Great Lakes RESTORATION

Great Lakes Restoration Initiative Report to Congress and the President

Fiscal Year 2016

CONTENTS

About This Report

This report presents an overview of the Great Lakes Restoration Initiative progress. It includes information on funding, project accomplishments and success stories, and performance on Action Plan Measures of Progress through Fiscal Year 2016. Data on direct spending is taken from the U.S. Environmental Protection Agency financial systems. Information on Great Lakes Restoration Initiative projects and activities is available at http://glri.us.

The U.S. Environmental Protection Agency is required by the 2010 Appropriations Conference Report, 111-316, to submit this report to Congress on behalf of the Great Lakes Interagency Task Force. The Conference Report directs the Agency to provide detailed yearly program accomplishments and compare specific funding levels allocated for participating federal agencies from fiscal year to fiscal year.

The report also satisfies the Action Plan II Measure of Progress for issuance of annual GLRI reports to Congress and the President.

MESSAGE FROM THE CHAIR OF THE GREAT LAKES INTERAGENCY TASK FORCE

As we now understand more than ever, we do not have to choose between the health of our environment and the health of our economy. We can and should have both.

I am proud that through the Great Lakes Restoration Initiative (GLRI)—helping to protect and restore the system that comprises more than 80 percent of the fresh water in the U.S. and Canada—we are fulfilling our mission to restore the health of the water that so many of our communities depend on.

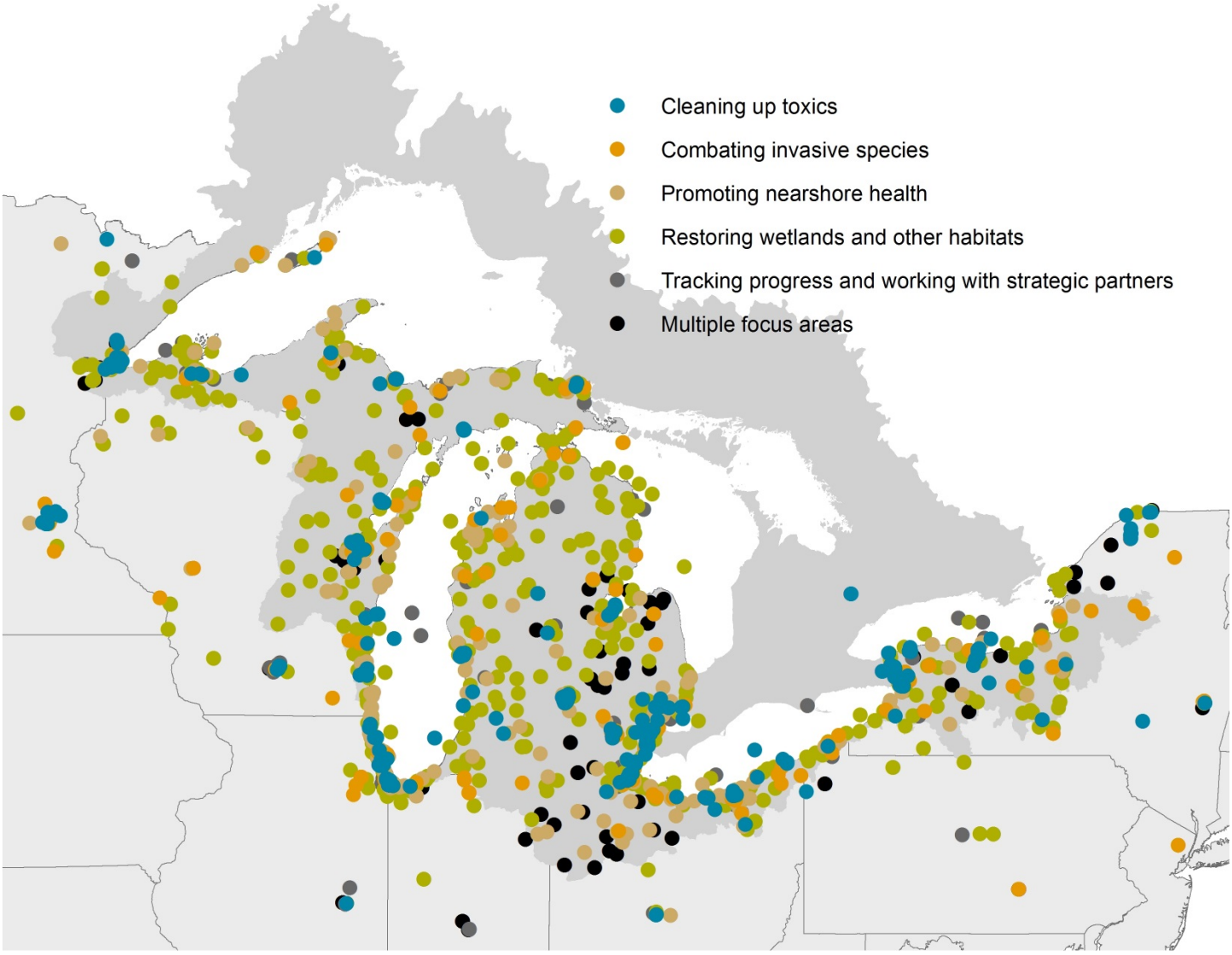
Thanks to resounding bipartisan support, 11 federal departments and their partners from states, tribes, municipalities, businesses, citizens' organizations, academia and others are breaking through to restore the Great Lakes. These GLRI investments—approximately $2.3 billion supporting more than 3,500 projects—are making a tremendous difference from Isle Royale National Park to the mouth of the St. Lawrence River and points in between.

As this Progress Report to Congress and the President shows, the GLRI is responsible for cleaning up contaminated sites — areas that, once restored, will increase property values and property tax bases. This program is also preventing the introduction of silver and bighead carp, species that could do irreparable harm to the region's economy and ecology if they enter the lakes. And GLRI is reducing nutrient runoff to our most sensitive waterways, such as Lake Erie, Saginaw Bay, and Green Bay.

The GLRI is protecting public health in the Great Lakes more than any other coordinated interagency effort in U.S. history, and helping to ensure that our children and their children live in safer, healthier communities.

Scott Pruitt
Chair, Great Lakes Interagency Task Force
Administrator, U.S. Environmental Protection Agency

Great Lakes Restoration Initiative Projects from FY 2010 – FY 2016



Section 1 –Executive Summary

The Great Lakes Restoration Initiative, or the GLRI, was launched in 2010 to accelerate efforts to protect and restore the largest system of fresh surface water in the world, the Great Lakes. The GLRI is critical to addressing the most persistent and challenging environmental problems facing this important ecosystem.

The GLRI has been a catalyst for unparalleled federal agency coordination – through both the Interagency Task Force (IATF) and the Regional Working Group (RWG), which are led by the EPA. This coordination has produced unprecedented results. GLRI resources have supplemented agency base budgets that have funded over 3,500 projects that improve water quality, protect and restore native habitats and species, prevent and control invasive species, and address other additional Great Lakes environmental problems.

The Great Lakes Restoration Initiative Action Plan II, released in September of 2014 (http://greatlakesrestoration.us/actionplan/pdfs/glri-action-plan-2.pdf), identifies the most significant ecosystem problems that exist in the Great Lakes Basin, and identifies ways to solve them. This report provides an overview of progress during FY 2016 for each Focus Area. It also includes select success stories, detailed information on funding, and performance information for Action Plan II Measures of Progress.

GLRI Action Plan II Focus Areas

Toxic Substances and Areas of Concern

In FY 2016, federal agencies and their partners finished all the management actions needed to delist the St. Clair River Area of Concern (AOC) in Michigan. During FY 2016, substantial progress was made towards the completion of management actions needed to delist four other AOCs, including St. Mary's River (MI), Lower Menominee River (MI), River Raisin (MI), and Rochester Embayment (NY). All management actions in these AOCs are expected to be completed in FY 2017.

Invasive Species

During FY 2016, federal agencies and their partners continued efforts to prevent the introduction of new invasive species and control existing invasive species populations throughout the Great Lakes ecosystem. Ongoing work in the Chicago, IL Area Waterway System and new efforts in Eagle Marsh, IN are stopping the upward migration of silverhead and bighead carps and preventing them from becoming established in the Great Lakes. Federal agencies and their community partners expanded control activities in FY 2016 by over 14,000 acres. Since the inception of the GLRI, federal agencies and their partners have taken actions to control invasive species on over 115,000 acres.

Nonpoint Source Pollution Impacts on Nearshore Health

The GLRI implemented focused conservation activities to reduce sources of phosphorus loadings that threaten the Great Lakes nearshore regions. During FY 2016, federal agencies and their partners worked collaboratively to reduce nonpoint sources of phosphorus runoff that contribute to harmful algal blooms around the Great Lakes in priority watersheds such as Lake Erie, Saginaw Bay, and Green Bay. Federal agencies project that over 402,000 pounds of phosphorus has been prevented from entering the Great Lakes cumulatively as a result of GLRI funded projects.

Habitat and Species

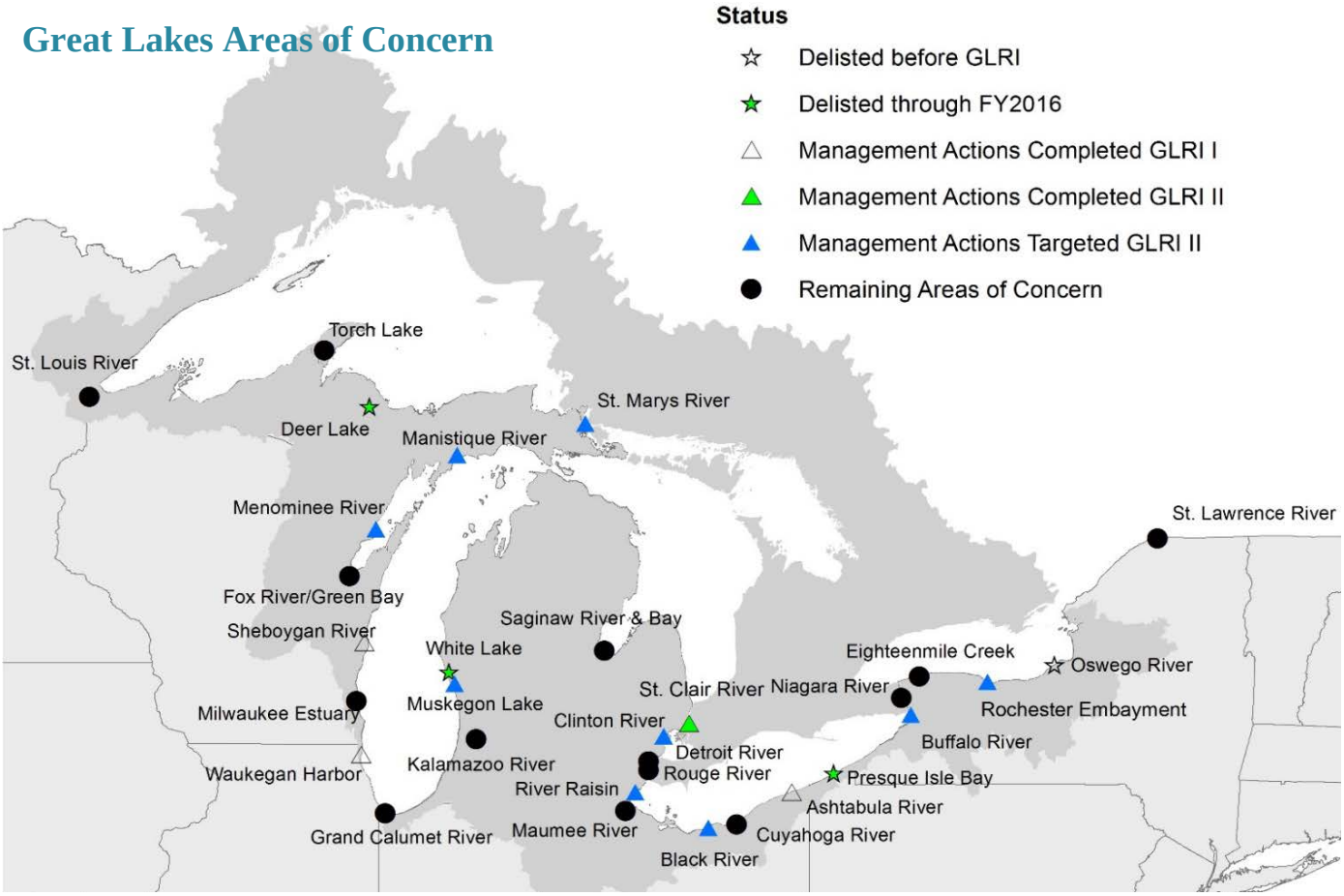
During FY 2016, federal agencies and their partners protected, restored and enhanced habitats and native species throughout the Great Lakes basin, implementing a total of 45 projects. These efforts add to the more than 920 habitat and species projects undertaken over the course of the GLRI. Federal agencies and their partners protected, restored and enhanced 642 miles of Great Lakes shoreline and riparian corridors and 17,500 acres of coastal wetlands through FY 2016. Since the start of the GLRI, more than 180,000 acres of habitat have been protected, restored, or enhanced.

Foundations for Future Restoration Actions

In order to improve transparency and fiscal stewardship, the GLRI has established accountability mechanisms, management practices, and third party oversight for effective management. During FY 2016 the GLRI educated people residing in the Great Lakes basin, reaching over 400 educators who then incorporated Great Lakes specific material into their broader environmental education curricula. More than 27,000 people are estimated to have been educated as a result of this curriculum in FY 2016.

