

vegetative cover, such as native grasses, wildlife plantings, trees, filterstrips, or riparian buffers. Farmers receive an annual rental payment for the term of the multi-year contract. Cost sharing is provided to establish the vegetative cover practices. As of June, 1998, 23,350 agreements were in place in the U.S. Great Lakes basin counties, affecting nearly 810,000 acres.

Conservation practices such as conservation tillage and buffer strips reduce the loads of nutrients, herbicides, and pesticides to the surface waters of the Great Lakes Basin.

Conservation tillage is any planting method that leaves at least 30 percent of the soil surface covered with crop residue after planting. The soil is tilled only to the extent needed to prepare a seedbed, incorporate chemicals, control weeds, and plant the crop. Conservation tillage is rapidly becoming the primary cultivation practice in the Basin, affecting as much as 70 percent of the total acreage in many counties, and 48 percent basinwide.

Buffer strips are strips of land in permanent vegetation, designed to intercept pollutants and manage other environmental concerns. Strategically placed buffer strips can effectively mitigate the movement of sediment, nutrients, and pesticides within and from farm fields. Buffer strips can also enhance wildlife habitat by providing a source of food, nesting cover, and shelter for many wildlife species. USDA's unprecedented National Conservation Buffer Initiative is set to install conservation buffers along 2 million miles of the nation's 3.5 million riparian miles by 2002.

The Environmental Quality Incentive Program (EQIP) works primarily in locally identified conservation priority areas where there are significant problems with natural resources. High priority is given to areas where agricultural improvements will help meet water quality objectives. EQIP offers contracts for conservation practices such as manure management systems, pest management, erosion control, and other practices to improve and maintain the health of natural resources. Activities must be carried out according to a conservation plan.

The Sustainable Agriculture Research and Education (SARE) program works to increase knowledge about, and help farmers and ranchers adopt, practices that are economically viable, environmentally sound and socially responsible. To advance such knowledge nationwide, SARE administers a competitive grants program first funded by Congress in 1988. For the combined years of 1997 and 1998, 78 grants were awarded within the eight Great Lakes states. As the outreach arm of SARE, the Sustainable Agriculture Network (SAN) provides national leadership in facilitating information exchanges in support of sustainable agriculture. Information is produced in a variety of formats including print, World Wide Web, and electronic books or diskette versions.

The Farmland Protection Program provides funds to help purchase development rights to keep productive farmland in use. Working through existing programs, USDA joins with State, Tribal, or local governments to acquire conservation easements or other interests from landowners. To qualify, farmland must meet several criteria, including having a conservation plan.

### **Groundwater Impacts**

The Great Lakes watershed is being impacted by nonpoint source loadings from groundwater. Nonpoint source loadings from groundwater may take years, decades, or longer to decrease and, therefore may make it difficult to achieve the 30 percent reduction goal by the year 2005 as recommended by the IJC. The USGS and USDA are working to improve the understanding of the impacts of groundwater as a major source of herbicide loadings to the Great Lakes. Recent improvements in herbicide application BMPs (e.g., lower application rates, spot spraying) are designed to help reduce the infiltration of these substances into the groundwater and, therefore, reduce loadings. The USGS has determined that pesticide loads from urban watersheds can be as high or higher than those found in agricultural watersheds, chiefly due to stormwater runoff, and may further impact the ability to achieve the recommended reductions. The U.S. Great Lakes Program in general, and the USGS in particular,



will continue to research and address the impacts of groundwater in the basin.

### **Additional Progress in Reducing Nonpoint Source Pollution**

The following programs are examples of the progress that has been accomplished in reducing nonpoint source pollution:

