

FY2010 – FY2014

Great Lakes Restoration Initiative Action Plan



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Great Lakes Restoration Initiative Action Plan

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Executive Summary



The Great Lakes states and the Great Lakes Basin boundary.

The lands and waters of the Great Lakes are like no other place. In a world where fresh surface water is increasingly in demand, the region contains some 20 percent of it. At a time when people are not looking as much to faraway places for respite, the Great Lakes offer some of the most majestic natural shorescapes on the planet to accommodate them. As a result, people are reconnecting to their beaches, wide-open waters, petroglyphed bluffs, dune ranges and tumbling tributaries like never before. Likewise, these same resources have served as the raw material to build some of the Earth's most legendary cities, create jobs to support families, and contribute to the largest economy in the history of the world.

Still, our expectation that the Great Lakes will continue to meet these needs has resulted in lost flora, fauna, soil, and air and water quality to the point where the ecosystem is showing signs of severe stress and its ability to keep up with these demands is in doubt.

While in the past we have worked to minimize harm, public demand for a new standard of care is surging. That standard of care is that *we must leave the Great Lakes better for the next generation than the condition in which we inherited them*. We must continue to go beyond minimizing harm to proactively rehabilitating the Great Lakes. Only then will they be able to keep providing jobs, recreation and sanctuary.

Understanding this, U.S. President Barack Obama and U.S. Environmental Protection Agency (EPA) Administrator Lisa Jackson, in collaboration with 15 other federal agencies, have made restoring the Great Lakes a national priority. Signaling a commitment beyond measure of past promises, in February 2009, President Obama proposed \$475 million for a *Great Lakes Restoration Initiative* (Initiative). This Action Plan describes how the Initiative will be executed from 2010 through 2014.

The Initiative is not intended to be another grand statement about the Great Lakes; it is intended to operationalize those statements. It builds on countless hours by elected, agency, business, public interest and other leaders, which resulted in the Great Lakes Regional Collaboration Strategy (GLRC Strategy). The GLRC Strategy provides a framework for the Action Plan, and the Action Plan is just that: an *action* driver. It articulates the most significant ecosystem problems and efforts to address them in five major focus areas:

- **Toxic Substances and Areas of Concern**, including pollution prevention and cleanup of the most polluted areas in the Great Lakes (see pages 19-21 for Measures of Progress with specific, quantifiable targets; and Principal Actions)
- **Invasive Species**, including efforts to institute a “zero tolerance policy” toward new invasions, including the establishment of self-sustaining populations of invasive species, such as Asian Carp (pages 24-26)
- **Nearshore Health and Nonpoint Source Pollution**, including a targeted geographic focus on high priority watersheds and reducing polluted runoff from urban, suburban and, agricultural sources (pages 29-30)
- **Habitat and Wildlife Protection and Restoration**, including bringing wetlands and other habitat back to life, and the first-ever comprehensive assessment of the entire 530,000 acres of Great Lakes coastal wetlands for the purpose of strategically targeting restoration and protection efforts in a science-based manner (pages 33-35)
- **Accountability, Education, Monitoring, Evaluation, Communication and Partnerships**, including the implementation of goal- and results-based accountability measures, learning initiatives, outreach and strategic partnerships (pages 38-39)

The Action Plan identifies goals, objectives, measurable ecological targets, and specific actions for each of the five focus areas identified above. The Action Plan will be used by federal agencies in the development of the federal budget for Great Lakes restoration in fiscal years 2011 and beyond. As such, it will serve as guidance for collaborative restoration work with participants to advance restoration. The Action Plan will also help advance the Great Lakes Water Quality Agreement with Canada.

The Initiative is not the only tool in the toolbox, however. Traditional infrastructure financing under Clean and Drinking Water State Revolving Funds, and Superfund cleanup enforcement, for example, represent work outside the Initiative’s scope. This work, however, continues to be essential to Great Lakes protection and restoration and EPA is working with states and tribes to ensure that these high priority activities are properly targeted whenever possible to help further clean-up of the Great Lakes.

This plan also aims to build upon the significant amount of work already accomplished by states and other partners in protecting and restoring the Great Lakes. In addition, it tries to minimize the duplication of effort by focusing on high priority work that has already been identified in the many programs and strategies already in place around the Great Lakes Basin. This includes work under the Great Lakes Regional Collaboration Strategy, individual states’ Great Lakes restoration plans, and many others.

Under the Initiative, EPA will administer funding individually and with other federal agencies. Funds will be used to implement priority federal projects as well as other programs undertaken by nonfederal entities that support the Action Plan. Funding will be provided through grants and cooperative agreements or through interagency agreements that allow the transfer of funds to other federal agencies for subsequent use and distribution. Most grants will be issued competitively. Annual reports to the President, beginning in 2011, will describe accomplishments to date, action planned for the upcoming year, and progress toward meeting ecosystem goals and targets. These efforts will underpin the Action Plan's operating principles:

- 1) **Accountability:** The Initiative is an unprecedented opportunity to heal the ecosystem. With this unprecedented opportunity comes unprecedented responsibility, however, for *all of us* to demonstrate we are achieving the results intended in the Action Plan. We will use transparent means of demonstrating how public dollars are being invested as directed by the best available science.
- 2) **Action:** This distinguishes the Initiative from so many other efforts in the past. For the most part, we know the problems facing the Great Lakes. The Initiative supports our resolve to solve them. While there is a place for monitoring, sampling, surveying and planning under the Initiative, these activities must have a bias for action, that is, real on-the-ground and in-the-water project work that will breathe new life into the ecosystem. Projects ready to go with existing plans will receive preference over efforts that require extensive new planning.
- 3) **Urgency:** Study after study shows the health of the lakes is in jeopardy. While we have been working heroically to hold the line over the years to prevent their further decline, we have been entrusted with powerful new resources to rehabilitate the lakes: leadership at the highest levels demanding action, policy tools, and the promise of significant financial resources. With these, there are no more reasons for delay. After all, the Great Lakes have endured some 150 years of abuse. Though it will take time for the ecosystem to respond to our actions today, there is not another minute to lose in restoring these magnificent waterways for tomorrow. To the extent that actions undertaken now increase the resiliency of the ecosystem, they will also help the Great Lakes adapt to climate change.

This Action Plan – including the funding and other policy tools that will be used to leverage its outcomes – is intended to realize our goals: that the fish are safe to eat; the water is safe to drink; the beaches and waters are safe for swimming, surfing, boating and recreating; native species and habitats are protected and thriving; no community suffers disproportionately from the impacts of pollution; and the Great Lakes are a healthy place for people and wildlife to live.

A National Treasure



Indiana Dunes National Lakeshore

The Great Lakes – the largest group of freshwater lakes on Earth – are true wonders of the world. An important part of the physical landscape and cultural heritage of North America, the Great Lakes hold 95 percent of the United States’ surface fresh water. Shared with Canada, these “freshwater seas” boast more than 10,000 miles of magnificent coastline and 30,000 islands and provide drinking water, transportation, power and a wide array of recreational opportunities. The region’s four-season climate, uniquely influenced by the Great Lakes, supports boating, fishing, diving, beach enjoyment and other forms of recreation that support the region’s proud outdoor heritage.

The environment of the Great Lakes region is blessed with wide swaths of forest and wilderness areas, rich agricultural land, hundreds of tributaries, thousands of smaller lakes, and extensive mineral deposits. The region’s sand dunes, coastal marshes, rocky shorelines, lakeplain prairies, savannas, forests, fens, wetlands and other landscapes contain features that are globally unique or best represented within the Great Lakes basin. For example, the world’s largest freshwater dunes line the shores of Lake Michigan.

The region’s glacial history and the influence of the lakes themselves create unique conditions that support a wealth of biological diversity, including over 200 globally rare plants and animals and more than 40 species that are found nowhere else in the world. Rare species making their home in the Great Lakes region include the world’s last known population of the white catpaw pearly mussel, the copper redhorse fish and the Kirtland’s warbler. The Great Lakes environment supports a world-class fishery, with an estimated 180 species of native fish, including small- and large-mouth bass, muskellunge, northern pike, lake herring, whitefish, walleye and lake trout.

If the Great Lakes region were its own nation, it would house the largest economy second only to the United States itself, providing transportation for raw materials and finished goods; fresh water for our industries; drinking water for our communities; and recreation for the basin’s more than 30 million citizens. The 4.3 million recreational boats registered in the eight Great Lakes states generate nearly \$16 billion in spending on boats and boating activities in a single year. That spending directly supports 107,000 jobs, a figure that grows to nearly 250,000 when secondary impacts are taken into consideration.

The Great Lakes Restoration Challenge



Pigeon River kayaking, Michigan

The Great Lakes impact our way of life, as well as all aspects of the natural environment, from weather and climate to wildlife and habitat. Yet for all their size and power, the Great Lakes are not as resilient as they look. In the past, their fragile nature was not recognized and the lakes were mistreated for economic gain, placing the ecosystem under tremendous stress from our activities. Today, we understand that our health and our children's future depend on our collective efforts to wisely manage this complex ecosystem.

History has shown us that the Great Lakes are highly sensitive to biological and chemical stresses. While restoration progress has been made through years of concerted effort and expenditures on the part of federal, state, tribal and local governments and other stakeholders, that progress is slowing or even reversing. The Great Lakes face a number of serious challenges. The most significant of these include toxic substances, invasive species, nonpoint source pollution and nearshore impacts, habitat and species loss, and a need for better information to guide decision making.

Although releases of toxic pollutants have been reduced significantly over the last 30 years, there is a legacy of contamination in sediments and continuing inputs through rivers and air. Excessive levels of contaminants are still found in fish throughout the system. As a result, all Great Lakes states and the province of Ontario issue annual fish consumption advisories. Mercury and other pollutants continue to enter the Great Lakes from nearby and global sources through air deposition. Newly recognized chemicals of concern are also being identified as potential threats to the chemical integrity of the Great Lakes. Thirty toxic hotspot "Areas of Concern" (AOCs) in the United States are still in need of cleanup after more than 20 years; only the Oswego River has been removed from the AOC list.

Aquatic and terrestrial invasive species continue to cause ecological and economic damage, and greatly complicate efforts to restore the Great Lakes. New aquatic species of invaders have arrived at the rate of about one every eight months, adding to the more than 180 already established in the basin. In recent years this rate has slowed but the door to new arrivals has not yet been shut. Enhanced prevention and control efforts are necessary to stop new invasive species like Asian Carp from becoming established in the Great Lakes.

Pollution from nonpoint sources contributes to impaired water quality and excess nutrients. Many of our coastal areas also suffer from sewer overflows that contaminate the water and close the beaches.

Habitat destruction and degradation due to development, competition from invasive species, alteration of natural lake level fluctuations and flow regimes, poor coastal development planning and land management, and habitat fragmentation have negatively impacted wildlife. This has led to altered food webs, a loss of biodiversity, and poorly functioning ecosystems. Yet, opportunities for the protection and restoration of critical habitat exist throughout the basin.

While the Great Lakes region has been a leader for innovative science and advances in natural resource management, there are still significant gaps in knowledge about ecological processes and key indicators of ecosystem health. Efforts must be strategically chosen in order to obtain the additional information needed to inform implementation activities, assist tracking and reporting of progress, and to identify adaptive management actions. The Great Lakes also face new and emerging problems such as the effects of climate change, including potentially changing long-term Great Lakes water levels and the timing and duration of ice cover.

Collectively, these problems have seriously compromised the environmental health of the Great Lakes. As a result, there is a new sense of urgency for action to address the highest priorities for restoring and protecting the Great Lakes. This document outlines a strategic multi-year approach to address those urgent problems.

What is “Restoration”?



