

**GREAT LAKES BASIN PROGRAM FOR SOIL  
EROSION AND SEDIMENT CONTROL**

**ANNUAL REPORT**

**PROGRAM YEAR 1998**

**SEPTEMBER 1, 1997 THROUGH AUGUST 31, 1998**

**PRESENTED TO:**

**U.S. DEPARTMENT OF AGRICULTURE — NATURAL RESOURCES CONSERVATION SERVICE**

**PREPARED BY:**

**GREAT LAKES COMMISSION**

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## PREFACE

This annual report was prepared by staff members of the Great Lakes Commission working with Great Lakes Basin Program grantees. The Great Lakes Commission acknowledges the support and involvement of the Soil Erosion and Sedimentation Task Force throughout the project year. Specifically, the Commission thanks the following state, federal and regional representatives who serve on the task force: Jerry Wager (chair), Pollution Abatement and Land Treatment Division of Soil and Water Conservation, Ohio Department of Natural Resources; Richard Nichols, Bureau of Soil Conservation, Illinois Department of Agriculture; Jim Ray, Division of Soil Conservation, Indiana Department of Natural Resources; Jim Bredin, Office of the Great Lakes, Michigan Department of Environmental Quality; Jim Birkholz, Minnesota Board of Water and Soil Resources; Ron Shelito, Minnesota Board of Water and Soil Resources; Philip De Gaetano, Bureau of Water Quality, New York Department of Environmental Conservation; Doug Gillette, New York Department of Environmental Conservation; John Booser, Division of Watershed Support, Pennsylvania Department of Environmental Protection; Donald Benczkowski, Coastal Zone Management Program, Pennsylvania Department of Environmental Protection; Terry Donovan, Bureau of Watershed Management, Wisconsin Department of Natural Resources; Percy Magee, Great Lakes Water Quality Coordinator, U.S. Department of Agriculture -- Natural Resources Conservation Service; Tom Davenport, Watershed Management Unit, U.S. Environmental Protection Agency, Region 5; Bill Horvath, Policy Center, National Association of Conservation Districts; Lyn Kirschner, Conservation Technology Information Center; Bruce Kirschner, International Joint Commission.

At the Great Lakes Commission, Tom Crane, Program Manager for Resource Management and Environmental Quality provides day-to-day oversight for the Great Lakes Basin Program under the guidance of Executive Director, Dr. Michael J. Donahue. The principal editor of this report is Jennifer Read, formerly Program Specialist with the Great Lakes Commission and currently with the Great Lakes Institute for Environmental Research (GLIER), University of Windsor, Windsor, Ontario. Appreciation is extended to Rita Straith, Commission manager of support services, who formatted this document.



## I BACKGROUND

Nonpoint source pollution has been identified as a significant cause of water quality degradation in the Great Lakes basin. The movement of sediment is a major pathway for the addition of nutrients and toxic chemicals that are bound to soil particles. Beyond water quality degradation, soil erosion and sedimentation reduces agricultural productivity; degrades fish and wildlife habitat; limits water-based recreation; and damages water treatment and transportation facilities.

In late 1987, a regional Task Force assembled by the Great Lakes Commission released a report titled *Soil Erosion and Sedimentation in the Great Lakes Region*. The report documented the serious nature of the basin's nonpoint source pollution problems; analyzed and interpreted soil erosion and sedimentation data; and presented a series of findings and recommendations that were endorsed by the eight member states of the Commission. Recommendations addressed funding issues, program development, standards and control programs, education/coalition building, and research and evaluation.

Principal among those recommendations was the establishment of a federal/state "Great Lakes Basin Program" for comprehensive, basin-specific soil erosion and sedimentation control. In offering the recommendation, the Task Force recognized the Great Lakes system as a "special and unique international resource that deserves special attention and protection." The Task Force also recommended that a linkage with the federal Clean Water Act Section 319 nonpoint source pollution control program be made to ensure coordination of activities with the U.S. Environmental Protection Agency (U.S. EPA).

The Task Force subsequently developed the framework for the Great Lakes Basin Program and, in 1988, secured the unanimous endorsement of the member states of the Great Lakes Commission. The Basin Program became reality in late 1990, when the U.S. Congress appropriated \$1.0 million through the budget of U.S. EPA Region V to support program activities. Funding levels for fiscal years 1991 and 1992 were \$1.0 million. FY1993 funding was \$1.2 million. In FY1994, the funding source for the Great Lakes Basin Program shifted from U.S. EPA to the U.S. Department of Agriculture-Soil Conservation Service (now Natural Resources Conservation Service). Funding levels for fiscal years 1994 and 1995 were \$250,000. Fiscal year funding levels for 1996, 1997 and 1998 were \$350,000. Programmatically, the Great Lakes Basin Program has operated on a schedule slightly different than the federal fiscal year. Therefore, resources and products are reported on a Great Lakes Basin Program Year which is September 1 through August 31. For this 1998 program year report, the period covered is September 1, 1997 through August 31, 1998.

## II PROGRAM GOALS AND OBJECTIVES

The goal of the Great Lakes Basin Program is to protect and improve the basin's water quality by controlling soil erosion and sedimentation; limiting the input of associated nutrients and toxic contaminants; and minimizing off-site damages to harbors, streams, fish and wildlife habitat, recreational facilities and the basin's system of public works. Objectives associated with the goal, as adopted by the Great Lakes Commission follow:

1. To achieve special legislative recognition for the water quality problems associated with soil erosion, sedimentation, and the delivery of nutrients and toxic contaminants to the Great Lakes;
2. To provide dedicated, reliable, long-term funding for erosion and sediment control programs in the Great Lakes basin;
3. To coordinate efforts, roles, and initiatives among federal, state, and local soil conservation and pollution control agencies and groups in the Great Lakes basin;
4. To recognize sediment as an important pollutant and its role in the transport of chemicals and degradation of habitat and to improve the linkage between erosion control and water quality programs;
5. To support the development and implementation of urban and rural nonpoint source management programs and sediment components of Remedial Action Plans under terms of the U.S.-Canada Great Lakes Water Quality Agreement;
6. To build coalitions and networks to support a Great Lakes Basin Program and to share information and educate groups and individuals with similar interests and goals;
7. To protect and enhance the region's water quality for the benefit of all economic and environmental interests.

As designed, the Great Lakes Basin Program is comprised of three elements: 1) program and technical assistance; 2) demonstration projects; and 3) information and education. In FY 1998, a sum of \$350,000 was appropriated through the budget of the U.S. Department of Agriculture – Natural Resources Conservation Service (USDA-NRCS). Of this amount, \$250,000 was applied to the competitive demonstration grants program with \$100,000 being retained by the Great Lakes Commission, largely for regional information and education activities. Since program inception in 1991, \$4.75 million has been applied to the program; \$3.2 million from U.S. EPA and \$1.55 million from USDA-NRCS. Program oversight is provided by a regional Soil Erosion and Sedimentation Task Force. The Task Force includes representation from the eight Great Lakes states (Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania and Wisconsin), U.S. EPA, USDA-NRCS, National Association of Conservation Districts (NACD), Conservation Technology Information Center (CTIC), and the International Joint Commission (IJC). Under the leadership and guidance of the Soil Erosion and Sedimentation Task Force, the following activities, tasks and products were completed in PY 1998:

### III ACCOMPLISHMENTS

#### A. PROGRAM GRANTS - INSTITUTIONAL ARRANGEMENTS AND PROGRAM COORDINATION

1. The Great Lakes Commission convened two meetings of the Soil Erosion and Sedimentation Task Force (September 30, 1997 in Chicago, Illinois and April 1, 1998 in Ann Arbor, Michigan) to discuss and act upon issues related to the implementation of the Great Lakes Basin Program.
2. At the September 30 meeting, the Soil Erosion and Sedimentation Task Force reviewed the established process for receiving and evaluating proposals as part of the “request for proposals” (RFP) process under the Demonstration Grants component of the Basin Program. Minor revisions were suggested pertaining to receipt of proposals and the procedures for instructing applicants on how to submit a complete proposal. These changes were implemented by Great Lakes Commission staff prior to the RFP mailing in mid-November 1997. The Task Force also reviewed and approved changes to the protocols for grant reporting, payments and project evaluation. The most significant change was the agreement that each state task force member will be required to approve all interim and final reports prior to payment being issued.
3. In June, the Commission received word from the USDA-NRCS that FY1999 funds for the Great Lakes Basin Program had been secured. The total amount to be received from USDA was \$500,000, up from \$350,000 in FY1998. Of this amount, \$350,000 is for the competitive grants program with the balance directed largely to regional information/education and coordination activities.
4. Requests for proposals (RFPs) were mailed to more than 1,100 potential applicants in early November 1997. Among others, RFPs were sent to state agencies, municipalities, soil and water conservation districts, drain commissioners, watershed councils, RC & D area councils, colleges and universities, and environmental and conservation groups.
5. The Commission facilitated the review, ranking, and selection of the proposals received under the competitive grants component of the program which were due on January 15, 1998. Sixty four proposals totaling \$865,435 in requests were received, with each Task Force member prioritizing the proposals from his/her state. Twenty nine proposals totaling \$405,632 in requests were advanced to the full Task Force for final review.
6. On April 1, 1998 the Soil Erosion and Sedimentation Task Force met to review and discuss the top proposals and to recommend final funding decisions. Of the 29 projects reviewed, 20 were selected to receive funding that totaled \$249,327.<sup>1</sup>
7. As part of an ongoing process, Commission staff worked with the project officers of the 99 previously funded projects to provide project updates for this annual report of the Great Lakes Basin Program. Slides, photographs, and other support materials have been accumulated from several of the project officers to help enhance the descriptions of the projects and further publicize and promote the overall program.
8. The Commission continued to provide staff and financial support to the NACD — Great Lakes Committee through the Great Lakes Basin Program. The NACD convened a meeting of

<sup>1</sup> An award of \$2,450 to the Henry Soil and Water Conservation District, approved at the April 1, 1998 meeting of the Soil Erosion Task Force, was subsequently declined. When that grant is taken into account the total amount awarded to projects in FY1998 was \$246,877.

its Great Lakes Committee on September 25, 1997 in Duluth, Minnesota. At this meeting, Committee members received updates from state and federal agency advisors on various programs and activities occurring in the Great Lakes region including the Great Lakes Basin Program for Soil Erosion and Sediment Control. In addition, there were special presentations on new federal initiatives including U.S. Army Corps of Engineers sediment reduction program. The Committee also received an update on legislative activities and discussed strategies for formalizing the Great Lakes Basin Program through the legislative process. Bill Horvath, NACD North Central Region Representative, directed discussion on the future of the Committee and potential areas for Committee involvement with the Great Lakes Basin Program.

## **B. INFORMATION/EDUCATION AND OUTREACH ACTIVITIES**

1. The Great Lakes Commission, through its staff, member states, and the Soil Erosion and Sedimentation Task Force continued to promote and publicize the Great Lakes Basin Program through its newsletter, the *Advisor*, as well as through numerous meetings and workshops.

On September 11, 1997, the last in a series of state workshops on Soil Erosion and Sediment Control was conducted in Erie, Pennsylvania sponsored by the Pennsylvania Association of Conservation Districts, NACD and the Great Lakes Commission. This workshop was supported by a 1995 Great Lakes Basin Program grant to the NACD for the purpose of convening seven workshops throughout the Great Lakes basin. The first six of the seven workshops were held in PY 1997. The dates and locations for all of the workshops are as follows:

<u>Date</u>	<u>Location</u>	<u>Local Sponsor</u>
September 26, 1996	Two Harbors, MN	MN Assoc. of Soil and Water Cons. Districts
December 5, 1996	Bellaire, MI	MI Assoc. of Cons. Districts
December 5, 1996	Oshkosh, WI	WI Land Cons. Assoc.
December 13, 1996	Sandusky, OH	OH Federation of Soil and Water Cons. Districts
February 13, 1997	Western, NY	NY Assoc. of Cons. Districts
June 2-3, 1997	Duluth, MN	MN Assoc. of Soil and Water Cons. Districts
September 11, 1997	Erie, PA	PA Assoc. of Cons. Districts

The purpose of these workshops was to provide information on the Great Lakes Basin Program for Soil Erosion and Sediment Control, inform participants about opportunities under the competitive grants portion of the program, and enhance technology transfer and information sharing through presentations on previously funded projects in each state. Commission staff attended all but the Wisconsin and New York workshops. Tom Crane from the Commission was in attendance at the Pennsylvania workshop and spoke about the Great Lakes Basin Program to approximately thirty attendees. The Erie workshop also included field trips highlighting soil erosion projects and problems in Pennsylvania's Great Lakes basin. The average attendance for the seven workshops was about two dozen people.

3. On September 30-October 1, 1997, Commission staff met with the USDA-NRCS Water Quality Liaisons as part of a joint session with the Soil Erosion and Sedimentation Task Force in Chicago, Illinois. The Water Quality Liaisons are USDA employees who facilitate and coordinate NRCS involvement in important water resources management activities at the state level. The Commission serves as an advisor to the NRCS Water Quality Liaisons. The September 30 session was the business meeting of the Water Quality Liaisons and featured an interac-

tive nominal group process designed to assist in developing and refining a mission, vision statement and strategic plan for the group. The October 1 joint session featured special presentations on sustainable agriculture and whole farm planning, construction of artificial wetlands, the Gulf of Mexico Initiative and a panel presentation on U.S. EPA's water quality programs.

4. Commission staff continued the development of a Great Lakes Basin Program web page on the Internet. It can be accessed at the following URL:

<http://www.glc.org/basin/glbp.html>

The page, established in 1995, contains basic information on the Great Lakes Basin Program, a brief summary of the grants program and a list of the Task Force membership. Many of the Commission's Great Lakes Basin Program related reports are on line including: *Keeping it on the Land!*, *Preventing and Controlling Soil Erosion and Sedimentation* (fact sheets for each state), and *Conserving the Great Lakes Basin's Soil and Water through Local Action* (prepared with NACD). The Commission has also begun placing information online on each of the 118 projects funded through the Great Lakes Basin Program since its inception. This work will continue with assistance from the USDA-NRCS.

### **C. DEMONSTRATION GRANTS AND SPECIAL PROJECTS**

Approximately \$250,000 was available via the cooperative agreement with the USDA for demonstrations and special projects in PY 1998. Nineteen new projects were awarded grants beginning on June 1, 1998. Short descriptions of these projects are provided in this report. For earlier years, extended project summaries and results are provided **only** for those continuing projects awarded in fiscal years 1991-1997 that were still ongoing as of September 1, 1997. This report includes progress reports of projects funded with USDA funds (Fiscal Years 1994-97). For information on previously completed projects under the program, please refer to earlier Great Lakes Basin Program annual reports or the Great Lakes Basin Program web page: (<http://www.glc.org/basin/glbp.html>).

## IV PROGRAM BENEFITS

Between 1991 and 1998, the Great Lakes Basin Program has provided the resources to gather technical information to help evaluate soil erosion and sediment problems, demonstrate various best management practices (BMPs) for control soil erosion and sedimentation, and educate the public on both the impacts and solutions for controlling soil erosion. Over that period, 118 grants have been awarded totaling \$3.92 million. All eight Great Lakes states have received Great Lakes Basin Program support to date.

In evaluating the success of the program, four types of measures have been used:

- Tons of soil and other nutrients saved (In some cases the actual pollutant load, e.g. sediment delivery, to the streams has been calculated);
- Total acreage involved in some form of soil erosion and sediment control practice;
- Audiences reached; and
- Additional resources that the Great Lakes Basin Program funds have leveraged.

These tools have been applied to the 99 projects awarded between 1991 and 1997. (See Figures One and Two.) The 19 projects awarded in this program year have not been included in the results measurements since they have just begun.

