



U. S. Fish and Wildlife Service

Restoring the Great Lakes



Great Lakes RESTORATION



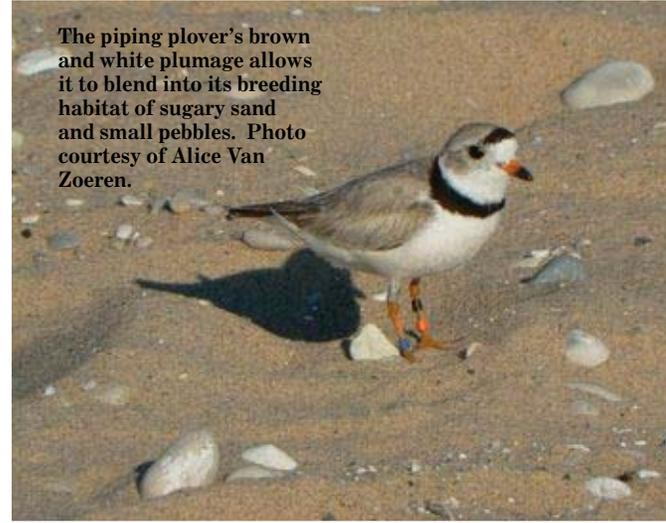
The Power of Partnerships

The Great Lakes Restoration Initiative projects highlighted in this book were made possible through a partnership between the U.S. Environmental Protection Agency and the U.S. Fish and Wildlife Service. The phrase “working with others” is prominent within the Service’s mission statement. In addition to the other 14 federal agencies implementing the Great Lakes Restoration Initiative, the Service’s on the ground actions were further facilitated by our state, tribal and nonprofit project partners.





Joe Sloesser of the Service checks sturgeon egg mats in the Bad River, Wis. Service photo.



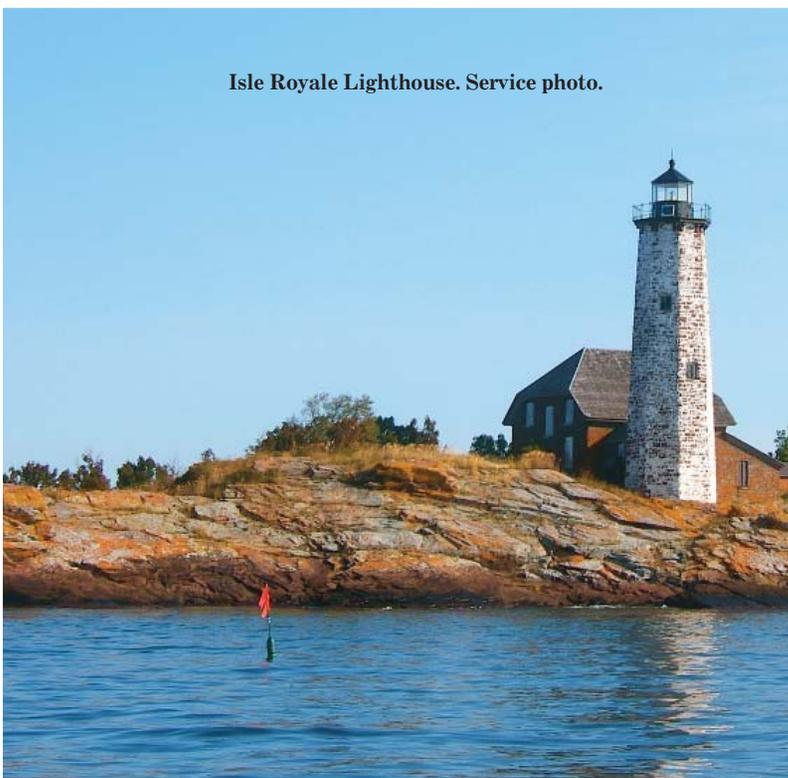
The piping plover's brown and white plumage allows it to blend into its breeding habitat of sugary sand and small pebbles. Photo courtesy of Alice Van Zoeren.



Service biologist Charles Bronte hard at work. Photo courtesy of Charles Krueger, Great Lakes Fishery Commission.



The Menominee River Fish Passage Partnership has hosted multiple community open houses. Service photo.



Isle Royale Lighthouse. Service photo.

The U.S. Fish and Wildlife Service's mission is working with others to conserve, protect and enhance fish, wildlife, plants and their habitats for the continuing benefit of the American people.

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On the Cover:

Great Lakes habitat and wildlife scenes.

introduction

Dear Reader,

The Great Lakes Restoration Initiative marks the country's renewed interest in the protection and restoration of the Great Lakes. Comprised of more than 10,000 miles of coastline and 30,000 islands, the Great Lakes provide drinking water, transportation, power, jobs and recreational opportunities to the 30 million citizens who call the Great Lakes basin "home." Holding 95 percent of the United States' surface fresh water, the Great Lakes are too valuable a resource to lose to such threats as toxic substances or invasive species. Nestled between the U.S. and Canada, and spanning across eight U.S. states and many tribal lands, the management of the Great Lakes represents both an international and interstate challenge that necessitates the highest levels of coordination.

Grounded in collaboration, the Great Lakes Restoration Initiative was first envisioned in 2005 by more than 1,500 stakeholders from diverse backgrounds who contributed to the creation of the Great Lakes Regional Collaboration Strategy. In 2009 President Obama's fiscal year 2010 budget put aside \$475 million for the Great Lakes Restoration Initiative to target the most significant environmental problems impacting the Great Lakes' ecosystem. Through an inter-agency agreement with the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service became a federal partner in the implementation of GLRI. Captured on the pages of this booklet is a sampling of what the Service accomplished in the first year of the Initiative. From fighting the spread of Asian carp, to creating an early warning system for new chemical pollutants, to wetlands restoration, the Service worked to efficiently and effectively transform more than \$65 million dollars into on-the-ground environmental improvements.

Many citizens have experienced the wonders of the Great Lakes—be it catching a glimpse of piping plovers darting across the sand or spying the shadowy forms of lake sturgeon beneath the water's surface. For those who do not have everyday access to the Great Lakes, on your next trip to the region we invite you out to our national wildlife refuges and national fish hatcheries to view for yourself not only the fish and wildlife of the Great Lakes, but also the people who depend on this resource as a source of income and way of life. With the help of the Great Lakes Restoration Initiative the Service and our project partners are working to insure that the Great Lakes remain "great" for you and future generations.

Warmest Regards,

Tom Melius



Regional Director, Midwest Region



Marvin Moriarty



Regional Director, Northeast Region



Great Lakes Restoration Initiative Funding Areas Leading to Actions

Why Save the Great Lakes?