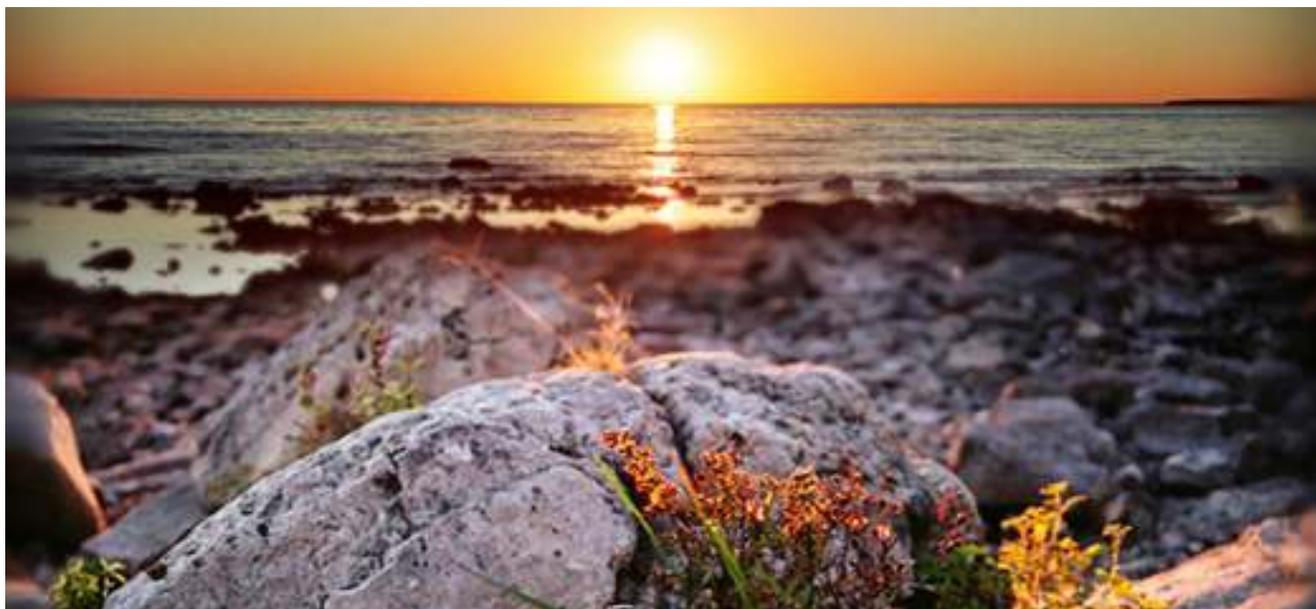
Sleeping Bear Dunes National Lakeshore, Michigan

Restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed. For purposes of this Initiative, restoration includes ecosystem protection, enhancement, rehabilitation and remediation. A restored ecosystem is resilient; its chemical, physical, and biological functions and processes provide the requisite conditions for life. A restored ecosystem contains sustainable populations of native plant and animal species and their habitats. Potential threats or further damage have been eliminated or reduced as much as possible and the restored ecosystem is able to withstand future threats. Restoration *is not* the attempt to change the ecosystem to pre-European settlement conditions; however, a restored ecosystem does attempt to emulate those conditions to the extent possible under present-day chemical, physical and biological conditions.

Restoration of degraded, damaged or destroyed water and lands is more costly than protection of resources before damage occurs. Therefore, this Initiative recognizes the wisdom of supporting ecological protection. **Protection is defined as actions taken to prevent stress to ecosystems.** Actions include the establishment of stewardship

partnerships to manage and monitor habitats and species; construction of physical barriers to prevent damage to sensitive areas; implementing best management practices to protect ecosystems; and, acquisition of land and protection agreements such as easements. The Initiative acknowledges that land acquisitions and protection agreements alone *will not* protect ecosystems from threats such as invasive species, encroaching development, or airborne toxic pollutants. Acquisition and protection agreements must be accompanied by appropriate stewardship and management actions.

Taking On the Challenge: The Great Lakes Restoration Initiative



Nelson Point State Park, Wisconsin

When running for president, Barack Obama issued a campaign promise to protect and restore the Great Lakes. The pledge built upon a May 2004 Executive Order that created the Great Lakes Interagency Task Force to coordinate federal restoration efforts. In 2005, some 1,500 stakeholders created the Great Lakes Regional Collaboration Strategy (GLRC Strategy) that outlines challenges facing the lakes, a framework for restoration and protection, and a common set of recommended solutions across eight priority issue areas:

- Aquatic Invasive Species
- Habitat/Species
- Coastal Health
- Areas of Concern (AOCs)/Sediments
- Nonpoint Source
- Toxic Pollutants
- Indicators and Information
- Sustainable Development¹

Released in May 2009, the President's FY 2010 budget included \$475 million for a new Great Lakes Restoration Initiative (Initiative), strategically targeting programs and projects to address the most significant problems in the

¹ The Initiative collapses these eight focus areas into five. A ninth focus area, concerning water quantity issues, was excluded from the GLRC Strategy because it was being addressed through a separate process: the Great Lakes-St. Lawrence River Basin Water Resources Compact. The Sustainable Development area also identified water infrastructure needs in the Basin. Infrastructure needs are not being addressed by GLRI but through increased funding for the State Revolving Funds through EPA's Regional offices.

Great Lakes ecosystem to demonstrate measurable results. EPA, in concert with its federal partners on the Task Force and other stakeholders, is leading the development and implementation of this Initiative and will administer the funding. Building upon the extensive planning and collaboration that was done by the Task Force and a wide variety of stakeholders and non-governmental partners in development of the GLRC Strategy, the Task Force developed a plan for FY 2010.²

The Initiative presents an unprecedented opportunity to systematically tackle the environmental challenges that have persisted for decades. In July and August 2009, EPA held a series of public meetings with agencies and stakeholders in the Great Lakes states to get public feedback on the highest priority issues in each focus area, both basinwide and locally, and to get suggestions for how to address these issues to maximize results under the Initiative. This Action Plan incorporates those basinwide and local priorities into a five year time frame for action. Federal agencies began implementing that FY 2010 plan following Congressional appropriation of the President's \$475 million request.³

The Path Forward: The Action Plan



Lake Superior wave

Plan Overview

This Great Lakes Restoration Action Plan (Action Plan) outlines methods and actions to advance implementation of the Initiative through FY 2014 and will help protect and restore the chemical, physical and biological integrity of the Great Lakes Basin ecosystem.

Five principal focus areas have been identified which encompass the most significant environmental problems in the Great Lakes (other than water infrastructure) for which urgent action is required. These include⁴:

- Toxic Substances and Areas of Concern
- Invasive Species
- Nearshore Health and Nonpoint Source Pollution
- Habitat and Wildlife Protection and Restoration
- Accountability, Education, Monitoring, Evaluation, Communication and Partnerships

² The FY 2010 plan, together with documents describing Agency actions therein and the programs and projects to carry it out, are posted to <http://www.epa.gov/glnpo/glri/index.html>.

³ Objectives and targets in this plan are premised on an assumption that \$300 million will be appropriated in FY 2011, and \$475 million in subsequent years.

⁴ Regional goals for water and sewer infrastructure improvements, which are supported by funding under the Clean or Drinking Water State Revolving Fund programs, are being addressed through those and other processes and are not part of this Action Plan.

Each focus area in this Action Plan includes a problem statement, goals, objectives, measures of progress and targets, and the principal actions in support of the objectives. On an annual basis, federal agencies are expected to identify the specific actions they will take to implement the Action Plan. Federal agencies also will minimize overhead in carrying out the Action Plan and, to the extent feasible, will use existing staff. EPA will assure that the Action Plan's goals, objectives, and targets are aligned with those of Great Lakes state, municipal and tribal governments.

Within the five focus areas, the Action Plan will address the highest priority projects. It is the intent of the Initiative's federal agencies to target efforts and funds to these projects in a way that maximizes results. Targeted, cooperative efforts are necessary to ensure meaningful progress on many of the complex and costly issues that have plagued the Great Lakes for decades. Some issues exist basinwide (e.g., invasive species, nonpoint source pollution,) and require broad, expansive action, while others are more localized (e.g., Areas of Concern, habitat) and will have site-specific remedies.

In each focus area there are efforts which will be given special attention.

- In the focus area of Toxic Substances and Areas of Concern, efforts will be targeted to remediate contaminated sediments and to address other major pollution sources in order to restore and delist the most polluted sites in the Great Lakes basin.
- In the focus area of Invasive Species, efforts will be targeted to institute a "zero tolerance policy" as a long term goal toward new invasions, including the development of ballast water technology, an early detection surveillance program, and a rapid response capability to address threats from new invasive species such as Asian Carp.
- In the focus area of Nearshore Health and Nonpoint Source Pollution, efforts will be targeted geographically to focus on watersheds of extreme ecological sensitivity (such as the Green Bay/Fox River, Genesee River, Maumee River, St. Louis River, and Saginaw River, places where environmental problems and their solutions have been clearly identified).
- Efforts will target implementation of lakewide biodiversity conservation blueprints and restoration of important species such as the Lake Sturgeon and the Piping Plover.
- In the focus area of Accountability, Education, Monitoring, Evaluation, Communication and Partnerships, efforts will include implementation priority Lakewide Management Plan projects for restoring the lakes, as well as establishment of quality goals and results-based accountability measures, learning initiatives, outreach and strategic partnerships.

Detailed information about these efforts is included in the focus area descriptions which follow in a subsequent section of this Action Plan.

Building on Past Progress, Integrating with Current Programs

This Action Plan includes many elements of the Strategy and draws upon the ecological priorities, goals and objectives of numerous pre-existing issue or area-specific plans and programs that have been developed by federal, state, tribal, local and non-governmental stakeholders, such as:

- Plans under the Great Lakes Water Quality Agreement, including Lakewide Management Plans and Remedial Action Plans for Areas of Concern
- Comprehensive Management Plan for St. Clair River and Lake St. Clair
- Great Lakes Binational Toxic Strategy
- State Wildlife Action Plans
- U.S. Fish and Wildlife Service (FWS) National Fish Habitat Action Plan

- A Joint Strategic Plan for Management of Great Lakes Fisheries
- Plans under the U.S. - Canada Convention on Great Lakes Fisheries
- Partners in Flight North American Land Conservation Plans
- North American Waterbird Conservation Plan
- North American Waterfowl Management Plan
- U.S. Shorebird Conservation Plan
- Great Lakes Coastal Wetland Monitoring Plan
- Great Lakes Fishery Plan
- Endangered Species Recovery Plans
- Coastal Management Plans under the Coastal Zone Management Act
- Plans under the Coastal and Estuarine Land Conservation Program
- Source Water Protection Plans
- Tribal-Federal Environmental Agreements



Boats along Lake Huron

This Action Plan takes a step toward integrating and aligning these and other plans, including individual states' Great Lakes restoration plans. Our goal is to minimize the duplication of effort while using the Initiative to do high priority work that has already been identified or that may be incomplete, under other programs. As such, the Action Plan represents our best attempt to capture the broad consensus of the Great Lakes community's collective commitment to advance Great Lakes protection and restoration. This broad consensus is the result of years of planning finally capped by 18 meetings in summer 2009 with representatives of states, tribes, cities and other stakeholders. We expect that these representatives and others will be able to continue providing input to federal agencies for implementation of priority Great Lakes actions by participating in these and other ongoing planning efforts. The Great Lakes Restoration Initiative will also support the National Policy and Implementation Plan being developed in response to the President's memorandum on a "National Policy for the Oceans, Our Coasts, and the Great Lakes."

In addition to new federal funding through GLRI, the Initiative will rely on partnerships to leverage and harness a wider set of resources for the protection and restoration of the Great Lakes. In many instances, the most effective solutions to the challenges facing the Great Lakes will require effective use of non-GLRI baseline federal funding, federal regulatory or other policy tools, and the significant regulatory and policy tools and resources of states, tribes, and other non-federal partners. These efforts, summarized below, are complementary to GLRI efforts.

- **Non-GLRI baseline federal funding.** For example, construction of water infrastructure for treatment and conveyance of drinking water and wastewater.
- **Federal regulatory or other policy tools.** For example, national rulemakings and permitting that reduce the risk of future invasions of ANS; permitting activities under the Clean Water Act; or regulatory means to reduce atmospheric mercury deposition to the Great Lakes.
- **Tools and resources of non-federal partners.** For example, stewardship of properties by a state, tribe or non-governmental organization for the purpose of enhancing habitat protection or connectivity; or implementation of source water protection plans for drinking water treatment facilities with intakes that draw from surface or groundwater within the Great Lakes basin.

Federal Integration and Coordination

The primary means for ensuring that the Action Plan is developed and implemented in an integrated manner is the Great Lakes Interagency Task Force, chaired by EPA.

Created by presidential Executive Order in 2004, the Interagency Task Force (Task Force), through the efforts of the Regional Working Group (RWG), coordinates federal Great Lakes efforts, including some 140 federal programs that address Great Lakes issues. The Task Force includes 11 of the agency and cabinet organizations which manage those programs: EPA, State, Interior, Agriculture, Commerce, Housing and Urban Development, Transportation, Homeland Security, Army, Council on Environmental Quality, and Health and Human Services.

Implementing the Action Plan

Though a national treasure of magnificent grandeur, we know the Great Lakes are still vulnerable to misuse and exploitation. Degradation of the lakes and their supporting ecosystem happened over the course of more than a century. Even with nature's resiliency, discernable widespread improvements will likely also take time. The goals, objectives, measures of progress and other efforts identified in this Action Plan will help ensure quantifiable annual *outputs* are in place that will lead to long-term restoration *outcomes*, even if such outcomes will not be immediately measurable on an ecosystem scale.

Tracking Progress and Using the Best Available Science

The Task Force will implement an accountability system to routinely track, measure and report progress pursuant to the Action Plan. Recipients of Initiative funding will be required to provide routine progress reports, at least semi-annually, on their individual projects as well as progress toward the goals, objectives, and measures of the Initiative. EPA will collect that information and report on overall progress toward attaining the goals and objectives of the Action Plan. EPA will work with the Task Force to identify, adapt and modify activities in future years based on performance and newly identified needs. These will be included in the development of funding plans for subsequent years.

