Great Lakes
RESTORATION

Great Lakes Restoration Initiative Report to Congress and the President

April 2021

Fiscal Year 2018

CONTENTS

About This Report

This report presents an overview of progress made under the Great Lakes Restoration Initiative (GLRI). It includes information through Fiscal Year 2018 on: funding; project accomplishments; success stories; and actual results as compared to planned results under GLRI Action Plan II. Data on direct spending is taken from the U.S. Environmental Protection Agency financial system. Information on GLRI projects and activities is available at http://glri.us.

The EPA Administrator is required by Clean Water Act Section 118 (c)(7)(H)(iii) to provide this report to the House Committee on Transportation and Infrastructure and the Senate Committee on Environment and Public Works. The report also satisfies the Measure of Progress under GLRI Action Plan II requiring issuance of annual GLRI reports to Congress and the President.

MESSAGE FROM THE CHAIR OF THE GREAT LAKES INTERAGENCY TASK FORCE

The Great Lakes Restoration Initiative continues to achieve unprecedented results in restoring and protecting the Great Lakes. Between the GLRI's inception in FY 2010 and the end of FY 2018, the U.S. Environmental Protection Agency and its partnering federal agencies have invested over $2.4 billion from the GLRI to implement more than 4,000 projects across the Great Lakes basin.

In FY 2018, GLRI-funded projects:

- Cleaned up contaminated "areas of concern" – toxic hotspots which remained untouched and polluted for years but which are now being environmentally restored and economically revitalized.
- Kept silver carp, bighead carp, and black carp out of the region, preventing irreversible damage to the ecological and economic integrity of the Great Lakes.
- Reduced phosphorus loads and urban runoff – which contribute to harmful algal blooms –entering the Great Lakes.
- Restored and enhanced natural habitat across the Great Lakes basin.

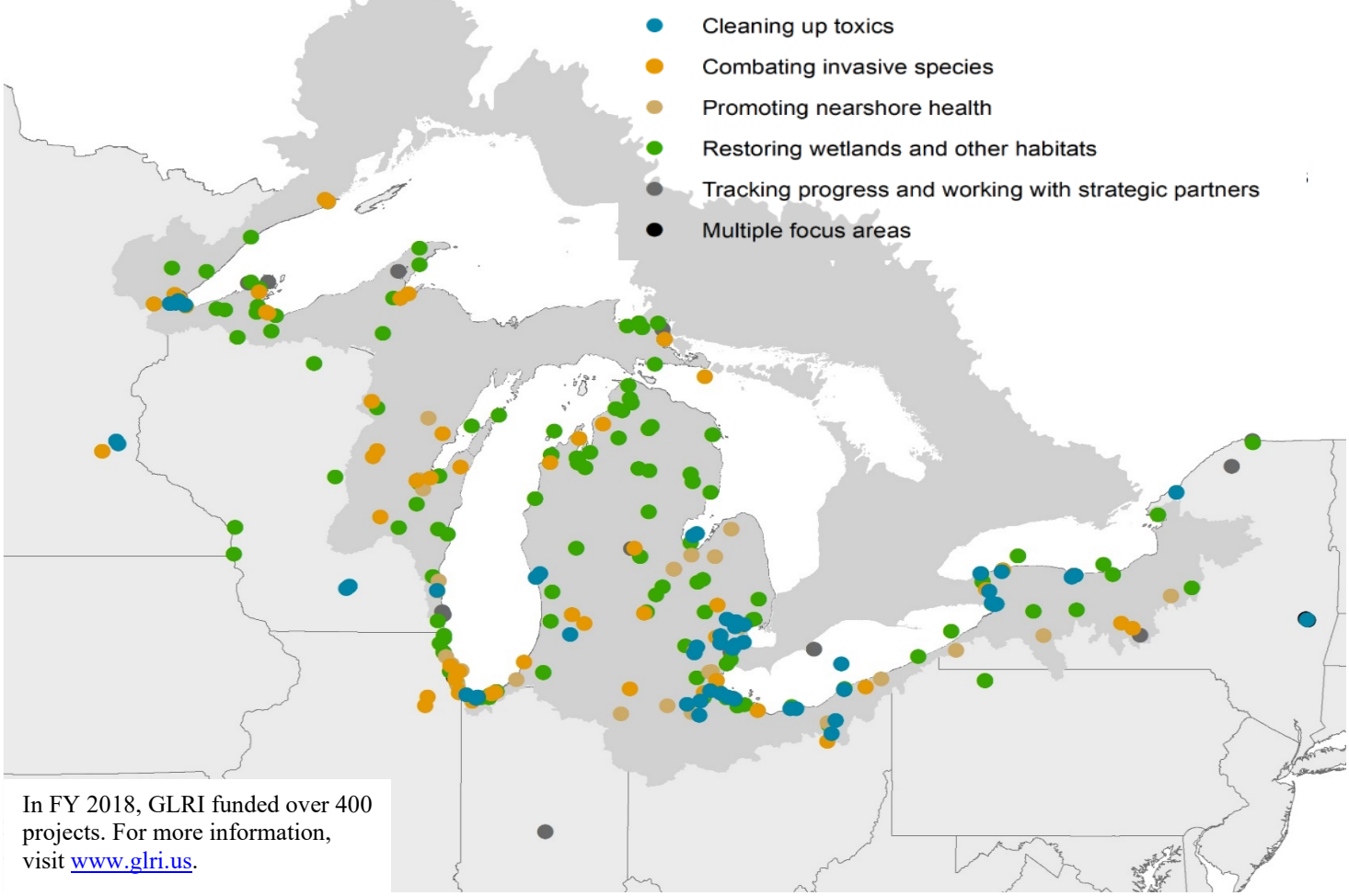
I am proud of the EPA's role in leading the implementation of the GLRI, while recognizing the essential roles performed by our federal, state, tribal, local and private partners. These well-established, strong, and continuing partnerships have been the linchpin of the GLRI's success, and, along with the environmental benefits, are a key reason for the initiative's strong and widespread support.

The Biden-Harris Administration will continue to support the Great Lakes by not only restoring and protecting the Great Lakes environment, but by recognizing and emphasizing the relationship between a restored environment and opportunities for economic, social, and cultural revitalization and environmental justice. Every person in the United States has the right to clean air, clean water, and a healthier life - no matter how much money they have in their pockets, the color of their skin, or their zip code. Across the Great Lakes, formerly degraded and economically abandoned waterfront areas are "coming back to life" as people take advantage of the recreational, social, and economic opportunities that these restored areas provide – opportunities made possible by the GLRI and the partnerships and hard work that are necessary to implement it.

The GLRI is proof that environmental protection and economic prosperity go hand in hand. EPA is committed to building on the GLRI's tremendous success and I look forward to achieving even greater results in upcoming years.

Michael S. Regan

Great Lakes Restoration Initiative Projects in FY 2018



In FY 2018, GLRI funded over 400 projects. For more information, visit www.glri.us.

Section 1 – Executive Summary

Since its 2010 inception, the Great Lakes Restoration Initiative, or the GLRI, has greatly accelerated efforts to protect and restore the Great Lakes – the largest system of fresh surface water in the world. The GLRI continues to address the most persistent and challenging environmental problems facing this vital ecosystem.

Under EPA's leadership, the GLRI has been a catalyst for unparalleled coordination between the 16 federal agencies and departments that make up the GLRI Interagency Task Force (IATF) and the GLRI Regional Working Group (RWG). This unprecedented coordination has produced unprecedented results. Through FY 2018, GLRI has funded over 4,700 projects that focus on what the GLRI has prioritized as the most important Great Lakes environmental issues, including cleaning up highly contaminated Areas of Concern, protecting and restoring native habitat and species, and preventing and controlling invasive species.

In December of 2016, Congress amended Section 118 of the Clean Water Act to authorize GLRI funding in the amount of $300 million annually for fiscal years 2017 through 2021. Section 118 (c)(7)(B) also requires that GLRI efforts address five priority areas, including: (i) the remediation of toxic substances and areas of concern; (ii) the prevention and control of invasive species and the impacts of invasive species; (iii) the protection and restoration of nearshore health and the prevention and mitigation of nonpoint source pollution; (iv) habitat and wildlife protection and restoration, including wetlands restoration and preservation; and (v) accountability, monitoring, evaluation, communication, and partnership activities.

The five priority areas correspond directly with the Action Plan II Focus Areas described below. This report provides an overview of progress during FY 2018 for each Focus Area within Action Plan II.

GLRI Action Plan II Focus Areas

1) Toxic Substances and Areas of Concern

During FY 2018, GLRI federal agencies and their partners completed all the management actions needed to ultimately delist four Areas of Concern (AOCs): The River Raisin and the St. Marys River AOCs in Michigan; the Lower Menominee AOC in Michigan and Wisconsin, and the Rochester Embayment AOC in New York. The GLRI also continued its work to protect human health from contaminants in Great Lakes fish and assess impacts of chemicals of emerging concern on fish and wildlife populations.

2) Preventing and Controlling Invasive Species

During FY 2018, GLRI federal agencies and their partners continued efforts to prevent the introduction of new invasive species and to control existing invasive species populations throughout the Great Lakes ecosystem. Ongoing work continues to aggressively prevent the migration into and establishment of Silver Carp, Bighead Carp, and Black Carp (three of the four Asian Carp species) in the Great Lakes. Since GLRI began, GLRI federal agencies and their partners have taken actions to control invasive species on over 153,000 terrestrial and aquatic acres, including over 18,700 acres in FY 2018.

3) Nonpoint Source Pollution Impacts on Nearshore Health

During FY 2018, GLRI federal agencies and their partners implemented focused conservation activities to reduce sources of phosphorus loadings that threaten the Great Lakes nearshore regions. During FY 2018, these partners worked collaboratively to reduce nonpoint sources of excess phosphorus runoff that contribute to harmful algal blooms around the Great Lakes in priority watersheds such as Lower Fox River, Saginaw River, and Maumee River. Federal agencies project that over 1 million pounds of excess phosphorus have been prevented from leaving farms and entering the Great Lakes cumulatively as a result of GLRI-funded projects including over 340,000 pounds of phosphorus reductions in FY 2018 alone. In addition, during FY 2018, GLRI federal agencies and their partners worked collaboratively in urban areas to prevent over 13 million gallons of polluted storm water from entering the Great Lakes.

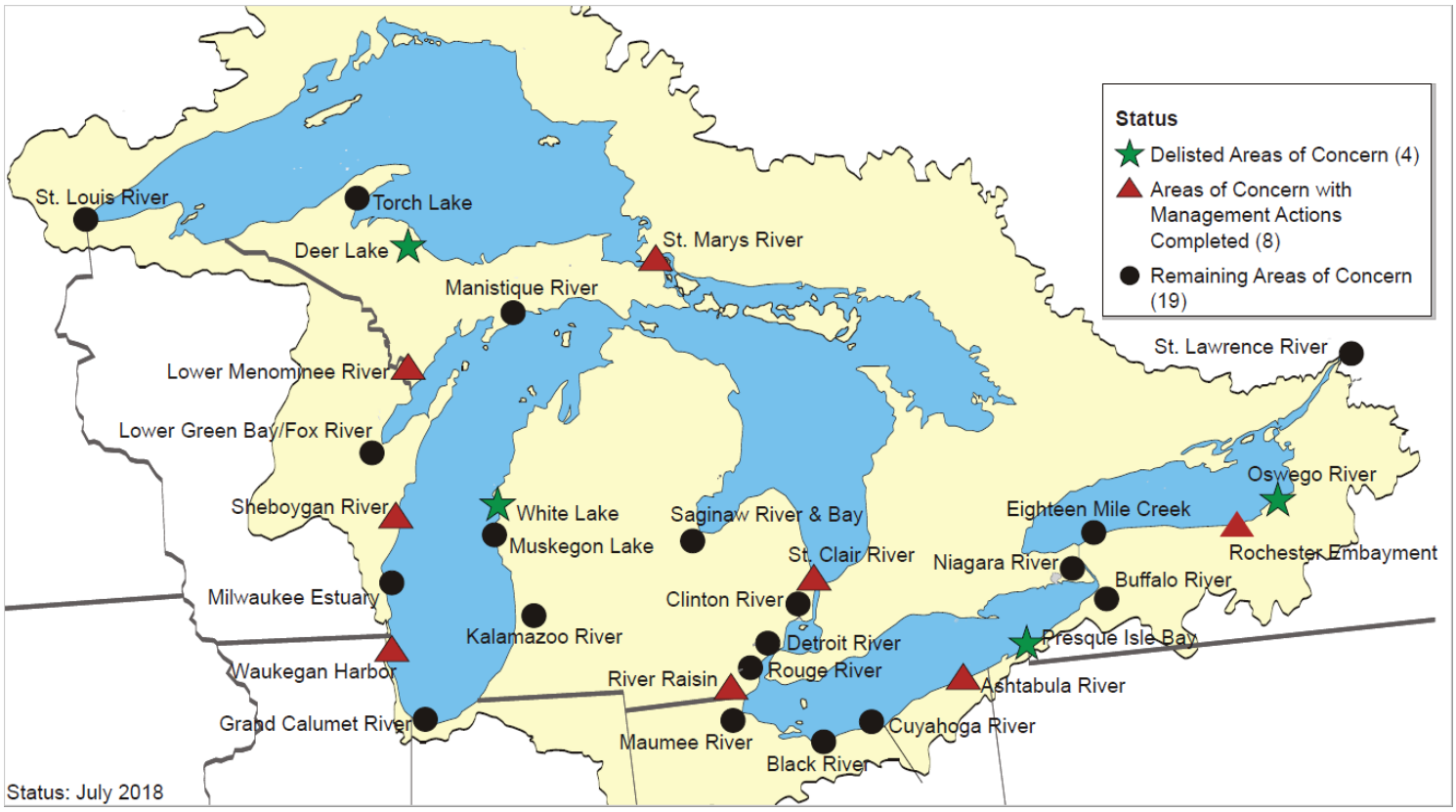
4) Habitat and Species

During FY 2018, GLRI federal agencies and their partners protected, restored, and enhanced habitats and native species throughout the Great Lakes basin. These efforts included re-establishing the connectivity of 320 miles of Great Lakes tributaries for the benefit of a variety of native fish species, including brook trout and lake sturgeon. Since the start of the GLRI in FY 2010, more than 370,000 acres of habitat have been protected, restored, or enhanced, including over 140,000 acres in FY 2018.

