Habitat Hotline Atlantic

Issues of Concern for Atlantic Marine Fish Habitat

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Restoring Coastal Habitat

NOAA's Restoration Center Partnerships Along the Atlantic Coast

All along the Atlantic Coast, efforts are underway to restore coastal and marine resources from such damaging impacts as coastal development, nonnative species introductions, oil spills, pollution discharges, and ship groundings. Through the National Oceanic and Atmospheric Administration's (NOAA) Restoration Center, we are returning polluted or degraded environments as closely as possible to successful, self-sustaining ecosystems with both clean water and healthy habitats. These habitats support fish and wildlife, and human uses such as swimming, diving, boating, and recreational and commercial fishing. The goal of restoration is to expedite natural processes in rebuilding a healthy, functioning natural ecosystem that works like it did before it was polluted or destroyed. Restoration is still a relatively young science, and many habitat restorations "completed" over the last decade are still becoming established, evolving toward better functioning. Thus, it is important to note that restoration is not a substitute for habitat protection. To ensure healthy, functioning coastal ecosystems, first priority should be to avoid or minimize damaging impacts to natural habitats through protection and conservation efforts. If and when protection fails, then clean-up and restoration are the next priorities.

Restoration Center Programs

The NOAA Restoration Center and its many partners, including Restore America's Estuaries, National Fish and Wildlife Foundation, American Rivers, and FishAmerica Foundation, are committed to implementing quality restoration projects, advancing the science of habitat restoration, monitoring the success of efforts to ensure healthy and sustainable fishery resources, and empowering local groups to implement their own community-based restoration project. To accomplish this, the Restoration Center administers four major programs. Projects of the **Coastal Wetland Planning, Protection and Restoration Act** reduce coastal erosion and reverse wetlands losses in Louisiana, where tens of thousands of acres of wetlands are lost each year through subsistence, erosion, and marsh die-offs. The **Community-based Restoration Program (CRP)** takes a grass-roots approach and is designed to actively engage communities in meaningful on-the-ground restoration of local habitats. Under the **Damage Assessment and Restoration Program,** injured marine resources are restored after oil spills, toxic releases or ship groundings. Emerging restoration technology, science and cost-effective practices are advanced through the **Restoration Research Program**. In addition, the Restoration Center currently has several Congressionally-directed programs which serve as examples of **Regional Restoration Efforts.** They include the Connecticut River watershed, Mobile Bay, the coastal waterways of New Hampshire, Louisiana's vast marshes, and the lower Bronx River of New York.

This article concentrates on restoration work from CRP projects along the Atlantic coast. This program focuses on habitats vital to commercial and recreational fisheries (marine fish and shellfish); anadromous species (fish like salmon and striped bass that spawn in freshwater and then migrate to the sea); endangered and threatened marine species; and marine mammals and sea turtles. Habitat types include marshes, mangroves, seagrass beds, kelp forests, oyster reefs, coral reefs, riverine systems and other coastal and estuarine areas.

Community-based Restoration Program (CRP)

The CRP began in 1996 funding a few projects with year-end funds in response to requests for help from local groups and individuals interested in restoring habitats in their communities. It has grown into a systematic effort to catalyze partnerships to help citizens carry out meaningful restoration projects. The program provides seed money and NOAA technical expertise to grass-roots restoration projects, with an emphasis on collaborative strategies built around improving coastal resources. Examples of CRP

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projects that have been supported include renovation or installation of fishways; removal of fish blockages (dams); and restoration of coastal habitat, such as, riparian buffer habitat, saltmarshes, submerged aquatic vegetation, oyster reefs, kelp forests, coral reefs, and mangrove forests. Restoration projects involve all aspects of development including design, construction, and monitoring.