- > The Corps, in cooperation with EPA, is supporting IDEM's development of TMDLs for the Grand Calumet River in Indiana. This effort will identify nonpoint sources of pollution and evaluate ways to reduce these loadings.
- > The Corps, in cooperation with the Metropolitan Water Reclamation District of Greater Chicago, completed construction of the first of three reservoirs that will store stormwater and sewage and reduce the backflow of contaminants into Lake Michigan at Chicago during extreme storm events.
- > A wetland restoration project was developed at the Indiana Dunes National Lakeshore in Gary, Indiana. Two sites, Derby Ditch and the Island Manor Project, have helped reduce peak outflow rates during a storm events.
- > The Lake and Porter County, Indiana Soil and Water Conservation Districts are presently working with the Corps-Chicago District to evaluate a land treatment project for the Deep River Watershed. This watershed encompasses 79,000 acres that include 37,700 acres of cropland. The project would include erosion control, sediment reduction, and nutrient and pesticide management.
- > In July 2000, the State of Michigan and USDA signed a Conservation Reserve Enhancement Program (CREP) agreement totaling \$177 million. This agreement allows landowners in targeted areas of Michigan to automatically enroll in the Conservation Reserve Program (CRP) and provides them with regular CRP payments, as well as additional state funds. In return, the farmer must implement approved practices such as filter strips, riparian buffers,

and grassed waterways and maintain them for at least 15 years. The Michigan CREP targets 80,000 acres of environmentally sensitive farmland along the Raisin River and other waterways in the Macatawa and Saginaw watersheds. Other Great Lakes states with CREP agreements include Illinois, Ohio, Minnesota, Pennsylvania, and New York.

- > Federal and state grants are funding implementation of the National Resources Conservation Services (NRCS) Nemadji River Basin Project in Minnesota. Reducing streambank erosion rates through land management is a major long-term goal. A local Forestry Committee will begin collectively analyzing timber stands and coordinating harvesting in order to minimize runoff rate increases. The Corps is currently working to produce a sediment transport model that will facilitate land management planning. The Michigan DNR Fisheries Department has targeted sections of key tributaries for stream bank erosion control projects. State trout stamp and clean water partnership funding will pay for materials that volunteer groups will use to stabilize critical areas.
- > The Penfield Watershed Management Committee in New York will produce a trifold informational brochure to increase the public's awareness of water quality issues, sediment control, and soil erosion. The brochure will be directly mailed to approximately 13,000 households.
- > NRCS, with the Ohio Lake Erie Commission, has established a resource team to enhance the National Conservation Buffer Initiative. The Initiative will improve water quality in Ohio's Lake Erie Watershed, while providing adjacent landowners with financial incentives to reduce agricultural runoff. The Ohio Lake Erie Buffer Team, established nearly a year ago, is comprised of 22 public and private individuals from agricultural and natural resource organizations and is guided by NRCS. The team has developed and instituted a 12-point strategic plan to implement and sustain Ohio's program with a goal of establishing 50,000 acres of new conservation buffers. Over the last 15 years, conservation



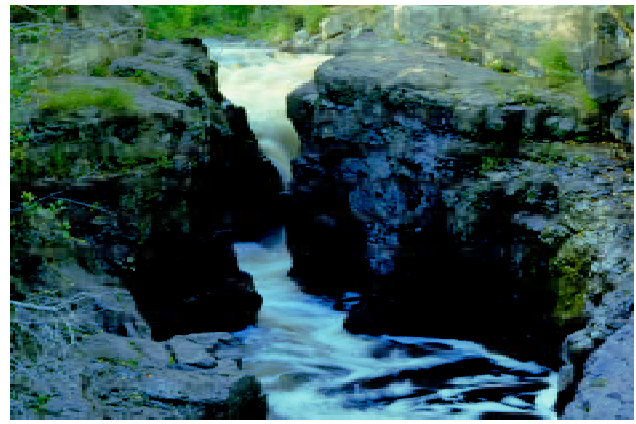
tillage increased from 5 to 50 percent within the Lake Erie basin.

- > The Toledo Harbor Sediment Reduction Project is a pilot project by the NRCS to demonstrate how upland erosion control can reduce sediment delivery and dredging needs in the Toledo Harbor. A study by an economist at Ohio State University concludes that a 15 percent reduction in dredging would provide a present market value of reduced dredging costs worth \$1.3 million per year. The project used a locally led approach, including county sediment committees, county sediment reduction strategies, and competitive grants to distribute available grant funds. The project successfully demonstrated a delivery system that can be effective in accelerating the rate of application of sediment reduction practices within the Maumee Watershed, as well as generating many innovative ideas for promoting conservation tillage and sediment reduction activities.
- > Investigations to date indicate nonpoint source pollution to be the largest contributor of contaminants to the Presque Isle Bay AOC. EPA has provided funding to the Erie-Western Pennsylvania Port Authority for construction of a path system at the water edge to prevent sediments from entering the Bay, as well as to neutralize acidic runoff. Measuring will be conducted over the next 2 years to evaluate the effectiveness of this system.

