Northeast Region Fisheries Program
Strategic Plan
Fiscal Years 2009-2013

Supplement

Northeast Region, U.S. Fish and Wildlife Service
Department of the Interior

Draft
July 1, 2008

Value of Aquatic Resources

The Region's fish and other aquatic resources are among the richest and most diverse in the Nation. (XXXXX want rich and diverse info here – suggests healthy watershed paragraph on next page, but it doesn't quite work)These resources, and the recreational, commercial, and intrinsic values they provide, have produced enormous economic, ecological, and social benefits.

The Service's 2006 National Survey of Fishing, Hunting and Wildlife-Associated Recreation (USFWS 2007a) shows that recreational fishing contributes several billion dollars annually and tens of thousands of jobs to the nation's economy. Over 87 million U.S. residents 16 years old and older fished, hunted, or wildlife watched in 2006. During that year, 30.0 million people (approximately one out of every eight individuals) fished, 12.5 million hunted, and 71.1 million participated in at least one type of wildlife-watching activity including observing, feeding, or photographing wildlife; visiting public parks because of wildlife; and maintaining plantings and natural areas around the home for the benefit of wildlife.

Wildlife recreationists' enthusiasm was reflected in their spending which totaled over $120 billion in 2006. This amounted to 1% of the U.S. Gross Domestic Product. This spending supports hundreds of thousands of jobs in industries and businesses. Of the total amount spent, $37 billion was for trips, $64 billion for equipment, and $21 billion for other items such as land leasing and ownership.

Sportspersons (anglers and hunters) spent a total of $76 billion in 2006—$42 billion on fishing, $23 billion on hunting, and $11 billion on items used for both hunting and fishing. Wildlife watchers spent $45 billion on trips, equipment, and other items. (USFWS 2007a). In 2007, hunters, anglers and boaters paid an estimated 524 million in federal excise taxes. Federal excise taxes and state license revenues generated by hunters and anglers annually provide more than 80% of the funding for most state fish and wildlife agencies; among other benefits, this allows states to own and manage 15.4 million acres of habitat, contributing to increases in native fish populations (National Shooting Sports Foundation 2007).

Table II.1. describes participation rates for fishing, hunting and wildlife watching for New England (Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island), the Middle Atlantic (New York, New Jersey and Pennsylvania) and South Atlantic (West Virginia, Virginia, Maryland, Delaware, District of Columbia, and states south) compared with national rates. As shown in the table, New England and Middle Atlantic rates of participation in fishing are lower than the national average; South Atlantic rates are slightly higher than the national average. For hunting, New England, Middle Atlantic and South Atlantic participation rates are lower than or equal to the national average. For wildlife watching around the home and away from home, the Middle and South Atlantic participation rates are lower than the national average, but the New England participation rates exceed the national average.

	Fishing	Hunting	Watching Around the Home	Watching Away from Home
National	13	5	30	10
New England	11	3	38	12
Middle Atlantic	8	5	27	9
South Atlantic	14	4	28	7

Table II.1: Percentage of population age 16 and over participating in fishing, hunting, and wildlife associated recreation in the Northeast Region (based on information contained in USFWS 2007a). See text for definitions of geographic areas.

Fish and other aquatic resources are particularly important to States and Tribes, which rely upon diverse, sustainable natural resources to support commercial and recreational fishing, tourism, environmental health, subsistence, and other economic needs (XXXXsays important to all, not just states and tribes).

Healthy watersheds are the foundation of sustainable communities and economies. Among the many human benefits derived from healthy watersheds and functioning natural ecosystems are clean air and water, food, waste assimilation, medicinal compounds, outdoor recreation and spiritual renewal (Daily et al. 1997). Aquatic ecosystems provide enormous ecological benefits. For example, wetlands fulfill vital roles in the life history of most fish species in near-shore marine environments. In the Northeast, 41 percent of commercial marine fish species depend on estuarine habitats; for Chesapeake Bay this figure is 78 percent (Chambers 1992 cited by Loftus et al. 2000). Freshwater mussel communities play a significant role in aquatic ecosystems by improving water quality and as indicators of aquatic ecosystem health. Research has shown positive correlations between regular time spent in a natural environment and improved health status for both children and adults (Louv 2005; additional literature reviewed by Bunch 2007). A significant factor motivating participation in recreational fishing is the social and emotional benefits experienced (Responsive Management 2007). The economic value of such natural "goods and services" is significant and has been estimated to be twice the world's gross national product (Costanza et al. 1998). As described above, fish and wildlife resources alone provide tremendous economic benefits.

These economic, ecological and social realities highlight the importance of holistic, ecosystem-based approaches to restoring and sustaining critical land and water resources and the human communities that depend on them.