The total savings resulting from the various control measures put in place as a result of the 99 grants awarded amounts to more than 470,000 tons of soil, over 127,000 pounds of phosphorus and more than 240,000 pounds of nitrogen over the project period alone. These are very conservative estimates, as many of the best management practices installed will continue to prevent soil from eroding from the land many years after the project has been completed. In addition, the saving results are representative of Great Lakes Basin Program sites only and exclude additional acreage treated by other farmers/landowners throughout the basin as a result of the projects. Many projects funded under the Great Lakes Basin Program have provided the technical background information necessary, through one-on-one communication, site visits, and aerial assessments, for future soil erosion and sediment control projects. Although no soil savings have been attributed directly to these particular grants, the potential saving for future projects is enormous.

Topography varies among the eight Great Lakes states, which leads to varying types of best management practices to control soil erosion and sedimentation. Shoreline stabilization, conservation tillage, urban construction, streambank stabilization, and filter strips are the most common types of BMPs that have been demonstrated as a result of the program. More than 113,000 acres are under some form of conservation treatment.

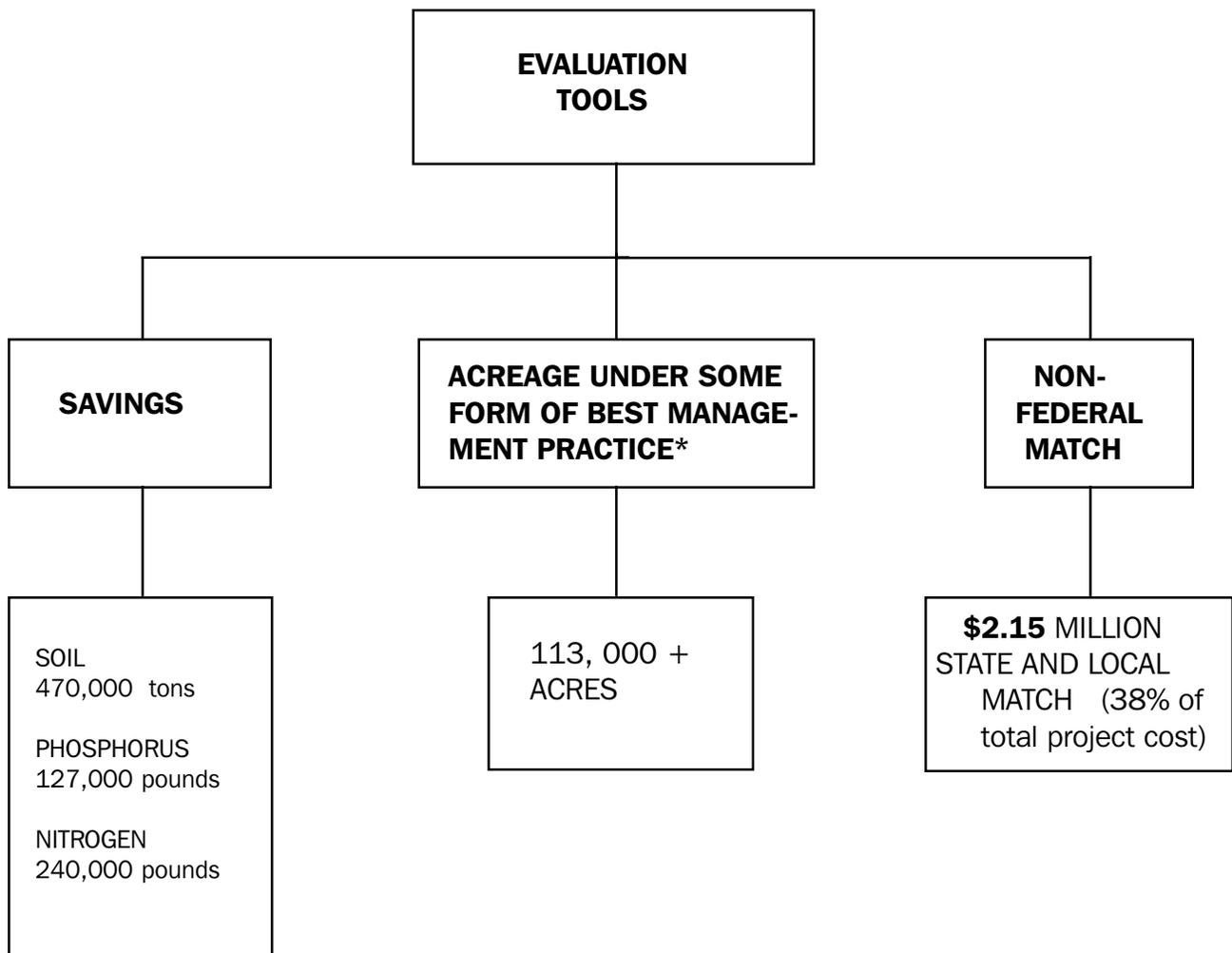
Through the educational component of the program, more than 2,000 farmers, landowners, contractors, and other parties have had direct contact with technical professionals to solve soil erosion and sedimentation problems through site visits, workshops, and tours. More than 120,000 others have been informed of the benefits of soil erosion and sediment control through various outreach activities such as newsletters, brochures/flyers, billboards, displays, newspaper articles, radio, cable TV, and special events such as trade shows, and festivals. Many projects have used several of the above methods in community outreach in an effort to reduce soil erosion and sedi-

**FIGURE ONE**

# **GREAT LAKES BASIN PROGRAM**

## **RESULTS MEASUREMENTS**

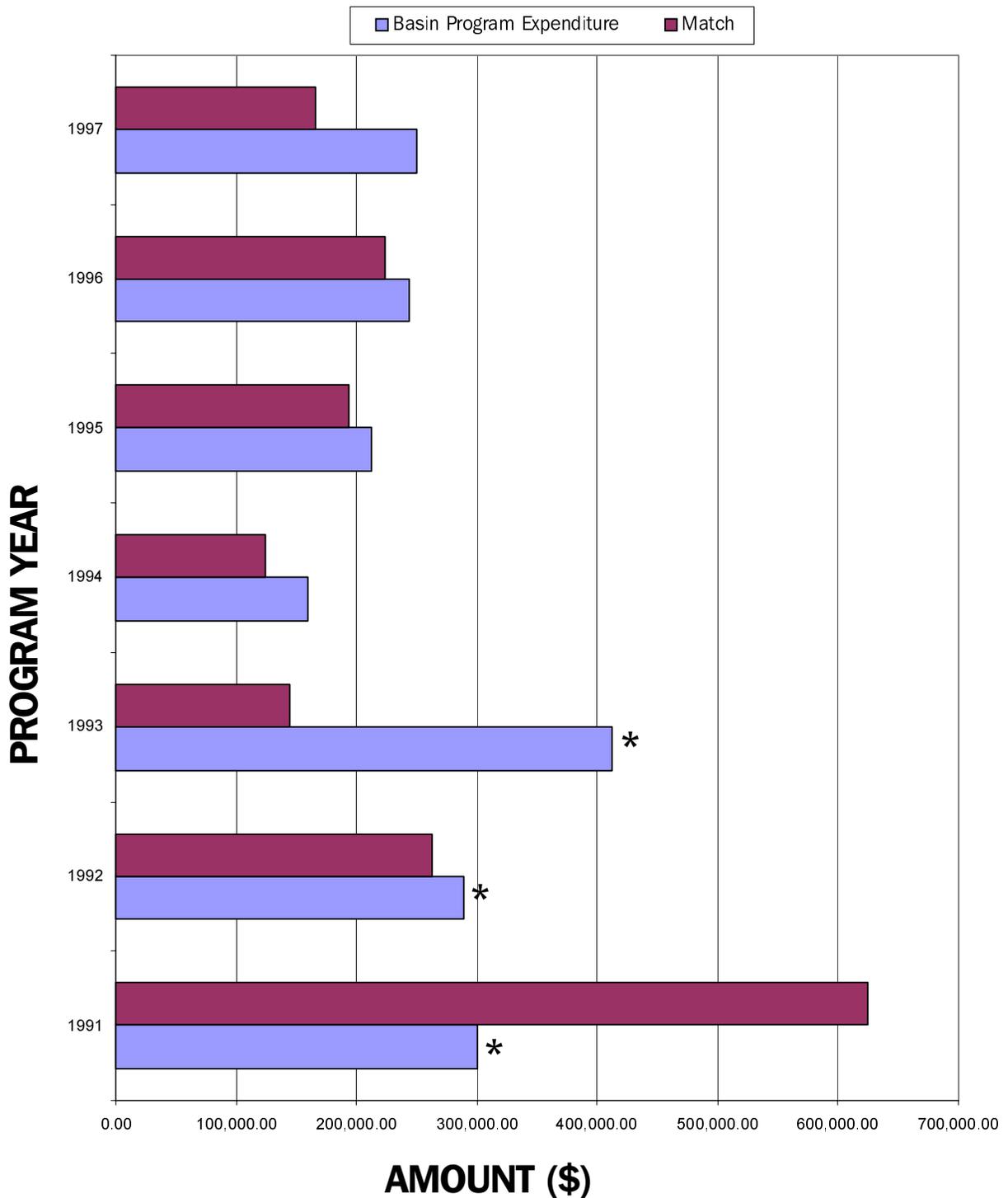
**SEVEN YEAR SUMMARY,  
PY 1991 THROUGH PY 1997**



\* For example, buffer strips, conservation tillage, reforestation, streambank planting, toe stabilization and construction site erosion control practices.

**FIGURE TWO**

**Great Lakes Basin Program Summary Comparison of  
Grant Awards and Non-Federal Match Funds  
(1991 through 1997)**



\* Does not include three \$600,000 non-competitive annual grants to the Saginaw Bay Soil Erosion and Sedimentation Control Program (1991-1993).

mentation. Target audiences under this program are landowners, farmers, zoning officials, planning officials, students, teachers, developers and contractors, and agribusinesses.

An indication of the program's success is the numerous local/state contributions to the individual projects. The Basin Program is acting as a springboard for others to become involved and share their expertise. Over the eight-year life of the program, an additional \$2.15 million (38 percent of total project costs) have been contributed from state and local sources. This is \$750,000 more than the minimum nonfederal match required under the program.



## V FUNDED PROJECTS: PY 1998

### MICHIGAN

PROJECT TITLE:	GREAT LAKES BETTER BACKROADS EDUCATION PROGRAM
GRANTEE:	HURON PINES RESOURCE CONSERVATION AND DEVELOPMENT AREA COUNCIL, INC.
BASIN PROGRAM FUNDS:	\$ 15,000
NON-FEDERAL FUNDS:	\$ 10,500
PROJECT DURATION:	JUNE 1, 1997 – SEPTEMBER 30, 1998
PROJECT TYPE:	INFORMATION AND EDUCATION
STATUS:	COMPLETE

#### PROBLEM STATEMENT:

Northern Michigan's high quality, cold water streams are vulnerable to high levels of sand sedimentation, especially in the location of road stream crossings. Many of these erosion problems can be controlled with little expense by a combination of minor structures and consistent maintenance.

#### BACKGROUND:

The transportation network across northern Michigan has provided the area with important infrastructure to support local economies but can prove detrimental to fast flowing, cold water streams if not properly maintained. The region's sandy soil creates problems where these roads cross sensitive streams by eroding into the water, slowing its flow and allowing it to warm up. Many of these eroded areas can be controlled at minimal expense. A comprehensive educational training tool, such as a workshop and manual, is required to instruct road commission employees about the various techniques and strategies available to minimize sedimentation. The project will also provide techniques and materials useful in other parts of the Great Lakes basin where these high quality streams are endangered by road construction.

#### ACTIVITIES:

The project steering committee, under the lead of the Huron Pines Resource Conservation and Development Council, established document review and workshop presentation subcommittees. The document review subcommittee reviewed the model manual, *Vermont Better Backroads* and incorporated suggested changes into the *Great Lakes Better Backroads Guidebook: Water Quality by Design*. After publishing the guidebook, the workshop subcommittee developed an education session directed to road commission associations and individual commission employees which they presented on seven occasions.

#### RESULTS:

The project committee convened seven workshops beginning in May 1998. The first, held in conjunction with the 37<sup>th</sup> Senatorial District Council meeting, included representatives from 11 counties. Kalkaska Conservation District hosted a meeting and demonstration in June for local watershed agencies and road commissions. Two meetings of the County Road Commission Association Vacationland District Council in June and July also included workshops. Workshops were

also held with the Retired Seniors Volunteer Program in June, and two meetings in July, including the Regional Wood in Transportation Program. In total, 166 individuals were reached through workshops, while an additional 585 persons received *Great Lakes Better Backroads Guidebook: Water Quality by Design*. Additionally, this project enabled the Huron Pines Resources Conservation and Development Area Council to obtain an additional Michigan Department of Environmental Quality Section 319 Grant to continue and expand efforts initiated under this project.

# **MICHIGAN**

<b>PROJECT TITLE:</b>	<b>MONTAGUE DRAIN BIO-ENGINEERING EROSION CONTROL PROJECT</b>
<b>GRANTEE:</b>	<b>MUSKEGON COUNTY SOIL CONSERVATION DISTRICT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$14,975</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$13,344</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1996 – SEPTEMBER 30, 1997</b>
<b>PROJECT TYPE:</b>	<b>TECHNICAL ASSISTANCE</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT:**

Severe gully and stream bank erosion is occurring on the upper end of the Montague Drain at Buttermilk Creek. Approximately 525 tons of sediment are delivered to White Lake each year from this source. It has been identified as one of the major source of sediment to the lake by the White Lake Public Advisory Council (PAC), the Muskegon County Soil Conservation District (MCSCD), and the U.S. Department of Agriculture - Natural Resource Conservation Service (USDA–NRCS).

## **BACKGROUND:**

The goal of this project was to reduce soil erosion and the amount of resulting sediment entering White Lake. Project personnel achieved this by building partnerships with local units of government, local citizen groups, and state and federal agencies. The project also included the implementation of a demonstration bio-engineering erosion control project to remediate gully and stream bank erosion around White Lake. This project helped raise public knowledge and awareness about soil erosion and the negative impacts of resulting sedimentation.

Following the 1995 Montague Drain Bio-Engineering Design, remedial work was carried out which included vegetation, along with rock rip-rap and filter cloth to control erosion. This design, which identified 15 sites for treatment in a 1,400 foot reach, was a result of a project by the MCSCD and the White Lake PAC. Project personnel included MCSCD, USDA-NRCS, and contractual staff with assistance from White Lake PAC members and community volunteers. The design consultant and NRCS staff assisted MCSCD staff in the application of bio-engineering techniques to the 15 sites. MCSCD staff coordinated the volunteer labor pool which included a Montague High School FFA/Agri-science class, PAC members, interested volunteers, and hired individuals. MCSCD staff, with PAC members, implemented the educational component of this project. They promoted bio-engineering techniques to control erosion on other streams in the White Lake watershed, increased public awareness of the detrimental effects of sediment, and encouraged students in a local hands-on science application of bio-engineering technology.

## **ACTIVITIES:**

Project personnel, PAC members, and volunteers completed the following tasks:

- Met with the engineering design consultant for training and consultation in the installation of bioengineering techniques at sites identified in the design plan.
- Identified permits needed for the project.

- Contacted private landowners for their cooperation and received permission to access their property in order to deliver materials to the site.
- Video-taped each site along Montague Drain for use in training, public education, project dissemination and evaluation.
- Surveyed and flagged each site as well as upland access areas for toe stone and material delivery.
- Student involvement during National Making a Difference Day: 120 students and 20 adults attended a talk on the issue of soil erosion and the negative impacts of sedimentation on water quality. Following the talk, 30 students and teachers participated in a hands-on workshop on bio-engineering design and techniques. The students participated in preparing the site for spring planting.
- Sent two press releases to local media to announce the project and to highlight the collaborative approach used.
- Installed 55 tons of toe stone on the 9 sites calling for slope protection.
- Planted approximately 650 shrubs, silky dogwood and willow stakes, to revegetate slopes on the 15 sites.
- Cleared and removed debris from 1,400 feet of the channel that was causing stream bank erosion.
- Repaired the 6-8 foot over fall that was cutting back up the stream bottom, through the road commission.
- Completed bio-engineering treatment to the 15 sites -- 670 feet of eroded stream banks as called for in the design.