## WETLANDS

### Playing a Vital Role

A vital component of the Great Lakes ecosystem, wetlands serve a variety of important functions. Wetlands protect shorelines from erosion, store flood waters with their dense vegetation, and trap sediments that can pollute waterways. They also provide nursery, resting, feeding, and breeding grounds for a rich diversity of birds, fish, and wildlife. They protect a variety of fish species from waves and predators. Coastal wetlands offer fish warmer temperatures than open lake waters.



**Wetlands provide vital habitat for Great Lakes fish and wildlife.**

Larval and juvenile fish harbored by wetlands are an important food source for waterfowl. Ducks consume plants that extend above and below the water, and geese graze on plants above water.

More than half of Great Lakes wetlands have been lost since 1800 (see Figure 20 on the following page). The most extensive losses took place in the nineteenth and early twentieth centuries when many wetlands were drained for agricultural use. Remaining wetlands continue to be threatened by building construction, waste disposal, and mining of sand. Consumption of groundwater has diminished recharge of certain wetlands.

### Restoring and Protecting Remaining Wetlands

The following examples (and others highlighted in the habitat section of the report) provide information regarding the scope of wetland protection and restoration projects and programs occurring around the U.S. portion of the Great Lakes Basin.

A partnership consisting of the FWS, the Ohio Division of Wildlife, EPA, Ducks Unlimited, and other private conservation groups, with the support of locally elected members of Congress, has completed construction associated with the restoration of Metzger Marsh, which borders the coast of Lake Erie. This project may serve as a model for coastal wetland restoration in other parts of the Great Lakes. Construction of water level/fish control structures and other features will





**Figure 20. Almost every Great Lake state has lost at least 50 percent of their original wetlands statewide, giving an indication of the losses experienced within each state's portion of the basin; Indiana, Illinois, and Ohio have lost at least 85 percent statewide (Source: Mitch and Gosselink, *Wetlands*. 2nd Edition, Van Nostrand Reinhold, 1993).**

protect this 900-acre wetland from storm damage and will allow this area to once again provide a diverse aquatic plant community and habitat for a variety of fish and wildlife species. The Metzger Marsh project is one of ten flagship projects of the North American Waterfowl Management Plan that was created to protect, restore, and enhance wetlands from Mexico to Canada.

Through partnerships, the Michigan Private Lands Office completed 22 wetland restorations totaling 160 acres. The Michigan Wildlife Habitat Foundation, through a cooperative agreement, completed the bulk of these restorations. These projects were often completed with cooperation from county drain commissioners. Additional restorations were completed through the Kalamazoo Conservation District. Partners, including landowners, contributed approximately 50 percent of the cost of the projects.

Nearly 11,000 acres of wetlands have been restored through the USDA Wetlands Reserve Program in Wisconsin's Great Lakes watershed. These 126 sites are long-term restorations or permanent easements, providing flood control, improved water quality, and wildlife habitat in the North American Flyway.

Three biologists hired through a partnership between the FWS, NRCS, and the Wisconsin

Waterfowl Association have secured over 3,800 acres of restorable wetland and associated uplands in key wetland areas of Wisconsin for the Wetlands Reserve Program. The lands, located in 108 different parcels, will be restored under either 10- or 30-year agreements or perpetual easements. Funds are being provided by the Wetlands Reserve Program and the FWS.

The FWS recently participated in a multi-agency winter navigation agreement that will protect the St. Marys River and more than 13,300 acres of Michigan's coastal wetlands. The 10-year Memorandum of Agreement (MOA) fixes opening and closing dates for the Soo Locks at Sault Ste. Marie, Michigan, vessel speed limits, and other monitoring responsibilities relating to commercial shipping traffic on the St. Mary's River. In the MOA, the FWS East Lansing Field Office negotiated provisions to protect more than 75 miles of riverine habitat and wetlands from the effects of early navigation season. The parties to the MOA include the Corps, the U.S. Coast Guard, Michigan DNR, and Michigan DEQ.

