

**The Great Lakes Basin Program for Soil  
Erosion and Sediment Control**

**ANNUAL REPORT  
PROGRAM YEAR 1997**

**SEPTEMBER 1, 1996 THROUGH AUGUST 31, 1997**

**PRESENTED TO:**

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

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**GREAT LAKES BASIN PROGRAM FOR SOIL EROSION AND SEDIMENT CONTROL  
1997 ANNUAL REPORT**

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# Table of Contents

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<b>Background</b> .....	1
<b>Goals and Objectives</b> .....	2
<b>Accomplishments</b> .....	3
I.    Program Grants - Institutional Arrangements and Program Coordination .....	4
II.   Information, Education and Outreach Activities .....	4
III.  Demonstration Grants and Special Projects .....	5
 <u>ILLINOIS</u>	
Stormwater Detention in an Urbanized Area .....	7
 <u>INDIANA</u>	
Evaluation of Economic Incentive for Construction Site Erosion Control: Indiana Study .....	9
Fish Creek Area Stabilization Program .....	10
Northwest Indiana Great Lakes Basin Soil Erosion and Sediment Control Assistance Program .....	13
Streambank Stabilization “Erosion/Runoff” Control Project .....	15
 <u>MICHIGAN</u>	
Antrim Creek/Cedar River Road Restoration .....	17
Deerfield Nature Park Erosion Control Project .....	19
Montague Drain Bioengineering Erosion Control Project .....	21
Mud Busters .....	23
Mud Busters – The Sequel .....	25
Reducing Sedimentation on the Boardman River Through Greater Public Involvement .....	27
Rifle River Streambank Stabilization Demonstration .....	29
Soil Bioengineering Erosion Control — Tahquamenon Falls State Park .....	31
Soil Erosion and Sediment Control on White River Tributaries in Newaygo County .....	33
Streambank Stabilization and Interpretive Signage-Rifle River Recreation Area .....	35
Swan Creek Bioengineering Project .....	31
Thunder Bay River Streambank Restoration .....	39
Wetlands, Wildlife and You Too .....	41
 <u>MINNESOTA</u>	
Dune Stabilization on Minnesota Point .....	43
Enhanced Capabilities for SWCD Technicians in Construction Inspection in the Lake Superior Watershed. ....	45
Enhancement of Lake Superior’s Water Quality .....	47
Kingsbury Creek Erosion Project .....	49
Knife River Watershed Education Project .....	51
Shoreline Best Management Practice Workshops in the Minnesota Lake Superior Drainage Basin .....	53
Sustainable Development Initiative for Cook County .....	55

<u>NEW YORK</u>	
Best Management Practices for Water Quality on Forest Land .....	57
Cold Brook Stream Improvement .....	59
Kashong Creek Watershed Streambank Filter Strips .....	61
Lake Ontario/Oswego County Shoreline Survey .....	63
Stewardship Awareness & Water Quality Protection Demonstration Projects in the Chittenango Basin	
Watershed of the Lake Ontario Basin .....	65
Twelve Mile Creek Watershed Remediation/Demonstration Project .....	67
 <u>OHIO</u>	
Blue Creek Stabilization Demonstration Area .....	69
BMPs on Construction Sites: Involving Citizens, Builders and Developers .....	71
Evaluation of an Economic Incentive for Construction Site Erosion Control .....	73
Multi-Disciplinary Assistance for Streambank Stabilization and Habitat Restoration	
Projects in Ohio Areas of Concern .....	75
 <u>PENNSYLVANIA</u>	
Effectiveness of Undersized Sediment Basins: An Evaluation and Demonstration .....	77
Stream Crossings for Logging Operations: A Video .....	79
 <u>WISCONSIN</u>	
Clean Bay Backer Erosion Awareness Project .....	81
Dredging Impacts Study .....	83
Portable Bridge Project for Temporary Water Crossings in the Lake Superior Watershed .....	85
Stony Creek Watershed Sediment Delivery and Soil Erosion Reduction Project .....	87
 <b>Fiscal Year 1997 Approved Projects .....</b>	 <b>89</b>
 <b>Conclusion.....</b>	 <b>92</b>

