	10.51	588.24
American Eel (B)	NCT	TC	M	T	2	2.00	0.22	0.16	0.14	80.00
Eastern Banded Killifish (C)	NW	WC	M	T	2	2.00	0.22	0.00	0.00	2.00
Smallmouth Bass (A)	IA	TC	C	M	81	81.00	8.99	34.07	28.99	420.67
Smallmouth Bass (B)	IA	TC	C	M	102	102.00	11.32	6.71	5.71	65.78
Smallmouth Bass (Y)	IA	TC	C	M	183	183.00	20.31	1.36	1.16	7.44
Pumpkinseed Sunfish (C)	NW	GF	C	P	1	1.00	0.11	0.03	0.02	25.00
Redbreast Sunfish (A)	NW	GF	C	M	131	131.00	14.54	6.04	5.14	46.11
Redbreast Sunfish (Y)	NW	GF	C	M	31	31.00	3.44	0.05	0.04	1.45
Mile Total					901	901.00		117.54		
Number of Species					11					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (ust. Worumbo Dam)**	Sample Date: **2003**
River Mile: **9.60**	Location:	Date Range: 07/30/2003
Time Fished: 4194 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	168	168.00	25.81	0.36	1.16	2.12
Chain Pickerel (A)	NW	TC	M	P	3	3.00	0.46	0.38	1.24	126.67
Chain Pickerel (B)	NW	TC	M	P	22	22.00	3.38	0.27	0.89	12.42
Golden Shiner (A)	NW	GF	M	T	8	8.00	1.23	0.11	0.35	13.25
Golden Shiner (Y)	NW	GF	M	T	2	2.00	0.31	0.02	0.05	8.00
Spottail Shiner (C)	IA	WC	M	P	3	3.00	0.46	0.02	0.07	7.33
Brown Bullhead (A)	NW	GF	C	T	4	4.00	0.61	1.24	4.03	309.00
Brown Bullhead (Y)	NW	GF	C	T	1	1.00	0.15	0.00	0.01	3.00
Smallmouth Bass (A)	IA	TC	C	M	32	32.00	4.92	13.27	43.31	414.80
Smallmouth Bass (B)	IA	TC	C	M	56	56.00	8.60	3.00	9.79	53.57
Smallmouth Bass (Y)	IA	TC	C	M	18	18.00	2.76	0.04	0.14	2.44
Largemouth Bass (A)	IA	TC	C	P	1	1.00	0.15	0.14	0.46	140.00
Largemouth Bass (Y)	IA	TC	C	P	12	12.00	1.84	0.06	0.21	5.33
Pumpkinseed Sunfish (A)	NW	GF	C	P	9	9.00	1.38	0.36	1.17	40.00
Pumpkinseed Sunfish (C)	NW	GF	C	P	5	5.00	0.77	0.04	0.14	8.40
Redbreast Sunfish (A)	NW	GF	C	M	90	90.00	13.82	3.52	11.48	39.08
Redbreast Sunfish (C)	NW	GF	C	M	187	187.00	28.73	6.64	21.65	35.48
Yellow Perch (A)	NCL	C	M		22	22.00	3.38	1.15	3.76	52.36
Yellow Perch (Y)	NCL	C	M		8	8.00	1.23	0.03	0.08	3.13
Mile Total					651	651.00		30.65		
Number of Species					10					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (dst. Worumbo Dam)**	Sample Date: **2003**
River Mile: **8.00**	Location:	Date Range: 07/31/2003
Time Fished: 4724 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	288	288.00	44.86	0.50	2.04	1.74
Chain Pickerel (B)	NW	TC	M	P	2	2.00	0.31	0.01	0.05	6.00
White Sucker (A)	NCL	GF	S	T	6	6.00	0.93	5.48	22.33	913.67
White Sucker (B)	NCL	GF	S	T	17	17.00	2.65	1.60	6.51	94.00
White Sucker (Y)	NCL	GF	S	T	2	2.00	0.31	0.00	0.02	2.00
Common Shiner (C)	NCL	GF	S	P	1	1.00	0.16	0.00	0.00	1.00
Spottail Shiner (Y)	IA	WC	M	P	2	2.00	0.31	0.00	0.01	1.50
Fallfish (Y)	NCL	GF		P	5	5.00	0.78	0.01	0.03	1.50
American Eel (A)	NCT	TC	M	T	1	1.00	0.16	1.20	4.89	1,200.00
American Eel (B)	NCT	TC	M	T	1	1.00	0.16	0.04	0.18	44.00
White Perch (Y)	NA	TC	M	P	1	1.00	0.16	0.00	0.01	3.00
Smallmouth Bass (A)	IA	TC	C	M	19	19.00	2.96	9.40	38.30	494.95
Smallmouth Bass (B)	IA	TC	C	M	63	63.00	9.81	3.35	13.66	53.23
Smallmouth Bass (Y)	IA	TC	C	M	107	107.00	16.67	0.33	1.34	3.08
Largemouth Bass (Y)	IA	TC	C	P	1	1.00	0.16	0.00	0.01	2.00
Pumpkinseed Sunfish (C)	NW	GF	C	P	5	5.00	0.78	0.12	0.49	24.00
Redbreast Sunfish (A)	NW	GF	C	M	82	82.00	12.77	1.70	6.92	20.73
Redbreast Sunfish (C)	NW	GF	C	M	26	26.00	4.05	0.52	2.12	20.00
Redbreast Sunfish (Y)	NW	GF	C	M	2	2.00	0.31	0.00	0.01	1.00
Yellow Perch (A)	NCL	C	M		9	9.00	1.40	0.24	0.98	26.67
Yellow Perch (B)	NCL	C	M		1	1.00	0.16	0.02	0.09	22.00
Yellow Perch (Y)	NCL	C	M		1	1.00	0.16	0.01	0.02	5.00
Mile Total					642	642.00		24.55		
Number of Species					13					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin R. (Pejepscot Impoundment)**	Sample Date: **2003**
River Mile: **7.00**	Location:	Date Range: 07/31/2003
Time Fished: 3297 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	21	21.00	1.78	0.04	0.15	1.81
Chain Pickerel (A)	NW	TC	M	P	3	3.00	0.25	2.30	9.05	766.67
Chain Pickerel (B)	NW	TC	M	P	6	6.00	0.51	0.13	0.49	20.83
Northern Pike (B)	IA	TC	M	I	1	1.00	0.08	0.08	0.31	80.00
White Sucker (A)	NCL	GF	S	T	3	3.00	0.25	2.73	10.74	910.00
White Sucker (B)	NCL	GF	S	T	1	1.00	0.08	0.04	0.16	40.00
Golden Shiner (B)	NW	GF	M	T	15	15.00	1.27	0.25	1.00	16.93
Common Shiner (C)	NCL	GF	S	P	10	10.00	0.85	0.02	0.08	2.10
Spottail Shiner (C)	IA	WC	M	P	773	773.00	65.51	1.21	4.76	1.57
Fallfish (A)	NCL	GF		P	15	15.00	1.27	0.46	1.82	30.80
Fallfish (C)	NCL	GF		P	10	10.00	0.85	0.16	0.63	16.00
Smallmouth Bass (A)	IA	TC	C	M	13	13.00	1.10	5.61	22.06	431.31
Smallmouth Bass (B)	IA	TC	C	M	27	27.00	2.29	1.31	5.13	48.33
Smallmouth Bass (Y)	IA	TC	C	M	7	7.00	0.59	0.01	0.05	1.86
Largemouth Bass (Y)	IA	TC	C	P	5	5.00	0.42	0.01	0.04	1.80
Pumpkinseed Sunfish (C)	NW	GF	C	P	4	4.00	0.34	0.23	0.91	58.00
Redbreast Sunfish (C)	NW	GF	C	M	112	112.00	9.49	4.27	16.82	38.16
Yellow Perch (A)	NCL	C	M		132	132.00	11.19	6.53	25.69	49.47
Yellow Perch (Y)	NCL	C	M		22	22.00	1.86	0.03	0.10	1.18
Mile Total					1,180	1,180.00		25.42		
Number of Species					13					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (dst. Pejepscot Dam)**	Sample Date: **2003**
River Mile: **4.30**	Location:	Date Range: 07/25/2003
Time Fished: 1937 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	91	91.00	13.87	0.15	0.43	1.65
American Shad (Y)	NA	PI			33	33.00	5.03	0.01	0.04	0.42
White Sucker (A)	NCL	GF	S	T	15	15.00	2.29	14.57	41.86	971.43
White Sucker (B)	NCL	GF	S	T	1	1.00	0.15	0.26	0.75	260.00
Spottail Shiner (C)	IA	WC	M	P	2	2.00	0.30	0.03	0.09	15.00
Spottail Shiner (Y)	IA	WC	M	P	2	2.00	0.30	0.00	0.00	0.50
Fallfish (A)	NCL	GF		P	18	18.00	2.74	1.85	5.30	102.50
Fallfish (B)	NCL	GF		P	184	184.00	28.05	1.01	2.90	5.49
Fallfish (Y)	NCL	GF		P	101	101.00	15.40	0.12	0.34	1.17
American Eel (A)	NCT	TC	M	T	3	3.00	0.46	1.40	4.02	466.67
Smallmouth Bass (A)	IA	TC	C	M	26	26.00	3.96	7.75	22.26	298.08
Smallmouth Bass (B)	IA	TC	C	M	56	56.00	8.54	2.77	7.96	49.45
Smallmouth Bass (Y)	IA	TC	C	M	13	13.00	1.98	0.04	0.11	3.08
Redbreast Sunfish (C)	NW	GF	C	M	111	111.00	16.92	4.85	13.93	43.69
Mile Total					656	656.00		34.81		
Number of Species					8					
Number of Hybrids					0					