The Old Woman Creek National Estuarine Research Reserve (OWC NERR), the only Great Lakes-type freshwater estuary in the System, continues to build upon its strong relationship with federal, state, and local partners. The Reserve's science program provides information to the coastal community on functions of the complex Lake Erie Coastal wetlands ecosystem. The Program is directed toward determining the role of estuaries and other wetlands in the Great Lakes ecosystem. A second responsibility is to develop a database to evaluate subtle, long-range changes in the Lake Erie system. Recent research has focused on the movement of sediments from fair fields and on mitigating runoff from agricultural lands. This work allows the Reserve to serve as a regional model and stimulus for improving the health of the threatened coasts of the lower Great Lakes.



## HABITAT PROTECTION AND ENHANCEMENT

Native Great Lakes ecosystems provide habitats upon which a diversity of plant and animal species depend. The current percentage rate of loss of the little natural habitat that remains, while lower than in times past, is still quite high and threatens the health and survival of many Great Lakes species. Under a variety of unique programs and partnerships at the Federal, State, Tribal, and local landowner levels, a large number of wetland and upland habitat creation, protection, restoration, and enhancement activities are being conducted to address this issue. Much of the needed work orients itself towards the goal of protecting and restoring ecosystem health. This is important in both environmental and economic terms. Fishing, hunting, bird-watching and other wildlife-related recreation are enjoyed by 77 million people annually. Wildlife remains a remarkable engine for economic growth and job creation, accounting for approximately \$100 billion annually.



**Fishing and other outdoor activities are enjoyed by 77 million people and is a \$100 billion industry.**

The following examples of habitat protection and enhancement projects (and other highlighted in the wetlands and fish and wildlife sections of this report) touch on the variety of such activities taking place in the Great Lakes.

Native prairie restoration projects at 16 sites in 3 Ohio counties have enhanced waterfowl nesting habitat on more than 225 acres. In Ottawa County, 12 sites and 119 acres of native prairie were restored. In Sandusky County, three sites

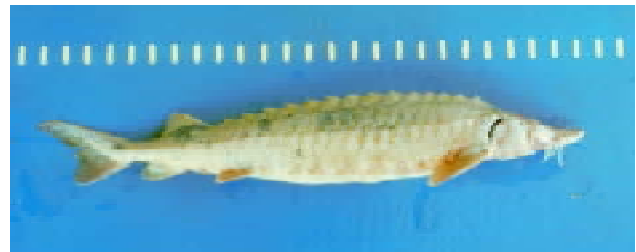
and 96.4 acres of native prairie were restored. In Erie County, one site and 10 acres of native prairie were restored. The restoration projects will improve waterfowl nesting habitat and provide enhanced winter cover for game and non-game birds. In the Ottawa National Wildlife Refuge, 20 acres of native prairie were restored for waterfowl nesting habitat and winter cover for both game and nongame birds.



**Re-establishing native trout populations will depend upon the restoration of its habitat.**

The USGS/FWS Great Lakes Initiative to restore native fish (lake trout, coaster brook trout, and lake sturgeon) and habitat began with a \$1.5 million investment in 1998. The purpose of this project is to pick restoration sites and restock those sites using native fish populations. Various Tribal groups, States, and Canadian organizations are also involved in the Initiative.

The FWS Ashland Fishery Resources Office, in cooperation with Michigan DNR, Keweenaw Bay Indian Community, and Pictured Rocks National Lakeshore, is developing site-specific plans for stocking and assessment of coaster brook trout, under guidance of the newly-adopted "Brook Trout Rehabilitation Plan for Lake Superior".



**Sturgeon restoration activities are being implemented in the Detroit River.**



Fingerlings hatched and reared at the Iron River National Fish Hatchery will be stocked in selected Michigan streams in 1999. Coaster brook trout were once abundant in the upper Great Lakes, but were depleted by fishing, habitat degradation, and introduced species.

