Great Lakes Commission
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Great Lakes Sediment and Nutrient Reduction Program

REPORT ON AGREEMENT 6 OUTCOMES

The **Great Lakes Sediment and Nutrient Reduction Program** is a state and federal partnership managed by the Great Lakes Commission in cooperation with the USDA's Natural Resource Conservation Service (NRCS), U.S. EPA, and the eight Great Lakes states. Through this program, the GLC has provided grants to nonfederal units of government and watershed organizations to install erosion and sediment control practices in the Great Lakes basin for 30 years.

Since 2010, funding for the program has been provided by the Great Lakes Restoration Initiative. The funding has been directed to innovative projects that help address sources of nutrient and sediment losses within the basin. The program is directed by a task force that includes representatives from the states, NRCS, and U.S. EPA; the task force identifies priorities for funding and reviews proposals to award funding each year.

Locations of Agreement 6 grantees. Overall, 14 projects were funded through this agreement. Each number corresponds to a description below.

Great Lakes Sediment and Nutrient Reduction Program

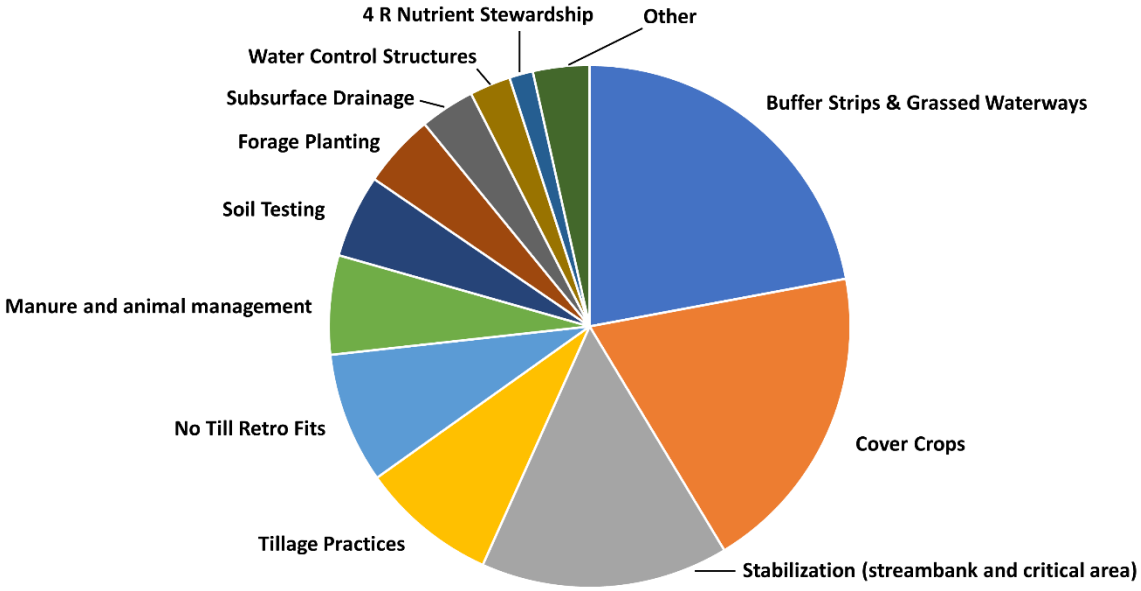
BY THE NUMBERS

14 GRANTS, $1,760,499 IN TOTAL FUNDING

State	Number of Grants	Total Funding
Indiana	1	$195,645.59
Michigan	2	$398,671.54
New York	2	$280,607.19

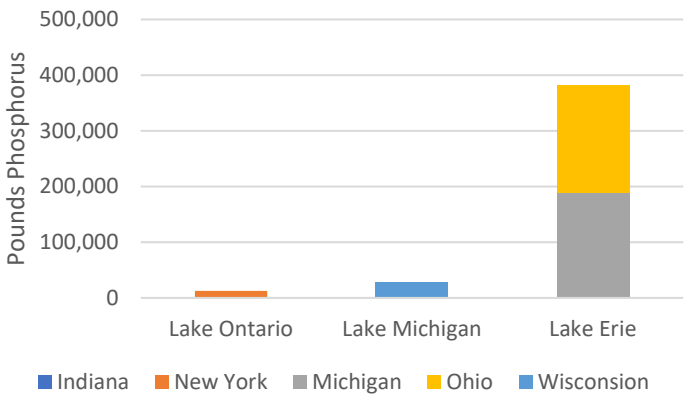
State	Number of Grants	Total Funding
Ohio	4	515,540.39
Pennsylvania	1	5,906.83
Wisconsin	4	364,126.89

AGREEMENT 6 GLSNRP PRACTICES



Under Agreement 6 the Great Lakes Sediment & Nutrient Reduction Program funded a variety of best management practices.