Beginning in March, 2010, EPA will provide annual reports that provide funding allocations by federal agency and that identify any adjustments from annual requests. In addition, starting in 2011, EPA will work with its Task Force partners to provide an Annual Report to the President on accomplishments in achieving the Action Plan's outcomes and measures. The report will also compare funding allocations among participating agencies from fiscal year to fiscal year.

Scientific integrity at all levels is critical to the success of Great Lakes restoration. Therefore, the Initiative will use the best available science to prioritize and implement actions, as well as to track progress. To do this, EPA and the Task Force will take all appropriate steps so that the Action Plan and its programs and projects optimize

the likelihood of successful restoration at relevant scales. This will include engaging an independent scientific review panel to review the scientific credibility of the Action Plan so that the best available science guides efforts to restore the Great Lakes. Some of the distinct programs and projects in this Plan may also require a more specific peer review. These scientific reviews will be scaled as necessary to establish the scientific justification and credibility for the Action Plan's goals, objectives, and measures and actions. The GLRI will also ensure that the rate of progress is scientifically validated, and scientific research will guide any revisions to restoration priorities as well as enable the Initiative to adapt and modify activities when necessary.



Flowing stream near the Chicago River

Project Selection

The following criteria and principles will guide selection of programs⁵ and projects pursuant to this Action Plan. All agencies and prospective grant applicants should consult the respective Requests for Proposals (RFPs) issued each year to solicit grant proposals, as project selection criteria and principles may change from year to year.

- Ability to strategically achieve measurable environmental outcomes linked to the highest priority issues
- Ability to advance applicable ecological priorities of existing plans, such as Lakewide Management Plans, Remedial Action Plans for Areas of Concern, as well as other relevant national and regional coordinated strategic planning efforts, as mentioned above
- Feasibility of prompt implementation, including a bias for projects that are both ready-to-go and will have results soon (however, some funding will be used for planning and design to ensure cost effective implementation and for monitoring, particularly where it is needed to establish baseline conditions and/or to better understand environmental problems to inform implementation actions)
- Observable local impacts, especially for projects at the “field” level
- Strong bias for interagency/inter-organizational coordination and collaboration
- Support new work, or enhance (but do not replace) existing Great Lakes baseline activities
- Public support
- Ability to leverage non-federal resources
- Promotion of long-term societal, economic, and environmental sustainability
- Minimization of transaction costs

⁵ Note that these funds will not be directed toward water infrastructure programs that are addressed under the Clean Water or Drinking Water State Revolving Fund program.

Projects and activities must also meet standards for:

- best available science
- experience, ability, and authority of the funding recipient to properly perform the work;
- reasonableness of project costs; and
- measuring progress and success.

The Great Lakes Interagency Task Force used the criteria above to develop the focus areas of the Initiative, evaluate programs and projects, and create provisional funding allocations.

Work within each focus area will be accomplished through federal interagency cooperation, and by working closely with states, tribes, local government, academia, NGOs, and other stakeholders in the Great Lakes basin, as well as Canadian representatives. As this Action Plan encompasses numerous national and regional coordinated strategic planning efforts and their associated plans, participating agencies must assure that they continue to support their existing base program activities in the Great Lakes and that added Initiative support will not be used to supplant their existing base funding. As a starting point for identifying their base funding, agencies have been asked to use the 2009 Office of Management and Budget's Great Lakes Restoration Initiative Crosscut Budget Report to Congress. Final funding allocations are dependent upon actual appropriations.

Funding and Grants Cycle

Through this Action Plan and collaboration among EPA and the other agencies on the Great Lakes Interagency Task Force, and with input from Great Lakes stakeholders, the distribution of funds will be directed to maximize Great Lakes restoration and protection. Resources will be directed to the most significant issues and opportunities.

To be positioned to fund projects through grants⁶ as soon as possible after an annual appropriation is made, EPA will collaborate with the Interagency Task Force to do as much up-front work as possible, including issuance of a RFP as soon as possible each fiscal year. The planning process assumes that an appropriation for grant funding for states, tribes, local governments, and other organizations can be available early in each fiscal year.

Most EPA grants will be issued competitively pursuant to RFPs addressing the five focus areas.⁷ These expressions of needed work are included in numerous issue-based and geographically focused plans as referenced above. Should significant problems and issues need to be addressed outside of the five focus areas, a competitive grant program would be used to fill gaps, cut across or overlap focus areas, address unanticipated areas, or facilitate innovation. Important criteria for grant selection will include a demonstration of the ability to commence work expeditiously to connect the project to Great Lakes priorities.

Following annual appropriations, EPA will act upon expert recommendations and will select proposals and issue grants for EPA programs. Upon routine implementation of the Initiative, EPA believes that if it were to receive an appropriation by October 1 of a given fiscal year, the first grants could be issued early in the new calendar year, with others issued in the course of the year. One or more additional RFPs would be issued as needed throughout the year.

Several other members of the Interagency Task Force are also expected to select proposals, issue grants, and provide other assistance with funding from the Initiative. Each agency would provide assistance following its own applicable procedures, but would require special Initiative reporting provisions that will be outlined in the Interagency Agreement. EPA would be given the opportunity to review other agencies' Requests for Proposals

⁶ The term "grants," as used in this document, includes both grants and cooperative agreements.

⁷ As in previous years, some noncompetitive funding will be made available to states and tribes to ensure the capacity to participate in ongoing work to implement Lakewide Management Plans and Remedial Action Plans for Areas of Concern.

(RFPs) and proposed project selections. Likewise, EPA would share its RFPs and proposed project selections to avoid duplication. To assist stakeholders in finding assistance opportunities pursuant to the Initiative in a single location, EPA developed and will periodically update the Task Force’s Funding Guide. Grant issuing agencies will ensure that appropriate results and accountability information is incorporated into public reports and provided to oversight groups.

Focus Areas



Indiana Dunes National Lakeshore

The following describes the five focus areas around which significant ecological stresses and efforts to address those stresses will be organized:

- Toxic Substances and Areas of Concern
- Invasive Species
- Nearshore Health and Nonpoint Source Pollution
- Habitat and Wildlife Protection and Restoration
- Accountability, Education, Monitoring, Evaluation, Communication and Partnerships

Each focus area includes subsections that provide a problem statement to describe stresses, long-term goals⁸ for addressing those stresses, objectives, measures of progress to ensure efforts are on track for implementing long-term goals and principal actions to achieve that progress. This section is also helpful to prospective grantees and others who might receive Initiative funds to ensure what they plan to propose is in keeping with overall Initiative efforts.

Some priorities cut across focus areas. For example, the Task Force will “geographically target” activities, such that federal, state and other stakeholders can leverage efforts to restore areas that are highly degraded and of high ecological importance in the Great Lakes. Geographic targeting across the focus areas is expected at places such as the Genesee River, Green Bay/Fox River, Maumee River, St. Louis River, and Saginaw River watersheds.

Another cross-cutting priority will be environmental justice and work to reduce disproportionate ecological impacts. Environmental justice, as a priority, will be handled under some of the individual focus areas (e.g.,

⁸ Some long-term goals may not be achieved within the time span of this action plan.

cleanups in Areas of Concern, which may correspond to areas of potential environmental justice concern). While we do not anticipate creating a separate funding source for work in this area, special consideration will be given to efforts that address these important priorities.

Similarly, projected impacts of climate change on the Great Lakes have implications across all focus areas. Climate change impacts and the needs of the Great Lakes community to adapt to those impacts will be assessed and addressed by GLRI projects and programs where appropriate. To the extent that actions undertaken as part of this Initiative increase ecosystem resiliency, they will also help the Great Lakes ecosystem adapt to climate change.

Focus Area 1: Toxic Substances and Areas of Concern

Problem Statement

Although many point sources of pollution – discharges from discernible, often end-of-pipe conduits – have been reduced, legacy contamination remains. “Legacy contamination” is pollutants largely left over from past practices, but that continue to recirculate through the ecosystem. Such legacy pollutants, often persistent toxic substances (PTS), such as mercury and polychlorinated biphenyls (PCBs), continue to be present at levels above those considered safe for humans and wildlife, warranting fish consumption advisories in the Great Lakes, connecting channels, and Midwestern and New York interior lakes.

Urban communities living in or near these areas and indigenous communities that still live off the land in the basin are particularly at risk from disparate impacts on health from pollution in these areas, and from consuming contaminated fish.

Continuing sources of persistent toxic substances include releases from contaminated sediments; industrial and municipal point sources; nonpoint sources including atmospheric deposition, agricultural and urban runoff, and contaminated groundwater; and cycling of the chemicals within the lakes.

Efforts to restore degraded conditions in the 30 U.S. Great Lakes Areas of Concern (AOCs) are underway using a variety of funding sources including those under the Great Lakes Legacy Act, Superfund and other tools, but much more needs to be done, including the remediation of an estimated 43 million cubic yards of contaminated sediments, which are the main cause of beneficial use impairments in the majority of the AOCs.

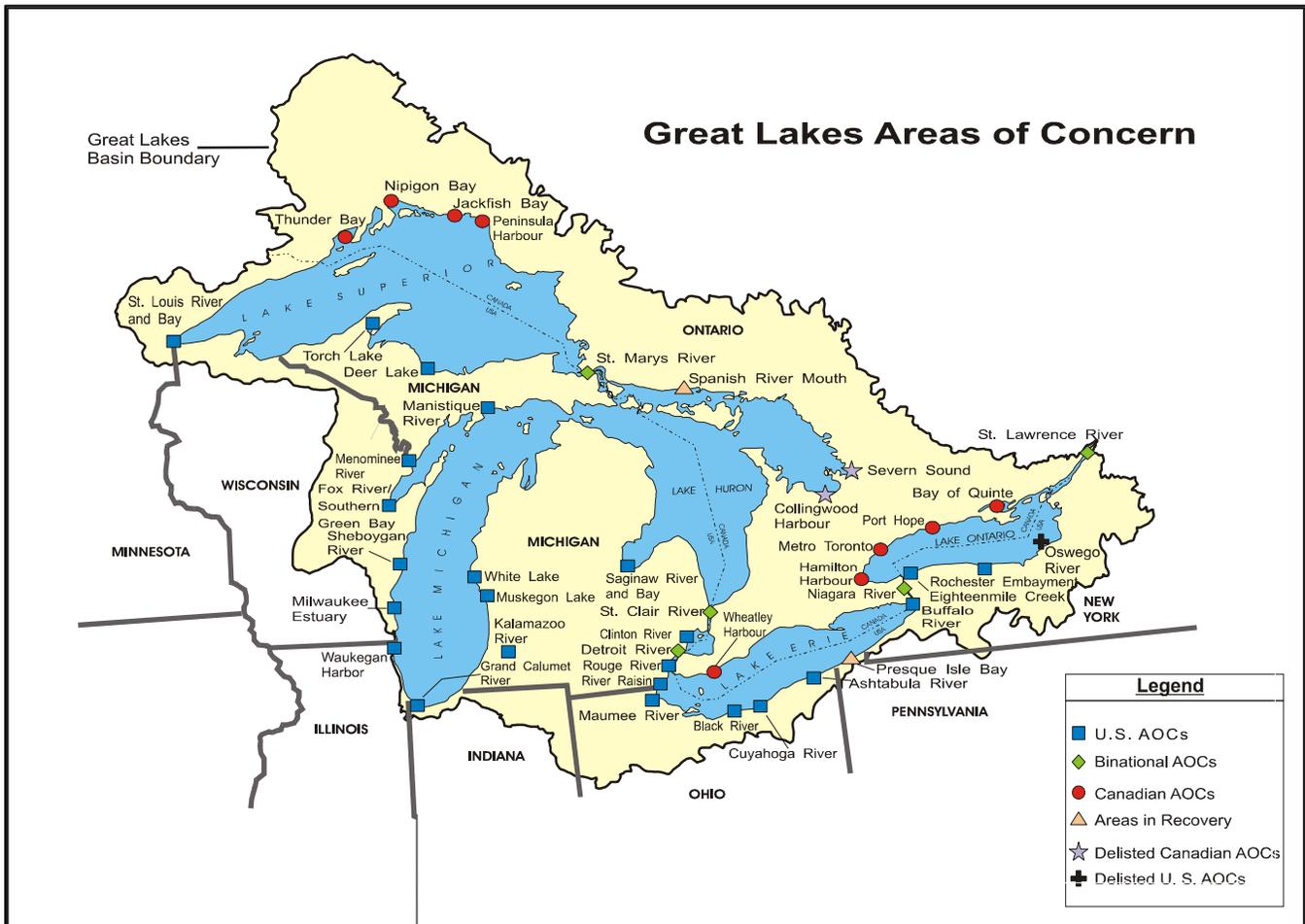
In addition to the well-known toxicants like mercury, PCBs, and banned pesticides, there are chemicals of emerging concern that have been detected in the Great Lakes over the past several years, which may pose threats to the ecosystem. Some such chemicals may include flame retardants, surfactants, pharmaceuticals and personal care product constituents.