The FWS developed a partnership with Michigan DNR, Trout Unlimited, and the Huron Mountains Club to protect and restore habitat in the Salmon-Trout River, where the last suspected self-sustaining coaster brook trout population in a mainland U.S. stream spawns. The initiative would create a voluntary watershed management program to address remediation of a serious sand loading problem.

The FWS is working with USGS partners to survey the use and condition of historically reported lake sturgeon spawning habitats in the Detroit River. The spawning habitats are being investigated to determine current habitat characterization of the sites, as well as current use of sites by lake sturgeon. Another component of this study is to examine nursery habitats being utilized in the Detroit River by juvenile lake sturgeon.

The Nature Conservancy's Great Lakes Office developed a model to classify freshwater biological habitats and communities and piloted the application of this model to identify priority aquatic conservation sites across the Great Lakes basin. The goal was to identify places that together represent the diversity of biological communities in the Great Lakes. This project is an excellent starting point for the portfolio of places necessary to conserve the region's aquatic biological diversity.

NOAA has released its final proposal to designate Thunder Bay, Michigan and surrounding waters on Lake Huron as the 13th National Marine Sanctuary. The proposal, detailed in the Final Environmental Impact Statement and Management Plan (FEIS/MP) for the Thunder Bay National Marine Sanctuary, includes a 5-year management plan and draft final regulations as well as responses to public comments received during the sanctuary designation process. Thunder Bay contains a nationally important

collection of historic shipwrecks that represents maritime heritage of regional, national and international significance. This would be the first national marine sanctuary to focus solely upon a large collection of underwater cultural resources.

The Grand Traverse Band of Ottawa and Chippewa Indians is presently working in partnership with the Grand Traverse Bay Watershed Initiative, the Great Lakes Environmental Center, and Meridian Geographics through a Michigan Great Lakes Protection Fund Grant to identify and assess 6 potentially critical habitats in the Grand Traverse Bay. The selected habitats are located strategically around the entire bay. The assessments include water quality, benthic populations, fish, wildlife, and plants. An additional grant from the Michigan Coastal Zone Management program is allowing for the assessment of three additional sites in Grand Traverse Bay in 1999.

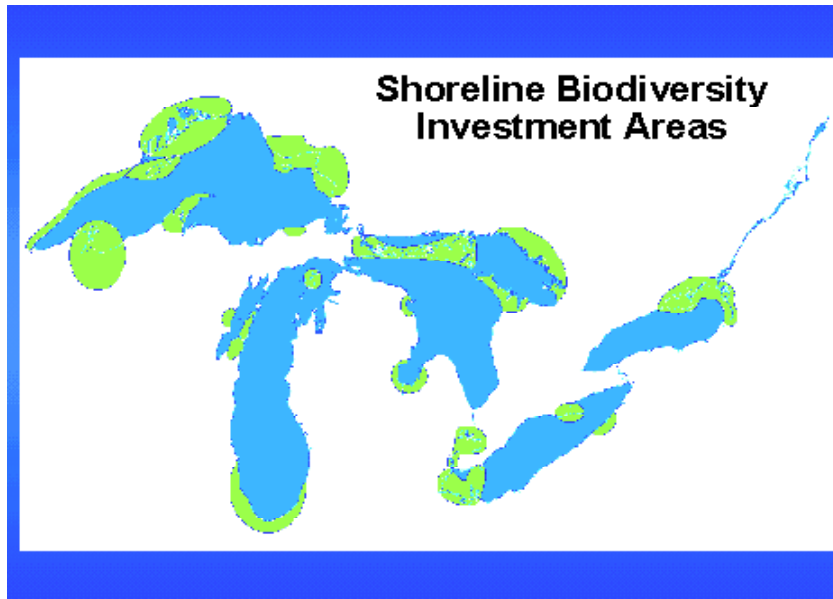
In 1998, GLNPO awarded more than \$1.1 million in grants for the protection and restoration of significant ecosystems. The 20 projects will provide a scientific base for priority setting, build institutions to protect biodiversity, build community support for protection and restoration of significant habitat, and implement on-the-ground protection and restoration activities across the Great Lakes basin. In addition, GLNPO funds were instrumental in supporting the Natural Areas Association Conference and a Wild Rice Conference organized by Great Lakes Tribes.

