

U.S. Fish & Wildlife Service

Restoring the Great Lakes

*Success Stories from
the 2014 Field Season*



Welcome!

Dear Reader,

Over the past five years the Great Lakes Restoration Initiative has blossomed from a line item in the President's budget into a rich mosaic of conservation actions taking place across the Great Lakes basin. We're excited to say, this is only the beginning. Bringing tangible environmental change to the Great Lakes is a marathon and with the assistance of GLRI our staff and our partners are off to a strong start.

Through our 2014 inter-agency agreement with the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service received more than \$49 million to support new and ongoing Great Lakes projects. In total, we have received more than \$230 million over the past five years. As always, we are proud to share our accomplishments with you. The 2014 edition of Restoring the Great Lakes focuses on the progress of projects, as well as highlighting a few new projects to keep your eye on.

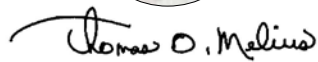
For our readers who live, work and play on or around the Great Lakes, you already know how precious a resource the Great Lakes are to our country. To our friends who live in distant places, and who may not have had a chance to experience the wonder of the Great Lakes, please know that our work may still touch your life in unexpected ways. The songbird chirping by your window or waterfowl swimming in your local pond is a testament to our migratory bird habitat work in the Great Lakes. It reminds us that we live in an interconnected world where the results of conservation actions happening thousands of miles away may still find their way into our lives.

We invite you out to our national wildlife refuges and national fish hatcheries to learn more about the work that we do and the people who make it happen. Our GLRI supported projects in the Great Lakes reflect the passion and hard work of our staff. Come witness it for yourself.


We look forward to seeing you!

Warm regards,




Tom Melius
Regional Director, Midwest Region




Wendi Weber
Regional Director, Northeast Region



Great Lakes RESTORATION



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U.S. Fish & Wildlife Service

Great Lakes Restoration Initiative (GLRI)



Bird and bat radar unit. USFWS



Lake trout restoration. USFWS



Fish passage. USFWS



Protecting and restoring bird habitat. 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 through FY 2014. 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 USFWS’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 \$69 million in FY 2010, \$37.4 million in FY 2011, \$43.6 million in FY 2012, \$40.5 million in FY 2013, and more than \$49 million in FY 2014 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). 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. In FY 2014 \$4 million in GLRI funding was allocated to the Service to work specifically on Asian carp control and management, with an additional \$6 million allocated for state projects.

■ **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:** The Service will foster coordination of management activities to create synergy with project partners.

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 fishery habitat utilization project. Fish passage projects are giving lake sturgeon access to their historic spawning grounds. With the help of partners, hundreds of acres of important bird habitat are being restored.



Piping plover species recovery. USFWS



Conservation of Great Lakes islands and coasts. USFWS



Contaminants of emerging concern research. USFWS

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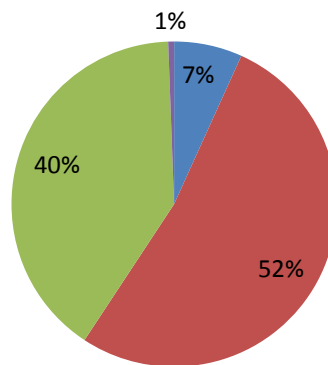
Proud Partner

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 2014 Distribution of USFWS Funding by Focus Area

■ Toxic Substances ■ Habitat ■ Invasive Species ■ Accountability



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>**

The Great Lakes, Crossroads for Shorebird Migrations

By Robert Russell

Every May lines of migrating whimbrel depart in the evening from coastal Virginia staging areas and migrate through the Great Lakes on their way to Canadian tundra breeding grounds. August finds nearly every sandy beach on Lake Michigan and Lake Huron hosting small, scurrying flocks of sanderlings on their way to Gulf and Atlantic coast beaches. Thousands of pectoral sandpipers gather at refuges along the south coast of Lake Erie and Lake Ontario, putting on additional body fat to carry them to breeding areas in Canada and Alaska. Large flocks of willet coming southeast from the Dakotas often converge for a day in July at the Indiana Dunes on their way to the southeastern United States. Small flocks of the declining red knot migrate along Lake Erie and Lake Michigan beaches on an 8,000 mile journey that will eventually take them to wintering grounds in Argentina. More than 35 species of shorebirds utilize stopover habitat on the Great Lakes for foraging, resting, roosting and even a few species for breeding.

The Great Lakes Restoration Initiative has provided unprecedented funding opportunities to further U.S. Fish and Wildlife Service bird conservation efforts in this globally-important watershed. From radar research investigating migration hotspots, to wetland restorations on private land in the upper watersheds of Great Lakes tributaries, to important coastal habitat protection and enhancement projects, GLRI has been a boon for birds in the Great Lakes!

The habitats required to support the migrating shorebirds are remarkably diverse. Wilson's snipe

utilize coastal wetlands to forage in shallow pools and grassy marsh edges. Ruddy turnstones frequent rocky shores and jetties while short-billed dowitchers prefer refuge drawdowns with very shallow waters and exposed mudflats. During late summer in years of declining water levels, large bays such as Green Bay in Wisconsin and Michigan's Saginaw Bay provide an abundance of exposed flats and shallow marsh habitat. During years of high water when mudflats and shallow water feeding areas are scarce, personnel at refuges like Michigan's Shiawassee National Wildlife Refuge and Ohio's Magee Marsh State Wildlife Area perform drawdowns on their pools to attract thousands of migrants for up to several weeks at a time.

The sandy beaches are no less important for several species. Migrant least sandpipers, black-bellied plovers and sanderling appear on almost any major beach, usually limiting their stays at those dominated by humans. Protection of their habitats is shared by a wide range of agencies and conservation groups, often working in partnerships to assure that adequate stopover sites exist. From the National Park Service's Sleeping Bear Dunes National Lakeshore and the U.S Forest Service's Nordhouse Dunes in Michigan where piping plovers breed in relative solitude, to Chicago Montrose Harbor where a small beach often brims with early morning shorebird activity, protection and management comes from a diverse group of shareholders.