The core of the CRP is partnership. The CRP works to form partnerships at the national, regional, and local levels. Partners contribute cash and in-kind services, especially those that promote citizens' hands-on involvement and local stewardship and monitoring to sustain and evaluate the success of the restoration over time. Examples of in-kind services donated include materials and earthmoving equipment, land, workforce support, and technical assistance for restoration site selection, design, and evaluation. Partnerships occur in all projects and bring together groups such as: community organizations, state and local governments, Tribal Nations, recreational and commercial fishing organizations, students and educational institutions, private landowners, businesses, and nonprofit groups. Currently there are 17 active partners including American Rivers, American Sportfishing Association's FishAmerica Foundation, Connecticut River Watershed Council, Ducks Unlimited, Gulf of Maine Council on the Marine Environment, National Fish and Wildlife Foundation (NFWF), Ocean Trust/National Fisheries Institute, Restore America's Estuaries (RAE), The Nature Conservancy, and Trout Unlimited. Partners work with the Restoration Center usually under 3-year cooperative agreements.

Since it began, the Restoration Center has supported over 650 projects in 27 states. Typically individual projects receive between $5,000- $75,000. Although projects may be small individually, they are beginning to have a significant cumulative impact on coastal and estuarine habitats across the country. CRP funding has steadily increased from $250,000 in 1996 to $10 million in 2002. Partners bring in additional funding from a variety of public and private sources. At the national level, a partner may match the amount of funds provided by the NOAA Restoration Center with its own funds. Partner funds are typically leveraged again with support from other organizations at the local level, resulting in three to five times the Federal dollars invested. Based on past experience, for example, NOAA's $10 million investment in CRP projects in 2002 will be leveraged several times with matching funds and in kind services from other partners, bringing the estimated value of funded projects close to $40 million. Examples of some CRP projects along the Atlantic coast are highlighted below.

Connecticut River Water Chestnut Control

The lower Connecticut River is 36 miles in length and extends from the towns of Cromwell and Portland south to Long Island Sound. It is designated as a "Wetland of International Importance" and an American Natural Heritage River. This area contains one of the least developed and least disturbed large-river tidal marsh systems in the Northeast. The river supports one of the largest and most stable populations of American Shad in the United States and a population of blueback herring that is estimated to be the largest in the world. One of the most significant and essential finfish habitats on the lower Connecticut River is the series of coves with populations of freshwater and brackish water submerged aquatic vegetation. Native submerged aquatic vegetation is critical habitat for juvenile fish, which use it as protection from predators and a place to forage. All of these coves and tributaries of the Connecticut River were in danger of being infested with water chestnut (*Trapa natans*), an aquatic nonnative annual plant that overwinters entirely by seed. In 1999, a 7-acre population was discovered in the Hockanum River, a tributary to the Connecticut River, and a smaller population was found in Keeney Cove, a tidal freshwater inlet off the Connecticut River. Plans to install fish passage for alewife at a dam on the Hockanum River were put on hold until the cooperative effort addressed the nonnative species.

In August 2000, the NOAA Restoration Center and the Connecticut Department of Environmental Protection (DEP) formed a partnership to restore aquatic habitat at the Hockanum River through the removal of the invasive water chestnut. The DEP facilitated access to the Hockanum River through construction of gravel roads. A contractor harvested water chestnut plants using an aquatic weed harvester (see Figure 1). Volunteers pulled plants by hand or by rake from around the edges of the river where water depths were too shallow for the harvester to operate. Other volunteers searched downstream from the harvesting operation to locate and remove any cut plants that escaped after harvesting. The town of East Hartford waived their landfill tipping fees and accepted the plant material at the their compost facility. The Nature Conservancy of Connecticut coordinated its staff and work with DEP to plan and implement the project.

Seven acres of water chestnut were successfully removed in June-August, 2000, from the Hockanum River. Activities included five days of mechanical harvesting using an aquatic weed harvester and eleven days of hand-pulling by numerous staff and volunteers from different project partner organizations. The smaller population of water chestnuts discovered in Connecticut's Keeney Cove was removed by hand-pulling. Removal of the water chestnut was essential to protect downstream critical fish habitat and to restore anadromous fish to the Hockanum River. Monitoring of these sites will be ongoing for as long as 7–10 years because seeds can lie dormant for many years before sprouting.

