Final Report for the Cooperative Agreement between the Great Lakes Commission and United States Department of Agriculture NRCS #68-3A75-11-231

A summary of benefits achieved through application of Great Lakes Restoration Initiative funding in controlling sediment and reducing nutrients in the Great Lakes

Great Lakes Commission
des Grands Lacs

Acknowledgments

Support for the seven projects described in the following report was made possible with funding from the Great Lakes Restoration Initiative (GLRI) through the USDA-Natural Resources Conservation Service (NRCS). The Great Lakes Commission gratefully acknowledges the United States Environmental Protection Agency (U.S. EPA) (which manages the GLRI) and the NRCS for funding the Great Lakes Basin Program for Soil Erosion and Sediment Control in 2011.

Critical to the success of this cooperative federal-state effort over the many years of the Great Lakes Basin Program has been the guidance provided by the Soil Erosion and Sedimentation Task Force, including representatives from the eight Great Lakes states, NRCS, U.S. EPA, and the U.S. Army Corps of Engineers. The Task Force membership list is included as Appendix 1. The involvement of the Task Force members in all aspects of the project has been tremendously helpful to ensure that project activities meet the soil and water conservation needs of the Great Lakes states and address the priorities of the GLRI.

Special thanks go the following individuals from NRCS who have been involved with and supported this effort by serving as GLRI coordinators for NRCS: Jan Surface (2010), Vicki Anderson (2010-2011), Tom Krapf (2012-2013), Michael Moorman (2013-2015), Paul Youngstrum (2014-2015), Doug Deardorf (2016) and Lisa Duriancik (2016). Appreciation is also extended to Dan Lawson, who served as Branch Chief for Conservation and Watershed Planning (2010-2011); Angel Figueroa, Conservation Initiatives Team Leader (2011-2012); and Martin Lowenfish, current Conservation Initiatives Team Leader, for providing oversight to the project for NRCS headquarters. Additional thanks are extended to the Great Lakes Basin Program staff who worked on this project, including Gary Overmier, Senior Project Manager (who manages the project) and Michael Schneider, Senior Program Specialist, (who assists in the coordination of all aspects of the project). Thomas Crane, Deputy Director of the Great Lakes Commission, provides guidance to the staff and project oversight.

Finally, special acknowledgement goes to David Knight (Great Lakes Commission contractor), Laura Andrews, Design Manager, and Beth Wanamaker, Communications Manager, for their excellent work in the writing, design and editing of this report.

Table of Contents

Executive Summary

The Great Lakes Commission has a long history of providing grants to local entities to control nonpoint source pollution. The Great Lakes Basin Program for Soil Erosion and Sediment Control (Basin Program) began in the early 1990s as a cooperative federal-state program to reduce erosion and control sediment from entering the waters of the Great Lakes basin. The Basin Program was rebranded in 2015 as the Great Lakes Sediment and Nutrient Reduction Program (GLSNRP). For this report, the program is referred to as the Basin Program. Through support from its federal partners (U.S. EPA 1991-1993; and USDA-NRCS 1994-present) the Basin Program has supported locally-led and implemented conservation practices to stop soil erosion and reduce the flow of sediment and nutrients into the Great Lakes. With the enactment of the Great Lakes Restoration Initiative (GLRI) this effort was continued on a larger scale beginning in 2010. Over its nearly thirty year history, the program has supported 438 projects to reduce the input of unwanted sediment, nutrients, and other sediment-borne pollutants into Great Lakes, reducing soil erosion by more than two million tons and phosphorus loadings by more than two million pounds.

This report contains the results of the second year of GLRI funding that supported seven local projects in six Great Lakes states (IN, MI, MN, NY, OH and WI). Under this four-year agreement between the Great Lakes Commission and NRCS, substantial and measurable reductions in both sediment and phosphorus have been achieved. The following report narrative provides an overview of these efforts, including documentation of project methodologies and quantitative results from the nine projects. The appendix contains details on the entire process of the program from the request for proposals and project selection process to the administrative documents and methodology used to track progress and assure accountability. Each project's final report is also included, many with before and after pictures. Finally, lessons learned and suggestions for future program implementation are included, many of which were incorporated into subsequent program year efforts.

An analysis of the results was also conducted on the implementation activities. The analysis provides interesting insights into cost effectiveness of the practices. Permanent practices tended to provide more sediment reduction at a lower average cost than the annual management practices such as cover crops and residue management. These latter two practices become cost-effective only if the farmer adopts the practice and continues to use it in the future at no further cost to society.

The results of the program's activities are as follows:

- **19,570 acres of land were treated with some type of conservation practice**
- **14 individual types of conservation practices were implemented across projects**
- **179 conservation practices, in total, were implemented**
- **109,582 (estimated) tons of soil were saved from being eroded and kept out of the waters of the Great Lakes**
- **111,539 (estimated) pounds of particulate phosphorus were kept out of the waters of the Great Lakes**
- **36,783 (estimated) tons of sediment were kept out of the waters of the Great Lakes**

The three largest practices in terms of total aces treated were cover crops, conservation cropping systems (including residue management and no-till), and gypsum soil amendments. These three practices cover a total of 15,169 acres treated, with 13,441 tons of estimated soil savings over the life of the projects, and 13,827 pounds of particulate phosphorus saved.

Given the successes over several decades in eliminating most point-source contributors of pollutants to the Great Lakes, increasingly attention is being focused on nonpoint sources of pollution, sediment and excess nutrients impacting water quality. The seven projects carried out in 2011 under the Great Lakes Basin Program with GLRI support demonstrated measurable effectiveness in achieving objectives in this high priority area of the GLRI mission.

Project Background

Efforts to restore and protect Great Lakes water quality by reducing agricultural runoff received a major boost in 2010 with Congress's enactment of the Great Lakes Restoration Initiative (GLRI). In August of that year, the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) awarded $5 million in GLRI funds to the Great Lakes Commission to implement a program for soil erosion and sediment control involving project demonstration grants, technical assistance and information/education activities to improve water quality in the Great Lakes basin. The Commission used an existing program, known as the Great Lakes Basin Program for Soil Erosion and Sediment Control (Basin Program) to carry out these tasks. The goal of the Basin Program, which was authorized under the 2002 and 2008 Farm Bills, is to protect and improve water quality in the Great Lakes by reducing sediment and nutrient runoff through financial incentives, information and education, and professional assistance.

Since 1991, the Great Lakes Commission has managed the Basin Program, which includes an annual grants component providing funding for erosion and sediment control projects in the Great Lakes basin. Through its history, the program has been funded by U.S. EPA Region 5 (1991-1993); the U.S. Department of Agriculture-NRCS (through its conservation operations budget) 1994-2010; and USDA-NRCS (through the GLRI) 2010-current.

Over the life of the program, more than $27 million dollars in federal funds has been made available to support on the land conservation programs in all eight Great Lakes states.

Under the Basin Program, the Great Lakes Commission issues a request for proposals each winter for small scale and watershed scale grants designed to control erosion and sediment and reduce phosphorus throughout the Great Lakes basin. Beginning in 2010 with funds provided through the Great Lakes Restoration Initiative, funding was directed at specific priority watersheds including the Maumee River basin (covering portions of Indiana, Michigan and Ohio), the Lower Fox River basin in Wisconsin, the Saginaw River/Bay area in Michigan, the St. Louis/Nemadji River basins in Minnesota and the Genesee River basin in New York.

An important attraction of the Basin Program to NRCS when entering into the agreement with the Great Lakes Commission was the existence of the regional Soil Erosion and Sedimentation Task Force comprised of members from each Great Lakes state, NRCS, U.S. EPA and the U.S. Army Corps of Engineers. The Task Force, in place since 1991 to oversee the work of the Basin Program, is responsible for providing broad oversight of the program and meets annually via conference call to select the projects to be funded under the program.