TOTAL PHOSPHORUS REDUCTIONS AGREEMENT 6



For Agreement 6, practices were installed in five states with total phosphorus reductions occurring in the watersheds of three Great Lakes. Note that a significant number of projects worked in the Lake Erie basin.

Phosphorus reductions were estimated based on RUSLE 2 soil savings estimates, which were translated to estimated phosphorus reductions for the life of the installed practice. For more information, see Appendix 7C.

1. North Branch Elkhart River Phosphorus and Sediment Reduction

LaGrange County Soil & Water Conservation District (Indiana)

The North Branch of the Elkhart River is influenced by Amish landowners in the northern portions of the watershed and to a much lesser extent, landowners practicing modern farming techniques. The majority of livestock operations (98%) along the entire drainage area are owned and managed by landowners in the Amish community. Eight years of water quality testing data revealed that phosphorus and sediment loading is concentrated within sub-watersheds that have high concentrations of livestock controlled by Amish agricultural producers. Many of these livestock operations allow direct access of livestock to moving surface waters, have improper or no ditch bank buffers or controls in place for barnyard runoff, and deficient nutrient management, including barnyard maintenance and manure removal. The $200,000 investment from GLSNRP allowed the Conservation District to build its relationships with Amish producers, despite challenges related to wet weather conditions and a shortage of skilled contractors. Due to additional challenges with landowners shifting commitments, the award was extended to allow for work with LaGrange County Parks and Recreation on a shoreline protection project benefitting Dallas Lake.

The photos above provide exterior and interior views of a poured concrete, covered manure storage constructed on an Amish farm in the Elkhart River watershed. Farm buildings lie uphill from an open stream and a field that contains multiple natural springs. The poured concrete wall and sloped floor completely contains all manure, bedding and associated liquid until this material can be land applied as fertilizer on crop fields. For the small dairy herd of 38 Friesian-Holstein cattle, this storage provides 180 days of storage. Farm owner Ervin Bontrager reports that “this manure storage has been one of the best things we have ever done on this farm since moving here 20 years ago. Keeping the rainwater out of the manure stockpile makes it more manageable and usable as fertilizer. It keeps our whole operation cleaner, neater, more sanitary, as well as more efficient and productive. I just love it!”

2. Michigan Phosphorus Reduction of the Tiffin River/WLEB

Hillsdale Conservation District (Michigan)

The Tiffin River is one of the more erosive watersheds in the Lake Erie drainage basin. The river system receives major loading as a result of erosion from agricultural cropland. The conservation practices delivered through this grant help prevent soil loss, sedimentation, and nutrient loading from 3,622 treated acres. Wet springs in fall 2018 and spring and summer 2019 required adaptation of initial plans, which resulted in more acres in cover crops. Approximately 88 acres were converted to hayland planting from traditional row crop rotations. The grant allowed the Conservation District to introduce local producers to the "4R" Nutrient Stewardship approach, helping them learn more about grid soil sampling and save money on fertilizer costs during a period of low crop prices.

3. Strip-till Within the River Raisin Watershed

Lenawee Conservation District (Michigan)

This project expanded on existing conservation activities with producers in the River Raisin watershed by providing resources and technical expertise on the utilization of strip-till equipment or retrofitting of no-till equipment to minimize sediment and nutrient loss to local waterways and ultimately, Lake Erie. Producers were more interested in the no-till retrofit of corn planters, achieving the goal of 10,000 acres treated. Adoption of the strip-till approach was more challenging, with only 2,400 acres of the 10,000-acre goal achieved. Conservation District staff note that changes in tillage operations are significant for producers, with potential for yields to initially lag. It is recommended that efforts to change tillage practices be bundled with a system of practices to manage transitional stages, including cover crops and adjustments in nutrient management.

Planting corn in the River Raisin watershed with retrofitted equipment.