River Code: **60-001**	Stream: **Androscoggin River (dst. I-95)**	Sample Date: **2003**
River Mile: **1.50**	Location:	Date Range: 07/25/2003
Time Fished: 1562 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Chain Pickerel (B)	NW	TC	M	P	1	1.00	0.33	0.02	0.07	15.00
White Sucker (A)	NCL	GF	S	T	11	11.00	3.68	9.56	42.24	869.09
White Sucker (B)	NCL	GF	S	T	5	5.00	1.67	0.74	3.27	148.00
White Sucker (Y)	NCL	GF	S	T	53	53.00	17.73	0.10	0.42	1.82
Golden Shiner (A)	NW	GF	M	T	28	28.00	9.36	0.15	0.64	5.19
Golden Shiner (Y)	NW	GF	M	T	4	4.00	1.34	0.02	0.09	5.00
Common Shiner (C)	NCL	GF	S	P	51	51.00	17.06	0.33	1.48	6.54
Spottail Shiner (A)	IA	WC	M	P	37	37.00	12.37	0.24	1.06	6.46
Spottail Shiner (C)	IA	WC	M	P	12	12.00	4.01	0.06	0.27	5.00
Fallfish (B)	NCL	GF		P	11	11.00	3.68	0.09	0.39	8.00
Fallfish (Y)	NCL	GF		P	12	12.00	4.01	0.01	0.04	0.67
American Eel (A)	NCT	TC	M	T	2	2.00	0.67	1.00	4.42	500.00
Eastern Banded Killifish (C)	NW	WC	M	T	2	2.00	0.67	0.01	0.04	4.00
Smallmouth Bass (A)	IA	TC	C	M	19	19.00	6.35	8.29	36.63	436.42
Smallmouth Bass (B)	IA	TC	C	M	22	22.00	7.36	1.14	5.05	52.00
Smallmouth Bass (Y)	IA	TC	C	M	4	4.00	1.34	0.02	0.07	4.00
Redbreast Sunfish (A)	NW	GF	C	M	25	25.00	8.36	0.87	3.84	34.80
Mile Total					299	299.00		22.64		
Number of Species					10					
Number of Hybrids					0					