Other key project partners included The Nature Conservancy, U.S. Fish and Wildlife Service, Connecticut River Watershed Council, Town of East Hartford, Hockanum River Watershed Association, and United Technologies Corporation.

Indian River Lagoon Restoration, Florida

The Indian River Lagoon (IRL) is a 156-mile long barbuilt estuary located on the east coast of central Florida. For decades, urbanization has increased the rate of shoreline and wetland degradation in the IRL. The IRL is an estuary of national significance due to its great species diversity. However, it contains the highest number of fish species facing possible

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extinction of any water body in the United States. Over seven species of fish face possible extinction; loss of habitat is believed to be a critical factor in the extinction of species.

An estimated 75% of game fish and 90% of commercial species in Florida depend on the mangrove ecosystem for essential habitat during a portion of their life cycle, including mangrove snapper, snook, speckled sea trout, tarpon, and red drum. Mangrove roots also trap sediment and filter pollution, thus preventing erosion and improving water quality. Over 80% of the mangrove coverage along the IRL's shoreline has been either removed or impounded. Invasive species such as Brazilian pepper are displacing mangrove and destroying valuable habitat.

In an effort to restore mangrove, salt marsh, and upland habitat along the IRL shoreline, the Marine Resources Council (MRC) of East Florida has organized "Pepper Busters," a coalition of volunteer groups working to remove Brazilian pepper and replant native shoreline vegetation. By combining local volunteer efforts with scientific oversight, the MRC eradicated Brazilian pepper trees and other invasive species along 36,050 ft. of shoreline (146 acres). Several hundred volunteers participated in 198 Pepper busting or native planting events, contributing close to 4,000 hours to this project. The primary method for the removal of invasive Brazilian pepper trees is the cut stump method, where trees are cut as close to the ground as possible and immediately, the stump is painted with a herbicide called Rodeo that is designed for shoreline and aquatic use. Trained MRC staff handle and apply the herbicide, while volunteers clear away the cut trunks, branches, and leaves. Then, mangroves were planted using the Burlap Aggregate Method. The MRC produced **A Field Manual for Invasive Plant Removal and Mangrove Restoration - Getting the Community Involved** describing removal methods for Brazilian pepper plants and planting methods for mangroves.

Figure 1. Mechanical aquatic weed harvester used in deep water areas of the Hockanum River, CT to help eliminate water chestnut, an invasive, non-native plant. Courtesy of the Connecticut Department of Environmental Protection's Office of Long Island Sound Programs.

This IRL restoration effort was part of an ongoing project with support from the Florida Dept. of Environmental Protection, the U.S. Fish and Wildlife Service, Florida Power and Light, and the Indian River Lagoon Program. These project partners provided funding for purchasing herbicides and equipment, including shovels and chain saws. The MRC provided volunteers and mangroves for planting.

ACE Basin Shellfish Restoration, Bennett's Point, SC

Dramatic changes in estuarine shellfish populations have occurred throughout the east coast of the United States due to disease, loss of habitat, overharvesting, modification of natural salinity regimes, physical perturbations, and increased nonpoint source runoff. Oysters are generally acknowledged as keystone species playing an important role in converting organic material to edible protein. An adult oyster can filter as much as 50 gallons of water a day, ingesting phytoplankton and detritus, which enhances the health of the ecosystem. The demise of oysters is often linked to water quality, food-chain problems, and a lack of aquatic reef habitat. These reefs provide essential habitat for shellfish as well as many finfish but are often lost to harvest pressure, siltation, oyster diseases, and pollution.