Under the 2011 Agreement (the second year of GLRI funding for the program), the Commission awarded grants totaling over $2.4 million to seven regional projects aimed at helping farmers implement practices to keep soil on the land, thus reducing flow of unwanted sediment, nutrients, and other sediment-borne pollutants into Great Lakes waters. The implemented conservation practices will save over 109,000 tons of soil, retaining over 111,000 pounds of particulate phosphorus in the soil. This is important because it prevents the phosphorus from entering Great Lakes bays, harbors and tributaries and contributing to the formation of harmful algal blooms and oxygen-depleted dead zones.

The program's impact, enhanced with support through the GLRI, has also been experienced in other ways. These include greater public acceptance of soil conservation practices, particularly among Great Lakes basin farmers and agricultural land owners, a group that does not easily accept change.

The core strategy of the Great Lakes Basin Program, which was re-branded as the Great Lakes Sediment and Nutrient Reduction Program (GLSNRP) in 2015, has long been to fund locally led efforts to reduce runoff and sedimentation. Supported by Farm Bill authorization and administered by the Great Lakes Commission for over

two decades, the program's profile has grown in recent years as a result of increased attention paid to nonpoint source pollution of Great Lakes waters.

Thanks to such landmark legislation as the Clean Water Act of 1972 and the National Pollutant Discharge Elimination System (NPDES), "point source" discharges of toxic pollutants, typically from industrial and municipal sources, have largely been eliminated. The increased emphasis and change of focus to nonpoint sources such as agricultural runoff began to occur in various programs and initiatives (such as the Farm Bills beginning with the 1985 Farm Bill) but is clearly reflected – and fully validated – by the Great Lakes Restoration Initiative's original Action Plan which included "*Reducing nutrient runoff that contributes to harmful/nuisance algal blooms"* as one of four main focus areas.

Since 2010, under its nonpoint source focus area guidance, GLRI resources have been used to double the acreage enrolled in agricultural conservation programs in watersheds where phosphorus runoff contributes to harmful algal blooms, including western Lake Erie, Saginaw Bay and Green Bay.

According to the GLRI's FY2010 Report to Congress and the President, "Progress in this focus area is critical to the restoration of the Great Lakes, because the nearshore is the principal area in which people interact with the Great Lakes. Moreover, degraded water quality in the nearshore can undermine larger lake restoration efforts. The projects underway in this focus area will make progress toward reducing sediment and nutrient loadings into the Great Lakes, which will reduce human health risks and ecosystem degradation posed by bacteria, viruses, pathogens, and other nuisance biological growths. Progress in this area under the GLRI is tied directly to protecting drinking water and improving the recreational use of the Great Lakes. To foster effective restoration or protection of nearshore waters, projects also focus on improving the ability of decision-makers to identify and implement appropriate actions."

"Reducing sediment pollution from entering the Great Lakes is a win-win, for both farmers and Great Lakes water quality," said Tim Eder, executive director of the Great Lakes Commission. "These GLRI funds are putting much needed resources on the ground to help install conservation practices to control nonpoint sources of pollution in critical watersheds."

Program history reflects strong federal-state collaboration

The Great Lakes Basin Program for Soil Erosion and Sediment Control was established in 1988 with enthusiastic support from the eight Great Lakes states and relevant federal and regional agencies, to address conservation needs identified and under the 1985 Farm Bill. The program is a federal and state partnership managed by the Great Lakes Commission in cooperation with the U.S. Department of Agriculture (NRCS), U.S. Environmental Protection Agency (Region 5), the U.S. Army Corps of Engineers and representatives from departments of natural resources, environmental protection and agriculture from the eight Great Lakes states.

The Farm Bill emphasized the need for implementation of conservation practices to reduce erosion on highly erodible land. While the Great Lakes basin does not have a significant amount of highly erodible lands relative to other areas of the country, the soil that does wash off into Great Lakes tributaries and into the Lakes directly has been identified as a significant contributor to water

Under the seven soil erosion and sediment control projects supported by the GLRI in 2011:

- **19,570 acres were treated**
- **179 best management practices applied**

quality degradation, especially in nearshore areas. The Basin Program was thus established to fill a unique and, at the time, unmet environmental protection role.

The program has historically operated by providing competitive grants to local and state units of government and nonprofit organizations to implement erosion and sediment control measures in priority areas within the Great Lakes basin. Between 1991 and 2010, the program supported 438 locally sponsored projects, allocating over $19 million in grant awards to projects generally not funded by other U.S. EPA or USDA cost-share programs. Those 438 projects are estimated to have reduced soil erosion in the Great Lakes basin by more than 2 million tons and phosphorus loadings by over 2 million pounds.

GLRI support in 2011 enabled the addition of seven additional projects in watersheds located among six states: Indiana, Michigan, Minnesota, New York, Ohio and Wisconsin.

Priority watersheds were identified to maximize impact from conservation practices

Priorities for the 2011 GLRI-supported grant program were developed with input from a regional Soil Erosion and Sedimentation Task Force that included representatives from the eight Great Lakes states, NRCS, U.S. EPA, and the Army Corps of Engineers. The Task Force evaluated areas of need in the basin, a process that continues annually, and directed grant support to address the most pressing needs. It also developed and employed a rigorous review and evaluation process to prioritize projects generating the highest environmental and economic returns on GLRI investments.

With an overall goal of reducing total sediment and phosphorus loadings to the Great Lakes from heavily farmed watersheds, the Task Force in 2011 (upon the recommendation of NRCS) opted to consolidate resources into strategically selected, concentrated areas, versus funding individual site projects scatted more randomly across the basin. This approach led to adoption of a strategy to identify and implement best management practices in priority watersheds. These were generally watersheds in the basin characterized by heavy agricultural land use, substantial amounts of soil with high clay content, and a prevalence of unstable streambanks, all conditions known to contribute to sediment runoff and erosion.

Grant awards involved a competitive process based on potential for sediment and phosphorus reduction, appropriateness of practices to be implemented, applicants' ability to complete projects on time and within budget, creativity in design of the practices, innovation in approaches to cost sharing with landowners, and other factors.

The selection process used for the 2011 program was changed from that used for 2010, the first year with GLRI support, and was similar to that used for the Basin Program prior to the GLRI. The Task Force dropped the two-phase process in which pre-proposals were first solicited.

The greater magnitude of anticipated projects and the change in focus from local erosion control to more comprehensive Great Lakes-wide sediment load reduction required a substantial rewrite of the Request for Proposals (RFP) from previous years prior to the arrival of the GLRI. Much greater detail was sought on the types of conservation practices proposed and their projected effectiveness in terms of total soil tonnage retained.

The 2011 RFP focused on two pollutants: sediment and particulate phosphorus. Applicants in the pre-selected priority watersheds were asked to develop their own unique implementation projects for funding. To ensure maximum use of the program's flexibility, no pre-determined conservation practices were required or featured. Applicants were given the flexibility to choose the sediment and particulate phosphorus reduction practices that best addressed their local circumstance. Applicants chose the types of practices, the number of each practice to be implemented and specific implementation sites.

Following the announcement of the new round of GLRI-supported grants by the Great Lakes Commission, a total of 24 proposals were submitted. Of those, seven were ultimately approved by the Task Force for funding. All project timelines were at least three years in length with some projects extended to five years after the work had begun. Contracts between awardees and the Commission spelled out specific obligations of both parties, such as quarterly reporting requirements, adequate insurance coverage and assurance that all appropriate state and federal regulations would be met.

Payment of funds to grant recipients was done on a quarterly reimbursement basis. Once Commission staff approved the reports, a separate approval form along with the signed invoice was provided to the Commission's budget department for processing. Individual project requests were bundled and sent to NRCS. NRCS would process a lump-sum payment to the Great Lakes Commission, which would then reimburse each individual project based on their approved reimbursement amount. As most awardees had budget constraints that limited their ability to start up new projects, the Commission provided up-front funding of ten percent of the total project budget at the contract signing.

Agriculture and erosion

Agricultural activities cause erosion as a result of tilling the soil and leaving all or parts of the soil surface unprotected from the impact of rainfall and concentrated flows. Soils with higher clay content are more easily transported to the Great Lakes once eroded from the landscape. Clay is a very small particle which remains in suspension with minimal stream flow energy. Essentially, once a clay particle enters the stream system it is eventually transported to the Lakes. Clay is also the most chemically active of soil particles, absorbing many of the chemicals used in agriculture. Soil eroded from streambanks is almost one hundred percent delivered to the stream system, disproportionately providing sediment delivery to the Lakes.