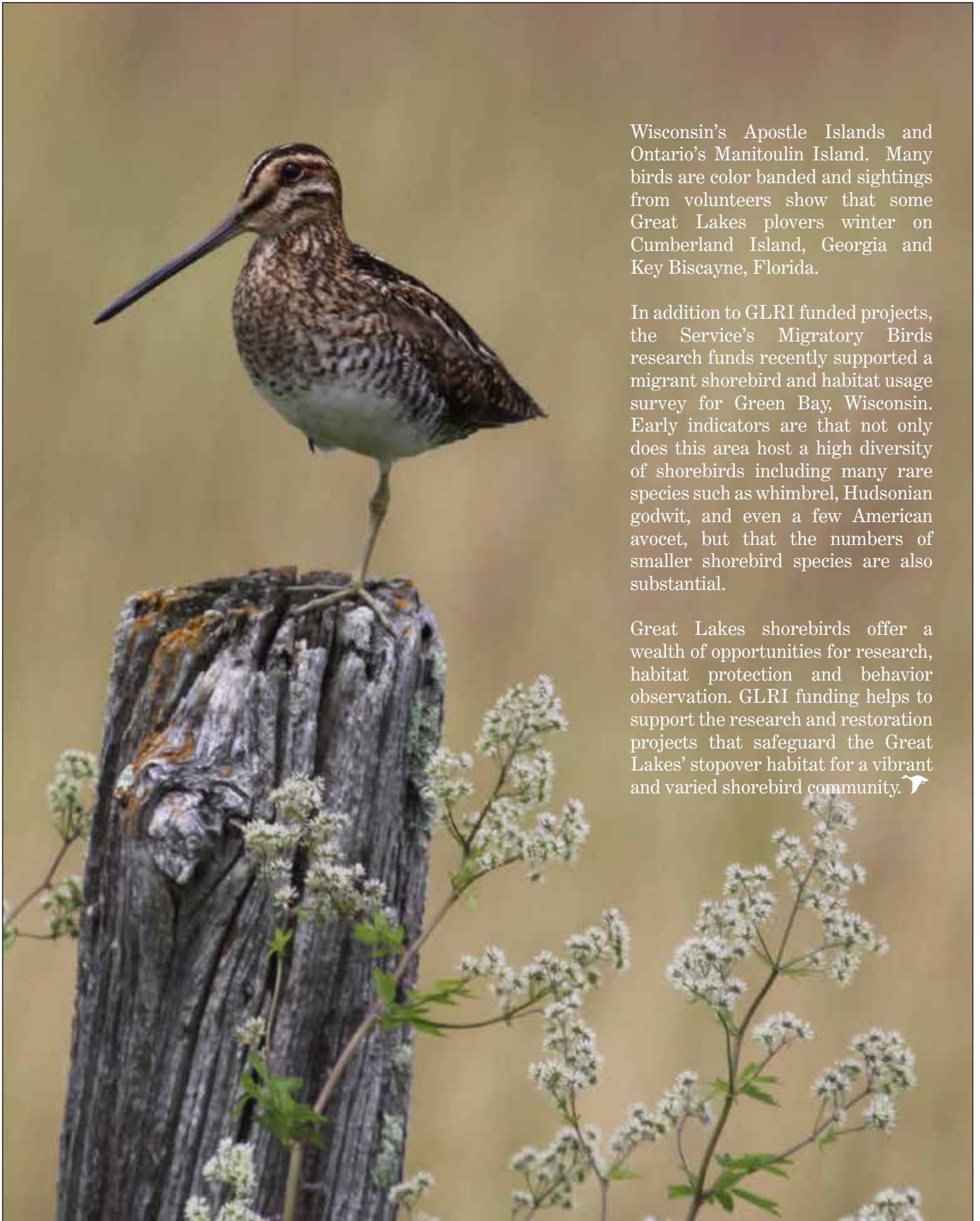
Michigan's Tawas Point State Park and Pennsylvania's Presque Isle State Park are major state-owned sites with high shorebird diversity.

Even regional land trusts play an important role. The Grand Traverse Regional Land Conservancy protects an important shorebird site at the 3,600 acre C.S. Mott Preserve in Benzie County, Michigan. Recent U.S. Fish and Wildlife Service efforts have focused on protection of offshore islands in northern Lake Michigan, which are important roosting sites for whimbrel and other shorebird species.

Six shorebird species regularly breed in the Great Lakes. Killdeer are commonly observed in a variety of situations including marshes, industrial sites and agricultural fields. Wilson's snipe is fairly common in grassy wetlands from upstate New York west to Wisconsin. A small population of upland sandpipers occurs in hayfields in northern Wisconsin and the Upper Peninsula. More substantial populations occur in the Lower Peninsula where it is dependent upon grassland and agricultural landscapes. Early successional forests support large numbers of the curious American woodcock, a bird more easily heard than seen as they perform their twilight courtship aerial displays in spring. Spotted sandpipers occur on most coastal streams and inland lakes.

The only endangered bird species now breeding in the Great Lakes is the piping plover. Once reduced to 17 pairs in the 1970s, intensive efforts by the Service and state agencies have recovered the population to 70 pairs in 2014 with 133 fledged chicks, 24 of which were captive-reared. Most occur in the Sleeping Bear Dunes region of Michigan with well over one-third of all the breeding pairs. A few pairs were sighted on

(continued next page)



Wisconsin's Apostle Islands and Ontario's Manitoulin Island. Many birds are color banded and sightings from volunteers show that some Great Lakes plovers winter on Cumberland Island, Georgia and Key Biscayne, Florida.

In addition to GLRI funded projects, the Service's Migratory Birds research funds recently supported a migrant shorebird and habitat usage survey for Green Bay, Wisconsin. Early indicators are that not only does this area host a high diversity of shorebirds including many rare species such as whimbrel, Hudsonian godwit, and even a few American avocet, but that the numbers of smaller shorebird species are also substantial.

Great Lakes shorebirds offer a wealth of opportunities for research, habitat protection and behavior observation. GLRI funding helps to support the research and restoration projects that safeguard the Great Lakes' stopover habitat for a vibrant and varied shorebird community. 🐦

Wilson's Snipe. Robert Russell, USFWS

Restoration and Recreation in The Great Lakes: Creating Resting Places For Wildlife and People

By Tina Shaw

The National Wildlife Refuge System is a powerful intersection of conservation and recreation. Over the past five years, our biologists and managers across the Great Lakes region have grown the ecological footprint for migratory birds, as well as people.

Thanks to Great Lakes Restoration Initiative funding, people who enjoy birding and other wildlife-dependent recreation have more places to get out and enjoy close to home. One significant bird area is the Blausey Unit of Ottawa National Wildlife Refuge, near the Cleveland and Toledo metro areas.