Action Illustration:

Electronic Waste and Unwanted Medicines

During the 2008 Earth Week Campaign U.S. EPA held an electronic and unwanted medicines waste collection campaign with the goal of collecting 1 million pounds of e-waste and one million pills of expired and unused medicines in the Great Lakes basin. Approximately \$500,000 in grants was awarded to states, tribes, and local governments. Over 100 entities participated in the week-long campaign across the basin. The campaign goals were far exceeded with approximately 5 million pounds of electronic waste and 5 million pills collected. With funding and support from the GLRI, over the next two years, we anticipate broad participation in similar collection events throughout the Great Lakes basin, resulting in at least 20 million pounds of electronic waste and 20 million pills of unwanted medicines collected and kept safely out of the Great Lakes environment. Beyond the collection events, the principal goals in this effort include raising awareness in Great Lakes communities regarding the importance of safe disposal of electronic waste and unwanted medicines, and continuing to cultivate the development of ongoing and sustainable hazardous waste collection programs within the Great Lakes basin, as well as making communities and businesses aware of existing collection programs.

Beyond protecting human and ecosystem health related to fish consumption, activities in this focus area that address current and new pollution threats can also help protect drinking water sources.



Long Term Goals

- Goal 1: Areas of Concern are cleaned up, restoring the areas and removing the beneficial use impairments.
- Goal 2: The release of toxic substances in toxic amounts is prevented and the release of any or all persistent toxic substances (PTS) to the Great Lakes basin ecosystem is virtually eliminated.
- Goal 3: Exposure to toxic substances from historically contaminated sources is significantly reduced through source reduction and other exposure reduction methods.
- Goal 4: Environmental levels of toxic chemicals are reduced to the point that all restrictions on the consumption of Great Lakes fish can be lifted.
- Goal 5: The health and integrity of wildlife populations and habitat are protected from adverse chemical and biological effects associated with the presence of toxic substances in the Great Lake Basin.

Objectives

- By 2014, delist five Areas of Concern.
- By 2014, 46 Beneficial Use Impairments (BUIs) will be removed in Areas of Concern.
- By 2011, 15 million pounds of electronic waste and 15 million pills of unwanted medicines will be collected or their release will have been prevented.
- By 2014, 45 million pounds e-waste, 45 million pills of unwanted medicines, and 4.5 million pounds of household hazardous waste in the Great Lakes basin will have been collected or their release will have been prevented.
- By 2014, 9.4 million cubic yards of contaminated sediments will be remediated.
- Through 2014, an annual average of up to 5% annual decline will be maintained or improved for the trend (year 2000 and on) in average concentrations of PCBs in whole lake trout and walleye samples.

Action Illustration: Cleaning Up Areas of Concern

Thirty of the originally identified 31 toxic hotspot “Areas of Concern” (AOCs) have been on official lists for cleanup for more than 20 years. In all that time, only the Oswego River AOC has been delisted and only the Presque Isle AOC has attained a “recovery” status. In both cases, local governments implemented pollution control programs and a strong local citizenry developed community-based volunteer programs to assess, monitor and improve environmental conditions.

AOC cleanup is complex for several reasons - due to the nature of jurisdictional issues among multiple levels of government, the complexity of the many environmental programs that are being brought to the task, and the immensity of the environmental issues being faced. For example, prior analyses have placed the costs for sediment clean-up alone across all AOCs in the Great Lakes basin on an order of \$1 – 4 billion. In addition to sediment cleanups, AOCs face other costly and intractable environmental problems, such as agricultural and urban nonpoint source pollution, combined sewer overflows and other manifestations of aging water infrastructure, wetlands loss, and others. Solutions to these problems often require decades of work, all the time coordinating among multiple partners and authorities to harness and synchronize the significant resources that are necessary over several years.

Measures of Progress

The Great Lakes Restoration Initiative will significantly accelerate pollution prevention and reduction in the Great Lakes ecosystem. The measures by which progress will be evaluated in this focus area are:

Measure	Baseline/ Universe ⁹	2010 Target	2011 Target	2012 Target	2013 Target	2014 Cumulative Target
1. Number of Areas of Concern in the Great Lakes where all management actions necessary for delisting have been implemented (cumulative).	Baseline: 1 AOC Universe: 31 AOCs	1 AOC (no change)	1AOC	3AOCs	4 AOCs	5 AOCs
2. AOC BUIs removed (cumulative). ¹⁰	Baseline: 11 BUIs Universe: 261BUIs	20 BUIs	26 BUIs	31 BUIs	41 BUIs	46 BUIs
3. BUI delisting project starts at AOCs (cumulative). ¹¹	Baseline/Universe: 30 national and bi-national AOCs Universe: 261BUIs	60 projects	80 projects	110 projects	140 projects	170 projects

⁹ Baseline represents the starting point for the measure. Universe represents all that is likely possible to protect, restore, enhance, etc.

¹⁰ This is an existing measure under the Government Performance Results Act.

¹¹ These projects represent on-the-ground actions that are being implemented in order to remove BUIs. For example, sediment removals, Superfund cleanups, habitat projects and others.

Measure	Baseline/ Universe ¹²	2010 Target	2011 Target	2012 Target	2013 Target	2014 Cumulative Target
4. Cubic yards (in millions) of contaminated sediment remediated in the Great Lakes (cumulative). ¹³	Baseline: 5.5 million cubic yards (2007) Universe: 46 million cubic yards	6.3 million cubic yards	7.0 million cubic yards	7.2 million cubic yards	8.6 million cubic yards	9.4 million cubic yards
5. Pollution (in pounds) collected through prevention and waste minimization projects in the Great Lakes basin (cumulative).	Baseline: 0	10 million pounds	15 million pounds	25 million pounds	35 million pounds	45 million pounds
6. Cumulative percentage decline for the long term trend in average concentrations of PCBs in Great Lakes fish. ¹⁴	Baseline: (2000) 0%	34%	37%	40%	43%	46%

Principal Actions to Achieve Progress

New actions for FY 2010 to 2014 to protect the Great Lakes from toxic substances, clean up sediments and restore Areas of Concern include:

- *Restore Areas of Concern/Remediate Contaminated Sediments* – Accelerate the rate of sediment cleanup in AOCs throughout the Great Lakes basin through programs such as the Great Lakes Legacy Act, Water Resources Development Act, Natural Resource Damage Assessment, and Superfund. Restore and delist AOCs through strategic actions identified in Remedial Action Plans to restore individual beneficial uses. EPA will develop an enhanced management structure and ultimately increase our effectiveness in managing sediment remediation in AOCs. As other sediment sites may be identified, we will explore opportunities and authorities to address remediation at those sites.

Action Illustration: Contaminated Sediment Clean-up Can Also Provide Benefits to Environmental Justice Areas

Contaminated sediment is a significant source of fish contamination, which can disproportionately impact women of childbearing years, subsistence anglers and communities in areas of Environmental Justice concern. In 2009, the U.S. EPA Great Lakes National Program Office, Wisconsin Department of Natural Resources and other partners conducted a Great Lakes Legacy Act clean-up of heavily contaminated sediments in a section of Milwaukee's Kinnickinnic River. The project removed around 167,000 cubic yards of sediment contaminated with PCBs and polycyclic aromatic hydrocarbons, which were available to resident fish and had worked their way downstream to Lake Michigan, causing environmental harm and impeding commercial and recreational navigation. This project was in a section of the City of Milwaukee considered to be an area of potential Environmental Justice concern. Although the project was not carried out as an Environmental Justice project, nor was it in response to specific Environmental Justice concerns, the clean-up resulted in improved environmental health for the area, and it received support from local environmental groups and community health advocates. The clean-up also spurred economic revitalization efforts in this urban river community. Yet another benefit was that the clean-up provided job training opportunities to disadvantaged youth.

¹² Baseline represents the starting point for the measure. Universe represents all that is likely possible to protect, restore, enhance, etc.

¹³ This is an existing measure under the Government Performance Results Act.

¹⁴ The annual decline is 5% per year. This is based on an existing measure under the Government Performance Results Act. In FY 2010, 2008 data is compared to 2000; in FY 2011, 2009 data is compared to 2000; and so forth. PCBs are one indicator for a broader suite of persistent toxic substances and one of a number being tracked.

- *Strategic Pollution Prevention and Reduction Projects* – Prevent toxic and potentially toxic pollutants from entering the Great Lakes through a variety of new strategic actions, working closely with state, tribal and local

**Action Illustration:
Beneficial Use Impairments**

AOC cleanup actions are directed toward restoring beneficial uses that have been impaired. A Beneficial Use Impairment (BUI) is defined in the Great Lakes Water Quality Agreement with Canada as “a change in the chemical, physical or biological integrity of the Great Lakes System sufficient to cause any of the following:

1. restrictions on fish and wildlife consumption;
2. tainting of fish and wildlife flavor;
3. degradation of fish wildlife populations;
4. fish tumors or other deformities;
5. bird or animal deformities or reproduction problems;
6. degradation of benthos;
7. restrictions on dredging activities;
8. eutrophication or undesirable algae;
9. restrictions on drinking water consumption, or taste and odor problems;
10. beach closings;
11. degradation of aesthetics;
12. added costs to agriculture or industry;
13. degradation of phytoplankton and zooplankton populations;
14. and loss of fish and wildlife habitat.”

EPA cooperates with states to ensure actions are taken to address the BUIs in each AOC. When monitoring data shows a beneficial use is no longer impaired, the state and EPA can delist that BUI. When data shows all identified beneficial use impairments have been eliminated, then EPA can submit a proposal to the International Joint Commission (IJC) for removing the designation of AOC in its entirety from the area. If the IJC concurs that all BUIs have been restored, the parties, public and IJC can agree to delist the AOC as a whole.

governments. Initiate toxic reduction activities targeting mercury in emissions, products and waste, and expand Clean Sweep, and other collection programs and prevention practices to promote the safe disposal and elimination of pesticides, pharmaceuticals and other waste stream pollutants that can cause impairments.

- *Protect Human Health through Safer Fish Consumption* – Increase protection of Great Lakes fish consumers from harmful chemicals such as mercury and PCBs, with sound and sensible advice provided through enhanced and expanded state and tribal fish advisory programs. Work closely with the Great Lakes medical and health communities to educate the general public regarding the benefits and risks of Great Lakes fish consumption.
- *Measuring Progress and Assessing New Toxic Threats* – Measure progress in cleaning up toxics in the Great Lakes environment through comprehensive monitoring and assessment. Coordinate with efforts to update the Toxic Substances Control Act to ensure national programs take into account threats developing in the Great Lakes. Identify significant sources and impacts of new toxics to the Great Lakes ecosystem through robust surveillance as well as laboratory and field studies, in order to devise and implement effective control strategies.

Focus Area 2: Invasive Species

Problem Statement

Progress toward restoring the Great Lakes has been significantly undermined by the effects of non-native aquatic, wetland, and terrestrial invasive species. More than 180 aquatic nuisance species (ANS) now exist in the Great Lakes. The most invasive of these, including the well known zebra mussel, reproduce and spread, ultimately degrading habitat, out-competing native species, and short-circuiting food webs.

Prevention is the most cost-effective approach to dealing with organisms that have not yet arrived and could potentially threaten the lakes. New invasive species can be introduced into the Great Lakes region through various pathways, including commercial shipping, canals and waterways, trade of live organisms, and activities of recreational and resource users. Once invasive species establish a foothold in the Great Lakes, they are virtually impossible to eradicate; however, invasive species still need to be controlled to maintain the health of the Great Lakes ecosystem. Given that commercial shipping is a proven vector for invasive species transfer, advancing the development and use of ballast water treatment systems that are protective of fresh water is a high priority. Promising technology and innovative management practices that can significantly reduce the cost of control are under development. Control efforts will be accelerated in order to prevent the further spread of the organisms to inland lakes, the Mississippi River watershed, and beyond.