## **RESULTS:**

A total of 26,375 people have received information on soil erosion/sedimentation and the Montague Drain project through presentations and articles. This includes 35 White Lake Public Advisory Council members and 400 recipients of the PAC newsletter, *Lakenews*; 120 students from four school districts and 20 adults who organized "Making a Difference Day;" and, 15,000 *Muskegon Chronicle* subscribers through the MCSCD Annual Report published as an insert in that newspaper. Project news has been disseminated through the White River Watershed Partnership and Timberland RC and D as well. Information reached an additional 10,800 people through the a *White Lake Beacon* article.

A estimated total of 485 tons of soil, 485 pounds of phosphorus, and 970 pounds of nitrogen have been saved through this project.

# **MICHIGAN**

<b>PROJECT TITLE:</b>	<b>RAPID RIVER RESTORATION PROJECT</b>
<b>GRANTEE:</b>	<b>KALKASKA CONSERVATION DISTRICT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$15,000</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$24,280</b>
<b>PROJECT DURATION:</b>	<b>NOVEMBER 15, 1997 – JUNE 30, 1998</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT:**

Two road/stream crossings have been identified as delivering excessive amounts of sediment to the Rapid River, part of the Elk River Chain of Lakes Watershed. The two sites are steep, unpaved roads whose construction, in combination with poorly located river crossings, causes excessive erosion.

## **BACKGROUND:**

The Elk River Chain of Lakes Steering Committee is a strong partnership of local citizens and agencies committed to the stewardship of Elk River watershed natural resources. Their paramount goal is to protect and improve the watershed's water resources and, under the Elk River Chain of Lakes Watershed Management Plan, the group has identified priority road/stream crossings to be improved. The Kalkaska Conservation District and the Natural Resources Conservation Service identified 6 road/stream crossings delivering excessive amounts of sediment to the Rapid River. The two most severely eroded sites were targeted for remedial action. These were Day Road where an estimated 100 cubic yards of sediment erodes down a 700 foot hill into the Rapid River annually; and Wood Road from which almost 80 cubic yards annually erodes.

## **ACTIVITIES:**

In cooperation with the Kalkaska County Road Commission, which supplied the equipment and labor required for the project, the Kalkaska Conservation District used Basin Program funds to purchase materials and obtain the required permits. Conservation District representatives also worked with the Road Commission and the Natural Resources Conservation Service to complete design drawings. The on-site work included paving the hills, curbs and gutters at both sites using the relatively new technique of berming the road edges with pavement which directs water off the road into settling basins. At the Wood Road site they also utilized a poured-in-place culvert.

As part of the project, the Kalkaska Conservation District hosted a tour to demonstrate the techniques used in the Wood and Day Road remediation. Fourteen people attended the tour.

## **RESULTS:**

The project remediated both road sites and saved 81 tons of soil. Fourteen persons representing several country road commissions, other river restoration projects, soil and water conservation districts and state observers attended the tour of the completed sites.



# **MICHIGAN**

<b>PROJECT TITLE:</b>	<b>REDUCING SEDIMENTATION ON THE BOARDMAN RIVER THROUGH GREATER PUBLIC INVOLVEMENT</b>
<b>GRANTEE:</b>	<b>GRAND TRAVERSE SOIL AND WATER CONSERVATION DISTRICT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$13,164</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$12,739</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1996 – NOVEMBER 18, 1997</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION; INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT:**

A 1991 study entitled *Boardman River Watershed Report* identified over 600 eroded sites along the Boardman River and its tributaries; 85 percent of these sites are the result of human activity. The sediment entering the river from these sites has significantly degraded the productivity of this state-designated “Blue Ribbon” trout stream and has negatively impacted the recreational opportunities offered by the river. In addition to correcting these problems, long term protection of the area’s soil and water resources as well as improved riparian landowner and user group stewardship is imperative.

## **BACKGROUND:**

The goal of this program was to reduce sedimentation and water quality degradation in the Boardman River Watershed through greater public involvement by: (1) providing hands-on opportunities for students, riparian landowners, and user groups to stabilize and revegetate stream bank erosion sites within the watershed; and (2) conducting an interactive river ecology workshop for the general public to improve their understanding of river system dynamics and see how their individual actions may affect a river.

Restoration of the Boardman River is an ongoing project and the focus of national attention. Through a Section 319 grant from the Michigan Department of Natural Resources, a successful grant (1994) from the Great Lakes Commission, and with local support from over 200 partners, the District has restored 108 of 600 identified erosion sites since 1993. This has stopped an estimated 1,500 tons of sand from entering the Boardman River System each year. To complement this effort and look toward the future, the current project will increase public involvement in the process through the hands-on opportunities and interactive workshop mentioned above.

## **ACTIVITIES:**

*Objective A:* The following work was completed to provide hands-on opportunities for riparian landowners and user groups to stabilize and revegetate stream bank erosion sites within the watershed. Over 75 people including landowners, Trout Unlimited members, employees from local businesses, students from the Ausable Institute, and eighth graders from Kingsley School restored fourteen sites. This work consisted of:

- Placing 190 tons of rip-rap and 110 cubic yards of top soil on three actively eroding sites.
- Placing 50 feet of fish habitat structure and 40 feet of whole-tree revetment at these sites.

- Restoring a severely eroding recreational access site on state land and placing 5 cubic yards of rip-rap on an associated eroding bank.
- Restoring the remaining sites with rip-rap, top soil, vegetation, and whole-tree revetment.
- Earth Day activities involving 23 eighth graders.
- Restoration by 15 students from the Ausable Institute using whole-tree revetment and top-soil on the North Branch of the Boardman River.

*Objective B:* In an effort to heighten public knowledge and awareness concerning river ecology two workshops were held. These workshops addressed issues including laws affecting rivers, the importance of aquatic insects as indicators of water quality, and the principles of river ecology and geomorphic processes. One workshop involved 450 students attending the second annual Student River Congress conducted by the Grand Traverse Bay Watershed Initiative. A model stream, constructed with this grant, was used to demonstrate river processes and simulate restoration techniques. The second workshop, a daylong event held along the banks of the Boardman River, involved 1,500 people learning about river ecology.

## **RESULTS:**

*Objective A:* The project team estimated that 115 tons of soil and an associated 193 pounds of nitrogen and 97 pounds of phosphorus are prevented from entering the Boardman River each year as a result of these projects. As well, a total of 756 linear feet of stream bank were treated, 6,460 square feet of vegetative stabilization was added, and 96 linear feet of fish lunger structures were installed.

*Objective B:* The project reached almost 2,000 people through the Boardman River ecology workshops.

Evaluation of the success of the Boardman River Restoration Project continues and this information is shared with other resource management groups around the state. Great Lakes Basin Program funds helped involve volunteers in the restoration activities at over 20 erosion sites. Results have been reported in the District newsletter and in the new Boardman River Project newsletter *Boardman Currents*. The final results were presented at the Michigan Association of Conservation Districts 1997 annual convention.

# **MICHIGAN**

<b>PROJECT TITLE:</b>	<b>RIPARIAN HOMEOWNER'S STEWARDSHIP PROJECT</b>
<b>GRANTEE:</b>	<b>MID-MICHIGAN ENVIRONMENTAL ACTION COUNCIL</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 9,500 (APPROVED)</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$ 7,250 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>MAY 1, 1997 –</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>ONGOING</b>

## **PROBLEM STATEMENT:**

Riparian homeowners in the Red Cedar River watershed are not aware that their activities have an impact upon the river's water quality. If they can be educated to understand that there are economic benefits to riparian best management practices, they could prove to be a good source of coordination, leadership and labor for riparian projects.

## **BACKGROUND:**

Red Cedar River riparian homeowners do not realize that their activities, such as composting too close to the river's edge, misuse of pesticides and fertilizers, or keeping a riverside lawn with no buffer strip degrade the quality of Red Cedar water. Homeowner Associations (HOA) formed along the Red Cedar River benefit from a healthy river, not just economically but also in terms of quality of life. With this impetus, HOAs have the potential to be active guardians of the river which is both a natural and economic resource. HOAs are potentially the most effective forum for completing projects that require significant coordination, leadership and labor. Because they are already established groups that are accustomed to working with each other and are more experienced coming to consensus than an ad hoc volunteer group.

## **ACTIVITIES:**

Mid-Michigan Environmental Action Council (Mid-MEAC) tapped the labor, coordination and leadership potential of four homeowner associations (HOA) along the Red Cedar River, Indian Hills HOA, Riverwood HOA, Sylvan Glenn HOA and Tacoma Hills HOA. Through a variety of fora, including canoe trips, walking tours and seminars with HOA, project staff informed riparian homeowners about potential threats to Red Cedar Creek water quality. They outlined actions individual homeowners could undertake, including environmentally sensitive lawn care and home maintenance procedures. In addition, project staff conducted 15 individual on-site consultations with interested homeowners to provide recommendations for buffer strip design and water resource protection.

## **RESULTS:**

Project staff completed and distributed the Red Cedar River Riparian Homeowner's Handbook to over 300 individual homeowners, local government officials, and other interested groups. Staff and volunteers designed and constructed three major riparian buffer strips over 300 feet along the river.



# **MICHIGAN**

<b>PROJECT TITLE:</b>	<b>VEGETATIVE BARRIERS TO PREVENT SOIL EROSION AND INCREASE BIOLOGICAL PEST CONTROL IN AGRICULTURAL LANDSCAPES</b>
<b>GRANTEE:</b>	<b>MICHIGAN STATE UNIVERSITY, DEPARTMENT OF ENTOMOLOGY</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 14,860 (APPROVED)</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$ 13,301 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>DECEMBER 1, 1997 –</b>
<b>PROJECT TYPE:</b>	<b>TECHNICAL ASSISTANCE</b>
<b>STATUS:</b>	<b>ONGOING</b>

## **PROBLEM STATEMENT:**

Soil erosion and sedimentation from crop lands has been identified as a major source of nonpoint source pollution in the Great Lakes basin. The Natural Resources Conservation Service identified vegetative barriers as an effective measure for reducing sedimentation and nonpoint source pollution. Michigan State University research found additional benefits to vegetative barriers which include providing habitat for crop pest predators and parasites.

## **BACKGROUND:**

In addition to creating a significant source of nonpoint source pollution, agricultural land use, especially tillage, disturbs habitat, overwintering sites, refuge from pesticide application and food resources for arthropods which prey on crop pests. The lack of these habitats has been linked to increased crop losses which can, in turn, lead to increased pesticide use and an attendant rise in nonpoint source pollution. Including adequate habitat management in agricultural land use planning is the key to an ecosystem-based approach to managing these problems. Properly managed vegetative barriers such as cross wind trap strips within fields and filter strips bordering fields may serve multiple purposes including wind and water erosion control and increased habitat for beneficial life forms.

In the Saginaw Valley region, high crop and tillage intensity combined with inherent soil and landscape characteristics, make soil erosion and associated nutrient and pesticide loading in surface waters an acute problem. Annual soil erosion into the Saginaw Bay watershed is estimated at nine million tons. Under the Great Lakes Water Quality Agreement the watershed has been designated an Area of Concern and become the focus of the U.S. Environmental Protection Agency's first National Watershed Initiative Program. As part of the program, the Natural Resource Conservation Service is developing vegetative barriers as a component of a Conservation Management System. These include technical guidelines for cross wind trap strips for use within fields to induce soil deposition and trap pollutants before they are deposited downwind. At the same time the reduction in non-crop habitats such as fence and hedgerows, wood lots and riparian buffers has limited the abundance and diversity of crop pest predators. One means of reintroducing the required habitat into the landscape is through vegetative barriers. Michigan State University

research has developed natural enemy resource habitats comprised of perennial grasses, legumes and flowering herbs most of which have also been approved for use in vegetative barriers.

#### **ACTIVITIES:**

Three field test plots of varying composition, legume, switch grass and soybean, were established in Midland County, Bay County and Tuscola County. At each site, researchers conducted weekly pitfall trapping for Carabid ground beetles which are important insect and weed seed predators. In addition, researchers conducted seed predation studies at the Midland County site.

#### **RESULTS:**

The research demonstrated that filter strips can contain a more diverse and abundant carabid (ground beetle) community than the adjacent field. A total of 11 species of carabids were found in the soybean filter strip, 20 in the legume plot and 25 in the switch grass test site with corresponding abundance following similar trends. Carabids and other invertebrates were responsible for a significant removal of weed seed. For instance, in one week they removed 84 percent of foxtail seeds in the switch grass filter strip compared to 42 percent and 17 percent in the legume and soybean filter strips respectively. An unexpected finding was that crickets also consume large quantities of weed seeds.

The project team produced the following articles:

Douglas Landis and Lawrence Dyer, "Conservation Buffers and Beneficial Insects, Mites and Spiders," 1998, USDA–NRCS Conservation Information Sheet. 4 pp.

Fabian Menalled and Doug Landis, "Carabid Beetles, Filter Strips and Biological Control of Annual Weeds," *Midwest Biological Control News* 5 (December 1998): 4-5; [www.wisc.edu/entomology/mbcn/weed512.html](http://www.wisc.edu/entomology/mbcn/weed512.html)

Douglas Landis, Fabian Menalled, Janna Lee, Dora Carmona and Malia Perez-Valdez, "Habitat Management to Enhance Biological Control in IPM," International Conference on Emerging Technologies in Integrated Pest Management: Concepts, Research and Implementation. March 8-10, 1999 (in press), 12 pp.

Additionally, project personnel hosted two field days which attracted approximately 60 farmers, extension agents, and high school students. An article detailing the results of the project was published in the *Midwest Biological Control News*, with a circulation of more than 2,000 people, including county extension offices and extension entomologists in the eleven state north-central region. Another 2,000 people received the USDA–NRCS conservation information sheet as well.

# **MICHIGAN**

<b>PROJECT TITLE:</b>	<b>YORK CREEK/ALPINE-WALKER DRAIN STREAM BANK STABILIZATION PROJECT</b>
<b>GRANTEE:</b>	<b>GRAND VALLEY STATE UNIVERSITY WATER RESOURCES INSTITUTE</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 4,382</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$ 3,120</b>
<b>PROJECT DURATION:</b>	<b>NOVEMBER 1, 1997 – APRIL 30, 1998</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT:**

An increasing percentage of the Alpine-Walker Drainage District is shifting to high-density, commercial uses with a corresponding increase in impervious surface areas. These areas lack sufficient storm water control which has resulted in stream bank failure at several locations in the watershed.

## **BACKGROUND:**

The Alpine-Walker Drain is a feeder stream into the larger York Creek hydrologic system. Nonpoint source pollution problems and hydrologic instability occurring in the Drain add to York Creek's problems such as out-of-bank flooding, channel clogging from imbedded sediment and lateral stream meandering. In order to address these issues, the York Creek Watershed Project is undertaking a three-track approach to watershed management which include administrative best management practices (BMP) such as a township storm water management ordinance, researching and installing storm water surge control technologies which complement current storm water systems, and instituting a variety of bio-engineered bank stabilization activities.

## **ACTIVITIES:**

Phase I: Tree Revetments and Log Wall Construction – Field crews reinforced slope toes using logs affixed with 3/16 inch steel cable and heavy gauge duckbill driven approximately 2.5 feet into the streambed. Then graduated sizes of granite cobble were deposited in front and behind the logs, the area immediately behind the logs was backfilled with finer cobble and clay/sand substrate removed from the stream channel. Field crews then installed recycled Christmas trees within the average high water mark in a “shingle” pattern placing larger diameter trees at the bottom. Several sites required “harder” structures than tree revetments and field crews installed hardwood log walls behind six-foot steel posts driven three-feet into the streambed. Large cobble and boulders protected log walls from high-water then Christmas trees were secured behind the wall to induce further stabilization. Phase I field work concluded by mid-September 1997.

Phase II: Live Stake Planting – In January 1998 the York Creek Project Manager decided to supplement Phase I activities with a live stake planting program. Seven hundred live stakes of species similar to native bush such as red osier dogwood, grey dogwood, button bush, and black willow were ordered. Field crews began installing the live stakes in May and completed the project within two weeks.