Three papers on the topic of Biodiversity Investment Areas (BIAs) (see Figure 21 on the following page) were presented and discussed at SOLEC'98. These papers describe outstanding areas throughout the Great Lakes basin of aquatic, coastal wetland, and nearshore terrestrial ecosystems. Properly protected, these areas will preserve ecological integrity and, ultimately, help protect the health of the Great Lakes themselves.

## RESTORING AQUATIC SPECIES

Fish populations have been greatly depleted over the last 2 centuries. Population depletion can be attributed to food chain disruptions, pollution, habitat loss and degradation, overfishing, exotic





**Figure 21. The protection of Shoreline Biodiversity Investment Areas will help preserve the ecosystem health of the lakes (Source Land by the Lakes: Nearshore Terrestrial Ecosystems, EPA/EC, SOLEC, 1996).**

species, and other factors. Damage to once abundant fish populations has been profound; however, recent signs of recovery are very encouraging.

Lake trout in Lake Superior are now reproducing at a rate that does not require additional stocking, and mayfly populations, an insect that is important prey food for many fish in Lake Erie, are approaching historic abundance. Recent discoveries of deepwater sculpin in Lake Ontario provide hope for the recovery of this species that was thought to be eliminated from the Great Lakes. Several projects are assisting the recovery of other species, including Atlantic salmon (in Lake Ontario) and lake sturgeon.

The following variety of important actions are examples of the many steps being taken to aid in the recovery of basin populations of native species.

### ***Progress on Self-Sustaining Lake Trout***

Lake trout were historically the top native predator fish in the Great Lakes and an important component of commercial and sport fisheries. A combination of overfishing and predation by the sea lamprey, along with other contributing factors, caused the disappearance of lake trout during



**Sea lamprey predation, which once took a drastic toll on the Great Lakes fishery, is being effectively controlled through successful programs requiring multi-agency cooperation.**

the 1950s in all of the Great Lakes except Lake Superior, where populations were greatly diminished.

Progress of lake trout restoration in the Great Lakes:

- *Lake Superior* - Lake trout reproduction and survival have reached a modern high. The rate of reproduction can sustain the population without requiring additional stocking. Trout restoration activities that proved successful in Lake Superior are being adapted to other lakes and other species.



- *Lake Michigan* - Spawning of stocked lake trout and subsequent production of young have been evident since the early 1970s. However, survival of young fish to adults has not been documented. Offshore reefs appear to be the most promising areas for establishing reproducing populations.
- *Lake Erie* - Abundance of lake trout have been improving annually since 1992. Reproduction has not been detected, but lake trout are surviving to sexual maturity and offspring of stocked lake trout have been raised successfully in a hatchery.
- *Lake Huron* - Intensive stocking on mid-lake reefs has resulted in the production of young lake trout each year since 1993.
- *Lake Ontario* - Naturally produced 2-year-old lake trout are present in many areas of the lake. Prior to 1995, spawning by stocked lake trout failed to produce detectable numbers of 2-year-old fish, although fry were detected as early as 1983.

### Revival of Mayfly Population

The burrowing mayfly (*Hexagenia*) was an important part of the benthic fauna and a huge food

source for fisheries in western Lake Erie. The population suddenly disappeared in 1953, presumably because of pollution and dissolved oxygen depletion. In the early 1990s, after an absence of 40 years, burrowing mayfly adults were seen along the shores of western Lake Erie. Scientists from the Great Lakes Science Center were encouraged by these sightings and obtained bottom samples from western Lake Erie to document the presence of burrowing mayfly nymphs with densities increasing throughout western Lake Erie. The last 5 years have seen a remarkable recovery in population, from zero to numbers approaching those of the early twentieth century. This is a strong sign of improvement of water quality, which is good news for all inhabitants for the Lake Erie ecosystem.

### Reappearance of Deepwater Sculpin



The deepwater sculpin, thought to be extirpated, was recently discovered in Lake Ontario.