## **BACKGROUND**

Nonpoint source pollution has been identified as a major 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. The FY1993 funding for the program 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 and 1997 were \$350,000. Programmatically, the Great Lakes Basin Program has operated on a schedule slightly different than the federal fiscal year. Therefore, activities and products are reported on a Great Lakes Basin Program Year which is September 1 through August 31. For this 1997 program year report, the period covered is September 1, 1996 through August 31, 1997.

## **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, are as follows:

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 to understand 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 that 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 FY1997, 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 for program administration and regional information and education activities. Since program inception in 1991, \$4.4 million have been applied to the program, \$3.2 million from U.S. EPA and \$1.2 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 1997:

## **ACCOMPLISHMENTS**

### **I. PROGRAM GRANTS - INSTITUTIONAL ARRANGEMENTS AND PROGRAM COORDINATION**

1. The Great Lakes Commission convened two meetings of the Soil Erosion and Sedimentation Task Force (October 16, 1996 in Erie, Pennsylvania and March 18, 1997 in Ann Arbor, Michigan) to discuss and act upon issues related to the implementation of the Great Lakes Basin Program.
2. At the October 16 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. The Task Force unanimously endorsed the continuation of the one step process whereby project applicants submit a complete funding proposal on the application deadline date. The initial review of proposals will continue to be coordinated by the appropriate state Task Force member for applications received from his/her state. The leading proposals from each state are forwarded to the Task Force for final review and approval. Language was also added to clarify the match calculations and items that can be covered by indirect costs. These changes were implemented by Great Lakes Commission staff prior to the RFP mailing in mid-November, 1996.
3. In October, the Commission received word from the USDA-NRCS that FY1998 funds for the Great Lakes Basin Program had been secured. The total amount to be received from USDA was the same as in 1997; \$350,000 with \$100,000 for program administration and regional information/education activities and \$250,000 for the competitive grants program.
4. Requests for proposals (RFPs) were mailed to more than 900 potential applicants in mid-November. 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, 1997. Seventy-nine proposals totaling nearly \$994,000 in requests were received. These were reviewed by the Task Force, with each member prioritizing the proposals from his/her state. Thirty-five proposals were advanced to the full Task Force for final review.
6. On March 18, the Soil Erosion and Sedimentation Task Force met to review and discuss the top proposals and to recommend final funding decisions. Of the 35 projects reviewed, 20 were selected to receive funding totaling \$250,630.
7. As part of an ongoing process, Commission staff worked with the project officers of the 79 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 National Association of Conservation Districts (NACD) Great Lakes Committee through the Great Lakes Basin Program. The NACD convened a meeting of its Great Lakes Committee on October 18, 1996

in Erie, Pennsylvania and again on March 19-20, 1997 in Ann Arbor, Michigan. At the October 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 managing the land and water resources of Lake Erie. 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.

9. The March 19-20 meeting of the NACD Committee on the Great Lakes was a joint meeting with the USDA-NRCS Water Quality Liaisons. This special session of the two groups provided a forum for them to share information and explore opportunities to collaborate on important issues. Highlights of the meeting included special presentations on Great Lakes sediment research by scientists from NOAA's Great Lakes Environmental Research Laboratory (GLERL) and a tour of GLERL's facility in Ann Arbor.

## II. 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. A special insert to the *Advisor* was prepared for the September/October 1996 edition focusing on Great Lakes basin agriculture. The insert highlighted the Commission-led recently completed agricultural profile project and summarized the major recommendations from the agricultural summit held in East Lansing, Michigan in April 1996. Many of these recommendations related to soil erosion and sediment control and other issues addressed under the Great Lakes Basin Program.