River Code: **61-001**	Stream: **Androscoggin River (Driscoll Island)**	Sample Date: **2003**
River Mile: **-2.60**	Location:	Date Range: 09/12/2003
Time Fished: 4106 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Sea Lamprey (Y)	NA	PF	N	M	4	4.00	0.28	0.04	0.03	10.67
Alewife (Y)	NA	PI	M	P	1	1.00	0.07	0.01	0.00	5.00
White Sucker (A)	NCL	GF	S	T	183	183.00	12.60	113.78	84.88	621.74
White Sucker (B)	NCL	GF	S	T	86	86.00	5.92	1.52	1.14	17.70
White Sucker (Y)	NCL	GF	S	T	1	1.00	0.07	0.02	0.01	20.00
Golden Shiner (Y)	NW	GF	M	T	12	12.00	0.83	0.01	0.01	0.83
Spottail Shiner (Y)	IA	WC	M	P	386	386.00	26.58	0.26	0.19	0.67
White Catfish (A)	IA	TC	C	P	1	1.00	0.07	0.12	0.09	120.00
American Eel (B)	NCT	TC	M	T	175	175.00	12.05	13.19	9.84	75.38
American Eel (Y)	NCT	TC	M	T	440	440.00	30.30	0.49	0.37	1.12
Eastern Banded Killifish (C)	NW	WC	M	T	20	20.00	1.38	0.07	0.05	3.26
Striped Bass (Y)	NA	TC	M	I	7	7.00	0.48	0.12	0.09	17.71
Smallmouth Bass (A)	IA	TC	C	M	7	7.00	0.48	1.41	1.05	201.67
Smallmouth Bass (B)	IA	TC	C	M	11	11.00	0.76	0.71	0.53	64.55
Smallmouth Bass (Y)	IA	TC	C	M	17	17.00	1.17	0.08	0.06	4.71
Pumpkinseed Sunfish (C)	NW	GF	C	P	14	14.00	0.96	0.36	0.26	25.33
Redbreast Sunfish (A)	NW	GF	C	M	54	54.00	3.72	1.28	0.95	23.70
Redbreast Sunfish (C)	NW	GF	C	M	16	16.00	1.10	0.37	0.28	23.13
Redbreast Sunfish (Y)	NW	GF	C	M	12	12.00	0.83	0.02	0.01	1.67
Yellow Perch (A)	NCL	C	M		1	1.00	0.07	0.15	0.11	150.00
Yellow Perch (Y)	NCL	C	M		4	4.00	0.28	0.03	0.02	8.00
Mile Total					1,452	1,452.00		134.04		
Number of Species					13					
Number of Hybrids					0					