Section 2 – Program Accomplishments

Great Lakes Areas of Concern



FOCUS AREA 1: Toxic Substances and Areas of Concern

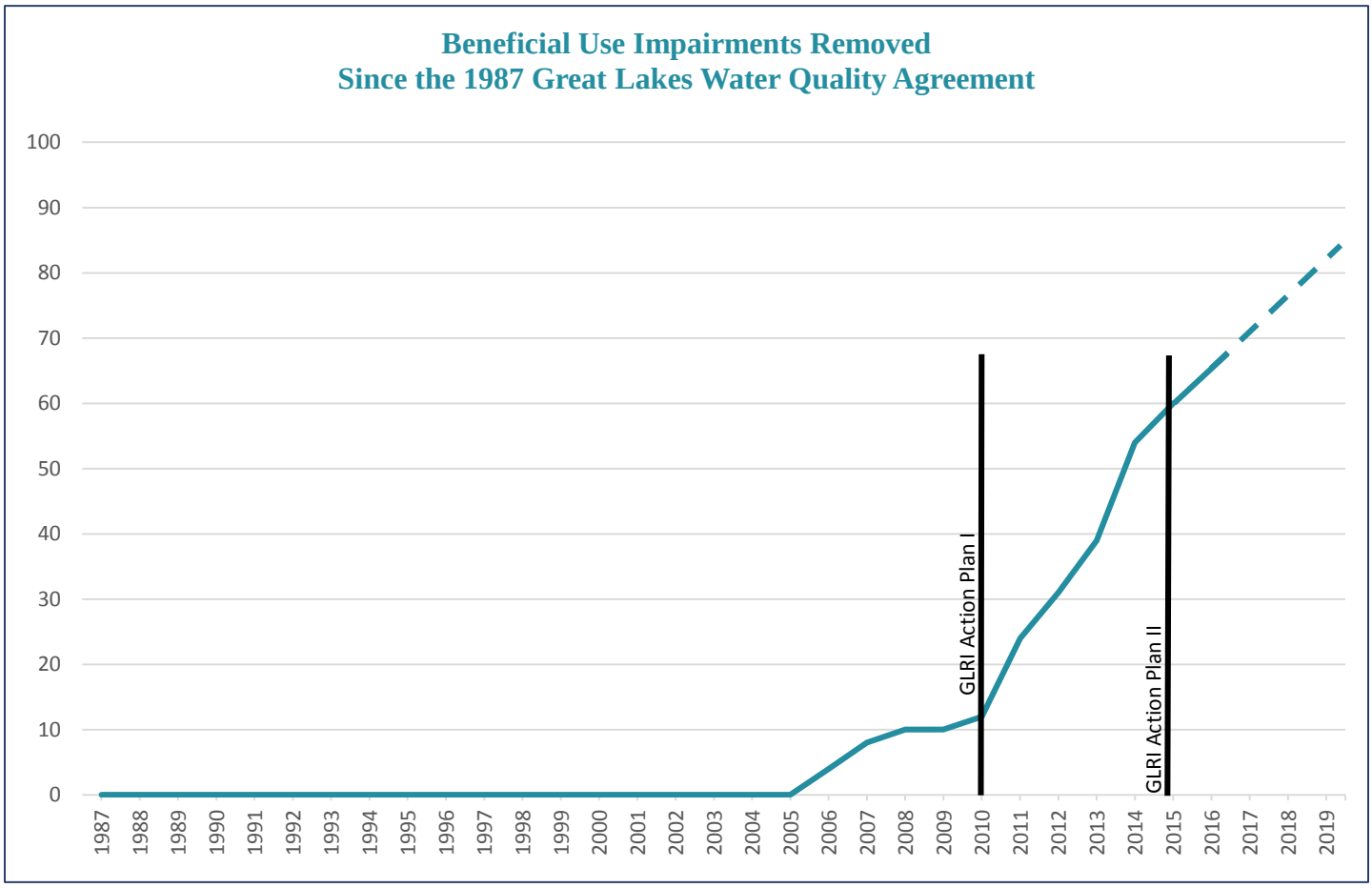
Defined in the 1987 Great Lakes Water Quality Agreement, AOCs are the areas of the Great Lakes basin that are most heavily contaminated with legacy pollutants and show signs of environmental degradation such as habitat loss and fish consumption advisories. Federal agencies and their partners have completed all management actions required to delist seven AOCs in the Great Lakes Basin.

In FY 2016, federal agencies and their partners finished the management actions needed to delist the St. Clair River AOC in Michigan. One of the habitat projects at St. Clair River, Marysville Living Shoreline, is shown here. During FY 2016, substantial progress was made toward completion of management actions needed to delist four other AOCs, including St. Mary's River (MI), Lower Menominee River (MI), River Raisin (MI), and Rochester Embayment (NY). Management actions in these AOCs are expected to be completed in 2017.

St. Clair River, Michigan (Cleanup Complete)

In FY 2016, federal agencies and their partners removed five Beneficial Use Impairments (BUIs) at five AOCs in three states, bringing the cumulative total BUI removals since the start of the GLRI to 65, more than five times the total removed in the preceding 22 years. BUIs are the benchmarks of environmental harm and characterize the AOC. Once an AOC's BUIs are removed, the area becomes known as an area in recovery until monitoring shows it can be formally delisted.

During FY 2016, federal agencies and their partners implemented 7 projects to protect human health from contaminants in Great Lakes fish. Federal agencies and their partners updated fish consumption advisories and provided public information on the health risks as well as the benefits of Great Lakes fish consumption.



During FY 2016, federal agencies and their partners provided advice to over 200,000 people regarding the risks and benefits of Great Lakes fish consumption. Federal agencies and their partners focused on populations with the highest risk of contaminant exposure, including:

- Women of child bearing age
- Children
- Urban anglers
- Tribal communities
- Others who rely on Great Lakes fish as a significant part of their diet

Federal agencies and their partners continue to characterize and assess the risks posed from emerging contaminants on the health of Great Lakes fish and wildlife. Through this multi-agency effort, GLRI partners have gained a better understanding of how the presence and distribution of emerging contaminants (such as Perfluorinated compounds (PFCs) and Polybrominated diphenyl ethers (PBDEs)), can affect potential routes of exposure and have potential health impacts on fish and wildlife populations.

Focus Area 1 Success Stories

Grand Calumet River AOC Restoration

During FY 2016, the GLRI conducted sediment remediation and habitat restoration in the Grand Calumet River AOC (IN). EPA and its project partners have removed approximately 15,000 cubic yards of sediments contaminated with polycyclic aromatic hydrocarbons (PAHs), heavy metals, and other legacy pollutants from the river and have begun installing a multilayer active cap over this 1/2-mile stretch of the river. This project has contributed to the improvement of the shoreline by removing invasive plants, improving fish and wildlife habitats, providing better food and shelter for native species, and enhancing the landscape aesthetics. Restoration of nearly three miles of the West Branch of the Grand Calumet River to the Indiana/Illinois state line has been completed.

Contaminants of Emerging Concern in Sturgeon Blood

In FY 2016, a team of U.S. Fish and Wildlife Service (USFWS) biologists coordinated non-lethal sampling to measure Contaminants of Emerging Concern in sturgeon blood. This was done on a regional scale at sites in major rivers across the lower Great Lakes. The field team drew on the collective experience and skills of USFWS staff and partners to help understand how such contaminants may be accumulating in lake sturgeon, and in turn, how these chemicals may be impacting their health. The Lake Sturgeon Project is just one example of how the USFWS is using GLRI funding to support cross-programmatic, inter-agency, and other collaborations to find efficiencies while achieving project goals.

Great Lakes Indian Fish & Wildlife Commission Mercury Program

In FY 2016, the Great Lakes Indian Fish & Wildlife Commission (GLIFWC), with support from the GLRI, empowered tribal members in the Lake Superior region to make informed decisions regarding safe fish consumption. In 2010 the GLRI began funding the GLIFWC's Mercury Program. During that time, 2,500 fish have been collected from Lake Superior and nearby inland lakes and tested for mercury, with a focus on tribally important species and harvest locations. The data is used to generate and update the GLIFWC's Mercury Maps, which display color-coded, and lake-specific fish consumption advice for over 300 lakes. This data provides strategies for continuing to harvest and consume fish, a vital part of the tribal way of life, while minimizing mercury exposure.

Focus Area 1 Success Stories

Menominee River AOC Restoration

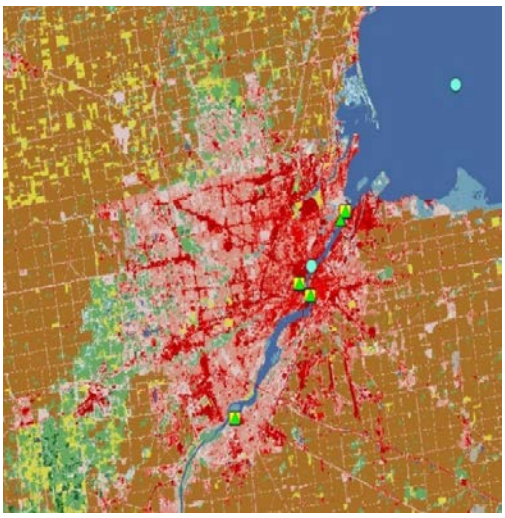
In FY 2016, with GLRI funding, the City of Marinette, WI along with the Wisconsin Department of Natural Resources (WDNR), has continued restoration efforts at Menekaunee Harbor, WI. Habitat restoration began with invasive species plant control, native plantings, and the installation of fish and wildlife habitat structures. Project partners removed 27,000 cubic yards of contaminated sediments along with failing wooden seawalls, treated phragmites, and commenced commenced monitoring. The city and WDNR share a vision for the harbor that includes: better public access, improved economic and recreational opportunities, healthier environment, and improved fish and wildlife habitat.

Rochester Bay AOC Restoration

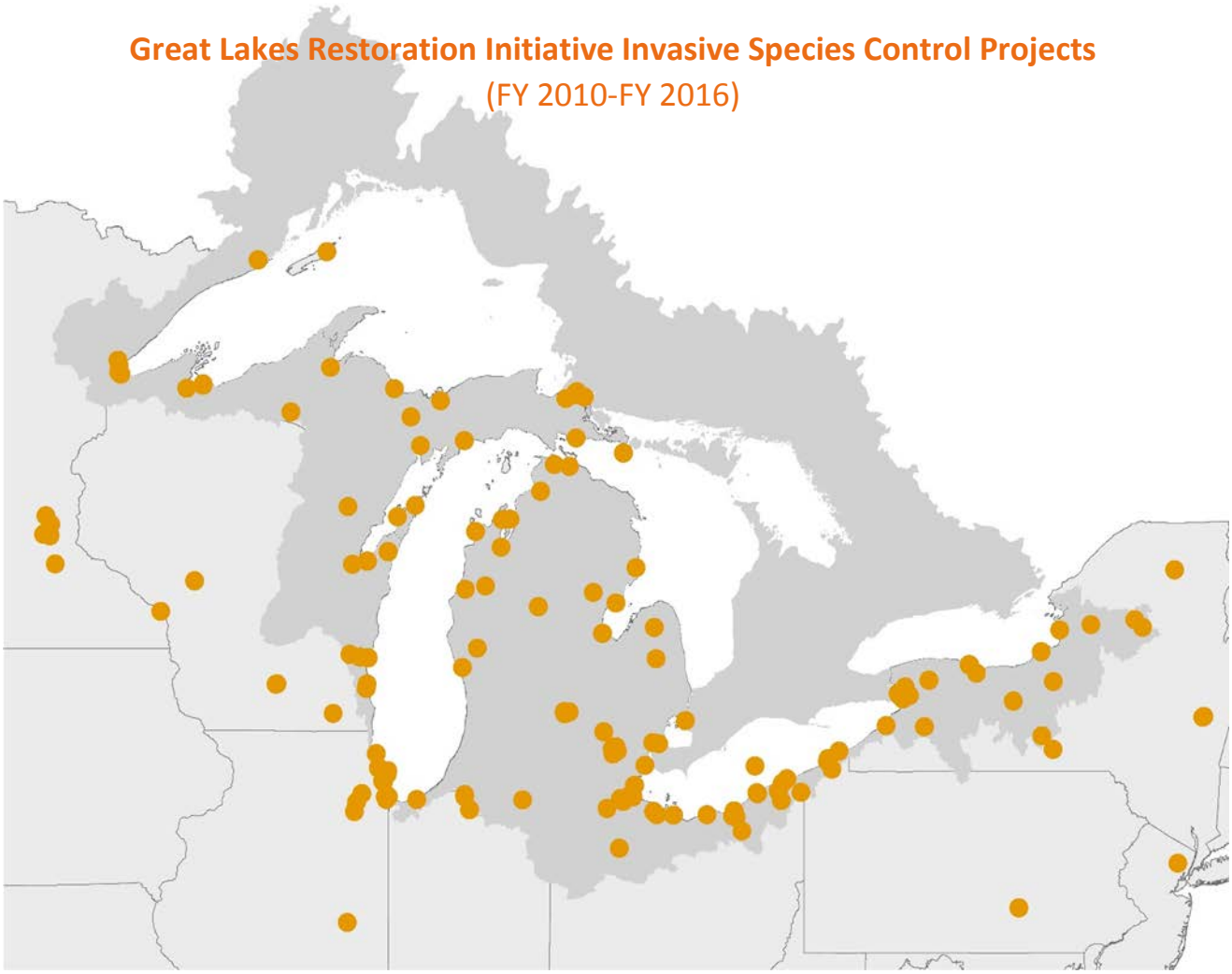
During FY 2016, GLRI partners began work to protect and restore Braddock Bay, a 340-acre coastal embayment on Lake Ontario consisting of expansive emergent wetlands and aquatic beds. The work within the bay is designed to improve habitat diversity of the cattail-dominated wetlands and reduce erosion, which in the past century has resulted in over 100 acres of wetland loss. In spring, channels and potholes were excavated in the existing wetland in order to increase the diversity of emergent wetlands and to improve connectivity to remnant sedge meadow habitat. A barrier beach is under construction in the bay mouth to protect the wetlands from further erosion and allow for the restoration of an additional three acres of wetlands historically lost to erosion. Together these activities protect and improve habitat for a wide range of flora and fauna including the northern pike and the New York state endangered black tern.

Maumee River AOC Sampling

During FY 2016, federal partners worked to define the presence and magnitude of chemical contaminants within Great Lakes tributaries and watersheds, in order to understand their impacts on fish and wildlife. This was accomplished through an intensive sampling effort that took place within the Maumee River watershed, one of the most agriculturally influenced rivers in the entire Great Lakes basin, that includes corn, soybean, and wheat crops as well as some confined animal feeding operations. Sampling took place along a land use gradient ranging from agricultural to urban/industrial influenced, and was timed to coincide with summer pesticide runoff. Along with chemical analyses in various media and biota, a variety of biological organisms were collected for evaluation of biological effects. Partners are developing relationships between watershed attributes, such as land use and industrial point sources, and prioritizing watersheds by their likelihood of adverse biological impacts.



Great Lakes Restoration Initiative Invasive Species Control Projects
(FY 2010-FY 2016)



FOCUS AREA 2: Invasive Species

During FY 2016, federal agencies and their partners continued efforts to prevent the introduction of new invasive species and control existing invasive species populations in the Great Lakes ecosystem.