4. Cayuga Creek Sediment and Nutrient Reduction Project

Erie County Soil & Water Conservation District (New York)

Through this project, the Conservation District stabilized eroding banks of Cayuga Creek while also addressing adjacent and in-watershed agricultural practices that contributed to erosion and nutrient loss. Across six project sites, involving seven landowners, a municipality, and a watershed board, the project team stabilized 1,965 linear feet of streambank, saving 2,650 tons of soil as estimated over a 10-year period. Phosphorus loss will be reduced by 2,532 pounds over the same 10-year period. This work succeeded despite significant storm events causing damage to the stream corridor. Approximately 1,000 linear feet of riparian buffer was installed across three sites using mixed, native species of trees and shrubs. The Conservation District has secured separate funding for an annual Riparian Buffer Program which will allow continued development and maintenance of riparian buffers along streams throughout Erie County. Finally, a Nutrient Management Plan (NMP) was developed for one farm involving approximately 500 acres of cropland mostly adjacent to the stream corridor. Implementation was tracked in both 2016 and 2017 and revealed a roughly 25% reduction in the application of fertilizer when compared to pre-NMP conditions, lowering costs of production and benefitting Cayuga Creek.

Cayuga Creek at the Townline Rd. site, pre- and post-construction

5. Upper Genesee River Streambank Stabilization - Caneadea, NY

Center for Environmental Initiatives, Inc. (since 2020, Genesee Riverwatch, Inc.)

This streambank restoration project was developed to stabilize undercut banks adjacent to an agricultural field along the Genesee River in the town of Houghton, New York. Restoration activities reduced sediment and phosphorus loads to the river while adding 900 feet of new riparian zone. The project emphasized the use of bioengineering techniques to improve water quality and enhance habitat, while meeting the landowner's objective of halting the loss of acreage from his field. Soft or natural approaches to shoreline stabilization efforts are believed to be more resilient to the increasing frequency and intensity of precipitation and snowmelt events experienced in the Great Lakes basin.

Permits were required to stabilize the bank with rip rap and then slightly grade the riparian zone for planting with native vegetation. In spring 2018, 65 volunteers helped plant the 1,000 bare-root seedlings necessary to complete the restoration.

This project was so successful that Genesee RiverWatch and the landowner were eager to undertake an additional site. In 2019 we were awarded a grant from the Great Lakes Commission to restore 1,800 feet of riverbank. The stabilization of the bank was completed in October 2021 and the riparian planting will be completed in 2022.

George Thomas
Genesee RiverWatch

The landowner will conduct post-restoration maintenance and monitoring to ensure proper plant growth and stability of the restoration, ensuring that the approximately $100,000 federal investment and corresponding water quality benefits last in the years to come.

The landowner (left) and Genesee RiverWatch Executive Director George Thomas finish planting the restored bank of the Genesee River during spring 2018.

6. Sediment and Phosphorus Reduction in the Brights Ditch Watershed

Hancock Soil & Water Conservation District (Ohio)

The purpose of this grant was to reduce sediment and phosphorus loading and runoff volume from the Brights Ditch watershed, preventing those pollutants from reaching the Blanchard River and ultimately, Lake Erie.