5) Foundations for Future Restoration Actions

In order to improve transparency and fiscal stewardship, GLRI federal agencies have established accountability mechanisms and internal controls to effectively manage the GLRI. In addition, during FY 2018, GLRI federal agencies and their partners trained over 900 educators (with a general focus on grades K-12) who, in turn, will have the ability to reach over 55,000 students each year by incorporating Great Lakes-specific material into their environmental education curricula. More than 40,000 people were also educated on the Great Lakes ecosystem, primarily through place-based experiential learning activities provided via National Park Service (NPS) interpretive programs in FY 2018.

Section 2 – Program Accomplishments

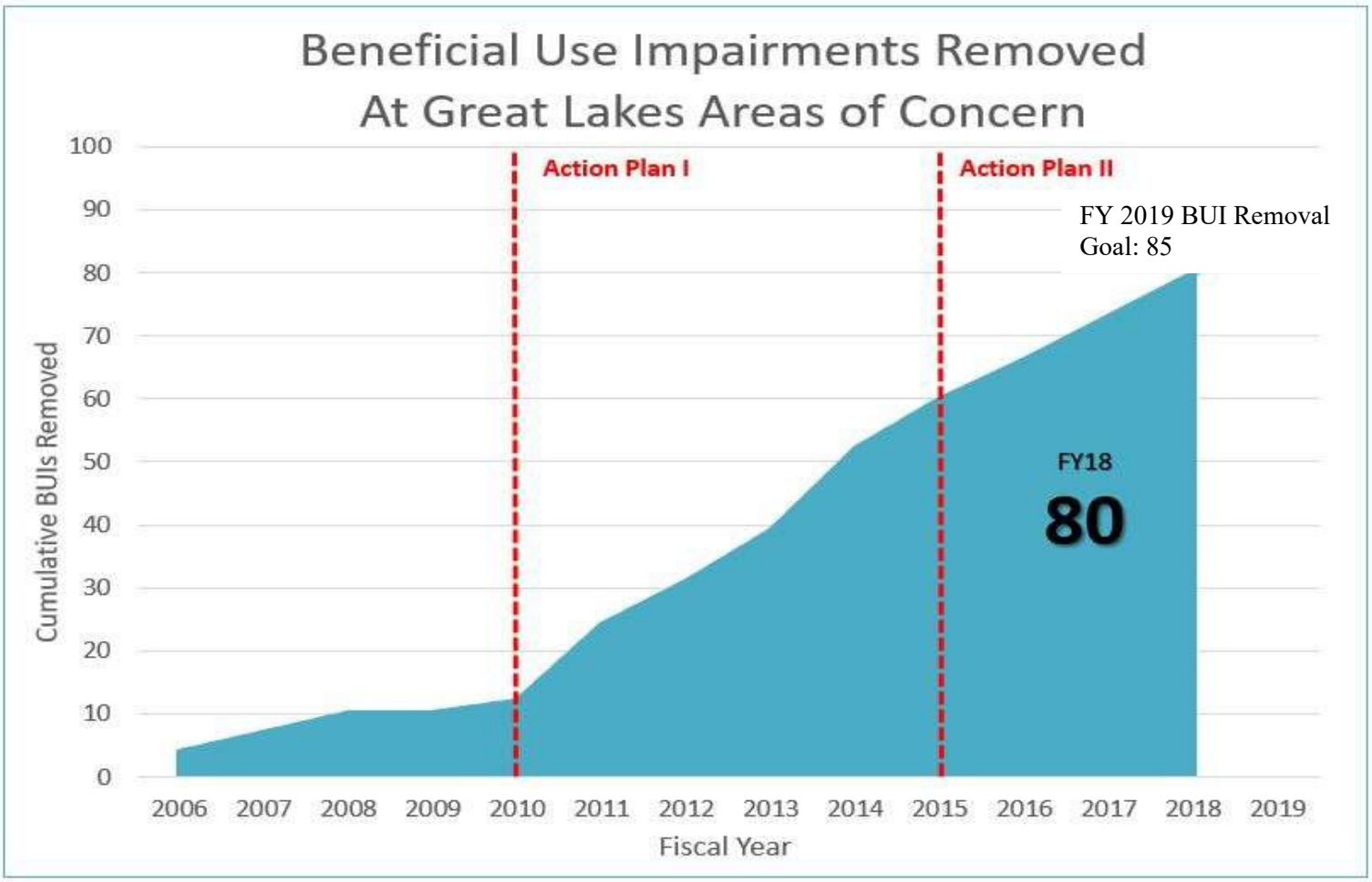


FOCUS AREA 1: Toxic Substances and Areas of Concern

Defined in the 1987 Great Lakes Water Quality Agreement, AOCs are specific areas of the Great Lakes basin that are heavily contaminated with legacy pollutants and show signs of environmental degradation such as habitat loss and fish consumption advisories. GLRI federal agencies and their partners have delisted four AOCs and have completed all management actions required to delist an additional eight AOCs.

In FY 2018, GLRI federal agencies and their partners finished all of the management actions needed to delist the Rochester Embayment AOC. Also, in FY 2018, three AOCs – Clinton River AOC, Manistique River AOC and Muskegon Lake AOC – all created complete "management action lists" detailing the remediation and restoration actions necessary to remove Beneficial Use Impairments (BUIs) which is necessary to ultimately delist these AOCs.

In FY 2018, GLRI federal agencies and their partners removed seven BUIs at seven AOCs in five states, bringing the cumulative total of BUIs removed to 80. Since the start of the GLRI in 2010, 70 BUIs have been removed, more than seven times the total removed since its inception. BUIs are indicators of environmental harm used to characterize an AOC. Once all of an AOC's BUIs are removed, the AOC can move forward with delisting.



During FY 2018, GLRI federal agencies and their partners implemented three new projects that will further protect people from contaminants in Great Lakes fish and continued to fund several ongoing projects. GLRI federal agencies and their partners conducted outreach activities targeting populations that consume high amounts of Great Lakes fish, including several sensitive populations and environmental justice communities. Specifically, projects in 2018 (i) helped to inform urban anglers in Detroit of current fish consumption advisories by conducting educational and outreach activities; (ii) enhanced awareness and availability of fish consumption advice in the Hmong community in Minnesota; and (iii) built upon earlier and highly successful GLRI projects that utilized health care providers as a resource for communicating fish consumption guidance.

GLRI federal agencies and their partners continued their integrated efforts to identify the extent to which chemicals of emerging concern (CECs) threaten Great Lakes fish and wildlife populations. They also continued to develop biological effects surveillance tools to inform resource management decisions. Through these efforts, GLRI partners have determined that CECs are ubiquitous throughout Great Lakes tributaries with the types of chemicals present depending on a variety of factors including surrounding land use (e.g., urban vs. agricultural inputs). As a result of this work, GLRI partners are developing and refining biological surveillance tools that will allow resource managers to make better decisions about possible adverse effects from these chemicals.

Focus Area 1 Success Stories

Braddock Bay: Rochester Embayment AOC

In FY 2018, the U.S. Army Corps of Engineers (USACE), in partnership with New York State Department of Environmental Conservation and the Town of Greece, NY completed an innovative restoration project at Braddock Bay – one of the largest coastal wetlands on the south shore of Lake Ontario located in the Rochester Embayment AOC. Wetland habitat diversity was increased by excavating a network of eight acres of channels and potholes and re-creating two acres of emergent marsh that were previously lost to erosion. The barrier beach has already been visited by a variety of shorebirds, including the federally endangered piping plover. This project not only provides meaningful ecological benefits, but it also strengthens coastal resiliency. By protecting the wetlands from Lake Ontario wave action, the wetlands can act as a natural sponge temporarily storing stormwater and reducing flooding. It also has stimulated a $1.7 million investment by the Town of Greece, NY to increase recreational access of the bay. Community members can now interact with this natural area through heightened opportunities for fishing, boating, and aesthetic appreciation within the bay.

Zephyr Sediment Remediation and Habitat Restoration: Muskegon Lake AOC

EPA partnered with the Michigan Department of Environmental Quality to remove 50,000 cubic yards of sediment contaminated with petroleum hydrocarbons, lead, and other heavy metals, and to restore 15 acres of productive wetland adjacent to the North Branch of the Muskegon River. The removal of cattails and other invasive species along with the installation of native plants created a more suitable habitat for game species, migratory birds, and other fish and wildlife. Removing contaminants from the Zephyr site is an important piece of the restoration puzzle because it is adjacent to the North Branch of the Muskegon River, which feeds into Muskegon Lake and eventually Lake Michigan. This project opens up the area for recreational opportunities and dramatically increases redevelopment potential.

Estabrook Dam: Milwaukee River AOC

Through a partnership with the Wisconsin Department of Natural Resources and funding from GLRI and the Fund for Lake Michigan (FFLM), the Milwaukee Metropolitan Sewerage District (MMSD) removed the Estabrook Dam from the Milwaukee River Area of Concern. Removing this barrier allows fish to access upstream spawning and nursery habitats, increasing their recruitment to the lake. The Estabrook Dam was the furthest downstream barrier to fish passage on the Milwaukee River. Removing the dam was critical to linking habitat in the upstream portions of the Milwaukee River to Lake Michigan. In combination with another GLRI/FFLM-funded fish passage project in the AOC at Kletzsch Park Dam, this project will open and connect 25 miles of the Milwaukee River, 29 miles of tributary stream, and over 2,400 acres of wetland spawning and nursery habitats for fish and aquatic organisms. The dam removal projects along with other habitat restoration projects are important steps to ultimately remove the *Loss of Fish and Wildlife Habitat* BUI. This project also improves water quality, reduces flooding, and allows sediment necessary for river feature creation to move downstream. A connected river also enables enhanced recreational opportunities such as kayaking, canoeing, fishing, and nature observation.

Fish Shelves at Black River AOC

In FY 2018, approximately 650 linear feet of fish shelves were constructed at the Black River AOC utilizing GLRI funds. This innovative work provides critical habitat to fish and macroinvertebrates along a bulkhead at the mouth of the Black River. Upon construction completion, early survey work and sonar images revealed that there is an increased presence of fish congregating near the newly constructed habitat. This project is an important step in the eventual removal of the *Loss of Fish and Wildlife Habitat* and *Degraded Fish and Wildlife Populations* BUIs in the Black River AOC.

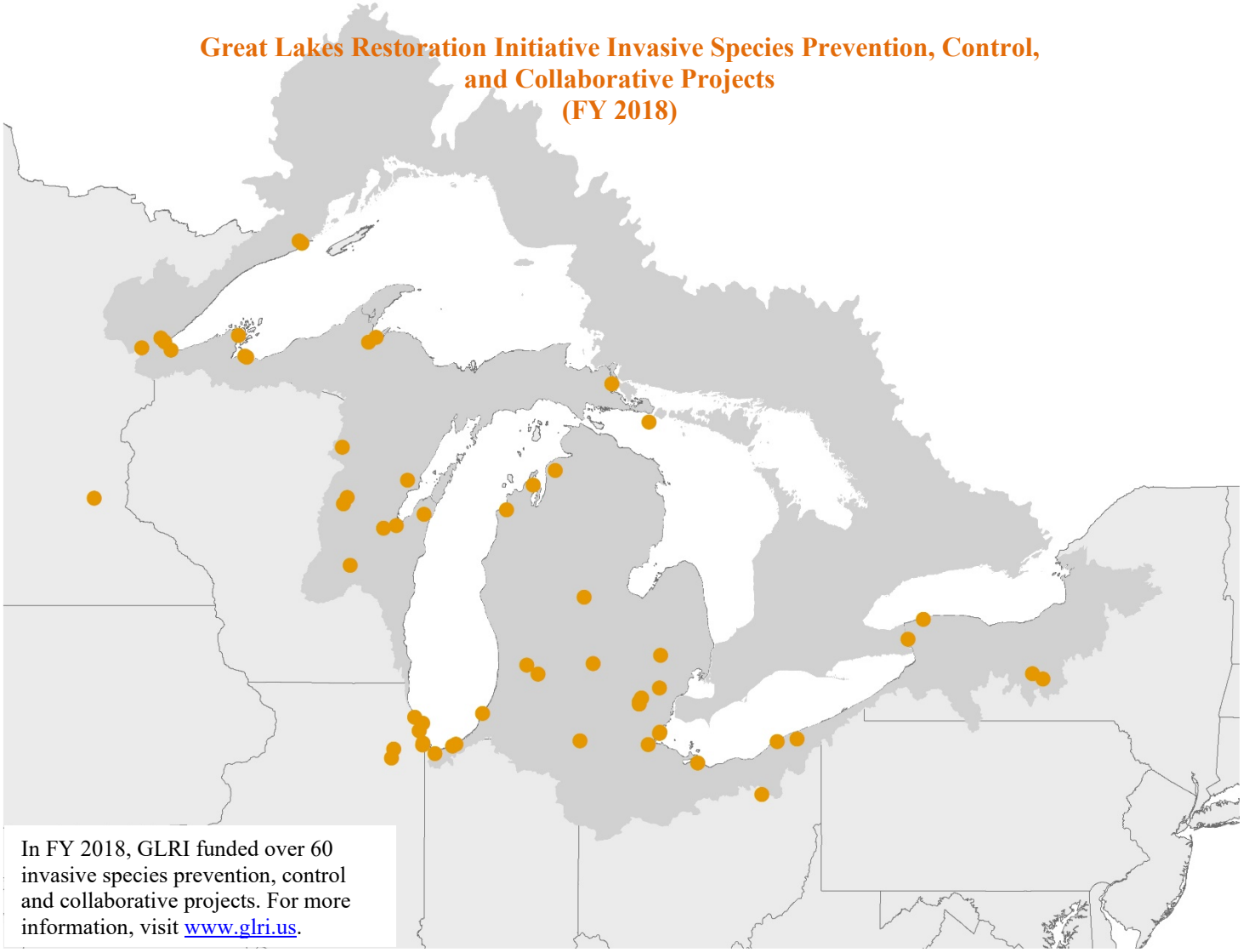
Stony Island: Detroit River AOC

In FY 2018, National Oceanic and Atmospheric Administration (NOAA) completed construction on the nearly $8 million Stony Island Shoal Habitat Restoration Project, being the largest project to date in the Detroit River AOC. A total of 1,350 linear feet of rock shoal in the upper bay and 2,300 linear feet in the lower bay now protect 52 acres of uninhabited island land and surrounding emergent and submergent wetlands which had been greatly reduced in size due to decades of erosion. Both bays are important habitat for the Detroit River and Lake Erie fish stock. Among other species, they provide important spawning grounds for pike and aid in the recovery of the lake sturgeon. Other habitat structures put in place, including snake hibernacula, mudpuppy refugia, turtle basking structures and bird nesting areas, will benefit local mammals, amphibians, reptiles, and birds, including some species listed as threatened in Michigan. The area also provides habitat for rare and transient waterfowl such as the Great Blue Heron. The island's wetlands and tree stand now contain the river's largest Great Blue Heron rookery with over 140 active nests.

