Final Report for the Cooperative Agreement between the Great Lakes Commission and United States Department of Agriculture NRCS #68-3A75-10-54

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

Acknowledgments

Support for the nine 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 2010.

Critical to the success of this cooperative federal-state effort over the years 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 work 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.

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Table of Contents

Acknowledgments 2

Table of Contents 3

Executive Summary 4

Project Background 6

Program history reflects strong federal-state collaboration 7

Priority watersheds were identified to maximize impact from conservation practices 8

Best management practices in the program's tool kit were many and varied 10

Lesson learned: Regional economic pressures impacted project implementation 11

Looking ahead: Opportunities for maximizing program efficiency, effectiveness 12

Selected conservation practices costs and soil and phosphorus savings produced by the 2010 GLRI-supported Sediment and Nutrient Reduction Program 15

2010 Great Lakes Restoration Initiative (GLRI) Watershed Grants 16

Appendices 34

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 429 projects to reduce the input of unwanted sediment, nutrients, and other sediment-borne pollutants into Great Lakes, reducing soil erosion by an estimated 1.6 million tons and phosphorus loadings by 1.6 million pounds.

This report contains the results of the first year of GLRI funding that supported nine local projects in five Great Lakes states (IN, MI, MN, NY, and OH). Under this four-year agreement between the Great Lakes Commission and the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS), substantial 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 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 improvements are included to help guide 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 annual management practices like 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 terms practices, best management practices (BMPs) and conservation practices all appear in this report. These terms are used interchangeably.

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

- **45,710 acres of land were treated with some type of conservation practice**
- **28 individual types of conservation practices were implemented across projects**
- **763 conservation practices in total were implemented**
- **356,000 tons of soil were kept on the land and out of the waters of the Great Lakes**
- **362,000 (estimated) pounds of particulate phosphorus were kept out of the waters of the Great Lakes**
- **95,000 (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 covered a total of 30,167 acres treated, with 38,798 tons of estimated soil savings over the life of the projects, and 38,274 pounds of particulate phosphorus saved. The most successful practice - in terms of soil and phosphorus savings - was the streambank stabilization practice. This practice was applied to 1,439 treated acres in several of the projects, with 110,683 tons of projected soil savings and 115,910 pounds of particulate phosphorus saved over the life of the projects.

These results affirm the importance of the GLRI to support on the land conservation treatment projects in order to show water quality and ecosystem improvements in priority watersheds of the Great Lakes.

Given the success in eliminating most point-source contributors of pollutants to the Great Lakes over the past several decades, the GLRI is bringing increased attention to nonpoint sources of pollution, sediment and excess nutrients impacting Great Lakes water quality. The first GLRI Action Plan for Fiscal Years 2010-2014 identified sediment as a significant nonpoint pollution problem facing our lakes, rivers and streams. The Action Plan found that 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 BMPs can have multiple benefits, including simultaneous reductions in runoff of soils, nutrients and pesticides, as well as protection of drinking water sources.

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." The nine projects funded in 2010 and summarized in this report, with GLRI funds provided by NRCS, demonstrate measurable effectiveness and results in achieving GLRI objectives under the Nearshore Health and Nonpoint Source priority area. They are good examples of collaboration between the federal government, the states and local conservation organizations providing evidence of the good progress that is being made toward reducing sediment and nutrient loadings to the Great Lakes as mentioned in the GLRI report to Congress.

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 GLRI. In August of that year, the 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 established 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, was to protect and improve water quality in the Great Lakes by reducing sedimentation 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 have supported on the land conservation programs in all eight Great Lakes states.

Each winter under the Basin Program, the Great Lakes Commission has issued a request for proposals for small scale and watershed scale grants designed to control erosion, reduce phosphorus and control sediment throughout the Great Lakes basin. Beginning in 2010, funding was directed to 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 benefit to NRCS when entering into the agreement with the Great Lakes Commission to manage the program was the existence of the regional Soil Erosion and Sedimentation Task Force, which is comprised of members from each Great Lakes state, NRCS, USEPA and the U.S. Army Corps of Engineers. This Task Force, in place since 1991 to oversee the work of the Basin Program, is responsible for providing broad oversight and meets annually via conference call to select the projects to be funded under the program.

Under the 2010 Agreement, the Commission awarded grants totaling over $4.3 million to nine 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 initial projected estimates of soil savings for those nine projects was more than 24,000 tons over the life of the practices. Subsequent analysis estimated that, over their life span, the implemented conservation practices will actually save some 356,000 tons of soil and retain over 362,000 pounds of particulate phosphorus in the soil, thus preventing it from entering Great Lakes bays, harbors and tributaries and contributing to harmful algal blooms and dead zones.

The program's impact, greatly enhanced with support through the GLRI, has also been experienced in other ways, such as greater public acceptance of soil conservation practices, particularly among Great Lakes basin farmers and agricultural land owners - a group for which embracing change is not always easy. "These projects were very visual, so farmers would see the activity on a neighbor's field, and get talking about it; we'd get calls about what's going on and quickly the information spread," said Breann Hohman, Firelands Coastal Tributaries Watershed Coordinator for the Erie Soil and Water Conservation District (SWCD) in Ohio, the local sponsor for the *Old Woman Creek Sediment Reduction Initiative.*

Greg McKurth, district manager of the Wyoming County (NY) SWCD, a partner in the *Black and Oatka Creeks Sediment Reduction Program*, had a similar experience. "The farmers with whom we worked were very satisfied with their participation," he said. "They appreciated being able to address some problems that they would not have otherwise been able to address without the GLRI funding."