Federal agencies and their partners conducted early detection monitoring exercises and trained for rapid responses. During FY 2016, the GLRI funded three early detection monitoring activities that enhance the ability to detect and respond to new invasive species introductions. Federal agencies and their partners also completed a total of 11 exercises and responses, exceeding their target of eight rapid responses and exercises in FY 2016.

Federal agencies and their partners have further reduced the risk of invasive species entering the Great Lakes watershed by funding 14 projects that help block the pathways of introduction. These pathways include: canals and water ways, recreational boating, commercial shipping, illegal trade of banned species, release of aquarium species, and release of live bait.

Protecting the Great Lakes from Asian Carp

The GLRI provides support to the Asian Carp Regional Coordinating Committee, which has implemented the Asian Carp Action Plan – including surveillance, response actions, and testing of new control technologies. More information about the ARCC is available at http://www.asiancarp.us.

During FY 2016, federal agencies and their partners restored sites degraded by aquatic, wetland, and terrestrial invasive species. Federal agencies also supported community efforts to control and reduce the spread of invasive species. These projects were implemented with partners who are expected to continue maintenance and stewardship beyond the duration of the federally funded projects lifespan. In addition, federal agencies directly implemented control projects in national forests, parks, and wildlife refuges. In FY 2016, federal agencies and their partners managed and funded projects that protected over 14,000 aquatic/terrestrial acres from invasive species for a cumulative total of more than 115,000 acres.

During FY 2016, federal agencies and their partners developed and refined invasive species control technologies and management techniques while effectively minimizing harm to other non-invasive fish species. The GLRI supports invasive species control technologies with proven potential but require additional testing. During FY 2016, in order to evaluate their effectiveness in controlling invasive species in the Great Lakes basin, federal agencies and their partners field tested three technologies and methods, including two new ballast water management systems.

In FY 2016, federal agencies and their partners continued to support and enhance a total of four species-specific "collaboratives," which help communicate the latest control technologies and management techniques. Collaboratives are ongoing for the following species: Asian carp, phragmites, invasive mussels, and monoecious hydrilla. These collaboratives are actively involved in the protection and control efforts occurring under the other invasive species objectives.

Supporting Sustainable Invasive Species Control Through Community Projects

The GLRI is actively building the capability of Great Lakes communities to manage invasive species through funding on-the-ground and in-the-water control projects by supporting step 3 of this process.

Step 1

- Identify project site

Step 2

- Develop plans for short-term control and long-term stewardship

Step 3

- Provide funding for initial control activities and the assessment of project effectiveness. Project implementation also provides opportunities for communities to:
  - Create volunteer stewardship program
  - Provide job skills training
  - Provide employment opportunities, including the use of "civilian conservation corps" initiatives

Step 4

- Community stewardship maintains the significantly improved site

Protecting the Great Lakes from Sea Lamprey

The GLRI provides support to the Great Lakes Fishery Commission's Sea Lamprey Control Program. The GLFC has successfully implemented control techniques that returned Lake Huron and Lake Michigan sea lamprey populations to historic lows, and put Lake Ontario populations at target levels. Lake Superior and Lake Erie sea lamprey populations are both above target levels, but each continues to show a five-year downward trend in adult sea lamprey populations. The GLRI is supporting research that enhances sea lamprey control, including cutting-edge work on pheromones that attract and repel sea lamprey.

Focus Area 2 Success Stories

Closing Asian Carp Pathways

During FY 2016, the USDA Natural Resources Conservation Service (NRCS), working closely with the Asian Carp Regional Coordinating Committee and the Army Corps of Engineers (USACE), completed a barrier installation project at Eagle Marsh Nature Preserve in Fort Wayne, Indiana. This barrier is located on a NRCS Wetland Reserve Program easement and helps to keep Asian carp from transferring between the watersheds of the Wabash River in Indiana and the Lake Erie watershed in Ohio. The berm is 1.7 miles long and averages 7.5 feet high. Construction took three months and used 177,000 cubic yards of compacted fill. The project used Wetland Reserve Program funds from NRCS to construct the berm on the easement and GLRI funds for completing the effective barrier beyond the boundary of the easement site.

Preventing Potential New Invasive Species

During FY 2016, the USFWS developed the 11 Species Rule, listing the crucian carp, Prussian carp, Eurasian minnow, roach, stone moroko, Nile perch, Amur sleeper, European perch, zander, Wels catfish and the common yabby, as "injurious wildlife." The multi-species injurious listing sets a new precedent for preventative action to stop animal invaders before they enter the country. These 11 species are native to one or more of the continents of Europe, Asia, Africa, and Australia and have the potential to become invasive and highly detrimental to U.S. native wildlife and habitats. The USFWS selected animals for the multi-species injurious listing using a process called Ecological Risk Screening Summaries. Since 2010, to examine potential invaders, the GLRI has supported more than 1,400 risk assessments.

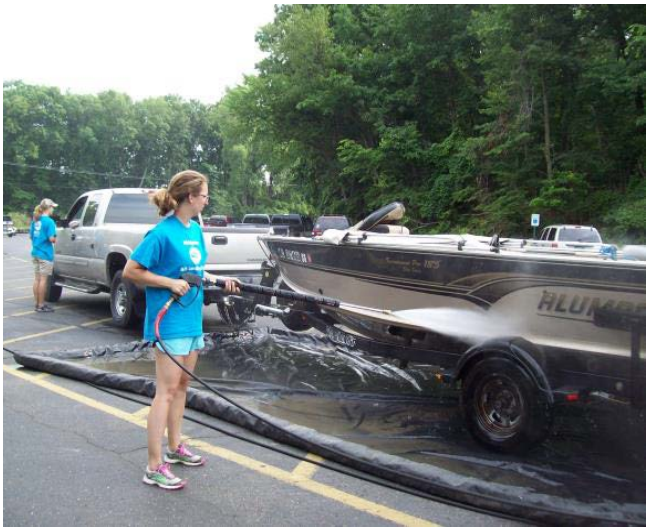
Cooperative Weed Management at Milwaukee County Zoo

In FY 2016, the U.S. Forest Service (USFS) partnered with the Southeastern Wisconsin Invasive Species Consortium (SEWISC) to control invasive plants at the Milwaukee County Zoo with support from GLRI funding. The Forest Service, with the help of the Student Conservation Association and the Milwaukee County House of Corrections, exposed and treated the bare ground layer after removing a dense thicket of glossy buckthorn and garlic mustard at the two-acre site adjacent to Lake Evinrude. In May, the Zoo hosted "Party for the Planet," a weekend of activities focusing on conservation, where trees were planted at the site and Zoo visitors learned about the importance of preserving native vegetation and protecting vital habitat.

Focus Area 2 Success Stories

Unifed Fishing Method

During FY 2016, the GLRI, to further reduce Asian carp abundance in the upper Illinois River, planned and executed a pilot project that deployed the "Unified Fishing Method" in a 500-acre lake in Morris, Illinois. In March of 2016, Illinois Department of Natural Resources (IDNR) worked with contracted fishers to implement the pilot project. The contracted fishers, along with IDNR, deployed nets that were lifted and reset, funneling and blocking the fish to continually concentrate the fish into the east end of the lake over a two-week time period. The fisherman used boat movement, electrofishing boats, motors, and additional sound. In all, the project captured or removed nearly 100,000 pounds of bighead and silver carp.

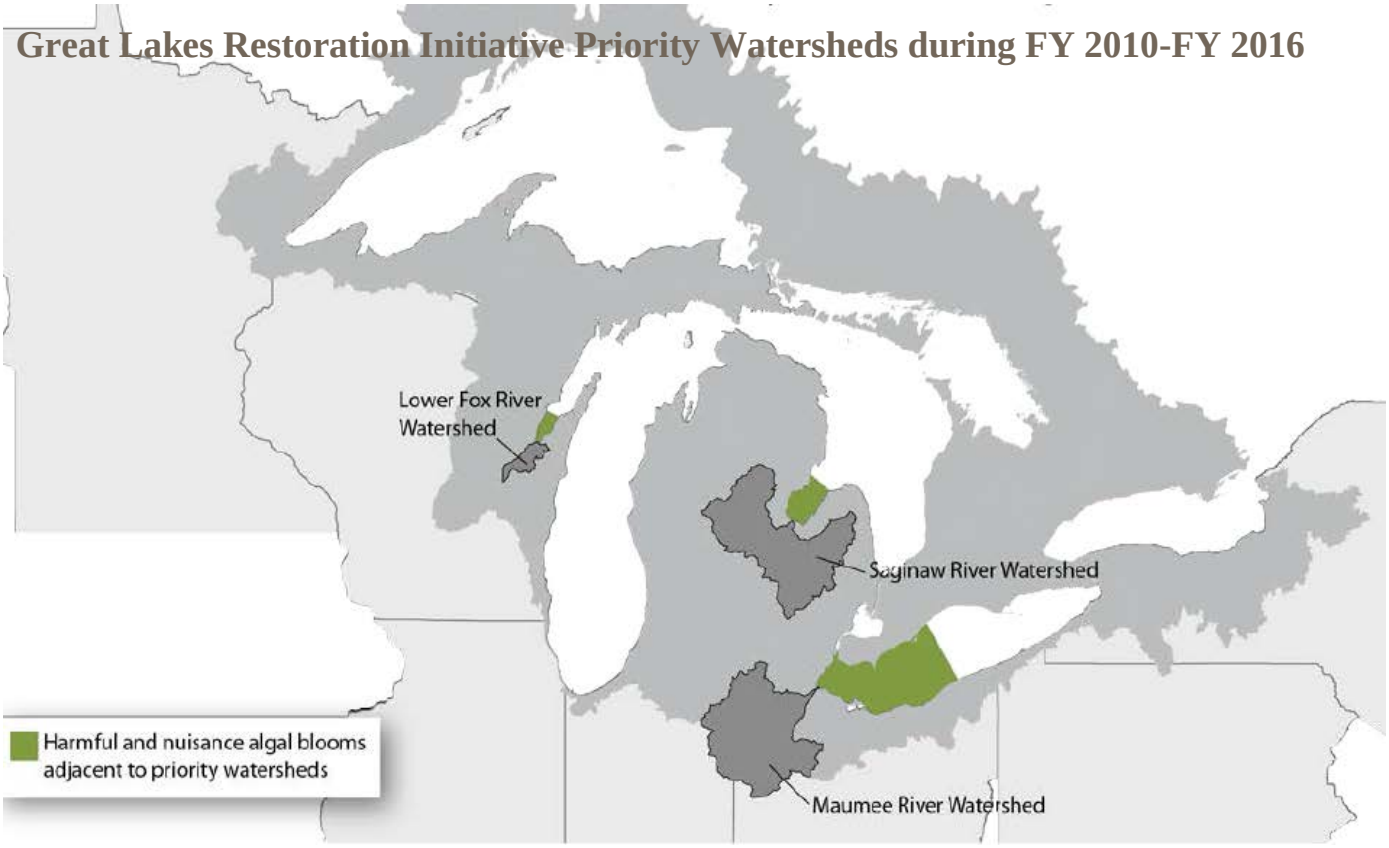


Mobile Boat Washing in Michigan

During FY 2016, using GLRI funding, USFS along with the help of volunteers, prevented aquatic invasive species from inadvertently being transported between lakes in Michigan. Aquatic Invasive Species have a tendency to attach themselves to the outside of boats. Using a mobile boat washing unit, project staff coordinate educational boat washings at boating access sites and boater related events throughout the summer. Results from the 2016 season outpaced those of the first two years thanks to acquisition of a second mobile boat washing unit and a second team. The messages shared through boat cleaning events have a lasting impact on people, and the ecosystem. Every boater, angler and recreational user has the potential to spread the vital message of "Clean, Drain & Dry" to thwart the spread of invasive species.

Five Year Invasive Cleanup Complete at Times Beach

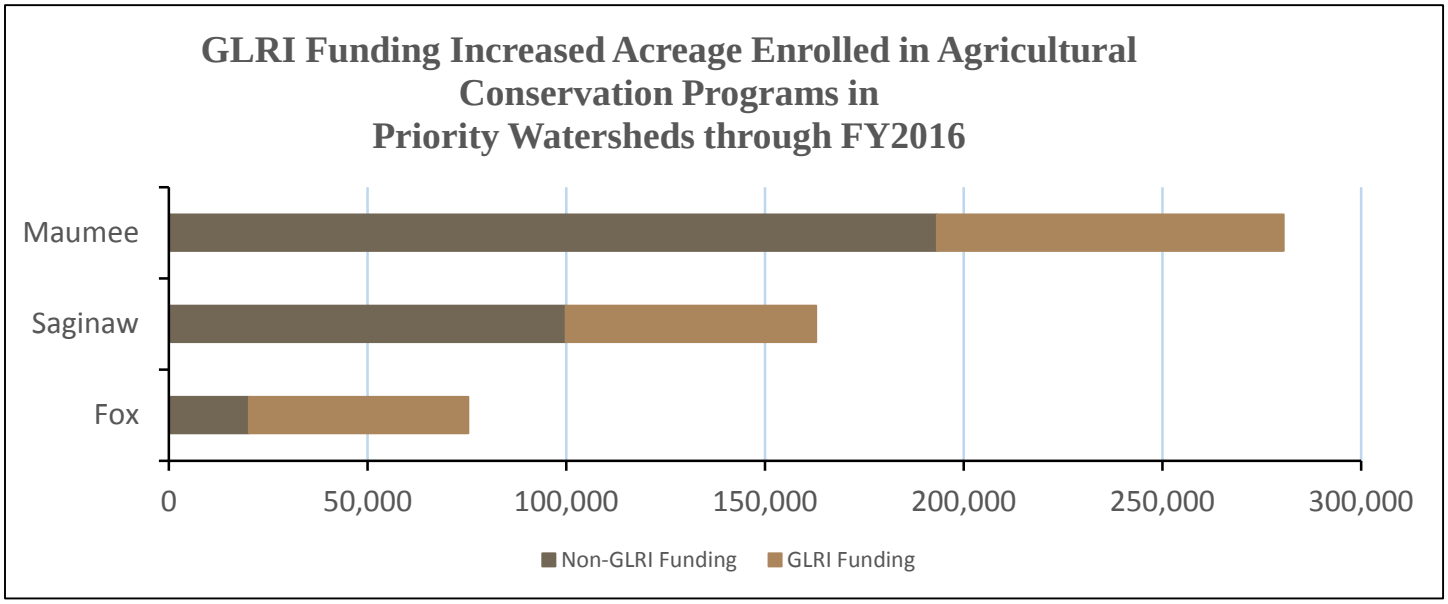
In FY 2016, USACE transformed Times Beach in Buffalo, NY into a healthy nature preserve supporting native vegetation and providing critical habitat for a wide range of bird species. Times Beach, a turn-of-the-century era recreational beach, was re-designated as a contained disposal facility for river and harbor dredged material in the 1930's due to industrial contamination. The contained disposal facility was decommissioned in 2005 and became a nature preserve with one of the most valuable bird and pollinator conservation sites in the Great Lakes. However, like many Great Lakes systems it was plagued with invasive plant species. USACE used GLRI funding to enhance the nature preserve through a five-year program that removed invasive species, such as phragmites.



