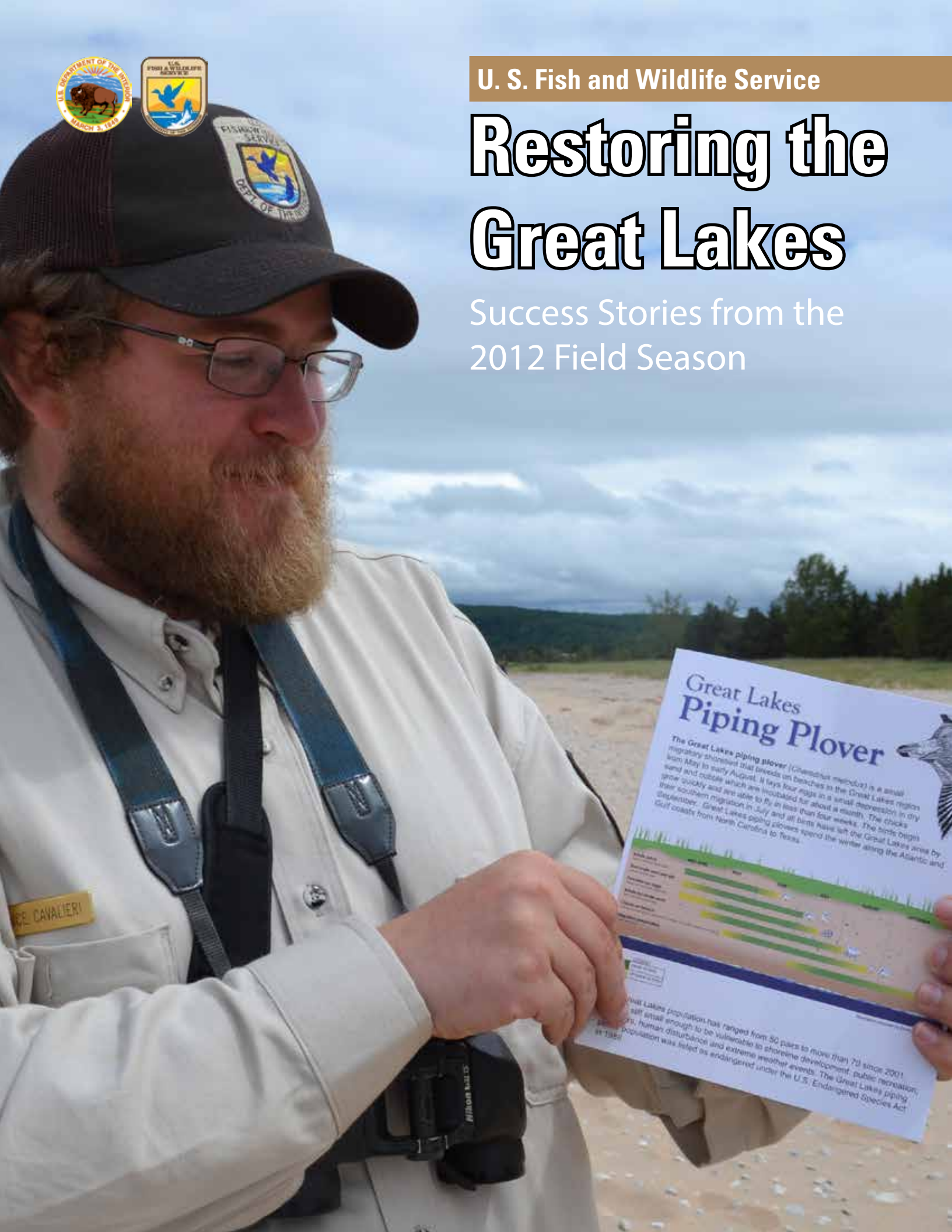




U. S. Fish and Wildlife Service

# Restoring the Great Lakes

Success Stories from the 2012 Field Season



CAVALIERI

## Great Lakes Piping Plover

The Great Lakes piping plover (*Chimichna melanotos*) is a small migratory shorebird that breeds on beaches in the Great Lakes region from May to early August. It lays four eggs in a small depression in dry sand and rubble which are incubated for about a month. The chicks grow quickly and are able to fly in less than four weeks. The birds begin their southern migration in July and all birds have left the Great Lakes area by September. Great Lakes piping plovers spend the winter along the Atlantic and Gulf coasts from North Carolina to Texas.



Great Lakes piping plover population has ranged from 50 pairs to more than 70 since 2001. The population is still small enough to be vulnerable to shoreline development, public recreation, human disturbance and extreme weather events. The Great Lakes piping plover population was listed as endangered under the U.S. Endangered Species Act in 1981.

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On the Cover: Vince Cavallieri from the Service's East Lansing Field Office shows off GLRI funded educational materials on piping plover. Service photo.