Comprised of more than 10,000 miles of coastline and 30,000 islands, the Great Lakes provide drinking water, transportation, power and recreational opportunities to the 30 million citizens who call the Great Lakes Basin “home.” Fishing, hunting, and wildlife watching in the Great Lakes generate almost \$18 billion in annual revenue. As the largest group of fresh water lakes on Earth, the Great Lakes hold 95 percent of the United States’ surface fresh water. Unfortunately, years of environmental degradation has left the Great Lakes in need of immediate on-the-ground action to save this precious resource for generations to come.

What is the Great Lakes Restoration Initiative?

The Great Lakes Restoration Initiative is a driver for environmental action in the Great Lakes. Building upon strategic recommendations for how to improve the Great Lakes ecosystem presented in the Great Lakes Regional Collaboration Strategy of 2005, President Obama’s fiscal year 2010 budget invested \$475 million for GLRI. Provisionally, funding decreased to \$300 million in fiscal year 2011. GLRI represents a collaborative

effort on behalf of the U.S. Environmental Protection Agency and 15 other federal agencies, including U.S. Fish and Wildlife Service, to address the most significant environmental concerns of the Great Lakes.

What is the Service’s Role in the Great Lakes Restoration Initiative?

The Service facilitates the implementation of GLRI Action Plan priority programs, projects and activities to protect, restore, and maintain the Great Lakes ecosystem. Through an interagency agreement with the U.S. Environmental Protection Agency, the Service was allocated approximately \$65 million in fiscal year 2010 and provisionally just under \$30 million in fiscal year 2011 to work on projects in the following focus areas:

- **Toxic Substances and Areas of Concern:** Years after pollution stops, persistent pollutants can remain in the environment, often trapped in sediments below the surface of the water. The areas of the Great Lakes Basin most severely impacted by these pollutants are known as Areas of Concern. The Service will work to restore and protect aquatic ecosystems in the Great Lakes from the threat of persistent pollutants. In addition, the Service is initiating an effort to address the looming threat of emerging

contaminants, such as hand sanitizers, pharmaceuticals, and personal care products, in the Great Lakes.

- **Invasive Species:** More than 180 non-native species are established in the Great Lakes. The most invasive of these reproduce and spread, ultimately degrading habitat, out-competing native species, and disrupting food webs. Service activities will work to control and eradicate harmful non-native species in the Great Lakes. An additional \$10 million in GLRI funding is provisionally allocated to the Service to work specifically on Asian carp control and management.

- **Habitat and Wildlife Protection and Restoration:** From climate change to increasing development activities along the shores of the Great Lakes, a multitude of threats are affecting the health of the Great Lakes habitats and native wildlife. Service projects will work to identify, restore, and protect important habitat for the area’s fish and wildlife.

- **Accountability, Education, Monitoring, Evaluation, Communication, and Partnerships:** Service will foster coordination of management activities to create synergy with project partners.

Great Lakes Restoration Initiative Funding Areas Leading to Actions

Toxic Substances and Areas of Concern

Actions:

- Remediation and Restoration of Contaminated Sediments
- Early Warning Program to Detect and Identify Emerging Contaminants and Effects on Fish and Wildlife
- Great Lakes Legacy Act Sediment Removal Projects, Habitat Restoration, and Natural Resource Damage Assessments
- Develop and Implement a Closure Plan for the Grassy Island Unit of the Detroit River

Habitat and Wildlife Protection and Restoration

Actions:

- Implementation of the Great Lakes Fish and Wildlife Restoration Act
- Restoration of Lake Trout and Lake Sturgeon in the Great Lakes
- Great Lakes Basin Endangered Species Recovery Initiative
- Great Lakes Habitat and Species Restoration Initiative
- Conservation of Great Lakes Islands
- GLRI – North American Wetlands Conservation Act
- Habitat Assessment and Accounting Infrastructure for the Great Lakes
- Upper Midwest and Great Lakes Landscape Conservation Cooperative
- Great Lakes Wind Power: Making it Migratory Bird-Friendly
- Great Lakes Basin Fish Habitat Partnership
- Great Lakes Watershed Restoration Grant Program

Invasive Species

Actions:

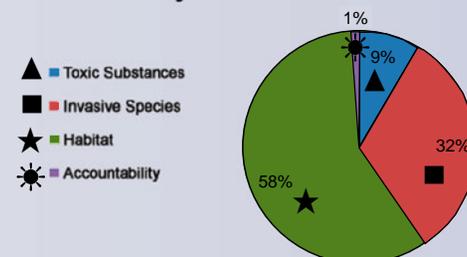
- Aquatic Invasive Species Prevention Program
- Integrated Pest Management Grant/Subcontract Support
- Integrated Pest Management for Priority Species
- State and Interstate Aquatic Nuisance Species Management
- Great Lakes Watershed Restoration Grant Program

Accountability, Education, Monitoring, Evaluation, Communication, and Partnerships

Actions:

- U.S. Fish and Wildlife Service Lake Management Plan Coordination and Implementation
- U.S. Fish & Wildlife Service Liaison Position to Great Lakes National Program Office

FY 2010 Distribution of USFWS's GLRI Funds by Focus Areas



Battling Asian Carp in the Great Lakes Basin

The U.S. Fish and Wildlife Service has been working aggressively with its partners to address the challenge of Asian carp prevention and control in the Great Lakes. The Midwest Region has been considered ground zero in battling the spread of bighead and silver carp. It is actively using every tool available to monitor and assess the threat in real time to contain the spread of these highly invasive fish species.

Through funding made available by the Administration's Great Lakes Restoration Initiative, the Service has received the critical resources needed to conduct on-the-water Asian carp surveys in the Chicago Area Waterways System and other key tributaries of the Great Lakes and Mississippi River systems, and to support rapid response containment and control efforts. The Service has also developed a final rule for the listing of Bighead carp as injurious under the Lacey Act in support of the Asian Carp Prevention and Control Act, recently signed

into law by President Obama. Additionally, the Service has provided millions of dollars of GLRI funds to support crucial work being conducted by natural resource management agencies in the Great Lakes states to combat the introduction and spread of Asian carp in their waters. These efforts include the following:

- Treatment of key stretches of the CAWS with rotenone, a chemical piscicide, to ensure the eradication of any possible Asian carp during rapid response operations.
- Support for highly-intensive, focused commercial recruitment overfishing intended to crash existing populations of Asian carp in the Illinois River.
- Support for development of new tools and technologies to battle Asian carp and other aquatic invaders in the Great Lakes Basin.