River Code: **61-001**	Stream: **Androscoggin River (dst. Brunswick Dam)**	Sample Date: **2003**
River Mile: **-0.20**	Location:	Date Range: 07/25/2003
Time Fished: 2327 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker (A)	NCL	GF	S	T	8	8.00	6.67	9.30	44.25	1,162.50
Common Carp (A)	IA	GF	M	T	1	1.00	0.83	2.70	12.85	2,700.00
Spottail Shiner (C)	IA	WC	M	P	5	5.00	4.17	0.04	0.19	8.00
White Catfish (A)	IA	TC	C	P	1	1.00	0.83	0.22	1.05	220.00
American Eel (B)	NCT	TC	M	T	24	24.00	20.00	3.30	15.70	137.50
American Eel (Y)	NCT	TC	M	T	12	12.00	10.00	0.06	0.29	5.00
Smallmouth Bass (A)	IA	TC	C	M	9	9.00	7.50	3.16	15.01	350.56
Smallmouth Bass (B)	IA	TC	C	M	32	32.00	26.67	1.48	7.04	46.25
Redbreast Sunfish (A)	NW	GF	C	M	28	28.00	23.33	0.76	3.62	27.14
Mile Total					120	120.00		21.02		
Number of Species					7					
Number of Hybrids					0					

River Code: **61-001**	Stream: **Androscoggin River**	Sample Date: **2003**
River Mile: **-2.60**	Location:	Date Range: 09/12/2003
Time Fished: 4106 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Sea Lamprey (Y)	NA	PF	N	M	4	4.00	0.28	0.04	0.03	10.67
Alewife (Y)	NA	PI	M	P	1	1.00	0.07	0.01	0.00	5.00
White Sucker (A)	NCL	GF	S	T	183	183.00	12.60	113.78	84.88	621.74
White Sucker (B)	NCL	GF	S	T	86	86.00	5.92	1.52	1.14	17.70
White Sucker (Y)	NCL	GF	S	T	1	1.00	0.07	0.02	0.01	20.00
Golden Shiner (Y)	NW	GF	M	T	12	12.00	0.83	0.01	0.01	0.83
Spottail Shiner (Y)	IA	WC	M	P	386	386.00	26.58	0.26	0.19	0.67
White Catfish (A)	IA	TC	C	P	1	1.00	0.07	0.12	0.09	120.00
American Eel (B)	NCT	TC	M	T	175	175.00	12.05	13.19	9.84	75.38
American Eel (Y)	NCT	TC	M	T	440	440.00	30.30	0.49	0.37	1.12
Eastern Banded Killifish (C)	NW	WC	M	T	20	20.00	1.38	0.07	0.05	3.26
Striped Bass (Y)	NA	TC	M	I	7	7.00	0.48	0.12	0.09	17.71
Smallmouth Bass (A)	IA	TC	C	M	7	7.00	0.48	1.41	1.05	201.67
Smallmouth Bass (B)	IA	TC	C	M	11	11.00	0.76	0.71	0.53	64.55
Smallmouth Bass (Y)	IA	TC	C	M	17	17.00	1.17	0.08	0.06	4.71
Pumpkinseed Sunfish (C)	NW	GF	C	P	14	14.00	0.96	0.36	0.26	25.33
Redbreast Sunfish (A)	NW	GF	C	M	54	54.00	3.72	1.28	0.95	23.70
Redbreast Sunfish (C)	NW	GF	C	M	16	16.00	1.10	0.37	0.28	23.13
Redbreast Sunfish (Y)	NW	GF	C	M	12	12.00	0.83	0.02	0.01	1.67
Yellow Perch (A)	NCL	C	M		1	1.00	0.07	0.15	0.11	150.00
Yellow Perch (Y)	NCL	C	M		4	4.00	0.28	0.03	0.02	8.00
Mile Total					1,452	1,452.00		134.04		
Number of Species					13					
Number of Hybrids					0					

River Code: **60-100**	Stream: **Sabattus River (ust. mouth)**	Sample Date: **2003**
River Mile: **0.20**	Location:	Date Range: 07/30/2003
Time Fished: 2807 sec	Drainage:	
Dist Fished: 0.50 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	132	264.00	12.97	0.75	1.17	2.84
Chain Pickerel (A)	NW	TC	M	P	1	2.00	0.10	0.48	0.75	240.00
Chain Pickerel (B)	NW	TC	M	P	10	20.00	0.98	0.46	0.72	23.11
Northern Pike (A)	IA	TC	M	I	4	8.00	0.39	23.64	37.02	2,955.00
White Sucker (B)	NCL	GF	S	T	2	4.00	0.20	1.57	2.46	392.50
Golden Shiner (Y)	NW	GF	M	T	7	14.00	0.69	0.12	0.18	8.29
Common Shiner (C)	NCL	GF	S	P	1	2.00	0.10	0.00	0.01	2.00
Spottail Shiner (A)	IA	WC	M	P	746	1,492.00	73.28	13.80	21.62	9.25
Brown Bullhead (B)	NW	GF	C	T	2	4.00	0.20	0.15	0.24	38.00
American Eel (A)	NCT	TC	M	T	1	2.00	0.10	2.00	3.13	1,000.00
American Eel (B)	NCT	TC	M	T	1	2.00	0.10	0.40	0.63	200.00
Smallmouth Bass (A)	IA	TC	C	M	15	30.00	1.47	13.44	21.05	448.13
Smallmouth Bass (B)	IA	TC	C	M	9	18.00	0.88	1.02	1.60	56.89
Smallmouth Bass (Y)	IA	TC	C	M	2	4.00	0.20	0.01	0.01	2.00
Largemouth Bass (B)	IA	TC	C	P	4	8.00	0.39	0.21	0.33	26.50
Largemouth Bass (Y)	IA	TC	C	P	20	40.00	1.96	0.12	0.19	3.10
Redbreast Sunfish (A)	NW	GF	C	M	17	34.00	1.67	1.09	1.71	32.12
Yellow Perch (A)	NCL	C	M		44	88.00	4.32	4.57	7.16	51.95
	Mile Total				1,018	2,036.00		63.85		
	Number of Species				13					
	Number of Hybrids				0					