Through a partnership with The Nature Conservancy and Ducks Unlimited, we focused GLRI dollars to restore 170 acres of critical coastal wetland and marsh habitat. Now the natural flow of wetlands has been reconnected to Lake Erie tributaries, which improves migratory bird resting and feeding areas, fish habitat, and overall water quality. Areas like this are vital to migrating birds as a stopover for resting and feeding, and also for nesting birds. Ottawa Refuge is proud to boast that the Blasey Unit is home to its first



Detroit River International Wildlife Refuge Manager Dr. John Hartig. Tina Shaw, USFWS

nesting osprey since restoration and she has three chicks this 2014 season!

Detroit River International Wildlife Refuge also has a success story to boast about, with the acquisition of Sugar Island in late April 2012. This 30-acre island is located near Grosse Ile, Michigan, at the mouth of the Detroit River, and is a migration corridor for many birds and insects.

The forested upland on the island is especially important for dozens of species of neotropical migrant passerines such as sparrows and kinglets, warblers, vireos, orioles and tanagers. With high populations of songbirds comes an influx of hunting raptors like sharp-shinned, broad-winged, red-shouldered and

Cooper's hawks, as well as northern goshawks, all looking for a meal.

"This significant addition to the refuge permanently protects the island for fish and wildlife populations, and helps protect our internationally renowned 'natural capital' that enriches our quality of life and is a gift to future generations," said Detroit River International Wildlife Refuge Manager Dr. John Hartig.

There is an interesting twist in the Sugar Island story. Before the Service acquired this key stopover habitat in 2012, the island was in private ownership and was historically a popular recreation spot for boaters and day-users.

"By opening the shoreline to the public for the summer months and keeping the uplands only available for wildlife, we have a real win-win, for both wildlife and people," explains Hartig.

Every acre that the National Wildlife Refuge System protects as natural habitat means that more birds and fish can thrive and that helps us meet our mission of large, landscape-level conservation here and across the Great Lakes. 🦅



Conservation partners mark completion of the Blausey Tract at Ottawa National Wildlife Refuge on May 6, 2013. Left to right: James Cole (The Nature Conservancy), Gildo Tori (Ducks Unlimited), Josh Knights (The Nature Conservancy), Congresswoman Marcy Kaptur (OH-9), Charlie Wooley (U.S. Fish and Wildlife Service), Roy Kroll (Ducks Unlimited), John Catena (National Oceanic and Atmospheric Administration), Jason Lewis (Ottawa National Wildlife Refuge), and Ottawa County Commissioner Jim Sass. Photo courtesy of Ducks Unlimited

Protecting Stopover Habitat for Migratory Birds in the Great Lakes Region

By Barb Jones and Andy Forbes

The Great Lakes watershed provides important habitats for migrating birds to rest and refuel as they journey between their breeding and wintering grounds. Marshes and mudflats along Great Lakes shorelines are key for migrating shorebirds, waterfowl and waterbirds. Forested shoreline habitats are critical stopovers for often exhausted songbirds searching for insects to feed on to fatten up for their long journeys, as well as offering refuge from inclement weather.

In recognition of the Great Lakes region's importance to migratory birds, the National Audubon Society has designated several large swaths of habitat as Important Bird Areas within the watershed. The Western Hemisphere Shorebird Reserve Network has also designated two

sites as priority stopover areas for shorebird conservation. The region is well known by birders for its unique assemblage of species, as birds from various regions of the continent pass through the Great Lakes as they migrate to other destinations.

Unfortunately, many of the habitats that support migrant birds are disappearing due to a variety of pressures, such as shoreline development and Great Lakes water level fluctuations. Invasive species, including phragmites and hybrid cattails, are also taking over large areas of coastal wetlands where their thick stands crowd out native vegetation and make habitat unusable for many marsh bird species. Birds also face multiple sources of direct human-caused mortality during migration, such as collisions with glass buildings, communication towers and automobiles.



A view from The Nature Conservancy's Mink River project in Wisconsin, partially funded by GLRI. Photo courtesy of Harold E. Malde

Recognizing these threats and the need to mitigate them, the Great Lakes Restoration Initiative – Joint Venture Habitat Protection and Restoration Program has awarded almost \$5 million in funds to conservation partners to protect, restore and enhance migratory bird habitats in the Great Lakes watershed. Since the program's inception in 2010, almost 5,900 acres across five states have been positively impacted as a result of the many GLRI-JV partner efforts. Funded projects include protection, restoration and enhancement activities at such key sites as the Lake Erie marshes region in Ohio, the Door County peninsula in Wisconsin, the Saginaw Bay region in Michigan and other Great Lakes coastlines.

To find out more about the GLRI-JV program, visit the following websites:

- <http://glri.us/>
- <http://www.uppermissgreatlakesjv.org/>
- <http://acjv.org/>



A Black-throated blue warbler looks in on her young. USFWS

Keweenaw Bay Indian Community Spearheads Aquatic Connectivity Project in the South Central Lake Superior Basin



Lake Superior beach in upper Michigan. Joanna Gilkeson, USFWS

By Joanna Gilkeson and Brad Potter

Partners for Watershed Restoration, a coalition made up of more than 30 agencies and organizations, formed around the consensus that coordination among partners was needed to restore the connectivity of streams across the South Central Lake Superior Basin. Early on the group encountered a major setback when they turned to science to prioritize their region's aquatic connectivity projects – not enough scientific data existed. With approximately 1,800 stream crossings to consider, questions loomed about where to strategically place limited restoration dollars.

With funding support from the Upper Midwest and Great Lakes Landscape Conservation

Cooperative, the Keweenaw Bay Indian Community will develop and bring relevant connectivity and barrier information to the collaborative restoration effort. The Keweenaw Bay Indian Community, with the U.S. Forest Service and the University of Wisconsin – Madison, are working together to bring the scientific information necessary to help the Partners for Watershed Restoration develop a unified vision for the efficient distribution of resources to restore watershed connectivity in the South Central Lake Superior Basin.

Work will include placing approximately 1,800 field inventoried stream crossings into a consistent geo-database. Once compiled, the data will enable the researchers to use optimization models to help

prioritize aquatic barriers for restoration action. Additionally, a special remote sensing technology called LiDAR will help to further evaluate site conditions.