FOCUS AREA 3: Nonpoint Source Pollution Impacts on Nearshore Health

During FY 2016, federal agencies and their partners reduced nutrient loads into the Great Lakes. The GLRI implemented focused conservation activities to reduce sources of phosphorus loadings that threaten the Great Lakes nearshore regions, and projects have been undertaken in selected agricultural priority watersheds. The largest nonpoint source of phosphorus loadings that threaten the Great Lakes nearshore areas is the nutrient runoff from agricultural lands.

Excess phosphorus loadings threaten the Great Lakes ecosystem by contributing to harmful algal blooms that cause human health effects, drinking water impairments, exacerbate dead zones, and cause beach closures that result in loss of recreational opportunities. The GLRI agencies project that over 402,000 pounds of phosphorus was prevented from entering the Great Lakes as a result of GLRI funded projects in FY 2016.



During FY 2016, federal agencies and their partners funded nutrient and sediment reduction projects on over 89,000 acres of targeted watershed in the Great Lakes Basin using GLRI funding.

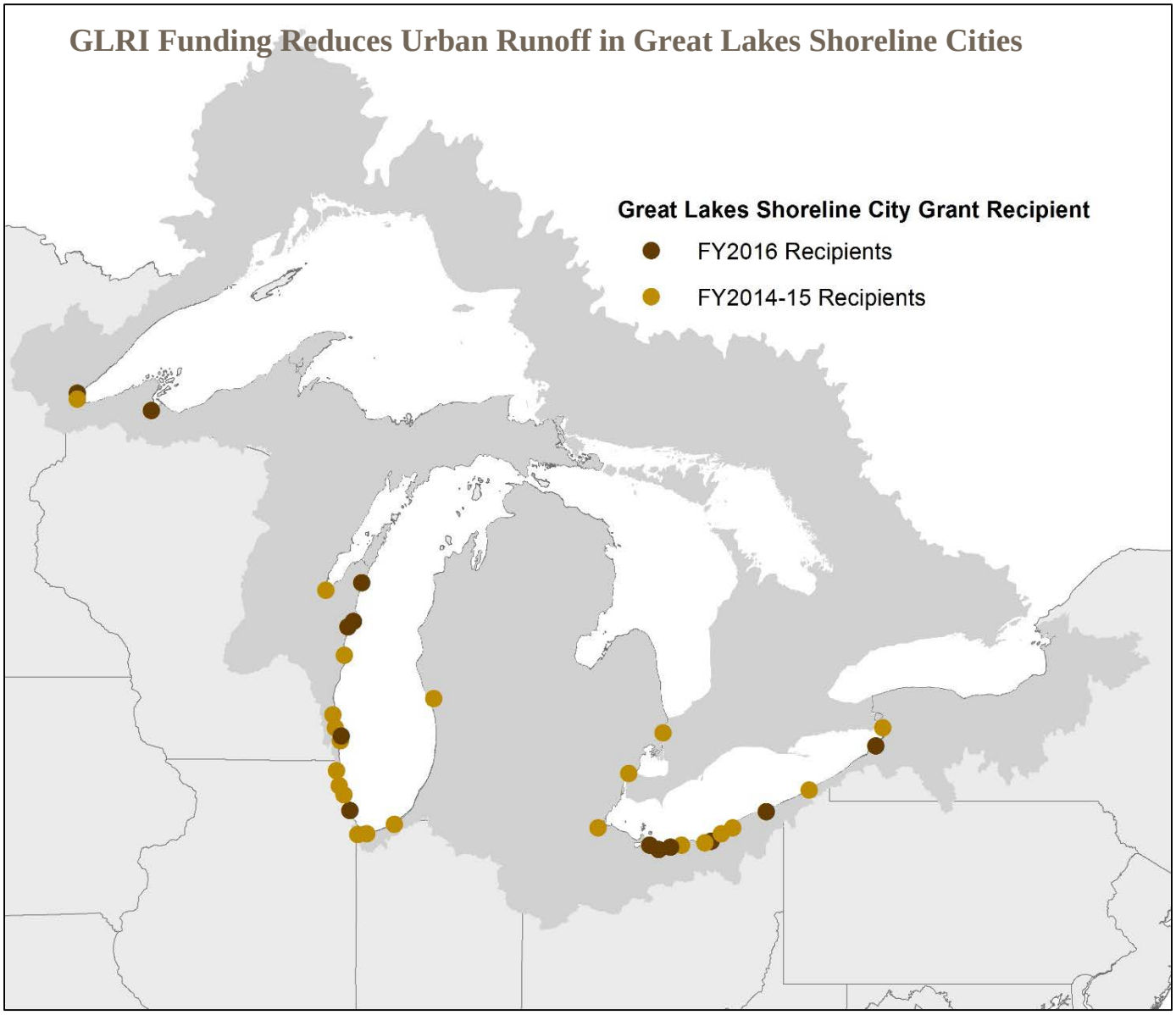
During FY 2016, federal agencies and their partners reported projections on urban runoff projects that are anticipated to capture an average annual volume of more than 79 million gallons of untreated urban runoff per year. These projects reduce flooding, increase green space in urban areas, and return vacant properties to productive use during FY 2016. Federal agencies and their partners funded 36 urban watershed management projects in FY 2016 to implement best management practices that address nonpoint source pollution in urban areas. The practices implemented include:

- Bioswales
- Rain gardens
- Bioretention ponds
- Porous pavement
- Tree plantings
- Constructed wetlands

In FY 2016, the GLRI also funded green infrastructure projects in the following 13 Great Lakes shoreline cities:

- East Chicago, IN
- Ashtabula, OH
- Cleveland, OH
- Huron, OH
- Sandusky, OH
- Vermillion, OH
- Duluth, MN
- Evans, NY
- Algoma, WI
- Ashland, WI
- Manitowoc, WI
- Wind Point, WI
- Two Rivers, WI

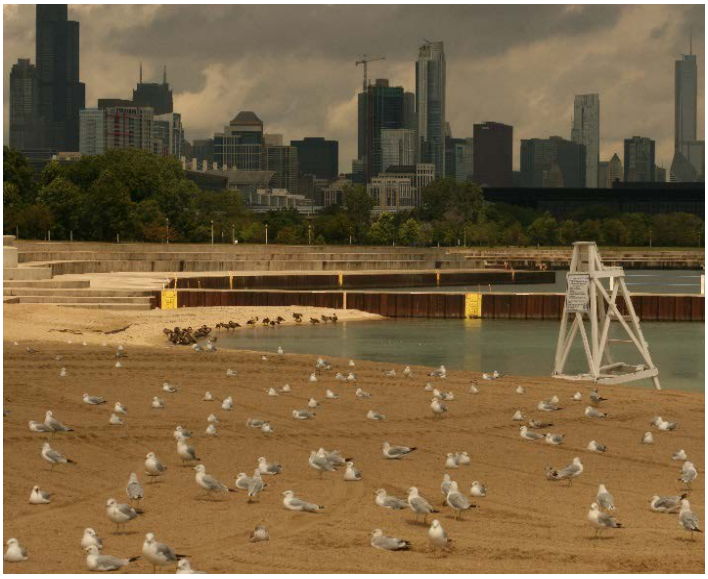
Projects in these shoreline cities will treat, slow, or capture untreated stormwater runoff, helping to improve water quality conditions within the Great Lakes basin.



Focus Area 3 Success Stories

Riparian Reforestation in Highland Hills, OH

In FY 2016, the USFS collaborated with the West Creek Conservancy, the Ohio DNR, and local volunteers to plant 6,000 native trees and live stakes over eleven acres in order to improve stormwater flow on Mill Creek located in Highland Hills, Ohio. Each one of these trees and shrubs will filter out pollutants before they can enter into the waterways and help reduce erosion along the shoreline. As part of this 2,900-foot stream restoration project, the USFS will conduct ten additional planting events over the next two years.



Near Shore Water Quality in the Windy City

Large ring-billed gull populations contribute to poor water quality in the nearshore waters/swim beaches of Lake Michigan in the Chicago, IL region. Results of tests for Escherichia coli (E. coli) in Chicago lakefront beach water have led to the frequent issuance of swim advisories. Through an adaptive water quality improvement program, the Chicago Park District, the U.S. Department of Agriculture's (USDA's) Wildlife Services program, and the EPA collaborated to improve these conditions in FY 2016. Components of this program included reducing the population of ring-billed gull chicks in Chicago, efforts to educate beach-users on their role in fostering clean beach water quality, improving waste disposal on beaches, and numerous other water quality improvement strategies.

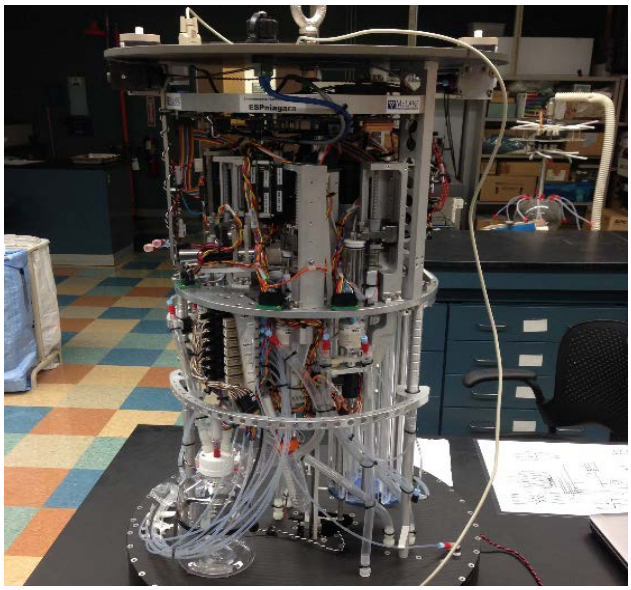
Green Infrastructure in Gary, IN

During FY 2016, the GLRI funded green infrastructure at City Hall in Gary, Indiana. Stormwater reduction strategies and green infrastructure were installed at a plaza just south of City Hall. The construction of the plaza included removal of impervious cover, repair of a failed subsurface drainage system, and redirection of stormwater from parking lot drains to a rain garden to enhance infiltration of stormwater. Monitoring started in spring of 2016 and will continue through 2017. Final products from these efforts will include hydrologic comparisons of stormwater reduction in different settings. Information gathered by these projects will be used to design future stormwater control measures in urban projects around the Great Lakes and in other parts of the nation.

Focus Area 3 Success Stories

NOAA GLERL Analyzes Lake Erie HAB Toxins

In FY 2016, the National Oceanic Atmospheric Administration's (NOAA) Great Lakes Environmental Research Laboratory (GLERL) deployed the first Environmental Sample Processor (ESP) in a freshwater system thanks to GLRI funding. An ESP is an autonomous robotic instrument that works as a 'lab in a can' in aquatic environments to collect water samples and analyze them for algal toxins. This allows for near real-time detection of Harmful Algal Blooms (HAB) and their toxins. The GLERL deployed the ESP in September 2016 near the Toledo Water intake to detect concentrations of toxins as a drinking water early warning system. This provides drinking water managers with data on harmful-algal toxicity in near real-time before the water reaches municipal water intakes. The ESP is part of a suite of 17 ESPs used globally.



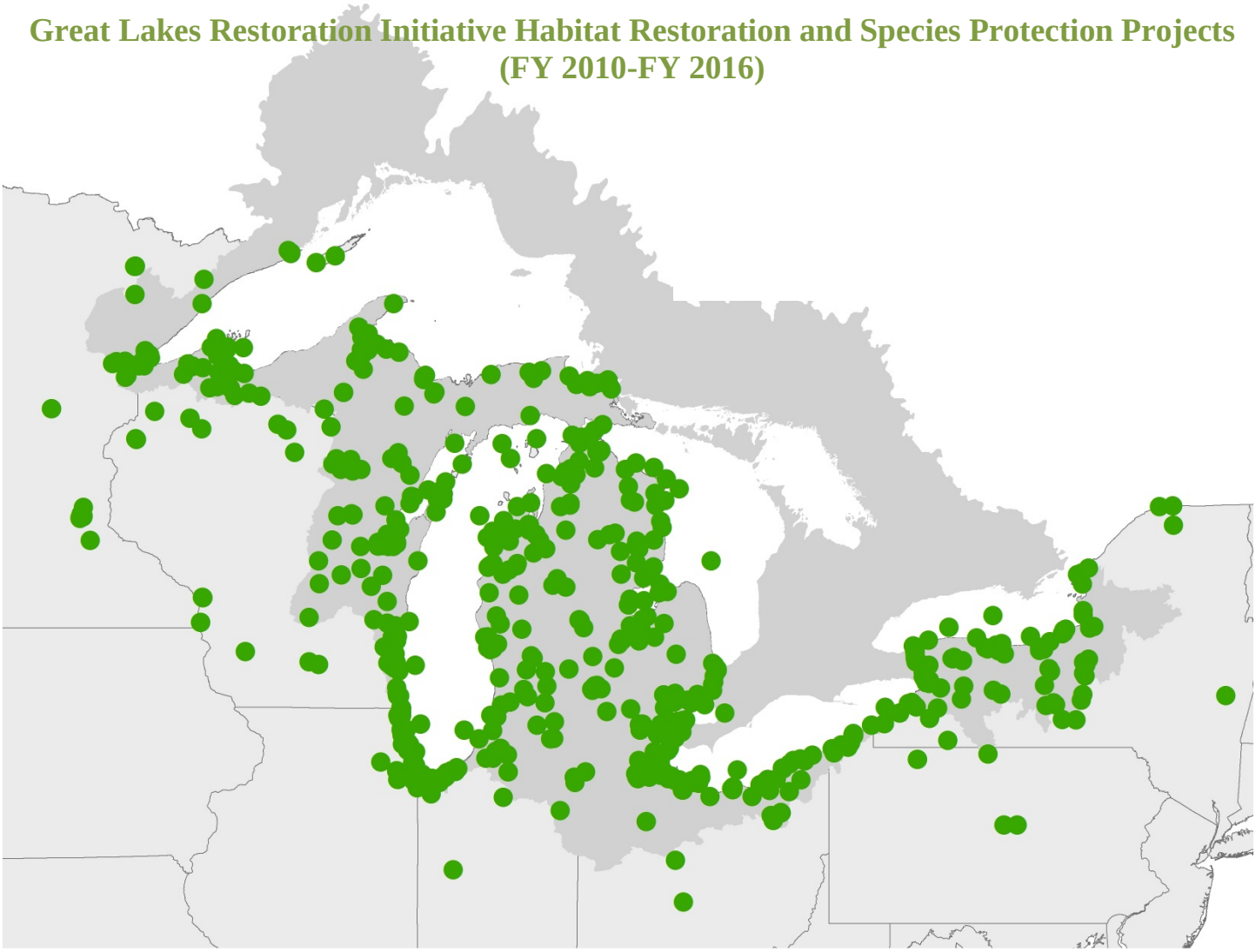
Modern Water Quality Trade Agreement in WI

In FY 2016, NRCS, and the Great Lakes Commission (GLC) announced the signing of the first modern water quality trade agreement between a crop farmer and a waste-water treatment facility on the U.S. side of the Great Lakes basin. The trade agreement, signed in the Fox River basin, near Green Bay, WI, was brokered by the GLC and is the culmination of a multi-year project known as Fox P Trade. During that time, the GLC worked with key stakeholders across the Lower Fox River watershed to test water quality trading as a potential tool to help reduce nutrient loadings into the Lower Fox River, which drains into Green Bay. The Brown and Outagamie county land conservation departments partnered to connect the project with local farmers.