Status of Regional Aquatic Ecosystems, Fish and Mussel Populations, and Participation in Fishing

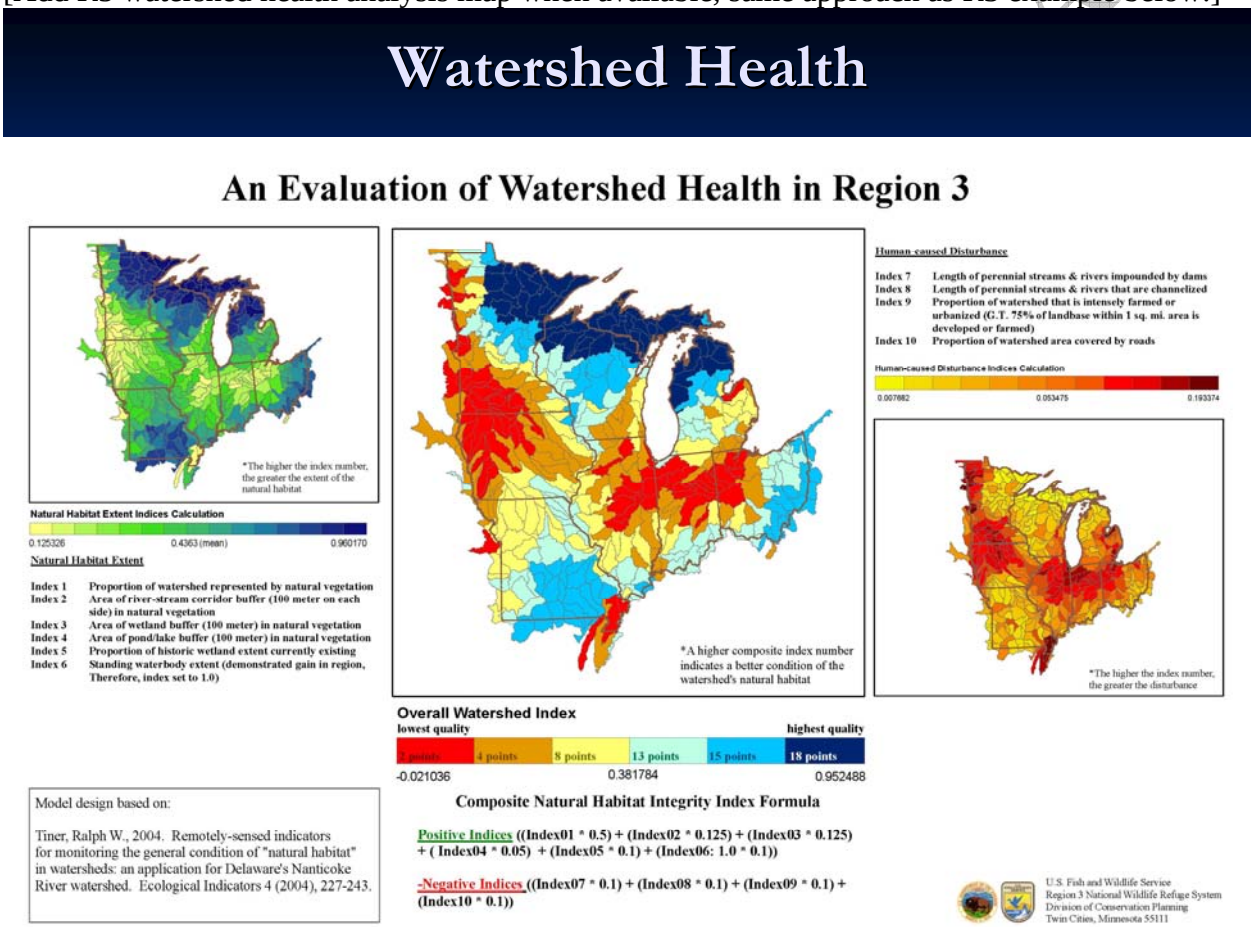
Status of Regional Aquatic Ecosystems

The Northeast Region encompasses a complex natural environment heavily influenced by human disturbance. While the 13 Northeast states comprise less than 7 percent of the U.S. landmass, almost 25 percent of the nation's population resides here. The historical pattern of development in the Northeast has resulted in significant fish and wildlife impacts, and serious threats remain.

Population growth and suburban sprawl in many areas will continue to put pressure on fish and wildlife populations. Global climate change will alter habitats and ecosystem dynamics, creating significant and unpredictable changes in distribution and abundance of aquatic species.

The Northeast Region has undergone significant ecosystem modification. Noss et al. (1995) identified 41 critically endangered, endangered or threatened ecosystems in the Northeast Region, second only to the South. These include elimination of 96% of virgin forests, significant losses of wetlands, loss of free-flowing rivers, eutrophication of lakes, acidification of surface waters, loss of estuarine submerged aquatic vegetation and other estuarine communities, and contamination of surface waters by toxic chemicals.

[Add R5 watershed health analysis map when available, same approach as R3 example below.]



Many of the over 10,000 dams in the Region, including hydroelectric projects, block fish from reaching historical rearing and spawning habitats and have significantly altered stream flow, temperature, and natural hydrologic conditions affecting a myriad of fish and invertebrates such as freshwater mussels. The highest density of dams nationally is found in the Northeast and Southeast U.S. (Graf 1999). Culverts also impede stream connectivity, with extensive negative impacts.

Dozens of species of non-native fish and mollusks have been introduced to Northeast waters. Some of these, such as zebra mussels, Asian and European clams, carps, eels and crabs can cause significant harm to native fish and other aquatic resources. Native resources are especially threatened by these invaders because of their rapid spread through connected waterways. Since the unintentional introduction of zebra mussels into the lower Great Lakes and their subsequent spread southward into major Northeast and mid-continental rivers the number of native mussel species has declined substantially. In the Northeast Region, the largest numbers of non-native aquatic species occur in western West Virginia and Virginia, the Potomac River basin, and the lower Connecticut River (Figure II.2.).