South Carolina's first oyster shell recycling repository was established at Bennett's Point in a partnership between the South Carolina Department of Natural Resources and the NOAA Restoration Center's CRP. In a grass-roots partnership with the ACE Basin National Estuarine Research Reserve (NERR), local commercial fisherman were contracted to restore shellfish growing areas and work with other community volunteers to conduct monitoring activities within the basin. In 1999, using several types of natural culch material such as recycled shell, Gulf Coast Shell and whelk, seed oysters and clams were planted along Two Sisters Creek in the ACE Basin NERR to enhance shellfish habitat,

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recruit oyster spat, and afford protection for propagation of hard clams. Five different cultivation techniques were used to demonstrate the efficacy of each while serving as an educational demonstration project for habitat restoration. The new grounds were closed to shellfish harvesting beginning in September 1999 for three years to allow for maturation and propagation of juvenile oysters and clams with the intent that the project area would be reopened for recreational harvesting upon favorable conditions. The area was reopened for clamming in January 2003, but is still closed for oyster harvest. The results from the experimental cultivation techniques are currently being applied in other management plantings in the state, where whelk shell was determined to be the best culch material.

Town Brook Herring Run Restoration, Plymouth , MA

Anadromous fish such as blueback herring and alewife play an important role in the sport and commercial fisheries of Massachusetts and the Town of Plymouth. In order to reach prime spawning grounds, river herring must ascend Town Brook starting at Plymouth Harbor. Town Brook flows from Billington Sea, a 269-acre freshwater pond, for 1.5 miles through the center of Plymouth. Fish passage devices constructed many years ago were in dire need of reconstruction and replacement. Fish America, the Town of Plymouth, the State of Massachusetts, the U.S. Fish and Wildlife Service, the Natural Resource Conservation Service, the NOAA Restoration Center and others worked to restore fish passage throughout Town Brook. The project involved installing a new fish ladder at the Newfield Street dam and complete dam removal and stream restoration at the Billington Street dam.

Dam removal at Billington Street and the restoration of the migratory habitat involved: (1) excavating about 1,500 cubic yards of fill; (2) regrading the channel bottom to an appropriate elevation; (3) restoring the channel bottom by placing small cobbles and gravel to mimic the upstream and downstream substrates; and (4) restoring the riparian habitat by regrading and planting of appropriate riparian vegetation. The Billington Street dam was removed in September of 2002 as part of a training exercise by the U.S. Army Reserves. The fish ladder at Newfield Street was replaced with an Alaskan steeppass fish ladder in the fall of 2001. Riparian and wetland planting was undertaken in the spring of 2003. Preliminary observations in 2003 show that the dam removal site is stable and no longer poses an impediment to fish passage. Additional fish passage restoration projects are currently emerging at other locations along Town Brook.

Future CRP Funding Opportunities

Individual habitat restoration projects are funded two ways: Either through the Restoration Center's direct solicitation, which is published annually in a separate Federal Register Notice, or through one of the many solicitations that occur through Restoration Center partnerships (FishAmerica Foundation, National Fish and Wildlife Foundation, Restore America's Estuaries, American Rivers etc.). Following is a brief summary of CRP funding opportunities for FY2004. See the Restoration Center's web site (www.nmfs.noaa.gov/habitat/restoration) for more detailed information.

Projects funded through the CRP are expected to have strong on-the-ground habitat restoration components that provide educational and social benefits for people and the communities in addition to long-term ecological habitat improvements for NOAA trust resources. Priorities for FY2004 habitat restoration activities and partnerships include:

- Areas identified by NOAA Fisheries as essential fish habitat (EFH) and areas within EFH identified as Habitats of Particular Concern,
- Areas identified as "critical habitat" for federally or state-listed marine and anadromous species,
- Areas identified as important habitat for marine mammals and sea turtles,
- Watersheds or such other areas under conservation management as special management areas under state coastal management programs, and
- Other important commercial or recreational marine fish habitat, including degraded areas that historically were important habitat for living marine resources.