Green Infrastructure at Former Brownfield Site

In FY 2016, using GLRI funding, the City of Oak Creek, WI began revitalizing a 250-acre former industrial area located on a bluff overlooking the shore of Lake Michigan. As part of a brownfield clean up, approximately 114 acres of this formerly contaminated land is being converted to a coastal greenfield. This green infrastructure project focuses on installing pervious pavers to capture untreated stormwater runoff from the parking area and constructing over 2.5 acres of wetlands. These green infrastructure installations will remove sediment and other nutrients from the stormwater runoff, cleaning it before it enters Lake Michigan. As a result of this work, the residents in the Oak Creek community will have public access to the Lake Michigan shore for the first time in 80 years.

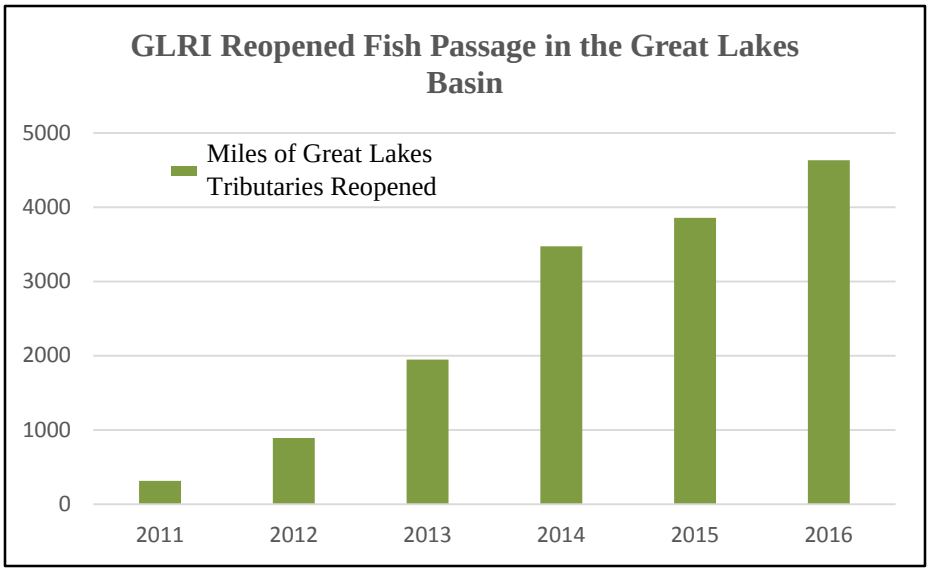
Great Lakes Restoration Initiative Habitat Restoration and Species Protection Projects (FY 2010-FY 2016)



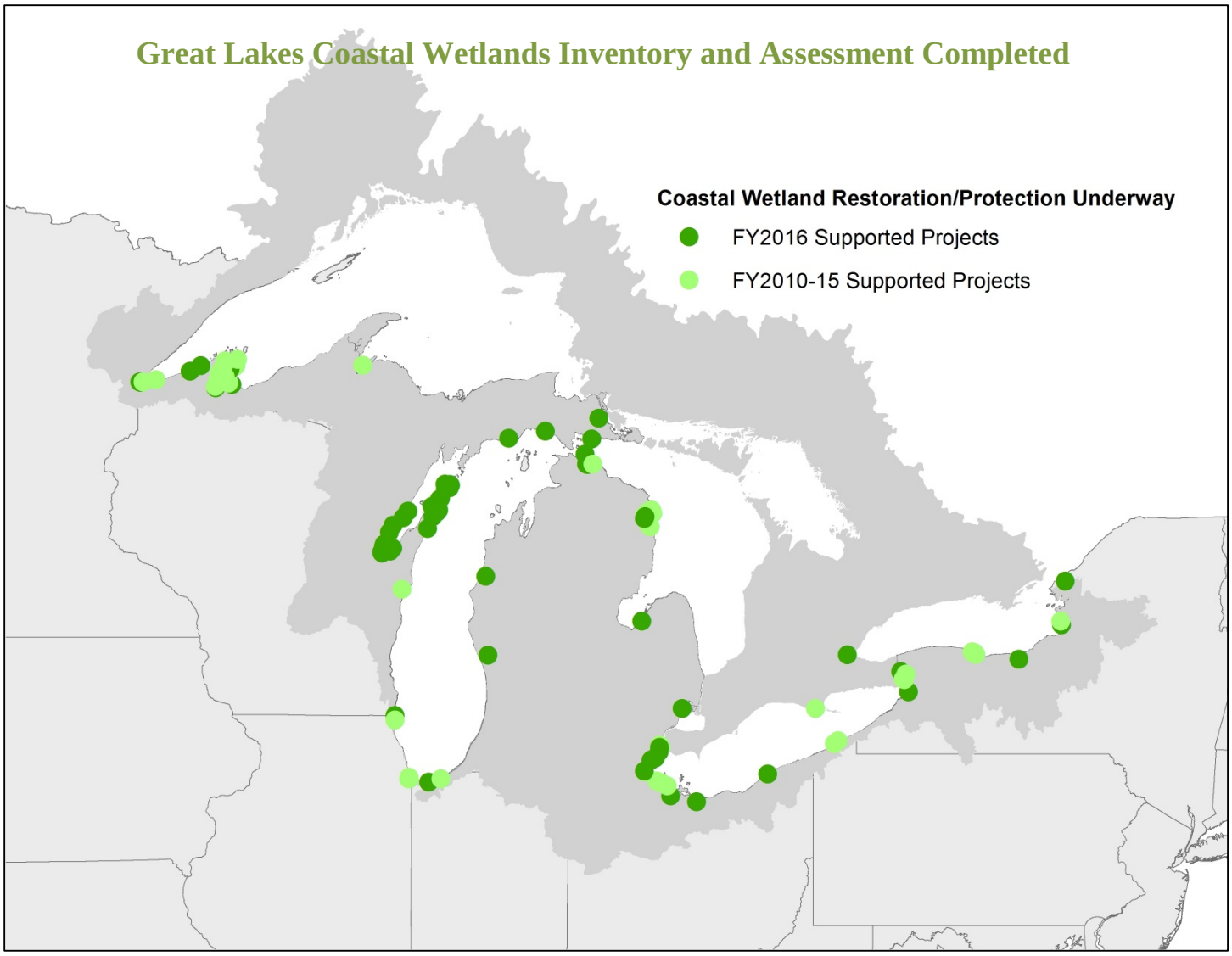
FOCUS AREA 4: Habitat and Species

During FY 2016, federal agencies and their partners protected, restored and enhanced habitats and native species throughout the Great Lakes basin. In FY 2016, GLRI agencies and their partners implemented 45 habitat and native species projects adding to the more than 920 habitat and native species projects underway or completed by federal agencies and their partners since the inception of the GLRI.

Through FY 2016, federal agencies and their partners, implemented protection, restoration, and enhancement projects that have reopened over 4,600 miles of Great Lakes tributaries, and increased aquatic connectivity for numerous fish species. In FY 2016, GLRI partners protected, restored, and enhanced more than 20,000 acres of non-coastal wetland habitats in order to sustain Great Lakes habitats and species populations.



The Great Lakes Restoration Initiative Action Plan II identified a measure to protect, restore and enhance coastal wetlands. The Great Lakes coastal wetlands are ecologically significant in part because more than 80 species of fish rely directly on coastal wetland habitats during some part of their life cycles and over 50 separate species depend entirely on coastal wetland habitats. Through FY 2016, federal agencies and their partners have protected, restored and enhanced over 660 miles of Great Lakes shoreline and riparian corridors and protected, restored and enhanced over 17,500 acres of Great Lakes coastal wetlands.



As a result of GLRI efforts, Great Lakes aquatic and terrestrial habitats are better integrated and the species that depend on coastal habitats can now use them to their full capacity. Projects focusing on the Great Lakes aquatic and terrestrial species are leading to the recovery of federally endangered species such as:

- Eastern prairie fringed orchid
- Houghton's goldenrod
- Chittenango ovate amber snail
- Snuffbox mussel
- Mitchell's satyr butterfly
- Piping plover

In FY 2016, projects implemented in the Great Lakes Basin were directed towards protecting, restoring and enhancing piping plover populations. Great Lakes Piping Plover numbers are at the highest point they have been in decades. This season there were approximately 150 breeding plovers, an additional 50 non-breeders and we will fledge somewhere in the vicinity of 130 chicks. Currently, there are 75 documented pairs of piping plover in the Great Lakes basin.

Focus Area 4 Success Stories

Horner Park Restoration

In FY 2016, GLRI funds restored a 10-acre parcel of underutilized park and river bank called Horner Park in Chicago, IL. Six hundred thousand citizens within three miles of the site now have access to a restored habitat and shoreline. Restoration included regrading the steep banks to a gradual slope reducing erosion, recreating a seasonal wetland for amphibians, restoring 2,600 feet of the Chicago River streambank, and restoring an Oak Savanna. Invasive species were removed and native species were increased by installing over 100 species of native grasses, forbs, wildflowers, and trees with over 35,000 plants. This restoration provides critial habitat for over 300 species of birds including over five million migrating song birds that travel along the globally significant Lake Michigan shoreline.

Wetland Restoration at Maankiki Marsh

In FY 2016, using GLRI funding and working with Ducks Unlimited, the USFWS restored 1,000 acres of wetlands that are part of Shiawassee National Wildlife Refuge in Michigan. An essential piece of Michigan's largest freshwater estuary, the project returned the highly-altered agricultural landscape to its natural state and reconnected rivers long separated. To honor the first inhabitants of the area, refuge staff reached out to the Saginaw Chippewa Indian Tribe of Michigan to help craft the project site's name. In the traditional language of the Chippewa, also known as Ojibwa or Ojibwe, *mannkiki* is Anishinaabemowin for marsh or marshland of any size. Now known as Maankiki Marsh, the newly restored land will provide food and shelter for migrating ducks, geese and shorebirds, improve the fishery at Saginaw Bay, and enhance water filtration and better flood protection to local residents.

Recovering the State Endangered American Marten

In FY 2016, GLRI funding made it possible to expand a camera survey in the Apostle Islands National Lakeshore to 18 islands, providing important information on distribution and relative abundance of the American marten. The American marten is state endangered in Wisconsin. It was thought to have been extirpated from the state in the 1920's – until its recent discovery within Apostle Islands National Lakeshore and the Red Cliff Reservation, WI. Remote cameras and DNA analysis verified the occurrence of the marten in the islands during a carnivore research project. Preliminary DNA evidence suggests that the marten have been on the islands for a long time. Interagency and tribal resource managers will use the results of this project to assist in statewide protection and recovery of the marten.

Focus Area 4 Success Stories

Restoring Native Fish Populations

As of FY 2016, the GLRI has funded 21 native fish passage projects for: walleye, lake trout, Atlantic salmon, bloater, lake whitefish, and cisco. Six of these projects are now complete. In addition, research results in 15 peer-reviewed publications and 21 presentations have been distributed to scientists, managers, and to the public. Evidence of sound production by lake trout associated with spawning, represents the first evidence of sound production by a salmonid. These results inform our understanding of lake trout reproduction, which remains an impediment to re-establishment. Information generated through the native fish restoration grant program is transferred to fishery managers via the Commission's Science Transfer Program where it can be put to work restoring native fishes throughout the basin.