Best management practices in the program's tool kit were many and varied

No single approach to reducing sediment and nutrient loadings is appropriate in every setting. Each location and situation requires evaluation to determine which best management practice (BMP), or combination of BMPs, best meet the resource need or solve the environmental problem. In both 2010 and 2011 projects, many different types of BMPs were employed by the funded projects. Practices aimed at controlling erosion and sediment were most prevalent. These included varying forms of residue management, cover crops, critical area stabilizations including streambank stabilizations, grass waterways with associated practice such as subsurface drainage and erosion control structures, filter strips and cropland-to-hayland conversions.

Several innovative approaches to sediment and erosion control were employed, both in the field and in project management. For instance, "BMP auctions"- a concept pioneered in Kansas - were used in two projects to maximize cost efficiency (see sidebar). Several new (or at least new to the region), field practices were utilized including soil amendments such as the application of gypsum, modification of fertilizer placement equipment, new fertilizer placement equipment, hydrologic modification to slow down flow rates (two stage and over-wide channels), livestock exclusion from streams including fencing, off-stream watering facilities, heavy use areas and designated stream crossings. In the first two years of the GLRI-supported work, some 28 types of practices were implemented, including:

- **Two-stage ditch construction**
- **Cover crop planting**
- **Equipment modification for cover crop planting**
- **Gypsum soil amendment**
- **Hay and pasture planting**
- **Heavy use area designation**
- **Pipeline and watering facility installation**
- **Streambank protection and fencing**
- **Roof runoff system and subsurface drain installation**
- **Stream crossing enhancement**
- **Streambank and shoreline protection**
- **Livestock area fencing**
- **No-till practices**
- **Reduced-till practices**
- **Residue management**
- **Strip-till practices**
- **Filter strip implementation**
- **Field border installation**
- **Gully stabilization**
- **Streambank stabilization**
- **Detention pond construction**
- **Water and sediment control basin (WASCOB) construction**
- **Rock-lined waterway construction**
- **Grass waterway construction**
- **Grade control structure installation**
- **Riparian buffer construction**
- **Over-wide ditch construction**
- **Critical area stabilization (old tile repair)**

BMP auctions represent a new market-based approach to sediment control

A Best Management Practice auction involves the land user submitting a bid on what BMPs they are willing to install to control erosion and sediment loading, and at what costs. Bids are then ranked by the amount of water quality improvements generated from each BMP. Sediment load reduction for each BMP is divided by the amount of the requested funds to arrive at a least cost per ton of sediment saved. BMPs to be used include filter strips, no-till cultivation, cover crops, streambank restoration and wetland restoration.

"The BMP auctions will enhance the reduction of sediments into waterways by implementing best management practices," says Jim Johnson, MDARD's Environmental Stewardship Division director. "The auctions provide an economically feasible tool for farmers to implement sediment-reducing practices."

Lessons learned: Recessionary pressures added to program challenges

Managing the nine projects under the first year of the GLRI, 2010, and the next seven projects in 2011, presented a few challenges and there were lessons learned which are described in the following section. A first challenge was not primarily technical, but dealt more with important social and economic issues facing the Great Lakes region. As new GLRI projects rolled out, the region was still dealing with severe economic aftershocks from the 2008 recession. As an entity created by and serving the eight Great Lakes states, the Great Lakes Commission was acutely aware of the economic challenges faced by the states as budget constraints affected almost all departments and personnel, including those involved with the Great Lakes Basin Program. The downsizing of state agencies handling permit applications, review and approval, for example, impacted the timely issuance of permits for the 2010 projects. This had the effect of delaying the work of some projects especially the larger-scale watershed projects.

A critical need emerged for personnel to quickly and efficiently plan, design and activate conservation practices in the priority areas given the influx of millions of dollars of implementation funds from GLRI. The grant program was intentionally designed to provide large watershed-size grants to local entities to allow them to hire staff who would provide much-needed technical assistance in implementing practices not only for those supported by the GLRI agreement, but also those working on previously established Farm Bill projects. This ability to fund project staff under the program was a key to success as it filled a real need for project applicants that may have been understaffed as a result of the slow regional economy.

The federal need to track and precisely account for GLRI-supported programs influenced how the projects were managed. GLRI funding had to be spent as a package and staff supported by GLRI funds could only implement GLRI-supported practices to guarantee that the benefits accrued to the practices could be more clearly evaluated. This resulted in projects reducing their technical assistance budgets and increasing financial assistance dollars. Where a team or two or three staff members might have been envisioned originally, only a half time staff person may have been available under the revised budgets. Most projects were thus forced to use existing staff. This delayed the installation of some practices.

The recession had additional impacts on the program, involving effects on the private sector as well as the states. Many contractors involved in conservation-related work went out of business during this period, thus reducing the pool of available contractors to do the needed work. Contractors available for soil conservation work included many small, local, family-run businesses that struggled unsuccessfully to weather the economic downturn. On the positive side, however, (from a project management standpoint) bids from work-hungry contractors came in significantly lower than estimated project costs. Even larger contracting firms, not normally interested in conservation work, submitted bids as other large-scale job opportunities diminished.

Weather also had unforeseen impacts on project implementation. In 2011 excessive rainfall in the Great Lakes basin prevented a number of best management practice components from being completed on schedule. Others were damaged by excess runoff during and after installation and had to be reworked. In 2012 there was a drought which delayed the installation of any plant materials as well as some implementation.

Looking ahead: Recommendations for maximizing program efficiency, effectiveness

The management and administration of the 2011 agreement was conducted in the same manner and scope as the 2010 agreement. It was successful in carrying out the requirements of the agreement and should continue in the future. A few areas, though, could benefit from adjustments.

The 2011 RFP reduced the amount of the grants from $750,000 to $500,000 as a result of experience gained in administering the 2010 agreement. It is recommended this be further reduced because of the proliferation of additional implementation dollars making large projects funded by the GLC unnecessary. Also, many grantees had difficulty in completing their work plan on time with existing staff.

The total dollar amount available for grants for the 2011 program was reduced from 2010 which allowed the selection process to be streamlined and the pre-proposal requirement was eliminated. This did not affect the quality of the selection process. The 2011 project selection process should be continued in the future.

The change instituted to limit the project implementation areas to no more than three adjoining 12- digit hydrologic unit code (HUCs) did in fact concentrate implementation into the smaller areas. This was deemed necessary to making a positive difference in the reduction of the delivery of sediment from those watersheds, and should be continued.

One suggested change applies to invoices submitted by grantees for project work. The invoice form needs to be revised to better track the use of the advance payments. The requirement to “spend down” the advance before requesting additional funds caused some confusion among grantees. A revised invoice form is anticipated to correct this administrative issue.

The “innovative approaches to incentives and cost sharing” should be retained and expanded to include innovative conservation practices.

Beyond the quantitative benefits documented in this report, such as tons of soil retained on the land and pounds of phosphorus kept out of the waterways, it is important to note that this program produced additional, less measurable benefits for the Great Lakes basin and its residents.

The program strengthened relationships between state and local agencies involved in delivering soil conservation and watershed management to their constituents. It provided opportunities for participating agencies to explore, demonstrate and evaluate new and different methods of extending services to a target group - i.e. landowners and agricultural producers - that wield significant impact on the Great Lakes water resource.

The program provided opportunities to implement and evaluate a broad suite of conservation practices, both tried-and-true and new-and-innovative, in a variety of settings, scales and other circumstances. It provided opportunities for technology transfer and for organizations to expand their technical abilities and assets. The program encouraged landowners and farmers to better understand the value of soil conservation to both their operational benefit and the health of the resource.