These activities are all part of the Asian Carp Control Strategy Framework, the coordinated strategic plan of action of the Asian Carp Regional Coordinating Committee. This coalition, formed around a common mission of Asian carp prevention in the Great Lakes, is comprised of the Service, White House Council on Environmental Quality, Environmental Protection Agency, U.S. Coast Guard, U.S. Army Corps of Engineers, U.S. Geological Survey, Great Lakes Fishery Commission, City of Chicago, Metropolitan Water Reclamation District of Greater Chicago, and all Great Lakes States. Preventions and control efforts being implemented build upon the recommendations in the Management and Control Plan for Bighead, Black, Grass, and Silver Carps in the United States.

The resources provided through the GLRI are fundamental in the battle to prevent Asian carp from developing self-sustaining populations in the Great Lakes. In fiscal year 2011, GLRI funding will support new initiatives, including expanding environmental DNA testing capacity and developing and implementing cutting-edge biological controls and monitoring technology to protect the natural resources of the Great Lakes ecosystem.

--Mike Weimer, ARD Fisheries



The Service is an active partner in the Asian Carp Regional Coordinating Committee. Service photo.

Battling Asian Carp in the Great Lakes Basin



A bighead carp found in 2009 during a rotenone treatment in the Chicago Sanitary and Ship Canal. Service photo.



Though rarely found on the menus of restaurants in the United States, Asian carp are valued cuisine in China. Service photo.



Aerial image of Operation Pelican in the Chicago Area Waterway System. USCG photo.



Illinois Department of Natural Resource and Service fisheries biologists Vic Santucci (left) and Aaron Woldt (right) show Senator Durbin and former Congresswoman Halvorson Asian carp specimens that were recovered from the Illinois River. Service photo.

Lake Sturgeon and the Menominee River

Lake Sturgeon and the Menominee River

The Menominee River, a major tributary to Lake Michigan, forms the border between Wisconsin and Michigan. This picturesque river once featured several waterfalls, which made good sites for hydroelectric dams. Those same cascades were at one time also ideal habitat for lake sturgeon, which migrated upstream from Lake Michigan to spawn there.

Today, five hydro dams prevent all lake sturgeon from migrating up the river from Lake Michigan to get to their prime spawning and rearing habitat. This loss of habitat, along with pollution and overfishing, has caused a drastic decline in the number of lake sturgeon in Lake Michigan, from an estimated two million at their peak to about 3,000 sturgeon today – more than a 99 percent decline. Today, lake sturgeon that try to migrate upstream can only get as far as the last dam on the Menominee, at the cities of Marinette and Menominee. This area is poor sturgeon habitat, and most young sturgeon cannot survive there.

The Menominee Fish Passage Partnership, comprised of state and federal agencies, nonprofit conservation organizations and a private energy company, is developing safe and effective

ways for lake sturgeon to move around the dams.

The initial focus of this project is the two hydro dams found at Menominee, Mich. and Marinette, Wis. There, the partnership will build a bypass to enable downstream-moving fish to get through the upper dam, and will build an elevator (fish lift) at the lower dam to help move lake sturgeon upstream. Several hundred sturgeon will be moved around the dams by the time these structures are completed. By the year 2020, the partnership expects that tens of thousands of new lake sturgeon will be produced, aided by their being able to get to ancient spawning territory.

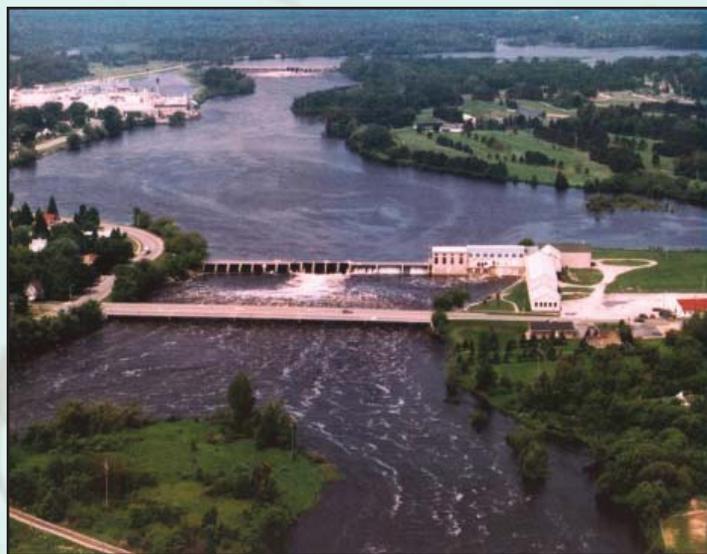
The National Fish and Wildlife Foundation and the U.S. Environmental Protection Agency contributed \$3 million in funding for fish passage around the lower two dams on the Menominee River through the Great Lakes Restoration Initiative. The dams' owner, North

American Hydro, will contribute nearly \$1.4 million to complete the initial work. In addition, North American Hydro will operate the fish passage as part of their normal hydropower operations, with assistance from state and federal wildlife agencies.

The goal for the resource agencies and non profits involved in this project is to raise enough public and private funding to provide passage for sturgeon at five hydro dams on the Menominee River, by 2020.

--Nick Utrup

Below: North American Hydro's Menominee River Dam is part of the fish passage project. Service photo.



Lake Sturgeon Accomplishments

Lake Sturgeon Accomplishments

- Acquired a trailer and equipment for building a stream side rearing trailer unit to imprint lake sturgeon for stocking into the Kalamazoo River, Mich.
- Hired fish biologists and obtained equipment to conduct eight surveys to assess sturgeon populations in the Bad and White Rivers in Wisconsin, Detroit, Kalamazoo, and Ontonogon Rivers in Michigan and the Niagara River in New York.
- Provided assistance to maintain the five existing lake sturgeon stream side rearing units operating on Lake Michigan that will stock over 6,000 fingerling sturgeon in 2011.
- Provided technical assistance to design passage of lake sturgeon over the Park Mill and Menominee hydroelectric dams on the lower Menominee River in Lake Michigan.



Above: Genoa NFH Lake Sturgeon Mobile Rearing Unit. Service photo.



Above: Mark Luehring and Josh Schloesser with a 74 pound adult sturgeon. Service photo.

Michigan Fish Passage Projects

Michigan Fish Passage Projects

In Fiscal Year 2010, the Great Lakes Restoration Initiative supported 12 fish passage projects around the Great Lakes Basin. The projects funded through GLRI, with U.S. Fish and Wildlife Service partners, will remove 10 barriers to aquatic organism movement, reopen 90 miles of stream habitat, and assess and prioritize current barriers for future removal.