**RESULTS:**

The project stabilized approximately 1,000 feet of stream bank during Phase I. During Phase II 700 native species live stakes were installed as a supplement to Phase I. An instructional video detailing the Phase II methodology was also completed.

One year later, 90 percent of Phase I installations remain intact. The need for the other 10 percent to require maintenance was attributed to a 100-year storm event occurring in September 1997. It is estimated that the project will save 742 tons of soil over fifteen years of the project life.

Local engineering firms have expressed interest in the project as has the Kent County Drain and Road Commission and Alpine Township. The York Creek Project Manager presented the project to about 100 people of the Maple River drainage district and the York Creek Watershed Project Steering Committee at two workshops and anticipate reaching close to 1,000 more persons over the next few years. Bio-engineering presents an increasingly accepted alternative to conventional erosion control practices in stream bank protection and restoration.

# **MINNESOTA**

<b>PROJECT TITLE:</b>	<b>ENHANCED CAPABILITIES FOR SWCD TECHNICIANS IN CONSTRUCTION INSPECTION IN THE LAKE SUPERIOR WATERSHED</b>
<b>GRANTEE:</b>	<b>MINNESOTA BOARD OF WATER AND SOIL RESOURCES</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$9,258</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$15,000</b>
<b>PROJECT DURATION:</b>	<b>AUGUST 1, 1996 – JULY 31, 1997</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT:**

This project trained SWCD staff how to inspect construction projects in progress.

## **BACKGROUND:**

Minnesota is currently placing a high priority on the technical training of local government staff, especially Soil and Water Conservation District (SWCD) technicians. There are seven SWCDs functioning in the Minnesota Lake Superior Watershed. Also, the Lake Superior Association of Soil and Water Conservation Districts (LSA) and the Minnesota Board of Water and Soil Resources (BWSR) currently have a backlog of approximately 50 projects on the north shore of Lake Superior.

This project completed two high priority erosion control projects on the shore using SWCD technicians during portions of the construction inspection. By doing this, the project provided job training to SWCD personnel and other local government technical staff, while at the same time completing the two stabilization projects.

## **ACTIVITIES:**

Two high priority rip-rap revetement projects (Moland and Sanden) were built using this grant, totaling approximately 269 feet of Lake Superior shoreline. The project topographies were surveyed with SWCD technicians on site as the first part of their preconstruction inspection training. In addition, final design plans and specifications, contract bid packages, permit applications and construction observations were also completed providing additional SWCD training. From the start, district technicians were involved in the project work, to increase understanding of construction inspection guidelines.

## **RESULTS:**

The *Construction Inspection Guidelines for Rip-rap Revetments* training manuals were also developed and distributed to appropriate SWCD technicians and SRF state engineers. A training session was also held as part of a Natural Resources Conservation Service TR-2 workshop on Lakeshore Protection Training and had more than 41 attendees.

The completed projects will save an estimated 181 tons of soil per year. An additional 68 tons per year will be saved from the Fuller project which served as the project for state match and additional training. This brings the total to approximately 249 tons of soil per year. All three projects will improve fish habitat and overall lake quality by reducing direct sedimentation into Lake Superior.

## **MINNESOTA**

<b>PROJECT TITLE:</b>	<b>KNIFE RIVER WATERSHED EDUCATION PROJECT</b>
<b>GRANTEE:</b>	<b>LAURENTIAN RESOURCE CONSERVATION AND DEVELOPMENT COUNCIL</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$10,415 (APPROVED)</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$6,700 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1996</b>
<b>PROJECT TYPE:</b>	<b>INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>ONGOING</b>

### **PROBLEM STATEMENT:**

Tree planting, seeding and other habitat enhancement activities are occurring as a result of a Forest Stewardship Watershed Project initiated in 1992. For these activities to continue, develop, and endure over the long-term, an educational program targeting the citizens in the watershed is also needed. To address this need, the Knife River Watershed Education Project was initiated.

### **BACKGROUND:**

The Knife River Watershed is a unique system among Minnesota's Lake Superior/North Shore tributaries. It encompasses an area of approximately 60,000 acres split evenly between private and public ownership. The Knife River has the North Shore's only naturalized wild steelhead population and is the only North Shore tributary that has no natural barriers preventing fish migration. However, the river is also a major source of sedimentation to Lake Superior. According to the North Shore Steelhead Plan, land use changes have resulted in the acceleration of stream bank erosion and sedimentation along with excessive fluctuations in stream flow and water temperature. Furthermore, cumulative hydrologic effects have combined to produce a negative impact on the Knife River system's quality and quantity.

The goal of this project was to minimize and/or prevent soil erosion and sedimentation in the Knife River Watershed, which directly impacts Lake Superior, and thus protect and improve water quality as well as wildlife and fish habitat. This goal was reached through information and education activities.

### **ACTIVITIES:**

The project goal was accomplished by meeting both short-term and long-term objectives. The short-term objectives completed include four *Edge of the Knife* newsletters this project year. These newsletters educated readers about the necessity of riparian tree establishment, existing tree species, historical data on the Knife River, protection of wildlife and fisheries habitat in the Knife, as well as acknowledging landowners that have currently implemented stewardship plans in the watershed. Over 600 landowners and residents, local organizations and agencies, elected officials, project partners, and other interested persons received these newsletters. In addition, a Knife River Watershed factsheet was produced and distributed through the newsletter and by other means. Educational signs were developed and posted at six strategic locations throughout the watershed. These signs attract attention year-round, as they are placed at popular fishing, swimming, and picnic spots, as well as along hiking, skiing, and snowmobile trails.

More than 1,700 trees were planted on private and public lands to stabilize streambanks and prevent erosion. This is well over the 750 trees originally proposed. A total of 31 acres of public and private land were planted as part of the "Riparian Tree Cost Share" program, where landowners received 50 percent cost share for trees, mats, and mulch. Furthermore, eight landowners received Forest Stewardship Plans.

The long-term goal of creating a Geographic Information System (GIS) is underway. Maps of political boundaries, national wetlands, highways and roads, rivers and streams, and/or watershed boundaries can already be generated. GIS maps have been produced and included in the *Edge of the Knife* newsletters. So far, the GIS has been a tool to give the landowners a visual idea on how large the watershed is, where beaver dam sites are located, the location of tributaries and sub-tributaries, and ownership boundaries in the watershed. The GIS will eventually be used for community-wide, landscape-level planning purposes and will generate important information about the watershed for local professionals, local units of government, and landowners for futureplanning and decision-making activities.

## **RESULTS:**

An estimated 20 tons of soil will be saved per year as a result of 1,800 feet of forested filter strips, 300 feet of vegetative stabilization, and 3,000 feet of riparian tree planting over some 31 acres. Eight editions of the newsletter, *Edge of the Knife*, were produced and mailed to 650 landowners, elected officials and other interested parties. Additionally 2,000 fact sheets were produced and circulated. Student volunteers also participated in two tree plantings.

Additionally, several smaller watersheds along Lake Superior's North Shore have started watershed projects based on the information generated by this project. Thus the potential for improvement and protection of Lake Superior water quality is ever expanding.

# **MINNESOTA**

<b>PROJECT TITLE:</b>	<b>LAKE SUPERIOR LOW COST SHORELINE EROSION CONTROL DEMONSTRATION PROJECTS</b>
<b>GRANTEE:</b>	<b>MINNESOTA BOARD OF WATER AND SOIL RESOURCES AND LAKE SUPERIOR ASSOCIATION OF SOIL AND WATER CONSERVATION DISTRICTS</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$13,500</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$13,557</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1997 – JULY 31, 1998</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT:**

Conventional soil erosion projects are very expensive for Lake Superior shoreline due to long fetches and the lake's severe wave climate. Most projects cannot be funded solely by the landowners, nor do state share-cost funds cover many large scale projects. If low cost alternatives can be demonstrated as acceptable options under certain conditions, state share-cost funds will go further and more shoreline can be protected.

## **BACKGROUND:**

Recently a large scale erosion control project has been completed at Sucker Bay. From that site an estimated 3,000 tons of sediment eroded annually from the four adjacent shoreline areas. Remediation of these areas cost an average \$250-\$300 per linear foot. Forty more such projects have been identified by the Lake Superior Association of Soil and Water Conservation Districts, at least 15 of which have been classified as potential low cost shore protection project sites. Low cost sites are defined as those with eroding shorelines substantially above lake level or with partial protection already in place. Potential low cost solutions include greater and more efficient use of vegetation, use of pinned rock rather than poured concrete and use of rock filled gabions in lower wave impact areas.

## **ACTIVITIES:**

Four sites were selected for low cost demonstration projects representing different specific problems: use of selected dump and fill rip-rap to protect a very steep erosion pocket; use of large rectangular pinned rock in place of a concreted wall; use of gabions to protect an eroding area of Lake Superior; installation of a modular wall system to protect a sandy beach back shore area; and pinning the outer row of rip-rap in a revetment in order to build over a bedrock outcrop. A matching project, a pinned toe stone revetment, was also constructed.

## **RESULTS:**

The six projects will save an estimated 545 tons/year of sediment from entering Lake Superior. This is expected to be an ongoing saving. As these techniques are adopted elsewhere along the lakeshore, further soil savings are expected to occur. If successful over the long term, fish habitat and ambient lake water quality are expected to improve through the reduction of direct sedimentation into Lake Superior.

At a July 1998 Sea Grant workshop inquiries about the projects and requests for further information indicate a basin-wide interest leading to the conclusion that the cost and erosion benefits will accrue to other Great Lakes shorelines as well.

# **MINNESOTA**

**PROJECT TITLE:** LAKE SUPERIOR SHORELINE VEGETATION  
DEMONSTRATION PROJECTS FOR EROSION  
CONTROL AND BLUFF STABILITY

**GRANTEE:** MINNESOTA BOARD OF WATER AND SOIL  
RESOURCES AND LAKE SUPERIOR ASSOCIATION  
OF SOIL AND WATER CONSERVATION DISTRICTS

**BASIN PROGRAM FUNDS:** \$14,700

**NON-FEDERAL FUNDS:** \$ 8,030

**PROJECT DURATION:** JANUARY 1, 1998 – JULY 9, 1998

**PROJECT TYPE:** DEMONSTRATION

**STATUS:** COMPLETE

## **PROBLEM STATEMENT:**

Revegetation of the region directly landward of shoreline erosion control projects is required in order to sustain their long-term success. In order to choose the most appropriate woody or other deep rooted vegetation, specific guidelines for selecting Lake Superior facing slope and frontage specific species is required.

## **BACKGROUND:**

Final revegetation of several Lake Superior projects has not been completed to date because specific guidelines for species selection have not yet been devised. Issues to be addressed include height, whether species are native or exotic, erosion control capability and potential slope stability, plant acquisition and care. The development of a shoreline vegetation fact sheet will help disperse acquired information.

## **ACTIVITIES:**

Four typical Lake Superior vegetation sites were selected, planting plans devised and demonstration planting carried out. The four sites included a flat splash zone directly landward of an existing rip-rap revetment; a steep rock and clay shoreline; a tall slumping clay bank with toe protected by a rock buttress; and a sandy beach back shore area. Detailed planting plans for each site were prepared for spring 1998 planting. Approximately 1,400 trees, plants and shrubs were planted in addition to ground cover and erosion control matting. Investigators also created a fact sheet to guide property owners in the future.

## **RESULTS:**

A total of 880 tons of soil were saved annually. Because the planting formed the final aspect of each site's erosion control program, task specific amounts cannot be calculated for them, nevertheless each planting forms an integral aspect of the final soil saving calculation. It is expected that successful vegetation will result in improved fish habitat and ambient water quality.

The fact sheet, *Erosion Control Vegetation for the Lake Superior Shoreline* was printed and made available for distribution to interested property owners.



# **MINNESOTA**

<b>PROJECT TITLE:</b>	<b>WATERSHED GUARDIAN PROGRAM</b>
<b>GRANTEE:</b>	<b>ST. LOUIS RIVER CITIZENS ACTION COMMITTEE</b> <b>C/O MINNESOTA POLLUTION CONTROL AGENCY</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 10,000 (APPROVED)</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$ 3,335 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>MAY 1, 1997 –</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>ONGOING</b>

## **PROBLEM STATEMENT:**

Unique topography and soils, including low permeable red clay and impervious urban surfaces, in the St. Louis River/Lake Superior watershed at Duluth, MN and Superior, WI have led to substantial erosion difficulties. There are 29 high quality streams and small watersheds which dissect Duluth's escarpment and act essentially as storm water conduits carrying associated point and nonpoint pollutants to the St. Louis River and Lake Superior.

## **BACKGROUND:**

Changes in land cover since European settlement have increased the storm water impact on water quality. The pre-Contact coniferous and mixed forest coverage has changed to predominantly deciduous forests dominated by early successional tree species, such as aspen, which has resulted in higher peak stream flow and greater stream bank erosion and sedimentation. As well, urbanization has increased impervious surfaces adding to peak flows and erosion. A reduction in peak storm flows, due to increased coniferous coverage, as well as activities undertaken as a result of riparian education in best management practices, should help reduce nonpoint source pollution to the St. Louis River/Lake Superior watershed.

The St. Louis River Citizens' Action Committee (CAC) is lead on a multi-organization funded project to carry out stream restoration projects and cultivate public awareness of stormwater impacts on water quality. This portion of the project is designed to protect Miller Creek, an urban stream in Duluth, which has a naturally reproducing brown trout population. The restoration project will establish herbivore exclosures to protect stream side northern white cedar, white pine and other conifers from predation from deer and rabbits. The conifers will increase on-land retention time for storm water by slowing snowmelt in the spring and reduce stream water temperature in an area of thermal stress for brook trout.

## **ACTIVITIES:**

Designated sites of high thermal stress and erosion along Miller Creek were planted with northern white cedar, white pine and other conifers as appropriate for the site. The intention is to ensure a thick stand of native tree species providing multiple benefits to the stream. Interpretive signs have been placed at the stream plantings in order to inform the public about the purpose and need for the improvements.



## **NEW YORK**

<b>PROJECT TITLE:</b>	<b>OSWEGO RIVER EROSION CONTROL PROJECT</b>
<b>GRANTEE:</b>	<b>OSWEGO COUNTY PLANNING AND COMMUNITY DEVELOPMENT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 13,058 (APPROVED)</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$ 6,529 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>MAY 1, 1997 –</b>
<b>PROJECT TYPE:</b>	<b>INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>ONGOING</b>

### **PROBLEM STATEMENT:**

Residential development along the Oswego River has removed both native ground cover vegetation and trees causing accelerated soil loss, stream bank erosion and the addition of pollutants such as fertilizers and pesticides adhering to sediment particles. As a result, fish and wildlife habitats are disrupted and the aesthetic appeal of the canal is damaged. Nonpoint source pollution from this source impacts the river, Oswego Harbor and Lake Ontario.

### **BACKGROUND:**

Numerous studies have identified sediment problems on the Oswego River and Harbor. The Oswego County Water Quality Strategy recognized the section of the Oswego River upstream from the Harbor to the junction at Three Rivers as impaired due to silt and sedimentation. The Oswego River has been placed on New York's Priority Water Problem List and identified for preservation of scenic qualities under the State Canal System Revitalization Plan. Additionally, Oswego Harbor has been designated an Area of Concern under the Great Lakes Water Quality Agreement, and the resulting Remedial Action Plan (RAP) is designed to reduce sediment and nonpoint source pollution inputs into the Oswego Harbor.

### **ACTIVITIES:**

A visual survey and video tape record of the Oswego River shoreline provided the raw data to enable the identification of erosion problems. Geographical Information System (GIS) maps were then created to identify shoreline, stream banks, and other areas requiring protective and/or remedial action.

The team assessed development pressures on riparian property based upon municipal development plans. They prepared draft ordinance to create a riparian buffer zone for potential adoption by municipal governments. This was disseminated to municipal governments and planning boards. An educational outreach program which addressed current land use and erosion conditions, remedial measures, environmental impact, and economic benefits of proper streambank management was conducted.