Encouraging and promoting innovation and discovery is a process, and improvements will occur and continue through communication and ongoing re-evaluation. One area that should be carefully assessed going forward is the scale of individual projects. Reviewing the first two years of the GLRI-supported projects, it becomes apparent that some individual project scopes and the administrative requirements involved may have been too broad for

the project timeframe allowed, and too complex to manage for the local agencies and the participating landowners. The recommendation going forward is to emphasize a greater number of smaller grant awards and fewer large-scale, large-budget projects.

Developing new and innovative best management practices and implementing the best approach for incentivizing them takes time. Education is required and learning curves are necessary for both the service provider and funding recipient/implementer. This was evident in the GLRI-supported projects that experimented with BMP auctions. Actual field work on these projects experienced delays because the bidding process and evaluation process were not synchronized with the construction and cropping season. Also, the evaluation process was so complex it took several months longer to obtain the results, by which time some bidders had lost interest, gone on to other projects, or given up due to lateness in the construction season and fiscal year requirements for project implementation.

This experience illustrates potential discrepancies that can typically exist between hypothetical models and actual practices in the field. Looking ahead, the recommendation is for increased emphasis on how theoretical processes can be streamlined as much as possible, particularly on the front end with more flexibility allowed on the bidding and awarding functions.

Allowances should also be considered, going forward, for personnel adjustments. As much as agencies and organizations bring some degree of institutional stability to any project, individuals in critical roles can often determine whether a project is successful or not. As examples, some of the GLRI-supported projects experienced changes of people in key management positions which interfered with implementation and overall project progress. Other projects required new hires that necessitated training and a certain learning curve before these individuals were fully-effective in their roles. This again delays project work. With typical project timelines limited to three years, considering how short the construction season can be in the Great Lakes region, and factoring in unforeseen weather delays, any time missed for training new personnel can hinder progress toward meeting project goals on time and within budget. The recommendation, going forward, is that new hires not be placed in the position of managing a project, if it can be avoided.

As a result of the Commission's experience with administering similar grants in the past, it was realized the budgets needed to be flexible as far as adjusting individual line items. As projects moved forward individual budget line items needed adjustments. Most grantees switched funds from other line items in order to install more practices. This was accomplished not by revising and resigning the formal contract between the Commission and the grantees but by written exchange of letters. This method worked very well and should be retained.

Going forward, the lessons learned in carrying out the Basin Program projects supported by the Great Lakes Restoration Initiative provided significant added value to the program in the form of pathways to greater efficiency and effectiveness in future project management.

Selected conservation practices costs and soil and phosphorus savings – 2011

	Acres treated	Total cost per practice ($)	Average cost per acre ($)	Soil saved –over life of practice (tons)	Particulate phosphorus saved (lbs.)	Average cost per ton soil saved ($)
Cover crops	5,068	150,980	29.82	4,329	4486	34.87
Conservation cropping systems[1]	6,085	140,974	23.2	6,162	6,366	22.88
Filter strips	236	308,206	1,305	31,775	34,977	9.70
Grassed waterways	13	81,383	6279	7,199	7,143	11.30
Gypsum soil amendments	4016	95,188	23.70	2,950	2,975	32.27
Grade stabilization structures	5.4	46,146	8545	9,462	9,574	4.88
Equipment modification[2]	2,793	44,838	16.1	4,470	3,668	10.03
No-tillage	150	556	54.3	599	575	13.63
Streambank stabilization	18	444,574	24,698	40,227	39,727	11.05
WASCOBS	10.5	10,494	999	757	721	13.86

[1]Includes Minimum Tillage, Reduced Tillage, Residue Management
[2]To increase/enhance conservation systems

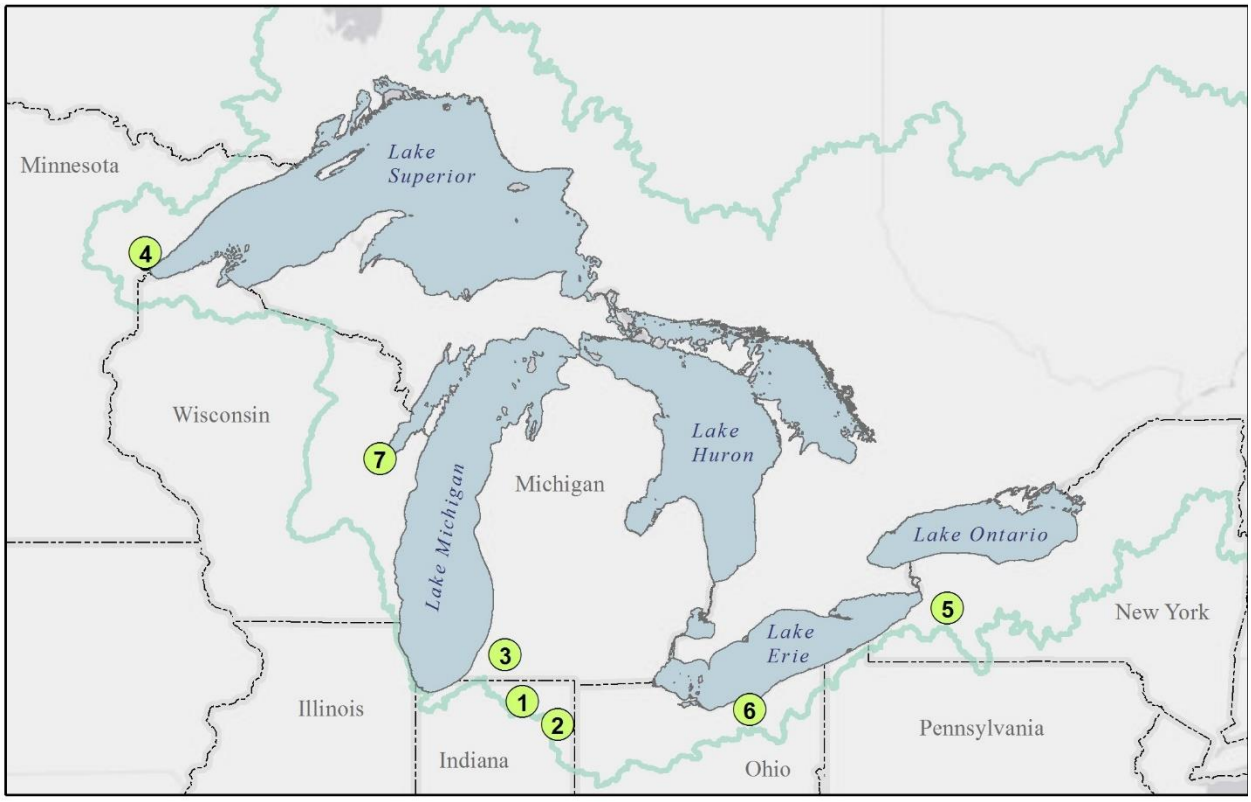
Summary of funds and practice implementation data – 2011

Total cost-share dollars spent per ton of soil saved and pound of particulate phosphorus saved over the life of the practices installed	$12.34
Total cost-share dollars spent per ton of soil saved and pound of particulate phosphorus saved when technical assistance costs are included	$22.37
Estimated tons of soil saved over the life span of the practices	109,482
Estimated pounds of particulate phosphorus saved over the life span of the practices	111,539
Acres treated	19,570
Number of individual practices installed	179
Number of states with projects	6
Number of watersheds	7
Average cost-share $ per acre treated	$69.00
Average tons of soil saved per cost share dollar spent	.08
Average pounds of particulate phosphorus saved per cost share dollar spent	.08

Conservation practices installed – 2011

Conservation practice	Number Installed	Percent of Total
Grade stabilization structure	35	19.5
Cover crop	27	15.1
Conservation systems -reduced tillage/conservation cropping / residue management systems	23	12.8
Stream bank stabilization	23	12.8
Gypsum applications	18	10
Filter strips	14	7.8
Grassed waterways	11	6.2
No-tillage practices	8	4.5
Equipment modifications	8	4.5
WASCOBs	6	3.4
Miscellaneous practices	4	2.2
Strip tillage systems	1	.6
Livestock exclusion/fencing	1	.6