NOAA published a Federal Funding Opportunity (FFO) Announcement on June 30, 2003 to announce the availability of federal funds for a variety of NOAA programs including NOAA's CRP. Funding of up to $3,000,000 is expected to be available for individual CRP projects in FY2004 with the typical project award ranging from $50,000 to $200,000. **Applications for project funding under the CRP must be received by or postmarked by September 12, 2003.**

NOAA also has announced the availability of CRP partnership funding. Funding of up to $7,000,000 is expected to be available for establishing habitat restoration partnerships in FY2004, and annual funding is anticipated to maintain them for up to 3 years duration. Typical partnership awards will range from $200,000 to $600,000 per year. **Applications for partnership funding under the CRP must be received by or postmarked by December 5, 2003.**

The Restoration Center web site also lists CRP partnerships that periodically announce funding opportunities throughout the year. For example, NOAA partners with the Gulf of Maine Council to fund habitat restoration projects located within the United States portion of the Gulf of Maine watershed within Maine, Massachusetts, and New Hampshire. During open announcements, applications should be directed to the Gulf of Maine Council. Letters of Intent are due September 29, 2003 and proposals are due November 15, 2003.

For more information on NOAA's CRP program or funding opportunities, see the Restoration Center's web site at **www.nmfs.noaa.gov/habitat/restoration**, or contact Robin Bruckner of the NOAA Restoration Center at (301) 713-0174 or email: Robin.Bruckner@noaa.gov.

Source: NOAA Restoration Center website www.nmfs.noaa.gov/habitat/restoration.

Reducing Pollution by Trading Nitrogen Credits

The Connecticut Department of Environmental Protection (CT DEP) initiated a nitrogen trading program in January 2002 to reduce nitrogen loading and improve water quality in Long Island Sound. Nitrogen has been identified as the primary pollutant causing low dissolved oxygen (DO) conditions, known as hypoxia, that occur throughout much of the Sound's bottom waters each summer. Excessive nitrogen stimulates algal growth, which after it dies, consumes oxygen in the decay process.

In April 2001, the U.S. Environmental Protection Agency (EPA) approved the Total Maximum Daily Load (TMDL) for Long Island Sound. This resulted in Connecticut municipal wastewater treatment plants being required to reduce total nitrogen effluent discharges by 64% by the year 2014. In response to the TMDL requirement, the Connecticut General Assembly passed a law in July 2001 (Public Act 01-180, An Act Concerning Nitrogen Reduction in Long Island Sound) that allowed for the issuance of a General Permit to 79 municipal wastewater treatment plants in Connecticut. The General Permit provided annual total nitrogen effluent limits for the above municipal wastewater treatment plants. The nitrogen limits become more stringent in each subsequent year until the TMDL required level is achieved in the year 2014.

The state law also created a nitrogen credit exchange that provides a trading program within the 79 municipal treatment plants in the General Permit. The exchange program allows treatment facilities that provide nitrogen removal to a level that is less than the general permit annual limit to sell excess credits through the exchange. The program also allows treatment facilities to purchase credits if their annual limit is exceeded. Specifically, the CT DEP purchases all equivalent nitrogen credits and sell credits to municipalities to achieve compliance. The Nitrogen Credit Advisory Board, an appointed board of 12 members, is charged with oversight of the nitrogen exchange program and the purchase and sale of all nitrogen credits and the setting of the annual cost of a nitrogen credit.

The benefit of such a trading program is that it can be a cheaper and faster way to address water quality problems. The trading program provides an incentive to those facilities that can achieve the nitrogen reduction more easily and more cost effectively. The trading program has saved the state of Connecticut an estimated $200,000,000 in avoided costs in sewage treatment plant reconstruction projects.

In January 2003, the EPA released its final policy on water quality trading. The new Water Quality Trading Policy was developed to cut industrial, municipal and agricultural discharges into the nation's waterways. The trading policy seeks to support and encourage states and tribes in developing and putting into place water quality trading programs that implement the requirements of the Clean Water and federal regulations in more flexible ways and reduce the cost of improving and maintaining the quality of the nation's waters. However, some environmental organizations have expressed concern over the new trading policy, stating that the policy doesn't set a pollution cap or limit that declines over time (as in CT DEP's nitrogen trading program).