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The core strategy of the Great Lakes Basin Program was 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, particularly in western Lake Erie, Saginaw Bay and Green Bay.

"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. "Along with our federal partner (NRCS), 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.

Under the nine soil erosion and sediment control projects supported by the GLRI in 2010:

- **45,710 acres were treated**
- **763 best management practices applied**

The 1985 Farm Bill emphasized the need for implementation of conservation practices to reduce erosion on highly erodible land. Soil that washes off into Great Lakes tributaries and into the Lakes directly has been identified as a significant contributor to water 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 grants to local and state units of government and nonprofit organizations, selected on a competitive basis, to implement erosion and sediment control measures in priority areas within the Great Lakes basin. Between 1991 and 2010, the program supported 429 locally sponsored projects, allocating over $15 million in grant awards to projects generally not funded by other U.S. EPA or USDA cost-share programs. Those 429 projects are estimated to have reduced soil erosion in the Great Lakes basin by more than 1.6 million tons and phosphorus loadings by over 1.6 million pounds.

GLRI support in 2010 enabled the addition of nine additional projects in seven watersheds located among five states: Indiana, Michigan, Minnesota, New York and Ohio.

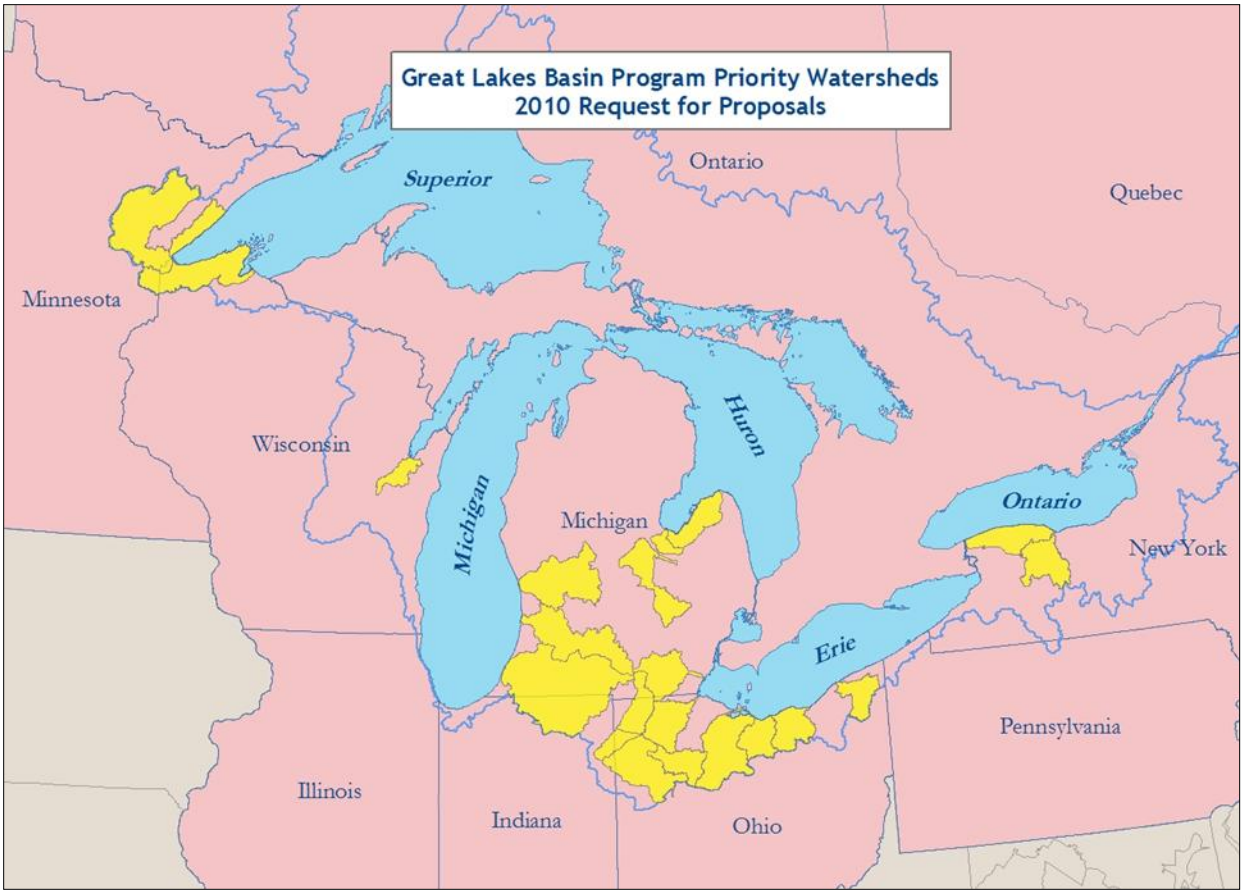
Priority watersheds were identified to maximize impact from conservation practices

Priorities for the 2010 GLRI-supported grant program were developed with input from the Great Lakes Soil Erosion and Sedimentation Task Force, which includes 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 2010 (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 BMPs 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.