Project location map - 2011



	Watershed	Applicant	Project Title
1	Elkhart River	Elkhart River Restoration Association, Inc.	Elkhart River Watershed Sediment Reduction Program
2	Upper Maumee	Allen County SWCD for the Upper Maumee River Watershed Partnership	Promoting Sediment Reduction in the Upper Maumee Watershed
3	Paw Paw River	Southwest Michigan Planning Commission	Ecosystem Services in the Paw Paw River Watershed
4	Knowlton Creek	Spirit Mountain Recreation Area	Knowlton Creek WS Erosion Control Project, Phase III Spirit Mountain
5	Buffalo River	Erie County Soil & Water Conservation District	Buffalo River Watershed Erosion and Sediment Control Project
6	Rocky River	Cuyahoga Soil & Water Conservation District	Stopping Sediment at its Source in the Rocky River Watershed
7	Oneida Nation	Oneida Nation of Wisconsin Environmental Health and Safety	Oneida Nation addressing AOC & TMDL Targets

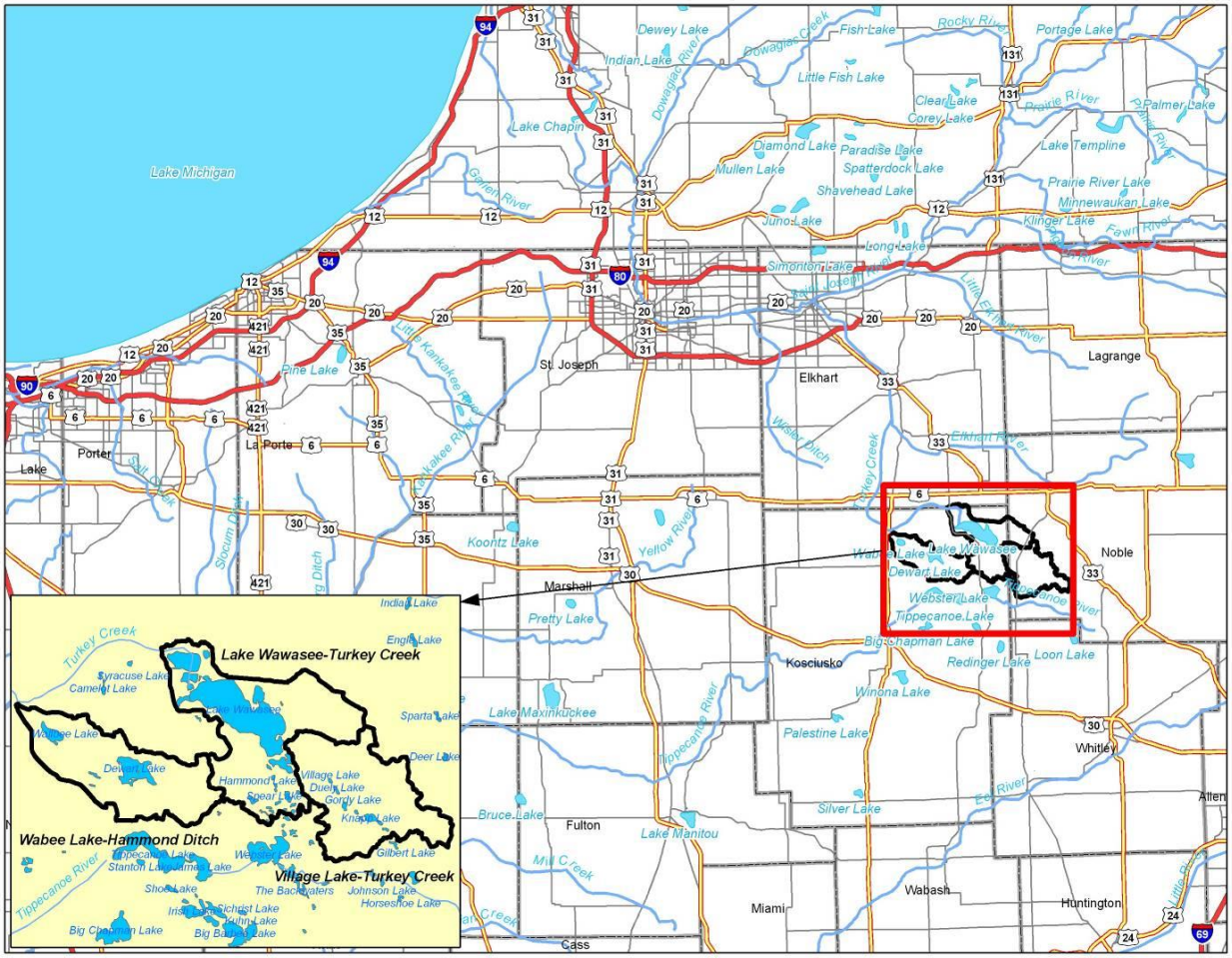
The following summaries describe the individual projects and accomplishments.

Project Title: Elkhart River Watershed Sediment Reduction Program

Grant Amount Awarded: $397,900

Sponsor: Elkhart River Restoration Association, Inc.

Turkey Creek is a sub-watershed located in the southwestern portion of Indiana's Steuben County. Turkey Creek drains into the St. Joe River, which flows through Elkhart and eventually into Lake Michigan. The area contains several lakes, of which Big Turkey Lake is the largest. Approximately 74 percent of the Turkey Creek watershed acreage is used for agriculture. Some erosion control producers have not implemented full conservation tillage measures (no till and cover crops) resulting in periods of significant erosion. The goal of this project was to reduce sediment erosion from fields and within the stream themselves, by concentrating efforts on those agricultural fields adjacent to waterways and waterway stabilization using a variety of standard and innovative NRCS practices.



Best Management Practices Applied include:

- **Stream bank stabilization including: bank barbs, bank deflectors, root wad revetments, rock toe protection, and reinforced earth (soil encapsulated lifts with brush layering)**
- **Two-stage ditch construction**
- **Filter strips and buffer strips**
- **Tree planting**
- **Grassed waterway construction**
- **WASCOB construction**
- **Grade stabilization structures including vortex rock weirs**
- **Rock chutes for gully stabilization**
- **Fencing (for livestock exclusion and grazing rotation)**
- **Watering station development/heavy use area**
- **Wetland construction/restoration**
- **Conservation tillage (promoting no-till and cover crops)**

Project Title: Promoting Sediment Reduction in the Upper Maumee Watershed

Grant Amount Awarded: $353,400

Sponsor: Allen County SWCD for the Upper Maumee River Watershed Partnership

While great strides have been made to combat sediment and phosphorus loading tied to sediment, the Maumee River is still not meeting water quality standards and algal blooms in Lake Erie are returning to levels that have not been documented in 30 years. The Western Lake Erie Basin (WLEB) watershed is the most heavily agricultural Great Lakes Watershed, with 71% of land under agricultural production. The primary focus of the project was to target agricultural landowners and producers with the proposed BMP cost-share options. Adoption of practices supported by this project has the potential to hold sediment in the upper reaches and alleviate downstream sediment issues facing Lake Erie and the Port of Toledo.