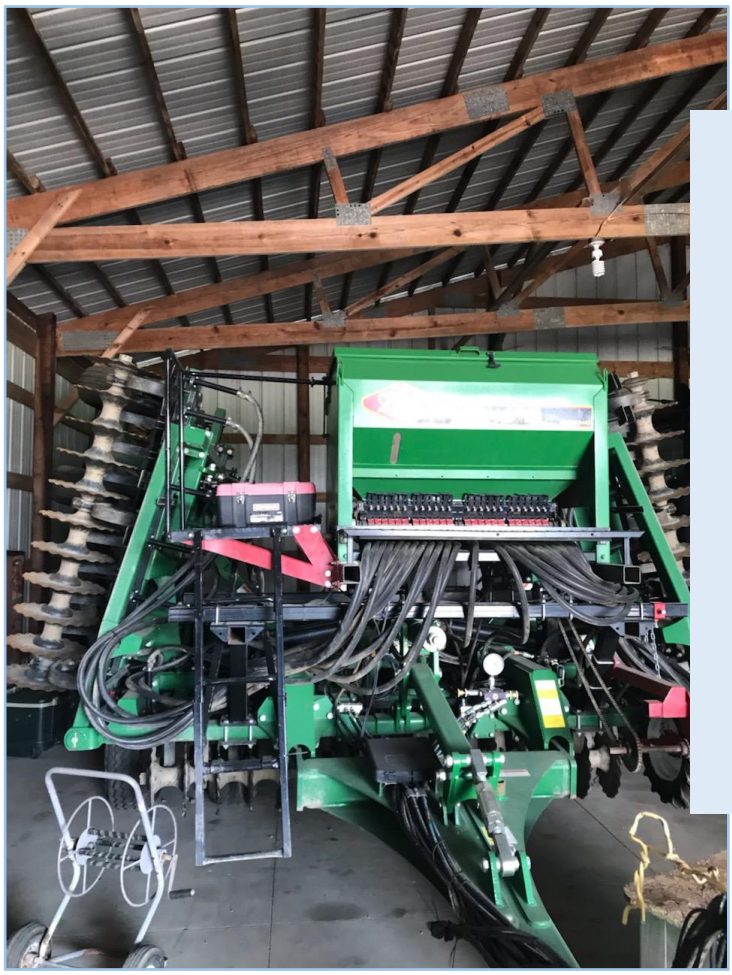
By implementing selected conservation practices to reduce surface and tile runoff, farmers took an active role in reducing losses from their fields, estimated as a savings of 5,479 tons of soil and 4,171 pounds of total phosphorus over the life of the installed practices. In addition to the practices detailed in the table below, two water control structures were installed and over 1,700 acres received precision soil testing.

Conservation Practice	Acres Treated	Tons Soil Saved (life of practice)	Pounds Total Phosphorus Saved
Conservation Tillage	580	1,047	1,054
Cover Crops	1,021	3,577	2,266
Fertilizer Placement	503	855	850
Total Soil & Phosphorus Reduction:		**5,479 tons**	**4,171 pounds**

7. Sediment and Phosphorus Reduction in the Cranberry Creek and Bear Creek

Putnam Soil and Water Conservation District (Ohio)

For this project, the Conservation District worked to increase cover crop adoption through assistance with equipment modifications, allowing producers to apply cover crops with their own equipment. Four implements were retrofitted to include cover crop seeders. The project also capitalized on producer interest in precision soil sampling, providing support to test 6,183 acres and develop 42 nutrient management plans. 4,680 acres were planted in cover crops, resulting in estimated soil savings of 2,161 tons and total phosphorus savings of 2,366 pounds. Opening up cost-share support countywide at the end of the grant increased the number of producers participating, including some that had never before visited the Conservation District's office.



Previously, we had to hire out labor to seed our cover crops. With the Gandy Air Seeder on our TurboMax, we get better seed to soil contact, a more even seeding rate, and can seed in a timely manner. We no longer have to wait on a custom applicator to apply the seed which provides a more efficient process. The addition of the Gandy Air Seeder allowed us to seed our cover crops without buying an additional machine.

Mark & Gary Siebeneck
Grant Particpants

The photo above is the Siebeneck's tractor, which was retrofitted to add a cover crop seeder to the front. The grant paid $25/acre of cover crop that was seeded with the retrofit. The producer paid for the equipment retrofit upfront and was able to get reimbursed for every acre installed during the three years of the grant. The producer was eligible for payments of a maximum of up to 800 acres or the cost of the retrofit. They also were required to have a Nutrient Management plan on the acres of assisted cover crops.

8. Tiffin River and Bear Creek Watershed Improvement Plan

Fulton Soil and Water Conservation District (Ohio)

To address nutrient loss in the Tiffin River and Bear Creek watersheds and improve the overall health of Lake Erie as the downstream receiving water, the Conservation District worked with local producers to install practices that slow the flow of water and keep nutrients from moving off farm fields. Heavy rainfall events were a challenge during the project period, washing out newly installed grassed waterways. Through re-installation or additional seeding, all practices were installed per NRCS specifications and Conservation District staff grew skilled at protecting newly seeded areas with straw blankets.

Conservation Practice	Acres Treated	Tons Soil Saved (life of practice)	Pounds Total Phosphorus Saved
Cover Crops	779.86	1,958	1,952
Filter Strips	5.02	3,120	3,349
Grassed Waterways	24.59	133,732	143,474
Erosion Control Structures	88.2	33,558	36,801
Total Soil & Phosphorus Reduction:		**172,368**	**185,576**

This is the best grassed waterway in the county.