River Code: **50-100**	Stream: **Sebasticook River (Upper Douglas Pond)**	Sample Date: **2003**
River Mile: **36.60**	Location:	Date Range: 10/14/2003
Time Fished: 2942 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Chain Pickerel (A)	NW	TC	M	P	2	2.00	1.90	0.68	5.35	337.50
Brown Bullhead (A)	NW	GF	C	T	3	3.00	2.86	0.55	4.36	183.33
Smallmouth Bass (Y)	IA	TC	C	M	1	1.00	0.95	0.01	0.04	5.00
Largemouth Bass (A)	IA	TC	C	P	11	11.00	10.48	10.09	79.98	916.82
Largemouth Bass (B)	IA	TC	C	P	2	2.00	1.90	0.12	0.91	57.50
Largemouth Bass (Y)	IA	TC	C	P	38	38.00	36.19	0.15	1.22	4.05
Pumpkinseed Sunfish (C)	NW	GF	C	P	1	1.00	0.95	0.02	0.12	15.00
Redbreast Sunfish (A)	NW	GF	C	M	2	2.00	1.90	0.15	1.19	75.00
Redbreast Sunfish (Y)	NW	GF	C	M	1	1.00	0.95	0.00	0.02	3.00
Yellow Perch (A)	NCL	C	M		12	12.00	11.43	0.58	4.56	47.92
Yellow Perch (B)	NCL	C	M		8	8.00	7.62	0.20	1.59	25.00
Yellow Perch (Y)	NCL	C	M		24	24.00	22.86	0.08	0.66	3.46
Mile Total					105	105.00		12.61		
Number of Species					7					
Number of Hybrids					0					

River Code: **50-100**	Stream: **Sebasticook River (Lower Douglas Pond)**	Sample Date: **2003**
River Mile: **33.80**	Location:	Date Range: 10/14/2003
Time Fished: 2296 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Chain Pickerel (A)	NW	TC	M	P	5	5.00	3.82	1.00	6.73	200.00
Chain Pickerel (Y)	NW	TC	M	P	4	4.00	3.05	0.02	0.12	4.50
White Sucker (A)	NCL	GF	S	T	1	1.00	0.76	1.08	7.24	1,075.00
Brown Bullhead (A)	NW	GF	C	T	18	18.00	13.74	4.85	32.64	269.23
American Eel (A)	NCT	TC	M	T	1	1.00	0.76	0.65	4.38	650.00
American Eel (B)	NCT	TC	M	T	1	1.00	0.76	0.30	2.02	300.00
Largemouth Bass (A)	IA	TC	C	P	5	5.00	3.82	2.95	19.87	590.00
Largemouth Bass (B)	IA	TC	C	P	1	1.00	0.76	0.05	0.34	50.00
Largemouth Bass (Y)	IA	TC	C	P	54	54.00	41.22	0.24	1.58	4.35
Pumpkinseed Sunfish (A)	NW	GF	C	P	13	13.00	9.92	1.30	8.75	100.00
Yellow Perch (A)	NCL	C	M		28	28.00	21.37	2.43	16.33	86.61
Mile Total					131	131.00		14.85		
Number of Species					7					
Number of Hybrids					0					

River Code: **50-100**	Stream: **Sebasticook River (dst. Pittsfield)**	Sample Date: **2003**
River Mile: **29.40**	Location:	Date Range: 09/30/2003
Time Fished: 3615 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Chain Pickerel (A)	NW	TC	M	P	7	7.00	2.30	2.00	14.58	285.71
Chain Pickerel (Y)	NW	TC	M	P	11	11.00	3.62	0.10	0.73	9.09
White Sucker (A)	NCL	GF	S	T	1	1.00	0.33	1.15	8.38	1,150.00
White Sucker (B)	NCL	GF	S	T	7	7.00	2.30	1.50	10.93	214.29
White Sucker (Y)	NCL	GF	S	T	6	6.00	1.97	0.03	0.22	5.00
Golden Shiner (Y)	NW	GF	M	T	19	19.00	6.25	0.04	0.29	2.11
Common Shiner (C)	NCL	GF	S	P	9	9.00	2.96	0.01	0.07	1.11
Fallfish (A)	NCL	GF		P	2	2.00	0.66	0.14	0.98	67.50
Fallfish (Y)	NCL	GF		P	19	19.00	6.25	0.02	0.15	1.05
Brown Bullhead (A)	NW	GF	C	T	3	3.00	0.99	0.42	3.06	140.00
Smallmouth Bass (A)	IA	TC	C	M	4	4.00	1.32	0.55	4.01	137.50
Smallmouth Bass (B)	IA	TC	C	M	1	1.00	0.33	0.06	0.44	60.00
Smallmouth Bass (Y)	IA	TC	C	M	2	2.00	0.66	0.00	0.03	2.00
Largemouth Bass (A)	IA	TC	C	P	1	1.00	0.33	1.10	8.02	1,100.00
Largemouth Bass (B)	IA	TC	C	P	1	1.00	0.33	0.03	0.22	30.00
Largemouth Bass (Y)	IA	TC	C	P	106	106.00	34.87	0.48	3.46	4.48
Pumpkinseed Sunfish (C)	NW	GF	C	P	6	6.00	1.97	0.33	2.37	54.17
Redbreast Sunfish (A)	NW	GF	C	M	8	8.00	2.63	0.25	1.82	31.25
Redbreast Sunfish (C)	NW	GF	C	M	22	22.00	7.24	0.73	5.34	33.33
Yellow Perch (A)	NCL	C	M		66	66.00	21.71	4.78	34.80	72.35
Yellow Perch (Y)	NCL	C	M		3	3.00	0.99	0.02	0.11	5.00
Mile Total					304	304.00		13.72		
Number of Species					11					
Number of Hybrids					0					