# introduction

Dear Reader,

Now in its third year, the Great Lake Restoration Initiative continues to fund priority research and restoration throughout the Great Lakes basin. As we tighten our budgets in a tough economic climate, the Great Lakes Restoration Initiative ensures that our dedicated staff and our project partners have the resources they need to bring positive environmental change to the Great Lakes. Their hard work is needed now more than ever. In addition to 37 million people, the Great Lakes are also home to over 30 Areas of Concern. An AOC is a geographic area that is so polluted that it threatens aquatic life and potentially jeopardizes human health. With the largest group of freshwater lakes on the planet in jeopardy, the time has come to roll up our sleeves and get to work making the Great Lakes cleaner and safer.

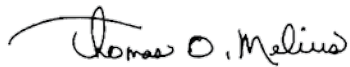
The U.S. Fish and Wildlife Service is proud to be a federal partner in the implementation of the Great Lakes Restoration Initiative and we are excited to share with you our success stories from the 2012 field season. Through an interagency agreement with the U.S. Environmental Protection Agency, the Service received more than \$43.5 million in funding to reduce toxic substances, restore critical habitat, protect wildlife and prevent the movement of invasive species into and throughout the Great Lakes. In our third edition of Restoring the Great Lakes we present only a sampling of the amazing work our staff, field teams and project partners have accomplished with support from Great Lakes Restoration Initiative dollars.

From the small darting figure of the piping plover on the beach to the shadowy form of the mighty lake sturgeon under your boat, you may be surprised to learn how the work of the U.S. Fish and Wildlife Service in the Great Lakes basin is all around you. If the stories within this book spark your curiosity, we invite you out to our national wildlife refuges and national fish hatcheries to learn more not only about 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. We are already planning our 2013 field season and we look forward to sharing our ongoing Great Lakes Restoration Initiative accomplishments.

Warmest regards,

Tom Melius

Regional Director, Midwest Region



Wendi Weber

Regional Director, Northeast Region





# Great Lakes Restoration Initiative (GLRI)



*Bird and bat radar unit*

Credit: USFWS



*Lake trout fingerling after being tagged*

Credit: USFWS



*Lake sturgeon streamside rearing unit*

Credit: USFWS



*Office of Law Enforcement's X-ray van*

Credit: USFWS

## 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 (GLRI) 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 FY 2010 budget invested \$475 million for GLRI. Funding decreased to \$300 million in FY 2011 and FY 2012. 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 (USFWS), to address the most significant environmental concerns of the Great Lakes.

## What is the USFWS’s role in the Great Lakes Restoration Initiative?

The USFWS 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 USFWS was allocated approximately \$69 million in FY 2010, \$37.4 million in FY 2011 and \$43.6 million in FY 2012 to work on projects in the following focus areas:

- **Toxic Substances and Areas of Concern (AOCs):** 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 (AOCs). USFWS will work to restore and protect aquatic ecosystems in the Great Lakes from the threat of persistent pollutants. In addition, the USFWS 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. USFWS activities will work to control and eradicate harmful non-native species in the Great Lakes. An additional \$10 million in GLRI funding was allocated to the USFWS 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. USFWS projects will work to identify, restore, and protect important habitat for the area’s fish and wildlife.

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



(From the top) The Service is working to identify ecologically important areas for birds and bats in the Great Lakes. Millions of lake trout are tagged and stocked into the Great Lakes through the mass marking program. In the streamside rearing unit juvenile lake sturgeon are raised in their natal waters. The mobile X-ray van travels to airports and shipping centers throughout the Great Lakes to prevent the illegal import of potentially harmful invasive species.

**Want more information?**  
Go to <http://www.fws.gov/GLRI>



*Piping plover species recovery*

Credit: USFWS



*Asian carp education and outreach*

Credit: USFWS



*Contaminants of emerging concern research*

Credit: USFWS

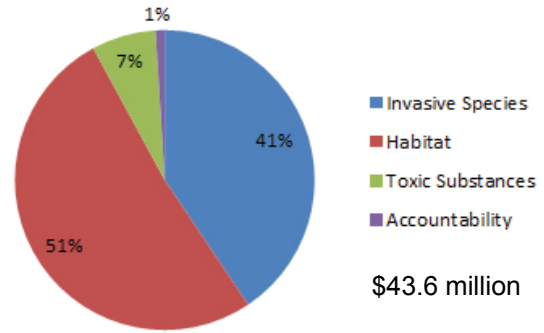
# GREAT LAKES RESTORATION INITIATIVE

## *Proud Partner*

The U.S. Fish and Wildlife Service is a proud partner in the implementation of the Great Lakes Restoration Initiative. Working with our conservation partners and utilizing our field based organization; we help to bring positive environmental change to the Great Lakes region.



**FY 2012 Distribution of USFWS's GLRI Funds by Focus Area**



Diversity and the Great Lakes: GLRI represents the collaborative efforts of a diverse group of stakeholders. Pictured above are State, Federal and Tribal representatives who participated in the Great Lakes Regional Collaboration Conveners Meeting held in Chicago, IL in December of 2004. This group is just a sub-set of the more than 1,500 stakeholders who helped identify needed priority actions in the Great Lakes, many of which are now being implemented through the Great Lakes Restoration Initiative.