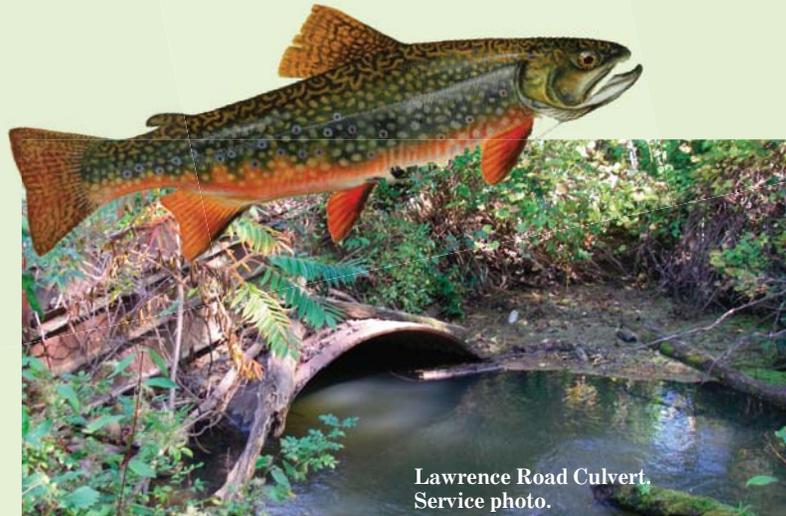
Salmon Trout River Watershed and the High Bank Creek, two of the 12 GLRI funded fish passage projects, illustrate the environmental gains these types of restoration projects provide.

Salmon Trout River Watershed

Three perched culverts located at a single site are a barrier to fish passage in the Salmon Trout River watershed and will be restored in 2011. A new single bottomless culvert will be installed to create a natural stream channel and



Above: Construction projects, like the one at Pendills Creek National Fish Hatchery pictured here, boost the Service's capacity to rear trout while concurrently benefiting local economies through the use of local contractors. Service photo.



Lawrence Road Culvert. Service photo.

restore passage for native fish and other aquatic life. The Salmon Trout River is located in Northern Marquette County, Mich., and is a popular recreational trout fishing stream in Michigan's Upper Peninsula. The lower Salmon Trout River is home to one of the last surviving populations of naturally reproducing coaster brook trout in the Lake Superior Basin.

One of the primary sources of impact to the Salmon Trout River and its coaster brook trout population is sediment from road crossings. This sediment negatively impacts native brook trout and other fish spawning habitat, so the project is engineered in a manner which will control and reduce erosion and sediment to the stream. In addition, the proposed work will implement key recommendations of the Salmon Trout River Watershed Management Plan and other basin-wide plans and initiatives.

High Bank Creek

High Bank Creek is a tributary to the Thornapple River in Barry County, Mich. The creek has steep banks and is designated a top-quality warm water stream in its upper one-third. The Lawrence Road culvert and the Morgan Dam are two fish passage barriers that restrict movement of resident fish species in High Bank Creek. The culvert is undersized, partially collapsed, and submerged on both ends during low flow conditions. Morgan Dam was the former site of a grist mill in the 1940's. Then in the 1960's the dam's cement abutment walls were knocked down to reduce the safety hazard caused by the collapsing dam. In the late 1960's or early 1970's the impoundment was drained, and the mill race was filled with dirt. Today, boulders and cement slabs from the dam prevent passage of native fish and constrict the stream channel. Removal of both barriers will restore a free flowing condition and open up 30.9 creek miles for passage of native fish.

--Brian Elkington and Mark Holey

Lake Trout Restoration Projects

Lake Trout Restoration Highlights

- Reared 300,000 more lake trout to achieve restoration stocking targets for all five Great Lakes because of facility improvements at National Fish Hatcheries in Michigan (Jordan River and Pendills Creek), Massachusetts (Berkshire), New Hampshire (White River), Pennsylvania (Allegheny), and Wisconsin (Iron River and Genoa).
- Increased capacity to rear lake trout by enhancing the ability of United States to support its obligation to the 2000 Consent Decree - a federal court order to achieve tribal and state lake trout management objectives within the Treaty of 1836 waters.
- Completed facility enhancements that prepare federal hatcheries for the mass marking of stocked lake trout and evaluation of the lake trout restoration program using the returns of coded wire tagged fish.
- Increased the efficiency of the Service's lake trout hatchery program with improvements to disease monitoring, egg collections for brood stock development, and fish delivery tanks.
- Completed the development of the bottom trawling and hydro acoustic survey capabilities of the Service's 95 foot stocking and assessment vessel, the M/V Spencer F. Baird, and subsequently improved the evaluation of the lake trout restoration program.
- Completed the survey and assessment of six Great Lakes lake trout populations.

--Mark Holey



Above: Fisheries Scientist Charles Bronte examines a lake trout from Lake Michigan. GLRI has helped to augment Service efforts to increase lake trout populations in the Great Lakes. Service photo by Robert Elliot.



Above: The new free span bridge was built by the Iron County Forestry Department. This view is looking downstream. U.S. Fish and Wildlife Service student employee, Tyler Martin, is as happy as the fish. Service photo.

A Return to Wetlands: Shiawassee

The goal of the Shiawassee Flats Floodplain Wetland Restoration Project is to restore a 141-acre farm field to a Flint River floodplain wetland at Shiawassee National Wildlife Refuge in Michigan. The former wetland was fed by floodwaters of the Flint River. Almost 100 years ago it was ditched and tiled, and a dike was constructed that completely segregated the site from the river. Additionally, the site has been continuously pumped to keep it dry enough for farming. This restoration project will bring back wetland habitat for wildlife, increase floodwater storage capacity, and improve water quality in the Saginaw Bay Watershed.

This restoration project relies on the installation of dikes and water control structures to reverse the effects of prior drainage practices. It creates a direct hydrologic link to the Flint River, enabling it to flood back into this section of the floodplain. With restoration of this hydrology, wetland plant communities will return and attract a great diversity and abundance of wildlife, including waterfowl, shorebirds, wading birds, and innumerable other forms of life. Consequently,

this project supports the long term habitat management goals the North American Waterfowl Management Plan and the Upper Mississippi River/Great Lakes Region Joint Venture, the U.S. Shorebird Conservation Plan for the Upper Mississippi Valley/Great Lakes Region, and the Partners in Flight Bird Conservation Plan for the Upper Great Lakes Plain. This program will benefit numerous U.S. Fish and Wildlife Service Midwest Region fish and wildlife conservation priority species and Birds of Conservation Concern, as well as a long list of species identified in the Michigan State Wildlife Action Plan as endangered, threatened, special concern, or of greatest conservation need.

The expected ecological benefits from this project and its location five miles upstream of the Saginaw River and Bay Area of Concern will contribute to the delisting of at least three of the Beneficial Use Impairments identified for this Area of Concern, including loss of fish and wildlife habitat, degradation of fish and wildlife populations, and eutrophication and undesirable algae.