River Code: **50-100**	Stream: **Sebasticook River (ust. Burnham)**	Sample Date: **2003**
River Mile: **27.00**	Location:	Date Range: 09/30/2003
Time Fished:	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	1	1.00	0.42	0.01	0.06	10.00
Chain Pickerel (A)	NW	TC	M	P	13	13.00	5.44	3.25	17.92	250.00
Chain Pickerel (Y)	NW	TC	M	P	12	12.00	5.02	0.09	0.50	7.50
White Sucker (A)	NCL	GF	S	T	5	5.00	2.09	3.45	19.02	690.00
Golden Shiner (B)	NW	GF	M	T	11	11.00	4.60	0.28	1.57	25.82
American Eel (A)	NCT	TC	M	T	5	5.00	2.09	2.50	13.78	500.00
Black Crappie (B)	IA	TC	C	P	3	3.00	1.26	0.05	0.28	16.67
Black Crappie (Y)	IA	TC	C	P	1	1.00	0.42	0.01	0.04	8.00
Smallmouth Bass (A)	IA	TC	C	M	1	1.00	0.42	0.20	1.10	200.00
Smallmouth Bass (B)	IA	TC	C	M	1	1.00	0.42	0.03	0.14	25.00
Largemouth Bass (Y)	IA	TC	C	P	21	21.00	8.79	0.08	0.41	3.57
Pumpkinseed Sunfish (A)	NW	GF	C	P	22	22.00	9.21	0.86	4.74	39.09
Redbreast Sunfish (A)	NW	GF	C	M	9	9.00	3.77	0.45	2.48	50.00
Redbreast Sunfish (C)	NW	GF	C	M	2	2.00	0.84	0.03	0.17	15.00
Yellow Perch (A)	NCL	C	M		114	114.00	47.70	6.76	37.26	59.29
Yellow Perch (Y)	NCL	C	M		18	18.00	7.53	0.10	0.55	5.56
Mile Total					239	239.00		18.14		
Number of Species					11					
Number of Hybrids					0					

River Code: **50-100**	Stream: **Sebasticook River (dst. Burnham)**	Sample Date: **2003**
River Mile: **22.40**	Location:	Date Range: 09/19/2003
Time Fished: 1725 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	7	7.00	2.36	0.05	0.20	7.14
Chain Pickerel (A)	NW	TC	M	P	15	15.00	5.05	1.05	4.12	70.00
White Sucker (A)	NCL	GF	S	T	20	20.00	6.73	17.00	66.72	850.00
Golden Shiner (A)	NW	GF	M	T	2	2.00	0.67	0.10	0.39	50.00
White Perch (A)	NA	TC	M	P	5	5.00	1.68	1.30	5.10	260.00
Black Crappie (Y)	IA	TC	C	P	1	1.00	0.34	0.01	0.02	5.00
Smallmouth Bass (B)	IA	TC	C	M	2	2.00	0.67	0.18	0.71	90.00
Smallmouth Bass (Y)	IA	TC	C	M	1	1.00	0.34	0.01	0.02	5.00
Largemouth Bass (B)	IA	TC	C	P	12	12.00	4.04	0.30	1.18	25.00
Largemouth Bass (Y)	IA	TC	C	P	32	32.00	10.77	0.20	0.78	6.25
Pumpkinseed Sunfish (A)	NW	GF	C	P	41	41.00	13.80	0.83	3.24	20.12
Redbreast Sunfish (A)	NW	GF	C	M	92	92.00	30.98	3.12	12.24	33.91
Yellow Perch (A)	NCL	C	M		67	67.00	22.56	1.35	5.28	20.08
	Mile Total				297	297.00		25.48		
	Number of Species				11					
	Number of Hybrids				0					