Restoring the Buffalo River AOC

In FY 2018, six habitat restoration projects were completed in the Buffalo River AOC utilizing GLRI funds. These projects enhanced nearly two miles of shoreline and 20 acres of habitat along the lower Buffalo River. The projects contribute to the goal of restoring a minimum of 25% of the AOC's shoreline with natural slopes, shallow water habitat, and aquatic native vegetation, a requirement for removing two BUIs. By removing invasive species, planting native species and softening the shoreline (e.g. replacing hard structures and channels with more natural habitat), the area will see improved storm water treatment, reduced erosion, and enhanced habitat for fish and wildlife. The community also anticipates significant economic benefits from the projects through increased overall recreation, including sport-fishing, wildlife viewing, and tourism opportunities. Funding for this work was provided to Buffalo Niagara Waterkeeper by a NOAA/Great Lakes Commission Regional Partnership. The GLRI has enabled a diversity of partners (NOAA, EPA, USACE, NY Department of Environmental Conservation, Great Lakes Commission, and Buffalo Niagara Waterkeeper) to come together and work towards environmental health, community revitalization, and ultimately, the delisting of the AOC.

Great Lakes Restoration Initiative Invasive Species Prevention, Control, and Collaborative Projects (FY 2018)



In FY 2018, GLRI funded over 60 invasive species prevention, control and collaborative projects. For more information, visit www.glri.us.

FOCUS AREA 2: Preventing and Controlling Invasive Species

During FY 2018, GLRI 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.

GLRI federal agencies and their partners conducted early detection monitoring exercises and trained for rapid responses. During FY 2018, the GLRI funded 24 early detection monitoring exercises that enhance the ability to detect and respond to new invasive species introductions. GLRI federal agencies and their partners also completed a total of 12 table-top exercises and field response drills, exceeding the FY 2018 GLRI Action Plan II target of eight rapid responses and exercises.

GLRI federal agencies and their partners have further reduced the risk of invasive species entering the Great Lakes watershed by funding 28 projects in FY 2018 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.

Development of a Comprehensive and Forward-Looking Sea Lamprey Strategy

In FY 2018, the Great Lakes Fishery Commission (GLFC) developed a strategic program of supplemental sea lamprey control research and development to assist the current Sea Lamprey Control Program. The GLFC is now positioned to increase opportunities for development of new control tactics including new lampricides and genetic controls.

During FY 2018, GLRI federal agencies and their partners restored sites degraded by aquatic, wetland, and terrestrial invasive species. GLRI federal agencies also supported community efforts to control and reduce the spread of invasive species. These projects were implemented with local partners with the goal of their maintenance and stewardship of the project beyond the duration of the federally funded project lifespan. In addition, GLRI federal agencies directly implemented control projects in national forests, parks, and wildlife refuges. In FY 2018, GLRI federal agencies and their partners managed and funded projects that protected over 18,700 aquatic/terrestrial acres from invasive species for a cumulative total of more than 153,000 acres since the start of GLRI.

During FY 2018, GLRI 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. GLRI federal agencies and their partners also conducted additional testing on potential invasive species control technologies to evaluate their actual effectiveness in controlling invasive species. In FY 2018, GLRI federal agencies and their partners field tested 22 different technologies and methods, including new ballast water management systems.

In FY 2018, GLRI 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 to a broad array of informed stakeholders including agencies, organizations and citizens. Collaboratives are in place for the following species: Asian Carp, phragmites, invasive mussels, and monoecious hydrilla. These collaboratives are actively involved in the protection and control efforts that achieve invasive species results under the Action Plan.

Protecting the Great Lakes from Asian Carp
The GLRI provides support to the Asian Carp Regional Coordinating Committee. More information about the ACRCC is available at http://www.asiancarp.us.

Support for Grass Carp Management and Response

Since 2014, the GLRI has funded actions to strategically address Grass Carp control in the Great Lakes. Unlike the other Asian Carp species, Grass Carp have been found sporadically in the Great Lakes since the 1980s, but not in numbers indicating an established population. Recent data provide evidence of Grass Carp reproduction in the western basin of Lake Erie. Because Grass Carp consume aquatic vegetation, they have the potential to significantly impact Great Lakes coastal wetlands, which provide critical habitat for various life stages of many native fish, waterfowl and wildlife species that sustain the economic and ecological viability of this unique freshwater ecosystem.

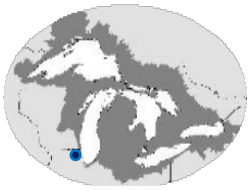
During FY 2018, state, provincial, and federal agencies from both Canada and the U.S. collaborated to develop and implement strategic Grass Carp detection and removal techniques in the Sandusky and Maumee rivers. These FY 2018 efforts build on similar activities from the previous years. Michigan and Ohio expect to increase their removal actions in future year with support through the Asian Carp Regional Coordinating Committee Action Plan, and assistance from U.S. Fish and Wildlife Service (USFWS) and U.S. Geological Survey (USGS). The investment in science to gain a better understanding of Grass Carp in Lake Erie is starting to increase effectiveness of response actions and is providing resource agencies the necessary information to implement strategies towards eradicating the species.

Focus Area 2 Success Stories

EPA Early-Detection Monitoring at Apostle Islands National Lakeshore finds Dreissena Mussel Veliger's

The Apostle Islands National Lakeshore on Lake Superior offers scenic coastlines and natural resources that are at risk of invasion by *Dreissena* (zebra and quagga) mussels. In 2018, efforts by staff of EPA's Office of Research and Development and NPS continued to assess Apostle Islands waters for *Dreissena* mussels. This early-detection monitoring effort found no settled *Dreissena* in any bottom samples or video footage but found "veligers" (the free-floating early life-stage of the mussels) in almost half of the zooplankton samples collected. The *Dreissena* veligers in Lake Superior waters were detected at extremely low densities in environmental conditions that are only marginal for the species' survival. This effort showed that early-detection monitoring can be effective even in a system as massive as Lake Superior.

USDA Natural Resources Conservation Service Partners with Local Land Managers to Benefit Lake Michigan Habitats through Invasive Species Control



U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) has worked with the Forest Preserve District of Cook County for the last three years to address problems associated with invasive species. The Forest Preserves' partnership with GLRI and NRCS has led to a sustained effort to restore highly valuable and rare natural communities along the southwestern rim of Lake Michigan. Because of the intense urbanization of this region, the natural areas have been disappearing and those that remain are subject to detrimental impacts. In 2018, GLRI funds were utilized to re-seed a valuable woodland, Turnbull Woods, which sits adjacent to the Chicago Botanic Garden and Mary Mix McDonald Woods. This woodland site is a highly visited and highly visible preserve located just north of Chicago. At Powderhorn Prairie and Marsh Preserve, invasive brush removal occurred in a globally rare dune-and-swale habitat. This biologically rich site contains over 300 species of native plants and rare species of insects and fishes. At Eggers Woods Forest Preserve of Cook County, invasive trees and brush were effectively removed from the western portion of the site – the greatest pocket of invasive brush at the preserve.

Emerald Ash Borer Mitigation of a Lake Ontario Coastal Wetland

Island Cottage Woods Preserve is a coastal wetland located west of Rochester, NY on the southern shore of Lake Ontario. This property is a migratory bird hotspot that provides excellent stopover habitat for migratory birds during spring and fall migration. In the past years, Emerald Ash Borer has arrived in the region, putting habitats like Island Cottage Woods at risk. With a $50,550 grant through the U.S. Forest Service (USFS), Genesee Land Trust planted over 2,500 trees and shrubs throughout the property between 2015 and 2018. The goal is to under plant the current ash-rich canopy and give these native trees and shrubs an advantage over invasive shrubs when the ash trees begin to die. To increase the success of the project, newly planted trees and shrubs are protected from deer and invasive shrubs around planting areas are being treated on an annual basis.

The Great Lakes Restoration Initiative is Making a Difference by Taking the Fight to Asian Carp

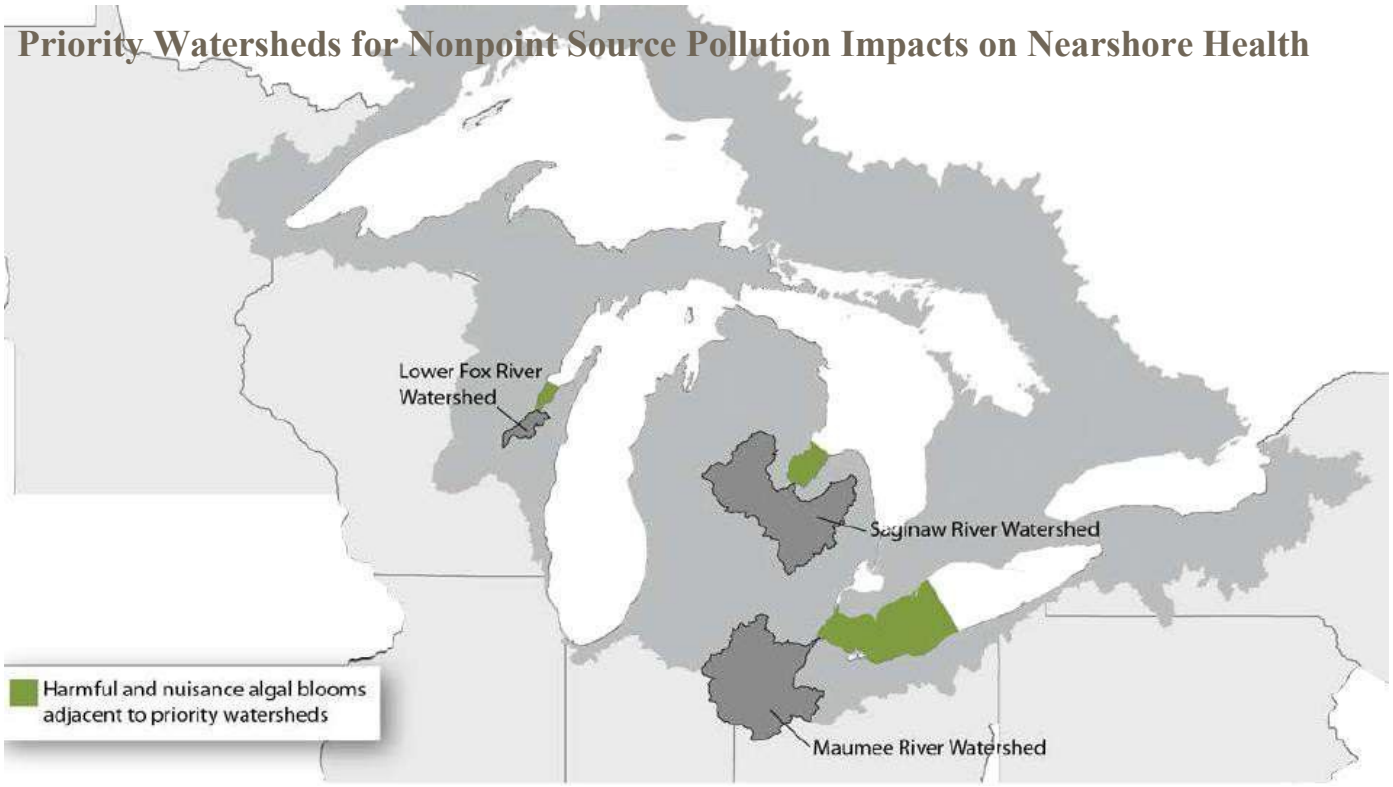
The Bighead and Silver Carp – two of the four species of invasive carp known as Asian Carp – in the Illinois Waterway are being caught and removed in great numbers by contracting with expert fisherman who operate under the supervision of Illinois Department of Natural Resource biologists. Through scientifically designed studies using hydro acoustics in upper Illinois Waterway navigation pools, Asian Carp densities are at an eight-year low. Detailed annual detection, monitoring and control projects, along with contingency planning, provides the protection from further expansion of the two species and useful information for agencies charged with managing them. Such planning and action allow GLRI partners to develop the aggressive plans for protecting the Great Lakes – and we are seeing results. Since 2010, 26 agencies have worked to identify where the Asian Carp are and developed effective strategies to reduce the risk of the two species moving toward Lake Michigan. Population levels have been significantly lowered at the leading edge of the northward Asian Carp migration, the Dresden Island Pool, and further action is being taken in to reduce populations further downstream. About one million pounds of Asian Carp are removed annually in the upper Illinois Waterway by contracted fisherman, which can be rendered into fertilizers, oils, animal feed and pet treats. In the lower Illinois Waterway, commercial fishermen remove an additional 3 million pounds or more, totaling 4 million pounds of Asian Carp removed from the Illinois Waterway annually, with managers considering additional efforts to reach a goal of removing 10 million pounds each year to further assist protection of the Great Lakes.

Unexpected and Critical Upgrades to the Asian Carp Barrier Are Made Possible due to GLRI

As part of efforts to improve operations of the Electric Dispersal Barriers in the Chicago Sanitary and Ship Canal, USACE assessed equipment in 2017 and then successfully replaced critical electrode components in 2018. Underwater inspection revealed that the rate of electrode corrosion was higher than expected. The conductive material at one of the barrier's narrow electrodes was significantly compromised, and the rate of electrode corrosion was expected to accelerate over time as the material becomes more permeable. To address this issue, USACE received $5 million in GLRI funding to replace the narrow array electrodes to improve the long-term performance of this critical tool in keeping Asian Carp out of the Great Lakes.