In addition, the EPA supplied over $800,000 in fiscal year 2002 funds to support 11 pilot trading projects to address a range of water quality challenges across the country. One of the pilot projects evaluates the first year's implementation of CT DEP's nitrogen trading program to meet the nitrogen TMDL in Long Island Sound. The project will assess nitrogen reductions achieved, the utility of a watershed permit used for the 79 wastewater treatment facilities, and the potential for expanding the program to include nonpoint sources. Other projects include nitrogen trading in the Chesapeake Bay Watershed -Conestoga River, PA and in the Neuse River Basin, NC. For more information on EPA's water quality trading policy and projects see EPA's web site www.epa.gov/owow/watershed/trading.htm

For more information on CT DEP's nitrogen trading program, contact Gary Johnson at 860-424-3754 or e-mail gary.johnson@po.state.ct.us.

Sources: CT DEP fact sheet, "Connecticut's Nitrogen Control Program," February 2003. EPA Headquarters Press Release, Washington, DC, 01/13/2003. "EPA's Water Quality Trading Plan Wins Support" by J.R. Pegg, Environmental News Service (ENS), January 13, 2003.

Report Calls for Conservation of Vital Juvenile Fish Habitat

According to the Ecological Society of America's recent report, **The Role of Nearshore Ecosystems as Fish and Shellfish Nurseries**, fisheries management and marine conservation strategies need to address juveniles and their habitats and should shift from mitigation and restoration measures to more preventive conservation of key coastal areas such as seagrass meadows, marshes, oyster reefs and kelp and mangrove forests. The report notes that there are significant differences both within and between ecosystems in their value as fish nurseries. Not all marshes are equally productive and the important nursery role of some ecosystems, such as oyster reefs and kelp forests, has been ignored. The report offers guidelines on assessing which coastal areas serve as vital nurseries, including for example, that the size and number of individuals added to adult populations is the best single measure of the value of juvenile habitat.

Another recommendation calls for key U.S. federal agencies, such as the National Oceanic and Atmospheric Administration, the Environmental Protection Agency, the Fish and Wildlife Service and the U.S. Geological Survey, to establish a jointly funded program focused on nursery ecosystem management. The report is available free online at www.esa.org/sbi/sbi_issues/issues_pdfs/issue11.pdf.

Potential Impact of Heavy Rainfall on Fish Habitat

Heavy rainfall during this past spring and early summer produced above-normal stream flow especially in Maryland, Virginia, North Carolina and South Carolina. This is in stark contrast to last year, when these same areas were battling drought conditions. Now that concerns associated with the drought conditions have been alleviated, attention is focused on possible impacts to fish and fish habitat from the recent heavy rainfall.

In some cases, increased water flow is considered beneficial. According to Wilson Laney of the U.S. Fish and Wildlife Service, this past spring is the first time since the removal of the Quaker Neck Dam in May 1998, that there has been enough water in the upstream portions of the Neuse River (North Carolina) to provide spawning flows for striped bass and American shad. In the Neuse River, adequate flows are most critical to migrating striped bass and American shad when they cross the fall-line, (approximately 71 river kilometers upstream from the former site of the Quaker Neck Dam), where numerous rapids may impede their upriver migration if flows are low.

In other cases, increased water flow may not be beneficial to fish and fish habitat. In the Roanoke River, high flows appear to have maintained lower water temperatures in the spring beyond the point at which spawning normally occurs, making conditions less suitable for spawning. Continued high water flows may have adversely impacted those fish larvae and juveniles that were produced.

In addition, high water flows are likely to lead to bank erosion and increased sedimentation. High water flows carry more nutrients, pollutants, and sediments into estuarine and bay areas that can stimulate excessive algal growth. Often the end results are oxygen-depleted waters causing fish kills and inhibited growth of submerged aquatic vegetation from decreased water clarity.

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