State Wildlife Action Plans have identified serious threats to aquatic species.
[Add regional threats from Karen Terwilliger SWAP synthesis when available.]

One of the most significant threats to Northeast Region aquatic species is global climate change. The Intergovernmental Panel on Climate Change (IPCC 2007) has concluded that "… Warming of the climate system is unequivocal." Specific impacts to the Northeast Region are likely to include further pressure placed on native freshwater fish communities as warmer conditions increase water temperatures, reduce winter snow and ice cover, and alter the timing, duration and volume of seasonal stream flow. Coldwater species likely to be affected include brook trout, lake trout, Atlantic salmon, and several types of whitefish. Studies in New England have already documented shifts in the timing of winter/spring and fall peak flows and associated measures such a last-frost dates, lake ice-out dates, and spring air temperatures (Northeast Climate Impacts Assessment 2007).

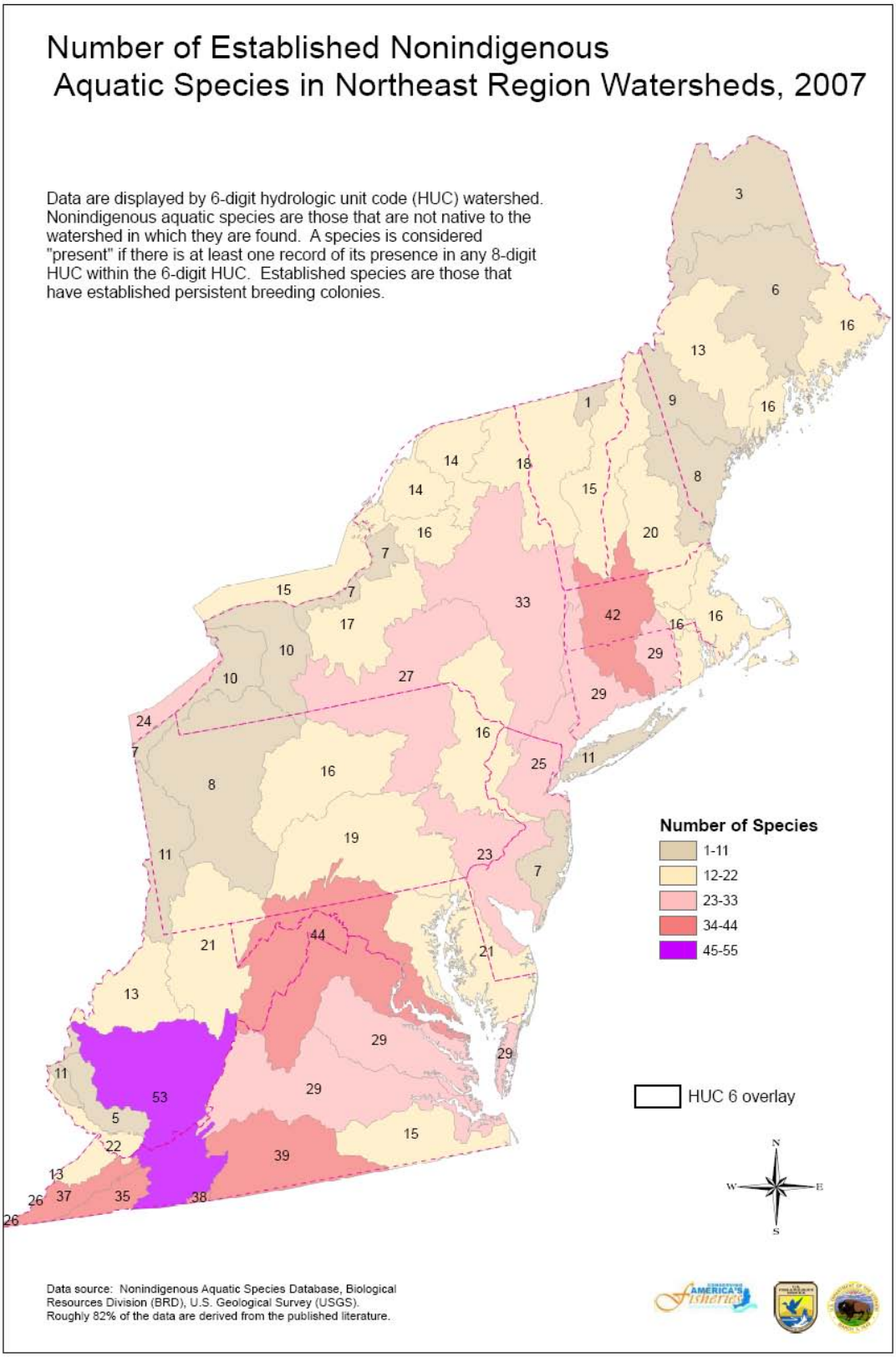


Figure II.2. Number of established nonindigenous aquatic species in Northeast Region watersheds, 2007 (Source: USGS)

Status of Regional Fish and Mussel Populations

Fish faunal intactness describes the extent to which freshwater fish communities have retained their historical composition. EPA (2007) reviewed data on the percent reduction in native fish species diversity in the contiguous United States between 1970 and 2003. Reductions in diversity at the watershed level may be due either to the overall extinction of a species, or, more commonly, to the extirpation of a species from certain watersheds. Species extirpations are most often due to pollution, habitat alteration, fisheries management, and invasive species. In the Northeast Region, reduction in native species diversity since 1970 was generally less than 9%, with the exception of the Great Lakes, which underwent greater reductions (over 50% for Lake Ontario).