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 the 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 the 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.



Grant awards involved a competitive process based on the potential and the promise for sediment and phosphorus reduction, appropriateness of practices to be implemented, the applicant's 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.

Also 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. Under the 2010 program, much greater detail was sought on the types of conservation practices proposed and their projected effectiveness, in terms of total soil tonnage retained.

The 2010 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 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 32 pre-proposals were submitted by March 2, 2010. Of those, nine were ultimately approved by the Task Force for funding in June of 2010. 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 section 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.

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 meets the resource need or solves the environmental problem. In 2010, 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. "BMP auctions," for instance, 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. A total of 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."

Lesson learned: Regional economic pressures impacted project implementation

Managing the nine projects under the first year of the GLRI presented several challenges and there were lessons learned which are described in this section below. A first challenge was not primarily technical, but dealt more with important social and economic issues facing the Great Lakes region. As the 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 the review and approval of permit applications, 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 local conservation 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. To meet this challenge, the watershed scale grants under the Basin Program were intentionally designed to allow the awardees to hire staff to provide much-needed technical assistance in implementing practices not only funded by the grants, but also in implementing related practices funded by previously established Farm Bill programs. This ability to fund staff to work on projects with multiple funding sources was viewed as an important key to success to get conservation practices on the ground quickly and efficiently. This flexibility filled a real need for grant applicants that may have been understaffed as a result of the slow regional economy.

In reality, the federal need to track and precisely account for GLRI-supported projects necessitated midstream changes regarding how the grant projects were managed. It was determined that GLRI funding had to be spent as a package and staff supported by the grant funds could only implement grant funded practices to guarantee that the benefits accrued to the specific funding could be more clearly evaluated.

This change required applicants to rework their applications to fit the new requirements. It resulted in projects reducing their technical assistance budgets and increasing conservation practice implementation dollars. Where a

team of 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, which delayed and impaired implementation of best practices at some project sites.

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: Opportunities for maximizing program efficiency, effectiveness

Beyond the quantitative benefits documented in this report of the Commission-managed, GLRI-supported Great Lakes Sediment and Nutrient Reduction projects–which includes, among others, 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 positive 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.

"We did a lot of outreach and education to the public about monetary benefits to the taxpayers, and people seemed to receive that very well," said Cindy Brookes, watershed specialist at the WSOS Community Action Commission in Fremont, Ohio, a partner in the GLRI-supported Making Sense Out of Soil Savings project for the Sandusky River watershed.

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 also provided opportunities for technology transfer; 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.

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Going forward, the lessons learned in carrying out the nine 2010 Basin Program projects supported by the GLRI will provide significant added value to the conservation treatment programs in the basin. From these lessons, the following opportunities have been identified and observations made for achieving increased efficiency and effectiveness in future project management.

The importance of right-sizing projects

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.

There should be a greater emphasis placed on supporting a greater number of smaller grant awards and fewer large-scale, large-budget projects.

Adapt theoretical processes to implementation practicalities

Developing new and innovative BMPs 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 academic models and actual practice implementation in the field.

Theoretical processes should be streamlined as much as possible, particularly at the beginning of the project, to allow flexibility for local implementation.

Project management should not involve on-the-job training

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 necessitated new hires, requiring training and a certain learning curve before these individuals are 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.

If practicable, newly hired, inexperienced personnel should not be placed in the position of managing a project.

Maintain capability for mid-stream operational adjustments

As a result of the Commission's experience administering similar grants in the past, it was able to manage the program with maximum flexibility. For instance, as projects moved forward individual budget line items needed adjustments. Most grantees switched funds from different budget line items in order to install more practices. This was accomplished not by formally amending the contract between the Commission and the grantees but through an exchange of letters that documented the changes.

Program flexibility and adaptability was extremely valuable. Commission staff and project managers were able to make mid-course adjustments during project implementation, with a minimum of paperwork and administrative delay. This flexibility is an important benefit of the program and should be retained.