On September 27, 1996 the first in a series of state workshops on Soil Erosion and Sediment Control was conducted in Two Harbors, Minnesota sponsored by the Minnesota Association of Soil and Water Conservation Districts, the National Association of Conservation Districts (NACD), and the Great Lakes Commission. This workshop series 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. Six of the seven workshops were held in PY 1997. The dates and locations for the workshops were 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

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. Bob Burris from NRCS was in attendance at the Wisconsin workshop and spoke about the Great Lakes Basin Program. The opportunity for the second Minnesota workshop came as a result of the Indiana state association declining the opportunity to convene a workshop in its state. The second Minnesota workshop focused on dredging and sediment transport issues in the Duluth-Superior Harbor. The average attendance for these six workshops was about two dozen people.

3. In March 19-20, 1997 Commission staff met with the USDA-NRCS Water Quality Liaisons as part of a joint session with the NACD-Great Lakes Committee at the Great Lakes Environmental Research Laboratory in Ann Arbor, Michigan. The Water Quality Liaisons are USDA employees who interface with the state water quality agencies and facilitate and coordinate NRCS involvement in important water resources management activities at the state level. The water quality liaisons for the Great Lakes states began meeting in 1995 under the leadership of Bob Burris, NRCS Great Lakes Water Quality Coordinator. The March 1997 meeting featured special presentations on the Great Lakes Basin Program and other Commission staff priorities including data collection and mapping of environmentally sensitive areas for the U.S. EPA under the Oil Pollution Act of 1990. The Commission serves as an advisor to the NRCS Water Quality Liaisons.
4. Commission staff participated in a workshop on pesticide reduction in the Great Lakes basin on August 21, 1997 in Toledo, Ohio. The meeting was attended by about two dozen individuals and was sponsored by the International Joint Commission (IJC) and the Conservation Technology Information Center (CTIC). In addition to pesticide reduction issues, participants discussed whole farm planning, water resources management, habitat preservation, and land use issues.
5. Commission staff continued the development of a Great Lakes Basin Program home page on the World Wide Web. It can be accessed at the following URL:

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

The home 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 list. Many of the Commission's Great Lakes Basin Program related reports are online 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 the process to place online information on each of the 99 projects funded through the Great Lakes Basin Program since its inception. This work will continue with assistance from the USDA-NRCS.

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

Approximately \$250,000 was available via a cooperative agreement with the U.S. Department of Agriculture for demonstrations and special projects in PY 1997. Twenty demonstration grants were awarded on March 19 with projects beginning on June 1, 1997. Short one-paragraph 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 1991-1996 that were still ongoing as of September 1, 1996. This includes progress reports of projects funded under U.S. EPA grant dollars (Fiscal Years 1991-93) and USDA grant dollars (Fiscal Years 1994-96). 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 home page: (<http://www.glc.org/basin/glbp.html>). Descriptions of the projects follow in alphabetical order by state.

# **ILLINOIS**

<b>PROJECT TITLE:</b>	<b>STORMWATER DETENTION IN AN URBANIZED AREA</b>
<b>GRANTEE:</b>	<b>CITY OF HIGHLAND PARK</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$10,000</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$50,667</b>
<b>PROJECT DURATION:</b>	<b>APRIL 1, 1995 –OCTOBER 31, 1997</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT**

Highland Park storm sewers empty directly into ravines which then drain into Lake Michigan. During storm events, they produce high speed runoff with short detention time that create heavy erosion from the ravines.

## **BACKGROUND**

The city of Highland Park, Illinois, population 34,000, has ten separate ravines, totaling over 11 miles of channel that drain the eastern third of the city into Lake Michigan. This watershed is highly urbanized and contains approximately 2,500 residential, commercial, and retail properties. The separate ravine drainage basins have impervious surface ratios (square footage of impervious surface divided by the total area square footage) of 20 percent to 48 percent. Sanitary sewers were installed in Highland Park 70 to 90 years ago to convey wastewater to Lake Michigan. Such sewers, along with a large interceptor sewer that receives and transports the conveyed wastewater to a treatment plant, are still in use. The construction of the sanitary sewers and other infrastructure improvements resulted in increased development of surrounding properties for residential, commercial and retail use. The result of this urbanization in and near the City of Highland Park has been storm sewers that directly discharge into the ravine channels at various locations, producing high runoff rates, short detention times, and high peak flows and velocities. The energy produced from the high flows and velocities have substantially eroded ravine channels, as well as their clay and silt banks. This process has lead to slope toe failures and slumping.