Many structural barriers like culverts, bridges and dams were previously evaluated in the region, but few natural barriers like waterfalls, beaver dams and forest roads have been reviewed. Natural barriers often receive limited consideration because they are more difficult to identify on a traditional two-dimensional aerial map, and usually harder to visit in-person. LiDAR technology helps to overcome this by producing three dimensional digital terrain models that reveal the earth's surface beneath forest canopy to show unidentified roads and natural barriers. Using this technology, the



Structural barriers like culverts act as barriers to fish passage. This culvert was replaced in Norman Creek River in upper Wisconsin. USFWS

project will place natural aquatic barriers into the context of regional and local site prioritization. By the end of the two year project, goals and strategies will be developed for aquatic resource restoration across the entire South Central Basin.

Not only is the Keweenaw Bay Indian Community developing a landmark geo-database for the South Central Basin, but they are also partnering with a University of Wisconsin effort to develop models for aquatic barrier prioritization across the entire Great

Lakes basin. In combination, these efforts can demonstrate to other resource managers throughout the Great Lakes basin how to use these new tools to inform conservation decisions.

Stay tuned for progress as this project takes off the ground! 🐦



Aerial image of Lake Superior, where this project will take place. Photo courtesy of NASA

Reclaiming the River Road Home: The Story of the Menominee River Lake Sturgeons

*By Katie Steiger-Meister,
Rob Elliott and Nick Utrup*

Lake sturgeons are an iconic fish species in the Great Lakes. The slender form of a lake sturgeon is covered with a row of bony plates that gives the fish its distinctive look and serves as a reminder of the fish's "living fossil" status. A prehistoric species, sturgeons existed in the era of the dinosaurs more than 135 million years ago. The largest North American freshwater fish species, individuals live for decades, with some females thought to live to 150 years in age.

Commercial fishing operations at the turn of the 20th century decimated the Great Lakes lake sturgeon populations. The remnant populations have since struggled to overcome other hurdles including pollution, long term habitat destruction and loss, and man-made river barriers.

Numerous federal, state and tribal organizations are in pursuit of rebuilding lake sturgeon populations in the Great Lakes. With sport and commercial fishing regulations in place, improving water quality, and better regulated river flows in many parts of the Great Lakes, river connectivity remains a looming issue. Structures, such as dams, prevent most non-jumping fish, including lake sturgeons, from traversing many of the tributaries connected to the Great Lakes. Fish passage projects are increasingly essential to lake sturgeon survival because when sturgeon are ready to reproduce they ritualistically return to the same waterways where they were born in an

attempt to reach their historic spawning grounds, which are typically located far up river. The inability to move past dams has resulted in a dramatic decrease in habitat suitable for successful lake sturgeon reproduction.

One Great Lakes Restoration Initiative funded fish passage project in northern Wisconsin intends to help lake sturgeons move past the Menominee and Park Mill Hydroelectric Dams, found on the Menominee River. The project is anticipated to reconnect 21 miles of river and restore 2,000 acres of associated lake sturgeon habitat. With \$6 million in GLRI and federal funding, and \$1.5 million in private matching funds from the hydroelectric dam owners, the Menominee River Fish Passage Project is an ambitious endeavor driven by strong partnerships.

The Menominee River Fish Passage Partnership includes the U.S. Fish and Wildlife Service, Eagle Creek Renewable Energy, Michigan Department of Natural Resources, Wisconsin Department of Natural Resources, River Alliance of Wisconsin and Michigan Hydro Relicensing Coalition. Working together since 2004, the partners' hard work culminated in June of 2014 when the project began construction on facilities designed to provide upstream and downstream passage for lake sturgeon around the two dams. Construction of the facilities are anticipated to be completed by November 2014 at Park Mill Dam and April 2015 at the Menominee Dam. After nearly 100 years of separation, lake sturgeons are expected to be reunited with the river above the dams in the spring of 2015.



Juvenile lake sturgeon. Katie Steiger-Meister, USFWS

Tracking the Progress of the Menominee Lake Sturgeons

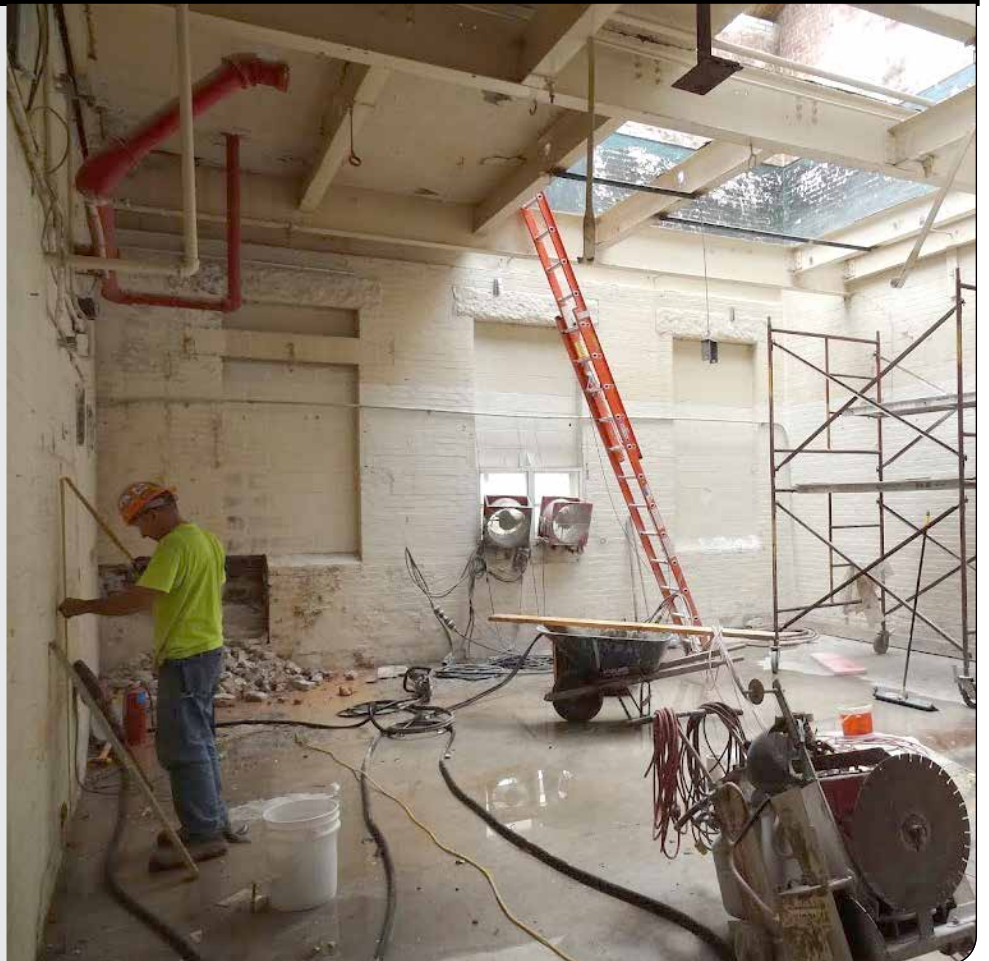
The Menominee River Fish Passage Project is one of the first and largest fish guidance and bypass structure facilities for sturgeons in the Great Lakes. The final structure will include a fish lift and sorting facility, which creates an opportunity to evaluate the behavior and success of fish that will pass up and down stream. Additional projects funded through the Great Lakes Restoration Initiative and the Great Lakes Fish and Wildlife Restoration Act therefore include special tag detection and underwater video