### **RESULTS:**

The Oswego County Environmental Council produced a report *The Determination of Buffer Widths: Literature Survey and Recommendations for Oswego County, New York*. The report was used to prepare a model ordinance.

Oswego County planning personnel presented information at meetings for the Planning Boards or Commission of nine local municipalities, as well as sessions of the Environmental Management Council, which reached some 110 local legislators. The model ordinance was announced through the press and communicated directly to the New York State Canal Corporation and the Oswego County Sheriff. News releases and newsletters potentially reached an audience over 120,000. Educational opportunities were arranged for over 6,000 boaters, shoreline owners and members of the general public.

## **NEW YORK**

<b>PROJECT TITLE:</b>	<b>ROAD DITCH STABILIZATION DEMONSTRATION FOR TOWN HIGHWAY SUPERINTENDENTS</b>
<b>GRANTEE:</b>	<b>YATES COUNTY SOIL AND WATER CONSERVATION DISTRICT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 15,000</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$ 20,580</b>
<b>PROJECT DURATION:</b>	<b>MAY 1, 1997 – NOVEMBER 30, 1998</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

### **PROBLEM STATEMENT:**

Highway departments are faced with the task of designing and maintaining highways which remove water quickly to prevent flooding and ensure safe driving conditions while, at the same time, ensuring water quality is not impaired through soil erosion and/or chemical pollution trapped in eroded sediments.

### **BACKGROUND:**

Approximately 95 percent of Yates County drains into the Finger Lakes-Seneca, Canandaigua and Keuka Lakes which, in turn, drain into the Great Lakes basin. A 1974 U.S. Department of Agriculture– Soil Conservation Service “Erosion and Sediment Control Inventory” estimated annual road ditch erosion in the Finger Lakes-Seneca, Canandaigua and Keuka Lakes watershed as averaging 12 to 15 tons per road ditch mile. A New York State Department of Environmental Conservation study entitled, “State of the Canandaigua Lake Watershed – 1994, A Guide to Understanding and Protecting Our Vital Resources,” identified 16 potential causes of nonpoint source pollution which included road bank and road ditch erosion. Road ditches designated very severe, with slopes greater than eight percent, averaged 82 tons of soil eroded per mile, while slopes designated severe, between five percent and eight percent slope, averaged 33 tons of soil eroded per mile. There are 18.1 miles of severe or very severe road ditches in Yates County draining into Canandaigua Lake. Another study using the same methodology designated an additional 26 miles of Yates County ditches draining into Keuka Lake as severe or very severe. An additional 17 miles of ditches in the Kashong Creek watershed were found in need of treatment due to erosion problems.

Most road ditch and bank problems are due to two principal causes: insufficient rights of way along county and town roads and inadequate funds to remediate the problems. Forty-two highway superintendents from five counties have been trained to recognize erosion and sediment control practices to control soil erosion when developing road management practices. The superintendents also received a supporting handbook with reference materials. The next step is to develop on site demonstrations to reinforce classroom-based knowledge.

### **ACTIVITIES:**

Yates County SandWCD inventoried all moderately, severely and very severely eroding road ditches by watershed. The inventory identified 8.9 miles of severe and very severe erosion sites in the Seneca Lake watershed. Project personnel selected approximately 2,750 feet at three severe or very

severe sites for stabilization and began working on the sites in July 1998. At site one project personnel reconstructed a limited use road which gave public access to the Keuka Lake Outlet Trail. Here steep road banks were stabilized by hydroseeding and mulch in anticipation of re-establishing thick vegetative cover. Sites two and three were road ditch projects which were stabilized with riprap in order to prevent costly annual reconstruction. Additionally, site two was also hydroseeded and mulched.

## **RESULTS:**

All three stabilized sites were subject to severe or very severe erosion. In total, a little over one-half mile or 2,750 feet of road ditch was stabilized. This amounts to a considerable saving of sediment to the Keuka Lake Outlet. Sites two and three, for instance, annually contributed an estimated 33 tons of sediment per mile before stabilization. With the completion of the project it is estimated that 41 tons of soil, 412 pound of phosphorus, and 83 pounds of nitrogen will be prevented from entering the Outlet which leads to Seneca Lake and is a classified trout stream.

There are additional benefits to this project. The road inventory will continue to be used by local communities in planning, especially those wishing to establish a road improvement plan to include road ditch stabilization. The project offers three demonstration sites which have already been viewed by highway superintendents and 15 highway personnel. The project has enhanced working relations between municipal officials and the Yates County Soil and Water Conservation District. Due to this cooperative effort, highway superintendents have contacted the Conservation District to request technical assistance on other road management problems they are experiencing.

## **NEW YORK**

<b>PROJECT TITLE:</b>	<b>SENECA COUNTY GRAZING LAND INITIATIVE</b>
<b>GRANTEE:</b>	<b>SULLIVAN TRAIL RESOURCE CONSERVATION AND DEVELOPMENT COUNCIL</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 15,000 (APPROVED)</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$ 5,000 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>MAY 1, 1997 –</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>ONGOING</b>

### **PROBLEM STATEMENT:**

Traditional agricultural practices are responsible for a significant amount of nonpoint source pollution entering the Great Lakes basin, including fertilizers and pesticides trapped in sediment particles. Intensive Rotational Grazing systems (IRG), also known as short duration grazing systems, are effective best management practices (BMPs) for controlling agricultural runoff but livestock producers need to know the environmental and economic advantages of IRG systems.

### **BACKGROUND:**

Agricultural causes of water quality impairment include manure spreading and storage, barnyard runoff, livestock in streams, pesticide and fertilizer application, and truck and row crops. These activities are responsible for introducing excessive sediments, nutrients, pathogens, pesticides and organic matter into rivers and lakes through runoff. Runoff from marginal crop land and existing pasture and hayfields can be reduced substantially through the use of Intensive Rotational Grazing systems. IRG has been identified with reducing annual soil loss by as much as 9.4 tons per acre, which if extrapolated over the one percent total crop land and pasture farmed within New York state's Lake Ontario basin, or 2.223 million acres, as much as 208,979 tons of soil could be saved annually.

Intensive Rotational Grazing BMPs include interior and perimeter fencing to prevent livestock from entering streams, pasture seeding/renovation, installation of livestock watering facilities and introducing short duration grazing systems.

### **ACTIVITIES:**

The Sullivan Trail Resource Conservation and Development Council (RC & D) established a Grazing Committee which, in turn, identified and selected participating farms. The RC & D prepared grazing plans for all participating farms. Each plan identified IRG systems BMPs applicable to the respective farm. Over the course of the summer project personnel laid out and began installation of BMPs on the participating farms. The Seneca County Water Quality Committee sponsored a tour of one of the farms and held a grazing workshop at another. Additional activities include completing BMP installation and a pasture walk for the fall of 1998.

### **RESULTS:**

The IRG systems BMPs are expected to last ten years during which they will save 8,800 tons of soil, 88,000 pounds of phosphorus and 17,600 pounds of nitrogen. Additionally, 85 livestock producers and elected officials were reached during four workshops/farm tours. These efforts will continue and more livestock producers will be introduced to IRG systems BMPs in the future.



## **NEW YORK**

<b>PROJECT TITLE:</b>	<b>TWELVE MILE CREEK WATERSHED REMEDIATION/ DEMONSTRATION PROJECT</b>
<b>GRANTEE:</b>	<b>NIAGARA COUNTY SOIL AND WATER CONSERVATION DISTRICT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$12,800 (APPROVED)</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$ 4,900 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1996 –</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION; INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>ONGOING</b>

### **PROBLEM STATEMENT:**

Recognized as a significant game fish corridor, Twelve Mile Creek's environmental health is in notable decline. Studies have established a correlation between the degradation of Twelve Mile Creek, soil erosion and the resulting sedimentation. Much of the degradation can be linked to the large scale "ditching" efforts which date back over many decades and remain in practice today.

### **BACKGROUND:**

Twelve Mile Creek, one of two major watersheds within Niagara County, feeds directly into Lake Ontario and is a major source of tourism revenue from its sport fishery. While drainage projects within the Twelve Mile Creek Watershed have been designed to meet stringent engineering standards, little attention has been given to the environmental impacts of these practices. Historically, the Niagara Soil and Water Conservation District has set the standard for local drainage efforts and sediment control practices with alternative drainage strategies, in an effort to rehabilitate and preserve sensitive fisheries habitats.

The project goal is to educate the public about the effects of erosion and sedimentation on fisheries habitats and associated ecosystems within Niagara County, while providing a mechanism to remediate and restore this dwindling natural resource. The project will use an interdisciplinary approach to provide outreach education and a viable demonstration project. Great Lakes Basin Program funds will be used in achieving this goal to lease skid-steer type excavation equipment, to cover consultant fees, and to purchase soil bioengineering vegetation, mulch and seed.

### **ACTIVITIES:**

The Twelve Mile Creek Watershed was selected because of degraded fisheries habitat in two towns on the watershed. Initially, local politics and historic drainage practices in the area proved very challenging. After many designs, meetings and conversations with the Army Corps Engineers, the parties were unable to come to agreement on drainage ditch design and installation specifications. Further collaboration between the Corps, a private environmental consultant and a professional engineer has reanimated the permit application process.



## **NEW YORK**

<b>PROJECT TITLE:</b>	<b>YATES COUNTY MODEL SITE PLAN REVIEW</b>
<b>GRANTEE:</b>	<b>YATES COUNTY PLANNING DEPARTMENT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 7,000</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$ 4,500</b>
<b>PROJECT DURATION:</b>	<b>APRIL 16, 1997 – MAY 15, 1998</b>
<b>PROJECT TYPE:</b>	<b>TECHNICAL ASSISTANCE</b>
<b>STATUS:</b>	<b>COMPLETE</b>

### **PROBLEM STATEMENT:**

In order to prevent and mitigate nonpoint source pollution, especially related to stormwater management, erosion and sedimentation control, the Yates County Planning Department proposed the use of model site plan regulations. Models provided under New York State enabling legislation do not meet the needs of Yates County communities for two reasons. Stormwater management, erosion and sedimentation control are not expressly listed as uses which would require site plan criteria. Also single-family dwellings are not expressly listed as uses which require site plan review. Yates County planners, therefore developed model site plan review regulations that include these two elements and are based on natural development constraints as identified by the County's geographic information system.

### **BACKGROUND:**

Municipalities within Yates County have recognized the importance of informed land use management and water resource protection in order to address nonpoint source pollution threatening water resource quality in the county. Yates County Planning Department personnel provide technical assistance to local municipalities to help ensure new development does not jeopardize planning goals, including environmental aspects. Soil erosion is a priority concern because eroded particles transport nutrients and toxic chemicals into local water bodies.

Yates County planners wanted to develop a model code for Site Plan Review to be adopted by local governments. The review would identify geographic areas within a municipality which are susceptible to erosion and sedimentation problems; determine the environmental impact of proposed developments; require proper storm water management, erosion and sedimentation control; and protect water resources to preserve municipal drinking water sources as well as recreation and aesthetic properties.

### **ACTIVITIES:**

In order to identify the areas of Yates County most susceptible to soil erosion and sedimentation associated with development, investigators used the Geographical Information System (GIS) base data set *Ontario and Yates Counties, New York-Series 1949, No.5* to correlate five different data sets. These included land use, steepness of slope, quality of drainage, depth of soil to bedrock and a composite of the constraining soil characteristics (slopes/drainage/bedrock depth). Planners developed a land use base map classifying land use into agriculture, forest, transitional, farmstead, lake residential and hamlet. They then produced detailed maps recording slope data -- less than 7 percent, 7-15 percent and greater than 15 percent; drainage as poor, moderate and well; and bedrock

depth data at 10-20 inches, 20-40 inches and deeper than 60 inches for the same areas. Finally, maps which incorporated all three constraining soil characteristics were produced. Severely constrained areas had slopes greater than 15 percent or poor drainage or bedrock depth less than 40 inches. The remainder of the area was classified as Slight to Moderate Constraint.

## **RESULTS:**

A set of illustrative development sensitivity maps were prepared for all nine towns in Yates County. Each set provided land use profiles, slope information, drainage quality, bedrock depth and composite soil maps with a two tiered development constraints map. The model site plan regulations which were developed refer to "site plan review district" which was defined as the severely constrained areas on the composite map. As of May 1998, the site plan review model had been presented to one municipality, which expressed a desire to move forward with some form of land use regulation for environmentally sensitive areas, especially steep slopes. Two other municipalities have expressed an interest in developing a site plan review ordinance; presentation of the models are pending. The Yates County Planning Department intends to continue meeting with municipalities over the following year as required to present findings from this study and solicit cooperation in this effort.

## **OHIO**

<b>PROJECT TITLE:</b>	<b>AN R<sup>x</sup> FOR LAKE ERIE STREAMS</b>
<b>GRANTEE:</b>	<b>Izaak Walton League of America, OHIO DIVISION</b>
<b>Basin Program Funds:</b>	<b>\$ 15,000</b>
<b>Non-Federal Funds:</b>	<b>\$ 10,198</b>
<b>PROJECT DURATION:</b>	<b>MAY 1, 1997 – SEPTEMBER 30, 1997</b>
<b>PROJECT TYPE:</b>	<b>INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

### **PROBLEM STATEMENT:**

Ohio Environmental Protection Agency has identified sediments and attached substances from nonpoint pollution as a major source of contamination in Lake Erie and its tributaries. While considerable work has been done to control rural nonpoint pollution, its urban counterpart continues to grow in volume. The Izaak Walton League of America, Ohio Division (IWLA) seeks to tap citizen concern and willingness to behave in an environmentally sensitive manner and enhance as yet underdeveloped programs to monitor and restore urban streams.

### **BACKGROUND:**

Historically Ohio Soil and Water Conservation Districts have concentrated on correcting agricultural sources of nonpoint pollution such as sedimentation, nutrient enrichment and pesticide deposition. Consequently remedial measures are relatively well-developed to address these issues but measures addressing urban run-off and stream modification are not nearly so well developed. The IWLA program *Save Our Streams* (SOS) trains volunteers to monitor streams for nonpoint pollution, implement hands-on restoration projects and, in turn, impart these skills to others. SOS has been identified as a potential complementary service which can be employed by Ohio Department of Natural Resources to increase citizen involvement and address Lake Erie basin urban run-off and stream modification problems.

The *Save Our Streams* program includes three workshops. "Introductory Volunteer Water Quality Monitoring" workshops teach volunteers to identify watershed pollution problems, develop a watershed map which include stream habitat and watershed land uses, and adopt a local stream for monitoring and restoration. "Quality Assurance" workshops are for persons who have completed the first workshop or have equivalent experience. Through in the field and laboratory tests participants are assessed on their ability to carry out in-stream monitoring, correct monitoring errors and analyze data. Finally, "Train the Trainer" workshops teach people to design, coordinate and run their own volunteer monitoring projects. Information covered included topics from the "Introductory" workshop as well as training in data review, management and reporting, quality assurance and control, program promotion and public outreach.

### **ACTIVITIES:**

The Ohio Division of Soil and Water Conservation (DSWC) provided funding to soil and water conservation districts to hire an urban stream specialist who organized local volunteers and groups to carry out urban watershed restoration programs. IWLA provided low cost training for DSWC

staff and volunteers enabling them to train other volunteers in-stream assessment and government agency cooperation to improve pollution control. IWLA national office sent experienced staff to Ohio to assist the Ohio Division in the initial training. IWLA Ohio held one "Train the Trainer" workshop, three "Quality Assurance Certification" workshops and four "Introductory" SOS workshops. There were located proximate to Great Lakes Quality Agreement Remedial Action Plan projects. The workshops provided needed education about stream pollution and rehabilitation, established a data base system to help monitor the streams and developed a 'hands-on' approach to conservation among the volunteers.

## **RESULTS:**

Representatives from 28 Ohio and one Pennsylvania counties participated in a total of eight SOS workshops between June and August 1997. Thirty persons were trained as SOS trainers, while an additional forty were certified through the "Quality Assurance" workshops. In total 143 persons received training to monitor nonpointpollution and participate in remedial stream modification at eight events.