In April 1998 in southwestern Lake Ontario, USGS scientists caught a deepwater sculpin. A deepwater sculpin had not been captured in the U.S. waters of Lake Ontario since 1942. In the Canadian portion of Lake Ontario the fish is extremely rare; only six deepwater sculpin have been reported in Canadian waters since 1972 (three in 1972 and three in 1996). Deepwater sculpins are an important link in the food chain, eating bottom-dwelling invertebrates and, in turn, being eaten by lake trout. The reappearance of deepwater sculpin in U.S. waters of Lake Ontario is one of many recent signs that a general recovery of the lake's native fish community is under way.

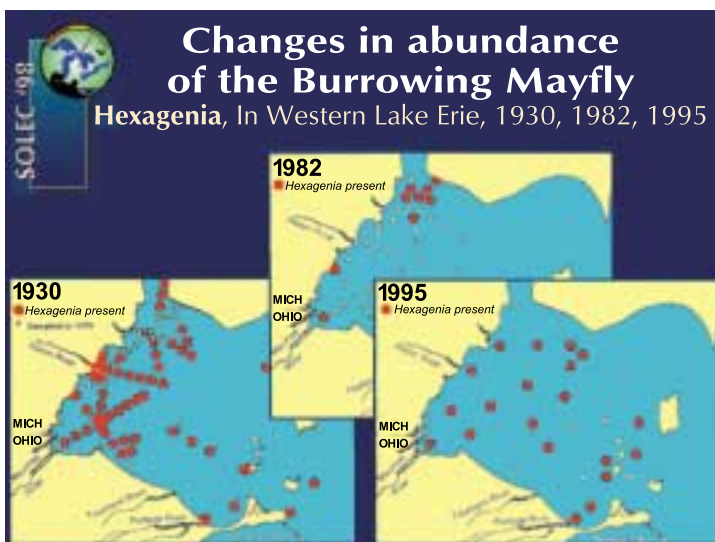


Figure 22. Water quality improvements in Lake Erie has led to a resurgence of the mayfly population (Source: Presentation, Nearshore and Offshore Waters, EPA/EC, SOLEC, 1998).





## ***Atlantic Salmon***

The landlocked Atlantic salmon, native to Lake Ontario and the Finger Lakes of New York, experienced a population reduction in the late 1800s due to dams on tributary streams where the salmon spawned. Currently, disease prevents the salmon from reproducing. However, scientists at Cornell University, NYSDEC, and USGS developed a treatment for this malady at fish hatcheries. They are examining the feasibility of restoring self-sustaining populations of Atlantic salmon in Lake Ontario and the Finger Lakes.

### ***Other Activities to Restore Aquatic Species***

- **Maintaining the Lake Superior Walleye Fishery:** The Natural Resources Department of the Bad River Band of Lake Superior Chippewa, as the primary steward of Kakagon Slough, and the FWS limit and monitor an annual Tribal subsistence walleye fishery in this system. Harvest limits are periodically evaluated by the Band to maintain and protect this thriving walleye fishery, the second largest in the Wisconsin waters of Lake Superior.
- **Re-establishing Native Clams in Metzger Marsh:** In 1996, a large population of native clams was discovered during the dewatering of Metzger Marsh. This population is critical to the future restoration of clams in Lake Erie, since it is one of the few populations in the lake that survived the negative effects of zebra mussels. During the marsh restoration project, all clams in Metzger were removed and boarded in various locations in Ohio and Michigan. Once the marsh is reopened to Lake Erie, the clams will be returned and assisted in rebuilding their population structure.
- **Recovery of Sticklebacks and Emerald Shiners:** In Lake Ontario, threespine sticklebacks began to appear in midwater trawl catches in 1993 and have become quite abundant since. Emerald shiners began to appear in midwater trawls in 1995, and abundance has been highly variable since, but this is typical for that species. The appearance of significant numbers of threespine sticklebacks and emerald shiners, both native species, is believed to be a response to diminished alewife abundance.
- **Evaluating Remnant Lake Sturgeon Stocks:** The FWS has been working with State and Tribal agencies in the evaluation of remaining lake sturgeon stocks. The Bad River (Wisconsin) supports one of two self-sustaining populations of lake sturgeon in U.S. waters of Lake Superior. The lower portion of the river is within the Bad River Indian Reservation, and activity there has been closely coordinated with the Tribal government. Surveys in the Bad River also provided information used to develop treatment strategies in the Sea Lamprey Management Program. The FWS and the Keweenaw Bay Indian Community planned and cooperatively conducted lake sturgeon assessment in Huron Bay, Michigan. The objectives are to gather biological statistics of sturgeon, describe their distribution and movement, and monitor habitat usage in Huron Bay.
- **Juvenile Lake Sturgeon Receive Ultrasonic Transmitters:** Lake sturgeon rehabilitation efforts in Lake Superior will benefit from determination of preferred habitat for juveniles. Efforts to protect or enhance juvenile lake sturgeon habitat are hindered by lack of knowledge of habitat requirements during this life stage. Eight juvenile lake sturgeon in Lake Superior were captured and will be tracked in the Chequamegon Bay and Apostle Island region during ice free months through June 2000.
- **Grand Portage Experimental Restoration:** The Grand Portage Indian Reservation in Minnesota has been the site of experimental reintroduction of coaster brook trout since 1992. In 1997, reproduction of coaster brook trout was documented in Grand Portage streams for the first time since reintroduction.
- **Pictured Rocks National Lakeshore (MI) Experimental Restoration:** The FWS