This project will also improve recreation opportunities for refuge visitors. The site is directly adjacent to the refuge's new auto tour route. The restoration of wetlands in place of soybean fields will greatly increase opportunities for wildlife observation and photography. Further, it is located next to the first parking area where visitors can get out to take closer looks at wildlife.

The Shiawassee Flats Floodplain Wetland Restoration Project is a collaborative between the Service, Ducks Unlimited the Shiawassee Flats Citizens and Hunters Advisory Council, and the Saginaw Bay Watershed Initiative Network. However, it could not have been completed without funding through the GLRI. --Steven Kahl



Above: The first GLRI Service project to be completed, Shiawassee demonstrates the power of partnerships. Service photo.



Above: The Shiawassee project restored 141 acres of high quality emergent wetlands. It also created more than 1,500 man hours for local contractors. Service photo.

Great Lakes Fish and Wildlife Restoration Act

The Great Lakes Fish and Wildlife Restoration Act is the primary federal program dedicated to restoring and protecting important fish and wildlife and the habitat they depend on in the Great Lakes region. The act provides grants on a competitive basis to states, tribes, and other groups. It supports monitoring, research, and on-the-ground solutions to restore degraded habitat, preserve healthy habitat, and re-establish healthy populations of fish and wildlife. The act is a key tool for implementing the Great Lakes Restoration Initiative Action Plan for fish and wildlife restoration and protection.

In 2010, the Great Lakes Restoration Initiative provided \$8 million of grant funding for the act. Of the 167 proposals

received, the Service funded 11 projects ranging from \$34,755 to more than \$2 million. The projects themselves focus on restoring a number of different habitats around the region as well as investigating issues that affect Great Lakes species and their habitats. These include the restoration of 5,700 acres of wetlands, reconnection of 240 miles of river habitat, reopening 62 miles of river habitat currently blocked by barriers, assessing and developing conservation strategies for native mussels in coastal areas of the Great Lakes, predicting climate change impacts on Great Lakes reptiles, updating the National Wetlands Inventory to determine changes in Great Lakes wetlands, describing the risk and ecology of the Viral Hemorrhagic Septicemia fish disease, evaluating lake sturgeon

restoration in Green Bay, and comparing reproductive and genetic differences among Lake Superior lake trout types.

Projects funded by the act are reviewed by the 24-member Proposal Review Committee (members are fish and wildlife staff from the Great Lakes states and tribal natural resource agencies) and from outside peer review. The extensive agency and peer review fosters a strong partnership between federal, tribal, and state fish and wildlife agencies and ensures that projects funded address the most pressing fish and wildlife restoration issues in the Great Lakes.

--Brian Elkington and Mark Holey

GLFWRA Projects this year using GLRI Funds

- **River Care: A Framework for Restoring Stream Connectivity and Habitat in the Upper Great Lakes, \$750,000, Conservation Resource Alliance, Michigan.**
- **Shiawassee Flats Wildlife and Fish Habitat Restoration – Michigan, \$589,199, Michigan Department of Natural Resources.**
- **Assessing Wetland Change in the Great Lakes, \$112,500, Ducks Unlimited, Michigan.**
- **VHSV: Disease Ecology and an Analysis of the Risks in the Great Lakes Basin, \$230,724, Michigan State University.**
- **First Phase Removal of the Ballville Dam, Sandusky River Tributary to Lake Erie, \$2 million, Ohio Department of Natural Resources.**
- **Assessment of Lake Sturgeon Restoration Efforts in Green Bay, Lake Michigan, \$118,276, Wisconsin Department of Natural Resources.**
- **Quantifying Genetic, Phenotypic, and Reproductive Differences of Siscowet and Lean Lake Trout Reared in a Controlled Environment, \$79,856, University of Wisconsin-Milwaukee.**
- **Conservation of Native Freshwater Mussel Refuges in Great Lakes Coastal Zones, \$381,168, Central Michigan University.**
- **Predicting Climate-change Induced Distributional Shifts in Great Lakes Region Reptiles, \$34,755, Northern Illinois University.**



Above: Removing barriers to stream connectivity improve ecosystem health and defragment habitats and populations. Photo courtesy of the Conservation Resource Alliance Service.

Fisheries Restoration Highlights from the Lower Great Lakes



Above; Biological Technician Vanessa Pereira holds a 2.5 kilogram, 760 millimeter long lake sturgeon that was collected, tagged and released in the lower Niagara River. Service photo by Betsy Trometer.



Above: Juvenile sturgeon. Service photo.

Lake Sturgeon Population Status Assessment and Identification of Lake Sturgeon Spawning Habitat in the Lower Niagara River and Bar

Prior to the European settlement of the Great Lakes region, lake sturgeon were a dominant species of large rivers and nearshore areas with populations estimated in the millions. Overfishing and ecological degradation of their spawning areas leaves us today with remnant populations. The Niagara River has one of the few remaining remnant populations of lake sturgeon in Lake Ontario. The goals of this study are to estimate population abundance and survival, determine age class structure, improve habitat suitability models and identify spawning habitat in the lower Niagara River and Niagara Bar. In 2010, 28 sturgeon were marked and aged and field work will resume in spring 2011. This study is a collaboration of the Service's Lower Great Lakes Fish and Wildlife Conservation Office and Northeast Fishery Center.

Fisheries Restoration Highlights from the Lower Great Lakes



Above: Road-crossing over Honeoye Creek; identified by field assessment to block fish passage. Service photo by Ray Li.

Habitat use, Movement and Genetic Composition of Lake Trout in the Niagara River and Niagara Bar

Lake trout are found in the Niagara River and on the Niagara Bar from fall through spring. It is suspected that lake trout are successfully spawning in the Niagara River and on the Niagara Bar. In this study, we are identifying potential spawning areas as well as the lake trout strains utilizing the river and bar. In November 2010, radio tags were attached to 18 lake trout for tracking to identify spawning areas. In addition, genetic analysis of tissue samples collected from those adults and collected eggs will help identify the strains of lake trout that are reproducing in the river. This study is being conducted in collaboration between the Service's Northeast Fishery Center, Lower Great Lakes Fish and Wildlife Conservation Office, and the Pennsylvania State University USGS Cooperative Research Unit.

Conserving Native and Recreational Fisheries in the Lower Great Lakes

Prioritizing Fish Passage Restoration Activities in the Lake Ontario Plain: The Lake Ontario plain supports diverse stream fish and mussel communities; however road-crossings can significantly fragment stream corridors and restrict their movement to critical habitats. Over 1,000 road-crossings over streams were field assessed to identify and inventory barriers, and a Geographic Information Systems database was developed to prioritize interagency efforts to restore fish passage. Field assessment and inventory work will continue through the summer of 2011.