River Code: **50-100**	Stream: **Sebasticook River (dst. Clinton)**	Sample Date: **2003**
River Mile: **6.30**	Location:	Date Range: 09/18/2003
Time Fished: 3168 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	10	10.00	0.73	0.02	0.06	2.00
Chain Pickerel (A)	NW	TC	M	P	14	14.00	1.03	1.48	4.59	105.71
Chain Pickerel (B)	NW	TC	M	P	1	1.00	0.07	0.02	0.06	20.00
White Sucker (A)	NCL	GF	S	T	5	5.00	0.37	3.77	11.69	754.00
Golden Shiner (A)	NW	GF	M	T	1	1.00	0.07	0.08	0.25	80.00
Golden Shiner (Y)	NW	GF	M	T	103	103.00	7.55	0.12	0.36	1.13
Common Shiner (Y)	NCL	GF	S	P	290	290.00	21.25	0.21	0.66	0.74
Fallfish (Y)	NCL	GF		P	135	135.00	9.89	0.19	0.60	1.43
American Eel (A)	NCT	TC	M	T	1	1.00	0.07	0.65	2.02	650.00
American Eel (B)	NCT	TC	M	T	1	1.00	0.07	0.09	0.26	85.00
Smallmouth Bass (A)	IA	TC	C	M	4	4.00	0.29	0.89	2.76	222.50
Smallmouth Bass (B)	IA	TC	C	M	3	3.00	0.22	0.32	0.99	106.67
Smallmouth Bass (Y)	IA	TC	C	M	54	54.00	3.96	0.41	1.27	7.55
Largemouth Bass (B)	IA	TC	C	P	8	8.00	0.59	0.20	0.62	25.00
Largemouth Bass (Y)	IA	TC	C	P	35	35.00	2.56	0.43	1.34	12.35
Pumpkinseed Sunfish (A)	NW	GF	C	P	16	16.00	1.17	0.63	1.95	39.38
Redbreast Sunfish (A)	NW	GF	C	M	665	665.00	48.72	22.42	69.54	33.72
Redbreast Sunfish (Y)	NW	GF	C	M	15	15.00	1.10	0.02	0.05	1.00
Yellow Perch (A)	NCL	C	M		1	1.00	0.07	0.28	0.87	280.00
Yellow Perch (Y)	NCL	C	M		3	3.00	0.22	0.02	0.06	6.67
Mile Total					1,365	1,365.00		32.24		
Number of Species					12					
Number of Hybrids					0					

River Code: **50-100**	Stream: **Sebasticook R. (upper Benton Falls Imp.)**	Sample Date: **2003**
River Mile: **5.20**	Location:	Date Range: 09/17/2003
Time Fished: 2301 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	7	7.00	1.86	0.07	0.23	10.00
Chain Pickerel (B)	NW	TC	M	P	6	6.00	1.59	0.22	0.72	36.67
White Sucker (A)	NCL	GF	S	T	11	11.00	2.92	9.30	30.55	845.45
Golden Shiner (B)	NW	GF	M	T	1	1.00	0.27	0.03	0.10	30.00
Fallfish (A)	NCL	GF		P	3	3.00	0.80	0.14	0.46	46.67
American Eel (B)	NCT	TC	M	T	9	9.00	2.39	1.24	4.07	137.50
White Perch (A)	NA	TC	M	P	24	24.00	6.37	3.83	12.58	159.58
Black Crappie (A)	IA	TC	C	P	1	1.00	0.27	0.11	0.36	110.00
Smallmouth Bass (A)	IA	TC	C	M	7	7.00	1.86	6.48	21.29	925.71
Smallmouth Bass (B)	IA	TC	C	M	2	2.00	0.53	0.22	0.72	110.00
Smallmouth Bass (Y)	IA	TC	C	M	31	31.00	8.22	0.24	0.79	7.74
Largemouth Bass (A)	IA	TC	C	P	2	2.00	0.53	1.64	5.39	820.00
Largemouth Bass (Y)	IA	TC	C	P	20	20.00	5.31	0.31	1.02	15.50
Pumpkinseed Sunfish (Y)	NW	GF	C	P	9	9.00	2.39	0.01	0.04	1.33
Redbreast Sunfish (A)	NW	GF	C	M	224	224.00	59.42	5.86	19.26	26.18
Redbreast Sunfish (Y)	NW	GF	C	M	13	13.00	3.45	0.02	0.06	1.31
Yellow Perch (A)	NCL	C	M		7	7.00	1.86	0.72	2.37	102.86
Mile Total					377	377.00		30.44		
Number of Species					13					
Number of Hybrids					0					