conducted backpack electrofishing assessment of fish communities of all streams at Pictured Rocks National Lakeshore, and visually inspected the streams to evaluate potential as coaster brook trout habitat. Some fish found below the barrier on Sable Creek could be a tiny, remnant population of native, anadromous brook trout.

- Four Great Lakes States Agree to Stocking Reduction of Introduced Species:** Coho and chinook Salmon, which limit alewife populations and are prized game fish, do not create self-sustaining populations and require continuous stocking. Michigan, Wisconsin, Indiana, and Illinois have agreed to a 27 percent reduction in the number of chinook salmon stocked in Lake Michigan in 1999 because food supply is limited for existing trout and salmon populations. Additionally, the Michigan DNR plans a 20 percent reduction in Lake Huron chinook stock this year. Fisheries in both Lakes Michigan and Huron have evolved into highly complex biological systems over the 30-year period since coho and chinook salmon were first introduced into the Great Lakes Basin. Officials say these developments require a broader, ecological approach rather than the traditional single species management practices.
- Keweenaw Bay Indian Community Lake Trout Production:** The FWS and the Keweenaw Bay Indian Community are celebrating the success of a 2-year agreement for the Community to operate a fish health isolation facility to aid efforts to restore lake trout in the Great Lakes region. Midwestern Tribes have responded to the challenges of resource management in their unique role as users and managers of more than 900,000 acres of reservation inland lakes, treaty ceded territories, and the Great Lakes.
- Presque Isle Bay AOC:** Brown bullhead liver tumor rates have dramatically decreased from a 22 percent rate in 1992 to just a 3 percent rate as of 1997, according to studies by the Pennsylvania Department of Environmental Protection (PADEP), Pennsylvania Sea Grant,



**Fishery resource managers at the Federal, State and Tribal levels are working together to reestablish health Great Lakes aquatic ecosystems.**

the Erie County Department of Public Health, and EPA. This is good news since the RAP identified fish tumors and other deformities as a use impairment in the AOC. A new study will help determine if these declining rates are due to improving environmental conditions, such as improved sediment quality, or because older tumored fish are dying off and not being replaced at the same rate. Results of this study will help determine future actions in the AOC.

## RESTORING WATER BIRD POPULATIONS

The Great Lakes Basin supports a rich diversity and abundance of breeding birds, making it one of the most important regions on the North American continent for many species. Long-term, comprehensive monitoring of the status and trends of bird populations and communities can allow resource managers to determine the health of bird communities and habitat conditions.

Twenty-five years after the U.S. canceled the pesticide DDT, many fish-eating bird species have experienced remarkable recoveries. The ban has been characterized as one of history's great environmental success stories. Bald eagles, peregrine falcons, osprey, and double-crested cormorants, viewed as "DDT victims," have all experienced increases in breeding populations in the Great Lakes Basin. Decreases in PCBs, dioxins, mercury and other pesticides, in addition to DDT, have also greatly contributed to these