Above: Fish Biologist Dmitry Gorsky with a radio tagged lake trout being released into the lower Niagara River for tracking in November, 2010. Service photo by Betsy Tromete.

Updating the National Wetlands Inventory for the Great Lakes Basin

With the assistance of Great Lakes Restoration Initiative funding, Ducks Unlimited is working with the U.S. Fish and Wildlife Service and state governments to update and upgrade the 30 year old National Wetlands Inventory for the Great Lakes Basin. The Service is the principal federal agency that provides information on the extent and condition of the country's wetlands, providing data that helps the NWI to track wetland gains and losses. The health and location of wetlands is used by all on-the-ground wetland and habitat restoration organizations to target high priority areas in need of restoration. Ducks

Unlimited and the U.S. Fish and Wildlife Service also use this information to predict waterfowl and wildlife populations over time.

Beyond providing homes for fish and wildlife, wetlands also provide important services to humans. Wetlands have the ability to hold and slowly release flood water and snow melt. They also recharge groundwater, recycle nutrients and act as natural filters for water. A dynamic landscape feature, wetlands provide an ideal setting for outdoor recreation and wildlife viewing opportunities.

Wetlands are natural features of the environment, and as such do not correspond with jurisdictional boundaries, such as county or state lines, that are often used to delineate where management responsibilities fall. NWI is an important tool that provides seamless information across county, state, tribal and international boundaries, illustrating the need for collaborative planning in wetland management activities.

--Brian Huberty



The National Wildlife Refuge System provides quality wetlands for outdoor recreation. Service photo.

Upper Midwest and Great Lakes Landscape Conservation Cooperative

Working with the U.S. Environmental Protection Agency's Great Lakes Restoration Initiative and a number of conservation organizations across the Great Lakes, the U.S. Fish and Wildlife Service has encouraged the development of an Upper Midwest and Great Lakes Landscape Conservation Cooperative. Representing the collective work of all partners, the LCC builds the tools necessary to ensure efficient and effective on-the-ground conservation action.

The knowledge and tools developed by the LCC will help partner organizations effectively address the stressors impacting our natural resources. As the U.S. Fish and Wildlife Service, and the entire Great Lakes conservation community increasingly shares in the development of goals and metrics of progress, so must we develop and share the science that will help us become more effective and efficient in actions taken. In other words, we must

decide what is important and what is less important, based on desired outcomes, not simple outputs.

In 2010, the LCC community, consisting of state and federal agencies, tribes, and NGOs reviewed science needs and prioritized a list of projects designed to help deliver on-the-ground actions. All of the following are underway:

- **Down-scaled Climate Data** extends existing down scaled daily climate projections of maximum and minimum temperature, precipitation, and snow pack for Wisconsin to the entire Great Lakes region. This will allow region-wide assessments of species vulnerability, potential land use changes, and climate adaptation strategies.
- **Identification of Climate Vulnerable Terrestrial Species and Natural Communities** integrates a climate change sensitivity database developed for terrestrial species in the region with selected national/regional climate change vulnerability assessments (e.g., State of the Birds 2010). This effort will zero in on some of the region's most climate vulnerable species and communities so that regional adaptation strategies can be developed.

- **National Wetlands Inventory Mapping** improves digital wetland mapping capabilities and improves mapping results for forested wetlands in Michigan, Minnesota and Wisconsin. More economical and more accurate identification and characterization of forested wetlands for the northern half of the Upper Midwest and Great Lakes LCC are needed to ensure the wise management of these important resources region-wide.

- **Information Network for Optimizing Resource Management** ensures the shared development, ownership, and maintenance of scientific data and knowledge related to conservation actions in the Great Lakes. Ensuring that relevant scientific knowledge is accessible to and understandable by natural resource managers, as well as applicable to the management challenges they face, is critical to justifying our investment in that science.

--Craig Czarnecki and Brian Anderson



“Scientists and resource managers need to have new and more effective opportunities to collaborate, communicate, and develop scientific direction to inform resource management.” --Draft Department of Interior CSC/LCC Guidance

Improving Wetlands to Promote Bird Diversity

The Hunneyman Road Wetland Enhancement and Restoration project is in the Town of Alexandria, N.Y. The 100 acre wetland complex is located near the headwaters of Crooked Creek and had been altered through past human activities, ultimately resulting in large expanses of cattail stands with little habitat diversity.

Muskrats (*Ondatra zibethicus*), much like their larger cousins beavers (*Castor canadensis*), are highly effective landscape engineers. If initial conditions are suitable, they are known to affect vegetation structure and increase habitat diversity. In the case of Hunneyman Road Wetland, water levels were too low and the muskrats that were there were confined to a small area of deep water habitat. The Service worked with a private landowner, the Wetland Trust, and the New York State Department of Environmental Conservation to enhance the wetland. The plan was to raise water levels by eight inches to



Above: Wetland restoration will improve shoreland bird and waterfowl diversity like these mallards. Service photo.

provide deeper water to make the wetland more suitable for muskrats. Muskrats are desirable species because they reduce standing biomass and are known to increase plant species richness, which in turn increases bird species diversity in the marsh.

In June 2010, the Service used Great Lakes Restoration Initiative funding to install 678 feet of plastic sheet piling to create deeper water habitat which would allow muskrats to move into the entire 100 acre wetland complex. The

results were almost immediate. By July, water levels in the wetland were at the designed levels and by the end of August muskrat huts were popping up throughout the complex. Although it is too early to assess vegetative response to the muskrat “treatment,” our expectation is that plant communities will diversify and bring with it the diversification of waterbirds and waterfowl utilizing the site.

--Gian L. Dodici



Left: Muskrat hut from the Hunneyman Road Wetland enhancement project. Service photo.

Detection and Identification of Emerging Contaminants

Throughout the past five decades, the Great Lakes have been severely degraded by chemical pollutants such as polychlorinated biphenyls and the pesticide DDT. Had we known the dire consequences of these chemicals in the environment, we may have prevented this catastrophe. Today, there is a substantive increase in the occurrence and detection of new or “emerging contaminants” in the Great Lakes. Some classes of emerging contaminants have been shown to cause adverse effects, such as feminization of male fish, not evaluated in traditional toxicity testing protocols. These contaminants are frequently not regulated or inadequately regulated by state or federal water quality programs. Knowledge of the potential adverse impacts of these contaminants may facilitate actions to avoid or minimize their effects. Failure to identify and understand their impacts on fish and wildlife resources may result

in deleterious impacts to Great Lakes resources that can result in adverse ecological, economic, and recreational consequences.