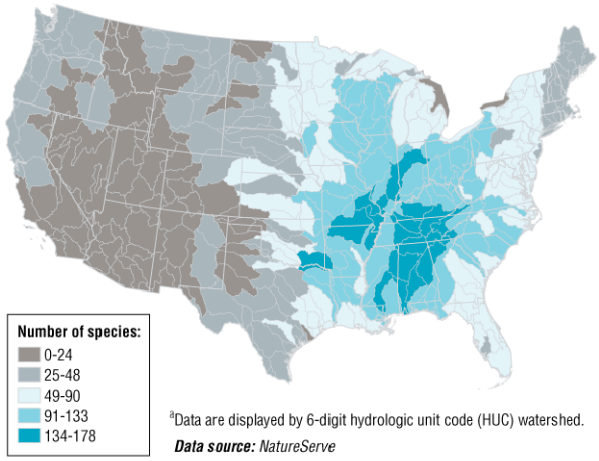


Figure II.3. Historical diversity of native fish species in the contiguous U.S., 1970 (EPA 2007)

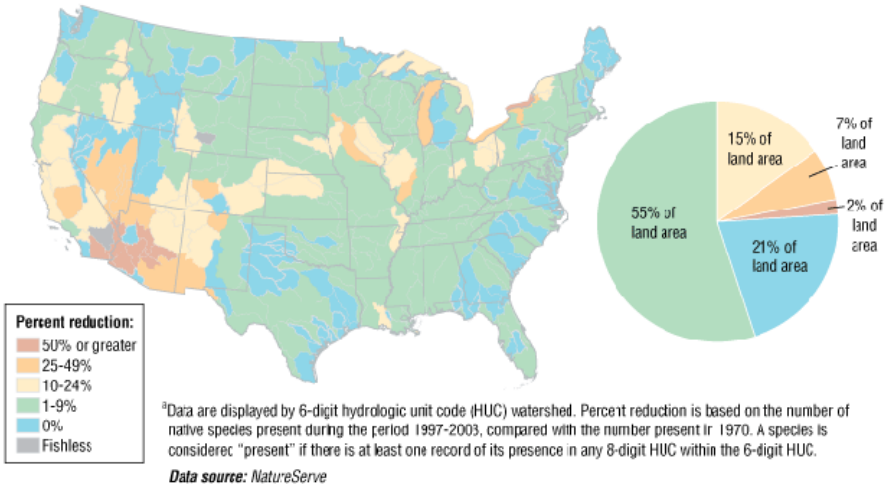
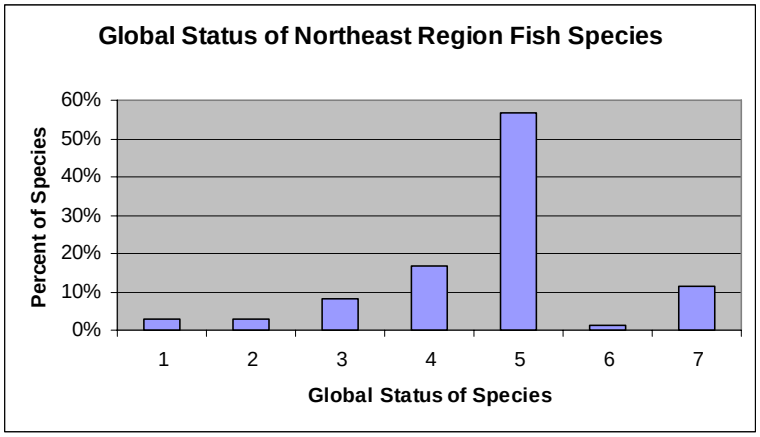


Figure II.4. Percent reduction in native fish species diversity in the contiguous U.S. from 1970 to 1977-2003 (EPA 2007)

Within the Northeast Region, approximately 74 percent of the total of 362 fish species are considered secure or apparently secure. Approximately 14 percent are considered critically imperiled, imperiled, or vulnerable (Figure II.5).



Status Categories
1=NatureServe G1 category (Critically Imperiled)
2=NatureServe G2 category (Imperiled)
3=NatureServe G3 category (Vulnerable)
4=NatureServe G4 category (Apparently Secure)
5=NatureServe G5 category (Secure)
6=NatureServe GH or GX category (Possibly Extinct or Presumed Extinct)
7=Unranked

Figure II.5 (analysis of NatureServe (2007) data).

Approximately 59 percent of the total of 142 Northeast Region mussel species are considered secure or apparently secure. Approximately 37 percent are considered critically imperiled, imperiled, or vulnerable (Figure Figure II.6).