**Want more information?  
Go to <http://www.fws.gov/GLRI>**

# GLRI Supports the Great Lakes Fish and Wildlife Restoration Act!

Fish and wildlife restoration needs in the Great Lakes present a management challenge that is staggering in scope and complexity. The Great Lakes Fish and Wildlife Restoration Act provides critical support to implement key research and restoration efforts by prompting actions that “move the needle” in a strategic and effective way. The Act provides grants on a competitive basis to states, tribes, non-governmental organizations, universities, and other groups. It also supports monitoring, research, and on-the-ground solutions to restore degraded habitat, preserve quality habitat, and re-establish healthy populations of fish and wildlife. Key projects have allowed for the restoration of important Great Lakes habitats in cutting edge ways as well as promoting innovation, communication, and accountability.

GLRI has supported the Act by infusing additional funds into an already strong partner led grant process where projects are recommended for funding to the Service by the Proposal Review Committee. The PRC is comprised



Above: Deer Creek, Mich. Conservation Resource Alliance photo.



Grand River, Ohio. Ducks Unlimited photo.

of state and tribal representatives in the Great Lakes basin who review, score, and rank each proposal. The addition of \$8 million in FY2010, \$1.5 million in FY2011, and \$1.5 million in FY2012 to the Act has immensely expanded the amount of on-the-ground work being funded and completed. Although most of these projects are ongoing, many are slated to be completed this Fall. Changes on the landscape have already begun. For example, barrier removals and stream restoration projects have improved habitat connectivity; funds have been used toward long-term protection of lands through conservation easements; and thousands of wetland acres have been restored. Funding has been provided for many important research topics as well, including the mass marking of salmonids stocked in the Great Lakes and as studies on aquatic pathogens, avian migration, and other pertinent restoration concerns.

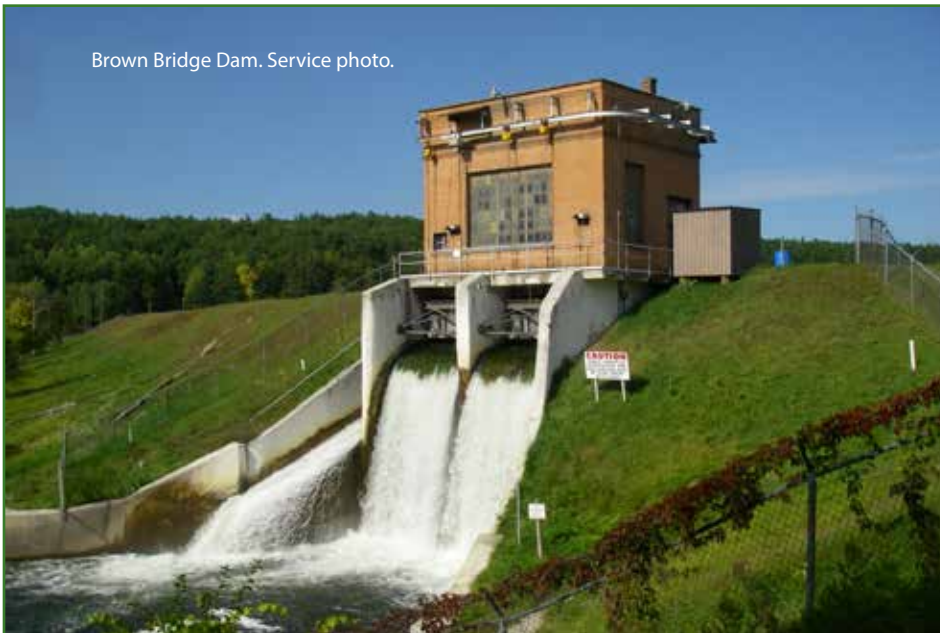
The Act is uniquely designed to provide a high level of on-the-ground restoration work through Service Fish and Wildlife Conservation Offices. Although this work has been ongoing since the Acts’ inception in 1990, its

long standing history and strong PRC led selection process has allowed the Act to effectively utilize GLRI funding to directly increase restoration in the Great Lakes basin. Additionally, GLRI funding also made it possible to utilize a portion of the Act legislation that allows for the selection of regional level projects, which are large enough in scope to directly effect multiple States or Tribes in the Great Lakes basin.

In the past three fiscal years we have received a total of 310 pre-proposals requesting more than \$63 million for projects in the Great Lakes basin. Of those, the Service has funded 23 high quality projects, including three regional projects, all of which are making strides forward in the ecological understanding and restoration of the Great Lakes basin. In the future the Act will continue to be an excellent mechanism for translating available funding into meaningful progress towards the restoration of the Great Lakes ecosystem.



# Great Lakes Fish and Wildlife Restoration Act: How Dollars Become Projects



You may know of the Great Lakes Restoration Initiative (GLRI) and how it benefits native fish, wildlife, their habitats, and water quality; but have you ever thought about how GLRI dollars find their way to the field? The U.S. Fish and Wildlife Service works with many partners to fund successful projects throughout the Great Lakes basin.