Long Term Goals

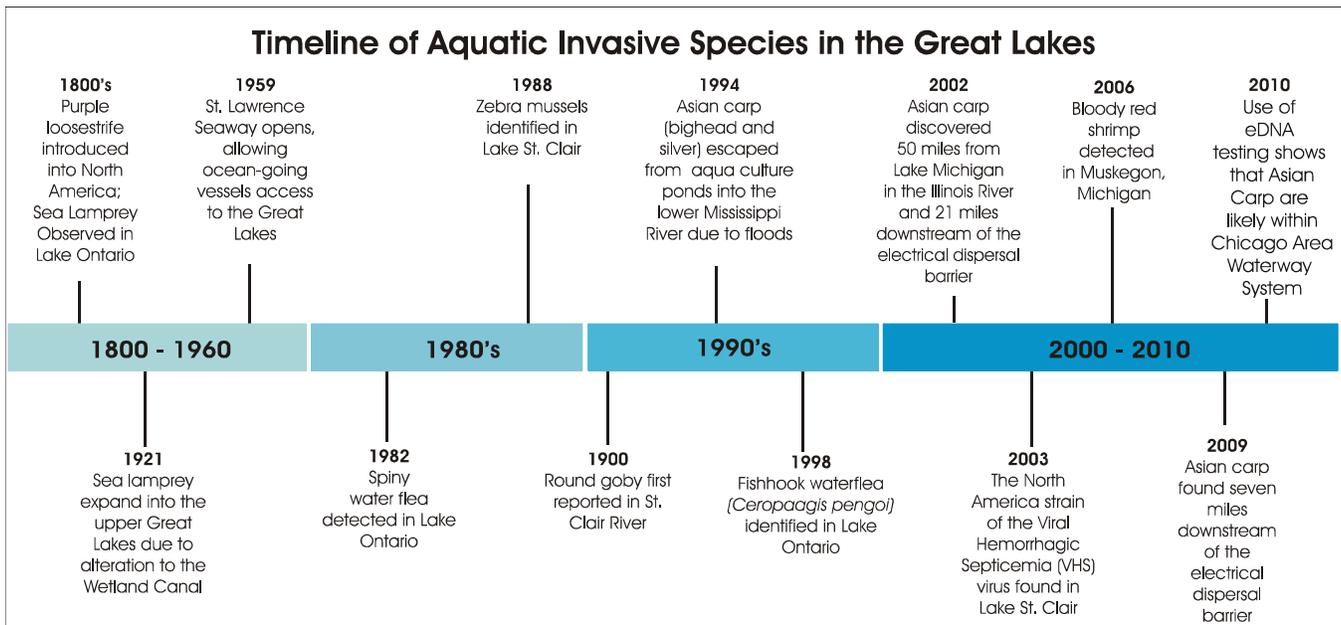
- Goal 1: The introduction of new invasive species to the Great Lakes basin ecosystem is eliminated, reflecting a “zero tolerance policy” toward invasives.
- Goal 2: The risk of introduction of species, which are imported for various uses, into the Great Lakes is minimized.
- Goal 3: The spread of invasive species, by means of recreational activities, connecting waterways, and other vectors, beyond their current range is prevented.
- Goal 4: A comprehensive program for detection and tracking newly identified invasive species in the Great Lakes is developed and provides up-to-date critical information needed by decision makers for evaluating potential rapid response actions.
- Goal 5: An effective, efficient and environmentally sound program of integrated pest management for invasive species is developed and implemented, including program functions of containment, eradication, control and mitigation.



Sea lamprey. Photo: by Dave Brenner, courtesy of Michigan Sea Grant.

Action Illustration: **Managing ANS already in the Great Lakes**

While efforts to date have been unable to eradicate the sea lamprey from the Great Lakes, an ongoing program coordinated by the Great Lakes Fishery Commission has been able to control their populations. In 2007, the Sea Lamprey Control Program focused on nearly 50 streams in the basin, using a lampricide to eliminate over 5.5 million larval sea lampreys. Each parasitic phase sea lamprey has the capability of killing upwards of 40 pounds of lake trout during its year in the lakes. The successful control program continues to ensure sport fish rehabilitation and protects a fishery valued at over \$7 billion in annual direct and indirect benefits.



Objectives

- By 2011, eight state ANS management plans will be established or revised to include rapid response capabilities. By 2014, eight state-based, multi-agency rapid response plans will be implemented and 22 mock exercises to practice responses carried out under those plans and/or actual response actions will be completed.
- Six technologies that prevent the introduction of invasive species and four technologies that either contain or control invasive species will be developed or refined and piloted by 2011. Ten technologies that prevent the introduction of invasive species and five technologies that either contain or control invasive species will be developed or refined and piloted by 2014.
- By 2011, methodology and protocols will be piloted for the coordinated monitoring methodology and shared protocols for basinwide invasive species surveillance. By 2014, a basinwide surveillance program with shared sampling protocols and methodologies to provide early detection of non-native species will be operational.
- By 2014, a 40 percent reduction in the yearly average rate of invasive species newly detected in the Great Lakes ecosystem will be achieved, compared to the period 2000-2009.
- By 2014, invasive species populations within the Great Lakes Ecosystem will have been controlled and reduced, as measured in populations controlled to a target level in 6,500 acres of managed area and by removing 5,000 pounds of invasive species from the Great Lakes ecosystem.

Action Illustration: Early Detection and Rapid Response

In summer 2008, a mock rapid response exercise for aquatic invasive species was conducted in the Pennsylvania waters of Lake Erie. Local, state and federal partners responded to a simulated report of a Snakehead fish by a member of a local fishing club. This mock exercise allowed agencies to test the effectiveness and further refine their multi-jurisdictional rapid response plan. This work will be greatly expanded to all the Great Lakes to enhance coordination between management agencies. A basinwide surveillance program will also be established by natural resource management and environmental protection agencies.

- By 2014, approximately 10 million recreation and resource users will be educated on best practices that prevent the introduction and spread of invasive species.

Measures of Progress

The Initiative will significantly advance efforts to prevent new introductions of invasive species in the Great Lakes basin and to stop the further spread of invasive species in the Great Lakes basin.¹⁵ Great Lakes Interagency Task Force agencies will work to further develop the initial set of measures by which progress will be evaluated in this focus area. While the Great Lakes community has pioneered many approaches to address invasive species, governmental programs and local efforts are still evolving to meet this threat. The GLRI will build upon and expand these programs, adapting our management approaches as we learn from our efforts. The measures by which progress will be evaluated in this focus area are:

Measure	Baseline/ Universe	2010 Target	2011 Target	2012 Target	2013 Target	2014 Target
1. Rate of nonnative species newly detected in the Great Lakes ecosystem.	Baseline: 1.3 species per year Universe: 181 species	1.3 species per year	1.1 species per year	1.0 species per year	1.0 species per year	0.9 species per year
2. Acres managed for populations of invasive species controlled to a target level. (cumulative)	Baseline: 0 acres	1,000 acres	1,500 acres	3,000 acres	4,500 acres	6,500 acres
3. Number multi-agency plans established, mock exercises to practice rapid responses carried out under those plans, and/or actual rapid response actions (cumulative).	Baseline: 0 rapid response exercises/actions	4 rapid response exercises/actions; and 8 plans established	7 rapid response exercises/actions	12 rapid response exercises/actions	17 rapid response exercises/actions	22 rapid response exercises/actions
4. Number of recreation and resource users contacted on best practices that prevent the introduction and spread of invasive species. (cumulative)	Baseline: 0 users	1,000,000 users	1,750,000 users	4,750,000 users	7,250,000 users	9,750,000 users

Principal Actions to Achieve Progress

Principal actions for FY 2010 to 2014 to prevent new introductions of ANS in the Great Lakes basin and stop the further spread of ANS include:

- *Develop Ballast Water Treatment that Protects Freshwater Ecosystems* – Develop a coordinated approach to the development of ballast water treatment suitable for freshwater ecosystems, though the use of laboratory, land-based and/or ship-board testing, and verification of treatment technologies in coordination with the maritime industry. Support work to reduce ship-mediated introductions through hull and anchor chain fouling.

¹⁵ While the regulatory tools of various agencies will also help advance these efforts, they are not currently a focus of this plan.

- *Implement Early Actions to Address Water Pathways Vectors* – Identify key waterways that could introduce ANS to the Great Lakes and implement actions such as ecological separation to reduce this risk. Existing canals and extreme storm events can form hydrological connections that may introduce invasive species into the Great Lakes. Models and analysis of hydrological connections under different weather conditions are needed to identify and minimize risks of these connections.



Silver Carp on the Illinois River.
Photo: U.S. Fish and Wildlife Service.

- *Prevention by Broad Stakeholder Outreach and Education* – Promote actions, including coordinated education and outreach, which will prevent the introduction and spread of invasive species through recreational uses such as hunting, fishing and recreational boating.
- *Develop and Demonstrate Innovative Control Technology* – Promote the development and use of new control technologies, including biological control methods, which will significantly reduce the cost and/or increase the effectiveness of invasive species control measures.

Action Illustration:

Asian Carp: Using the GLRI to respond to ecological threats

The innovative use of environmental DNA (eDNA) sampling has revealed that Asian carp are likely within the Chicago Area Waterway System but at levels lower than may be detected using traditional sampling methods. This recent discovery mobilized governmental agencies to undertake a rapid response action in December 2009 to prevent the further migration of Asian Carp while repairs were made to an Electrical Barrier in the waterway. Subsequent eDNA analyses revealed that carp may be near the O’Brian Lock, Wilmette Lock, and Calumet Harbor, within the Great Lakes basin.

Great Lakes environmental protection and natural resource agencies have formed an Asian Carp Regional Coordinating Committee to respond to information as it becomes available. Their coordinated approach is described in the *Asian Carp Control Strategy Framework*. GLRI funding is helping to implement actions described in that Framework, including:

- U.S. Army Corps of Engineers installation of structures at the electric barrier site to reduce the risk of bypass during high water events,
- U.S. Fish and Wildlife Service and Illinois Department of Natural Resource efforts to detect and remove Asian Carp from the system, and
- U.S. Geological Survey efforts to develop innovative control technologies.

Agencies will continue to adapt their management strategies as new information becomes available. GLRI funding will continue to support these adaptive management efforts.

- *Support States’ Role in Invasive Species Prevention and Control* – Support the development and on-the-ground implementation of ANS Management Plans for each of the Great Lakes states.
- *Control Key Invasive Species and Investigate Causal Mechanisms by which ANS impact Native Species* – Develop a better understanding and models of ecosystem interactions and management options for minimizing the impact of ANS, including new treatment or control methods.

- *Establish Early Detection and Rapid Response Capability* – Work with government agencies to initiate surveillance activities to detect new ANS and establish the capacity, methods and contingency plans for a rapid response. Joint planning will allow the mobilization of shared resources to create the best opportunity for eradicating species before they become established.

No effort to pursue these goals in the Great Lakes can ignore the rapidly changing situation involving Asian Carp. The migration of Asian Carp through the Chicago Area Waterway System is the most recent and most acute ANS threat facing the Great Lakes today. This species has wreaked permanent havoc on the Mississippi River Basin, where the fish’s rapid expansion of population and range has overwhelmed the river ecosystem by consuming plankton, a vital part of the food chain. As large populations of Asian carp have become established, the cumulative effects of these species have reduced food for native fishes, caused risks to human safety, and created impacts to regional economies that rely on fishing and boating.

The fish is now threatening similar damage to the ecosystem of the Great Lakes, as well as significant economic damage to the Great Lakes sport fishing industry. The Great Lakes community faces an urgency to prevent this threat from materializing.

An inter-governmental Regional Coordinating Committee has been established to oversee the implementation of an Asian Carp Control Strategy Framework, which is a cooperative effort by local, state, provincial, federal and even binational entities. The Framework is intended to provide direction for implementation efforts to prevent the establishment of ANS from migrating through artificially-connecting waterways that exist in the Chicago area, as well as other parts of the Great Lakes watershed, and if already in the basin, to work to implement efforts that might prevent further migration into the system.

The federal partners are working quickly to incorporate Carp and other ANS control efforts into the Initiative. This work pursues the objectives and measures of progress described in this section.

Focus Area 3: Nearshore Health and Nonpoint Source Pollution

Problem Statement

Nearshore and open waters provide drinking water for municipalities and habitat for numerous species of birds, fish and other aquatic life. This is the area in which most residents and visitors experience the Great Lakes through swimming, boating and other forms of recreation. Nearshore water quality has become degraded, as evidenced by eutrophication.¹⁶ The environmental stressors causing these problems include excessive nutrient loadings from both point and nonpoint sources; bacteria and other pathogens responsible for outbreaks of botulism and beach closures; development and shoreline hardening that disrupt habitat and alter nutrient and contaminant runoff; and agricultural practices, which increase nutrient and sediment loadings. Additional shoreline



Indiana Dunes National Lakeshore along Lake Michigan. Photo: Tom Gill.

¹⁶ The process by which a water body is enriched by nutrients such as phosphorus, resulting in excessive growth of algae, depletion of dissolved oxygen, and other impacts, including beach closings. In the nearshore zones of the Great Lakes, eutrophication has sometimes been manifested by harmful algal blooms; the green algae *Cladophora* washing ashore to make unsightly, odiferous rotting mats on beaches; and avian botulism.

stresses can be traced to failing septic systems, grey water pipes (pipes containing non-hazardous household substances like soap), inadequate pump-out stations for recreational boats, and even invasive species.

Nonpoint sources are now the primary contributors of many pollutants to the lakes and their tributaries. Although some nonpoint sources act on a whole-basin scale (e.g., atmospheric deposition of toxic substances), many smaller scale sources contribute to degraded water quality in Great Lakes tributaries and nearshore waters. Sediment is a significant nonpoint pollution problem facing our lakes, rivers and streams. When soil gets washed into our waterways, it can smother fish habitats and also can carry pollutants that threaten water quality. The complexity of pollutants and their presence in soil, water and air make pollution abatement for nonpoint sources particularly difficult to address. Control strategies to date

have been inadequate to deliver the degree of stream and lake restoration necessary for the protection and maintenance of the Great Lakes. However, implementation of agricultural, urban stormwater and other watershed best management practices can have multiple benefits, including simultaneous reductions in runoff of soils, nutrients and pesticides, as well as protection of drinking water sources.