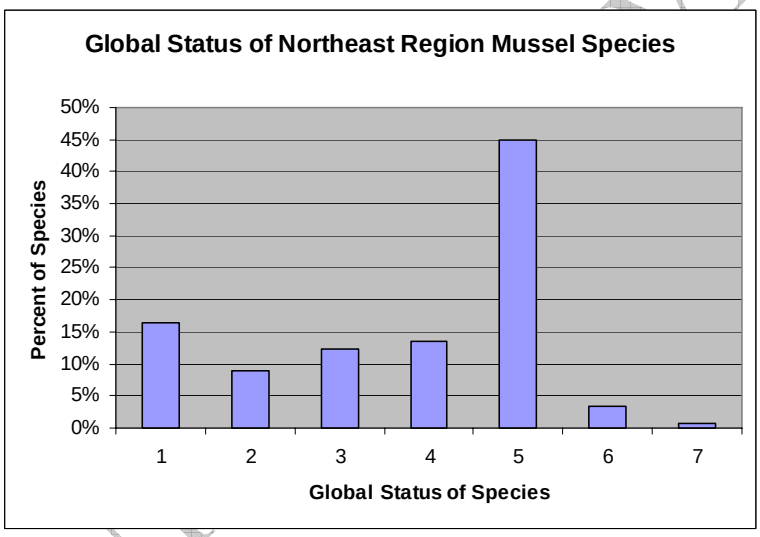


Figure II.6 (analysis of NatureServe (2007) data). Status categories the same as Figure II.5.

[Could do these analyses by state.]

Among the species managed by the Atlantic States Marine Fisheries Commission, Atlantic striped bass, Atlantic herring, Atlantic menhaden, northern shrimp, the Gulf of Maine population of winter flounder, the Gulf of Maine and Georges Bank populations of American lobster, and the mid-Atlantic population of Atlantic croaker are considered to be healthy. Spanish mackerel, bluefish, spiny dogfish, tautog and Atlantic sturgeon) are considered to be rebuilding. The Southern New England/Mid-Atlantic population of winter flounder, Southern New England

population of American lobster, summer flounder, weakfish, and American shad are considered to be depleted. The status of the South Atlantic population of Atlantic croaker, scup, black sea bass, red drum, spot, spotted seatrout, American eel, horseshoe crab, and river herring is unknown (ASMFC 2007).

Stock abundances of river herring (alewife and blueback herring) and American shad are well below historic levels of the early 20th century. Research on the biology, habitat requirements and stock status of American shad is in progress. NOAA recently listed river herring as Species of Concern, which should make research on these species a higher priority. The goal for both of these species is restoration to sustainable levels. Populations of American eel have declined, and in 2005 Atlantic Coast American eel stocks were the subject of a status review in response to a petition to list the species as threatened or endangered under the Endangered Species Act of 1973 (NOAA 2007). In 2007 the U.S. Fish and Wildlife Service concluded that protection of the eel under the ESA was not warranted. While the eel population has declined in some areas, the species' overall population is not in danger of extinction or likely to become so in the foreseeable future, the Service decided. (USFWS 2007b)

Horseshoe crabs play a vital ecological role in the migration of shorebirds along the entire Atlantic seaboard, as well as providing bait for commercial American eel and conch fisheries along the coast. Additionally, their blood is used by the biomedical industry. Little is known about the status of the horseshoe crab population. The challenge of fisheries managers is to ensure that horseshoe crabs are managed to meet all these diverse needs, while conserving the resource for its self-perpetuation (USFWS 2007c).

By 1950 the abundance of Atlantic salmon in New England rivers was severely depleted. A widespread collapse in Atlantic salmon abundance started around 1990. All stocks are at very low levels. The Gulf of Maine Distinct Population Segment of Atlantic salmon was listed as Endangered in 2000. Most Atlantic salmon populations are still dependent on hatchery production, and current marine survival regimes are compromising the long-term prospects of even these hatchery-supplemented populations (NOAA 2007).

Endangered Atlantic Salmon - The Gulf of Maine Distinct Population Segment (DPS) of Atlantic Salmon was listed as Endangered on December 17, 2000. At the time of listing, eight small rivers within the DPS (Dennys, Ducktrap, East Machias, Machias, Narraguagus, Pleasant, and Sheepscot rivers and Cove Brook) had extant populations. Estimated returns to rivers within the DPS from 1991 to 2002 are shown in Figure II.7. In 2006, seventy nine adult fish were estimated to return to the rivers within the DPS (U.S. Atlantic Salmon Assessment Committee 2007). Even with current conservation efforts, returns of adult Atlantic salmon to the Gulf of Maine DPS rivers remain extremely low. The 2006 status review (Fay et al. 2006) reports an estimated extinction risk of 19% to 75% within the next 100 years for the Gulf of Maine DPS even when current levels of hatchery supplementation are considered. Because of recent genetic information, the review concludes that the DPS should be expanded to include salmon in the Androscoggin, Kennebec, and Penobscot Rivers, as well as hatchery fish used in the recovery effort.