Where does the Service's grant money come from? Funding for all GLRI projects is allocated from the U.S. Congress to the U.S. Environmental Protection Agency. The EPA is responsible for distributing these funds to a host of partners, and one is the Service. The two agencies sign an Interagency Agreement which provides funds to the Service to supplement ongoing activities that address GLRI priorities.

Once the IA is signed, funds are distributed to Service programs in the Great Lakes basin. In the instance of the Great Lakes Fish and Wildlife Restoration Act of 2006, funds are given to the Service's Fisheries Program, which is responsible for processing the

grant proposals, obligating funds to selected projects, and working with partners to ensure project objectives are being met. The Act provides funding for grant proposals related to conservation, restoration, research, and management of fish and wildlife resources, and their habitats in the Great Lakes basin through a competitive process to any state, tribe, or interested entity.

The grant process begins when the Fisheries Program places a request for proposals through [www.grants.gov](http://www.grants.gov), the Midwest Region Fisheries Website, and press releases. In fiscal year 2010 alone, the program received 165 pre-proposals requesting nearly \$40.6 million. Once submitted, proposals undergo a competitive review process that ensures the merit of those ultimately chosen. Leading this process is the Proposal Review Committee made up of state and tribal fisheries as well as wildlife representatives, anonymous peer reviewers who are subject matter experts on the proposed projects, and the Service who works with the PRC to ultimately review and select the recommended projects. Projects are

reviewed, scored, and ranked based on eight criteria meant to describe the project. The eight criteria are: 1) importance of problem or opportunity, 2) project impact and scale, 3) target species/ habitats, 4) affects both fish and wildlife, 5) objective and methods, 6) cost value, 7) likelihood of success, and 8) potential for negative impacts.

After a project is selected, the Service develops an official agreement with the successful applicant and funds are obligated. Once the agreement is finalized, and the National Environmental Policy Act compliance is met, the awardee can utilize the funding to achieve project objectives.

An example of a project funded, in part, by the Service's Fisheries Program and Act is the Brown Bridge Dam removal project in Traverse City, Mich. This year the Service approved a \$500,000 grant to the Conservation Resource Alliance to support the removal and restoration of the Brown Bridge Dam. The ongoing Boardman River Dams Project will be one of Michigan's largest dam removal and restoration projects. This Brown Bridge dam removal project is an important first step in what could be a larger effort to remove or modify three additional dams downstream in the Boardman River to improve the ecosystem and fish habitat. Deconstruction of the Brown Bridge Dam is scheduled to begin in late July 2012.

The Brown Bridge Dam removal project funded through the Great Lakes Fish and Wildlife Restoration Act is just one of many ways that the Service transforms GLRI dollars into on-the-ground conservation efforts that work to conserve and restore the unique Great Lakes ecosystem.



# Creating Efficient Conservation Actions Through Collaboration and Sound Science

Research is examining how climate change impacts Great Lakes fisheries. Service photo.



Natural resource managers today are presented with unprecedented challenges that threaten the continued protection, conservation and management of land, water and wildlife, from impacts of climate change to habitat fragmentation and invasive species.

In 2012, the Upper Midwest and Great Lakes Landscape Conservation Cooperative, part of a network of science-driven partnerships aimed at addressing these large scale natural resource stressors, continues to advance the pool of science-based research necessary for land use managers, policy makers and others to make decisions that support long-term sustainability of the Great Lakes, its animals and its people.

Great Lakes Restoration Initiative provided \$500,000 in 2012 to expand research guided by the Upper Midwest and Great Lakes LCC. This ongoing research aims to prioritize terrestrial wildlife and advance fishery management techniques in the face of climate change and build a sound strategy for targeting aquatic

connectivity efforts across the Great Lakes basin.

Researchers from the University of Wisconsin and Wisconsin Department of Natural Resources led an effort among scientists and natural resource managers to identify priority terrestrial wildlife species that may be especially vulnerable to impacts of climate change. Species identified from the research include eastern

massasauga rattlesnake, white-tailed deer, Blanding's turtle, ruffed grouse and snowshoe hare. Researchers are now forging ahead with quantitative vulnerability assessments for a subset of these identified species to determine how climate change may impact future distribution and abundance.

Researchers from U.S. Geological Survey and Ohio Division of Wildlife continue to work to address regional climate change impacts on aquatic food webs in the Great Lakes, with the ultimate goal of adapting fishery management techniques that consider current and continued climate change trends, and more efficiently monitor fishery populations. Research is focused on dominant prey and predator fishes during spring, summer and fall between the central and eastern basins of Lake Erie. This data will allow researchers to understand how certain species respond to seasonal environmental variability in relation to long-term climate change.

Researchers from state and federal natural resources agencies, academic

Below: Eastern massasauga rattlesnake. Service photo.





# Creating Efficient Conservation Actions Through Collaboration and Sound Science

institutions and non-governmental entities across the Great Lakes are continuing to fill knowledge gaps that limit strategic removal of barriers to fish migration. The waterways that connect the Great Lakes with their tributaries are widely fragmented from construction of dams and road crossings. Researchers are working to map the location and attributes of barriers across the basin in relation to fish breeding habitat, which can help decision makers at local, state and regional levels, optimize on-the-ground habitat restoration and fish passage projects, and provide a systematic framework for weighing benefits and costs of barrier removal.