What is the "Nearshore"?

The aquatic nearshore can be considered to begin at the shoreline and extend offshore to the depth at which the warm surface waters typically reach the bottom in early fall, generally 20m - 30m deep, and terrestrial nearshore areas range from narrow beaches to inland features influenced by Great Lakes processes.

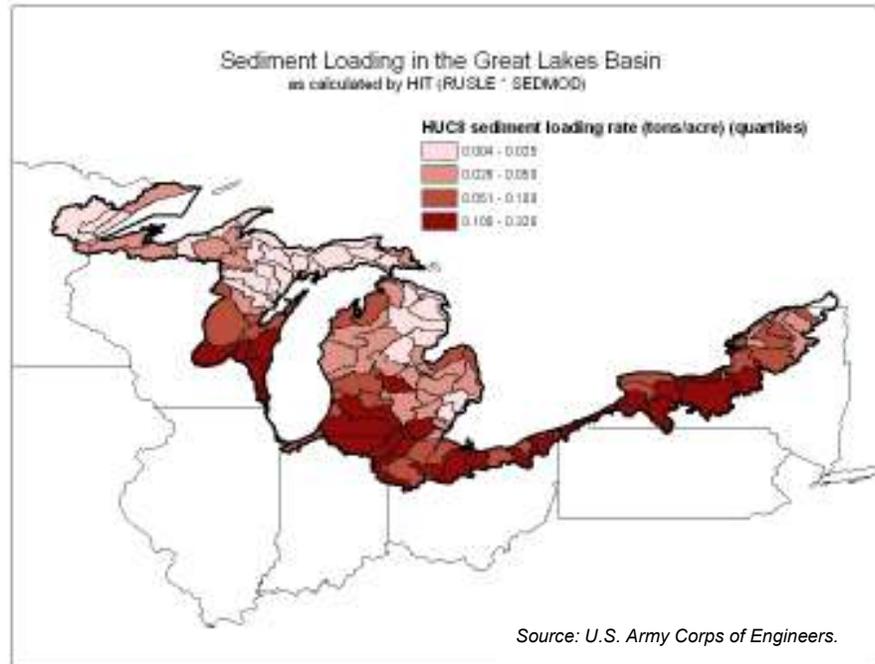


Long Term Goals

- Goal 1: Nearshore aquatic communities consist of healthy, self-sustaining plant and animal populations dominated by native and naturalized species.
- Goal 2: Land use, recreation and economic activities are managed to ensure that nearshore aquatic, wetland and upland habitats will sustain the health and function of natural communities.
- Goal 3: The presence of bacteria, viruses, pathogens, nuisance growths of plants or animals, objectionable taste or odors, or other risks to human health are reduced to levels in which water quality standards are met and beneficial uses attained to protect human use and enjoyment of the nearshore areas.
- Goal 4: High quality bathing beach opportunities are maintained by eliminating impairments from bacterial, algal and chemical contamination; effective monitoring for pathogens; effective modeling of environmental conditions, where appropriate; and timely communications to the public about beach health and daily swimming conditions.
- Goal 5: A significant reduction in soil erosion and the loading of sediments, nutrients and pollutants into tributaries is achieved through greater implementation of practices that conserve soil and slow overland flow in agriculture, forestry and urban areas.
- Goal 6: High quality, timely and relevant information about the nearshore areas is readily available to assess progress and to inform enlightened decision making.

Objectives

- By 2010, EPA will compile and map the highest priority watersheds for implementation of targeted nonpoint source pollution control measures.
- By 2014, remediation, restoration and conservation actions in at least one targeted watershed in each Great Lake basin will control erosion, reduce nutrient runoff from urban and agricultural sources, and improve habitat to protect nearshore aquatic resources.
- By 2014, a baseline will be established for total suspended solids loadings from targeted tributaries.
- By 2014, a measurable decrease will be achieved in soluble phosphorus loading from 2008 levels in targeted tributaries.
- By 2014, the causes of nutrient-related nearshore biological impairments will be better understood, and following local or watershed remedial actions, the number and severity of incidences of harmful algal blooms (HABs), avian botulism, and/or excessive *Cladophora* growth will be significantly reduced from 2008 levels.
- By 2014, a comprehensive nearshore monitoring program will have been established and implemented, including a publicly accessible reporting system, based on a suite of environmental indicators.
- By 2014, 50 percent of high priority¹⁷ Great Lakes beaches will have been assessed using a standardized sanitary survey tool to identify sources of contamination.
- By 2014, 20 percent of high priority Great Lakes beaches will have begun to implement measures to control, manage or remediate pollution sources identified through the use of sanitary surveys.
- By 2014, rapid testing or predictive modeling methods (to improve the accuracy of decisions on beach postings to better protect public health) will be employed at 33 percent of high priority beaches.



Action Illustration: Targeted Geographic Initiatives

Because some Great Lakes subwatersheds show severe signs of stress, targeted geographical areas will receive focused efforts toward restoration activities, e.g., agricultural best management practices. Watersheds for the Genesee River, Grand Calumet River and Harbor, Green Bay/Fox River, Maumee River, St. Louis River, and Saginaw River, for example, are places where long term environmental problems have been clearly identified, and they are expected to be among those targeted for Initiative efforts. Watersheds associated with other AOCs may also be targeted to demonstrate more immediate results of actions to restore beneficial use impairments.

¹⁷ Beaches that the states identify as most frequently used and/or that have the highest risk. In 2008, there were 356 high priority beaches out of a total of 1,411 total beaches in the U.S. Great Lakes.

- By 2014, the area of agricultural lands in conservation and/or utilizing conservation tillage practices will increase by 50 percent over 2008 levels.

Measures of Progress

The Initiative will significantly improve the health of Great Lakes nearshore areas and will advance the reduction of nonpoint source pollution to levels that do not impair nearshore waters. The measures by which progress will be evaluated in this focus area are:

Measure	Baseline/ Universe	2010 Target	2011 Target	2012 Target	2013 Target	2014 Target
1. Five year average annual loadings of soluble reactive phosphorus ¹⁸ from tributaries draining targeted watersheds.	Baseline: 2003-7 Fox River: 212 Saginaw R: 133 Maumee R: 623 St. Louis R: ** ¹⁹ Genesee R: 85 ²⁰	0% reduction Fox: 212 Saginaw: 133 Maumee: 623 St. Louis: ** Genesee: 85	0.5% Fox: 211 Saginaw: 131 Maumee: 617 St. Louis: ** Genesee: 85	1.5% Fox: 209 Saginaw: 130 Maumee: 611 St. Louis: ** Genesee: 84	2.5% Fox: 207 Saginaw: 129 Maumee: 604 St. Louis: ** Genesee: 83	4.5% Fox: 202 Saginaw: 126 Maumee: 592 St. Louis: ** Genesee: 81
2. Percentage of beaches meeting bacteria standards 95% or more of beach days.	Baseline: 86% (2006) Universe: 100%	86%	87%	87%	88%	89%
3. Extent (sq. miles) of Great Lakes Harmful Algal Blooms. ^{*21}	Baseline: 2008 estimate TBD	0% reduction	4% reduction	7% reduction	8% reduction	12% reduction
4. Annual number of days U.S. Great Lakes beaches are closed or posted due to nuisance algae. ²²	Baseline: 200 beach days (estimate)	0% improvement: 200 days	4% improvement: 192 days	7% improvement: 186 days	8% improvement: 184 days	12% improvement: 176 days
5. Annual volume of sediment deposition in defined harbor areas in targeted watersheds (cu yards). ²³	Baseline: 2008 Toledo Harbor: 1 million cubic yards	0% improvement: 1 million cubic yards	1% improvement: 0.99 million cubic yards	1% improvement: 0.99 million cubic yards	2% improvement: 0.98 million cubic yards	2.5% improvement: 0.975 million cubic yards

¹⁸ Metric tons per year. Total phosphorus will also be measured. Targeted watersheds will receive focused efforts toward restoration activities, e.g., agricultural best management practices.

¹⁹ **Calculations in progress, to be delivered 2010.

²⁰ Data for Genesee River are from 2006 and 2007 only.

²¹ Biological responses to nutrients loadings are also dependent on other factors such as water temperature, timing and intensity of precipitation, and hydrologic features. Year-to-year variability in these features may mask local improvements in nutrients management. Satellite imagery may provide data for days during which HABs are reported by shoreline observers or boaters.

²² This metric will be added to national surveys for beach managers for 2010. Nuisance algae can include *Cladophora*, HABs or other species, all of which are believed to be aggravated by elevated levels of phosphorus in the water.

²³ USACE dredges the federal shipping channel at Toledo Harbor each year. This area receives the highest rate of sedimentation in the Great Lakes, coming from the Maumee River watershed. Even small improvements in the rate of sedimentation here would reflect considerable efforts in the watershed to reduce erosion and farm runoff. Alternately, USACE conducts bathymetric surveys of commercial harbors each year, from which the volume of new fluvial sediment can be calculated for targeted watersheds. Because USACE does not dredge every location of every harbor each year, the estimated accumulation from a designated area over time will reflect the relative amount of sediments deposited from the tributary. This approach is currently in development.

Measure	Baseline/ Universe	2010 Target	2011 Target	2012 Target	2013 Target	2014 Target
6. Acres in Great Lakes watershed with USDA conservation practices implemented to reduce erosion, nutrients and/or pesticide loading under Farm Bill Programs. ²⁴	Baseline: 165,000 acres	2% increase 168,300 acres	10% increase 181,500 acres	25% increase 206,250 acres	40% increase 231,000 acres	50% increase 247,500 acres

Principal Actions to Achieve Progress

The principal actions to improve the health of nearshore areas and reduce nonpoint source pollution to levels that do not impair nearshore Great Lakes waters include:

- Targeting Watershed Plan Implementation* - Significant progress has been made nationally and in the Great Lakes basin in addressing soil erosion and in reducing nutrient or other contaminant loads to tributaries to the Great Lakes through the existing state and federal programs. Water quality problems still exist, however, with loadings of sediment and nutrients still unacceptably high in a number of areas and degraded watershed conditions linked to impaired nearshore biological communities. This results in increased costs for navigation dredging of harbors, and in localized environmental problems such as mats of rotting algae on swimming beaches and along the shore. Initiative efforts in this area will address high priority watersheds, performing scientific analyses to strategically target where on-the-ground actions can be most effective, and providing supplemental funding to implement those actions. Innovative actions may include green infrastructure, low-impact development solutions, and containment of wastes from confined animal feedlot operations. This will involve close collaboration between state programs, Great Lakes tribal governments, the U.S. Department of Agriculture's Natural Resources Conservation Service and U.S. Forest Service; the U.S. Army Corps of Engineers; Department of Interior's U.S. Fish and Wildlife Service and U.S. Geological Survey; and EPA.
- Identify sources and reduce loadings of nutrients and soil erosion* - These activities will contribute to the reduction or elimination of the number and severity of incidences of ecosystem disruptions, including *Cladophora*, HABs, botulism and other issues associated with eutrophication. Activities will include: applying research and modeling to identify the most effective actions to prevent incidences of *Cladophora*, HABs and botulism; enhancing or implementing watershed practices to reduce export of nutrients and soils to the nearshore waters; and establishing and implementing total maximum daily loads (TMDLs) for phosphorus, scaled from river reaches to watersheds.
- Improve Public Health Protection at Beaches* - Humans are put at risk when exposed to pathogenic bacteria. These activities will reduce risk to human health at swimming beaches by reducing the abundance of pathogenic organisms to levels below established criteria, increasing the effectiveness of monitoring for pathogens, modeling environmental conditions likely to result in elevated levels of bacteria, or enhancing communications to the public about daily swimming conditions.
- Generate Critical Information for Protecting Nearshore Health* - The nearshore environment of the Great Lakes is highly varied, including relatively unspoiled shorelines, highly urbanized reaches, tributary mouths, bays, wetlands and other environmental features. These activities will promote the collection of data about nearshore conditions and stresses, the assessment of information and management implications, or the dissemination of information to all potential users in the Great Lakes community.

²⁴ This measure reflects annual (not cumulative) implementation of conservation practices (from the Environmental Quality Incentives Program and Conservation Technical Assistance program) that will contribute to long term improvements of the listed outcomes.

Focus Area 4: Habitat and Wildlife Protection and Restoration

Problem Statement

The health of Great Lakes habitats and wildlife depends upon the protection and restoration of ecosystems: the Great Lakes, the coastline, wetlands, rivers, connecting channels and watersheds. Humans benefit from healthy ecosystems. Healthy Great Lakes, for example, provide us with clean drinking water; rare wildlife populate a variety of unique coastal habitats; wetlands help control floodwaters; rivers transport sediments, nutrients and organic materials throughout the watershed; forests provide oxygen while reducing erosion and sedimentation; and, upland habitats produce topsoil and habitats for pollinators and bio-control agents. Fully resilient ecosystems buffer the impacts of potential problems such as climate change.