equipment installed to track fish as they move through the passage structures. Biologists from the U.S. Fish and Wildlife Service, state department of natural resources and cooperating universities will be able to evaluate the behavior of sturgeons as they encounter and navigate the fish passage structures. Though it will be a long-term process, the sturgeon population in the Menominee River is expected to slowly increase as they make use of the important new habitat upriver of the two dams.

With the eventual completion of the Menominee River Fish Passage Project and unrestricted river access to more spawning areas, the future for the Menominee River lake sturgeon population is beginning to look a little brighter. The work of the Service and its partners on fish passage projects like the one on the Menominee River is allowing more and more lake sturgeons to find the river road home. 🐟

The Impact of the Menominee River Fish Passage Project to the Great Lakes

Though lake sturgeons are most commonly found relatively close to their river of origin, it is also common for them to disburse great distances during the long periods of their life when they are not migrating up rivers to spawn. Menominee River lake sturgeons have routinely been found swimming on the far side of Lake Michigan and occasionally in Lake Huron. An increase in the Menominee River population will mean an increase in the number of sturgeon people will encounter throughout Green Bay and potentially Lake Michigan and beyond.



A worker prepares a room that will eventually house the fish lift and sorting facility needed for upstream fish passage, located at the Menominee Dam on the Menominee River in northern Wisconsin. Photo courtesy of Rory Alsberg, Eagle Creek Renewable Energy

Lake Sturgeons Showing Signs of Recovery in the Lower Great Lakes

By Catherine Gatenby

Lake sturgeons were nearly extirpated throughout most of the Great Lakes by the 1950s, and the species is still imperiled throughout most of its historic range. With support of the Great Lakes Restoration Initiative, biologists at the U.S. Fish and Wildlife Service's Lower Great Lakes Fish and Wildlife Conservation Office and Northeast Fishery Center have spent the past five years intensively monitoring, researching and evaluating the remnant populations of lake sturgeons in the lower Great Lakes and Niagara River watershed in New York

The news is encouraging. Biologists observed increasing numbers of lake sturgeons in a wider geographic area than observed in previous years.



A lake sturgeon captured in Lake Erie for population and migration study. Photo courtesy of Brenna Hernandez, Shedd Aquarium

“We are finding fish as young as five years old, indicating lake sturgeons have been reproducing for several years. We also are seeing mature adult sturgeons returning to Lake Erie and Lake Ontario, the upper and lower Niagara River, and other tributaries to the lower Great Lakes and Finger Lakes of western New York. They appear to be preparing to spawn. Indeed, the population in the lower Niagara River is larger than we expected,” according to fisheries biologist, Dr. Dimitry Gorsky.

Gorsky and his colleagues have not seen very young sturgeons, however he is hopeful that they will see one to two year old fish returning as spawning habitat is restored. “For the first time in decades, we may have the ingredients in the lower Great Lakes that can sustain lake sturgeon populations,” he said.

Biologists with the the NEFC, the Lower Great Lakes FWCO, the Shedd Aquarium and the New York Department of Environmental

Conservation are also collecting data on lake sturgeons found above and below Niagara Falls using pop-off satellite tags to learn more about the routes the fish travel and the types of habitats they frequent.

“While attached to the fish, the tags gather data every four minutes, which is then stored on their internal memory,” explained Greg Jacobs, a fish biologist with the NEFC.

“Once the tags pop off at the end of their deployment and transmit their data back to us, we will relate measurements of light, magnetic field, depth and temperature to environmental conditions in the Great Lakes over the duration of the tag’s deployment to infer location, movement and habitat preferences.” GLRI funded research provides critical information about lake sturgeons that will help the U.S. Fish and Wildlife Service and our partners identify ways to better protect the species and their habitat. 🐟

Dr. Philip Willink from the Shedd Aquarium and Greg Jacobs from the Service’s Northeast Fishery Center implant a pop-off tag on a lake sturgeon captured in Lake Erie for a study of migratory movements and habitat use in the lower Great Lakes. Photo courtesy of Brenna Hernandez, Shedd Aquarium

New Whitney Genetics Lab Holds Promise in the Early Detection of Asian Carp

By Katie Steiger-Meister

White lab coats, futuristic machines and lights that sterilize rooms on contact. It may look like a lab out of a crime scene television show, but the U.S. Fish and Wildlife Service's new Whitney Genetics Lab in La Crosse, Wisconsin is on the hunt for a different type of killer—invasive species.

Invasive species are notorious for creeping into waterways undetected. Often, by the time the presence of an aquatic invader is detected, the species is established in the environment and difficult to eradicate. Catching the early invaders is key to preventing invasive species from gaining a foothold in a lake or waterway. Asian carps are no exception. For more than four decades bighead and silver carps have swum up the Mississippi River, out-competing native fish for food and decimating the river system as they go. With the Great Lakes potentially in jeopardy, the U.S. Fish and Wildlife Service is working with international, federal, and state partners to prevent the movement of Asian carp into the Great Lakes. An important component of the Service's work is the early detection of bighead and silver carps.