The goal of this project was to construct an in-channel gabion basket detention basin at a strategically located site to detain runoff from a 10 year storm event. This in-channel detention basin was designed to restrict downstream flow and control erosion from a 3.5 square mile, highly urbanized watershed that flows into Lake Michigan. Other goals of the one-year project included verification of the success of the detention basin with respect to limiting ravine slope and bank erosion and developing criteria for future ravine stormwater detention projects.

## **ACTIVITIES**

Project personnel chose two ravine sites, Lake Bluff and Highland Park, which were susceptible to rapid erosion and exhibited various stages of renewed downcutting with associated bank slumping and structural rotary failures.

*Lake Bluff Ravine* – This ravine is about 3,000 feet long and drains directly into Lake Michigan. The project focused on a 450-foot previously restored section and another 100-foot unrestored section upstream with an average slope 1:42. The intent was to augment or reestablish natural stream bed and streambank armor. Project personnel graded out stream bed irregularities and laid down geotextile in slumped areas. These were then filled with quarried limestone cobble and concrete rubble. The slumps were covered with soil and hydro seeded with temporary annual grass in order for natural vegetation to have an opportunity to reestablish itself.

*Highland Park Ravine 10* – Interceptor sanitary sewers installed in some of the ravines appear to have increased erosion because their installation disturbed the natural cobble streambed armoring. The project focused on 900 feet of ravine beginning at its head with an average slope 1:53. Project personnel utilized several methods for remediating this ravine section. They built gabion baskets out of galvanized steel mesh, filled them with 3-6 inch quarried limestone, and installed 3x3x9-foot and 3x3x12-foot units along the toes of ravine slopes where erosion was active. They also installed reno mattresses, which were constructed like the gabion baskets except they were only 9 inches thick. The reno mattresses were installed over geotextile on the base of the ravine bed. A-Jacks are concrete or plastic structures shaped like a 6-arm toy jack. These were installed at the toe of the ravine slope on either or both sides of the ravine bed or adjacent to and downstream of a Reno Mattress. Project personnel then planted willow cuttings between the jacks. Finally geo-web, a plastic textile that holds cobblestones in place, was used in areas of actively eroding clay.

## **RESULTS**

Project personnel measured the effectiveness of ravine stabilization in three ways: sediment transport sampling stations; stream bed down cutting measured with rod and transit; and visual survey. The various techniques demonstrated different rates of success. Least successful were the A-Jacks and willow plantings because there was too much erosion and not enough sunlight to enable the willows to grow. The restored stream bed armor in Lake Bluff exceeded expectations. Project personnel were able to demonstrate a savings of 13.2 tons per year for every 100 feet of restored ravine at the Lake Bluff site. They concluded that the installation of a continuous layer of streambed armor most closely mimics nature, is the least expensive solution, and is less obtrusive than other methods.

# **INDIANA**

<b>PROJECT TITLE:</b>	<b>EVALUATION OF AN ECONOMIC INCENTIVE FOR CONSTRUCTION SITE EROSION CONTROL: INDIANA STUDY</b>
<b>GRANTEE:</b>	<b>ST. JOSEPH COUNTY SOIL &amp; WATER CONSERVATION DISTRICT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$14,948</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$ 7,322 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1996 – AUGUST 31, 1997</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>OPEN</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 to apply erosion control measures promptly. For most developers, erosion control is both a nuisance and costs money, and therefore is simply ignored. While educational and regulatory efforts have had some successes, economic incentive 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 to gain a competitive edge and increase 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 idea of this project is to set up a “real world” experiment to measure objectively the impact that seeding and mulching a site 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 proposed work included two 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 involved randomly selecting sites for treatment and then evaluating them using standard statistical methods.