## **OHIO**

<b>PROJECT TITLE:</b>	<b>BMPs ON CONSTRUCTION SITES, INVOLVING CITIZENS, BUILDERS AND DEVELOPERS</b>
<b>GRANTEE:</b>	<b>CUYAHOGA SOIL AND WATER CONSERVATION DISTRICT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$15,000</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$44,371</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1996 – DECEMBER 1, 1997</b>
<b>PROJECT TYPE:</b>	<b>TECHNICAL ASSISTANCE</b>
<b>STATUS:</b>	<b>COMPLETE</b>

### **PROBLEM STATEMENT:**

For several years, citizens living and working in developing areas have been aware of the need for soil erosion controls on construction sites. However, they do not have knowledge of specific best management practices (BMP) information or know where to go to create changes in the existing system.

### **BACKGROUND:**

This grant is intended to inform citizens and the building industry about the value of applying good conservation practices to active construction sites. In general, the public has become more aware of the need for soil erosion control on construction sites. This project will also provide these citizens with the information needed to evaluate the sites about which they are most concerned. They can then work with their locally elected and appointed officials to control the soil, sediment and attached pollutants coming from active construction sites.

The material created by this project will inform interested citizens about the soil erosion controls available for construction sites. The new materials will also help encourage developers and builders to use the appropriate BMPs on their construction sites during the bare earth phase of construction. This is a critical form of conservation marketing because studies have shown that soil erosion on construction sites is 10 to 100 times greater than any other land use.

In addition, Ohio's standards and specifications for construction site BMPs have recently been revised. The development community and land use professionals need to be informed of this revised handbook and trained on how to use it. The workshop planned under this proposal will satisfy this need.

### **ACTIVITIES:**

One of the proposed tasks was to produce seven, two-page BMP job sheets written for average citizens, contractors, developers, and builders. These address the most effective soil erosion and sediment control BMPs for construction sites. Because of the high cost, only five job sheets were completed.

Two different booklets, one written for builders and the other for developers, were produced. These booklets addressed issues such as the National Pollutant Discharge Elimination System Permit process, preparing a Stormwater Pollution Prevention Plan, the inspection process, and maintenance of installed BMPs.

These documents were mailed to the 492 locally elected officials and the 1,740 public and private engineers, developers, and builders on the Cuyahoga SWCD's mailing list. The same material was distributed to interested citizens and to permit holders in Cuyahoga County on the Ohio Environmental Protection Agency's list of Construction Site Permit holders. Additionally, the SWCD held a training workshop for engineers and related land use professionals which introduced attendees to the new Ohio urban BMPs handbook. Not only did attendees receive the new handbook, but they had access to 8 distributors of BMP products and services. Representatives from the US Army Corps of Engineers, the Ohio EPA, the Natural Resource Conservation Service and the Cuyahoga Soil and Water Conservation Service gave presentations. Project personnel reached over 5,000 developers, builders, local elected officials, engineers and contractors through the booklets and workshop. They hope to reach an additional 1,000 elected officials and citizens beyond the grant period.

## **RESULTS:**

The publications, job sheets and booklets, were distributed to over 2,000 elected officials and land use professionals in the Cuyahoga SWCD as well as conservation site permit holders in the county and the interested public. The publications won the 1997 All Ohio Chapter of Soil and Water Conservation Society's "Outstanding Publication" Award. The publications were advertised by the International Erosion Control Association and as a result, the Cuyahoga SWCD received requests from Australia (3), Bangkok Thailand (1), Canada (6), and from several other US states. One city engineer asked for 300 of the Critical Area Planting job sheets to give to all of his home builders. The training workshop introducing the new Ohio urban BMPs had 140 attendees.

# **OHIO**

<b>PROJECT TITLE:</b>	<b>COST SHARES FOR URBAN STREAMBANKS</b>
<b>GRANTEE:</b>	<b>LAKE COUNTY SOIL AND WATER CONSERVATION DISTRICT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 10,160 (APPROVED)</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$ 4,420 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1997 –</b>
<b>PROJECT TYPE:</b>	<b>TECHNICAL ASSISTANCE</b>
<b>STATUS:</b>	<b>ONGOING</b>

## **PROBLEM STATEMENT:**

Lake County, Ohio has three valuable watersheds, a Lake Erie marsh, and two Ohio Department of Natural Resources (ODNR) designated scenic rivers, whose integrity are threatened by urban development. Sedimentation of the river mouths is the most significant impact of construction since neither the county nor municipalities have plans for storm water management or creek corridor conservation. There is a need to educate riparian land owners in best management practices (BMP) in order to ensure long-term erosion control and provide support for municipal regulation.

## **BACKGROUND:**

The Chagrin River has been classified a state scenic river with cold-water habitat. The Grand River is designated a wild river with a rating as an exceptional warm-water habitat. Both rivers are experiencing increasing sediment build-up from nonpoint sources. Sedimentation degrades aquatic habitat and affects navigation. The Chagrin River Port Authority estimates an annual dredging of 10,000 cubic yards to enhance recreational boating, while commercial access to Fairport Harbor will require removal of 225,000 cubic yards of sediment in 1997.

The Lake County Soil and Water Conservation District has a 50 year tradition of working with private landowners to conserve soil and water resources. In the affected watersheds the District will offer five riparian landowners technical assistance and small financial incentives as well as a 50 percent cost-share of materials, to encourage better stewarding of their stream banks. This pilot project will enable District personnel to assess landowner interest and responsiveness to determine the need for a continued cost-share program. The District also believes this pilot will help develop technical skills in bio-engineered solutions to erosion and sediment control, both among their personnel and, if sufficient interest is displayed, among local landscape contractors.

## **ACTIVITIES:**

Five demonstration sites have been chosen from 11 applicants. Site bioengineering designs and budgets are being developed by the program consultant. When bioengineering designs are complete, the project team will finalize negotiations with land owners, organize purchase of materials and arrange for labor and then install the chosen BMP. At the same time, project personnel will organize a seminar to introduce bioengineering to landscapers and other contractors.



# **OHIO**

<b>PROJECT TITLE:</b>	<b>COST STUDY OF STORM WATER EROSION CONTROL BMPs</b>
<b>GRANTEE:</b>	<b>SEVENTH GENERATION</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 13,750 (APPROVED)</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$ 4,585 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1997 –</b>
<b>PROJECT TYPE:</b>	<b>INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>ONGOING</b>

## **PROBLEM STATEMENT:**

Lorain and Medina counties are experiencing a development boom with attendant commercial and residential construction. Construction site runoff has been identified in the Black River Remedial Action Plan (RAP) as a significant contributor to nonpoint source pollution in the river impairing several beneficial uses.

## **BACKGROUND:**

The Black River runs through Lorain and Medina counties which, in 1995, ranked ninth and seventh respectively in population growth in the state of Ohio. Since 1994 the counties have experienced a correspondent growth in active construction sites, ranking fifth in the state. The Black River RAP identifies a number of nonpoint source pollution contributors, agricultural, urban and suburban runoff, river bank soil erosion, home septic system releases, combined and separate sewer overflows and construction site runoff. The resulting beneficial use impairments include degraded fish populations, a degraded streambed community, degraded aesthetics and the loss of fish and wildlife populations.

On a per-acre basis, construction sites produce more sediment than any other land use, although construction is not responsible for the greatest volume of sediment. Builders and developers base development decisions upon economic factors in which best management practices (BMPs) do not always weigh favorably. BMPs are viewed as labor intensive, costly and of little economic benefit and there are rarely any plans to encourage their use. Additionally, most jobs are bid without including the cost of erosion control; developers expect contractors to absorb the cost of BMPs themselves. Thus developers often have no idea of the actual cost of such practices, for instance an Environmental Protection Agency representative estimated the cost of meeting regulatory requirements at \$500.00 acre while a developer, looking at the same requirements, estimated \$2000.00 per half acre.

The goal of this project is to demonstrate the actual cost of best storm water erosion control practices to builders. Given accurate information and a comparison to the cost of failing in compliance, builders and developers might be more willing to use BMPs.

## **ACTIVITIES:**

Seventh Generation, the project lead, has secured tentative commitment from two developers, one in Lorain County and the other in Medina County. Both are waiting for their projects to be approved by the communities in which they are working. Seventh Generation has also received a tentative commitment from suppliers to donate materials for use on the construction sites in return for publicity in the information aspect of the program.



# **OHIO**

<b>PROJECT TITLE:</b>	<b>EVALUATION OF AN ECONOMIC INCENTIVE FOR CONSTRUCTION SITE EROSION CONTROL</b>
<b>GRANTEE:</b>	<b>GEAUGA SOIL AND WATER CONSERVATION DISTRICT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$15,778 (APPROVED)</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$5,629 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1996 –</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>ONGOING</b>

## **PROBLEM STATEMENT:**

One of the most frequent complaints of those working in the erosion and sediment control field is that it is like “pulling teeth” to get most developers promptly to apply erosion control measures. For most developers, erosion control is a nuisance, costs money and is simply ignored. While educational and regulatory efforts have had some successes, economic incentives may be the best approach to controlling soil erosion and sedimentation at construction sites. If early seeding and mulching increases the lot value and/or sale time, then developers/builders may voluntarily implement control measures, seeking a competitive edge and an increase in profits.

## **BACKGROUND:**

Soil erosion and sedimentation problems often occur at construction sites. Despite educational and regulatory efforts targeting developers, soil erosion and sedimentation control measures are often ignored. This project evaluates whether there is an economic incentive for developers to use good erosion control practices.

The goal of this project is to set up a “real world” experiment to measure objectively the impact that seeding and mulching sites has on lot value and sale time. Increased lot value and/or decreased sale time will result in increased profits for developers and builders. If it can be demonstrated rigorously that the economic benefits of controlling erosion and sedimentation from construction sites are greater than the costs of seeding and mulching, then this information could be widely publicized in the building/development community. Appealing to increased profitability seems to be a good way to develop voluntary application of seeding and mulching on construction sites.

## **ACTIVITIES:**

The plan of work proposed includes two primary tasks: (1) develop an approach that establishes the impact that seeding and mulching has on lot value, and (2) address the issue of lot sale time. Both tasks will involve randomly selecting sites for treatment and evaluating them using standard statistical methods. The results of the analyses will be publicized.

For Task 1, an empirical study was undertaken to investigate the economic impacts of seeding and mulching on residential lot sale timing. Residential lots on new developments in Geauga County were selected at random for the establishment of vegetative cover. The timing of lots sales were

tracked with the aim of comparing sale time for seeded (green) lots and unseeded (brown) lots. The results have not shown a preferential bias toward green lots over brown lots as was anticipated; however, the developer of the subdivision could see a benefit to having all the lots seeded.

For Task 2, an empirical study was undertaken to establish the economic impact of seeding and mulching on the values of residential lots. Residential lots on a new development in Geauga County were selected at random for the establishment of vegetative cover. Once seed was established, photographs of the both the green and the brown lots were taken and used in a "market survey" lot valuation study. Homebuyers, realtors, and developers were invited to take part in the lot valuation study. They were shown the pictures of the lots and then asked to order them in terms of desirability, and then place a dollar value on each lot. Statistical analysis of the survey data reveals that although developers do not perceive much added value for "green" lots, homebuyers perceive "green" lots to be worth on average four percent more than "brown" lots. This additional value far exceeds the costs for developers to apply standard seed and mulch practices to a residential lot. When considered in the context of multiple unit subdivisions, the profits from erosion prevention for developments can be sizable.

## **RESULTS:**

The results of this study have been presented to a number of audiences. To date, the project has reached approximately 800 professionals through presentations at workshops, trade shows and regional and international meetings such as the Ohio Association of Conservation Districts and the International Erosion Control Association annual meeting. Articles on the project have been released in local and state newspapers, journals and trade publications reaching tens of thousands of people. Articles on the project will soon appear in *NRDC Stormwater Solutions* and the *Journal of Soil and Water Conservation*. A final project publicity phase was held in October, 1998 at a demonstration site. The results of this project were released through the local and state press and trade organizations.

Because of the nature of the project, there are no appropriate measures of soil loss prevented or beneficial uses improved during this project period. One hundred percent of the initial phase, site selection and treatment, has been completed.

# **OHIO**

<b>PROJECT TITLE:</b>	<b>STRIP-TILL EQUIPMENT LEASE PROGRAM: REDUCING SOIL AND NUTRIENT RUNOFF</b>
<b>GRANTEE:</b>	<b>TOLEDO METROPOLITAN AREA OF GOVERNMENTS</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 15,000 (APPROVED)</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$ 5,440 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>MAY 1, 1997 –</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>ONGOING</b>

## **PROBLEM STATEMENT:**

Due to factors such as soil composition, farmers in Wood County, Ohio are experiencing significantly lower corn yields per acre when practicing no-till over wheat stubble than farmers who move back to conventional tillage; the yield is 89 bushels compared to 96 bushels respectively. Many farmers are moving back toward conventional tillage because of the substantial difference in yield. For instance between 1995 and 1996 one northwest Ohio county lost 12,964 acres of no-till corn. This reduces the nutrient and soil erosion control benefits proportionately.

## **BACKGROUND:**

Wood County, Ohio is the highest wheat producing county in the state. When planting corn into wheat stubble farmers experienced a substantial reduction in yield because Wood County's clay soils stay wetter and colder into the spring when farmed by no-till methods than by conventional tillage. The county is also an important component of the Maumee Remedial Action Plan (RAP) which had targeted sediment and nutrient loading reduction as important components of the plan. Wood County has the highest targeted reduction goal for phosphorous with the lowest amount of highly erodible land, very few acres enrolled in the Conservation Reserve Program and only two percent of total cropland in hay. Crop residue management, therefore, is the only reasonable means to achieve phosphorus reduction goal which means increasing the acreage under conservation tillage, not reducing it. In addition, tillage destroys soil structure improvements provided by conservation tillage, including microbial activity in organic matter.

This loss can be addressed by introducing zone or strip-tilling which places nutrients, such as phosphorus and potassium, in tilled bands 5-8 inches deep in the fall. Through this process nutrients are not exposed to wind and water erosion and they are concentrated into a smaller area for an overall reduction in amount used by 33 percent. At the same time a mound in which seed will be planted is prepared. In the spring the mound will be 5-10°(F) warmer than untouched soil which is significant since corn will not grow below 52°(F), while pathogens thrive at temperatures between 40°(F) and 52°(F).

## **ACTIVITIES:**

The project team purchased a 12-row DMI Precision Air caddy, tool bar and air unit with the grant money early in the summer of 1997. A tractor was also leased through a complimentary funding source. This equipment was used on thirteen different fields to determine effectiveness.

The equipment was on display at the Wood County Fair in August, 1997. Everyone at the fair was invited to view the equipment in action at the Strip Tillage Demonstration on the evening of August 7, 1997 near Bowling Green, Ohio. Invitations were also mailed to over nine hundred people who have an interest in the program and a press release went out to all area media.

Ninety people attended the demonstration, which also included an update on local 1997 conservation tillage (con-til) plots, an explanation of new equipment from a sales representative, and a presentation from an agricultural specialist on the benefits of tracked equipment. The Wood County Con-Til Club provided a free dinner. The demonstration was deemed successful even though the fertilizers were not released.

Landowners were charge a minimal fee of \$4.00 per acre to use the equipment. Altogether, eight landowners have used this equipment, with a total of 850 acres stip tilled in 1997. An interesting addition to this program was therequirement to have each participant provide test data. For comparison, landowners split their field into normal practice and strip till. They signed a contract to provide the Wood County SWCD with their production and yield data for evaluation. The data included field and soils information, direct crop inputs, nitrogen, phosphorus and potassium, other fertilizers, pesticides, field operations, indirect and total costs.

Significant reduction in no-till corn yields planted into wheat stubble is a major issue in Wood County. The trend to revert back to conventional tillage is an unfortunate result. This strip tillage equipment has now been used by eight farmers to till 850 acres. Available data only covers one planting year but data will continue to be gathered through the 2000 planting year for comparison.