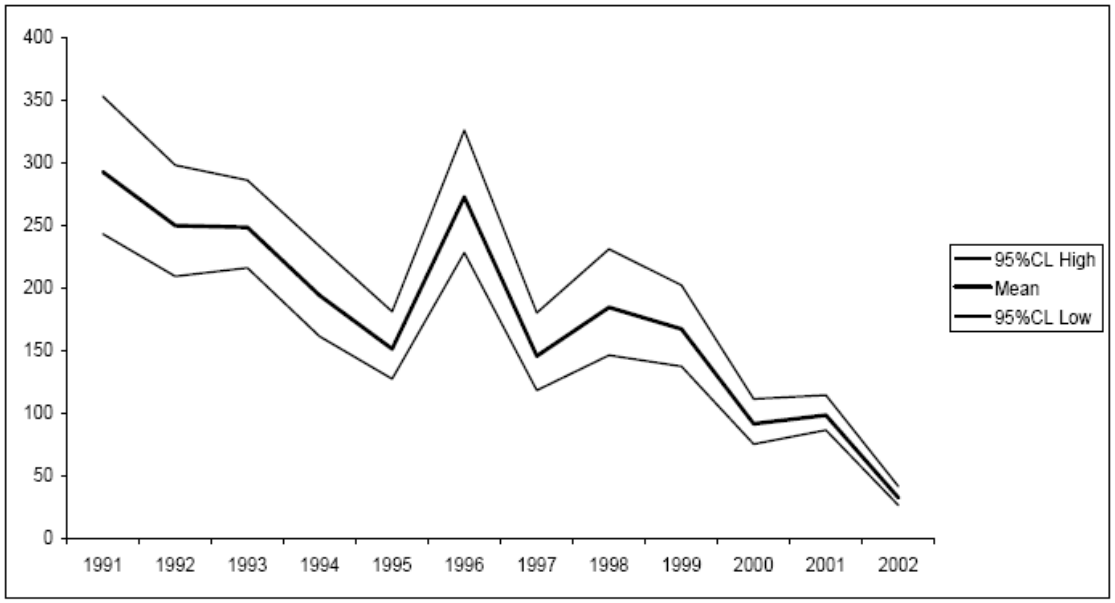


Figure II.7: Estimated Adult Atlantic Salmon Returns to Rivers within the Gulf of Maine Distinct Population Segment, 1921-2002. (Source: NMFS and USFWS 2005)

A growing number of aquatic species in the Northeast Region are declining at alarming rates. In the Northeast Region, 38 fish and mussel species are listed as endangered, threatened, or candidate by the Service. (Table II.1). The greatest concentration of listed species is in Southwest Virginia, where there are numerous endangered mussel species (Figure II.8).

Mussels, sentinels of ecological degradation - Mussels have been especially hard-hit by ecological degradation. With a total of 297 species, North America has the world's greatest diversity of freshwater mussels (G.M. Davis 1977). As filter feeders, mussels are exposed to toxins or other deleterious environmental conditions at a more acute level than many higher trophic level species. Minute levels of some toxins, or chronic environmental stresses such as siltation, low oxygen, or high ammonia levels can cause catastrophic losses in mussel communities long before they are noticed in higher fish populations. 75% of unionid mussels in the U.S. are classified as rare or extinct, in comparison to 11-15% of terrestrial vertebrates (Master 1990), resulting primarily from inundation of riffle habitat resulting from impoundment of major river systems (Bogan 1995).

Listed Fishes of the Northeast Region		
Scientific name	**Common Name**	**Status [1]**
Salmo salar	Atlantic salmon, Gulf of Maine Distinct Population Segment	**E**
Phoxinus cumberlandensis	Blackside Dace	**T**
Etheostoma percnurum	Duskytail Darter	**E**
Etheostoma sellare	Maryland Darter	**E**
Percina rex	Roanoke Logperch	**E**
Acipenser brevirostrum	Shortnose Sturgeon	**E**
Erimystax cahni	Slender Chub	**T**
Erimonax monachus	Spotfin Chub	**T**
Noturus flavipinnis	Yellowfin Madtom	**T**
Listed Mussels of the Northeast Region		
Scientific name	**Common Name**	**Status [1]**
Quadrula sparsa	Appalachian Monkeyface	**E**
Lemiox rimosus	Birdwing pearlymussel	**E**
Pleurobema clava	Clubshell	**E**
Hemistena lata	Cracking Pearlymussel	**E**
Villosa trabalis	Cumberland Bean	**E**
Epioblasma brevidens	Cumberland Combshell	**E**
Quadrula intermedia	Cumberland Monkeyface	**E**
Dromus dromus	Dromedary Pearlymussel	**E**
Alasmidonta heterodon	Dwarf Wedgemussel	**E**
Cyprogenia stegaria	Fanshell	**E**
Fusconaia cuneolus	Fine-rayed Pigtoe	**E**
Ptychobranchus subtentum	Fluted Kidneyshell	**C**
Epioblasma torulosa gubernaculu	Green Blossom Pearlymussel	**E**
Pleurobema collina	James Spinymussel	**E**
Pegias fabula	Little-winged Pearlymussel	**E**
Epioblasma torulosa rangiana	Northern Riffleshell	**E**
Plethobasus cooperianus	Orangefoot pimpleback	**E**
Epioblasma capsaeformis	Oyster Mussel	**E**
Lampsilis abrupta	Pink Mucket	**E**
Villosa perpurpurea	Purple Bean	**E**
Villosa fabalis	Rayed Bean	**E**
Obovaria retusa	Ring pink	**E**
Pleurobema plenum	Rough Pigtoe	**E**
Quadrula cylindrica strigillata	Rough Rabbits Foot	**E**
Plethobasus cyphyus	Sheepnose	**E**
Fusconaia cor	Shiny Pigtoe	**E**
Lexingtonia dolabelloides	Slabside Pearlymussel	**C**
Cumberlandia monodonta	Spectaclecase	**E**
Epioblasma florentina walkeri	Tan Riffleshell	**E**
1. Status Codes: E=Endangered; T=Threatened; C=Candidate		