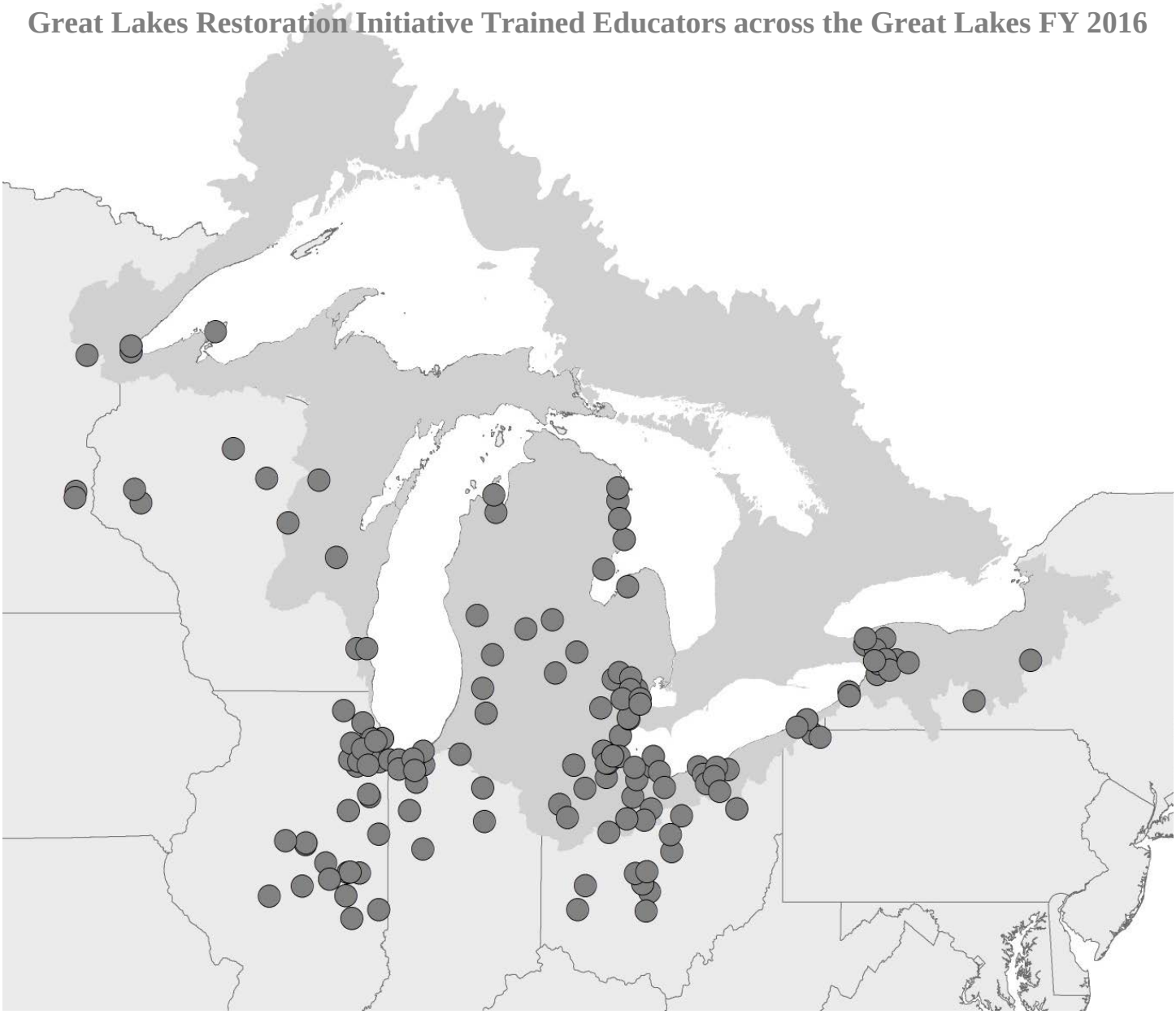
Wild Rice Returns to the Pine Creek Indian Reservation

In FY 2016, using GLRI funding, the Nottawaseppi Huron Band of the Potawatomi Environmental Program transplanted over 1,100 wild rice root masses to the Pine Creek Indian Reservation. Utilizing traditional ecological knowledge, a half-acre of wild rice was restored in Rice Pond and two miles were restored on Pine Creek. Tribal members assisted restoration efforts working from stream shallows and canoes to harvest seed and transplant wild rice shoots. This marked a significant phase for the project as it moved beyond an investigative and monitoring phase to return wild rice, a culturally important food the Tribe had depended on for centuries, back to the Reservation. In addition, over 50 miles of potential habitat for future wild rice donor and receiving beds were assessed in the Kalamazoo River and St. Joseph River watersheds of the Lake Michigan basin.

Improved Fish Passage in Spring Brook, Finger Lakes, NY

During FY 2016, using GLRI funding, the USFS replaced a stream culvert with an aluminum arch structure that will allow all species and sizes of aquatic organism to move freely upstream of Spring Brook in Hector, NY. Of particular interest are the wild trout that populate the lower reaches of Spring Brook, which is the only state-designated trout stream in the Finger Lakes National Forest. Spring Brook and the nearby Finger Lakes communities are a vital part of this ecosystem. As a result, aquatic organisms have no more difficulty moving through the stream crossing structure than the nearby section of stream. The increased size of the crossing structure, equal to the width of the natural stream, will also make it more flood resilient by effectively passing larger flood flows as well as sediment and debris moving down the stream.

Great Lakes Restoration Initiative Trained Educators across the Great Lakes FY 2016



FOCUS AREA 5: Foundations for Future Restoration Actions

In order to improve transparency and fiscal stewardship, federal agencies have established accountability mechanisms, management practices, and third party oversight to effectively manage the GLRI.

The GLRI Action Plan II laid out steps for agencies to develop and incorporate climate resiliency criteria in project selection, planning, and implementation. During FY 2016, federal agencies and their partners finalized a standardized set of climate resiliency criteria to help GLRI funded projects be more resilient to the effects of more frequent and intense storms and shifts in ranges of particular species.

The GLRI continues to promote Great Lakes-based ecosystem education and stewardship. During FY 2016, federal agencies and their partners trained 407 educators through the Center for Great Lakes Literacy (CGLL) a Great Lakes Sea Grant led program, and National Park Service interpretive programs. These programs provide hands-on experiences, educational resources, and networking opportunities to promote Great Lakes literacy among an engaged community of educators, scientists, and citizens. It is estimated that over 43,000 students will benefit each year from the training of these educators.

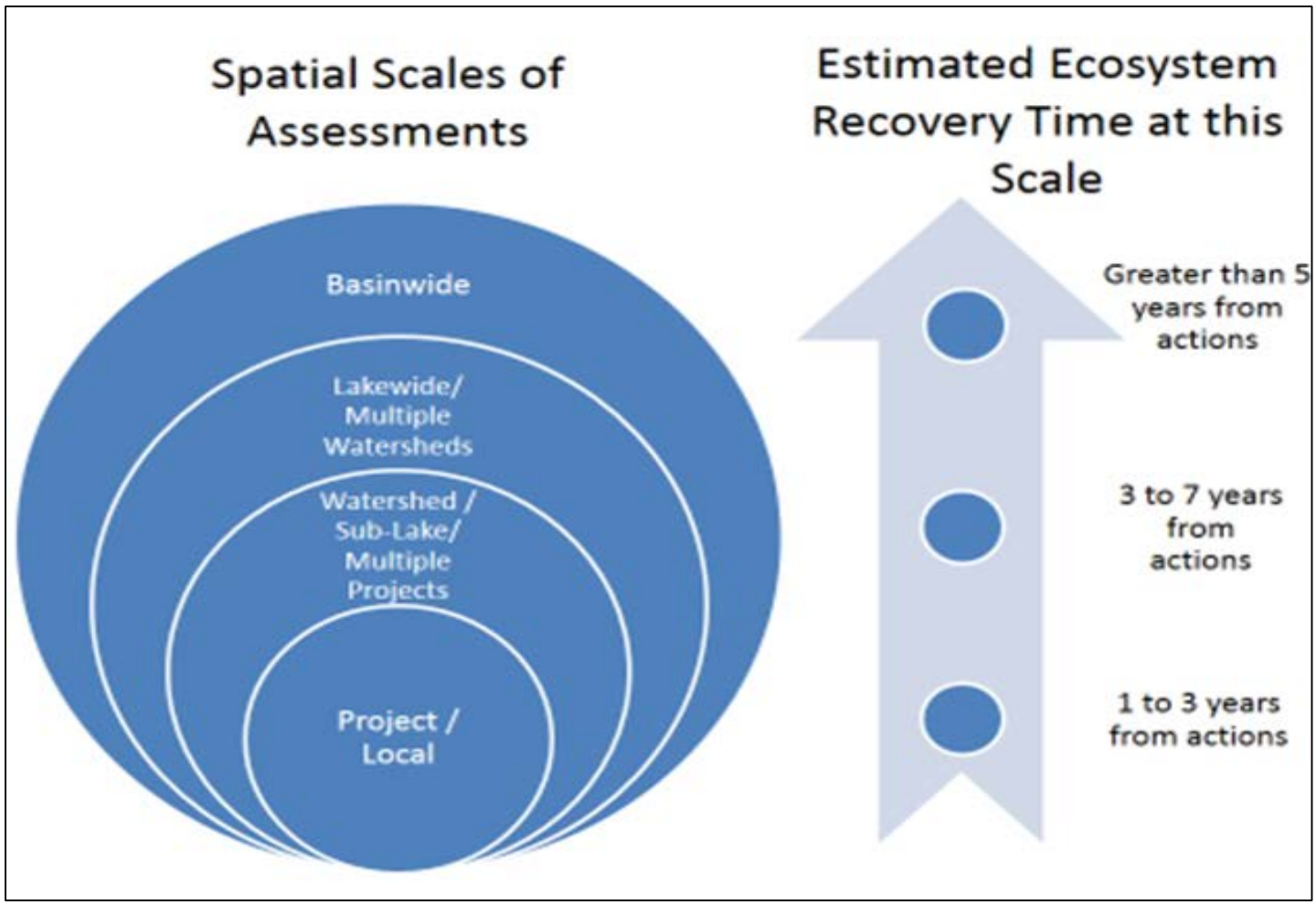
During FY 2016, federal agencies and their partner's educated over 27,000 people about the Great Lakes ecosystem through place based experiential learning activities on federally managed lands primarily through interpretative programs at national parks and lakeshores.

During FY 2016, federal agencies and their partners conducted comprehensive monitoring to assess the status and trends of environmental indicators in of the Great Lakes ecosystem. The monitoring data is used to prioritize future GLRI-funding decisions by identifying the most significant ongoing and emerging problems in the ecosystem.

During FY 2016, federal agencies and their partners continued to evaluate the effectiveness of GLRI-funded projects. The GLRI agencies utilized the accountability system, Environmental Accomplishments in the Great Lakes (EAGL), to track the effectiveness of GLRI-funded projects in meeting the Measures of Progress defined in the GLRI Action Plan II. The EPA also completed an EAGL Implementation Manual to improve data management and quality assurance throughout the EAGL system. The GLRI agencies also continued assessment efforts designed to evaluate the effectiveness of GLRI-funded projects.

The GLRI agencies and partners identified watersheds, habitats, and species to be targeted for potential additional restoration activities using monitoring data, assessments, models, and other decision support tools. The Great Lakes Advisory Board, states, tribes, and other stakeholders also provided input to the GLRI agencies on how to best use GLRI resources.

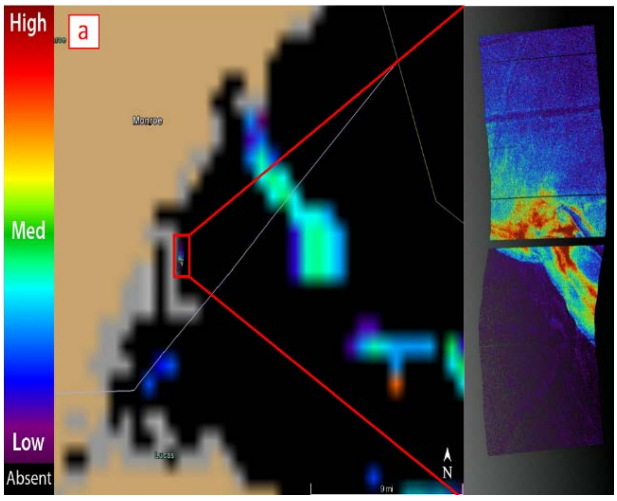
The GLRI Action Plan II incorporates a science-based adaptive management framework that is designed to guide restoration and protection actions by using the best available science and lessons learned from past and ongoing GLRI investments. During FY 2016, federal agencies and their partners finalized a conceptual framework that supplements the science-based adaptive management approach presented in the GLRI Action Plan II. The federal agencies also began a Pilot Project in the western basin of Lake Erie to test the implementation of the conceptual adaptive management framework. Below is a graphic that displays the spatial scales of project assessments and the estimated ecosystem recovery time at the given spatial scale.



Focus Area 5 Success Stories

Great Lakes Native Preyfish Restoration

In FY 2016, the GLRI funded a new, multi-agency, coregonid restoration program based on adaptive management. With lake trout populations on the rise and changes in the availability of prey across the Great Lakes, there is a need for more forage species, such as native coregonids. The multi-agency program is identifying and addressing key science needs and capabilities to support basin-wide restoration of coregonid species across the Great Lakes. The USFWS collected two million deepwater cisco eggs from Lake Michigan. The eggs were delivered to the U.S. Geological Survey (USGS) Tunison Laboratory in Cortland, NY to help meet science and fish stocking goals for restoration in Lake Ontario. This collaborative effort between USFWS and USGS led to establishing and rearing 16 different families produced from cisco gametes taken from northern Lake Huron.

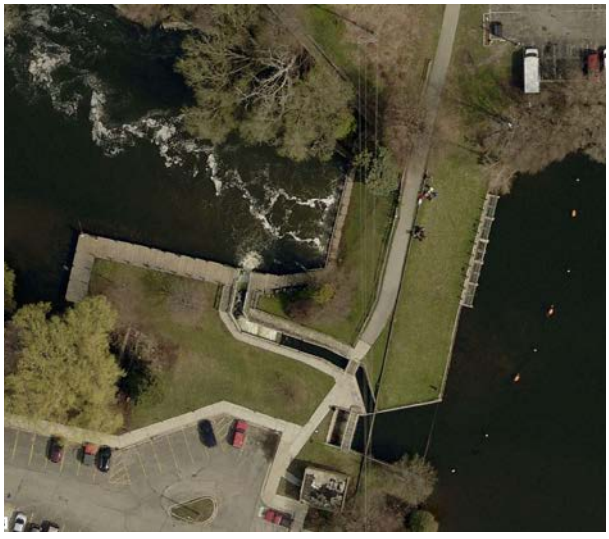


Hyperspectral Camera for HABs

During FY 2016, NOAA's Great Lakes Environmental Research Laboratory (GLERL) used an airplane mounted with a hyperspectral camera to capture images that improve harmful algal bloom (HAB) forecasts. Hyperspectral cameras capture information on HAB location and extent when satellites cannot due to cloudy conditions. There were many instances in FY 2016 where the camera was able to detect important algal scum features under clouds or nearshore, which satellites were unable to do detect. The hyperspectral camera images were converted to the cyanobacteria index (CI) and were overlaid on the NOAA Lake Erie HAB bulletin image using the same color table. The cyanobacteria index provides an important resource for the bulletin and also for water intake managers in the region.

Innovative Selective Fish Passage Project

In FY 2016, the innovative Selective Fish Passage Project was initiated to provide bi-directional movement of desired fishes while restricting movement of undesirable species through adaptive management. The Great Lakes Fishery Commission, the Grand Traverse Band of Ottawa and Chippewa Indians, USACE, the USFWS, the Michigan Department of Natural Resources, and the City of Traverse City, Michigan forged strong partnerships working on this project. On September 6th, 2016, the Traverse City Commission unanimously endorsed the Boardman River Union Street Dam as the project site. The project will match physical and behavioral attributes of fishes with technology and engineering to selectively pass desirable species and exclude invasive species at the Union Street Dam site to truly reconnect this watershed to the Great Lakes and apply lessons learned to other watersheds.