# **PENNSYLVANIA**

<b>PROJECT TITLE:</b>	<b>EFFECTIVENESS OF UNDERSIZED SEDIMENT BASINS: AN EVALUATION AND DEMONSTRATION</b>
<b>GRANTEE:</b>	<b>THE PENNSYLVANIA STATE UNIVERSITY – DEPARTMENT OF AGRICULTURAL AND BIOLOGICAL ENGINEERING</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$13,189</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$12,233</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1996 – AUGUST 31, 1997</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT:**

In Pennsylvania, sediment basins are required to be large enough to completely capture a five-year return period runoff event. Poor design, construction and maintenance practices have led to unacceptably poor sediment retention. There is need for research to determine appropriate methods for selecting basin size and detention time.

## **BACKGROUND:**

Sedimentation basins are currently used for two reasons: 1) to remove the eroded soil mass from the effluent leaving a site, and 2) to store that sediment. Experiments in 1992 and 1995 at Penn State University showed that from 90 to 97 percent of influent sediment is captured and retained by sedimentation basins constructed according to Department of Environmental Protection guidelines. However, silt and chemically active clays make up most of the sediment discharged to the uncontrolled environment. Thus, the project seeks to find a basin design that captures greater portions of these chemically active particles. Recent studies have shown that floating risers and in-basin barriers may be more effective methods of capturing and retaining sediment. In addition, the proper selection of basin detention time and basin size relative to local hydrologic constraints remain poorly understood.

The amount of sediment released to the environment is controlled by the basin's outlet structures. The basin's principal spillway regulates the release of water, thus controlling the vertical location from within the basin where water and suspended soil particles are selectively discharged. Presently the perforated riser is the cheapest and most popular method of controlling basin dewatering. However, non-uniform practices of perforation sizes, spacings, and locations have made dewatering difficult to predict and sediment settling difficult to control. These poor design practices, compounded by improper or careless construction practices, short-circuiting of sediment laden water and poor maintenance practices have resulted in unacceptably low rates of sediment detention.

This project is a continuation of several sedimentation basin studies which have occurred in the Department of Agriculture and Biological Engineering at Penn State University since 1992. This research has evaluated several concepts, including a floating dewatering device and in-basin barriers, each designed to improve water quality from earth disturbance sites by confining eroded sediment to sedimentation basins. To date, efforts have focused on quantifying sediment removal from

basins which meet Pennsylvania Department of Environmental Protection's size regulations. The specific objectives of this proposed work is to evaluate and demonstrate the effectiveness of undersized sedimentation basins, relative to watershed area, with respect to reduced effluent sediment concentrations and portion of each soil particle size retained.

#### **ACTIVITIES:**

The new undersized basin to be used for conducting experiments was constructed. An earth moving contractor was hired to excavate the basin and install all of the piping required to get the controlled inflow water and sediment to the basin, and collect and monitor the basin outflow using an HS-Flume and an ISCO sampler. Because it was possible to collect the new basin's effluent into the same sampling apparatus used in a 1996 basin evaluation, the cost of site construction and preparation were greatly reduced.

Four principal spillway/in-basin barrier combinations identical to those used in the 1996 basin evaluation were prepared. The apparatus included a skimmer and a perforated riser, each tested alone and then in combinations with internal basin barriers designed to subdivide the basin into three equal volumes. Each of the four combinations were tested three times with 3,000 ft<sup>3</sup> simulated runoff events containing 454 kg of soil. Basin outflow and sediment concentration rates were monitored during each 24 hour inflow-outflow event.

#### **RESULTS:**

Experiments carried out on the basin demonstrated that the skimmer yielded the best overall performance, retaining 94.3 percent of the soil injected; the perforated riser yielded the poorest performance retaining 90.4 percent of the sediment. The barriers proved ineffective at enhancing either spillway's sediment capture ability. When compared to the results from the larger basin the smaller one performed better than the larger one until the basin filled to the level of the emergency spillway which meant a significant amount of unsettled water left the basin. Fifty percent to 77 percent of the soil lost from the small basin was through the emergency spillway.

Particle size distributions were also determined on all discharge water samples collected. All particles larger than 30 micro-meters were retained in the basin for all treatments. The most poorly retained particles were 3.7-11 micro-meters and 11-20 micro-meters (the silt range). The skimmer retained 59 percent and 80 percent of those particles respectively, while the perforated riser retained only 28 percent and 67 percent. Retention of clay and sand particles was nearly 100 percent.

# **PENNSYLVANIA**

<b>PROJECT TITLE:</b>	<b>DEMONSTRATING THE EFFECTIVENESS OF SKIMMERS TO CONTROL DEWATERING OF SEDIMENTATION BASINS</b>
<b>GRANTEE:</b>	<b>PENNSYLVANIA STATE UNIVERSITY, DEPARTMENT OF AGRICULTURAL AND BIOLOGICAL ENGINEERING</b>
<b>Basin Program Funds:</b>	<b>\$ 10,000 (APPROVED)</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$ 14,647 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1997 –</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>ONGOING</b>

## **PROBLEM STATEMENT:**

Existing sediment basin spillways, primarily perforated risers, are not the most efficient or effective at reducing the amount of suspended particles released into the environment.

## **BACKGROUND:**

Under the Federal Surface Mining Control and Reclamation Act and Pennsylvania Department of Environmental Protection regulations, mechanisms for controlling erosion from earth disturbance sites include sedimentation basins. Sedimentation basins capture and store eroded soil from effluent leaving a disturbed surface site before the water is discharged into the environment. The amount of sediment released is controlled by the basin's outlet structure, the most popular of which are perforated risers. Perforated risers withdraw water from the entire column, but the majority is removed from the lower layers where sediment concentration is highest. In order to increase the capture of sediment and reduce the amount of suspended silt and chemically active clays released to the environment, investigators propose the use of floating risers or skimmers to remove the highest quality of water from the basin.

## **ACTIVITY:**

With the support of Pennsylvania Department of Environmental Protection (PADEP), County Conservation Districts and engineering firms in each region, the project team selected three of four proposed sites to demonstrate the skimmer. The sites are located in PADEP designated regions; one is in Lehigh County (south-east region), one in Centre County (north-central region), and one in Lebanon County (south-central region). The remaining site will be located in Erie County (north-west region). As project personnel located demonstration sites they also scheduled opportunities for developers, engineers, regulators, and Conservation District and US Department of Agriculture–Natural Resources Conservation District personnel to learn more about the technology.

During the remainder of the project, the final site will be selected. Four skimmers have been ordered and will be installed at the demonstration sites. The scheduled demonstrations for interested personnel will be planned and carried out.



## **PENNSYLVANIA**

<b>PROJECT TITLE:</b>	<b>GRAZING/WATER SUPPLY EROSION CONTROL DEMONSTRATION</b>
<b>GRANTEE:</b>	<b>PENN SOIL RESOURCE CONSERVATION AND DEVELOPMENT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 15,000 (APPROVED)</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$ 5,000 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>MAY 1997 –</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>ONGOING</b>

### **PROBLEM STATEMENT:**

Controlling livestock access to streams by installing fencing and stream crossings helps control stream bank erosion but does not address the need to water livestock. Providing adequate water away from stream sites with adequate electricity is a key concern. Ram pumps, which use falling water to push water up hill, offer a low-cost solution where falling water is available. However the Lake Erie basin is too flat to utilize ram technology. A potential solution may be solar powered pumps.

### **BACKGROUND:**

Erie and Crawford counties contain all of Pennsylvania's Lake Erie watershed. Dairying is one of the principal agricultural enterprises in the drainage area and thus a major contributor to agricultural nonpoint source pollution through milk house and barnyard waste, livestock stream access, nutrients and pesticides. Allowing cattle access to water directly in streams contributes to a significant percentage of nonpoint pollution sources. While restricting cattle access reduces pollution, it creates a further problem of how to water the livestock, especially in areas which are not easily reached by electricity.

Hydraulic ram pumps generate power using falling water to push water uphill to a watering trough. While this has proven to be an inexpensive, and effective solution, the flat topography of the Lake Erie watershed does not lend itself to this solution. One potential solution is solar power. Contemporary systems can be installed for less than \$1,500.00. They are reliable, requiring little maintenance with a relatively long life span (from 20 to 40 years) and can pump enough water for any size herd. In addition to delivering water to cattle away from sensitive areas, such as stream banks, solar pumps can also distribute water to all parts of a pasture and ensure improved forage quality, herd health and productivity.

### **ACTIVITIES:**

Penn RC & D hired a project technician/consultant who researched available solar powered equipment and conducted a search for potential participant farmers. Ten prospective farm sites were targeted and prioritized within Crawford County's Lake Erie watershed. In conjunction with the U.S. Department of Agriculture – Natural Resources Conservation Service (NRCS) a comprehensive barnyard management plan was developed for one volunteer farmer. The plan included a solar pump system which provided an alternative drinking water source for cattle, restored riparian areas, and limited nutrient runoff.

**RESULTS:**

The installation of a solar powered watering system was completed on one volunteer farm during this project year. The system works well in full sunlight. During cloudy weather or afternoons when the solar panel is not in direct line with the sun, the pump does not pump enough water. Also, during the 1998 drought, the source spring went dry and the system was out of operation until the water returned. An important issue, not addressed as part of this erosion control project, is water quality for the herd. Previously, with direct access to the stream, the cattle were exposed to waterborne pathogens. That possibility is now substantially curtailed, given the new source of water. Thirty farmers and elected officials toured the site during a council meeting.

# **WISCONSIN**

<b>PROJECT TITLE:</b>	<b>CONSTRUCTION SITE EROSION CONTROL DEMONSTRATION FOR ROADS</b>
<b>GRANTEE:</b>	<b>ASHLAND BAYFIELD DOUGLAS AND IRON COUNTY LAND CONSERVATION DEPARTMENT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$14,020 (APPROVED)</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$13,520 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>MAY 1, 1997 –</b>
<b>STATUS:</b>	<b>ONGOING</b>

## **PROBLEM STATEMENT:**

The unique red clayey till soil and steep slopes of the Lake Superior basin combine to create an area that is highly susceptible to erosion. Given these factors, road construction is a significant contributor of nonpoint source pollution to Lake Superior and its tributaries. Cost-effective erosion control alternatives for roadway stabilization in Wisconsin's Lake Superior coastal counties are required.

## **BACKGROUND:**

Road maintenance and construction have been a historic concern with resource managers in the Lake Superior coastal counties of Ashland, Bayfield, Douglas and Iron. Steep slopes combine with natural drainage ways and unstable red clayey till soil to contribute to the instability of road construction sites. A number of studies at the federal, regional and local levels have identified proper planning and maintenance of road construction sites as a priority in controlling nonpoint source pollution to the lake. Educational programs which promote proper construction site design as well as application of construction site erosion control best management practices (BMPs) were also identified as priority activities.

## **ACTIVITIES:**

The Ashland, Bayfield, Douglas and Iron Land Conservation Department assembled a review team to evaluate possible demonstration sites, of which five were reviewed. The review team selected two sites, one in Douglas County and the other in Bayfield County.

The project team planned, designed and constructed erosion control measures for the Douglas County site. This included 14,256 linear feet of road ditch shaping and seedbed preparation, 6 ½ acres of roadside seeding and mulch, 1,420 and 1,800 linear feet, respectively, of high velocity and regular erosion control matting placed and anchored, four culvert inlet and outlet protections of non-woven geotextile, rock and matting, and 90 linear feet of channel lined with non-woven geotextile and rock.

The Bayfield County site included 2,500 linear feet of road ditch shaping, 330 linear feet of silt fencing, 23.7 tons use as outlet protection, one culvert replacement (rebedded and packed), one acre seeding and one acre of mulch, non-woven geotextile for firm outlet bed, and erosion control matting placed and anchored.

**RESULTS:**

The Douglas County road ditch deposited water and sediment directly into Lake Superior, while the Bayfield County project formerly deposited sediment into an intermittent stream, to a trout stream, and eventually to Lake Superior. Results indicate that at the Douglas County site an estimated 950 tons of soil were saved by installing these erosion control practices, and an estimated 305 tons of soil were saved on the Bayfield County site.

# **WISCONSIN**

<b>PROJECT TITLE:</b>	<b>DREDGING IMPACTS STUDY</b>
<b>GRANTEE:</b>	<b>BAY-LAKE REGIONAL PLANNING COMMISSION</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$14,915</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$ 4,971</b>
<b>PROJECT DURATION:</b>	<b>SEPTEMBER 1, 1996 – JULY 15, 1998</b>
<b>PROJECT TYPE:</b>	<b>INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT:**

Each year thousands of cubic yards of silt and sediments are dredged from the many small commercial harbor and marina facilities located within the Bay-Lake Region. It appears that the need to dredge is perpetual and that the environmental and economic costs of dredging are enormous.

## **BACKGROUND:**

The Bay-Lake Region contains approximately 450 miles of shoreline, and encompasses three designated Areas of Concern (Marinette, Green Bay, and Sheboygan) and includes 185 units of local government. A majority of these governments are located in watersheds that drain to Green Bay or Lake Michigan. Dredging has become a major issue in the region, as increasing amounts of sediment get transported through these watersheds and deposited into the many harbors and marina facilities located in the Bay-Lake Region.

This study assesses the extent and the cost of maintenance dredging of the more than 70 marinas and harbor facilities in the Bay-Lake region, and the impact that these costs have on the communities. The cost assessment will develop data that may be used to determine the economic impact of dredging. These data may, in turn, be used as a basis to influence public opinion and policy regarding the need and desirability of enacting and enforcing comprehensive soil erosion and sedimentation controls, as well as the implementation of best-management practices (BMPs) that will reduce the frequency and need for dredging.

## **ACTIVITIES:**

The Bay-Lake Regional Planning Commission undertook an inventory of dredging activities within the Commission's coastal areas. The inventory included all dredging permits which had been issued within the study area by the Wisconsin Department of Natural Resources and the U.S. Army Corps of Engineers. Using the inventory, the Commission created a data base containing a characterization of the materials dredged, quantification of the amount dredged and frequency of dredging, and a review of disposal options. The cost component included the engineering costs, permit and enforcement costs, dredging costs, and disposal costs. Investigators created a database using existing data on current and historic dredging activities in the region.

After the database was completed, investigators undertook an economic impact study. Data relative to the cost of upland stream bank protection and policy and planning development, both general in scope and specific to the watersheds located within the Bay-Lake region, was compiled and ana-

lyzed. The cost of enacting and enforcing comprehensive soil erosion and sediment controls, and the implementation of best-management practices was determined. The direct and indirect economic benefits of harbor facilities, Manitowoc and Kewaunee harbors, was determined and analyzed through utilization of past planning documents.

## **RESULTS:**

The Bay-Lake Regional Planning Commission published *An Inventory and Assessment of Dredging in the Bay-Lake Region* in April 1998.

The report indicated that dredging has been and will likely remain a permanent solution to maintaining Wisconsin's commercial ports, harbors and marinas.

The dredging inventory that was conducted for the report found that more than 18.5 million cubic yards of soil and sediment have been dredged from navigation channels and small harbors and ports located within the Bay-Lake Region since 1957 utilizing the record of issued permits. The vast majority of that total, approximately 17.8 million cubic yards, were removed to aid commercial navigation at the eight commercial ports located within the Bay-Lake Region. The remainder, 790,000 cubic yards of material, were removed by private individuals to aid and enhance navigation for small marinas and personal access.

The cost of removing bottom sediments for all purposes has been significant, nearly \$50 million total. With disposal methods becoming increasingly more regulated and costly, future dredging cost will only increase proportionately.

The report found that erosion deprives land of its productivity. Sedimentation occurs when eroded soil detached by rain, wind and other forces, is deposited into rivers, harbors and lakes. Sediment deposition not only degrades water quality, but also compromises the environmental value of lands and water bodies, limits their uses, and can cause significant infrastructure costs. The also report indicated that the cost of removing sediment and soil from the navigational channels and harbors within the Bay-Lake Region varies significantly, depending upon the type of material dredged and disposal cost.