Herb Schaffner
Grant Participant

Schaffner's new grassed waterway, with straw netting to protect the newly seeded area

9. Applying TEK to Reduce Phosphorus in the Lower Fox AOC

Intertribal Agriculture Council (Oneida Tribe Wisconsin)

LESSON LEARNED

Crops need to become climate resilient; the project found that interseeding an appropriate cover crop provided extra soil moisture and produced a greater yield.

The project supported the Oneida Tribe's efforts to reduce phosphorus and soil loss from tribal lands within the Lower Fox Area of Concern. The grant also provided the Ohe.laku, a group of Oneida families growing traditional white corn, with the funds to demonstrate conservation planting and learn the benefits of soil health. Ohe.laku means *among the cornstalks*. Through the Intertribal Agriculture Council, grant participants were able to share their experience among the cornstalks of an 18-acre test field with other tribes, encouraging them to consider soil heath and reduced erosion. The test field was divided into six three-acre fields, with the goal of improving soil health and reducing erosion and nutrient loss through long periods of soil rest and longer crop rotations. The project was challenged by weather conditions and a steep learning curve to identify appropriate cover and companion crops suitable for growing heirloom corn.

10. Lower Fox Perennial Forage Project

Alliance for the Great Lakes (working in Wisconsin)

This project occurred in two parts: first, as the Lower Fox River Perennial Forage project taking place from August 2016 through September 2019; and second as the Fond du Lac County Great Lakes Priority Watersheds Harvestable Buffer project from October 2019 to June 2021.

Perennial Forage project:

The Alliance for the Great Lakes worked with Brown & Outagamie Counties' Land and Water Conservation Departments (LWCD) and private agronomists to partner with 15 landowners interested in planting perennial forages (alfalfa-grass mixes) in the Upper East, Ashwaubenon, and Apple Creek watersheds.

With how wet spring 2019 was, the grass gave my participating farm forage on acres that the practice was used on until things dried out slightly and the alfalfa could thicken back up.

Private agronomist participating in the Perennial Forage project

The photo above shows perennial grass interseeded into an alfalfa field. "Wherever you see grasses, that would be just bare soil if this was a pure alfalfa stand," noted an agronomist participating in the Perennial Forage project.

Harvestable Buffer project:

Fond du Lac County LWCD worked with landowners in the Pipe Creek Watershed project area to establish harvestable buffers along riparian areas in the watershed to reduce sediment and phosphorus runoff. Fond du Lac LWCD staff worked with three farmers to establish 25.4 acres of harvestable buffers. This work built from efforts under another GLSNRP investment, The Pipe "P" Trap, further detailed below.

11. The Pipe "P" Trap: A Collaboration for Cleaner Waters

Fond du Lac County Land and Water Conservation Department (Wisconsin)

The Pipe Creek watershed in Fond du Lac County, a tributary to Lake Winnebago, experienced significant erosion issues in 2014. An excess of hay at the main dairy in the watershed resulted in removal of hay acres in the watershed. The lack of hay ground meant significantly more corn acreage. These cropping changes, coupled with significant rain events, led to the formation of many gullies and a very visible amount of rill erosion and turbid water during the spring 2014. These changes in the watershed were noticed by the Conservation Department and local residents, inspiring a project application that led to this $175,728 investment from the GLSNRP.

It also should be noted that two producers in the watershed — who own the most land in the watershed — are committed to utilizing cover crops and less tillage as often as possible on as much acreage as possible, thanks to the insights and conversations had through the outreach activities, farm walkovers, and individual meetings. So while we only cost shared 111 acres of cover crops through the grant dollars, the grant funding has had a very positive impact on the adoption of cover crops throughout the watershed on many more acres than were paid on.

Paul Tollard
Fond du Lac County Conservationist

Through the grant, the Conservation Department worked with producers to bring perennial acreage back into the watershed through the installation of harvestable buffers. This conservation practice mimics traditional buffers but allows the producer to clip or harvest material as forage for livestock. 63 acres of harvestable buffers were installed, with more planned for the future through other funding. The grant also supported "NMP Verification" which allowed Department staff to continue building relationships as 26 existing nutrient management plans were reviewed to improve efficiency and accuracy for producers. Cover crops acres and critical area seeding were installed along with the completion of a watershed study to identify optimal opportunities for the placement of conservation practices through this grant and any future efforts.