Early Detection Program Finds Bloody Red Shrimp in Lake Superior

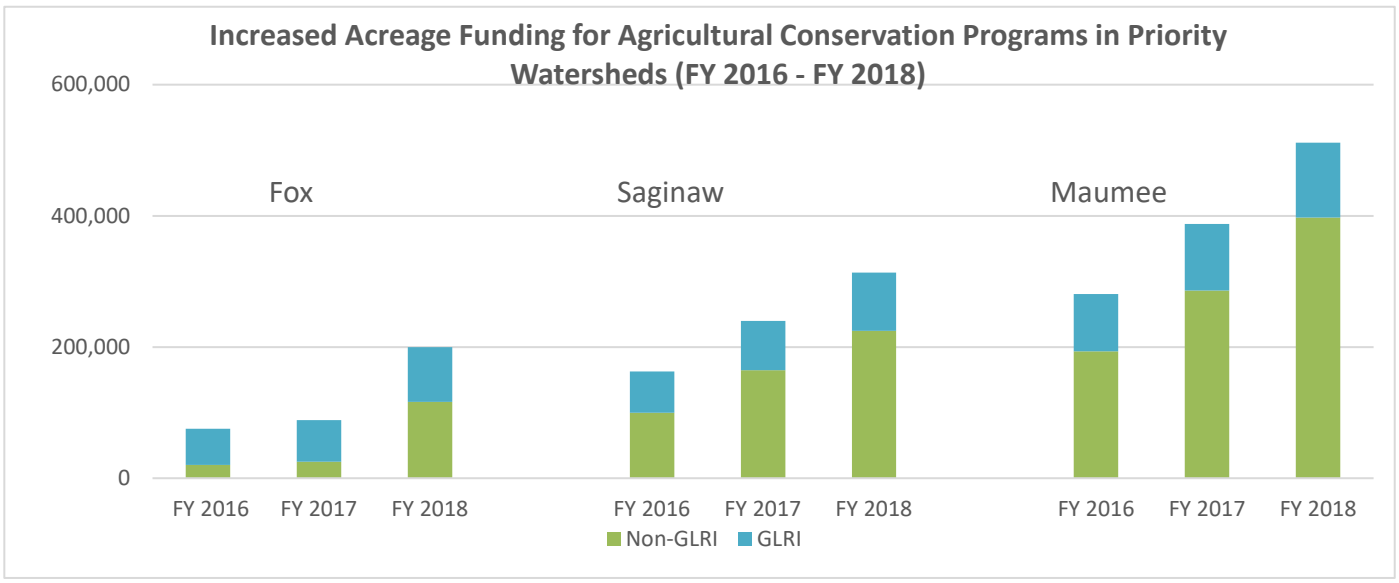
The USFWS collected a single bloody red shrimp, *Hemimysis anomala*, in May 2018, during an annual sampling event on the Wisconsin side of the Duluth-Superior Harbor. The finding was significant as it was the first bloody red shrimp to be collected in Lake Superior. This non-native species is now known to be present in all the Great Lakes, but it remains unknown whether it might disrupt food webs like other invasive species. The sampling was part of the Service's Great Lakes Early Detection Monitoring Program, a comprehensive surveillance program supported by the GLRI. The program operates in areas of the Great Lakes most vulnerable to aquatic nuisance species in coordination with state and federal partners.



FOCUS AREA 3: Nonpoint Source Pollution Impacts on Nearshore Health

Polluted runoff, also known as "nonpoint source pollution", threatens the Great Lakes ecosystem by contributing to harmful algal blooms that cause human health effects, drinking water impairments, ecological dead zones, and beach closures that result in lost recreational opportunities. Runoff can carry excess nutrients from fertilizer, sediment, bacteria, road salts, and other land-applied chemicals, such as herbicides and pesticides. The pollutant carried by runoff that most significantly impacts the Great Lakes nearshore areas is excess nutrients from agricultural watersheds, particularly phosphorus.

GLRI federal agencies and partners are working to reduce excess phosphorus loadings from agricultural watersheds in several ways. GLRI funding is used to supplement other prominent agricultural conservation programs, such as the Conservation Technical Assistance Program and Environmental Quality Incentives Program, which provide technical and financial assistance to agricultural producers to plan and install conservation practices. In addition, GLRI federal agencies partner with and provide grants to support non-government programs and projects at the state and local level, such as demonstration farms. Funding for agricultural conservation is targeted to priority watersheds for harmful algal blooms (see map), as well as the Genesee River watershed and nearshore areas along Lakes Michigan and Ontario.



During FY 2018, GLRI federal agencies and their partners funded nutrient and sediment reduction projects on over 115,000 acres of targeted watershed in the Great Lakes basin using GLRI funding. GLRI federal agencies have projected that over 340,000 pounds of phosphorus will be prevented from entering the Great Lakes as a result of these projects.

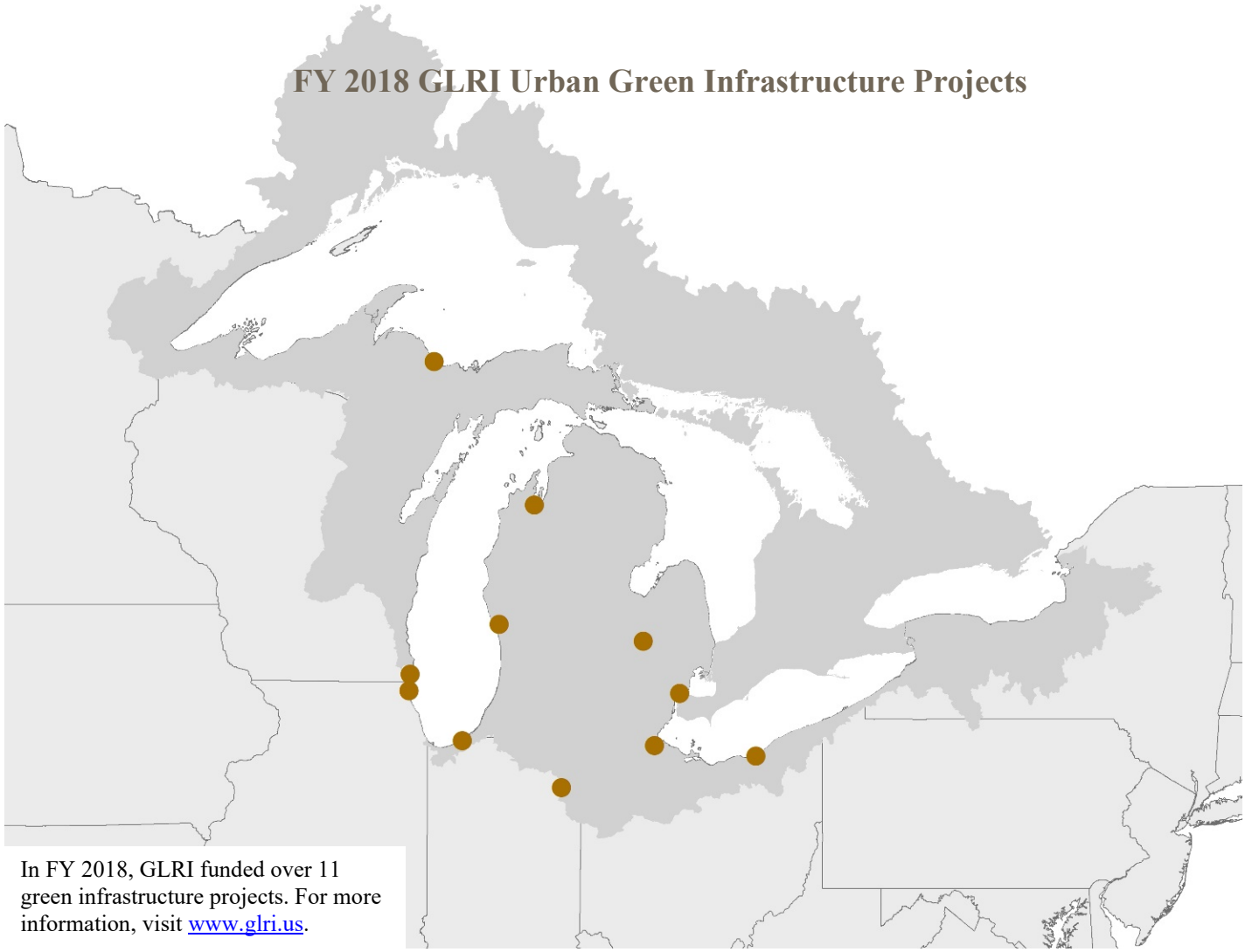
GLRI federal agencies and their partners also use GLRI funding to support watershed-based projects to address nonpoint source pollution in urban areas. Projects started in FY 2018 will capture more than 13 million gallons of untreated urban runoff per year. These projects reduce flooding, increase green space in urban areas, reduce bacterial contamination and return vacant properties to productive use. The types of best management practices implemented include:

- Tree plantings
- Constructed wetlands
- Bioretention ponds
- Porous pavement
- Bio swales
- Rain gardens

During FY 2018, 11 Great Lakes GLRI green infrastructure projects were implemented in the following locations and reflect over $4.5 million in investments:

- Waukegan, IL
- Michigan City, IN
- Fort Wayne, IN
- Oregon, OH
- Cleveland, OH
- Kenosha, WI
- Detroit, MI
- Flint, MI
- Marquette, MI
- Muskegon, MI
- Traverse City, MI

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



In FY 2018, GLRI funded over 11 green infrastructure projects. For more information, visit www.glri.us.

Focus Area 3 Success Stories

The Proof is in the Soil – WI Demo Farm Thrives with Use of Cover Crops and No-Till

Four years ago, crop farmer Dave Van DeHey and his three sons, Matthew, Ross and Derek, were introduced to the Lower Fox Demonstration Farms Network. This GLRI-funded project demonstrates leading edge conservation practices that improve Great Lakes water quality. After a visit, the Van DeHeys adopted many of the conservation practices on their farm, which sits on the banks of Apple Creek and flows into the Fox River. In FY 2018, NRCS, using GLRI funding, helped this multi-generational farm family implement two edge-of-field monitoring stations located on two 4-acre subwatersheds, side-by-side in the same field. These stations quantify the amount of sediment that washes off the land. Preliminary data was informative, as it revealed high losses of sediment in surface runoff, averaging about 4,000 pounds per acre annually. As a result, the Van DeHeys fully adopted no-till and cover crops on one of the monitoring fields. They will continue to farm the other monitored field conventionally to capture the real difference that soil conservation practices can make on the ground and encourage other farmers to make the change.

Cleveland Metroparks Green Infrastructure Retrofit

Cleveland Metroparks Huntington Reservation is located directly on the shore of Lake Erie in the City of Bay Village, approximately 8 miles west of Cleveland, Ohio. Under this green infrastructure project at Wolf Picnic Area, Cleveland Metroparks retrofitted an existing parking lot in FY 2018 with 7,000 square feet of pervious pavement and a 5,300 square foot vegetated island to reduce stormwater volume and to reduce contaminants from the parking lot that reach Porter Creek and Lake Erie. The overall goal is to improve water quality at Huntington Beach. The project will also remove about 115,000 gallons of water from the sewer system annually.

Ohio Farmers Take Action to Improve Water Quality, Blanchard River Demonstration Farms Network

Ohio farmers care about the land they farm and the environment they inhabit and want to improve both for future generations. NRCS worked with three such proactive farmers in northwest Ohio, who were willing to open their farms to the public and share the conservation systems, technology and innovations being implemented on their farms. Utilizing GLRI funding, Ohio NRCS and the Ohio Farm Bureau Federation joined forces to create the Blanchard River Demonstration Farms Network in 2015. The demonstration farms serve as models designed to showcase, demonstrate and research leading edge conservation practices that reduce or prevent nutrients from entering waterways, which will improve Lake Erie water quality. The Blanchard River Demonstration Farms Network was honored in 2018 with American Farm Bureau's prestigious New Horizon Award, which recognizes new and innovative state Farm Bureau programs. As of 2018, over 1,200 visitors have toured the demonstration farms. Visitors include members of Congress, the media, government officials, farm and urban groups as well as high school and college students.

Underwood Creek Restoration Project, Milwaukee, Wisconsin

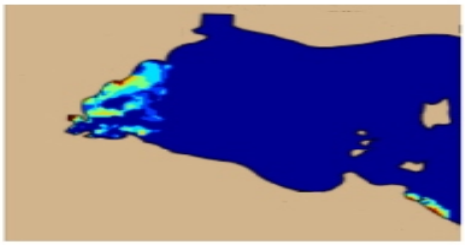
The integrated watershed management plan for the City of Milwaukee, Wisconsin includes a vision for the restoration of concrete-lined "spillways" historically designed to expedite the flow of urban runoff. In FY 2018, the USACE, in coordination with MMSD and other GLRI partners, removed concrete lining from a section of Underwood Creek starting at the confluence with the Menomonee River in downtown Milwaukee. This project ties into Milwaukee's larger watershed approach where wetland complexes and stream corridors in urban areas are being restored to help naturally mitigate stormwater runoff. Restoration of impermeable corridors like this are a vital tool to managing nutrient runoff and will reduce the amount of stormwater runoff entering Lake Michigan by storing and draining water into the ground naturally.

New Life for the Dead River in Michigan

The USFS, through the Michigan Department of Natural Resources and the Superior Watershed Partnership & Land Trust (SWP), brought new life and diversity to the Dead River watershed. In FY 2018, the SWP Great Lakes Conservation Corps planted 3,000 native trees in and around Marquette, MI, to restore the conifer forests that protect the health of Lake Superior and its tributaries. The project will result in the capture and filtering of more than 850,000 gallons of water during its first 5 years, and many millions more gallons over the life of the trees. By treating more than 40 acres of riparian and coastal habitat, storm water runoff will be reduced and treated, keeping Dead River and Lake Superior free of sediment, nutrients, pathogens, and pollutants from the surrounding land. These efforts of 45 local high school students and the Great Lakes Conservation Corps built connections with the Marquette community, supported development of the next generation of conservationists, and promoted a pathway to careers in natural resources.

NOAA Harmful Algal Bloom Forecast Helps Lake Users Find Clear Water

The annual recurrence of HABs in Lake Erie threatens valuable ecosystem services that benefit millions of residents and visitors, including fishing opportunities that contribute to a vibrant regional economy. NOAA and its partners help keep communities safe by using remote sensing, multiple models and daily monitoring to predict and track the formation and movement of harmful algal blooms during the summer months. This was well illustrated during July 2018, when the HAB Tracker gave advance warning that a HAB would concentrate near Monroe, MI. The team provided detailed information on the bloom location by conducting a flyover with aircraft-borne hyperspectral remote sensing instrumentation, despite persistent cloud cover which prevented observation of the bloom by satellite imagery.