To address this growing concern, the Service’s Environmental Contaminants Program in Regions 3 and 5 has initiated the “Early Warning Program to Detect and Identify Emerging Contaminants and Their Effects on Fish and Wildlife” funded through The Great Lakes Restoration Initiative. The Service is partnering with the U.S. Geological Survey and U.S. Environmental Protection Agency’s Mid-Continent Ecology Division to evaluate not only the presence but also the effects of emerging contaminants, many of which are considered endocrine disruptors, on fish and wildlife in the Great Lakes Basin.

Five Area of Concern sites within the Great Lakes Region (St. Louis River, Duluth, Minn.;



Above: Emerging contaminants project sampling locations. Service credit.

Fox River, Green Bay, Wis.; Detroit River, Detroit, Mich.; Genesee River, Rochester, N.Y.; and Maumee Bay- Swan Creek, Toledo, Ohio) were selected for the first year of the project with additional sites being added in future years. Water and sediment were analyzed for more than 150 emerging contaminants in the following categories: pharmaceuticals, hormones, personal care products, plastic components, pesticides and synthetic fragrances. Fish were evaluated for a subset of the above chemicals along with bioindicators including general fish health assessment, reproductive and growth indicators, and changes in cells or tumor growth.

This project represents a landscape scale approach being applied across the Great Lakes Basin to address a potentially increasing threat to fish and wildlife resources. Results from this effort may be used to recommend controls and/or regulations on these contaminants or resource management actions to prevent or reduce their adverse impacts.

--By Annette Trowbridge

The Genesee River in New York has a history of, and continues to be subjected to, various point and non point source pollutants including discharges from sewage, industrial waste water treatment plants and combined sewer overflows, and source pollutants from agricultural and urban runoff. Sampling efforts were led by the U.S. Fish and Wildlife Service New York Field Office. Media collected for emerging contaminant analysis included water, sediment, and fish.

– MaryEllen VanDonsel

Great Lakes Basin Areas of Concern

Discharges of toxic and persistent chemicals to the Great Lakes have been greatly reduced over the past 20 years, however contaminants still residing in sediments remain a substantial risks to aquatic organisms and wildlife. The Great Lakes Basin has 43 Areas of Concern -- areas that are severely degraded as defined by the U.S.- Canada Great Lakes Water Quality Agreement. These are geographic areas that fail to meet the general or specific objectives of the agreement where such failure has caused or is likely to cause impairment of beneficial use of the area's ability to support aquatic life. Simply stated, these are toxic hot spots most in need of cleanup and restoration.

The U.S. Fish and Wildlife Service, through the Great Lakes Restoration Initiative, has invested over \$5 million in 2010 to clean up these contaminated areas and to implement necessary remediation to restoration activities. Working in collaboration with state and local partners, the Service is working at AOCs across all the Great Lakes to identify cleanups necessary

to remove contaminants that impair beneficial uses and identify habitat enhancement and restoration opportunities. One area where this is being realized is the St. Louis River in northeastern Minnesota and northwestern Wisconsin; the largest U.S. tributary to Lake Superior.

The Service is working with partners, including the St. Louis River Alliance, to protect, enhance, and restore fish and wildlife habitat in the Lower St. Louis River AOC. The focus of the partnership is to develop and implement the St. Louis River System Remedial Action Plan to remove beneficial use impairments for fish and wildlife. The GLRI has provided momentum to these efforts in the St. Louis River AOC. Ongoing work at the 40th Avenue West project is proof of progress forward.

The 40th Avenue West ecological design project will guide management decisions for sediment remediation, substrate enhancement, and habitat restoration. The result will be restored ecological function at a site degraded by past industrial activity. The

project provides for a detailed ecological characterization of the site's sheltered bay and shallow flat area (vegetation, benthos, and use by birds), develops and tests restoration scenario models, and will result in a site-specific ecological restoration design. Additionally, the restoration scenario models will be applied to other planned remediation to restoration projects in the AOC.

Activities like the 40th Avenue West project are an important piece of a very complex puzzle in the St. Louis River AOC. The historical activity, current industrial use, and sheer size of this vast 12,000 acre estuary all contribute to a complicated approach for removing the St. Louis River from the AOC list. Through working partnerships at the local, state and federal levels, continued investment in these degraded areas, persistence, and a little patience, we can begin to classify these areas as "Areas of Conservation."

--Amy McGovern and Patrick Collins

St. Louis River AOC Aquatic Vegetation (waterlily).
Photo courtesy of Patrick T. Collins.



Piping Plover Recovery: A Bellwether for the Great Lakes

Imagine a nice, sunny, summer day in the Great Lakes region. The temperature is 80 degrees and there is a gentle, wispy breeze. Sounds like a great day to pack your cooler, grab your sandals, and head out to the local beach. Great Lakes beaches provide perfect opportunities for a summer picnic, an evening stroll, or a refreshing dip in the lake. Some of these same beautiful, sandy beaches are also the perfect home for an endangered shorebird: the piping plover.

Historically piping plovers nested along the shorelines of all five of the Great Lakes and its population was estimated at around 500 pairs. Today, plovers are found nesting at a small number of sites along Lakes Michigan and Superior. In 2010, its population was limited to just 60 breeding pairs. This small population size makes this species extremely vulnerable to extinction. The Great Lakes piping plover population, however, has seen a significant population increase from the meager 17 pairs identified in 1985, when it was listed under the Endangered Species Act. In addition, piping plovers have been expanding and re-colonizing historic nesting sites throughout the Great Lakes. We hope these occurrences serve as a bellwether for the future of plovers and for the improving health of the Great Lakes as a whole.

The listing of the species under the Endangered Species Act triggered conservation efforts to ensure this species' survival. Multiple threats, including loss of nesting habitat, human disturbance



Above: Hundreds of miles of Great Lakes shoreline are surveyed each summer for piping plover. Once nests are found, staff and volunteers erect wire enclosures around nests to reduce predation by skunks, raccoons, and foxes.

Photo courtesy of Alice Van Zoeren.

during sensitive nesting periods, and loss of adult, chicks or eggs to predators, are the primary reasons for this species endangered status. To address these threats, the U.S. Fish and Wildlife Service works alongside a myriad of state, federal, and private partners to implement a multi-faceted recovery program. Recovery actions undertaken annually include: finding and protecting plover nests, landowner and beach user education, banding and research, salvaging and rearing abandoned plover eggs, and managing predators.