Upper Maumee River Watershed Partnership Partners	
Ohio	**Indiana**
Defiance SWCD	Allen SWCD
Paulding SWCD	Dekalb SWCD
Ohio EPA	ISDA
NRCS Ohio	NRCS Indiana
ODNR	IDNR
Ohio State Extension	Purdue Extension
Maumee River Basin Commission	
Friends of the Rivers	
Maumee River Grassroots Organization	
Allen County Partnership For Water Quality	
Western Lake Erie Basin Partnership	
Maumee River Basin Partnership of Local Governments	
The Nature Conservancy	
City of Fort Wayne Public Works	

The project focused on three sub-watersheds of the Upper Maumee River. These watersheds were selected by the Upper Maumee River Watershed Partnership as critical areas where sediment reductions are both necessary and practical. Work in the three sub-watersheds targeted Amish and English farmers in the following areas:

- **Conventionally tilled agricultural fields adjacent to a stream or ditch**
- **Areas of significant erosion**
- **Unbuffered stream reaches**
- **Critical livestock operations**

Best Management Practices Applied include:

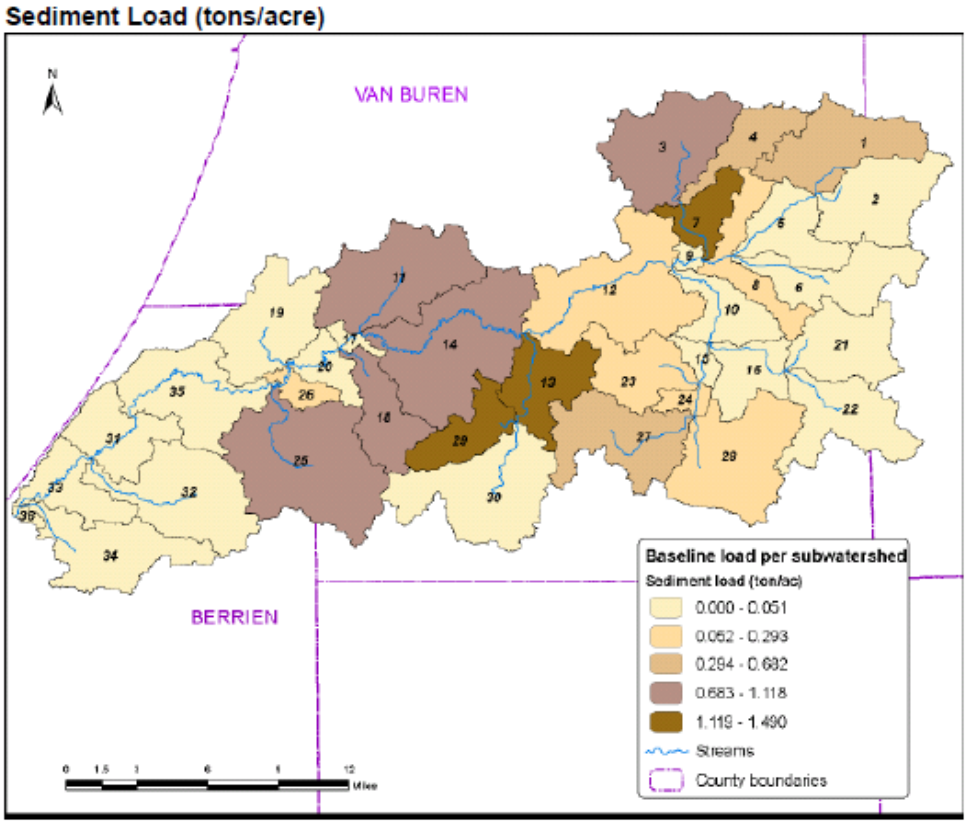
- **Equipment modifications**
- **Pasture/hay planting**
- **Cover crops**
- **Stream buffers/filter strips**
- **Grassed waterways**
- **Two-stage ditches**
- **Livestock exclusion fencing**
- **Alternative water supply systems**
- **Stream crossings**
- **Rotational grazing**
- **Controlled drainage**
- **WASCOB Systems**

Project Title: Payments for Ecosystem Services in the Paw Paw River Watershed

Grant Amount Awarded: $350,000

Sponsor: Southwest Michigan Planning Commission

In the Paw Paw River Watershed (PPRW) sediment is the highest priority pollutant impacting the St. Joseph River Watershed (SJRW). The PPRW is composed of 47% agricultural land use and the SJRW is about 70% agricultural. A significant portion of sediment, approximately 10,035 tons/yr., is delivered by a Paw Paw River tributary which feeds directly into the inner channel. The SJRW is estimated to be the second largest contributor of tons of sediment per year to Lake Michigan and fifth largest contributor to the Great Lakes.



This project will result in significant, long-term reduction of sediment loading to the PPRW, SJRW and Lake Michigan. Through an attractive incentive payment program, agricultural BMPs were implemented in the highest priority agricultural management areas as identified by extensive modeling in the PPRW Management Plan. The PPRW is the largest contributor of sediment to the St. Joseph River harbor at Lake Michigan and agricultural lands are the largest sources of sediment in the PPRW. Specifically, this project addressed the highest sediment loading areas in the PPRW and targeted the highest loading lands within those areas through the use of established tools.

The estimated soil reductions per year from this project will be 2,192 tons or at least 22% of the load to Lake Michigan, and these estimates are believed to be very conservative.

Best Management Practices Applied include:

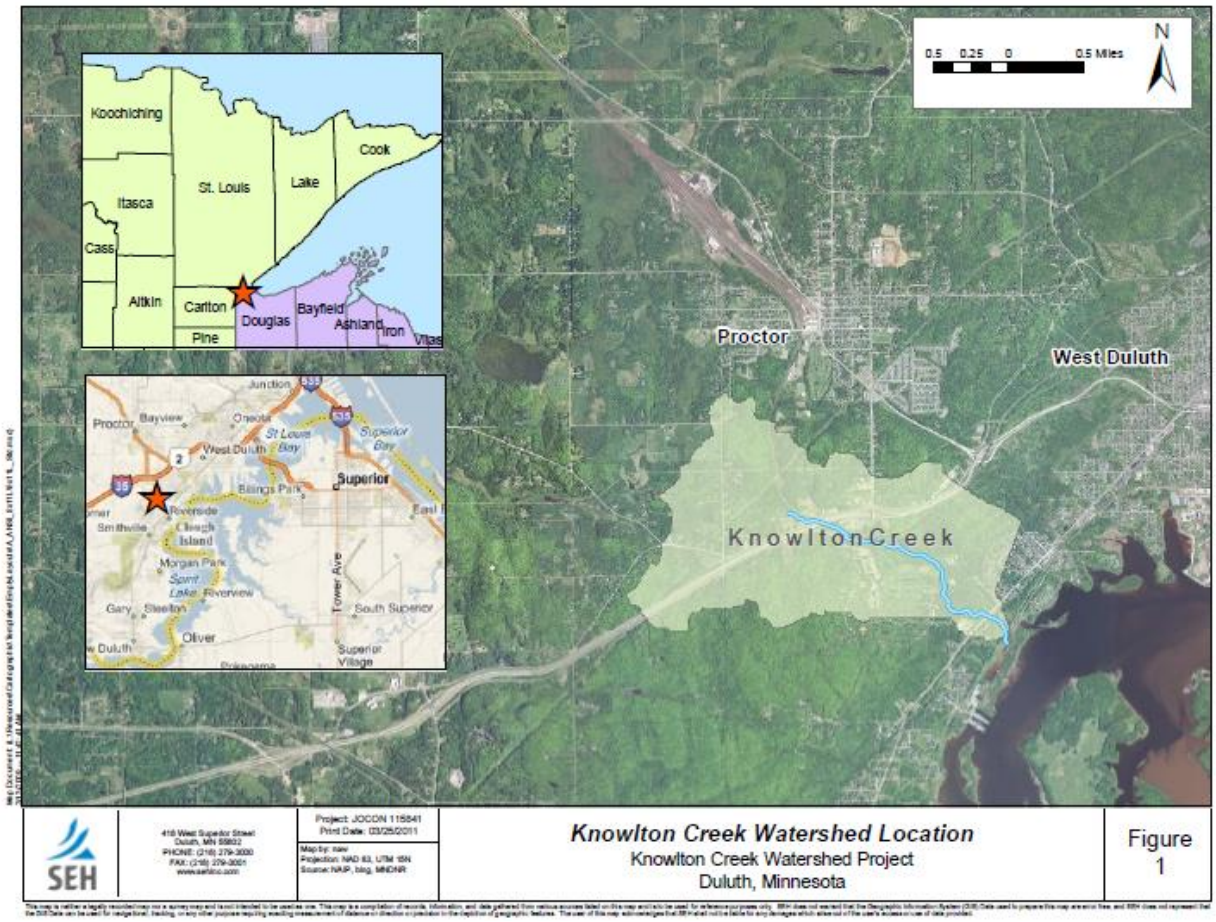
- **No-till practices**
- **Mulch till**
- **Grass filter strips**
- **Cover crops**