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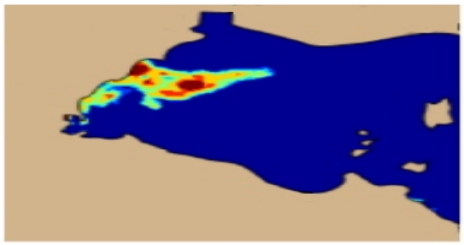

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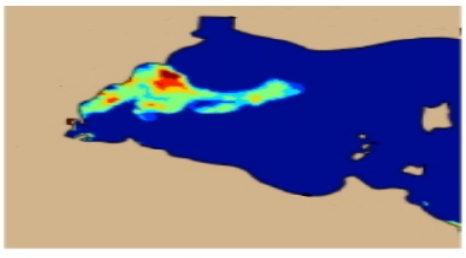

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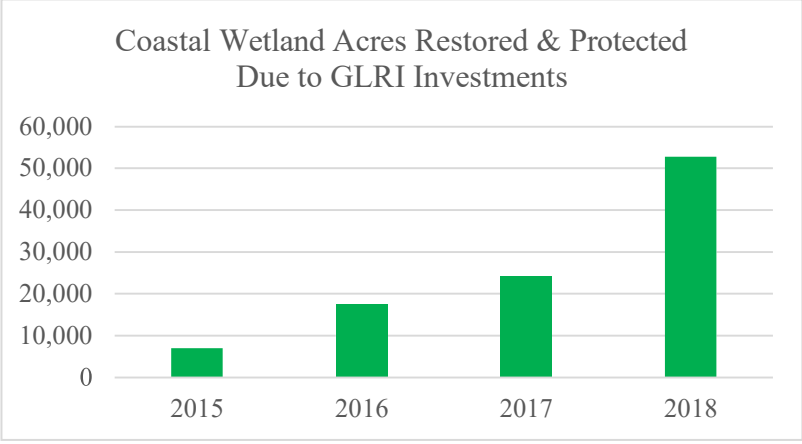
Great Lakes Restoration Initiative Habitat Restoration and Species Protection Projects (FY 2018)

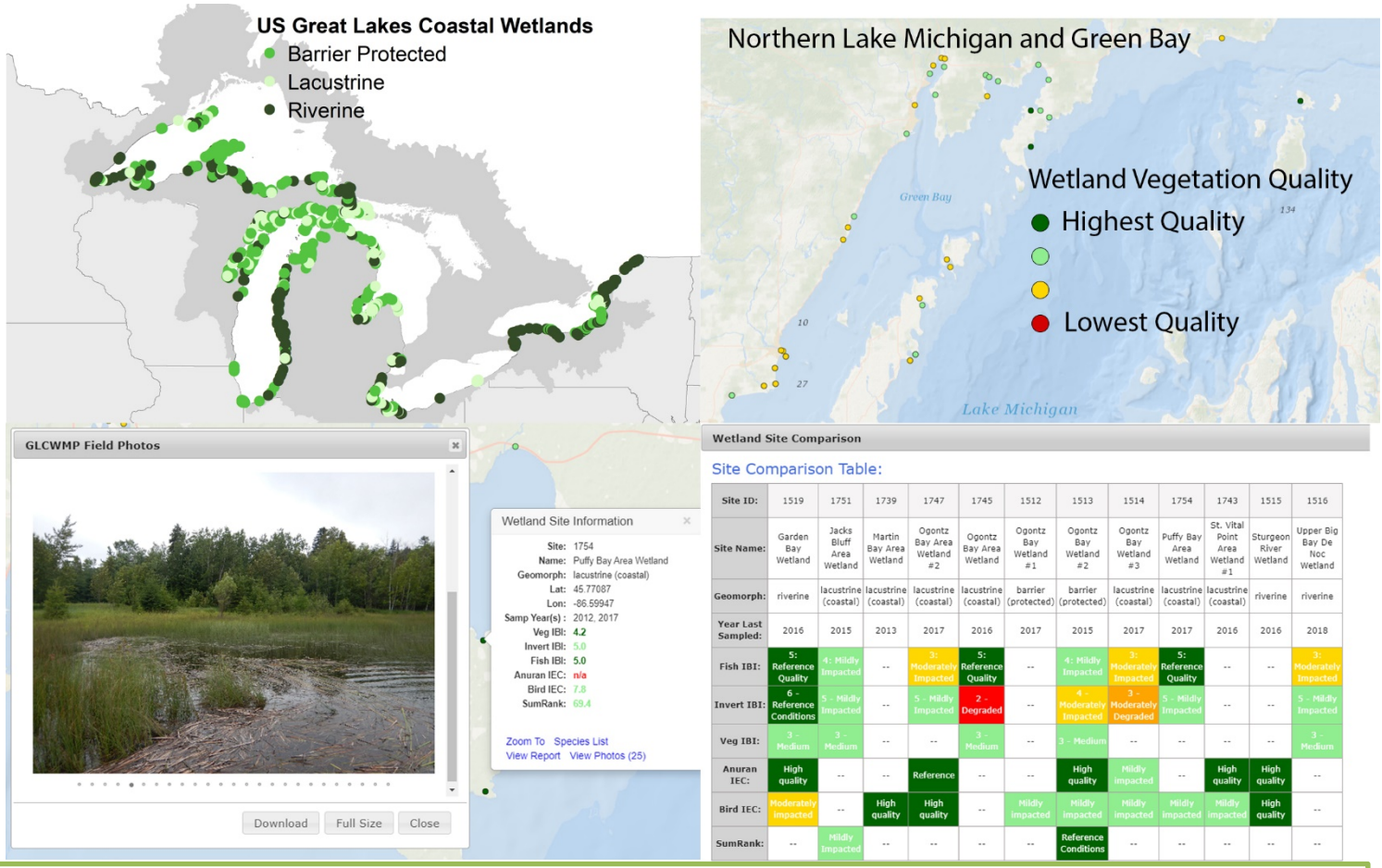
In FY 2018, GLRI funded approximately 200 habitat restoration and species protection projects. For more information, visit www.glri.us.

FOCUS AREA 4: Habitat and Species

During FY 2018, GLRI federal agencies and their partners protected, restored and enhanced habitats and native species throughout the Great Lakes basin. In FY 2018, GLRI federal agencies and their partners implemented 116 habitat and native species projects adding to the more than 1071 habitat and native species projects currently underway or completed since the inception of the GLRI.

By the end of FY 2018, GLRI federal agencies and their partners implemented protection, restoration and enhancement projects resulting in over 5,200 miles of Great Lakes tributaries reopening and increased aquatic connectivity for numerous fish species. Projects that addressed aquatic connectivity in FY 2018 assisted local dam owners, states and transportation authorities seeking to address aging infrastructure while simultaneously restoring rivers.





Site ID:	1519	1751	1739	1747	1745	1512	1513	1514	1754	1743	1515	1516
Site Name:	Garden Bay Wetland	Jacks Bluff Area Wetland	Martin Bay Area Wetland	Ogontz Bay Area Wetland #2	Ogontz Bay Area Wetland	Ogontz Bay Wetland #1	Ogontz Bay Wetland #2	Ogontz Bay Wetland #3	Puffy Bay Area Wetland	St. Vital Point Area Wetland #1	Sturgeon River Wetland	Upper Big Bay De Noc Wetland
Geomorph:	riverine	lacustrine (coastal)	lacustrine (coastal)	lacustrine (coastal)	lacustrine (coastal)	barrier (protected)	barrier (protected)	lacustrine (coastal)	lacustrine (coastal)	lacustrine (coastal)	riverine	riverine
Year Last Sampled:	2016	2015	2013	2017	2016	2017	2015	2017	2017	2016	2016	2018
Fish IBI:	5: Reference Quality	4: Mildly Impacted	--	3: Moderately Impacted	5: Reference Quality	--	4: Mildly Impacted	3: Moderately Impacted	5: Reference Quality	--	--	3: Moderately Impacted
Invert IBI:	6 - Reference Conditions	5 - Mildly Impacted	--	5 - Mildly Impacted	2 - Degraded	--	4 - Moderately Impacted	3 - Moderately Degraded	5 - Mildly Impacted	--	--	5 - Mildly Impacted
Veg IBI:	3 - Medium	3 - Medium	--	--	3 - Medium	--	3 - Medium	--	--	--	--	3 - Medium
Anuran IEC:	High quality	--	--	Reference	--	--	High quality	Mildly impacted	--	High quality	High quality	--
Bird IEC:	Moderately impacted	--	High quality	High quality	--	Mildly impacted	Mildly impacted	Mildly impacted	Mildly impacted	Mildly impacted	High quality	--
SumRank:	--	Mildly Impacted	--	--	--	--	Reference Conditions	--	--	--	--	--

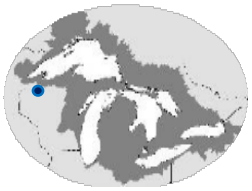
Targeted restoration and protection of US coastal wetlands (top left) continued in FY 2018 using ongoing basin-wide assessments (top right). Coastal wetland data has been rapidly made available at www.greatlakeswetlands.org to allow quick investigations of specific site conditions (bottom left) as well as regional comparisons of sites (bottom right).

A main emphasis of GLRI Action Plan II is a focus on efforts that protect, restore, and enhance coastal wetlands using available science and monitoring of sites. This prioritization of work in the coastal habitats of the Great Lakes began in 2015 at the beginning of Action Plan II and has been accelerating on-the-ground results through greater partner engagement and use of available data (www.greatlakeswetlands.org). Great Lakes coastal wetlands provide residents of the Great Lakes with many economic benefits, including property protection against high water levels and wave action, removal of nutrients from rivers and the nearshore areas of the Great Lakes before they feed harmful and nuisance algae, and fish nursery habitats necessary to support recreational and commercial fisheries. Great Lakes coastal wetlands are ecologically and culturally important because of the many species that depend on these wetlands and the unique resources provided to many Great Lakes tribal nations. Through FY 2018, GLRI federal agencies and their partners have protected, restored, and enhanced over 52,000 acres of Great Lakes coastal wetlands.

In FY 2018, projects implemented in the Great Lakes basin were directed towards protecting and restoring native shorebirds and fish important to individual Great Lakes states, tribes and GLRI federal agencies. Piping plovers, a federally endangered shorebird, are now found at the highest numbers in decades. In 2018, the number of piping plover chicks fledged was greater than 120, a 20% increase from 2017. In 2018 (as well as in 2017), piping plover were found near all five Great Lakes. Populations of lake trout, a native offshore top predator, continued to be restored through enhancement stocking and monitoring in Lakes Michigan, Huron, and Ontario. Wild fish now compose a significant portion (>50%) of the offshore spawning population. Given these results, stocking of yearling lake trout in Lake Huron was reduced by 67 percent beginning in 2018 – a significant outcome of GLRI restoration efforts.

Focus Area 4 Success Stories

Sharp-tailed Grouse Translocation and Restoration Project – Chequamegon-Nicolet National Forest, Wisconsin

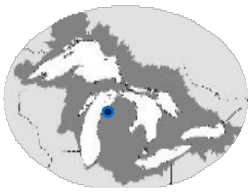


To restore and provide genetic diversity to the population of sharp-tailed grouse in the Moquah Barrens of the Chequamegon-Nicolet National Forest, 160 sharp-tailed grouse were translocated from NW Minnesota over a three-year period between 2016 and 2018. *Aagask*, Ojibwe for sharp-tailed grouse, are nicknamed the "firebird" since they are a species that relies on large scale disturbance events, like fire, to renew and maintain their habitat. Funding for this effort was provided through the GLRI and the USDA Lake Superior Landscape Restoration Partnership, who partnered with the Wisconsin and Minnesota Departments of Natural Resources, Bad River Band of the Lake Superior Tribe of Chippewa Indians, Red Cliff Bands of Lake Superior Chippewa, Wisconsin and Minnesota Sharp-tailed Grouse Societies, Great Lakes Indian Fish and Wildlife Commission and USFS. Numerous other volunteers also helped with the efforts to translocate individual birds.

North Branch Chicago River Ecosystem Restoration

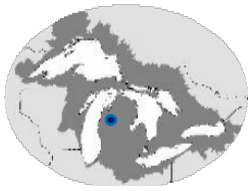
In FY 2018, USACE utilized GLRI funding to restore 50 acres of habitat on lands managed and maintained by the Chicago Park District, Illinois, including the removal of a concrete dam in the Chicago River. These measures restored habitat and connectivity for over 48 miles of riverine habitat with submerged vegetation and contoured bank slopes that were planted with native trees, shrubs, grasses and flowers. The restoration provides suitable habitat for migratory birds along the globally significant Lake Michigan flyway. The restored habitat will provide high calorie, high protein food such as seeds, fruits and insects along with a place to rest and avoid hazards. Finally, the project has 41 miles of trails that connect to a total of 950 miles of trails to downtown Chicago, Lake Michigan, Wisconsin, Indiana and Iowa. These ecosystem benefits and increased recreational opportunities improve the quality of life for over 460,000 people that live within 3 miles of this project.

Sabin Dam Removal, Traverse City, Michigan



In FY 2018, USACE utilized GLRI funding to remove the Sabin Dam on the Boardman River in Traverse City, Michigan, and restore the historic river channel. Removal of the dam increased connectivity for native fish to migrate upstream in this cold-water stream and opened an adjacent riparian corridor for aquatic and terrestrial wildlife, fishers, paddlers, and naturalists. These restoration activities will enhance the local economy and allow for movement of wood and sediment through the river system. The project also restores the natural balance between cold-water and cool-water species in the river, including various species of trout. This restoration project meets the goals of the numerous project partners, including the Michigan Department of Natural Resources, Michigan Department of Environmental Quality, U.S. Department of the Interior Bureau of Indian Affairs (BIA), Grand Traverse Band of Ottawa and Chippewa Indians, City of Traverse City, Grand Traverse County and the Great Lakes Fishery Commission.