12. Innovative Practice to Reduce P

Blanchard River Watershed Partnership (Ohio)

This project was built around the hypothesis that increasing soil organic matter will increase water retention in soil, thus slowing runoff and increasing yield through improved soil health. This $14,678 investment by the GLSNRP allowed the Blanchard River Watershed Partnership to work with three producers, focusing on three fields each. Of the nine fields, all but one was placed under a cover crop all three years of the award. Most of the project's acreage was also maintained through conservation tillage. Although the dataset proved too sparse to reliably gauge the impact of these practices on soil organic matter, soil testing of each field provided producers with improved information supporting more precise fertilizer application. The project also provided cost-share to producers planting wheat as a cover crop. Cost-share of $25 per acre decreased the profit gap between wheat as compared to corn or soybeans, incentivizing the planting of wheat. In addition to serving as winter cover, the earlier harvest of wheat allows for earlier incorporation of manure and establishment of a cover crop in advance of winter. Over time, the inclusion of wheat in the crop rotation should improve soil health.

13. Walnut Creek Restoration at P.I. Downs and Casino

The Pennsylvania State University

Walnut Creek is one of the finest steelhead fisheries in the Great Lakes region, bringing in millions of dollars to the Erie community each year. The stream supports a naturally reproducing trout population and provides habitat for threatened and endangered plant and animal species. This great resource gets significant pressure from land development. The mouth of Walnut Creek is located five miles west of the beaches of Presque Isle State Park, Pennsylvania's most popular park.

Pennsylvania Sea Grant (sponsored by The Pennsylvania State University) and Pennsylvania Department of Environmental Protection staff identified a 200-foot segment of Walnut Creek requiring stabilization. The original property owner, Presque Isle Downs and Casino, was involved in discussions to secure the GLSNRP award, but later sold the property. Pennsylvania Sea Grant staff steered the project through permitting processes, but ultimately the new owners of the property were unwilling to partner on the stream restoration project. Although alternative project locations were sought, none were feasible leading to the GLC's cancellation of the GLSNRP award.

14. Elkhart Lake Iron-enhanced Drainage Project

Sheboygan County Planning (Wisconsin)

The GLSNRP supported two phosphorus filter installations that were the culmination of several years of planning with the Elkhart Lake Improvement Association, consultants, Elkhart Lake area landowners, and the Sheboygan County Planning and Conservation Department. One filter was installed on a home's septic system while the second was installed on an agricultural tile line. Both filters were intended to investigate the potential for slag, a by-product of the steel industry, to bind phosphorus when used as filter media. Sampling indicated success in reducing phosphorus from the home septic system, while the agricultural tile line presented challenges as the original filter media solidified and required replacement. Lessons learned from the agricultural tile experience are shared in the box to the right. For the work with a home septic system, Sheboygan County Planning shares that it takes time to find a willing homeowner that also has a septic replacement project on the horizon.

LESSONS LEARNED FROM ADDING A PHOSPHORUS FILTER TO A TILE

- **Make sure there is enough elevation change in the system.**
- **Have a reliable way to regulate the inflow rate into the filter media such as a smaller diameter pipe carrying a set rate of water into the filter bed.**
- **Be sure to install a valve on the pipe leading to the filter bed to allow flow to the bed to be shut off if maintenance is needed or a reduction of flow if desired.**
- **Agricultural tile line filters are also dependent on the condition of the tile system coming from crop fields. If that system is experiencing maintenance issues, such as tile blowouts allowing sediment into the tile system, those issues will affect the filter system if not discovered and repaired immediately.**

Disclaimers

This material is based upon work supported by the Natural Resources Conservation Service, U.S. Department of Agriculture, under award 69-3A75-16-621 funded by the Great Lakes Restoration Initiative.

Any opinions, findings, conclusion, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the U.S. Department of Agriculture.

This publication was authored by Great Lakes Commission staff Ken Gibbons and Nicole Zacharda, with help from Great Lakes Sediment and Nutrient Reduction Program grantees.

The Great Lakes Commission is a binational government agency established in 1955 to protect the Great Lakes and the economies and ecosystems they support. Its membership includes leaders from the eight U.S. states and two Canadian provinces in the Great Lakes basin. The GLC recommends policies and practices to balance the use, development, and conservation of the water resources of the Great Lakes and brings the region together to work on issues that no single community, state, province, or nation can tackle alone.

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USDA United States Department of Agriculture
Natural Resources Conservation Service

Great Lakes RESTORATION