These and other LCC-funded projects continue to transcend boundary lines to generate the most advanced and scientifically grounded data to guide the natural resources communities of the Great Lakes. The partnerships and data produced are critical to informing the protection and conservation of these unique and valuable natural resources.

For the most up to date information of Upper Midwest and Great Lakes LCC activities, visit: [greatlakeslcc.org](http://greatlakeslcc.org)



Great Lakes Restoration Initiative provided \$500,000 in 2012 to expand research guided by the Upper Midwest and Great Lakes LCC.

With our various federal, state, tribal, and public partners we are conducting cooperative research to address pertinent issues. Service photo.



# Permanently Protected: 286 Acres of Erie Shorelines and Wetlands



Lake Erie Shoreline,  
Pennsylvania. Service photo.

Portions of the pristine Lake Erie shoreline, Elk Creek and associated wetlands and riparian corridors near Erie Bluffs State Park, will be permanently protected for conservation and recreational use as part of the David M. Roderick Wildlife and Lower Elk Creek Natural Heritage Area in Erie County, Penn. The Atlantic Coast Joint Venture utilized Great Lakes Restoration Initiative funding to support the Western Pennsylvania Conservancy's acquisition of 286 acres of privately

owned property to add to more than 3,600 acres of land in the ecologically diverse region previously protected by the Western Pennsylvania Conservancy. The multiyear project protects approximately 136 acres of wetlands, 780 feet of Lake Erie shoreline and 1,525 feet along Elk Creek.

The acquisition was made possible through public-private collaboration to protect this critically important habitat for migratory birds and other

wildlife, including several rare or endangered species. Safeguarded from residential and commercial development, the land owned and managed by the Pennsylvania Game Commission and Western Pennsylvania Conservancy will provide public access for fishing and recreational opportunities along Elk Creek, a high-quality stream and well-known steelhead angling destination, as well as hiking, nature photography, birding, and other recreational activities along the beautiful Lake Erie coastline. A portion of the land was sold by a family-run business Fairview Evergreen Nurseries, Inc., who will reinvest the proceeds from the sale into their business while contributing to the conservation of land no longer viable for nursery production.

Through a combination of more than \$1.25 million in federal, state and partner funding including GLRI dollars, this ecologically diverse region will be permanently protected for a vast array of birds, plants and wildlife, while generating ecotourism opportunities for visitors and residents.



The Western Pennsylvania Conservancy protects 3600 acres of land. Service photo.

# Asian Carp Outreach and Education

What do law enforcement and fisheries management have to do with each other? A lot if you are talking about Asian carp.

Two species of Asian carp, bighead and silver, are listed as injurious under the Lacey Act. The law makes it illegal to transport live bighead or silver carps across state lines. Yet recent law enforcement activities have demonstrated that shipments of live Asian carps are routinely being unlawfully transported across the United States in violation of federal and state laws. Within the last year shipments of live fish have been interdicted at the Canadian border destined for the food markets in Toronto. It is also expected that illegal shipments are hauled to other large cities in the lower 48 states and Canada, where live Asian carp are highly valued in the food market.

In an effort to reduce the illegal transport of live Asian carp,



the Midwest Region's Office of Law Enforcement is launching a new outreach initiative to assist in educating the law enforcement community about Asian carp. With the assistance of the Midwest Fisheries Program and External Affairs, the Office of Law Enforcement created an eight minute video that demonstrates how to identify bighead and silver carp, as well as telltale signs of potential illegal fish haulers. The video is accompanied by an educational brochure that includes photographs of different species of carp as a point

of reference and outlines what an officer should do if he or she encounters a vehicle suspected of illegally transporting live Asian carp.

With support from the Great Lakes Restoration Initiative, the Midwest Region's Office of Law Enforcement is doing its part to help apprehend the companies, drivers, and vehicles that illegally ship live Asian carps in interstate commerce.

Below: Law Enforcement brochure.



## Niagara River Lake Trout Project

Lake trout restoration in the Great Lakes uses hatchery stocking as a management tool to reestablish naturally reproducing populations in each of the Great Lakes. Though natural reproduction in the lower lakes continues to be limited, natural reproduction of lake trout has been documented within the Niagara River, a tributary of Lake Ontario.

Through a GLRI-funded joint project with the Service's Northeast Fishery Center in Lamar, Pennsylvania, and the Lower Great Lakes Fish and Wildlife Conservation Office in Amherst, N.Y., over the past two years lake trout have been observed using the Niagara River for spawning. In 2010, 27 adult fish were sampled and



Above: Graduate student Kelley Salvesen holding an adult female lake trout caught on the Niagara Bar in Lake Ontario. The fish was radio tagged and released. Service photo.