Because of the nature of the project, there are no appropriate measures of soil loss prevented or beneficial uses improved during the project period. In terms of the goals of the proposal, the initial

phase, site selection and treatment, has been completed and progress is being made on tracking lot sales and developing a questionnaire to be used in the lot valuation study.

## **RESULTS**

Through this project 2,200 farms and members of the agricultural business community were reached by the LaPorte County SWCD and St. Joseph County SWCD annual reports. Erosion control workshops reached 450 engineers, architects, and construction managers and 1,000 developers, consultants, and SWCD staff received flyers. Two hundred members of the conservation community were reached at the Indiana SWCD annual meeting. Academics were reached in both the United States and abroad through conferences and published papers.

# **INDIANA**

<b>PROJECT TITLE:</b>	<b>FISH CREEK AREA STABILIZATION PROGRAM</b>
<b>GRANTEE:</b>	<b>THE NATURE CONSERVANCY</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$14,300</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$ 6,000 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1996 - NOVEMBER 30, 1997</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>OPEN</b>

## **PROBLEM STATEMENT**

Monitoring has shown that conservation tillage does not solve all erosion problems on steep crop land with slopes exceeding ten percent. Many of these areas erode at rates greater than five tons per acre during storm events. Unfortunately, many of these areas occur next to tributaries or tile inlets that deliver the sediment directly to Fish Creek, Indiana. To control erosion properly on these small but critical areas, a permanent vegetative cover needs to be established to protect the soil.

## **BACKGROUND**

In most instances erosion control methods, such as conservation tillage, reduce soil erosion to tolerable levels. However, in some cases this is not enough and small areas within larger fields continue to erode due to steep slopes. These areas stay in row crop production because farmers are not willing to risk changing the crop grown on that small area or do not want the trouble of farming around them. This is often the case in the Fish Creek watershed. Therefore, as part of the bi-state and multi-county Fish Creek Watershed Project (FCWP), the outlined program will provide farmers with incentives to find more compatible uses for these small areas.

This project will take a three-phase approach that includes identification of critical areas, landowner contact, and implementation. Implementation will include developing a site protection plan. If the landowner is receptive, then a complete ecosystem-based plan will be developed for the field or entire farm. The program will provide an economic incentive to the landowner of a \$0.01 per square foot for the area permanently vegetated for a minimum of ten years. Previously, the FCWP has successfully used this method to encourage watershed landowners to install filter strips on their property.

## **ACTIVITIES**

### **PHASE 1**

Local soil and water conservation district personnel and key watershed residents have been informed about the program and have assisted with landowner contacts. An analysis of the watershed using a Geographic Information System has been completed. The analysis identified landowners whose property contained highly erodible soils as well as Conservation Reserve Program (CRP) land in relation to Fish Creek and tributaries.

**PHASE 2**

Fourteen landowners have been contacted about participating in the Critical Area Treatment (CAT) program. Six have signed agreements with The Nature Conservancy. Many of the landowners not participating in the CAT program have decided to participate in the CRP.

**PHASE 3**

Six projects are at different stages at this time depending on the type of vegetation being established and total 31.26 acres. Three of the projects will use trees as the permanent vegetation (14.9 acres) and three will use grasses (16.36 acres).

**RESULTS**

Estimated soil savings through the program vary from 35 tons per acre to 4 tons per acre with a total savings of 435.9 tons per year on 31.26 acres.