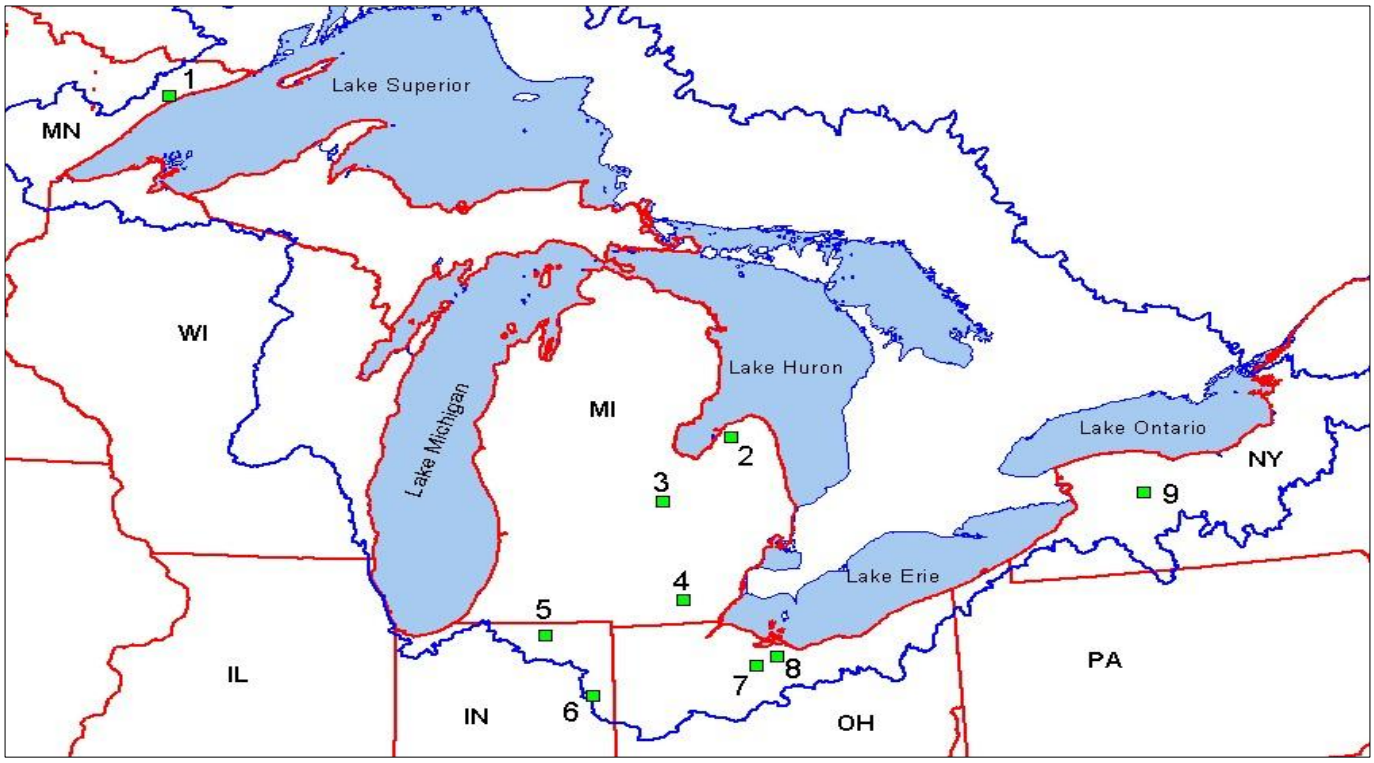
Oatka Creek watershed streambank before and after stabilization.

Going forward, these lessons learned in carrying out the nine 2010 Basin Program projects provide 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 produced by the 2010 GLRI-supported Sediment and Nutrient Reduction Program

	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	16,397	521,577	31.81	14,264	14,000	36.72
Conservation Cropping Systems	8,118	143,218	17.64	9,088	9,145	15.76
Filter Strips	668	73,353	109.74	5,515	5,413	13.30
Grassed Waterway	94	103,259	1,096	77,408	77,124	1.33
Gypsum Soil Amendment	5,652	94,085	16.65	15,446	15,129	6.09
Strip Tillage	1,259	48,455	38.47	2,299	2,128	21.07
No-tillage	1,519	28,042	18.46	462	432	60.83
Streambank Stabilization	1,439	880,995	612.08	110,683	115,910	7.96
WASCOBS	482	91,194	189.04	6,294	6,142	14.49

2010 Great Lakes Restoration Initiative (GLRI) Watershed Grants



Sponsor	Project Title	Grant Amount Awarded	Map #
Adams County Soil and Water Conservation District - IN	Blue Creek - St Mary's River	$448,115.00	6
LaGrange County Soil and Water Conservation District - IN	Little Elkhart River	$190,000.00	5
Michigan Department of Agriculture - MI	Pinnebog River	$745,373.00	2
Michigan Department of Agriculture - MI	River Raisin	$438,033.00	4
Shiawassee Conservation District - MI	Shiawassee River	$536,000.00	3
Cook County Soil and Water Conservation District - MN	Poplar River	$687,034.00	1
Wyoming County Soil and Water Conservation District - NY	Black and Oatka Creeks	$536,000.00	9
Erie Soil and Water Conservation District - OH	Old Woman Creek	$137,552.00	8
WSOS Community Action Commission, Inc. - OH	Sandusky River	$581,926.00	7

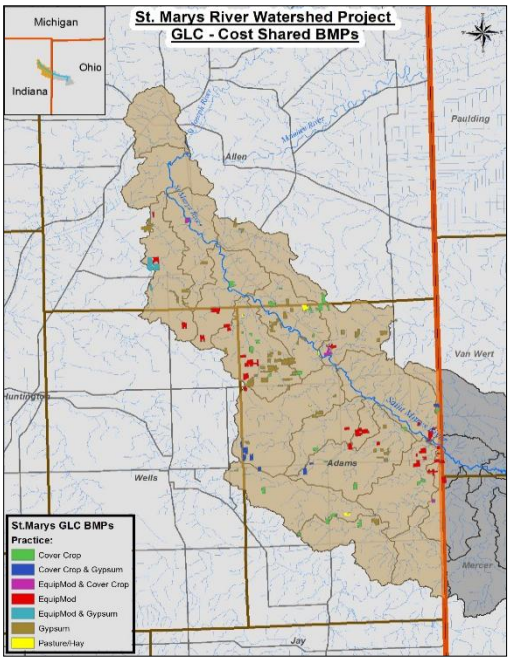
The following summaries describe the individual projects and accomplishments.