River Code: **50-100**	Stream: **Sebasticook River (Ust. Benton Falls Dam)**	Sample Date: **2003**
River Mile: **4.60**	Location:	Date Range: 09/18/2003
Time Fished: 3650 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	18	18.00	3.92	0.14	0.26	7.78
Chain Pickerel (A)	NW	TC	M	P	1	1.00	0.22	0.30	0.56	300.00
White Sucker (A)	NCL	GF	S	T	50	50.00	10.89	34.44	64.74	688.89
Golden Shiner (A)	NW	GF	M	T	1	1.00	0.22	0.07	0.13	70.00
Golden Shiner (B)	NW	GF	M	T	38	38.00	8.28	0.22	0.41	5.79
Fallfish (Y)	NCL	GF		P	2	2.00	0.44	0.01	0.01	2.50
Brown Bullhead (A)	NW	GF	C	T	1	1.00	0.22	0.44	0.83	440.00
American Eel (B)	NCT	TC	M	T	27	27.00	5.88	2.67	5.01	98.75
White Perch (A)	NA	TC	M	P	9	9.00	1.96	1.98	3.71	219.44
Black Crappie (A)	IA	TC	C	P	6	6.00	1.31	0.40	0.75	66.67
Black Crappie (Y)	IA	TC	C	P	1	1.00	0.22	0.01	0.01	5.00
Smallmouth Bass (A)	IA	TC	C	M	3	3.00	0.65	2.11	3.97	703.33
Smallmouth Bass (B)	IA	TC	C	M	1	1.00	0.22	0.12	0.23	120.00
Smallmouth Bass (Y)	IA	TC	C	M	18	18.00	3.92	0.20	0.38	11.11
Largemouth Bass (A)	IA	TC	C	P	2	2.00	0.44	1.20	2.26	600.00
Largemouth Bass (B)	IA	TC	C	P	3	3.00	0.65	0.12	0.23	40.00
Largemouth Bass (Y)	IA	TC	C	P	59	59.00	12.85	0.94	1.77	15.93
Pumpkinseed Sunfish (A)	NW	GF	C	P	6	6.00	1.31	0.35	0.66	58.33
Pumpkinseed Sunfish (C)	NW	GF	C	P	7	7.00	1.53	0.48	0.91	68.83
Redbreast Sunfish (A)	NW	GF	C	M	24	24.00	5.23	0.70	1.32	29.17
Redbreast Sunfish (C)	NW	GF	C	M	83	83.00	18.08	2.09	3.93	25.21
Redbreast Sunfish (Y)	NW	GF	C	M	13	13.00	2.83	0.02	0.03	1.15
Yellow Perch (A)	NCL	C	M		85	85.00	18.52	4.20	7.89	49.41
Yellow Perch (Y)	NCL	C	M		1	1.00	0.22	0.01	0.01	5.00
Mile Total					459	459.00		53.20		
Number of Species					14					
Number of Hybrids					0					

River Code: **50-100**	Stream: **Sebasticook R. (Ft. Halifax Impoundment)**	Sample Date: **2003**
River Mile: **1.10**	Location:	Date Range: 09/18/2003
Time Fished: 3168 sec	Drainage:	
Dist Fished: 1.00 km	Basin: No of Passes: 1	Sampler Type: A

Species Name / Stage / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Alewife (Y)	NA	PI	M	P	15	15.00	4.19	0.13	0.45	8.67
Chain Pickerel (A)	NW	TC	M	P	3	3.00	0.84	0.28	0.94	91.67
Chain Pickerel (B)	NW	TC	M	P	1	1.00	0.28	0.05	0.17	50.00
White Sucker (A)	NCL	GF	S	T	12	12.00	3.35	9.90	33.97	825.00
White Sucker (B)	NCL	GF	S	T	1	1.00	0.28	0.33	1.12	325.00
White Sucker (Y)	NCL	GF	S	T	1	1.00	0.28	0.01	0.03	10.00
Golden Shiner (B)	NW	GF	M	T	26	26.00	7.26	0.39	1.34	15.00
Golden Shiner (Y)	NW	GF	M	T	7	7.00	1.96	0.02	0.07	2.86
American Eel (B)	NCT	TC	M	T	8	8.00	2.23	1.73	5.92	215.63
White Perch (A)	NA	TC	M	P	8	8.00	2.23	1.80	6.18	225.00
Black Crappie (A)	IA	TC	C	P	1	1.00	0.28	0.13	0.43	125.00
Smallmouth Bass (A)	IA	TC	C	M	3	3.00	0.84	2.47	8.47	823.33
Smallmouth Bass (B)	IA	TC	C	M	2	2.00	0.56	2.30	7.89	1,150.00
Smallmouth Bass (Y)	IA	TC	C	M	2	2.00	0.56	0.01	0.03	5.00
Largemouth Bass (A)	IA	TC	C	P	3	3.00	0.84	2.28	7.81	758.33
Largemouth Bass (B)	IA	TC	C	P	14	14.00	3.91	0.55	1.89	39.29
Largemouth Bass (Y)	IA	TC	C	P	73	73.00	20.39	1.12	3.83	15.28
Pumpkinseed Sunfish (A)	NW	GF	C	P	24	24.00	6.70	1.67	5.73	69.58
Redbreast Sunfish (A)	NW	GF	C	M	18	18.00	5.03	0.56	1.92	31.11
Redbreast Sunfish (Y)	NW	GF	C	M	5	5.00	1.40	0.02	0.07	4.00
Yellow Perch (A)	NCL	C	M		118	118.00	32.96	3.35	11.49	28.39
Yellow Perch (Y)	NCL	C	M		13	13.00	3.63	0.08	0.26	5.77
	Mile Total				358	358.00		29.15		
	Number of Species				12					
	Number of Hybrids				0					