Focus Area 5 Success Stories

GLRI Sponsors Great Lakes Awarness Day

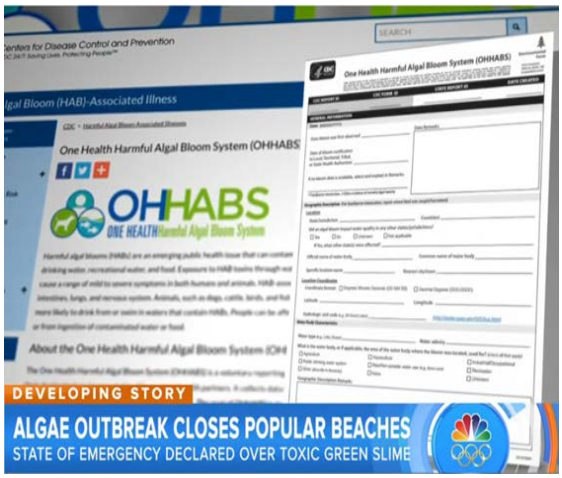
In FY 2016, GLRI partners led Great Lakes Awareness Day to share Great Lakes science with basin citizens through projects developed by CGLL-trained teachers and students. This year in Pennsylvania the event was the culmination of a yearlong, student driven effort in ten schools to develop and implement water-quality-related science learning projects. Students from the Fairview School District used science based protocol to determine the amount of micro plastics at their local beach. They recorded their data using NOAA's Debris Tracker App. The opportunity to share their work with 177 other students and 386 members of the general public was a chance for students to become the educators. CGLL teachers identified this as the highlight for the students participating.

Nearshore monitoring of Historic Lake Superior Flood

In FY 2016, with funding from the GLRI, the National Park Service (NPS) and partners from the University of Wisconsin-Milwaukee's School of Freshwater Sciences monitored tributary and nearshore conditions before and after an extreme rainfall event in northern Wisconsin. This event resulted in a greater than 500-year flood event on several Lake Superior tributaries, damaging roads and infrastructure, and tragically leaving three people dead. The flooding affected Lake Superior waters, producing notable sediment plumes that extended well into the lake. The team characterized the effects of the flood plume on nearshore waters, and picked up a rare bloom of blue-green algae in the weeks following the event. Through analysis of satellite imagery and historical data, the team found that sediment plumes from south shore tributaries are reaching Apostle Islands National Lakeshore more frequently in recent years, resulting in declines in Lake Superior's celebrated water clarity.

New Reporting System: Harmful Algal Blooms

In June of FY 2016, U.S. Centers for Disease Control and Prevention (CDC) launched the One Health Harmful Algal Bloom System (OHHABS), a voluntary reporting system available to Great Lakes and other state agencies to report human and animal cases of illnesses from HAB-associated exposures, as well as environmental data about HABs. The goal of OHHABS is to collect information to support the understanding and prevention of HABs and HAB-associated illnesses. CDC developed the OHHABS as part of the comprehensive GLRI approach to nutrient reduction and HAB mitigation in the Great Lakes. CDC concurrently launched the HAB-associated illnesses website (www.cdc.gov/habs) as a platform to educate the public about HABs and to provide HAB resources to public health professionals about this growing public health concern.



Section 3 – Financial Reporting

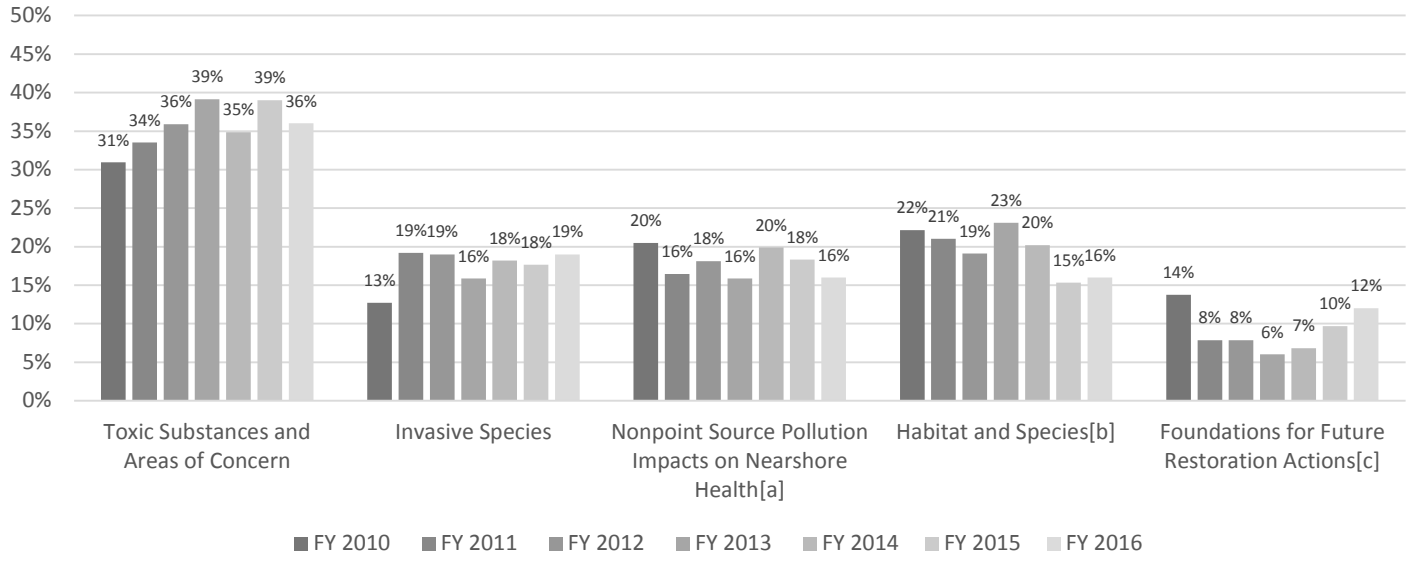
From FY 2010 to FY 2016, the USEPA has been appropriated approximately $2.26 billion in GLRI funds. In order to support effective project implementation, agencies that receive GLRI funds use multiple funding mechanisms, including interagency agreements, fund transfers, competitive grants, and capacity-building grants to states and tribes.

Table 1 and Chart 1 provide information on FY 2010 – FY 2016 GLRI funding by focus area. Table 2 provides summary information for FY 2010 – FY 2015 GLRI funding by agency (more detailed information for these years can be found in previous Great Lakes Restoration Initiative Reports to Congress and the President for FY 2010-FY 2015). Table 3 provides more detailed information for FY 2016 by agency.

Table 1 - GLRI FY2010 - FY 2016 Focus Area Allocations as of October 6, 2016 (Dollars in Thousands)

Focus Area	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
Toxic Substances and Areas of Concern	$146,946	$100,400	$107,500	$111,000	$104,600	$117,000	$108,000
Invasive Species	$60,265	$57,500	$56,900	$45,000	$54,600	$53,000	$57,000
Nonpoint Source Pollution Impacts on Nearshore Health[a]	$97,331	$49,250	$54,300	$45,000	$59,700	$55,000	$49,000
Habitat and Species[b]	$105,262	$63,000	$57,200	$65,500	$60,600	$46,000	$51,000
Foundations for Future Restoration Actions[c]	$65,196	$29,250	$23,500	$17,000	$20,500	$29,000	$35,000
TOTAL	$475,000	$299,400	$299,500	$283,500	$300,000	$300,000	$300,000

Chart 1 - Great Lakes Restoration Initiative Fiscal Years 2010-2016 Focus Area Allocations (as of October 1, 2016)



[a] Nearshore Health and Nonpoint Source Pollution in FY 2010-FY 2014.
[b] Habitat and Wildlife Protection and Restoration in FY 2010-FY 2014.
[c] Accountability, Education, Monitoring, Evaluation, Communication, and Partnerships in FY 2010 – FY 2014.

Table 2 – FY 2010 - FY 2015 Great Lakes Restoration Initiative Funding by Agency (as of October 6, 2016)							
Agency[1]	**Obligations[2]**						
	FY 2010	**FY 2011**	**FY 2012**	**FY 2013**	**FY 2014**	**FY 2015**	**Total**
DHS-USCG	$6,144,359	$1,617,774	$2,512,533	$2,450,986	$1,278,326	$2,006,364	$16,010,342
DOC-NOAA	$30,536,774	$18,289,090	$16,242,588	$25,504,538	$35,170,162	$24,817,678	$150,560,830
DOD-USACE	$49,272,025	$30,663,366	$35,408,903	$31,597,882	$28,503,609	$48,389,326	$223,835,111
DOI-BIA	$3,416,000	$6,316,027	$4,718,837	$3,985,077	$3,949,629	$4,749,710	$27,135,280
DOI-NPS	$10,479,525	$4,861,269	$3,527,109	$3,012,927	$3,176,525	$3,142,389	$28,199,744
DOI-USFWS	$69,348,690	$48,690,188	$45,699,986	$40,000,560	$49,037,576	$41,393,402	$294,170,402
DOI-USGS	$23,717,195	$14,531,602	$13,051,766	$12,661,690	$19,832,266	$23,432,650	$107,227,169
DOT-FHWA	$2,500,000	$1,218,000	$1,221,000	$973,156	$964,500	$0	$6,876,656
DOT-MARAD	$4,000,000	$2,694,600	$2,446,927	$2,311,345	$1,790,785	$1,290,832	$14,534,489
HHS-ATSDR/CDC	$5,500,000	$2,195,661	$2,200,000	$1,415,500	$1,739,134	$1,737,873	$14,788,168
USDA-APHIS	$1,884,727	$598,389	$1,134,000	$870,986	$1,245,775	$1,245,794	$6,979,672
USDA-NRCS	$34,092,000	$16,787,976	$25,603,174	$19,253,462	$24,280,233	$23,280,505	$143,297,350
USDA-USFS	$15,458,000	$8,889,772	$6,718,080	$5,928,545	$6,401,390	$6,289,519	$49,685,306
IA Totals:	$256,349,296	$157,353,715	$160,484,902	$149,966,654	$177,369,910	$181,776,042	$1,083,300,519
EPA, GLFC, IJC, and Misc IAs	$213,361,970	$135,426,023	$135,461,807	$131,076,241	$121,801,295	$118,043,321	$855,170,657
Total Obligated	$469,711,266	$292,779,738	$295,946,709	$281,042,896	$299,171,204	$299,819,363	$1,938,471,176
Returned[3]	$5,288,734	$6,620,262	$3,573,291	$2,655,104	$828,796	$180,637	$19,146,824
GLRI Grand Totals:	$475,000,000	$299,400,000	$299,520,000	$283,698,000	$300,000,000	$300,000,000	$1,957,618,000

[1] Individual Agency allocations from each appropriation can be found in previous Reports to Congress and the President.
[2] Obligations are the amount of orders placed; interagency agreements, contracts or grants awarded; and similar transactions by EPA. The amount reflects deobligations. Deobligation generally results from completing a project under budget, contract termination, changes in project scope or focus, or other unforeseeable circumstances.

[3] Returned funds are determined by subtracting obligations as of October 6, 2016 from appropriated funds. Returned funds generally result from deobligating funds as a result of completing a project under budget, contract termination, changes in project scope or focus, or other unforeseeable circumstances.

Table 3 - Great Lakes Restoration Initiative Fiscal Year 2016 Funding by Agency (as of October 6, 2016)

Agency	FY 2016 Initial Allocation[a]	FY 2016 Actual Allocation[b]	FY2016 Total Obligations
DHS-USCG	$2,053,193.00	$1,274,434.00	$1,274,434.00
DOC-NOAA	$16,173,635.00	$15,173,635.00	$15,173,635.00
DOD-USACE	$26,416,169.00	$32,322,840.00	$32,322,840.00
DOI-BIA	$4,473,031.00	$6,203,031.00	$6,203,031.00
DOI-NPS	$3,749,310.00	$3,749,310.00	$3,749,310.00
DOI-USFWS	$37,525,929.00	$44,245,929.00	$44,245,929.00
DOI-USGS	$19,182,271.00	$22,018,882.00	$22,018,882.00
DOT-MARAD	$2,105,892.00	$2,105,892.00	$2,105,892.00
HHS-ATSDR/CDC	$1,692,394.00	$1,692,394.00	$1,692,394.00
USDA-APHIS	$1,088,649.00	$1,088,649.00	$1,088,649.00
USDA-NRCS	$19,297,877.00	$19,286,877.00	$18,879,852.00
USDA-USFS	$10,257,831.00	$10,257,831.00	$10,257,831.00
IA Totals:	**$144,016,181.00**	**$159,419,704.00**	**$159,012,679.00**
EPA, GLFC, and Misc. IAs	**$155,983,819.00**	**$140,580,296.00**	**$67,589,041.23[c]**
GLRI Grand Totals:	**$300,000,000.00**	**$300,000,000.00**	**$226,601,720.23[D]**

[a] Based on allocations to each Agency approved by the Interagency Task Force in April 2016.

[b] Federal agencies work collaboratively to ensure that funding is used for the highest priority Great Lakes projects. The "Actual Allocations" (funding provided to each agency) reflect adjustments made to address emerging priorities (e.g., keep Asian carp from becoming established in the Great Lakes) and to maximize environmental outcomes.

[c] Components are: (i) grants totaling$38,301,336 (including funding for the Great Lakes Fishery Commission, an organization identified in the President's Budget); (ii) Great Lakes National Program Office support costs (payroll, travel, general expenses, and working capital) totaling $12,959,833; and (iii) contracts and miscellaneous interagency agreements (each less than $1 million) totaling $16,327,872.

[D} EPA expects to award funding under existing request for applications, invitations to States and Tribes, and identified AOC restoration projects for outstanding unobligated funding.