Prescribed Fire Restores Pollinator Habitat in the Huron-Manistee National Forests



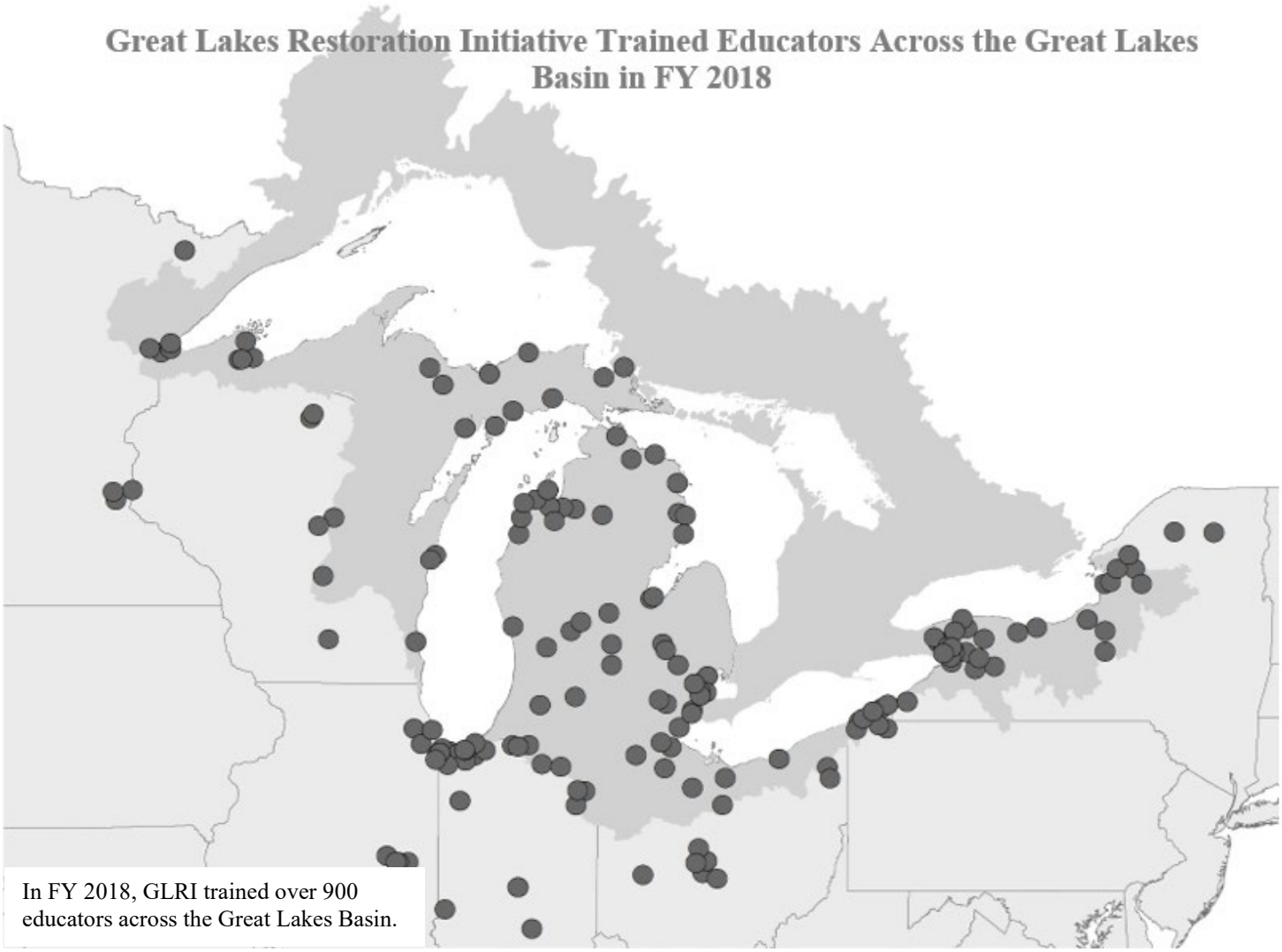
A prescribed (i.e., controlled) burn – completed as part of the GLRI – was conducted by USFS personnel in the Huron-Manistee National Forests on May 5, 2018. The goal of the burn was to restore habitat for rare pollinator species, the dusted skipper. Nearly 200 acres of oak-pine barrens were burned to return the element of fire to an ecosystem that depends on fire for ecological stability. Within weeks of the burn, wildflowers could be seen emerging from the recently blackened soil. Forest Service biologists monitored the burn area and found more than a dozen dusted skippers (butterflies) after the burn – in a site where they had not been previously documented. One of the main threats to the long-term survival of dusted skippers is habitat loss from encroachment of woody plants. Prescribed fire is one tool that land managers are using to conserve this important species and its habitat.

Lake Sturgeon Make Their Return in the Great Lakes after Enhanced Rearing Efforts

On April 12, 2018 the Little River Band of Ottawa Indians (LRBOI) Natural Resources Department staff recaptured a 10-year-old lake sturgeon from Manistee Lake – a sturgeon that was originally released in September 2008 in the Manistee River after having been raised at the nearby LRBOI sturgeon Streamside Rearing Facility. The sturgeon is thought to have been making its way upstream to spawn. To the LRBOI's knowledge, not only is this the first released sturgeon from the LRBOI rearing facility that has been documented returning to the Manistee River system, but this may be the first documented lake sturgeon from a streamside rearing facility to return to its natal stream within the entire Great Lakes Basin. Since 2012, the BIA GLRI program has provided support for the LRBOI's lake sturgeon restoration program. Another important part of the LRBOI's lake sturgeon (*nmé* in the Anishinaabe language) restoration strategy is outreach through LRBOI's traditional *nmé* release ceremonies. In September 2018, around 50 community members attended the release ceremony.

Ballville Dam Fish Passage Project

The removal of the Ballville Dam in Fremont, Ohio was completed in FY 2018, restoring 23 miles of the Sandusky River for native fish and wildlife. The dam was built in 1913 and was a significant barrier to the upstream movement of walleye and other important native species. Fish can now access habitat upstream of the old dam site, creating new angling opportunities and supporting robust self-sustaining fisheries in the region. Restoration will continue in the area in the coming years as the river carves its path through the former impoundment and the area is seeded with native grasses and planted with trees. Residents and visitors will be able to enjoy the beauty of the Sandusky River from a newly restored green space that includes a viewing platform.



In FY 2018, GLRI trained over 900 educators across the Great Lakes Basin.

FOCUS AREA 5: Foundations for Future Restoration Actions

In order to improve transparency and fiscal stewardship, GLRI federal agencies have established accountability mechanisms and internal controls to effectively manage the GLRI. GLRI Action Plan II laid out steps for GLRI federal agencies to develop and incorporate climate resiliency criteria in project selection, planning, and implementation. During FY 2018, GLRI federal agencies and their partners used a standardized set of 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.

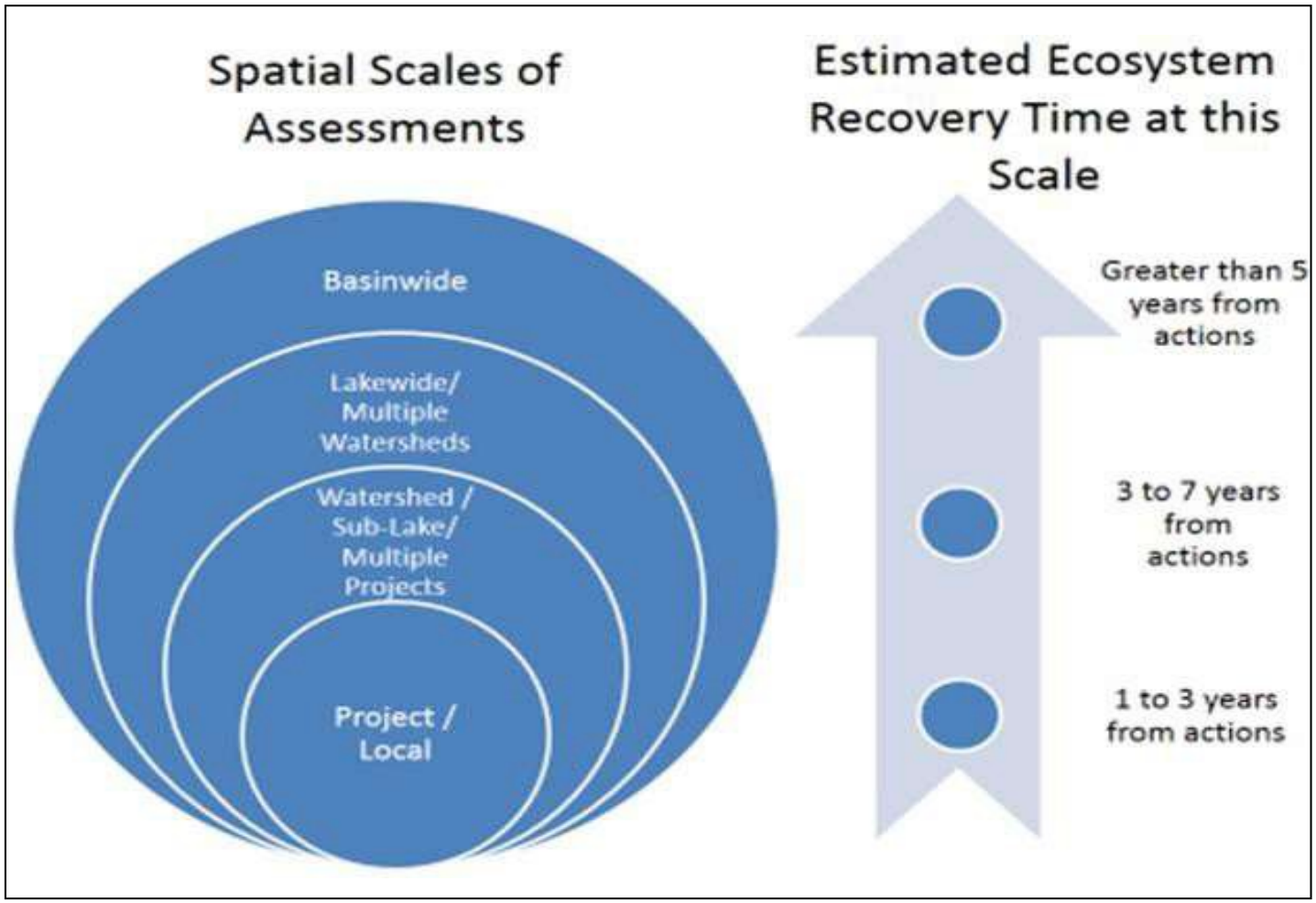
The GLRI continues to promote Great Lakes-based ecosystem education and stewardship. During FY 2018, GLRI federal agencies and their partners trained over 900 educators through the Center for Great Lakes Literacy, a Great Lakes Sea Grant program, NOAA's Great Lakes Bay Watershed Education and Training (B-WET) Program and NPS 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. About 55,000 students are expected to benefit each year from the training of these educators.

In addition, GLRI federal agencies and their partners educated over 40,000 people about the Great Lakes ecosystem through place-based experiential learning activities, primarily through interpretative programs at national parks and lakeshores. During FY 2018, GLRI federal agencies and their partners conducted comprehensive monitoring to assess the status and trends of environmental indicators in the Great Lakes ecosystem. Monitoring data is used to prioritize future GLRI-funding decisions by identifying the most significant ongoing and emerging problems in the ecosystem.

The GLRI federal 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. States, tribes and other stakeholders also provided input to the GLRI agencies on a variety of topics including restoration priorities, project longevity and duration and the GLRI Action Plan III.

During FY 2018, GLRI federal agencies and their partners continued to track the progress of GLRI-funded projects. The GLRI federal agencies utilized the Environmental Accomplishments in the Great Lakes (EAGL) tracking system, an accountability system, which tracks the effectiveness of GLRI-funded projects in meeting the Measures of Progress defined in GLRI Action Plan II. To improve the quality of reporting, in FY 2018 EPA conducted a second system-wide EAGL audit in accordance with the EAGL Implementation Manual.

The GLRI Action Plan II incorporated 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 GLRI investments. During FY 2018, GLRI federal agencies completed an adaptive management pilot project, initiated in FY 2016, to review the status of adaptive management within GLRI and recommend ways to improve its implementation.



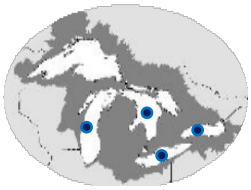
Focus Area 5 Success Stories

Hyperspectral Flyovers Inform Ohio EPA of Episodic Harmful Algal Blooms

NOAA conducted weekly flights over Lake Erie using an airplane equipped with a hyperspectral camera to assess the presence of HABs from late spring through October 2018. The resulting images are hyperspectral, meaning it contains many more bands of discrete wavelengths of light than a typical spaceborne satellite image. The hyperspectral camera has the unique capability to assess HAB conditions, while satellite-based sensors are unable to see through clouds and resolve nearshore areas. The additional coverage and enhanced spatial scale of the hyperspectral data (approximately 1 meter) compared to the satellite data (300 m to 1 km, depending on the satellite used) is a key resource for drinking water managers by providing a 24- to 48-hour rapid response notice of cyanobacteria levels within their vicinity. Based on the compilation of the data from these flights, cyanobacteria level maps were assembled and shared with Ohio EPA and the City of Monroe's drinking water managers.

Intensive Assessments on the Growth and Status of the Nuisance Benthic Algae, *Cladophora*

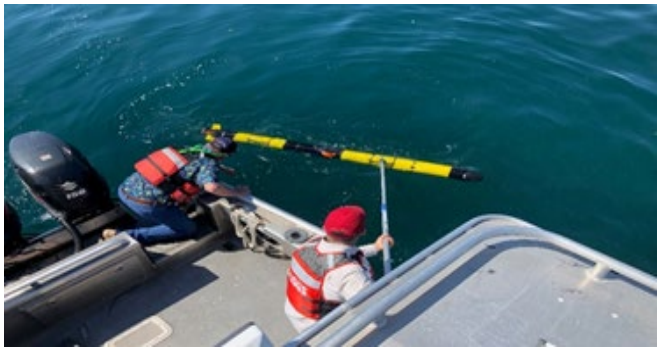
USGS scuba divers collect *Cladophora* algae and zebra and quagga mussels at the bottom of Lake Huron. Photo credit: Meredith Nevers, USGS.



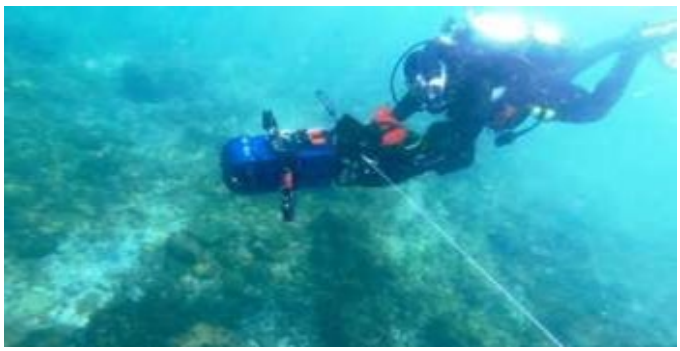
USGS initiated a basin-wide assessment to better understand the conditions that lead to the growth of the nuisance algae *Cladophora* throughout the Great Lakes. Overgrowth of *Cladophora* has negatively impacted fisheries, wildlife and coastal areas by altering food webs, harboring pathogens and fouling shorelines. During the 2018 growing season, USGS scientists and divers collected samples each month in lakes Michigan, Huron, Erie and Ontario to examine the influence of nutrient concentrations and invasive zebra and quagga mussels on *Cladophora* growth. In addition, NOAA updated annual distribution maps for submerged aquatic vegetation, including *Cladophora*, in all five Great Lakes for the years 2015 to 2018. These maps can be compared with historical maps generated from previous GLRI-funded work to identify areas of significant gain/loss and are being validated using data from the ongoing USGS effort.