\$2.65 million in Great Lakes Restoration Initiative funding received over the past four years has resulted in a 5,800 square foot, fully staffed, state-of-the-art research facility that is pushing the boundaries of genetic science to track Asian carp. Using a technique known as environmental DNA, or eDNA, lab staff are processing water samples taken from across the Great Lakes region to detect



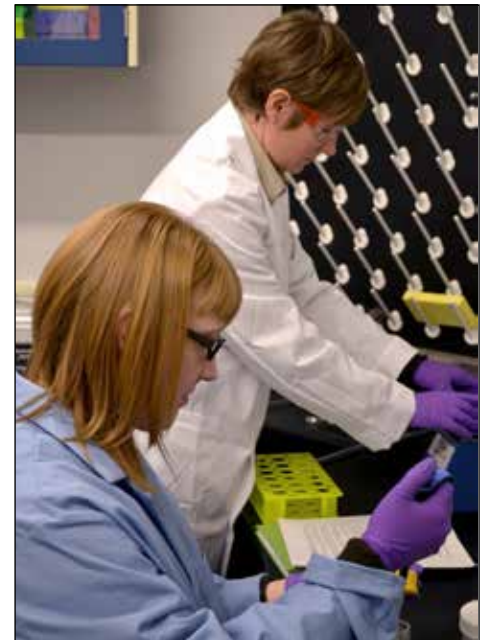
The science of eDNA can help in the early detection of invasive species like these Asian carps. Katie Steiger-Meister, USFWS

the presence of Asian carp genetic material. Patterns of positive eDNA findings in waterways over time can give managers clues about where the leading edges of the Asian carp populations are located.

Opened in 2013, the lab's processing capacity is quickly increasing. In its inaugural year, the lab processed more than 3,000 water samples. In 2014, the number of processed samples is anticipated to grow to more than 8,000. New eDNA markers in 2014, developed with the U.S. Army Corps of Engineers and the U.S. Geological Survey, are refining both the sensitivity of eDNA testing, as well as the efficiency. Though a positive eDNA finding does not mean there was or is a live fish in the water, it can still help to direct complementary fish sampling activities. eDNA monitoring is currently paired with traditional fish monitoring and sampling efforts that in their entirety contribute to a comprehensive Asian carp assessment and monitoring program.

Built in response to a need to expand the Service's genetic research capacity, the Whitney Genetics Lab will continue to push the scientific boundaries on the early detection of invasive species.

Interested in learning more about the science of eDNA? Watch the video at: <http://youtu.be/xXwply6ahQ8>



Jennifer Bailey and Maren Tuttle-Lau process eDNA samples at the Whitney Genetics Lab in La Crosse, Wisconsin. Katie Steiger-Meister, USFWS

UPDATE: Preventing the Spread of Aquatic Invasive Species in the Lower Great Lakes

Our Great Lakes Restoration Initiative funded work to prevent the spread of aquatic invasive species in the lower Great Lakes is focused on three invaders: Asian carp, Eurasian ruffe and hydrilla.

Asian Carp

The U.S. Fish and Wildlife Service's invasive species crews are working together to detect and prevent the spread of Asian carp in the lower Great Lakes. In 2014, crews collected and processed water samples for environmental DNA testing for Asian carp in Cattaraugus Creek, Buffalo River, Tonawanda Creek, upper and lower Niagara River, Genesee River and Oswego River.

Eurasian Ruffe

Crews throughout the Great Lakes region are using standardized sampling techniques for the early detection of invasive species, such as surveying for larval fish which enables a rapid response to prevent further spread of invasive species. The scope of surveillance increased for Eurasian ruffe, an invasive fish found in the lower Great Lakes. In 2014, surveys occurred in an area stretching from Toledo, Ohio to Rochester, New York. The crews did not find any Eurasian ruffe, however they encountered other invasive species including round goby and zebra mussels.

Hydrilla

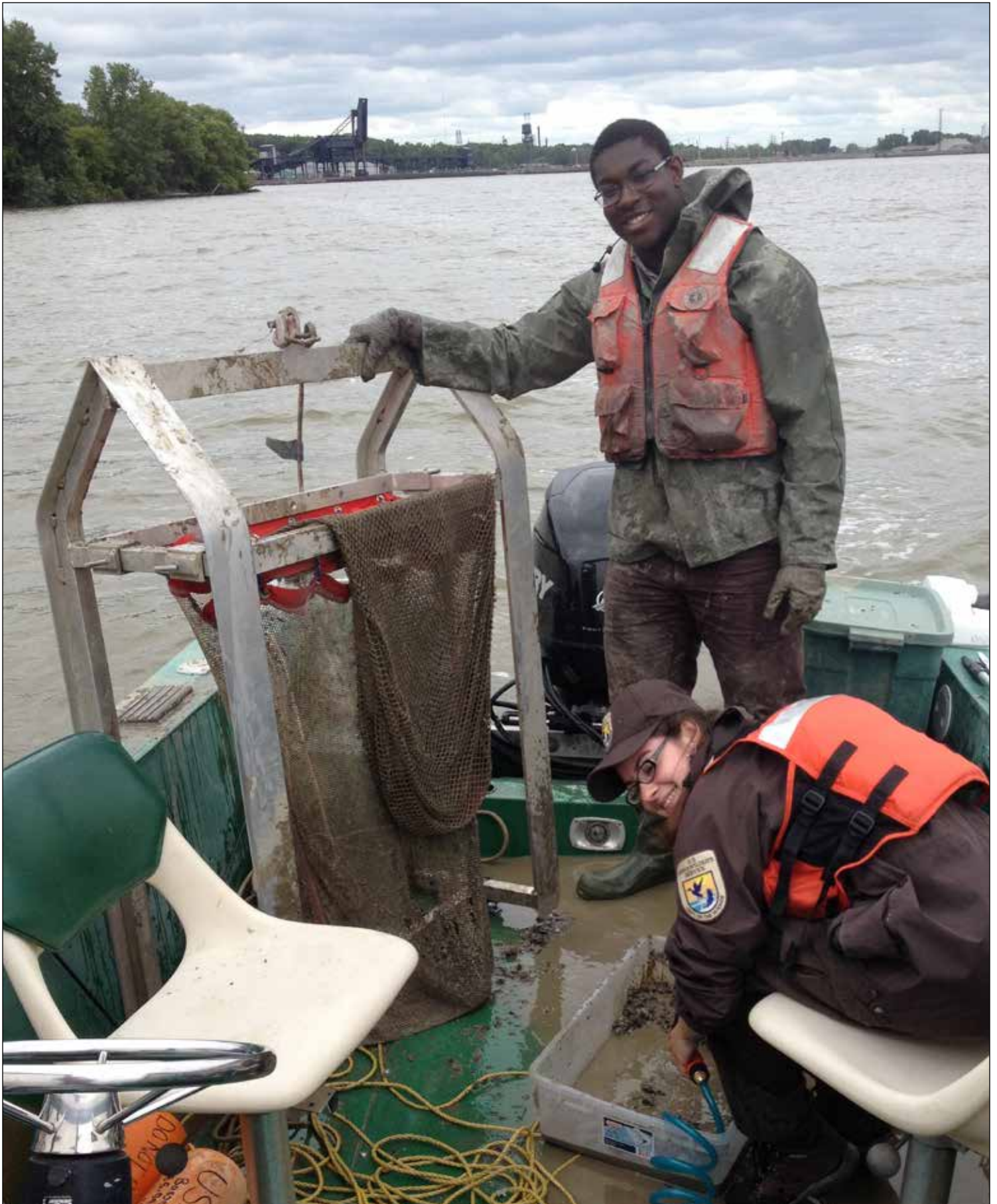
GLRI funding has been instrumental in work to detect and eradicate invasive aquatic plant species such as hydrilla. Hydrilla, one of the world's most rapidly spreading invasive plants, greatly threatens New York's economy by choking valuable fish habitat and reducing oxygen levels, which lead to fish kills. Service biologists and partners, including the U.S. Army Corps of Engineers