Table II.1. Listed fishes and mussels of the Northeast Region

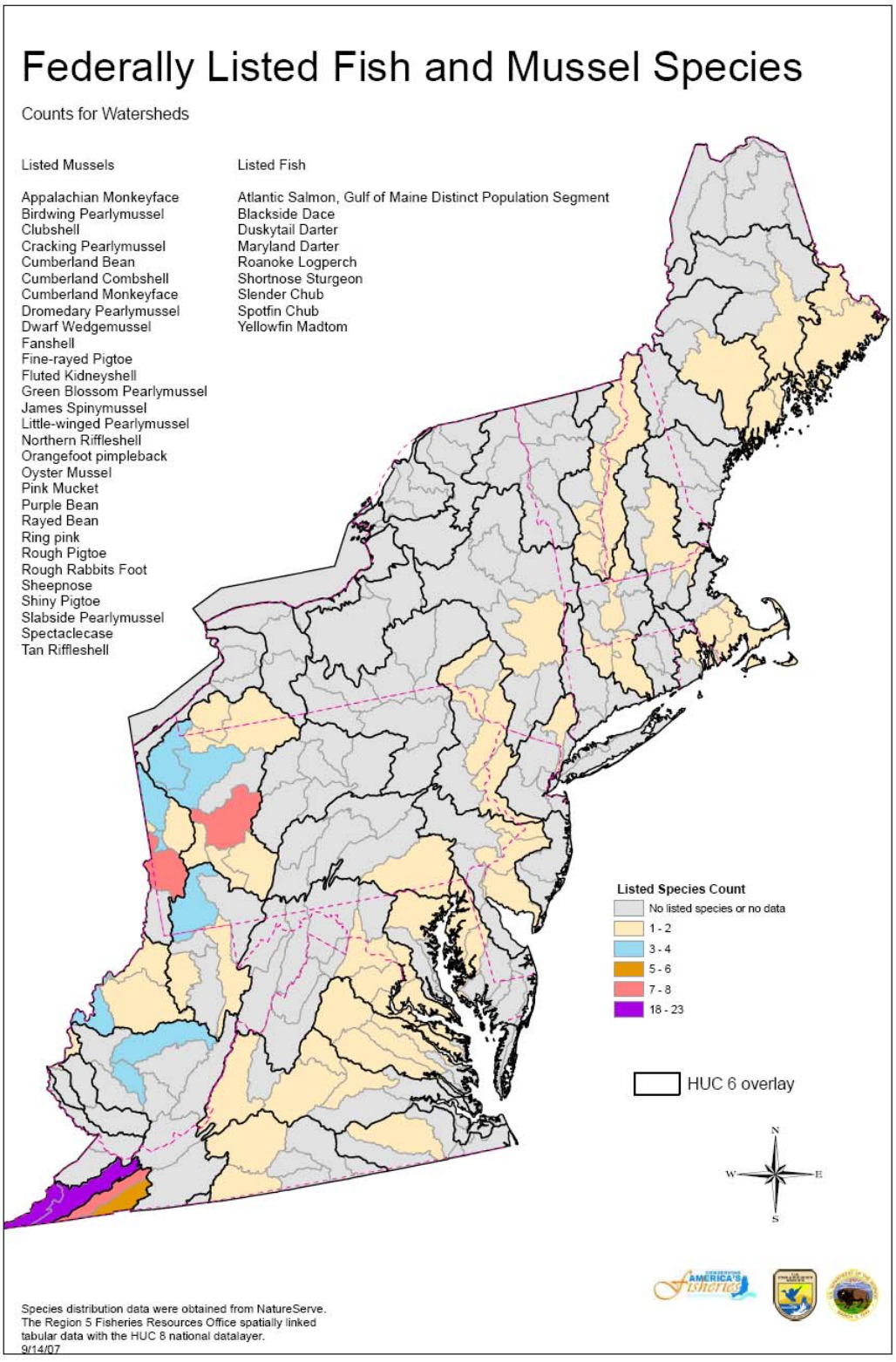


Figure II.8. Distribution of federally-listed fish and mussel species by 8-digit Hydrologic Unit Code.