Advance Mapping of Invasive Species, Nuisance Algae and Fish Habitat

USGS and its partner, the Michigan Tech Research Institute, have developed a 3-D camera system that is being used to map invasive species and nuisance algae in Lakes Ontario, Huron and Michigan. The camera is deployed by SCUBA divers or by a USGS-owned fully autonomous underwater vehicle. Images are currently being interpreted using a variety of image analysis approaches to help resource managers identify the presence and abundance of zebra and quagga mussels, invasive round goby fish and the nuisance green algae *Cladophora*. The system is also being used to map habitat types for fisheries management purposes.



USGS crew members retrieve an autonomous underwater vehicle (AUV) from the waters of Lake Ontario.



A USGS diver operating an underwater camera system (blue) attached to a dive scooter (black) in the waters of Lake Ontario.

Sea Lamprey Control Now Integrated into a Decision Support Tool for Fish Passage Projects in Great Lakes Tributaries

Control of invasive sea lampreys is a top management priority in the Great Lakes basin. The two primary methods to control lamprey populations are applying a selective pesticide, known as lampricide, to tributary streams where lampreys reproduce and maintaining aquatic barriers, like dams. There is growing interest in restoring access to tributary habitats for migratory fishes by removing aquatic barriers, but this could dramatically increase the cost of lampricide control measures. In FY 2018 a new generation model was developed that can now integrate lampricide application costs with barrier removal costs and benefits, comparing realistic trade-offs between tributary habitat access for desired species against sea lamprey control costs. The public and resource managers can access the fish passage modeling tool, *FishWerks*, at www.greatlakesconnectivity.org.

NOAA B-WET Rivers2Lake Program

NOAA's Great Lakes B-WET continues to support the Rivers2Lakes education program, which uses Lake Superior and the St. Louis River as a foundation for educator and student learning, Great Lakes literacy, stewardship and watershed restoration. Rivers2Lake engages students through outdoor and inquiry-based learning, and provides extended resources, opportunities, and year-long support to classrooms. In FY 2018, the Rivers2Lake program trained 20 teachers and engaged about 450 students. The Rivers2Lake program also continues to support a community of about 60 alumni teachers who were trained through previous B-WET grants from the GLRI.

Montessori students on a Rivers2Lake canoe trip

Rivers2Lake Summer Institute for teachers on the St. Louis River (Minnesota)

Reinforcing the Regiment of Great Lakes Educators

The Center for Great Lakes Literacy continues to provide training for educators (focused on grades K-12), with a cornerstone program being the immersive Shipboard Science workshops. In FY 2018, while aboard the S/V *Denis Sullivan*, 16 educators performed water-quality testing and analysis and participated in lessons about the changing Lake Michigan food web. This unique professional development opportunity allowed formal and informal educators to immerse themselves in Great Lakes learning. The educators have been able to share this information in their classrooms, impacting over 1,700 students.

Section 3 – GLRI Regional Partner Engagement

The GLRI federal agencies collaborate and coordinate extensively with numerous entities to address the challenging ecosystem problems that affect the Great Lakes. Below are just a few examples of this engagement.

Great Lakes Tribes

For tribal nations within the Great Lakes basin, support from the GLRI has fostered valuable partnerships and resulted in the implementation of important restoration and protective actions, including controlling invasive species, reducing nutrient and phosphorous loadings into waterways, reopening tributaries to restore fish passage, protecting Lake Superior coastal wetlands and restoring several culturally-significant species such as lake sturgeon, moose and wild rice.

In FY 2018, the Great Lakes Regional Work Group continued to enhance its commitment by improving communications and relationships with its Great Lakes tribal partners by holding an in-person Tribal Forum in July, co-hosted by BIA and EPA, with tribal representatives and leaders. This Forum provided an opportunity to discuss program processes and goals, tribal recommendations and concerns and methods to improve communication, collaboration and consultation.

Accompanying the GLRI's FY 2018 enacted appropriation (P.L.115-141) was explanatory language (164 Congressional Record H2622) directing the EPA to follow a directive in Senate Report 114–281 to "provide continued attention and resources towards building the capacity of on-the-ground partners, including States and tribes, as ongoing partners in the stewardship of the Great Lakes" and encouraging "EPA to work with tribal governments and the Bureau of Indian Affairs to develop a proposal for the creation of a distinct GLRI tribal program through which GLRI funds would be provided to allow tribes the flexibility to develop the programs that are of the highest priorities to their communities, and which fulfill the spirit of self-determination, and carry out Federal trust responsibilities." In FY 2018, funding to Great Lakes tribes totaled over $11 million. Since the inception of GLRI in FY 2010, tribes have directly received a total over $76 million in GLRI funding. This funding has been instrumental in building tribal resource management capacity and contributing to the protection and restoration of treaty-reserved resources and culturally significant habitats and species that support tribal lifeways.

Great Lakes State Partners

The GLRI is committed to working with the eight states that fall within the Great Lakes Basin. These states have a vested interest in the health and restoration of the Great Lakes to ensure the quality of their economies and the health of their citizens. The partnership between Great Lakes states and the GLRI continues to result in important work including controlling invasive species; protecting fisheries; reducing nutrient and phosphorous loadings into waterways; capturing and treating urban runoff delisting AOCs; and addressing environmental justice concerns. Since its inception in FY 2010, over $435 million of GLRI funds have been awarded to Great Lakes states, including over $80 million in FY 2018 funding.

In FY 2018, the GLRI enhanced its commitment to improving communications and relationships with our Great Lakes state partners by leading a virtual State Forum in June, hosted by EPA, with state environmental representatives and leaders. This forum provided an opportunity to discuss program processes and goals, state recommendations and concerns, as well as ways to improve communication and collaboration. In FY 2018, the GLRI federal agencies utilized a framework to guide continued engagement with Great Lakes states regarding the GLRI.

Section 4 – Financial Reporting

From FY 2010 to FY 2018, the EPA has been appropriated approximately $2.86 billion in GLRI funds. The agencies that receive GLRI funds use multiple funding mechanisms, including interagency agreements, competitive grants, and capacity-building grants to states and tribes.

Table 1 and Chart 1 provide information on FY 2014 - FY 2018 GLRI funding by focus area. Amounts for fiscal years 2014-2017 have been updated to report allocations at the end of applicable obligation periods. Table 2 provides summary information for Fiscal Years 2014 - 2017 of GLRI funding by Agency (more detailed information can be found in the GLRI Reports to Congress and the President for FY 2010 - FY 2017). Table 3 provides more detailed information for FY 2018 by Agency.

Table 1 - GLRI FY 2014 - FY 2018 Focus Area Allocations as of October 8, 2018 (Dollars in Thousands)

Focus Area	FY 2014	FY 2015	FY 2016	FY2017	FY 2018
Toxic Substances and Areas of Concern	$105,000	$120,200	$106,600	$107,500	$107,500
Invasive Species	$54,600	$53,600	$56,400	$62,200	$56,900
Nonpoint Source Pollution Impacts on Nearshore Health	$59,300	$51,000	$51,700	$47,900	$ 51,000
Habitat and Species	$60,600	$49,000	$54,200	$49,500	$50,000
Foundations for Future Restoration Actions	$20,500	$26,200	$31,000	$32,900	$34,600
TOTAL	$300,000	$300,000	$300,000	$300,000	$300,000

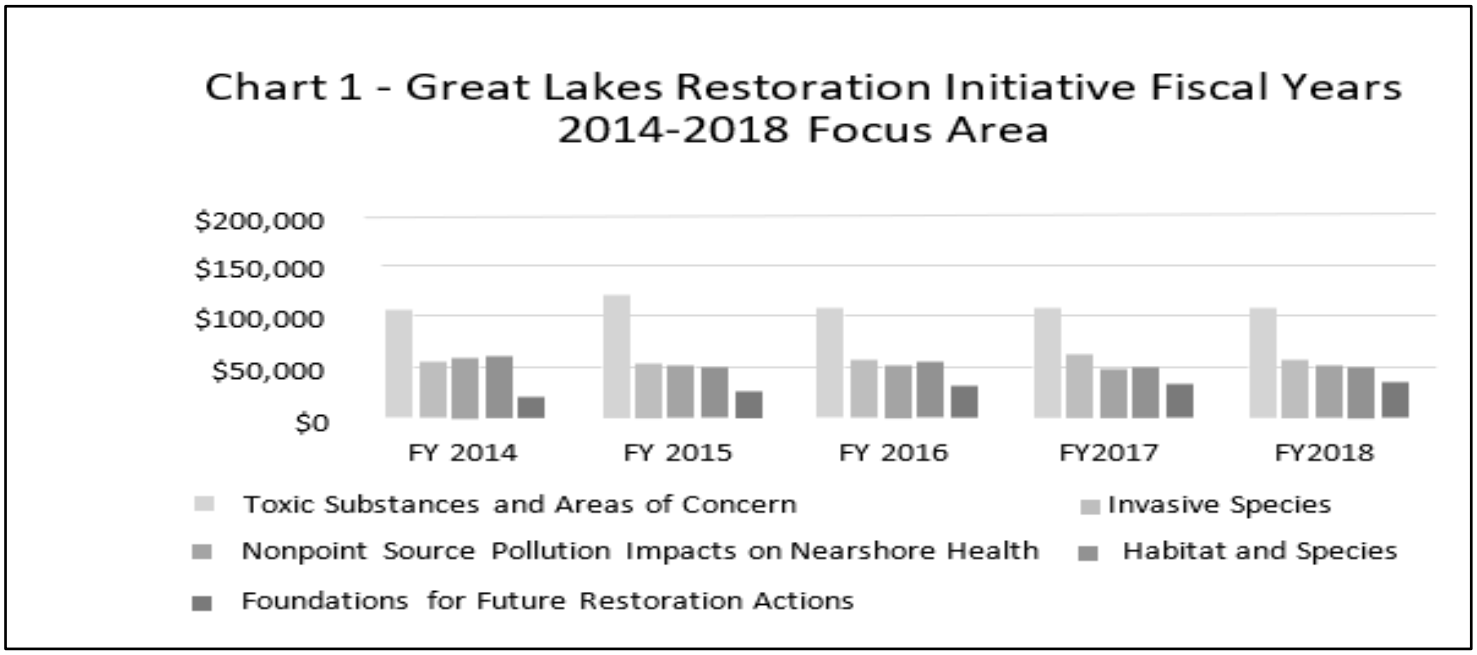


	Table 2- FY 2014 – FY 2017 Great Lakes Restoration Initiative Funding by Agency as of October 8, 2018 (Dollars in Thousands)				
Agency[a]	**Obligations[b]**				
	FY 2014	**FY 2015**	**FY 2016**	**FY 2017**	**Total**
DHS-USCG	$1,278	$2,006	$1,274	$1,580	$6,139
DOC-NOAA	$35,170	$24,818	$30,740	$12,027	$102,754
DOD-USACE	$28,504	$48,142	$33,317	$55,940	$165,903
DOI-BIA	$3,950	$4,750	$6,203	$10,904	$25,807
DOI-NPS	$3,177	$3,142	$3,799	$4,379	$14,497
DOI-USFWS	$49,038	$41,393	$48,118	$41,794	$180,343
DOI-USGS	$19,832	$23,433	$22,960	$26,817	$93,042
DOT-FHWA	$965	$0	$0	$0	$965
DOT-MARAD	$1,787	$1,291	$2,106	$800	$5,984
HHS-CDC/ATSDR	$1,739	$1,738	$1,692	$593	$5,762
USDA-APHIS	$1,239	$1,235	$1,078	$1,262	$4,813
USDA-NRCS	$24,280	$23,281	$19,062	$22,072	$88,695
USDA-USFS	$6,401	$6,290	$10,822	$11,355	$34,867
IA Totals:	$177,359	$181,518	$181,172	$189,522	$729,571
EPA, GLFC, IJC, Misc. IA	$120,665	$117,191	$116,360	$110,156	$464,372
Total Obligated	$298,024	$298,709	$297,532	$299,678	$1,193,944
Returned[c]	$1,976	$1,291	$2,468	$322	$6,056
GLRI Totals	$300,000	$300,000	$300,000	$300,000	$1,200,000

[a] Individual Agency allocations from each appropriation can be found in previous Reports to Congress and the President.

[b] Obligations are the amount of orders placed; interagency agreements, contracts or grants awarded; and similar transactions by EPA. The amount also reflects de-obligations. De-obligation generally results from events such as completing a project under budget, contract termination, changes in project scope or focus, or other unforeseeable circumstances.

[c] Returned funds are determined by subtracting obligations as of October 8, 2018 from appropriated funds. Returned funds generally result from de-obligating funds as a result of completing a project under budget, contract termination, changes in project scope or focus, or other unforeseeable circumstances. The amount in this line also can include reserves that have been established to provide for contingencies or to effect savings under the Anti-deficiency Act.

Table 3 - Great Lakes Restoration Initiative Fiscal Year 2018 Funding by Agency as of October 8, 2018 (Dollars in Thousands Rounded)

Agency	FY 2018 Initial Allocation[a]	FY 2018 Actual Allocation[b]	FY 2018 Total Obligations
DHS-USCG	$550	$500	$500
DOC-NOAA	$24,426	$24,629	$24,629
DOD-USACE	$29,464	$48,385	$48,385
DOI-BIA	$11,617	$11,617	$11,617
DOI-NPS	$3,940	$3,940	$3,940
DOI-USFWS	$51,769	$52,902	$52,902
DOI-USGS	$13,801	$25,724	$25,724
DOT-MARAD	$675	$675	$675
HHS-CDC	$590	$590	$0
USDA-APHIS	$1,176	$1,176	$1,176
USDA-NRCS	$25,356	$25,096	$25,096
USDA-USFS	$10,153	$10,153	$10,153
IA Totals:	$173,515	$205,387	$204,797
EPA, GLFC, and Misc. IAs	$126,485	$94,613	$87,254 [c]
GLRI Grand Totals:	$300,000	$300,000	$292,051

[a] Based on allocations to each Agency approved by the Regional Working Group November 2, 2017.

[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 approximately $51.4 million (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 approximately $12.1 million and (iii) contracts and miscellaneous interagency agreements (other than those above) totaling approximately $23.8 million.