Funding through the Great Lakes Restoration Initiative has assisted with every aspect of our piping plover recovery program. It allowed us and our partners to hire staff and fully protect and monitor all of our nesting sites. It provided funding to operate the salvage captive rearing program managed by the Detroit Zoological Society. It assisted with banding and research efforts led by professors and students at the

University of Minnesota. Finally, it supported the development of a predator management plan that will be utilized at sites through the Great Lakes. Together, these Great Lakes Restoration Initiative related activities resulted in finding, protecting, and monitoring 60 pairs of piping plovers at approximately 21 sites throughout the Great Lakes. These pairs produced 93 chicks that survived to fledgling (flying) stage. The captive rearing program produced an additional 14 fledglings that were released back into the wild.

Support of the piping plover recovery program through the Great Lakes Restoration Initiative has helped ensure the continued survival of this rare and unique part of our Great Lakes heritage. With continued effort and success, we expect more Great Lakes residents will have the experience of seeing or hearing a piping plover on their next trip to the beach.

--Christie Deloria-Sheffield

Wind Power: Making it Wildlife Friendly

The shorelines, islands, and offshore areas of the Great Lakes provide excellent wind power resources for wind power development. However, the shorelines and open water areas are also important habitat for many bird and bat species, particularly during the migration season. The U.S. Fish and Wildlife Service, wind project developers, regulators, and others need better information regarding: shoreline migration corridors and stopover habitat for birds and bats, utilization of Great Lakes islands by migrants and breeding birds, and migration and use over open water (pelagic) areas.

The primary purpose of this project is to identify areas where wind projects may be developed safely from a bird and bat impact perspective. The knowledge gained will also be useful in protecting areas important to migrating birds from other habitat impacts and would help identify key areas throughout the Great Lakes that are critical to the many bird and bat species that migrate across and around the Great Lakes. Finally, the data obtained from the studies will identify



areas where additional analysis is necessary to ensure that wind power is developed in a manner that is protective of bats and migratory birds.

Techniques for collecting this data are still being evaluated, but potential techniques include combinations of avian marine radar, acoustic/ultrasonic detectors, mist netting and bird banding, aerial and boat surveys, digitization of historic bird observations, and modeling. Generally, highest priority data

collection will be for the landward side of shore areas, second priority for islands, and third priority for offshore areas since that is the anticipated order of wind development.

Data gained from the surveys will be analyzed and incorporated into a spatial model to predict areas of relatively high and low risk for birds, relative to wind power development. Data will be incorporated into the Great Lake Wind Collaborative's Wind Atlas, which is a database of multiple data layers available to wind developers and the public to facilitate environmentally sensitive wind project siting decisions. It will also be shared with state Department of Natural Resources, state Power Siting Authorities, federal regulatory agencies (e.g. the U.S. Army Corps of Engineers) and other partners to aid in siting of wind power projects to protect bats and migratory birds. --Jeff Gosse



Above: Two avian radars were purchased using GLRI funds. Service photo.

Wildlife Inspection Program Gains Efficiency



Above: Chicago-based USFWS employee Jennifer Roth is one of the Wildlife Inspection Program staff that will be trained in using the mobile inspection system. Service photo.

Great Lakes Restoration Initiative funds are supporting the wildlife conservation mission of the U.S. Fish and Wildlife Service's Office of Law Enforcement at ports throughout the Great Lakes Basin. Charged with the responsibility of protecting and conserving native and foreign wildlife through the enforcement of federal laws, the Service's Wildlife Inspection Program, inspects cargo at some of the largest ports in the United States, including Chicago and Detroit. GLRI funds covered the cost of a mobile inspection system that will strengthen existing resource protection efforts by increasing the capacity and efficiency of wildlife inspection screening efforts.

This system is built for on-site, mobile inspections of high volumes of freight—from cargo plane pallets and rail cars, to intermodal containers that

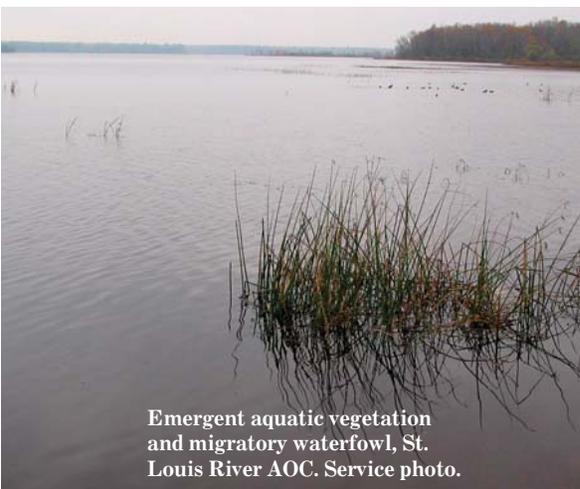
travel via cargo ship. It will be a tremendous asset for wildlife inspectors in their efforts to detect wildlife smuggling and interdict invasive species. Through this technology, wildlife inspectors will get accurate images of contents without the need of opening a parcel or box. This efficiency will allow inspectors to target and inspect large amounts of cargo using less manpower.

The mobile inspection system has computerized X-ray inspection capability with a programmable zoom that magnifies the image from 2 to 32 times. It also features sharp video display on dual 17 inch liquid crystal display flat panel monitors for crisp, real-time inspection. The screening software incorporates unique features designed to optimize threat prevention and product identification. One feature of note is image annotation, a

functionality that allows the operator to draw a frame around a suspect area of the scanned image and enter a reference code. The operator can either save the image for later review or transmit the image to a supervisor workstation for secondary review. Another key feature is Picture Perfect, a scanning process that analyzes and normalizes scanned images in both color and black and white modes, making all areas visible to the operator. Picture Perfect allows for clear identification of multi-layer content.

OLE wildlife inspection officers and special agents will be trained in the use and maintenance of this system in the spring of 2011.

--Tina Shaw



Emergent aquatic vegetation and migratory waterfowl, St. Louis River AOC. Service photo.



Ludington North Breakwater Light House. Photo courtesy of James Marvin Phelps.



Lake Michigan. Photo courtesy of Ani Od Chai.

Signs of Progress

All U.S. Fish and Wildlife Service field sites that are receiving Great Lakes Restoration Initiative funding will be marked by a sign similar to the one pictured below. Marking our field sites is part of our inter-agency agreement with the U.S. Environmental Protection Agency. This funding requirement is designed to increase transparency with regard to the use of GLRI funding and increase public awareness.

U.S. Fish and Wildlife Service

Great Lakes Restoration Initiative



This project is funded through the Great Lakes Restoration Initiative in joint effort with the U.S. Environmental Protection Agency and federal agencies to protect and restore the Great Lakes.

 For more information on Great Lakes Restoration Initiative Projects, please visit www.fws.gov/GLRI

*A lake is the landscape's most
beautiful and expressive feature.
It is Earth's eye; looking into which
the beholder measures the depth of
his own nature.*

--Henry David Thoreau



U. S. Fish and Wildlife Service

2011

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