Project Title: A Unique Approach to Sediment Reduction in the Blue Creek and St. Mary's River Watersheds

Grant Amount Awarded: $448,115

Sponsor: Adams County Soil and Water Conservation District and St. Mary's River Watershed Group

The Lower St. Mary's River basin encompasses 240,366 acres in northeastern Indiana, with 85.37% of land use classified as agriculture, 8.39% as urban, 5.10% as forest, and 0.08% wetlands and water. Due to the high percentage of agricultural land in the watershed, the primary focus of the project was to target agricultural landowners and producers and propose BMP cost-share options. Intensive row crop production under conventional methods has led to widespread sheet, rill, and gully erosion. Producers in the watershed, specifically the Blue Creek sub-watershed, have been reluctant to adopt conservation tillage farming practices due to historical and cultural tendencies. The St. Mary's River Watershed is also home to a large Amish population where conventional farming and livestock production is standard.



Cover crop planting in the St. Mary's River Watershed

Numerous livestock operations dot the landscape of the St. Mary's River Watershed. A windshield survey during the summer of 2008 identified over 1,000 locations with livestock. Many of these are Amish locations which utilize nearby streams as watering sources and riparian areas as a source of shade, therefore causing severe stream bank sedimentation and erosion.

"The producers in this area seemed very reluctant to make changes in the current farming practices," according to Jill Krause, a resource specialist at the Adams County Soil and Water Conservation District. "It took a lot more educational events and additional efforts to get area producers to try new practices, and when they did it was at a smaller scale then other areas we have similar programs in. This mind-set will take an ongoing effort to continue to make progress in this region. The large Amish population in the region is still very hard to reach; they seem very willing to learn and attend educational events when available; however, they are very reluctant to take assistance."

Creative billboards were part of the outreach strategy for the St. Mary's Watershed project.

Lack of stream buffers and a riparian corridor are also common across the watershed as producers utilize every available acre for production. Approximately 50% of the parcels adjacent to a stream or ditch were found to have an existing buffer or riparian corridor of 50 feet or less.

Amish and English farmers will be targeted to install soil erosion and sediment reduction practices in the following areas:

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

Project Title: Litte Elkhart River Sediment Reduction

Grant Amount Awarded: $190,000

Sponsor: LaGrange County Soil and Water Conservation District

A land use inventory clearly demonstrated that livestock-induced damage to stream banks and unrestricted access to the stream bed were the major causes of sedimentation in the river. In addition, sheet erosion near bare (not surfaced) barnyards is another major condition causing sedimentation.

Priority areas consisted of agricultural based properties directly adjacent to moving surface waters of the Little Elkhart River system. All sites involved livestock-induced stream bank damage due to direct unrestricted access that has been identified in the watershed management plan.

Fenced crossings minimized impact on streambanks of watering livestock.

In this watershed the majority of the farms were built right along the ditches and streams in order to have easy water access. This has caused severe ditch and stream bank erosion with tons of sediment getting into these water bodies. Landowners were not aware of the water quality problems they would be causing. Landowners in the watershed are primarily Amish farmers who have small dairy herds and horses.

An example of fencing and streambank stabilization in the Little Elkhart River project.

During the course of this grant period 29 BMPs were installed, such as the fencing and streambank stabilization shown above. The project involved working with 20 landowners in the Little Elkhart River Watershed. Total tons of soil saved in one year amounted to 608 tons. The lifetime of the majority of these completed projects is 10 years amounting to over 6,000 tons of soil saved during the practice's lifespan.

BMPS applied:

- Filter strips used in conjunction with livestock exclusion fencing
- Livestock exclusion fencing
- Streambank stabilization
- Alternative watering systems
- Stormwater runoff diversion (barnyards adjacent to stream channel)
- Heavy use area pads

Project Titles: Targeted Efforts for Reducing Sedimentation in the Pinnebog River and River Raisin Watersheds using BMP Auctions

Grant Amount Awarded for Pinnebog River: $745,373

Grant Amount Awarded for River Raisin: $438,033

Sponsor: Michigan Department of Agriculture and Rural Development

The Pinnebog River watershed, which empties into Saginaw Bay on Lake Huron, consists of nearly 125,000 acres, 85 percent of which is agricultural land. The major source of sediment in this watershed is cropland and stream bank erosion. The three-year project was designed to eliminate at least 20,000 tons of soil and sediment deposition through the installation of BMPs funded through the project.

Tom Young of the Michigan Department of Agriculture and Rural Development addressing participants in a field day event to kick off the Pinnebog River Watershed project.