The project team has presented the study and their results to four Regional Harbor Council Meetings and three Regional Technical Advisory Committee Meetings. In addition, copies of the study have been provided upon request to area Harbor Commissioners, Port Directors, state Soil and Water Conservation Department personnel, elected officials, libraries and county soil conservation personnel.

# **WISCONSIN**

<b>PROJECT TITLE:</b>	<b>STONY CREEK WATERSHED SEDIMENT DELIVERY AND SOIL EROSION REDUCTION PROJECT</b>
<b>GRANTEE:</b>	<b>DOOR COUNTY SOIL AND WATER CONSERVATION DEPARTMENT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$14,924</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$19,672</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1996 – JANUARY 23, 1998</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT:**

The Stony Creek Watershed has been identified as a high priority for the implementation of a large scale water quality protection and improvement project by the Wisconsin Department of Natural Resources (DNR). The DNR has studied the surface water quality of this watershed and concluded that it is in need of protection and improvement related to sediment and associated nutrients which limit the abundance and diversity of aquatic communities.

## **BACKGROUND:**

The primary goal of this project was to reduce soil erosion and sediment delivery from targeted high sediment delivery agricultural fields located in the Stony Creek Watershed. A related goal was to foster a cooperative effort between the Door County Soil and Water Conservation Department (SWCD), University of Wisconsin Cooperative Extension (UWEX), and the Door/Kewaunee Forage Council. The Forage Council is a group of agri-businesses and producers located in both Door and Kewaunee Counties, Wisconsin. Both goals will be completed through a cooperative effort to implement a quality forage based crop on agricultural fields, which have been identified as having a high soil loss rate and/or are yielding high sediment loads to Stony Creek and ultimately the Great Lakes system. A third goal of this project will be to change landowner attitudes toward forage based crops for their cash value and ultimately change the land use of these targeted fields.

## **ACTIVITIES:**

The SWCD, with assistance from the UWEX, completed a direct mailing announcing the project to all cropland owners and operators in the study area. SWCD personnel then created a database using field size, crop rotations, soil types, drainage patterns and other hydrologic information to determine sediment delivery data. Using the data they developed a program cost-share policy and nominated and ranked a list of eligible fields. Personnel disseminated information about the project through a program brochure, articles in the Door County Advocate, UWEX newsletters, and the Door County Property Owners Association newsletter.

The Door County Land Conservation Committee approved an additional \$5,000 from the County funds to compliment the program's goals because of the high costs involved with establishing a quality alfalfa field. Seven farmers signed cost-share applications for twelve fields totaling 216.9 acres at an estimated total landowner cost of \$32,024.76 with a related grant encumbrment of

\$18,715.27. All twelve fields had a sediment delivery rate of at least 0.35 tons/acre/year. The worst field inventoried had a sediment delivery of 5.07 tons/acre/year.

## **RESULTS:**

A cooperative effort between the Door County SWCD, UWEX, and the Door-Kewaunee Forage Council developed; however, a joint County Forage Council did not develop due to a lack of participation and commitment.

Efforts at changing landowner attitudes about the value of high quality forage and the benefits of adding alfalfa into their rotation is an ongoing process. This will be emphasized and reinforced over the three year post-project operation and maintenance period, as well as through other conservation projects in the counties.

The SWCD expects a 8.5 percent or a 270 ton reduction in the annual sediment delivery in the Stony Creek Watershed. This comparison is based on the continuous hay rotation verses the previously inventoried rotation through the use of the WIN-HUSLE Sediment Delivery Model. Also, the associated phosphorus load calculates the sediment load with a calibration factor, so similar reductions are expected. WIN-HUSLE estimated a reduction of 3,240 pounds of phosphorus to Stony Creek. Nitrogen reductions are estimated to be one-fifth of the phosphorus savings and are approximately 648 pounds.

## VI PROGRAM YEAR 1999 APPROVED PROJECTS

### INDIANA

*Apollo Erosion Control Project,* **\$ 15,000**  
Northeast Indiana Solid Waste Management District and Wood-Land-Lakes Resource Conservation and Development Council, Inc.

This project will develop a new partnership among local grassroots groups and local, state and federal agencies to control sedimentation from an 18-acre, highly erosive former land-fill site which is contributing significant sediments and contaminated leachate. This project will benefit environmentally sensitive Fish Creek, as well as the water supply for Fort Wayne, Indiana. Contact: Steve Christman, (219) 587-3063.

### MICHIGAN

*Agricultural Soil Erosion Reduction Project,* **\$15,000**  
Michigan Agricultural Stewardship Association

Michigan Agricultural Stewardship Association (MASA) will reduce agricultural soil erosion by encouraging seven member farmers to adopt sustainable farming practices on areas identified as moderate to highly susceptible to water erosion. The information will be shared through at least two educational field days and *Michigan's Farm and Country Journal*, as well as the MASA newsletter, *Farm Steward*. Contact: Russ LaRowe, (616)258-3305.

*North Branch of the Bad River Adopt-A-Stream,* **\$ 6,000**  
Gratiot Soil Conservation District

The Gratiot Soil Conservation District (SCD) will initiate an Adopt-A-Stream program for the North Branch of the Bad River which goes well beyond the traditional river cleanup program to address streambank remediation and prevent excessive soil erosion and sedimentation. Contact: Doug Young, (517) 875-3050.

*Lakeshore Erosion Demonstration Project,* **\$ 7,871**  
Boyne City

With this grant, Boyne City will construct a 290-foot biotechnical shoreline erosion control demonstration project on Lake Charelvoix that will protect the lake from sand, salt and toxics eroding into the water from Lakeshore Drive. Contact: Tim O'Leary, (616) 582-0337.

*Protecting Headwater Streams from Soil Erosion and Sedimentation through Stormwater Management, Education, Cooperation and Innovative Policy,* **\$ 15,000**  
Livingston County Drain Commissioner

The Livingston County Drain Commissioner will develop a model program which provides an understanding of soil erosion and stormwater impact on chemical transportation and habitat degradation. The project will be aimed at residents as well as the development community, including state and local officials, land owners, builders and contractors. Contact: Brian Jonckheere, (517) 546-0040.

*Soil Erosion/ Sediment Control Education, Grand Traverse Bay Watershed,* **\$ 7,105**  
Grand Traverse Bay Watershed Initiative

This project will support other Basin Program projects in the Grand Traverse Bay Watershed by constructing interpretive display panels to educate Boardman River users about soil erosion control practices. Project personnel will also conduct two training workshops for school teachers and develop a display for the Initiative's Land and Water Resource Center. Contact: Chris Wright, (616) 935-1514.

*Use of the WWW for Watershed Management,* **\$14,341**  
Michigan Technological University

This project will use the Internet to educate the public about the processes and effect of erosion and sedimentation in a watershed. Contact: Dennis Johnson, (906) 487-3613.

## **MINNESOTA**

*Baptism River Streambank Stabilization Demonstration,* **\$14,500**  
Minnesota Department of Natural Resources, Tettegouche State Park

The Minnesota Department of Natural Resources proposes a bioengineering project which will provide long-term protection of the Baptism River but also be aesthetically appealing. This demonstration project will also be used for the park interpretative program. Contact: Gary Hoeft, (218) 226-6365.

*Soil Testing/Phreatic investigation – Lake Superior Shoreline Stabilization,* **\$ 9,700**  
Minnesota Board of Water and Soil Resources

The project goal is to build a knowledge base that would reduce the cost of Lake Superior shoreline stabilization projects by determining and cataloguing information for slope stability analysis and design of various stabilization techniques. Contact: Gene Clark, (218) 723-4752.

*Lake Superior Shoreline Protection Project,* **\$20,000**  
Lake Superior Association of Soil and Water Conservation Districts

This project will be a collaborative effort among the Lake Superior Association of Conservation Districts, the Minnesota Board of Water and Soil Resources, and Lake, Cook and St. Louis counties to address some 53 “High Erosion Potential Areas” along Lake Superior north shore. Contact: Gene Clark, (218) 723-4752.

## **NEW YORK**

*Critical Area Seeding – Road Banks,* **\$ 15,000**  
Cayuga County Soil and Water Conservation District

Cayuga County SWCD will cooperate with town and county highway departments to develop an inventory of road banks in need of seeding within Cayuga County’s Lake Ontario drainage area. Contact: Jim Hotaling, (315) 252-4171.

*Erosion and Sediment Control Ordinance Pilot Project,* **\$5,000**  
Wayne County Soil and Water Conservation District

The Wayne County SWCD will facilitate the adoption of an erosion and sediment control ordinance in 15 Wayne County towns located in the Great Lakes basin along the Lake Ontario shoreline. Contact: Valerie Podolec, (315) 946-4136.

*Honeoye Lake Watershed Public Awareness and Education Project,* **\$12,000**  
Ontario County Soil and Water Conservation District

This project will develop a comprehensive publication for the Honeoye Lake watershed to be used as an educational guide to protect the natural resources of the watershed. The book is intended to promote commitments to specific soil erosion and sedimentation reduction actions. Contact: Tanya Dence, (716) 396-1450.

*Monroe County Highway Water Quality Improvement Project,* **\$ 24,600**  
Monroe County SWCD

Monroe County SWCD will provide additional technical support to the Monroe County Department of Transportation on water quality initiatives being designed for county highway projects. Technical support will include strategies for both the construction-phase and over the long-term. Contact: Paula Smith, (716) 473-2120.

*What’s the Dirt?* **\$ 15,000**  
Aquarium of Niagara

The Aquarium of Niagara will create an exhibit demonstrating the various aspects of erosion and sedimentation in the Great Lakes addressing questions such as: what are the causes of erosion; how

can erosion be controlled; how do erosion and sediment deposition affect me and the Great Lakes ecosystem; does erosion affect more than the immediate area in which it occurs; how can I affect change? Contact: Glen LaPlaca, (716) 285-3575.

## OHIO

*Black River Bioengineering Initiative for the Riparian Landowner* **\$15,000**  
Lorain Soil and Water Conservation District

This project will support a private-public partnership to educate landowners to restore and protect Black River riparian corridors through effective, low-cost means. The partnership will include the SWCD, the Black River and Cuyahoga Remedial Action Plans, the Ohio State University Extension Office, and the Lorain County Engineer's Office. Contact: Thomas Holmes, (440) 322-1228.

*Maumee River Storm Water Education,* **\$ 2,450**  
Henry Soil and Water Conservation District

The Henry SWCD will develop an public education program designed to inform the public about erosion control practices to reduce the impact of sedimentation in the Maumee River watershed. Contact: Brenda Williams, (419) 592-0881.

## PENNSYLVANIA

*Innovative Erosion Control Involving the Beneficial Use of Dredge Material, Indigenous Vegetation, and Landscaping Along the Lake Erie Shoreline,* **\$15,000**  
Pennsylvania Department of Conservation and Natural Resources, Presque Ile State Park

The Department of Conservation and Natural Resources will develop a low cost demonstration project for controlling soil erosion which utilizes native plants and non-conventional erosion techniques. Contact: Harry Leslie, (814) 833-7424.

*NPDES/Erosion and Sedimentation Control Project,* **\$15,000**  
Erie County Conservation District

The Erie County Conservation District is developing a 35-acre environmental education park. This project will use a building site next to the park as a demonstration project for nonpoint source pollution control including a National Pollutant Discharge Elimination System workshop for local contractors, developers, engineers and municipal officials. Contact: LeRoy Gross, (814) 796-4203.

## WISCONSIN

*Water and Sediment Control Basin/Grassed Waterway,*  
Fond du Lac County Land Conservation Department

**\$5,760**

This project will demonstrate to farmers the effectiveness of a water and sediment control basin with a grassed waterway at controlling soil erosion. Contact: Coleen Lapham, (920) 923-5562.



## VII APPENDICES

### APPENDIX ONE

#### GREAT LAKES COMMISSION

##### GREAT LAKES SOIL EROSION AND SEDIMENTATION TASK FORCE

###### ILLINOIS

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## Great Lakes Basin Program for Soil Erosion and Sediment Control

### **Grants Program, Seven-Year Summary, 1991-1998**

<b>Map #</b>	<b>Project Title</b>	<b>City and State</b>	<b>Contact and Phone Number</b>
1 '91	Saginaw Bay Soil Erosion & Sed. Control Prog.	Lansing, MI	Linda Humphreys, Michigan DNR, 517-373-3588
2 "	Lake Superior Shoreline Stabilization	Duluth, MN	Mark Nelson, MN Board of Water & Soil Res., 218-723-4752
3 "	Erie Co. Ag. Pollution Prevention Program	Buffalo, NY	Tom Hersey, Erie County, 716-858-6370
4 '92	Rapid River Road/Stream Crossing Restoration	Kalkaska, MI	Russ LaRowe, Kalkaska SWCD, 616-258-3307
5 "	Fish Creek Watershed Project	Indianapolis, IN	Larry Clemens, Nature Conservancy, 219-665-9141
6 "	White Lake Water Quality	Muskegon, MI	Greg Mund, Muskegon SCD, 231-788-5721
7 "	Zone Tillage/No-Till Corn in Northwest Ohio	Tiffin, OH	John Crumrine, Seneca SWCD, 419-447-7073
8 "	Sediment Reduction in Milwaukee River	Madison, WI	Paul Strom, Wisconsin DNR, 608-266-8631
9 "	Lake Superior Shoreline Stabilization	Duluth, MN	Mark Nelson, MN Board of Water & Soil Res., 218-723-4752
10 "	Saginaw Bay Soil Erosion & Sed. Control Prog.	Lansing, MI	Linda Humphreys, Michigan DNR, 517-373-3588
11 "	Construction Site Erosion Control	Valley View, OH	Donna Sessanna, Cuyahoga SWCD, 216-524-6580
12 "	Livestock Water Demonstration Project	LaPorte, IN	Theresa Wojkovich, LaPorte County SWCD, 219-362-6633
13 '93	Saginaw Bay Soil Erosion & Sed. Control Prog.	Lansing, MI	Linda Humphreys, Michigan DNR, 517-373-3588
14 "	Lake Superior Shoreline Stabilization	Duluth, MN	Mark Nelson, MN Board of Water & Soil Res., 218-723-4752
15 "	Muskegon & White Lake Water Quality	Muskegon, MI	Greg Mund, Muskegon SCD, 231-788-5721
16 "	Soil Erosion & Sedimentation on Private Lands	Conway, MI	Gail Gruenwald, Tip of the Mitt Watershed Cnd., 616-347-1181
17 "	Monroe County Erosion & Sediment Control	Rochester, NY	Frank Winkler, Monroe County SWCD, 716-473-2120
18 "	Urban Erosion Control Demonstration Project	Fort Wayne, IN	Greg Lake, Allen County SWCD, 219-422-3373
19 "	Ravine Erosion Control	Highland Park, IL	Ronald Kroop, Public Works Dept., 708-926-1144
20 "	Kingsbury Creek Erosion Project	Duluth, MN	Richard Harms, St. Louis Cty SWCD, 218-723-4867
21 "	Heavy Residue Management System	Bowling Green OH	Bob George, Wood County SWCD, 419-352-5172
22 "	Fenton/Livingston Erosion & Sediment Control	Howell, MI	Jean Wines, Livingston County SWCD 517-548-1553
23 '94	Clean Bay Backer Water Quality Pamphlet	Green Bay, WI	Yana DeMeyer-Hodkiewicz, 414-468-3177
24 "	Mud Busters Program, Huron River	Ann Arbor, MI	Paul Rentschler, Huron River Watershed Council, 734-769-5123
25 "	St. Joseph River Soil Erosion Project	Berrien Springs MI	Carol Schinske, St. Joseph River SWCD, 616-471-9117
26 "	Sedimentation in the Boardman River	Traverse City, MI	Lew Coulter, Grand Traverse SWCD, 616-941-0960
27 "	Big Manistee, North Branch Project	Kalkaska, MI	Russ LaRowe, Kalkaska SWCD, 616-258-3307
28 "	Civil Engineering Technical Assistance	Bay City, MI	James Hergott, Saginaw Bay RCD, 517-684-5650