# **INDIANA**

<b>PROJECT TITLE:</b>	<b>NORTHWEST INDIANA GREAT LAKES BASIN SOIL EROSION AND SEDIMENT CONTROL ASSISTANCE PROGRAM</b>
<b>GRANTEE:</b>	<b>LAKE COUNTY SOIL AND WATER CONSERVATION DISTRICT</b>
<b>Basin Program Funds:</b>	<b>\$10,000</b>
<b>Non-Federal Funds:</b>	<b>\$17,200</b>
<b>PROJECT DURATION:</b>	<b>SEPTEMBER 1, 1994 – DECEMBER 1, 1996</b>
<b>PROJECT TYPE:</b>	<b>TECHNICAL ASSISTANCE</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT**

Soil erosion and sedimentation have caused degraded water quality in northwest Indiana. The Lake County Soil and Water Conservation District estimates that over 2.5 million pounds of suspended solids are loaded into the Grand Calumet River from nonpoint sources during each 2-year, 24-hour storm event. A computer model of the Deep River and Turkey Creek watersheds also demonstrates that an additional 13,776 tons of soil erode into these streams during each 10-year frequency storm event.

## **BACKGROUND**

The goal of the Northwest Indiana Great Lakes Basin Soil Erosion and Sediment Control Assistance Program was to improve water quality in the Great Lakes sub-basin of Lake Michigan by controlling both urban and rural nonpoint source (NPS) pollution generated in northwest Indiana, including the Grand Calumet River Area of Concern (AOC).

The project goal was to broaden the applications of best management practices (BMPs) through technical and educational efforts, as called for in Indiana's NPS plan. The technical efforts consisted of implementing five soil erosion and sedimentation control BMPs to reduce loadings into storm drains, combined sewer overflows, ditches, and other watercourses within five major sub-watersheds covering 174,720 acres. Educational efforts were designed to enhance the knowledge of soil erosion and sedimentation control practices identified in the Indiana Department of Environmental Management (IDEM) NPS Program and Stage I Remedial Action Plan (RAP).

## **ACTIVITIES**

Under the direction of a Natural Resource Coordinator, hired on April 20, 1995, project activities included:

- Establishing a partnership with the major corporation, Northern Indiana Public Service Company, regarding their ownership of land along Wolf Lake and their interest in its revitalization. A Wolf Watershed Partnership tour was held to highlight the creation of an artificial wetland, the proposed planting on a slag field and the progress of the bank stabilization program. Twenty-six people attended the tour, including: the mayor of the City of Hammond; the city planner and his staff; IDEM; state and local representatives of the Department of Natural Resources (DNR); U.S. Environmental Protection Agency officials; state Natural Resource Conservation Service representatives; the Northern Indiana Regional Planning Commission;

local conservation groups, Save the Dunes, the Nature Conservancy, and the Grand Calumet River Task Force; and print and electronic media personnel. The two major newspapers, whose combined circulation is over 200,000, both reported the event as a lead story.

- Developing a partnership with the city of Gary, IDEM, and the Grand Calumet River Task Force to build the first parking lot sand filter in Indiana, which prevents nonpoint source pollution from directly entering the adjacent lagoon. Fourth grade students “adopted” this filter and stenciled the following on the parking lot, “This sand filter can make a difference to stop water pollution.” Two major newspapers covered this event. One of these two newspapers has an environmental editor with whom the project has developed a working relationship to get additional articles published. Local cable stations, with a combined audience of 100,000 viewers, interviewed the 23 participants including the newly-appointed district representative of IDEM, members of local environmental groups such as Save the Dunes, local officials, and state and local representatives of the DNR and NRCS.
- Participating in a Tour of Homes in Lake County, sponsored by the 200-member Building Industries Association (BIA). A BMP educational display was set up at the entrance of the tour for the 10,000 attendees as well as the BIA members.
- Conducting nine meetings with different local government departments. The meetings were attended by mayors, city/town planners, engineering departments, plan commissions, code compliance officers, developers, attorneys, builders, and sub-contractors. The attendees were informed of Indiana Code 15-5 -- known as Rule 5 -- and its relevance to Lake Michigan watershed protection. The goal of the meetings was to secure a Memorandum of Understanding (MOU) from the 13 communities located in the watershed and to educate them about nonpoint source pollution, and to continue BMPs and inspections. Four MOUs from Indiana’s largest Lake Michigan communities have been secured. Three others are pending.
- Organizing a group of neighborhood property owners who were adversely affected by a developer ignoring Rule 5. The group appeared before City Council and the Plan Commission, then took their concerns to the press. The Department of Natural Resources has followed up with letters, and meetings were scheduled with all concerned. These issues have appeared on the front page of a major newspaper for six weeks, drawing attention to builders’ responsibility to the Lake Michigan watershed.
- Conducting more than 70 meetings with city and town officials, such as mayors, planners, plan commission members, engineers, city attorneys, developers, and sub-contractors, to discuss the ditches, streams, and lakes in their communities and how the treatment thereof affects the Lake Michigan watershed.
- Producing a newsletter called *Urban Run-off Matters* which was distributed to more than 100 attendees at a Lake County Soil and Water Conservation annual meeting.