15 of them were radio tagged as a way to identify where in the river the fish are spawning. In 2011, 46 adult fish

were sampled and 29 of them were radio tagged. Eggs and larval fish were collected during the late fall/early winter and then again in the spring when eggs are expected to be hatching.

Within Lake Ontario, multiple hatchery strains are stocked. This project will use genetic analysis of collected samples to identify which hatchery strain is using the Niagara River for spawning to determine if there is any strain-specific movement or spawning site differences, and to determine which of the strains are successful in naturally reproduced offspring. Results from this study will be used to help inform strain selection and stocking practices within the Niagara River area to aid in lake trout restoration.

# Ottawa National Wildlife Refuge: Creating Jobs to Help Restore Lake Erie



Ottawa National Wildlife Refuge staff. Service photo.

In August 2011, the U.S. Environmental Protection Agency announced that the Great Lakes Restoration Initiative was allocating approximately \$6 million for federal agencies to help put Americans back to work and restore the Great Lakes. In effect, the U.S. EPA created a small-scale, 21st century Civilian Conservation Corps. The Ottawa National Wildlife Refuge submitted a grant proposal and was awarded \$480,000 to hire 30 temporary seasonal employees. Creative budgeting and planning yielded an even more positive result, with five additional positions being added, for a total of 35 new hires.

The positions were divided up between the refuge and conservation partners, including the Ottawa County Soil and Water Conservation District, Lake Erie Cooperative Weed Management Association and Black Swamp Bird Observatory. The refuge hired 22 seasonal employees including seven biological science technicians, two park rangers, two maintenance workers, an assistant office clerk, eight Youth Conservation Corps students, an intern and a contract employee to

oversee and coordinate the grant. In addition, refuge partners hired 13 seasonal employees including a wetland educator, several invasive plant technicians and various nonpoint source pollution and other outreach educators. Between new refuge and partner hires, collaborative efforts were implemented to develop and execute various conservation, restoration and outreach programs. These programs focus on GLRI

principal actions as they relate to the National Wildlife Refuge System and partnering organizations.

The refuge with partners have proposed various projects to augment existing refuge and partner programs to benefit coastal wetlands and develop outreach efforts to reach a wider audience. Project examples include:

- Extensive water quality monitoring program in partnership with U.S. Geological Survey staff to establish baseline water quality data, evaluate aquatic resource threats and implications to refuge management and coastal wetland restoration.
- Completion of bathymetric surveys of refuge wetland impounds to provide the refuge with general elevation data and adaptively manage wetlands for migratory birds under looming climate change threats.
- Expansion of the refuge's interpretive and environmental education programs in which park rangers and seasonal staff were able to reach a more diverse audience in order



# Ottawa National Wildlife Refuge: Creating Jobs to Help Restore Lake Erie

to connect youth and adults with nature.

- New GLRI displays, brochures, and other outreach materials including presentations are being developed to deliver a strong unified Great Lakes restoration and conservation message.
- Implementation of invasive plant management in and around Ottawa National Wildlife Refuge including invasive plant mapping, monitoring, and control efforts on the refuge and within watersheds around the refuge.
- Restoration and enhancement of refuge wetlands and other wildlife habitats by seasonal wage grade maintenance workers through installation of dikes, ditches, and water control structures which were in desperate need of repair.

Through GLRI funding and increased employment in the Great Lakes basin, the combined conservation effort has improved and restored refuge water management and has allowed the Service to fulfill its mission in Ohio.



Left: Wildlife Biologist Ron Huffman and Biological Science Technician Joanna Kauffman collect water samples in refuge wetlands to provide baseline data for the Near shore Health GLRI project.

Right: Park Ranger Aimee Weidner conducts environmental education programs for area high school environmental science students.

Service photos.



# The Maumee River Area of Concern: Improving the Health of Streams



Swan Creek before restoration activities.  
Service photo.

Healthy streams are able to assimilate nutrients or other pollutants without becoming degraded.

In addition to controlling sources of nutrients entering waterways, it is essential to preserve the natural physical features of waterways, such as riparian zones, floodplains, channel morphology and habitat diversity. In the Maumee River Area of Concern, efforts are underway to restore features in waterways that flow into Lake Erie and assimilate nutrients.

At Ottawa National Wildlife Refuge in Ohio, efforts are underway to restore some of these properties by reconnecting coastal marshes and establishing fish passage. One marsh has been reconnected to Crane Creek, which flows into Lake Erie. Monitoring shows that nutrients entering the marsh are greatly reduced after pulsing through the reconnected wetland, and fish species diversity and numbers increased. GLRI funds will support some of the monitoring of this and other reconnected wetland, along with habitat restoration at two other refuge

sites. The completed project will result in restoration and enhancement of 512 acres of habitat, along with 127 acres reopened to Lake Erie for fish spawning; improved fish passage; and improved habitat for rare, threatened and endangered species on the refuge. Project partners include The Nature Conservancy, Ducks Unlimited, U.S. Geological Survey, and the National Oceanic and Atmospheric Administration.