and New York Department of Environmental Conservation, are working to detect and remove this plant from key waterways in

western New York. The Service recently provided funding to New York to eradicate hydrilla from the Erie Canal. 🐟



Denise Clay, Lower Great Lakes Fish and Wildlife Conservation Office, filters water samples collected in the lower Great Lakes. The samples will be tested for the presence of Asian carp genetic material utilizing eDNA technology. USFWS



Kwamina Otseidu and Kelly McDonald, student interns at the LGLFWCO, prepare to deploy the benthic sled during aquatic invasive species surveys. USFWS

Exotic and Emerging Fish Disease Surveillance in the Great Lakes

By Catherine Gatenby

Each year, the Lamar Fish Health Center implements a Wild Fish Health Survey working closely with state, tribal and federal agencies throughout the Great Lakes. The survey screens for certain bacterial, viral and parasitic pathogens that are nationally regulated diseases, as well as some that are specific to the Great Lakes.

The Center also conducts biannual fish health inspections at each of the national fish hatcheries and state fish hatcheries in the U.S. Fish and Wildlife Service's Northeast Region that provide lake trout and rainbow trout for recreational and fish restoration programs in the Great Lakes basin.

In recent years, several new fish diseases have taken hold in the northeastern United States and caused disease outbreaks in the Great Lakes. These new fish viruses are true threats, both economically to the aquaculture industry and to native fisheries. The Service is just beginning to understand the implications of these diseases.



Fish kills are investigated by Northeast Fishery Center fish health experts. Photo courtesy of Mark Haffley, Pennsylvania Fish and Boat Commission



Fish biologists conduct wild fish survey investigations on Lake Ontario. Photo courtesy of the New York Department of Environmental Conservation

With the help of Great Lakes Restoration Initiative funding over the past five years, the Center has increased the volume and range of wild fish surveys in the Ohio, Pennsylvania and New York waters of Lake Erie and Lake Ontario and conducted rigorous sampling for potential pathogens in fish hatcheries. Comprehensive fish health investigations conducted in the wild and at hatcheries help identify possible impacts, assisting managers in prevention efforts.

Both traditional and highly specific molecular testing techniques are employed and provide early detection of new, previously undescribed viruses. Recent advancements in molecular (DNA) testing allow for earlier detection of a lake trout virus than was previously possible.

The Service relies heavily on partners to conduct tests for fish health. These partnerships ensure that surveys are conducted in a wide geographic range. The New York Department of Environmental Conservation, Pennsylvania Fish and Boat Commission, Pennsylvania

Sea Grant, the Service's Lower Great Lakes Fish and Wildlife Conservation Office, and the New York and Ohio offices of the U.S. Geological Survey assist in obtaining healthy and distressed fish for testing from the Lake Ontario and Lake Erie watersheds.

Important findings to date include the documentation of viral hemorrhagic septicemia (VHS type IVb) in the basin, although we are not seeing the massive fish kills or clinical symptoms of the disease as seen in the past. Since VHS IVb affects over 28 fish species, a cross section of the entire fisheries community is sampled and tested to protect and restore lake trout and lake sturgeon.

Separate from the work by the Lamar Fish Health Center, cooperative efforts with Michigan State University throughout the Great Lakes determined that lake sturgeon are not susceptible to VHS type IVb. The National Wild Fish Health Survey and the Great Lakes Fish Health Committee enables and enhances partnership opportunities that are critical to address ongoing and emerging aquatic disease issues.

All of these actions taken together with our partners help us protect the environmental health and the socioeconomic benefits of recreational and commercial fishing in the Great Lakes and throughout the country. 🐟



Biologists conduct diagnostic testing of wild and hatchery-reared fish for bacterial, viral and parasitic pathogens. Patricia Barbash, USFWS

Understanding Contaminants of Emerging Concern

By Annette Trowbridge

The Problem

Contaminants in the environment have posed challenges for decades, but in the past several years, emerging contaminants like pharmaceuticals, fire retardants and others have prompted concern about their impact on fish and wildlife. Some impacts include feminization of male fish, irregular courtship and nest-guarding behavior; decrease in predator-escape response and declines in prey species and sport fish populations.

Using \$1.6 million annually under the GLRI Action Plan's Toxic Substances and Areas of Concern components, the U.S. Fish and Wildlife Service is increasing knowledge about contaminants in Great Lakes fish and wildlife by identifying emerging contaminants and assessing impacts on these resources. The Service is working to identify risks to Great Lakes resources, and with partners, possible management actions to address problems. We need to more fully understand the sources, routes of exposure, and effects of contaminants of emerging concern to prevent and minimize ecological, economic and recreational impacts.

Look How Far We've Come

Over the past five years, we have gained a better understanding of the presence and distribution of contaminants of emerging concern, and their potential routes of exposure. After identifying rivers of potential concern based on surrounding land uses and potential point sources, we sampled water and sediment at multiple rivers across the Great Lakes and found large, complex mixtures of these substances in all rivers we sampled, including pharmaceuticals,

hormones, plasticizers, fire retardants, fragrances and flavors and pesticides. There were higher concentrations of emerging contaminants below wastewater treatment plants, combined sewer overflows, and concentrated animal feeding operations. We discovered higher concentrations and more compounds in some rivers compared to other rivers, which helps us focus efforts where they are needed most. We also learned that land use, such as industry or agriculture, influences chemical presence, with industrial chemicals and agricultural chemicals found near their respective sources.