The River Raisin flows for 139 miles through southeastern Michigan draining an area of 1,072 square miles into Lake Erie at Monroe, Michigan. Its watershed includes the Michigan counties of Lenawee, Monroe, Washtenaw, Jackson, Hillsdale, a portion of Fulton County, Ohio, and Monroe County, where its mouth is located. The

watershed contains 3,000 miles of man-made drainage systems, 22 main stem dams and 38 tributary dams. River Raisin Watershed land uses in 2010 included agriculture - 65%; urbanized areas - 11%; wetlands - 8%; forested - 7%; and grassland - 7%.

Both the Pinnebog and River Raisin projects focused efforts on riparian properties with potential erosion concerns as identified by the High Impact Targeting (HIT) tool, and riparian properties with sedimentation resource concerns as identified in conservation plans. The aim of the projects was to introduce an innovative technique, the Best Management Practice (BMP) auction, to develop an economically feasible watershed management response to environmental problems. The BMP auction concept was based on lessons learned from previous experience piloted in an east-central Kansas watershed.

The first step in this approach was to estimate the pollutant load from different fields within the study areas. The primary sources of soil erosion in the two watersheds are cropland and streambank erosion. Water quality tools guided soil conservation specialists to work one-on-one with producers to identify the sources of soil erosion on their farms and propose potential BMPs to address those sources.

Conservation plans were then developed to identify the system of BMPs that producers were interested in implementing on their farms, and the expected costs of those BMPs. This information was used to design the BMP auction. Auction forms were provided to producers living in the watershed so they could provide information on the location of their farms, the types of conservation practices they would like to implement, and the requested funding to cover costs of starting and maintaining the conservation practice.

The River Raisin

Once the auction forms were collected, a watershed tool was used to determine 1) each farm's sediment load (tons/acre) to surface waters, before implementing the conservation plan, and 2) how much the sediment load will be reduced once the BMPs are implemented at both the field and watershed levels.

The bids were ranked by the amount of water quality improvements generated per dollar granted. In the next step, the sediment load reduction for each farm was divided by the amount of the requested funds. This calculation was repeated for every submitted conservation plan. Those producers whose plans provided the most water quality improvement for the least cost received grant funding.

"We had a lot of participation," said Jennette Renn, District Manager at Huron Conservation District. "The big hurdle was dealing with more paperwork than originally anticipated. The auction was still more efficient than the USDA process. We received a lot of bids each signup period. More than we had cost share funds to cover."

The Pinnebog River project ultimately resulted in over 3,800 tons of soil saved over the life span of the BMPs based on the soil saving calculation provided by the Michigan State University BMP analysis team. The farmers in this watershed historically have not participated in NRCS conservation programs so the hope with this innovative approach to conservation practices was that a project with less paperwork would entice farmers to try new conservation practices on their farms.

The River Raisin project reduced sediment loading by 2,652.02 tons. Said Judith Holcomb, education and marketing director of the Lenawee County Conservation District: "I felt it was definitely worth the time and effort to run the BMP Auction. I felt it was a good way to streamline the process and get quicker results from landowners. I enjoyed talking with landowners to encourage them to enroll. And tag teaming with NRCS when landowners came into the office for various program details was definitely an advantage. NRCS often initiated the talk about the BMP Auction and then led them to us to get more in details."

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BMPs used included:

- **Filter strips**
- **No-till, strip till cultivation**
- **Cover crops**
- **Streambank restoration**
- **Wetland restoration**

Project Title: Shiawassee River Watershed Sediment Reduction Program

Grant Amount Awarded: $536,000

Sponsor: Shiawassee Conservation District

The Shiawassee River is approximately 110 miles in length and flows in a northerly direction, discharging into the Saginaw River and eventually the Saginaw Bay of Lake Huron. Land use activities, from urban to agricultural, in the Shiawassee River Watershed are major contributors of sediment to Saginaw Bay and Lake Huron.

Left: Severe streambank erosion occurs at the banks of the State Road Drain directly southwest of the "Buzz Bridge" at Chipman Rd. Right: Streambank erosion created this 14-foot embankment cliff at the Townson Drain.

The goal of the Shiawassee River Watershed Sediment Reduction Project was to address soil loss at the source through the implementation of best management practices (BMPs), to stabilize erosion in urban and residential areas, and reduce loss of soil from agricultural fields. This project included four large scale projects and an investigational gypsum incentive program. The adoption of these practices will save an estimated 1,000 to 3,000 tons of sediment per year from entering the Shiawassee River.

This proposal addressed sediment loss from cropland runoff sources through an incentive program that encouraged the use of synthetic gypsum as a soil amendment to clay soils on cropland. The application of gypsum (calcium sulfate dehydrate) to fields has several positive impacts on cropland.

Other sources of sediment were addressed through this project, including soil loss from a reach approximately 1,800 feet upstream of the State Road Drain outlet into the Shiawassee River. This reach has a long history of severe and extensive erosion. State Road Drain was constructed in 1886 with a 100 foot right-of-way established in 1916. In 1914, 1943 and 1998 the channel was cleaned out, widened and deepened. The drain extends 4.3 miles from its outlet into the Shiawassee River to its upper terminus at the Miner Drain.