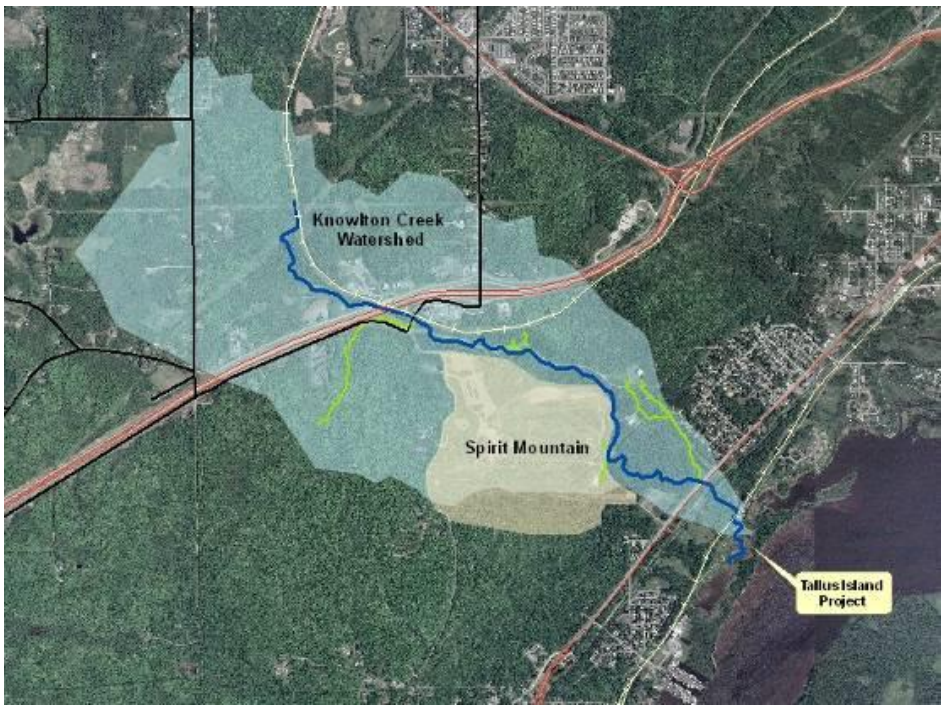
Project Title: Knowlton Creek Watershed Erosion Control Project, Phase III Spirit Mountain

Grant Amount Awarded: $400,000

Sponsor: Spirit Mountain Recreation Area

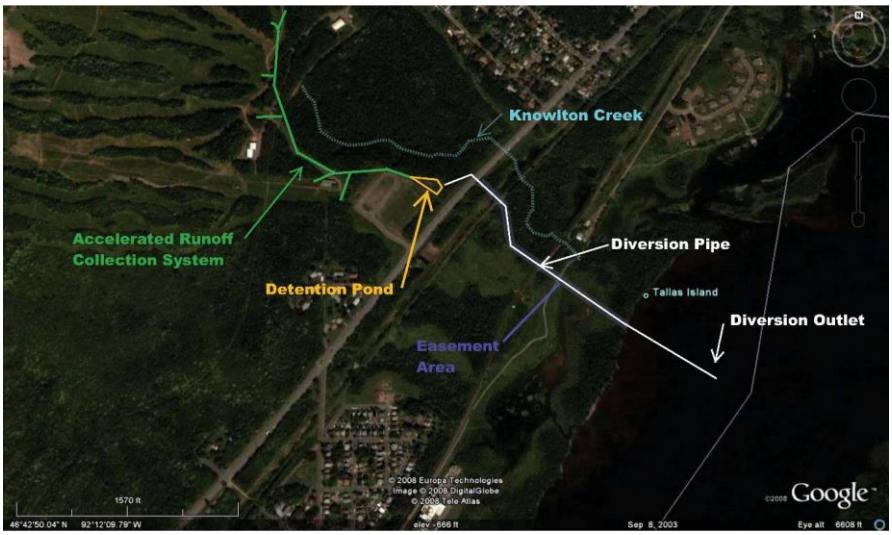
Approximately 200 acres within the Knowlton Creek Watershed were converted from forest to grass and impervious surface as a result of the development of the City of Duluth's Spirit Mountain recreational area in 1972. The change in land coverage from woodland forest to grasses increased the amount and speed of surface water on the landscape in any runoff event. Man-made snow further increases the volume of surface water in the watershed, which has changed the local stream's ability to effectively transport its sediment load without aggrading or degrading the streambed.





Knowlton Creek Restoration Phase III Spirit Mountain Sediment and Erosion Reduction Project is a system to collect the accelerated runoff from the Spirit Mountain Recreation Area and harmlessly divert it past the lower reach of Knowlton Creek to the St Louis River, thus preventing erosion damage to the creek and the associated downstream sedimentation.

This system at the base of Spirit Mountain will collect a portion of the runoff (with a system of check dams, swales and pipes), and route it into the existing detention pond. The pond was modified so sediments and floatable materials will be trapped. Then up to 35cfs will be diverted directly to the edge of the shipping channel in the St Louis River. This diversion of flow will prevent damage to the stream banks in Knowlton Creek.

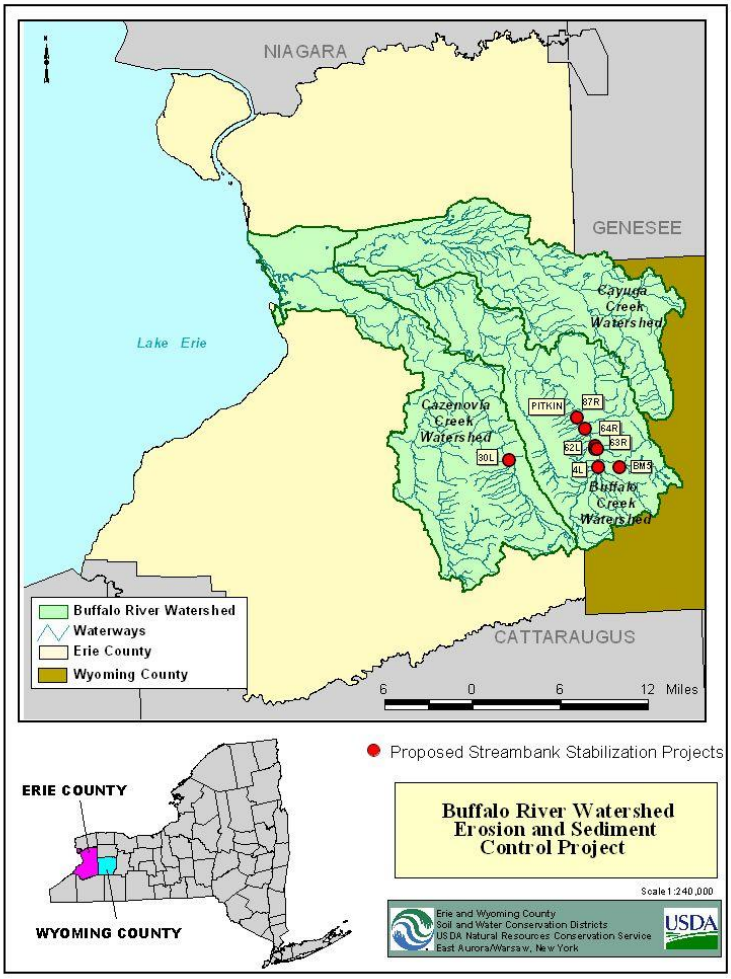


Project Title: Buffalo River Watershed Erosion and Sediment Control Project

Grant Amount Awarded: $180,000

Sponsor: Erie County Soil & Water Conservation District

The Erie-Wyoming Joint Watershed Board has the responsibility to annually inspect and maintain implementation sites in Buffalo Creek Watershed Project. While the majority of these streambank stabilization structures are intact and stable, the 2008 erosion inventory report revealed over 70 high priority sites totaling 3,670 linear feet of severely disturbed streambanks actively contributing sediments into Buffalo Creek and subsequently into the Buffalo River. After reviewing the erosion inventory, the Joint Watershed Board prioritized 11 sites in need of critical restoration. GLRI funding allowed the Joint Watershed Board and Erie and Wyoming County Soil and Water Conservation District's to use streambank stabilization practices on these 11 sites to improve water quality and aquatic habitat within the Buffalo River watershed through the reduction of ongoing sedimentation.