A multitude of threats affect the health of Great Lakes habitats and wildlife. Habitat destruction and degradation due to development; competition from invasive species; the alteration of natural lake level fluctuations due to artificial lake level management and flow regimes from dams, drain tiles, ditches, and other control structures; toxic compounds from urban development, poor land management practices and non-point sources; and, habitat fragmentation have impacted habitat and wildlife. This has led to an altered food web, a loss of biodiversity, and poorly functioning ecosystems. Many opportunities exist to protect and restore critical elements of the Great Lakes ecosystem even as we strive to improve our understanding of emerging issues and their impacts.



Menominee River lake sturgeon, Wisconsin. Photo: U.S. Fish & Wildlife Service

Long Term Goals

- Goal 1: Protection and restoration of Great Lakes aquatic and terrestrial habitats, including physical, chemical, and biological processes and ecosystem functions, maintain or improve the conditions of native fish and wildlife.
- Goal 2: Critical management activities (such as stocking native fish and other aquatic species, restoring access of migratory fish species at fish passage barriers, and identifying and addressing diseases) protect and conserve important fish and wildlife populations.
- Goal 3: Sound decision making is facilitated by accessible, site specific and landscape-scale baseline status and trend information about fish and wildlife resources and their habitats.
- Goal 4: High priority actions identified in strategic plans (such as state and federal species management, restoration and recovery plans, Lakewide Management Plans, Remedial Action Plans, and others) are implemented, lead to the achievement of plan goals, and reduce the loss of fish and wildlife and their habitats.
- Goal 5: Development activities are planned and implemented in ways that are sensitive to environmental considerations and compatible with fish and wildlife and their habitats.

Objectives

- By 2014, 4,500 miles of Great Lakes rivers and tributaries will be reopened and 450 barriers to fish passage will be removed or bypassed.

- By 2014, 82% of recovery actions for federally listed priority species will be implemented.
- By 2014, 53 percent of populations of native aquatic non-threatened and endangered species are self sustaining.
- By 2014, 97,500 acres of wetlands, wetland-associated uplands, and high priority coastal, upland, urban, and island habitats will be protected, restored or enhanced.
- By 2014, 100 percent of U.S. coastal wetlands in the Great Lakes basin will be assessed.
- By 2014, 30 habitat-related beneficial use impairments will be delisted across the Areas of Concern.

**Action Illustration:
Lake Sturgeon Recovery**

A resident of the Great Lakes for 10,000 years, the prehistoric lake sturgeon (*Acipenser fulvescens*) is more than a holdover from the distant past—it is a barometer of the health and diversity of the entire Great Lakes ecosystem. The largest fish in the Great Lakes, sturgeon can grow to be eight feet long and weigh more than 200 pounds. Remaining populations represent only a fraction of their former numbers and are now protected in most waters of the Great Lakes. Only 5 rivers basin-wide have an annual spawning run of 200 or more adults and only one river exceeds the minimal viable population spawning run target of 350 adults. Major contributors to the sturgeon's decline are historical over-harvesting and habitat loss resulting from the damming of tributary waters, siltation resulting from deforestation, poor agricultural practices and dredging. Pollution from nutrients and contaminants have also reduced water quality and hindered reproductive success. The sturgeon's late maturity and infrequent spawning has also contributed to its limited recovery.

Over 40 partnerships have been operating throughout the Great Lakes to conserve, protect, and enhance lake sturgeon populations through numerous cooperative efforts. Great Lakes Restoration Initiative funding will now accelerate sturgeon rehabilitation in the basin through on-the-ground habitat enhancement and restoration projects, such as restoring fish passage to historical spawning areas, as well as supporting the rearing, stocking, and assessment of sturgeon populations. Initiative funding will also support a coordinated, multi-agency investigation of environmental contaminants in sturgeon and will improve evaluation and prioritization of habitat restoration projects.

Of the 26 tributaries that support sturgeon in the Great Lakes, 16 of these will benefit from either initiation of stream-side rearing facilities to enhance recruitment or habitat enhancement through the GLRI. As a result of enhanced sturgeon management and rehabilitation efforts through the GLRI, a basin-wide total of 25,000 fingerling lake sturgeon will be stocked to enhance existing small but remnant populations. A boosted stocking effort through FY2014 is expected to promote lake sturgeon spawning success and will promote populations toward self-sustaining levels. Habitat assessment and enhancement projects will be implemented on 20 existing sturgeon streams, and fish passage will be provided on 2 barriers that limit sturgeon access to upstream habitat. Improvements to the health of lake sturgeon will be captured in the fifth measure of progress below: "Percent of populations of native aquatic non-threatened and endangered species self sustaining in the wild."

Measures of Progress

The Initiative will significantly accelerate Great Lakes habitat and wildlife protection. The measures by which progress will be evaluated in this focus area are:

Measure ²⁵	Baseline/ Universe	2010 Target	2011 Target	2012 Target	2013 Target	2014 Target
1. Miles of rivers reopened for fish passage.	Baseline: 0 Universe: 20,000 miles	1,000 miles	1,500 miles	2,500 miles	3,500 miles	4,500 miles
2. Number of fish passage barriers removed or bypassed.	Baseline: 0 Universe: 5,000 barriers	100 barriers	150 barriers	250 barriers	350 barriers	450 barriers
3. Number of species delisted due to recovery	Baseline (2009): 0 species Universe: 28 listed species-Great Lakes	0	1 ²⁶	1	1	2
4. Percent of recovery actions implemented for priority listed species	Baseline (2009): 0 Universe: 414 recovery actions ²⁷	16% 68/414	33% 138/414	51% 211/414	67% 277/414	82% 338/414
5. % of populations of native aquatic non-threatened and endangered species self-sustaining in the wild.	Baseline (2009): 27% 39/147 populations ²⁸ Universe: 147 populations	33% 48/147 populations	35% 52/147 populations	41% 60/147 populations	47% 69/147 populations	53% 78/147 populations
6. Number of acres of wetlands and wetland-associated uplands protected, restored and enhanced.	Baseline: 0 Universe: 550,000 acres	5,000 acres	7,500 acres	12,500 acres	17,500 acres	22,500 acres
7. Number of acres of coastal, upland, and island habitats protected, restored and enhanced.	Baseline: 0 Universe: 1,000,000 acres	15,000 acres	20,000 acres	35,000 acres	50,000 acres	75,000 acres
8. % of U.S. coastal Great Lakes wetlands assessed.	Baseline: 0 Universe: 100%	20%	40%	60%	80%	100%
9. Number of habitat-related BUIs removed from the 27 U.S. AOCs so impaired ²⁹ .	Baseline: 4 Universe: 75 so impaired	9 BUIs removed	12 BUIs removed	18 BUIs removed	24 BUIs removed	30 BUIs removed

Principal Actions to Achieve Progress

The principal FY 2010-2014 actions to protect and restore habitat and wildlife include the following. Agencies will work together with states, tribes, municipalities, non-governmental organizations and industry to:

²⁵ Out year targets for these measures are cumulative. The Universe represents all that is likely possible to protect, restore, enhance; baseline represents the number of acres etc. that are already protected, restored, enhanced. All measures of progress included here are interim figures until final baselines are established.

²⁶ Lake Erie Watersnake 2011, Pitcher's thistle 2014.

²⁷ Numerator: # recovery actions implemented for Great Lakes priority listed species. Denominator: Total recovery actions for Great Lakes priority listed species, as defined in species recovery plans. Note that many recovery actions are implemented annually (i.e., update landowner records, monitor current populations, evaluate threats, etc.). Recovery actions are implemented until the threshold for action "completion" is met, as defined in each species recovery plan.

²⁸ Numerator: # of populations of native aquatic non-T&E and non-candidate species that are self-sustaining in the wild. Denominator: total # of native aquatic non-T&E and non-candidate populations.

²⁹ Also captured under Measure 2, Focus Area 1.

- *Improve Aquatic Ecosystem Resiliency* – Protect and restore aquatic habitats for fish and wildlife populations by reconnecting habitats through corridors to enhance biological diversity, reducing sediment and nutrient inputs, restoring natural hydrological processes, improving water quality, restoring ecosystem services, and increasing populations of native fish and wildlife through coordinated management actions.
- *Maintain, Improve or Enhance the Populations of Native Species* - Implement restoration actions identified in species recovery and management plans; quantify habitat needs for depleted migratory bird species; propagate lake trout, coaster brook trout, lake sturgeon and other similar fingerlings for suppressed fish populations, assessing fish populations; and protect and restore culturally significant species.
- *Enhance Wetlands, Wetland-Associated Uplands, and High Priority Coastal, Upland and Island Habitats* – Protect, restore, or enhance habitats by acquiring properties that are important to sustain fish and wildlife populations, restoring natural hydrological regimes, improving water quality, and restoring the chemical, physical, and biological integrity of ecosystems in each Great Lake basin.
- *Identify, Inventory, and Track Progress on Great Lakes Habitats, Including Coastal Wetlands Restoration* – Assess progress toward restoring Great Lakes habitats by establishing baseline conditions and tracking trends; highlight the importance of coastal wetland conservation and restoration by implementing a long-term coastal wetland monitoring program and enhancing the National



Piping plover. Photo: Alice Van Zoeren.

**Action Illustration:
Great Lakes Piping Plover Recovery**

The Great Lakes population of piping plover (*Charadrius melodus*) is one of the region's most critically endangered species. As a result of long-term management and protection activities, reproductive success has improved, total population numbers have increased, and breeding pairs have increased from 17 in 1986 to 71 in 2009. However, the piping plover remains extremely vulnerable to extinction from threats including breeding site disturbances, habitat loss due to shoreline development and recreational use, adult mortality from predation and disease, and environmental events such as severe weather and oil spills. The U.S. Fish and Wildlife Service currently leads a multistate, binational recovery program that includes partners from other federal and state resource agencies, non-profit organizations, universities, zoos and volunteers. Funding through the GLRI will effectively boost partner participation with recovery efforts, as well as support the following goals over the next five years:

- Identify, protect and monitor each breeding area with a goal of increasing population levels approximately 15 percent, while sustaining wild reproductive success levels at 1.5 or more fledged chicks per adult pair.
- Implement population augmentation strategies including a salvage captive rearing program for abandoned eggs and chicks to increase overall reproductive success to greater than 1.7 fledged chicks per adult pair.
- Develop and implement an adaptive approach to predator management in an effort to sustain adult survival rates of 75 percent or greater.
- Conduct invasive species control efforts at 8-10 sites over a five year period to improve/preserve piping plover breeding habitat.
- Work with other agencies and non-profit organizations to secure conservation easements on three to four important piping plover breeding sites on private land.
- Support scientific research on plover ecology, population demographics and genetics.

Improvements to the health of piping plover populations will be tracked through recovery actions implemented (see measure four). These efforts will significantly improve the chances for long-term recovery of the piping plover in the Great Lakes.

Wetlands Inventory.

- *Restore Habitat Functioning in Areas of Concern* – Improve habitats in degraded urban environments and Areas of Concern where beneficial use impairments limit ecosystem functioning by restoring habitats for native species populations and removing or isolating contaminants.

Focus Area 5: Accountability, Education, Monitoring, Evaluation, Communication and Partnerships

Problem Statement

The Action Plan requires additional oversight, monitoring, assessment, and coordination to succeed. Although the initiative benefits greatly from the years of scientific effort in the Great Lakes, there are still gaps in efforts to measure and monitor key indicators of overall ecosystem function, to evaluate restoration progress, and to provide the information decision makers need.

This information needs to be based on best available science, and compiled and communicated consistently to decision makers to allow them to assess ecosystem conditions and to

track restoration progress. Efforts under the Initiative will establish the foundation for routine and consistent comprehensive ecosystem assessments. A comprehensive and efficient accountability system and well-defined metrics must be established to track progress under this Action Plan. This system needs to track progress of individual grant recipients and partner-led initiatives, as well as overall progress in meeting the short- and long-term goals and objectives of the Initiative as a whole.

This focus area is the necessary backbone for success in the others. There are gaps in knowledge and an inadequate understanding of complex and emerging issues such as nearshore dynamics and climate change impacts. This means new investment is needed, particularly in the first year of the GLRI, to set up the systems and tools necessary to understand, coordinate, teach, direct progress and capture results. Once these systems and tools are developed and in use, we anticipate that this focus area will decrease in significance as implementation increases in the other focus areas.