Intermittent streambank erosion appears from the point at which the drain begins to meander away from the straightened channel approximately 1,800 feet westward from the Chipman Road Bridge and the outlet at the Shiawassee River. Below the Chipman Road Bridge, elevation drops and streambank erosion becomes extensive. Bare streambanks tower 40 feet over the channel bottom in this entire lower stretch. Down-cutting is also occurring and sediment deposits are randomly distributed throughout the stretch with a visible plume entering the Shiawassee River at the outlet.

Total savings as a result of this overall project, including implementation of all BMPs and two-year FGD Gypsum Incentive Program, is 1,810 tons of soil.

BMPs installed:

- **Streambank stabilization**
- **Soil amendments**

Project Title: Poplar River Watershed Erosion and Sediment Reduction Projects

Grant Amount Awarded: $687,034

Sponsor: Cook County Soil and Water Conservation District

The Poplar River watershed is located in the Northeastern Minnesota portion of the Lake Superior Basin. The entire watershed encompasses 114 square miles. The headwaters begin in the Boundary Waters Canoe Area wilderness and then flow through various lake and river systems to Lake Superior at Lutsen, Minnesota.

Near Lake Superior the river transitions quickly to a steep gradient channel confined by narrow valley walls. The river channel and valley walls at this transition area are defined by bedrock, lacustrine beach and glacial deposits of clay and till. From this waterfall to the confluence with Lake Superior the river is listed as impaired for turbidity, primarily caused by excess sediment. This lower watershed area of the Poplar River is developed with resort commercial businesses, townhome and condominium subdivisions, recreation facilities and road and trail accesses to these facilities.

Poplar River

The projects supported by this grant represent an estimated savings of 300 tons per year. Because of their location in the watershed, and amount of sediment they are estimated to reduce, this application addresses the most critical of the priority projects to complete. The 1,300 acres within the 2.73 river miles represents the lower Poplar River Project Area.

Project facilitator Kerrie Berg of the Cook County SWCD reported: "From a watershed perspective, this was a very manageable project, and it targeted the most critical area of the full watershed in need of best management practices."

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Detention pond constructed as part of the Poplar River project.

BMPs used include:

- Streambank Stabilization
- Roadbank stabilization

Project Title: Black and Oatka Creeks Sediment Reduction Project

Grant Amount Awarded: $536,000

Sponsor: Wyoming Soil and Water Conservation District

The Great Lakes region of New York is the heart of the State's dairy industry. The watersheds contain 406 square miles or 260,000 acres. The Black and Oatka Creek watersheds cover portions of four counties. While this large area does encompass several villages and suburban areas, most areas are rural. Agriculture, particularly dairy operations, is an important economic driver in the region. The Great Lakes region has been an important focus of New York's Agricultural Environmental Management (AEM) process, which identifies, assesses, plans and remediates agricultural pollution concerns.

Oatka Creek

The Genesee River is the major source of sediment and phosphorus discharged into Lake Ontario at Rochester, New York. This area is known as the Rochester Embayment and is identified as an Area of Concern via the Lake Ontario Lakewide Management Plan (LaMP). These pollutants cause degradation of near shore water quality as evidenced by eutrophication in the near shore areas and outbreaks of harmful algal blooms around the mouth of the Genesee River. Many of these pollutants originate in tributaries like the Black and Oatka Creeks.

The Oatka Creek and Black Creek watersheds cover portions of Wyoming, Genesee, Livingston, and Monroe counties within the Lower Genesee River Basin and the Lake Ontario Drainage Basin. The Oatka Creek watershed consists of approximately 138,092 acres or 216.8 square miles and is 56 miles long. Some 55% of properties within the watershed are classified as agricultural land and over 6,000 acres are regulated wetlands. The Black Creek watershed covers 129,422 acres or 202.22 square miles and is 46 miles long. About 48% of properties within the watershed are classified as agricultural land and another 13,667 acres are wetland.

Addressing these sediment concerns has been a consideration of watershed planning starting at the broadest Lake-wide assessment to segment analysis for the Black and Oatka Creeks in the Lake Ontario LaMP, the Rochester Embayment Restoration Action Plan, the Genesee River Basin Action Strategy and AEM planning on the farms within these high priority watersheds, as part of Genesee, Wyoming, and Monroe Counties Agricultural Strategies.

BMPs applied:

- Cover crops
- Riparian buffer strips
- Prescribed rotational grazing
- Conservation tillage

Project Title: Old Woman Creek Sediment Reduction Initiatives

Grant Amount Awarded: $137,552

Sponsor: Erie Soil and Water Conservation District

Major sources of sediment in the Old Woman Creek (OWC) watershed include cropland and streambank erosion. Although much of the creek has a significant amount of riparian buffer and filter strips, areas within the field experience gully erosion due to concentrated flow patterns. In addition to in-field erosion the creek itself is also experiencing several areas of streambank erosion in the form of bank failure and slumping particularly in areas where the stream has been channelized.

Old Woman Creek as it flows into Lake Erie.