In Toledo, the Service is working with partners to restore, enhance and create habitat along the Ottawa River on the main campus of the University of Toledo. Until recently the River here was under a fish consumption advisory due to effects of agricultural and storm water runoff, development, municipal and industrial discharges and hazardous waste disposal. Service funds will enhance stream and stream bank restoration and stabilization efforts. The project will result in about 3,700 feet of contiguous habitat along the Ottawa as well as provide a public demonstration area for restoration of an impaired, urbanized stream system. Partnering with the Service are the U.S. Army Corps of

Engineers, Ohio EPA, Toledo Public Schools, Partners for Clean Streams, Inc., and the University of Toledo's President's Commission on the River.

A project along Swan Creek in Lucas County, Ohio, will enhance habitat in the Oak Openings Region, one of the most ecologically unique areas in the Midwest. In a predominately agricultural area, the wet prairies here are among Ohio's most diverse. Activities include invasive plant control, re-vegetation of farmed areas, creation of vernal pools, and creation of in-stream aquatic habitat. Among the project's benefits are restoration of 8 acres of floodplain; connectivity to adjacent Oak Openings Nature Preserve Metropark; and improved aquatic habitat and water quality in Swan Creek. Partners include the Toledo Metropolitan Area Council of Governments, Lucas Soil and Water Conservation Districts, Ohio EPA, the Maumee River Remedial Action Plan Coordinator, and a private landowner.



Above: Restoration activities in the Maumee AOC will restore waterway flows. Service photo.



# Clear Creek Stream Habitat and Fish Passage Restoration

Stream habitat degradation and fragmentation limit native and recreational fisheries throughout the Great Lakes basin. Like many other streams, Clear Creek located in the Cattaraugus Creek watershed of New York is significantly incised. High channel incision promotes excess bank erosion and sediment aggradation, causes channel instability, and limits ecological and habitat function of streams.

The U.S. Fish and Wildlife Service completed a stream habitat restoration project along Clear Creek in June 2012. Project goals were to: (1) re-establish a bankfull floodplain bench to reduce channel incision, (2) reduce excess stream bank erosion and channel instability, and promote sediment transport, (3) reduce sediment inputs and improve water quality, and (4) restore fish upstream passage above an obsolete sheet-pile dam. Natural channel design approaches including cross-vanes, J-hooks, toewood bank protection, and riparian plantings were installed to restore 2,400 linear feet of in-stream habitat and provide fish passage to six miles of habitat along Clear Creek in Sandusky, Cattaraugus County, New York. Stream habitat and fish passage restoration will support brook trout restoration, and improve recreational brown and rainbow trout fisheries along Clear Creek. The New York State Department of Environmental Conservation maintains 5.5 miles of Public Fishing Rights easements along Clear Creek including the project site. This project will complement other stream restoration and dam removal projects in the watershed to support restoration of native and recreational fisheries in Cattaraugus Creek and Lake Erie.



Implementing Clear Creek stream habitat and fish passage restoration. Service photo.



Clear Creek post-restoration; 4 cross-vanes installed to reduce bank erosion, promote sediment transport, and restore habitat function. Service photo.

Project partners are the New York State Department of Environmental Conservation, Trout Unlimited Red House Brook and Western New York Chapters, Seneca Trail Resource Conservation and Development, five private landowners, and the Service. The project was implemented with

funding received through the Great Lakes Restoration Initiative, and the New York State Council Trout Unlimited Conservation Fund.



# Great Lakes Restoration Initiative Species and Habitat Restoration Initiative

Piping Plover taking a drink. Photo courtesy of Alice Van Zoeren.



Funding provided by the GLRI – Species and Habitat Restoration Initiative has been key in the implementation of priority habitat protection, restoration, and enhancement in the Great Lakes watershed. Implementation is coordinated through four Service programs – the National Fish Passage Program, Bird Habitat Joint Ventures, Coastal Program, and the Partners for Fish and Wildlife Program. Efforts of all four programs are designed to most effectively implement the objectives of major regional and national plans, such as the Upper Mississippi River/ Great Lakes Region Joint Ventures Implementation Plan, the Great Lakes Basin Fish Habitat Partnership Strategic Conservation Framework, and others. Additionally, habitat work supported by each program has tangible benefits that extend across species groups.

In 2012, the GLRI NFFP program initiated a project to remove the Lyons Dam in Ionia County, Mich. As with thousands of other relic dams across the country, this structure no longer serves its intended purpose, and its removal will open 16 miles of habitat

to migrating and spawning fish on the Grand River that has been cut off from the rest of the system for over 150 years. This will also help reduce flooding and sedimentation issues caused by the presence of the dam. Removal of passage barriers improves in-stream habitat for many species of fish and other aquatic life, leading to more diverse species assemblages and healthier fish populations, which also provide secondary benefits to fish-eating birds such as Belted Kingfishers and Green Herons.