APPENDIX A – GLRI ACTION PLAN II: MEASURES OF PROGRESS

This table 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. *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. Cumulative measures indicated with an *.*

Focus Area	GLRI Action Plan II Measures	Result/Target			
		FY 2015	FY 2016	FY 2017	FY 2018
Toxic Substances	1.1.1 AOC Management Actions*	7/8	8/9	11/11	12/12
	1.1.2 BUIs*	60/60	65/65	73/72	80/78
	1.2.1 People Provided Fish Consumption Information	220,843	207,953	98,942**	118,361
	1.2.2 Fish/Wildlife Emerging Contaminant Projects	14	7	9	11
Preventing and Controlling Invasive Species	2.1.1 Rapid Response Exercises	21/8	11/8	25/8	12/8
	2.1.2 Projects Blocking Pathways	8	14	15	28
	2.1.3 Early Detection Activities	15	3	7	24
	2.2.1 Aquatic /Terrestrial Acres*	101,392/94,500	115,889/110,000	134,856/120,000	153,569/80,000
	2.2.2 Invasive Tributary Miles	0	0	0	0
	2.3.1 Invasive Technologies*	62	65	70	92
	2.3.2 Invasive Collaboratives*	4	4	4	4
Nonpoint Source Pollution Impacts on Nearshore Health	3.1.1 Ag. Phosphorus Reduction Projected* (lbs.)	160,117/130,000	402,943/310,000	767,864/525,000	1,113,603/795,000
	3.1.2 Nutrient/Sediment Reduction Projects (acres)	101,574	89,211	169,045**	115,519
	3.1.3 Nutrient/Sediment Reductions* (lbs.)	NA	NA	NA	138
	3.2.1 Urban Runoff Projected* (millions of gallons)	37/30	116/70	239/120	252/185
	3.2.2 Urban Runoff Projects	18	36	36	22
	3.2.3 Urban Runoff Captured of Treated*	NA	NA	NA	46,964
Habitats and Species	4.1.1 Habitat Tributary Miles*	3,855/2,200	4,615/4,200	4,967/4,900	5,289/3,100
	4.1.2 Shoreline Miles*	313/75	662/350	947/725	1,046/225
	4.1.3 Coastal Wetland Acres*	7,033/7,000	17,540/15,000	24,306/30,000	52,755/52,000
	4.1.4 Other Habitat Acres*	146,815/127,000	167,218/167,000	201,663/187,000	317,733/187,000
	4.2.1 Federally-Listed Species Projects	10	17	24	31
	4.2.2 Self-Sustaining Species Projects	47	28	23	38
Foundations for Future Restoration Actions	5.1.1 Climate Resiliency Criteria Developed (2016)	NA	Developed	NA	NA
	5.1.2 Climate Resiliency Criteria Incorporated (2017)	NA	NA	Incorporated	Incorporated
	5.2.1 Trained Educators	331	407	611	914
	5.2.2 People Educated	24,785	27,989	35,078	40,480
	5.3.1 Evaluations	Completed	Completed	Completed	Completed
	5.3.2 Annual Monitoring	Conducted	Conducted	Conducted	Conducted
	5.3.3 Targeted Watersheds, Habitats, Species to prioritize Funding	Identified	Identified	Identified	Identified
	5.3.4 Annual GLRI Reports	Issued	Issued	Issued	Issued
	5.3.5 Triennial GLWQA Reports	NA	Issued	NA	NA
	5.3.6 Triennial State of the Lakes Report	NA	NA	Issued	NA
	5.3.7 Online Information	Updated	Updated	Updated	Updated

***The FY 2017 result is a correction from the number previously reported.*

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) [a]	FY 18: 12 FY 17: 11 FY 16: 9 FY 15: 8 Baseline: 7[c]	FY 18: 12 FY 17: 11 FY 16: 8 FY 15: 7	AOC Management Actions were completed at the Rochester Embayment AOC (9/28/2018)
1.1.2	Area of Concern Beneficial Use Impairments Removed (cumulative) [a]	FY18: 78 FY 17: 72 FY 16: 65 FY 15: 60 Baseline: 52[c]	FY 18: 80 FY 17: 73 FY 16: 65 FY 15: 60	*Degradation of Aesthetics*: Buffalo River, NY (8/27/2018) *Tainting of Fish and Wildlife Flavor*: Rochester Embayment, NY (7/30/2018) *Restrictions on Fish and Wildlife Consumption*: Lower Menominee River, WI/MI (6/20/2018) *Degradation of Benthos*: Ashtabula, OH (1/25/2018) *Degradation of Benthos*: Waukegan Harbor, IL (12/19/2017) *Restrictions on Dredging Activities*: St. Mary's River, MI (11/14/2017) *Degradation of Aesthetics*: Cuyahoga River, OH (11/14/2017)
1.2.1	Number of people provided information on the risks and benefits of Great Lakes fish consumption by GLRI-funded projects	NA	FY 18: 118,361 FY 17: 98,942 FY 16: 207,953 FY 15: 220,843	Information was provided by HHS- ATSDR and EPA. Results reflect the GLRI federal agencies and their partners efforts to provide information on the risks and benefits of Great lakes fish consumption to the public. The FY 2017 result is a correction to the number previously reported.
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 18: 11 FY 17: 9 FY 16: 7 FY 15: 14	Project partners include EPA (GLNPO and ORD), NOAA, USGS, USFWS, and USACE.

2.1.1	Number of GLRI-funded Great Lakes rapid responses or exercises conducted	FY 18: 8 FY 17: 8 FY 16: 8 FY 15: 8 Baseline: NA[c]	FY 18: 12 FY 17: 25 FY 16: 11 FY 15: 21	The eight Great Lakes states have committed to conducting annual training exercises but prioritize activities to respond to detections of new invasive species. In FY 2018, multiple state agencies and others completed 12 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 18: 28 FY 17: 15 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 18: 24 FY 17: 7 FY 16: 3 FY 15: 15	Early detection activities were conducted in FY 2018. 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 18: 80,000 FY 17: 120,000[b] FY 16: 110,000[b] FY 15: 94,500[b] Baseline: 36,000[c]	FY 18: 153,569 FY 17: 134,856 FY 16: 115,889 FY 15: 101,392	Although FY 2017 results exceeded previously set cumulative targets, the target was not reset during President's budget development. GLRI federal agencies allocated additional funding to on-the-ground work with local partners, resulting in an exceedance of the FY 2018 target.
2.2.2	Number of tributary miles protected by GLRI-funded projects	NA	FY 18: 0 FY 17: 0 FY 16: 0 FY 15: 0	A significant sea lamprey control project at the Springville Dam on the Cattaragus Creek in now planned to be initiated in FY 2020. This project's complexity including incorporation of native fish passage, coordination among federal, state, tribal, county and other entities demonstrate the time and resource needed to successful implement these projects.
2.3.1	Number of technologies and methods field tested by GLRI-funded projects	NA	FY 18: 92 FY 17: 70 FY 16: 65 FY 15: 62	Technologies were field tested by GLRI federal agencies and their partners. Technologies included ballast water management systems and a tool for detecting non- native species at harbor sites.
2.3.2	Number of collaboratives developed or enhanced with GLRI funding	NA	FY 18: 4 FY 17: 4 FY 16: 4 FY 15: 4	Invasive species collaboratives counted under this Measure include the Asian Carp Regional Coordinating Committee led by USFWS, the Monoecious Hydrilla Collaborative led by USACE, the Mussels Collaborative led by USGS, and the Phragmites Collaborative also led by USGS.

3.1.1	Projected phosphorus reductions from GLRI-funded projects in targeted watersheds (measured in pounds) (cumulative)	FY 18: 795,500 FY 17: 525,000 FY 16: 310,000 FY 15: 130,000 Baseline: NA[c]	FY 18: 1,113,603 FY 17: 767,864 FY 16: 402,943 FY 15: 160,117	Results can vary each year due to the nature of voluntary conservation assistance programs. The targets for 3.1.1 were developed based on assumptions about the types of conservation practices that would be adopted by private landowners, and their effectiveness. In some years, the practices actually adopted resulted in an exceedance of performance goals for phosphorus reduction.
3.1.2	Number of GLRI-funded nutrient and sediment reduction projects in targeted watersheds (measured in acres)	NA	FY 18: 115,519 FY 17: 169,045 FY 16: 89,211 FY 15: 101,574	Contributing agencies: NRCS, EPA, and USACE. Practices implemented include: cover crops, filter strips and buffers, nutrient management, constructed wetlands and streambank restoration. The FY 2017 result is a correction to the number previously reported.
3.1.3	Measured nutrient and sediment reductions from monitored, GLRI-funded projects in targeted watersheds (measured in pounds)	NA	FY 18: 138 FY 17: NA FY 16: NA FY 15: NA	Results are reported for this measure after a reduction has been measured and quantified through pre- and post-performance monitoring. No results were available during FY 2015-2017 while baseline monitoring and statistical designs were still under development.
3.2.1	Projected volume of untreated urban runoff captured or treated by GLRI-funded projects (measured in millions of gallons) (cumulative)	FY 18: 185 FY 17: 120 FY 16: 70 FY 15: 30 Baseline: NA[c]	FY 18: 252 FY 17: 239 FY 16: 116 FY 15: 37	Result includes EPA shoreline cities grants in: Chicago, IL, Waukegan, IL, Michigan City, IN, Fort Wayne, IN, Oregon, OH, Cleveland, OH, Toledo, OH, Detroit, MI, Flint, MI, Marquette, MI, Muskegon, MI, Traverse City, MI, Milwaukee, WI, and Kenosha, WI. GLRI agencies have learned more about which management practices work best and have used opportunities to implement projects with these best management practices, thus yielding better results than originally projected.
3.2.2	Number of GLRI-funded projects implemented to reduce the impacts of untreated urban run-off on the Great Lakes.	NA	FY 18: 22 FY 17: 36 FY 16: 36 FY 15: 18	Practices implemented include: bioswales, rain gardens, bioretention ponds, porous pavement, tree plantings and constructed wetlands.
3.2.3	Measured volume of untreated urban runoff captured or treated by monitored GLRI-funded projects.	NA	FY 18: 46,964 FY 17: NA FY 16: NA FY 15: NA	Results for this measure are reported after a measured reduction has been quantified through pre- and post-performance monitoring.

4.1.1	Number of miles of Great Lakes tributaries reopened by GLRI-funded projects (cumulative)	FY 18: 3,100 FY 17: 4,900[b] FY 16: 4,200[b] FY 15: 2,200 Baseline: 1,900[c]	FY 18: 5,289 FY 17: 4,967 FY 16: 4,615 FY 15: 3,855	Targets were not raised during budget development when end-of-year results exceeded previously set cumulative targets. Measure includes projects to remove dams and impediments to fish passage.
4.1.2	Number of miles of Great Lakes shoreline and riparian corridors protected, restored and enhanced by GLRI-funded projects (cumulative)	FY 18: 225 FY 17: 725[b] FY 16: 350[b] FY 15: 75 Baseline: 0[c]	FY 18: 1,046 FY 17: 947 FY 16: 662 FY 15: 313	Although -FY 2017 results exceeded previously set cumulative targets, the target was not reset during President's budget development. In FY 2018, GLRI federal 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 18: 52,000 FY 17: 30,000 FY 16: 15,000 FY 15: 7,000 Baseline: 0[c]	FY 18: 52,755 FY 17: 24,306 FY 16: 17,540 FY 15: 7,033	In FY 2018, in addition to significant on-the-ground restoration accomplishments, projects benefiting from previous planning and design activities were completed resulting is reaching target acres this year.
4.1.4	Number of acres of other habitats in the Great Lakes basin protected, restored and enhanced by GLRI -funded projects (cumulative)	FY 18: 187,000 FY 17: 187,000 FY 16: 167,000[b] FY 15: 127,000 Baseline: 117,000[c]	FY 18: 317,733 FY 17: 201,663 FY 16: 167,218 FY 15: 146,815	Although FY 2017 results exceeded previously set cumulative targets, the target was not reset during President's budget development. In FY 2018, GLRI 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 18: 31 FY 17: 24 FY 16: 17 FY 15: 10	In FY 2018, continued significant progress was made on the recovery of piping plover. GLRI 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 18: 38 FY 17: 23 FY 16: 28 FY 15: 47	Projects focused efforts on protecting lake sturgeon, lake trout, and deep water coregonid. Actions were undertaken by GLRI federal agencies guided by emerging science, needs of individual states, and directions from multi-state fishery agencies.
5.1.1	By 2016, a standardized set of climate resiliency criteria will be developed for GLRI projects	FY 18: NA FY 17: NA FY 16: Developed FY 15: NA	FY 18: NA FY 17: NA FY 16: Developed FY 15: NA	GLRI federal agencies developed climate resiliency criteria in FY 2016.

5.1.2	Starting in 2017, projects will include climate resiliency criteria in planning and implementation	FY 18: Incorporated FY 17: Incorporated FY 16: NA FY 15: NA	FY 18: Incorporated FY 17: Incorporated FY 16: NA FY 15: NA	Climate resiliency criteria were incorporated by all of the 14 applicable GLRI federal agencies.
5.2.1	Number of educators trained through GLRI-funded projects	NA	FY 18: 914 FY 17: 611 FY 16: 407 FY 15: 331	GLRI funding helped train 914 educators in FY 2018.
5.2.2	Number of people educated on the Great Lakes ecosystem through GLRI-funded place-based experiential learning activities	NA	FY 18: 40,480 FY 17: 35,078 FY 16: 27,989 FY 15: 24,785	GLRI educated over 40,480 people on the Great Lakes ecosystem through GLRI-funded place-based experiential learning activities through NPS interpretative programs.
5.3.1	Project evaluations completed and used to prioritize GLRI funding decisions each year	NA	FY 18: Completed and used FY 17: Completed and used 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.
5.3.2	Annual Great Lakes monitoring conducted and used to prioritize GLRI funding decisions each year	NA	FY 18: Conducted FY 17: Conducted FY 16: Conducted FY 15: Conducted	GLRI 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 18: Identified and used FY 17: Identified and used FY 16: Identified and used FY 15: Identified and used	GLRI federal agencies and partners identified watersheds, habitats, and species to be targeted in FY 2018 and beyond. The 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 18: Issued FY 17: Issued 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 18: NA FY 17: NA FY 16: Issued FY 15: NA	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 18: NA FY 17: Issued FY 16: NA FY 15: NA	The Triennial State of the Lakes Reports, under the 2012 Great Lakes Water Quality Agreement, were issued in FY 2017.
5.3.7	Periodically update publicly available online information about GLRI	NA	FY 18: Updated FY 17: Updated FY 16: Updated FY 15: Updated	Updates included: publication of the FY 2017 GLRI Report to Congress and the President; project updates; glri.us enhancements: and links to information from other agencies.

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

[b] This target was adjusted from the Action Plan during EPA's development of the President's budget.

[c} Baseline year is FY 10, the first year of GLRI.