The southeastern headwaters portion of the OWC watershed appears to be the most susceptible to soil erosion, sediment yield, and resultant loadings. The soils in this region are predominantly of the Bennington-Cardington association, which have the highest erodible potential of the soils in the watershed. The southeastern portion of the watershed has also incurred a significant amount of land alterations for agricultural drainage purposes. Channelization and entrenchment of Old Woman Creek for improved drainage encompasses approximately 23% of the watershed. Although some banks appear to be stable, many sections are experiencing moderate to severe bank erosion as a result of increased storm activity in the recent years and increased flows due to extensive tiling of fields.

Based on this area's potential for sediment reduction through the implementation of conservation BMPs, the Old Woman Creek Watershed Action Plan has established a focus area for restoration along the southeastern branch headwater region and its tributaries. The action items featured in the GLRI-supported project specifically targeted this area, though participation in the program was open to the entire watershed.

As a result of the program, some 900 linear feet of over-wide ditch and 2,510 linear feet of two-stage ditch were constructed, and 250 linear feet of streambank were stabilized.

“The overwide ditches are performing very well,” said project coordinator Breeann Hohman, Firelands Coastal Tributaries Watershed Coordinator for the Erie Soil and Water Conservation District. “From our experience we would prefer the overwide over the two-stage ditch design if we were to do it again. They perform almost like a wetland in establishing bands of vegetation.” She noted that at least one farmer in the watershed was grateful for the increased capacity for handling runoff provided by the overwide ditches; he was saved from the loss of almost an entire farm field following the deluge accompanying Hurricane Sandy in 2012.

BMPs applied:

- **Broad ditch streambank stabilization**
- **Grassed waterways**
- **Overwide/2-stage ditch installations**

Project Title: Making Sense out of Soil Savings

Grant Amount Awarded: $581,926

Sponsor: WSOS Community Action Commission, Inc./ Sandusky River Watershed Coalition

The Sandusky River Basin is divided between two land resource areas. The lower basin lies in the Erie-Huron Lake Plain Resource Area while the upper basin is in the Ohio-Indiana Till Plain Resource Area. Land use in the lower portion of the basin is dominated by farmland used for cash grain crops, specialty crops, and fruit crops. The upper portion of the basin is dominated by farmland used for grain crops and livestock production. Pasture and woodland account for about 10 percent of land use. A number of rock quarries discharge ground water to tributaries of the Sandusky River.

Cover crops planted in Sandusky River watershed.

To participate in the *Making Sense Out of Soil Savings* project applicants had to develop a Resource Management System (RMS) plan that includes cropping rotation and tillage. The plan calculated the soil savings between current systems and an improved system. Runoff reduction calculations also assisted in the determination of the value of the practice to future soil saving potential and farm economics.

Applications for practices were made to the local SWCD. The SWCD Board of Supervisors approved applications by prioritizing monthly application by location within priority areas (Highly Erodible Lands or by soil infiltration rate) and for soil savings provided. Approved applicants entered into contract jointly with the local SWCD Board of Supervisors and WSOS Community Action Commission (CAC), Inc., the administering agent for the Sandusky River Watershed Coalition. Contracts were modeled after the contract utilized by USDA NRCS for USDA Farm Bill programs. Implementation of the practice with SWCD sign off was required before payment was issued by WSOS CAC, Inc./Sandusky River Watershed Coalition.

Annual spot checks of the practices were conducted by SWCD staff to assure compliance. If corrections were not made within the specified timeframe, incentive monies were to be repaid to WSOS CAC, Inc., and placed in a special fund to be used for conservation improvements as agreed upon between WSOS CAC, Inc./Sandusky River Watershed Coalition and the local SWCD Board of Supervisors.

Annual savings of 21,128 tons of soil were estimated for the project, with the lifetime savings totaling 66,240 tons based on the life expectancy of each practice. According to Cindy Brookes, watershed specialist at WSOS CAC., Inc., the project resulted in a significant increase in the planting of cover crops. “We look for that trend to increase as we continue our education efforts.”

There were also some unanticipated benefits, such as a tile maintenance program by the SWCD that will continue as an ongoing practice, even after the project’s completion. “That was a blessing in disguise,” said Brookes.

BMP applied included:

- Conservation cropping practice
- Cover crop planting
- Tile main repairs
- Stream bank stabilization
- Redlined waterway repair

Appendices

Appendix 1 ..... Great Lakes Soil Erosion and Sedimentation Task Force Members

Appendix 2 ..... Request for Proposals (RFP)

Appendix 3 ..... Project Selection Methodology

Appendix 4 ..... Project Selection Score Sheet

Appendix 5 ..... Pre-Proposal Acceptance Letter (sample)

Appendix 6 ..... Second Round Scoring Results and Email to Pre-Proposal Selectees

Appendix 7 ..... Award Letter (sample)

Appendix 8 ..... 2010 Project Agreement (sample)

Appendix 9 ..... Project Reporting Forms

Appendix 10 ..... Selectees Media Guide

Appendix 11 ..... Project Summaries

Appendix 12 ..... Reminder Letter to Complete Final Report (sample)

Appendix 13 ..... Conservation Practice Implementation Summary

Appendix 14 ..... Project Media Brochure (sample Little Elkhart project)

Appendix 15 ..... Project Final Report Narratives