Likewise, emergent marsh restoration projects designed to benefit waterfowl and other wetland birds, such as the GLRI-JV project at Maple River State Game Area in Gratiot County, Mich. (also within the Grand River watershed) benefit more than just birds. This project will enhance 344 acres of wetlands by replacing outdated and ineffective water control infrastructure, which will enable managers to better emulate natural hydrologic cycles, and control invasive species such as purple loosestrife. This project will provide habitat for wetland birds such as American Bittern and Black Tern, and will also boost populations of fish and other aquatic organisms by increasing the amount of quality emergent marsh vegetation on the area, which provides crucial nursery habitat for young fish.

The CP and the Michigan Department of Natural Resources are working together through GLRI to conserve rare and endangered species at Wilderness State Park. In the early 1990s the Park provided nesting habitat for nearly 25 percent of the endangered Great Lakes Piping Plover population. Today with reduced ice scour and prolonged low lake levels, vegetation encroachment has made

Maple River State Game Area, Mich. Service photo.





# Great Lakes Restoration Initiative Species and Habitat Restoration Initiative



habitat unsuitable. Efforts will focus on restoring open beach habitat by removing invasive species, both for the plovers' benefit and populations of federal and state listed species including Pitcher's thistle, Houghton's goldenrod, and Lake Huron tansy.

The GLRI PFW program has restored more than 1000 acres of wetlands and 800 acres of native grasslands within the Great Lakes watershed on private lands. Individual projects include re-establishing drained wetlands to provide habitat for water birds or restoration of former cropland to a mix of native grass and forb species, which provides improved habitat for grassland wildlife, such as Eastern Meadowlarks. In addition to improving wildlife habitat, restoration of wetlands and grasslands enhances water quality by reducing nutrient and soil runoff.

By proactively working together, Service programs are helping to



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ensure that GLRI grant dollars are achieving maximal cross-programmatic benefits. Additionally, efforts will continue to be targeted within Great Lakes Areas of Concern to accelerate the recovery of these impaired systems for the benefit of the fish, wildlife, and people that depend on them.

Top: photo Lyons Dam removal will open 16 miles of habitat to fish. Service photo. Bottom photo: Piping plover. Photo courtesy of Alice Van Zoeren.



# Restoration of Lake Trout and Lake Sturgeon: Lower Niagara River Lake Sturgeon Population Dynamics

The lower Niagara River lake sturgeon study is a collaboration between the Service's Northeast Fishery Center and the Lower Great Lakes Fish and Wildlife Conservation Office, to assess the health and status of the lake sturgeon population in the lower Niagara River and locate their spawning habitat. Since fall of 2010, over 300 individual fish of 3.5 to 5.5 feet in length and between 25 and 120 pounds in weight have been tagged and released. Age analysis of these fish from fin spine samples indicate that most fish in the lower Niagara River are between 13 and 16 years old. The movements of 72 lake sturgeon implanted with radio transponder tags (42 in 2011, 30 in 2012) have



Above: Service biologist, Greg Jacobs, releasing a freshly tagged lake sturgeon back into the lower Niagara River. Service photo.

been tracked using a combination of stationary radio-receivers and mobile tracking, which identified the locations of possible spawning grounds and

migration behavior. Using GIS mapping software, the lake sturgeon tracking data will be overlaid with data collected from a GLRI-funded sidescan sonar project, mapping the river substrate to provide important information on habitat in the lower Niagara. In 2012 blood samples were collected from all sturgeon captured prior to spawning season, to identify sex and spawning stage by measuring hormone levels. With the addition of some upcoming genetic analysis, the above

information will be combined into a population viability analysis to estimate the future population size of lake sturgeon in the lower Niagara River.



## Comparative Lake Trout Energetics

Stocking of hatchery produced lake trout within the Great Lakes is one of the primary management strategies used for restoration efforts. Different strains of lake trout are stocked, and these vary by the location within the lakes where the strain originated, and by body form. For example, the lean and the humper lake trout body forms differ in how deep in the water they live, the type of food they eat, and the amount of fat they store in their body. To determine which lake trout body form may be better to stock in current and future Great Lakes habitats, it is also important to consider how much the body forms can grow under different environmental conditions. For more than a year, the Service's Northeast Fishery Center in Lamar, Pennsylvania has



Above: Graduate student Megan Kepler measuring a lake trout used in the experiments.

Right: Laboratory setup for lake trout feeding studies at the USFWS Northeast Fishery Center in Lamar, PA. Service photos.

worked on completing laboratory experiments to compare two actively stocked lake trout body forms: lean and humper. To examine this, laboratory experiments to measure consumption, oxygen usage, and growth were carried out across different fish sizes and temperatures for both body forms to reflect current and future environmental conditions. Results from this GLRI funded study will be used to inform stocking and management recommendations for different body forms of lake trout in various habitats found in the Great Lakes.



# Sign of Progress



All U.S. Fish and Wildlife Service field sites which receive Great Lakes Restoration Initiative funding will be marked by a sign similar to the one pictured above. Identifying our field sites is part of our interagency agreement with the U.S. Environmental Protection Agency. This funding requirement was design to increase public awareness and transparency with regard to the use of GLRI funding.

To learn more about other Service GLRI projects, please visit <http://www.fws.gov/glri/>

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Restoring the Great Lakes

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