Requiring clean, cold headwater streams, Eastern brook trout can be considered an indicator of the health of watersheds in the Northeast Region. Eastern brook trout are found throughout New England, and in the Appalachian portions of New York, Pennsylvania, Maryland, West Virginia and Virginia. In 2006, an assessment team compiled information on the status of and threats to Eastern brook trout (Hudy et al. 2006). The assessment team evaluated 5,563 subwatersheds where brook trout historically thrived to determine the current strength of brook trout populations. 5 percent of these watersheds support intact populations; 9 percent support reduced populations; 27 percent are greatly reduced; 19 percent are present but no quantitative data are available on populations; 21 percent are extirpated; 6 percent are absent with historical presence unclear; 13 percent are unknown. (Figure II.9)

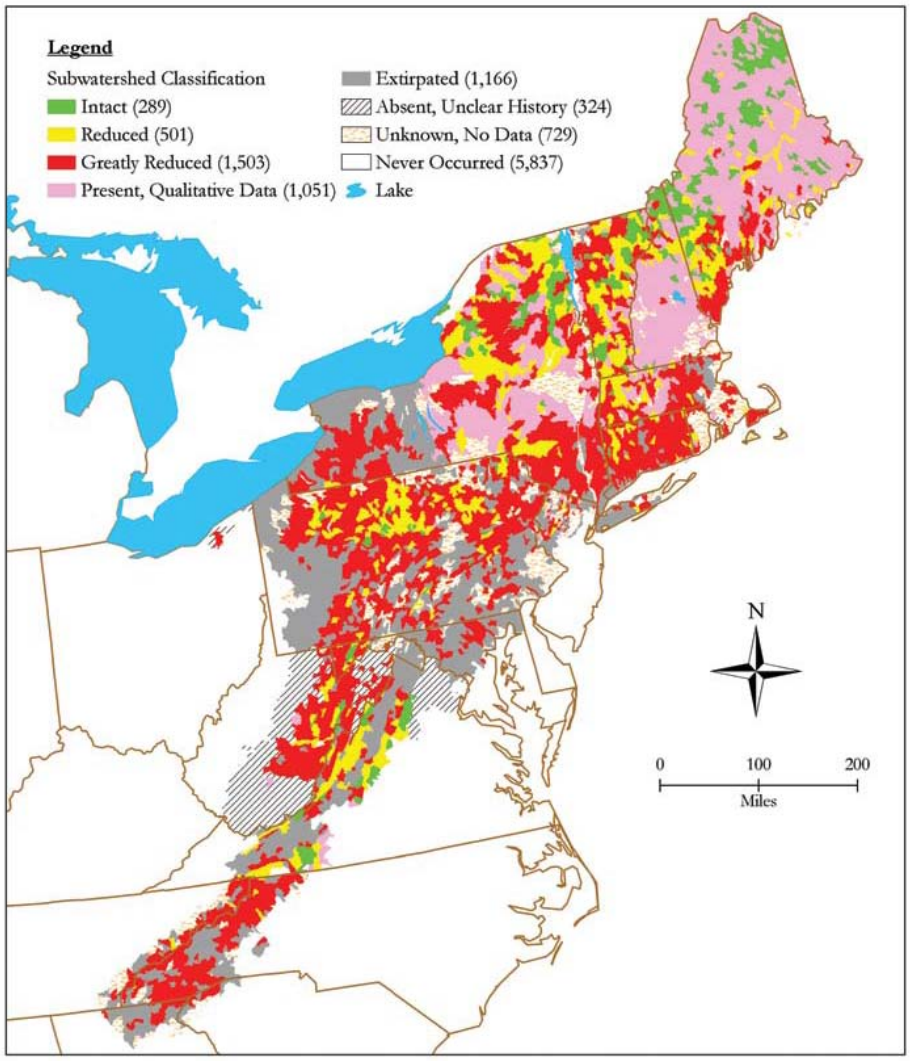


Figure II.9: Eastern Brook Trout Population Status in the Eastern U.S. Range by Subwatershed (Trout Unlimited 2006).

Regional experts identified poor land management associated with agriculture as the most widespread impact on brook trout habitat (37% of subwatersheds), largely by removing streamside trees and increasing sedimentation and nutrient runoff. Other threats, in order of the percent of subwatersheds in which they significantly affect brook trout populations, include high water temperature (36%), sedimentation from roads (27%), presence of one or more non-native fish species (26%), urbanization (25%), riparian habitat loss and degradation (23%), presence of brown trout (19%), stream fragmentation from roads (17%), inundation and loss of connectivity due to dams (16%), and poor land management associated with forestry (14%) (Trout Unlimited 2006).

Status of Regional Participation in Fishing

In 2006, six percent more people 16 years of age and older participated in wildlife-related recreation nationally than in 2001. The number of sportspersons (anglers and hunters) declined, but this decline was more than offset by an 8 percent increase in the number of wildlife watchers (USFWS 2007a). In the Northeast Region, the number of fishing licenses purchased has declined from about 4.6 million in 2001 to about 4.2 million in 2005 (Association of Fish and Wildlife Agencies and American Sportfishing Association 2007). The national decline in angling participation is due to demographic changes, changes in lifestyle, and lack of access due to urbanization and development (Southwick Associates 2007). The decline in angling is of concern because reduced license sales result in less financial support for state management agencies, many of which are funded solely by license sales. The decline in angling also is of concern because it may result in a declining constituency for healthy aquatic ecosystems.

This downward trend may be perpetuated as parents fail to engage children in fishing, hunting and other outdoor activities. For many cultural reasons, today's children are spending less time outdoors, as evidenced by increased rates of obesity and other health problems (Louv 2005). Research shows that an adult's affinity for nature and support for conservation is directly related to unstructured childhood experiences in nature. (Bunch 2007). This disconnection of people from nature has serious negative implications for natural resource stewardship and for public health.

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[missing citations will be added]

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