APPENDIX A – GLRI ACTION PLAN II: MEASURES OF PROGRESS

The table below provides an overview of the results achieved for each of the 34 Measures of Progress in the Great Lakes Restoration Initiative Action Plan II. Targets for Measures of Progress were established under assumptions contained in Action Plan II. Ten Measures of Progress have annual targets. The remaining Measures of Progress will be reported annually to track progress towards long term goals that will take more than five years to reach. Detailed information is provided in the following pages. *In the table below red indicates the target was not met, green indicates the target was met, and gray indicates that only results will be provided since a target does not apply.*

Focus Area	GLRI Action Plan II Measures	Result/Target	
		FY 2015	FY2016
Toxic Substances	1.1.1 AOC Management Actions *(Cumulative)*	7/8	8/9
	1.1.2 BUI's *(Cumulative)*	60/60	65/65
	1.2.1 People Provided Fish Consumption Information	220,843	207,953
	1.2.2 Fish/Wildlife Emerging Contaminant Projects	14	7
Invasive Species	2.1.1 Rapid Response Exercises	21/8	11/8
	2.1.2 Projects Blocking Pathways	8	14
	2.1.3 Early Detection Activities	15	3
	2.2.1 Aquatic /Terrestrial Acres *(Cumulative)*	101,392/94,500	115,889/110,000
	2.2.2 Invasive Tributary Miles	0	0
	2.3.1 Invasive Technologies *(Cumulative)*	62	65
	2.3.2 Invasive Collaboratives *(Cumulative)*	4	4
Nonpoint Source Pollution Impacts on Nearshore Health	3.1.1 Agricultural Phosphorus Reduction Projected *(Cumulative)*	160,117/130,000	402,943/310,000
	3.1.2 Nutrient/Sediment Ag. Acres	101,574	89,211
	3.1.3 Nutrient/Sediment Reduction *(Cumulative)*	NA	NA
	3.2.1 Urban Runoff Projected *(Cumulative)*	37/30	116/70
	3.2.2 Urban Runoff Projects	18	36
	3.2.3 Urban Runoff Captured of Treated *(Cumulative)*	NA	NA
Habitats and Species	4.1.1 Habitat Tributary Miles *(Cumulative)*	3,855/2,200	4,615/4,200
	4.1.2 Shoreline Miles	313/75	662/350
	4.1.3 Coastal Wetland Acres *(Cumulative)*	7,033/7,000	17,540/15,000
	4.1.4 Other Habitat *(Cumulative)*	146,815/127,000	167,218/167,000
	4.2.1 Federally-Listed Species Projects	10	17
	4.2.2 Self-Sustaining Species Projects	47	28
Foundations for Future Restoration Actions	5.1.1 Climate Resiliency Criteria Developed (2016)	NA	Developed
	5.1.2 Climate Resiliency Criteria Incorporated (2017)	NA	NA
	5.2.1 Trained Educators	331	407
	5.2.2 People Educated	24,785	27,989
	5.3.1 Evaluations	Completed	Completed
	5.3.2 Annual Monitoring	Conducted	Conducted
	5.3.3 Targeted Watersheds, Habitats, Species to prioritize Funding	Identified	Identified
	5.3.4 Annual GLRI Reports	Issued	Issued
	5.3.5 Triennial GLWQA Reports	NA	NA
	5.3.6 Triennial State of the Lakes Report	NA	NA
	5.3.7 Online Information	Updated	Updated

GLRI Action Plan II Measures of Progress – Detailed Information

	Measure	Target	Result	Explanation/Additional Information
1.1.1	Areas of Concern in the Great Lakes where all management actions necessary for delisting have been implemented (cumulative)[1]	FY 16: 9 FY 15: 8 Baseline: 7	FY 16: 8 FY 15: 7	AOC Management Actions were completed at the St. Clair River AOC. In addition, the program completed Management Actions at the River Raisin AOC at the end of the calendar year 2016. The completed Management Actions in the River Raisin AOC, were originally delayed due to the complexity of the sediment cleanup.
1.1.2	Area of Concern Beneficial Use Impairments Removed (cumulative)[1]	FY 16: 65 FY 15: 60 Baseline: 52	FY 16: 65 FY 15: 60	Sheboygan (WI) - Eutrophication. 11/24/15. Niagara R (NY). Fish Tumors and other deformities. 1/28/16 Rochester (NY), Degradation of Phytoplankton and Zooplankton. 5/9/2016 St. Clair River (MI), Beach Closings. 4/13/16 St. Mary's River (MI) - Beach Closing. 7/27/2016
1.2.1	Number of people provided information on the risks and benefits of Great Lakes fish consumption by GLRI-funded projects	NA	FY 16: 207,953 FY 15: 220,843	Information was provided by HHS-ATSDR and EPA.
1.2.2	Number of GLRI-funded projects that identify and/or assess impacts of emerging contaminants on Great Lakes fish and wildlife	NA	FY 16: 7 FY 15: 14	Projects were funded by EPA, BIA, and DOI-USGS.
2.1.1	Number of GLRI-funded Great Lakes rapid responses or exercises conducted	FY 16: 8 FY 15: 8 Baseline: NA	FY 16: 11 FY 15: 21	The 8 Great Lakes States have committed to conducting annual training exercises, but prioritize activities to respond to detections of new invasive species. In FY 2016 multiple state agencies and others completed 11 actual responses.

2.1.2	Number of GLRI-funded projects that block pathways through which aquatic invasive species can be introduced to the Great Lakes ecosystem	NA	FY 16: 14 FY 15: 8	Projects included work to reduce the spread of invasive species by hunters, anglers, and the recreational boat pathways.
2.1.3	Number of GLRI-funded early detection monitoring activities conducted	NA	FY 16: 3 FY 15: 15	Early detection activities were conducted in FY 2016. Activities included both conventional monitoring techniques (nets, traps, electroshocking) as well as environmental DNA sampling.
2.2.1	Number of aquatic/terrestrial acres controlled by GLRI-funded projects (cumulative)	FY 16: 110,000[2] FY 15: 94,500[2] Baseline: 36,000	FY 16: 115,889 FY 15: 101,392	Target was previously raised to 94,500 during FY 2016 budget development because the FY 2014 end-of-year result exceeded the previously set cumulative target for FY 2016.
2.2.2	Number of tributary miles protected by GLRI-funded projects	NA	FY 16: 0 FY 15: 0	Protected tributary miles are reported once a project is complete and the barrier is in use.
2.3.1	Number of technologies and methods field tested by GLRI-funded projects	NA	FY 16: 65 FY 15: 62	Technologies were field tested by federal agencies and their partners. Technologies included ballast water management systems and a tool for detecting Asian carp.
2.3.2	Number of collaboratives developed or enhanced with GLRI funding	NA	FY 16: 4 FY 15: 4	Invasive species collaboratives counted under this Measure include the Asian Carp Regional Coordinating Committee lead by USFWS, the Monoecious Hydrilla Collaborative lead by USACE, the Mussels Collaborative lead by USGS, and the Phragmites Collaborative also lead by USGS.
3.1.1	Projected phosphorus reductions from GLRI-funded projects in targeted watersheds (measured in pounds) (cumulative)	FY 16: 310,000 FY 15: 130,000 Baseline: NA	FY 16: 402,943 FY 15: 160,117	Projected phosphorus reductions are from USEPA and NRCS (Farm Bill Programs for Reducing Ag Nonpoint Source Loading). Projects were implemented in the following watersheds: Genesee, Green Bay-Lower Fox, Saginaw Bay-Saginaw, Western Lake Erie-Maumee, Lake Michigan-Wisconsin, Blanchard, Black-Macatwa, Kawkawlin-Pin, Sandusky, Western Lake Erie, Lower Maumee, and Lower Fox.

3.1.2	Number of GLRI-funded nutrient and sediment reduction projects in targeted watersheds (measured in acres)	NA	FY 16: 89,211 FY 15: 101,574	Contributing agencies: NRCS, EPA, and USACE. Practices planned or implemented in FY 2016 include: cover crops, conservation tillage, filter strips, drainage water management, nutrient management, constructed wetlands, waste storage facilities, contour buffer strips.
3.1.3	Measured nutrient and sediment reductions from monitored, GLRI-funded projects in targeted watersheds (measured in pounds)	NA	FY 16: NA FY 15: NA	Results are reported for this measure after a reduction has been measured and quantified through the implementation of standardized USGS monitoring and statistical designs. As quantification of these results requires long-term monitoring, preliminary results are not anticipated until FY2017 at the earliest.
3.2.1	Projected volume of untreated urban runoff captured or treated by GLRI-funded projects (measured in millions of gallons) (cumulative)	FY 16: 70 FY 15: 30 Baseline: NA	FY 16: 116 FY 15: 37	Result includes USEPA Shoreline cities grants in: East Chicago, IN, Ashtabula, OH, Cleveland, OH, Huron, OH, Sandusky, OH, Vermillion, OH, Duluth, MN, Evans, NY, Algoma, WI, Ashland, WI, Manitowoc, WI, Two Rivers, WI, and Wind Point, WI.
3.2.2	Number of GLRI-funded projects implemented to reduce the impacts of untreated urban run-off on the Great Lakes (cumulative)	NA	FY 16: 36 FY 15:18	Practices planned or implemented in FY 2016 include: bioretention ponds, storm water trees, drainage water management, porous pavement, bio-swales, constructed wetlands, rain gardens, and greenways.
3.2.3	Measured volume of untreated urban runoff captured or treated by monitored GLRI-funded projects	NA	FY 16: NA FY 15: NA	Results for this measure are reported after a measured reduction has been quantified through USGS monitoring and statistical designs. As monitoring and statistical designs are still under development by USGS, results are not anticipated until FY 2017 at the earliest.
4.1.1	Number of miles of Great Lakes tributaries reopened by GLRI-funded projects (cumulative)	FY 16: 4,200[2] FY 15: 2,200 Baseline: 1,900	FY 16: 4,615 FY 15: 3,855	Projects to remove dams and impediments to fish passage. Projects were completed in FY 2016 and contributed to surpassing the target of tributary miles reopened.
4.1.2	Number of miles of Great Lakes shoreline and riparian corridors protected, restored and enhanced by GLRI-funded projects (cumulative)	FY 16: 350[2] FY 15: 75 Baseline: 0	FY 16: 662 FY 15: 313	In FY 2016 agencies continued to accelerate projects to protect, restore, and/or enhance targeted coastal habitats and key river corridors in the Great Lakes.

4.1.3	Number of acres of Great Lakes coastal wetlands protected, restored and enhanced by GLRI-funded projects (cumulative)	FY 16: 15,000 FY 15: 7,000 Baseline: 0	FY 16: 17,540 FY 15: 7,033	Results represent the significant projects done by federal agencies as well as targeted actions by individual Great Lakes states.
4.1.4	Number of acres of other habitats in the Great Lakes basin protected, restored and enhanced by GLRI -funded projects (cumulative)	FY 16: 167,000[2] FY 15: 127,000 Baseline: 117,000	FY 16: 167,218 FY 15: 146,815	In FY 2016 federal agencies completed work in terrestrial and aquatic Great Lakes systems as well as targeted actions on federal and state protected lands.
4.2.1	Number of GLRI-funded projects that promote recovery of federally-listed endangered, threatened, and candidate species (cumulative)	NA	FY 16: 17 FY 15: 10	In FY 2016 continued significant progress was made on the recovery of piping plover. Federal agencies reprioritized actions for an additional seven federally listed species.
4.2.2	Number of GLRI-funded projects that promote populations of native non-threatened and non-endangered species self-sustaining in the wild	NA	FY 16: 28 FY 15: 47	Projects focused efforts on protecting lake sturgeon, lake trout, and deep water coregonid. New federal agency collaborations were initiated to increase efficiencies for this measure.
5.1.1	By 2016, a standardized set of climate resiliency criteria will be developed for GLRI projects	FY 16: Complete FY 15: NA	FY 16: Complete FY 15: NA	Federal agencies have developed climate resiliency criteria.
5.1.2	Starting in 2017, projects will include climate resiliency criteria in planning and implementation	FY 16: Complete FY 15: NA	FY 16: Complete FY 15: NA	Development of climate resiliency criteria is completed.
5.2.1	Number of educators trained through GLRI-funded projects	NA	FY 16: 407 FY 15: 331	GLRI funding helped train 407 educators in FY 2016.

5.2.2	Number of people educated on the Great Lakes ecosystem through GLRI-funded place-based experiential learning activities	NA	FY 16: 27,989 FY 15: 24,785	GLRI educated over 27,000 people on the Great Lakes ecosystem through GLRI-funded place-based experiential learning activities through National Park Service interpretative programs.
5.3.1	Project evaluations completed and used to prioritize GLRI funding decisions each year	NA	FY 16: Completed and used FY 15: Completed and used	GLRI-funded projects were routinely evaluated to ensure that they will be implemented as proposed. Progress in achieving objectives for existing projects was used to prioritize GLRI-funding decisions. A new accountability system (the Environmental Accomplishments in the Great Lakes system) was implemented in FY 2015 to track the progress of GLRI-funded projects in meeting the Measures of Progress in the GLRI Action Plan II.
5.3.2	Annual Great Lakes monitoring conducted and used to prioritize GLRI funding decisions each year	NA	FY 16: Completed and used FY 15: Completed and used	Federal agencies and partners conducted comprehensive monitoring to assess the status and trends of the Great Lakes ecosystem. Long-term monitoring of coastal wetlands, contaminants, nutrients, zooplankton, phytoplankton, harmful algal blooms, benthic communities, and prey fish among many other components was conducted throughout the basin. The monitoring data and information from previous years was used to identify the most significant Great Lakes problems and prioritize funding decisions to address those problems.
5.3.3	GLRI-targeted watersheds, habitats and species identified and used to prioritize GLRI funding decisions	NA	FY 16: Identified and used FY 15: Identified and used	GLRI agencies and partners identified watersheds, habitats, and species to be targeted in FY 2016 and beyond. The Great Lakes Advisory Board, states, tribes, and other stakeholders provided input to the agencies on how best to target GLRI resources. As part of efforts in all five focus areas, GLRI continues to prioritize work to accelerate the cleanup of Areas of Concern, reduce harmful algae, and prevent the introduction of new invasive species.
5.3.4	Issue Annual GLRI Reports to Congress and the President	NA	FY 16: Issued FY 15: Issued	The Great Lakes Restoration Initiative Report to Congress and the President is issued annually.

5.3.5	Issue Great Lakes Water Quality Agreement Triennial Progress Reports of the Parties	NA	FY 16: Issued	The Great Lakes Water Quality Agreement Triennial Progress Reports of the Parties was issued in September of 2016.
5.3.6	Issue triennial State of the Lakes reports	NA	FY 16: Issued	The first Triennial State of the Lakes Report under the 2012 Great Lakes Water Quality Agreement was issued in FY 2016.
5.3.7	Periodically update publicly available online information about the GLRI	NA	FY 16: Updated FY 15: Updated	Updates included: publication of the FY 2010-FY 2015 GLRI Report to Congress and the President; project updates; Great Lake Advisory Board information: and links to information from other agencies.

[1] Results from this Action Plan measure are achieved through GLRI funding as well as other non-GLRI federal and/or state funding.

[2] This target has been adjusted from the Action Plan