Project Title: Stopping Sediment at its Source in the Rocky River Watershed

Grant Amount Awarded: $400,000

Sponsor: Cuyahoga Soil & Water Conservation District

The sediment loading to Lake Erie from the Rocky River is approximately 70,560 tons/year, or the equivalent of 240 tons/square mile/yr. The Rocky River Watershed Action Plan (RRWAP) identifies siltation, embedded substrate or sediment loading as a problem in well over 70% of the watershed. In the watershed's rural areas, which are mainly located in Medina and Lorain Counties, soil loss from fields in row crop production, especially during periods of the year when the soil is bare, is an issue of primary concern - especially in the highly agricultural Mallet Creek and Plum Creek subwatersheds. Cover crops, conservation cropping systems and grassed waterways were installed. Stream bank erosion is also an issue in rural areas, usually in association with inadequate riparian buffers bordering fields, historical ditching or other stream modification, and small housing developments. Several of these areas were stabilized.

Agricultural practices were targeted in the Mallett Creek and Plum Creek subwatersheds. Within these watersheds, the practices (except livestock exclusion) further targeted areas in row crop production. Areas considered Highly Erodible Land were further prioritized. The cost-share on these practices was structured in such a way so as to incentivize incorporating the selected practices over a larger area.

Streambank stabilization practices were targeted in the Baldwin Creek subwatershed, which is characterized by medium-high density suburban residential land use that was developed largely during the 1960s and 1970s, before modern storm water control practices were required. This has led to altered hydrology and destabilization of streambanks and channels.

Best Management Practices Applied include:

- **Cover crops**
- **Filter strips/buffers**
- **Conservation tillage/residue management**
- **Grassed waterways**
- **Livestock exclusion**
- **Streambank stabilization**

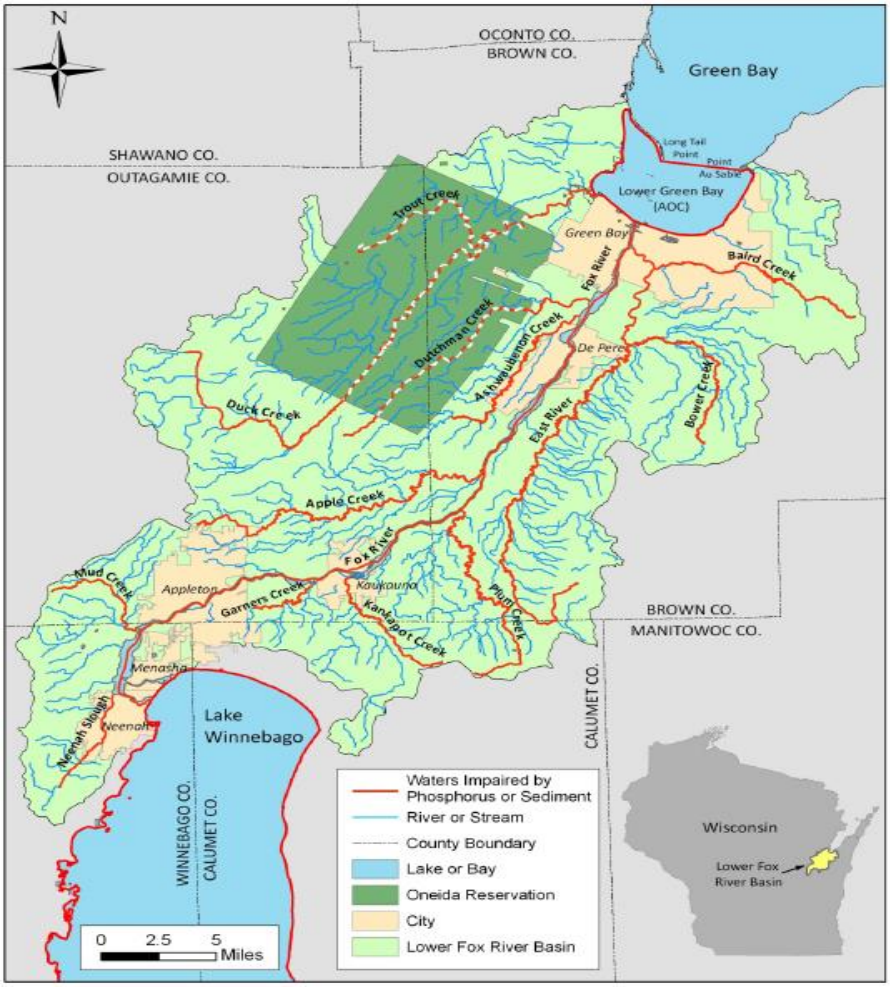
Project Title: Oneida Nation Addressing Areas of Concern and Total Maximum Daily Load Targets

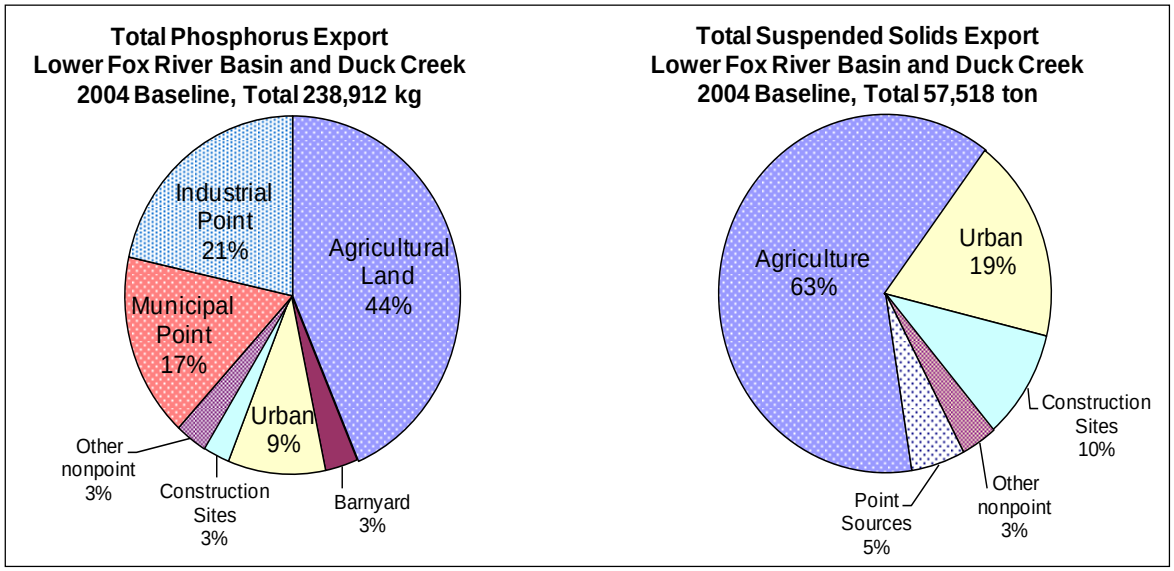
Grant Amount Awarded: $368,500

Sponsor: Oneida Nation of Wisconsin Environmental Health and Safety

The Oneida Tribe is the largest holder of land and the largest agricultural operator in the Lower Fox River with over 16,000 acres of operating agricultural land. In addition, 500 – 1000 acres of new rural land is purchased annually. Approximately half of the sediment and phosphorus loading to Lower Green Bay comes from watersheds in the Lower Fox Basin, even though they are only 10% of the Fox/Wolf Watershed.

Reservation watersheds are significant contributors of sediment and phosphorus to the Bay. Adding up the four major watersheds of the reservation - Ashwaubenon, Ducthman, Duck, and Trout Creek -account for approximately 17% of the phosphorus and 25% of the sediment loading going to the Bay from the Lower Fox Basin Watersheds. One hundred acres of grass and tree buffer and filter strip were installed along these streams.





Best Management Practices Applied include:

- **Grassed waterways**
- **Water and sediment control basins (WASCOB)**
- **Critical area plantings**

Appendices