Outreach and education are also crucial in the effort to restore the Great Lakes. If the change we seek is to leave the Great Lakes better for the next generation than the condition in which we inherited them, then we must educate upcoming decision makers so tomorrow they are capable of learning from and extending today's restoration efforts. The growth of service learning programs is an encouraging sign that school systems are placing an increasing value on stewardship of and hands-on learning about the Great Lakes. A handful of Great Lakes curricula exist that satisfy state and other relevant learning standards, yet these rarely find their way into core education objectives for Great Lakes schools. We must continue to reach traditional classroom teachers and



The R/V Lake Guardian. Photo: U.S. EPA Great Lakes National Program Office.

nature centers, but also reach non-traditional education outlets such as homeschoolers, national lakeshore and state park visitor centers, zoos, aquariums, and museums. Moreover, while there will always be some demand for the development of new curricula, alarmingly few resources are available today by the funding community for executing existing high-quality education specifically centered on the concept and practice of Great Lakes “restoration” that can show demonstrable results.

Additionally, current education efforts often lack coordination, duplicate efforts and fail to move the Great Lakes education community toward collaborative best practices supportive of Great Lakes restoration. Support is especially lacking for the sustained implementation of existing high-quality standardized curricula through, for example, teacher training, funding for field trips, support for teachers’ professional development opportunities and efforts focused on underserved communities, among other activities.

The Great Lakes span many different government jurisdictions along with their regulatory agencies and authorities: two countries, eight U.S. states, two Canadian provinces, 83 U.S. counties, thousands of cities and towns, 33 U.S. tribal governments and more than 60 recognized First Nations in Canada. Through the 1909 Boundary Waters Treaty with Canada, the related Great Lakes Water Quality Agreement, and a host of other institutional arrangements, this region has a long history of governments at all levels working in partnership to protect and restore the Great Lakes. Federal coordination efforts have been greatly improved through efforts of the Great Lakes Interagency Task Force and its Regional Working Group. Binational efforts continue with help from the International Joint Commission, and through the Binational Executive Committee, which coordinates binational implementation of the provisions of the Great Lakes Water Quality Agreement. These partnerships must continue and be further strengthened to address the complex issues faced by the Great Lakes.

Long Term Goals

- Goal 1: A cooperative monitoring and observing system provides a comprehensive assessment of the Great Lakes ecosystem.
- Goal 2: The necessary technology and programmatic infrastructure supports monitoring and reporting, including Great Lakes Restoration Initiative project deliverables by all agencies and participating stakeholders. Data and information are provided in reports that are

Action Illustration: Comprehensive Great Lakes Coastal Assessment

The nearshore environment of the Great Lakes is highly varied, including relatively unspoiled shorelines, highly urbanized reaches, tributary mouths, embayments, wetlands and other environmental features. Regular, comprehensive monitoring has been difficult because there are over 10,000 miles of Great Lakes shoreline and effective technologies have only recently been developed. This complexity has inhibited the ability to track issues impacting human and ecological health and requires new approaches to monitoring that can take advantage of new technological tools. In keeping with national efforts to provide statistically valid assessments of water resources, a nearshore monitoring program in the Great Lakes will be implemented, which builds on ongoing long-term efforts and initiates new efforts focused on poorly characterized areas or elements. The nearshore monitoring program will provide the necessary scientific basis to assess the physical, chemical and biological integrity of the nearshore environment and to target restoration and protection efforts. The assessment will establish baseline conditions of environmental quality and variability of the nearshore waters, bottom substrate and biota.

The nearshore monitoring program will utilize a probability-based design for site selection, as well as for shipboard surveys targeted for specific purposes. It will also utilize remote sensing and other observing tools to help monitor the coastal areas. The program will include rivers that flow directly into the Great Lakes and drain watersheds greater than 250 square miles. River monitoring will allow calculation of seasonal and annual loadings from the watersheds to the Great Lakes.

EPA’s National Coastal Condition Assessment will provide the basis for the initial effort by supplying a framework to which additional monitoring can be added. The additional monitoring will be an expansion of sites in the open waters, nearshore areas, and rivers using a probabilistic sampling design which allows statements on the overall quality of the Great Lakes coasts and also of the nearshore areas of individual lakes.

public friendly, timely and available on the Internet. Reports present integrated and scaled data from watersheds to lakes to Great Lakes basinwide.

- Goal 3: Increase outreach and education for the Great Lakes, and provide ongoing K-12 education for students to understand the benefits and ecosystem functions of the Great Lakes so they are able to make decisions to ensure that restoration investments are enhanced over time.
- Goal 4: Expand the range of opportunities for Great Lakes stakeholders and citizens to provide input to the governments and participate in Great Lakes issues and concerns.
- Goal 5: Work under the goals and objectives of the Great Lakes Water Quality Agreement is coordinated between the U.S. and Canada through Lakewide Management Plans (LaMP) and other binational processes, programs, and plans.

Objectives

- By 2011, opportunities for collaboration, planning, data accessibility and accountability will be increased through the expanded use of internet-based technology.
- By 2011, an Accountability System will be developed and implemented for the Initiative. The system will integrate and make transparent strategic planning, budgeting and results monitoring.
- By 2011, a satellite remote sensing program will be implemented to assess Great Lakes productivity and biological (e.g., algal bloom) events.
- By 2011, outreach and education efforts are increased, including identifying and revising existing curricula to incorporate sustainable education needs for the Great Lakes that meet state and other relevant learning standards.
- By 2011, a refined suite of science-based indicators for development of a comprehensive assessment of Great Lakes ecosystem health will be identified, monitoring programs for those indicators will begin to be implemented, and restoration and protection actions tied to those assessments and programs assured.
- By 2011, social media access opportunities for basinwide public involvement in the Initiative will be in place.
- By 2012, education efforts under existing curricula that meet state and other relevant learning standards will be coordinated across states, and a system for tracking student and teacher outreach (quantitatively and qualitatively) for their use.
- By 2012, improved coordination with Canada will take place for programs under the Great Lakes Water Quality Agreement, particularly under the LaMPs, which will result in the achievement of 5-10 priority LaMP goals and actions.
- By 2014, a statistically valid and comprehensive assessment, using a probability-based design, of Great Lakes water resources, will be established. The system will integrate shipboard monitoring, remote sensing, automated sampling, and other monitoring or observing efforts. By 2016, the system will be in place for all of the Great Lakes and capable of providing a scientifically justifiable assessment of Great Lakes water resources.

Action Illustration: What is a LaMP?

A Lakewide Management Plan, or “LaMP,” is a plan of action to assess, restore, protect and monitor the ecosystem health of a Great Lake. It is used to coordinate the work of all the governmental and non-government partners working to improve a Lake’s ecosystem. A public consultation process helps include attention to public concerns. Priority projects, such as sampling tributaries for chemicals, developing watershed plans, restoring habitats, conducting hazardous waste collections, and many others, are implemented in pursuit of LaMP goals and objectives. Many such projects are complex and time consuming, involving many partners and logistical concerns.

- By 2014, timely data and information will be provided to decision makers at multiple scales within a framework of established baselines, targets, indicators of progress, and monitoring.

Measures of Progress

The Initiative will significantly improve collaborative Great Lakes decision making, transparency, and accountability for Great Lakes information. Representatives of the federal agencies below will work together to determine which existing agency inventory and monitoring data can be used to establish baselines for the various performance goals and to identify needed additional research and monitoring, outreach, and implementation. The measures by which progress will be evaluated in this focus area are:

Measure	Baseline/ Universe	2010 Target	2011 Target	2012 Target	2013 Target	2014 Target
1. Improvement in the overall aquatic ecosystem health of the Great Lakes using the Great Lakes 40-point scale. ³⁰	Baseline: 20 points Universe: 40 points	23 points	23.4 points	23.9 points	24.3 points	24.7 points
2. Number of priority LaMP projects that are completed.	Baseline: 0 projects	10 projects	12 projects	15 projects	18 projects	20 projects
3. Number of educational institutions incorporating new or existing Great Lakes protection and stewardship criteria into their broader environment education curricula. ³¹	Baseline: 0	0 institutions	2 institutions	6 institutions	10 institutions	16 institutions

Principal Actions to Achieve Progress

The principal actions for FY 2010 to 2014 to achieve significant, measurable objectives include:

- *Develop Great Lakes Restoration Accountability System* – Develop and implement a transparent accountability system for the Great Lakes Restoration Initiative, including easy access to information and linkages to planning, budgeting, and results. With our new accountability system, partner agencies will report quality controlled information regularly on Initiative progress in meeting the objectives and targets of this Action Plan.



Deployment of towed sensor array on U.S. EPA research vessel. Photo: U.S. EPA Great Lakes National Program Office.

³⁰ This is an existing measure under the Government Performance and Results Act. The Great Lakes Index uses select Great Lakes ecosystem indicators (i.e., coastal wetlands, phosphorus concentrations, AOC sediment contamination, benthic health, fish tissue contamination, beach closures, drinking water quality, and air toxics deposition) and is based on a 1 to 5 rating system for each indicator, where 1 is poor and 5 is good. Improvements in the index and measures would indicate that fewer toxics are entering the food chain; ecosystem and human health is better protected; fish are safer to eat; water is safer to drink; and beaches are safer for swimming.

³¹ Educational institutions include: state departments of education, primary and secondary school districts, colleges, universities, zoos, aquaria, museums, and nature/resource centers. Curricula will meet relevant official standards.

Progress will also be reported with and through the LaMPs on the Great Lakes as a whole, as well as on each of the Lakes and Connecting Channels, and public forums will be harnessed to assist with the transfer and dissemination of information to the public.

- *Measure and Evaluate the Health of the Great Lakes Ecosystem using the best available science* – Enhance existing programs that measure and assess the physical, biological, and chemical integrity of the Great Lakes, including the Connecting Channels. Develop and implement a statistically valid assessment, using a probability-based design, of Great Lakes water resources, coinciding with intensive cooperative science and monitoring efforts for the Lakes. Implement strategic components relevant for Great Lakes decision making of the U.S. contribution to the Integrated Earth Observation System and the Integrated Ocean Observing System as part of the Global Earth Observing System of Systems. Develop a coordinated federal approach to address on the key scientific priorities needed to fully assess the impacts climate change may have on the health of the Great Lakes ecosystem and better manage those impacts. Promote the development and implementation of science-based indicators that will better assess and provide a better measure of accountability of actions to improve the health of the Great Lakes ecosystem.
- *Support Great Lakes restoration education* – Develop coordination mechanism(s) for Great Lakes restoration education efforts that meet state and other relevant learning standards. Identify the suite of participating educators and facilities (e.g., formal classroom teachers, homeschoolers, public and private community service learning programs, non-traditional education outlets such as nature centers, national lakeshore visitor centers, zoos, aquariums, museums, and urban community centers, etc.). The number of educators who participate in teacher trainings and, as a result the number of participating students, is increasing. These trends should be made to translate into more institutions incorporating Great Lakes lessons into their curricula. Ensure metrics are included the Great Lakes Restoration Accountability System.
- *Enhance Partnerships* – Enhance coordination and collaboration among Great Lakes partners to help ensure that actions, projects and programs under the Great Lakes Restoration Initiative are efficient, effective and in furtherance of the U.S. - Canada Great Lakes Water Quality Agreement. Partnerships will be advanced and resources and capabilities leveraged through existing collaborative efforts such as the U.S. - Canada Binational Executive Committee, the State of the Lakes Ecosystem Conference, the U.S. - Canada Great Lakes Binational Toxics Strategy, Lakewide Management Plans, Four Agency Agreements, the Coordinated Science Monitoring Initiative, and Great Lakes Fisheries management. This principal action will also stress building ownership and a sense of joint responsibility among agencies, institutions and the public across the Great Lakes basin. Partners and stakeholders will be encouraged to suggest refinements to the Initiative, to monitor and judge progress, and to help adjust objectives and actions as progress is made. Existing mechanisms, such as the U.S. Policy Committee, will be used and new ones developed, if needed, to enable that participation.

Conclusion

If we care for the Great Lakes, they will continue to care for us – economically, ecologically and socially. Study after study, however, shows a Great Lakes in peril. These studies point the way to how we can work to make the ecosystem more resilient over time by reducing toxic pollution and cleaning up Areas of Concern, instituting a zero tolerance policy toward aquatic nuisance species, rehabilitating fish and wildlife habitat, shielding nearshore health from polluted “nonpoint source” runoff, and enhancing these efforts through proper accountability mechanisms, education and other measures. By declaring Great Lakes restoration a national priority with the proposal for significant new resources to address these issues, President Barack Obama is encouraging federal, state, municipal, tribal and civic representatives – all of us – to unify for leaving the Great Lakes better for the next generation.



Pictured Rocks National Lakeshore, Michigan

Acronyms

ANS	Aquatic Nuisance Species
AOC	Area of Concern
BUI	Beneficial Use Impairment
EPA	U.S. Environmental Protection Agency
GLRC	Great Lakes Regional Collaboration
GLRI	Great Lakes Restoration Initiative
GPRA	Government Performance and Results Act
HAB	Harmful Algal Bloom
LaMP	Lakewide Management Plan
RFP	Request for Proposals
SRF	State Revolving Fund

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