We assessed risks that emerging contaminants may pose to Great Lakes fish and wildlife. Through laboratory and field studies, we have documented biological effects on fish that show changes in physiology and behavior, including feminization of male fish and delayed predatory response. These changes have the potential to cause impacts at a broader scale to populations of importance, including Great Lakes fishery resources. We have also identified additional data and research needs to better understand sources and pathways of these contaminants to fish and wildlife.

Looking Ahead

We will continue to work with partners to evaluate the presence, pathways and impacts of emerging contaminants that have the greatest potential to adversely impact Great Lakes fish and wildlife – impacts which may also result in ecological, economic and recreational consequences. We will conduct laboratory and field studies to evaluate biological effects from environmentally relevant chemical mixtures, evaluate long-term exposure of fish to contaminants, conduct additional field sampling where effects are being observed and sample other high priority wildlife such as migratory birds, mussels and amphibians.

In addition, we plan to assess the extent to which risks may impede environmental quality and resource management goals. Information from this investigation will inform future land use changes and other resource management actions to prevent and reduce adverse impacts of contaminants of emerging concern to fish and wildlife resources. We will evaluate projects on an annual basis to prioritize the design and implementation of future laboratory and field studies. 🐦



USFWS and USGS personnel sampling water. Zachary Jorgenson, USFWS

Restoring Habitat in the Lower Great Lakes

By Catherine Gatenby

The U.S. Fish and Wildlife Service's Lower Great Lakes Fish and Wildlife Conservation Office is working with others in New York and Pennsylvania to restore wetlands and streams. The success of these projects would not be possible without GLRI funding, as well as support from the Great Lakes Basin National Fish Habitat Partnership.

Wetland Restoration Project Underway at Lakeshore Marshes Wildlife Management Area



This unique project between the Service, Ducks Unlimited, Constellation Energy and the New York Department of Environmental Conservation will restore critical



wetland and marsh habitat along Lake Ontario. This project will improve fish passage in 59 acres of coastal wetlands and will provide valuable nursery habitat for native fishes, as well as nesting habitat for migratory birds. Located near Rochester, New York, the project will excavate 10 shallow water pools and 3,000 linear feet of channels in wetlands within the Lake Shore Marshes Wildlife Management Area.

More than 200 acres of lake shore fisheries habitat at state wildlife management areas in western New York will be restored in support of Governor Cuomo's New York is Open for Fishing and Hunting initiative. The GLRI funded work will be done

in partnership with Ducks Unlimited, The Nature Conservancy and NOAA among others.

The benefits of restoration work will extend well beyond improved wetland habitat for fish, waterfowl and other animals. These areas provide natural filters for water entering Lake Ontario and help absorb water during high rain events, preventing adverse impacts of flooding on local communities.

Restoring Native Brook Trout Habitat in the Hudson, St. Lawrence, Lake Ontario and Lake Erie Waters of New York and Pennsylvania

Brook trout has undergone a drastic decline throughout its historic range. Several habitat restoration projects aimed at removing fish passage barriers, such as dams, and increasing available quality habitat in New York and Pennsylvania were completed in an effort to restore brook trout populations in the region.

The projects open upstream passage for native brook trout, restore connectivity between isolated populations in headwaters and lower portions of rivers, enhance sediment transport and reduce thermal loading to downstream waters, thereby increasing both water quality and the overall availability of quality habitat to native brook trout.



Photos, from top: Digging a new stream channel at Lakeshore Marshes Wildlife Management Area. Post restoration efforts at Lakeshore MWMA. Creating pothole habitat at Lakeshore MWMA. All photos USFWS



All of these stream restoration projects directly benefit native brook trout, thereby increasing recreational fishing opportunities in New York and Pennsylvania. The projects could not have been implemented without the help of our partners: the New York State Department of Environmental Conservation, the Pennsylvania Department of Conservation and Natural Resources, the Finger Lakes-Lake Ontario Watershed Protection Alliance, The Nature Conservancy, Trout Unlimited, Black River-St. Lawrence Resource & Conservation Development, State University of New York at Oswego, Millcreek Township, Millcreek Township Sewer & Water Authority, Erie County Soil and Water Conservation District, Village of Springville and the U.S. Fish and Wildlife Service's New York Field Office. 🐟

Spring Brook is the largest wild brook trout stream in western New York that is unaffected by non-native trout. The upper reaches of Spring Brook, however, experience heavy sedimentation and nutrient inputs from land-use practices. Furthermore, banks along the lower sections have undergone excess erosion. Additionally, Walnut Creek is the second largest Lake Erie tributary in Pennsylvania. It supports a significant recreational trout fishery near metropolitan Erie, Pennsylvania, and also provides important ecosystem services to the Presque Isle Bay Area of Concern.



Photos, from top:
Spring Brook banks will be stabilized to decrease erosion and sedimentation from high water events. USFWS

Reynolds Gully free-flowing brook trout habitat post Rauber Dam removal. USFWS

Fish passage barrier at Rauber Dam on Reynolds Gully. USFWS

At Spring Brook, 2,500 linear feet of failed stream banks are being stabilized to decrease erosion and reduce associated impacts from high water. At Walnut Creek, 900 linear feet of stream channel was restored to improve fish passage to 2.2 miles of high quality habitat.

Approximately 14.2 miles of high quality stream habitat was opened to fish passage in Rice Creek, and 4.6 miles have been opened to brook trout at Reynolds Gully.



GLRI Funds Support Lake Trout Production at Allegheny National Fish Hatchery

By Catherine Gatenby

With continued support from Great Lakes Restoration Initiative funding, the Allegheny National Fish Hatchery in Pennsylvania has stocked more than one million spring yearlings and fall fingerling lake trout in the lower Great Lakes in 2014.

The hatchery continues to improve broodstock holding capacity of four strains of lake trout including the Seneca Lake, Huron Perry Sound, Klondike and Lake Champlain strains. Projects annually produce upwards of three million lake trout eggs for ongoing stocking of fall fingerlings and spring yearlings to help restore lake trout to the lower Great Lakes. In 2014, 277,000 eggs were also provided to Pennsylvania to help meet state stocking goals. 🐟



Dave Blick, Allegheny National Fish Hatchery, prepares to stock lake trout into Lake Erie. Photo courtesy of Ohio Department of Natural Resources



Lake trout fry reared at the Allegheny will be stocked into the lower Great Lakes in 2015. USFWS

The U.S. Fish & Wildlife Service is a proud partner in the implementation of the Great Lakes Restoration Initiative. Share in the inspiration at: <http://www.fws.gov/glri/>.



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

Signs 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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