## RESULTS

Partnerships with local newspapers and cable stations enabled coverage of sediment control activities, which reached audiences of tens of thousands. Public education efforts resulted in increased community involvement in sediment control measures. Four Memoranda of Understanding have been concluded with local communities and three others are pending.

# **INDIANA**

**PROJECT TITLE:** STREAMBANK STABILIZATION "EROSION/RUNOFF"  
CONTROL PROJECT

**GRANTEE:** LAGRANGE COUNTY SOIL AND WATER CONSERVATION  
DISTRICT

**BASIN PROGRAM FUNDS:** \$3,300

**NON-FEDERAL FUNDS:** \$2,925

**PROJECT DURATION:** APRIL 1, 1995 - MAY 13, 1997

**PROJECT TYPE:** DEMONSTRATION

**STATUS:** COMPLETE

## **PROBLEM STATEMENT**

A recent survey of Amish land owners indicated that over half allow their livestock unlimited and continued access to open ditches or streams on their farms. The resulting streambank erosion and nutrient loading from animal waste negatively impacts water quality.

## **BACKGROUND**

The goal of the Streambank Stabilization "Erosion/Runoff" Control Project was to reduce severe streambank erosion and sedimentation from feedlot and pasture sites along streams within the St. Joseph River watershed. To accomplish this, the project team informed, educated, and demonstrated to area landowners, particularly the Amish community, the economic and water quality importance of limiting livestock access to streams and ditches.

LaGrange County has several miles of perennial streams running west toward the St. Joseph River that outlet into a series of natural lakes. The majority of LaGrange Soil and Water Conservation District's cost-share funding has been targeted at individual lake watersheds rather than the streams and county drains on the outlet side of the natural lakes. In this area, there is a high concentration of Amish farms, livestock, feedlots, and pasture fields.

## **ACTIVITIES**

The project demonstrated to LaGrange County livestock producers, including members of the Amish community, that excluding livestock from an open stream does improve water quality. In addition, livestock producers were shown an alternative water source for livestock watering that eliminates the need for direct access to streams and ditches.

Project personnel constructed a cattle crossing, reseeded a streambank, and installed protective fencing at one of two demonstration sites. At the second demonstration site, a spring was developed as an alternative water source for livestock watering. Fencing and seeding along the stream at this site were also completed.

Water quality tests (chemical and macro invertebrates) were conducted in July and September 1995 and again in May and September 1996 at each of the demonstration sites. Since the installations

occurred between the two water quality testing periods, the water tests demonstrated before and after effects at the second site.

## **RESULTS**

The project efforts have resulted in a reduction in erosion and sedimentation where livestock have been restricted by fencing and the improvements described above. The project was estimated to have saved annually 30 tons of soil per acre, 23 lbs of phosphorus, and 56 lbs of nitrogen per acre. Final chemical tests and rapid bio-assessment results showed water quality improvements in the feedlot and pasture areas.

Results of the project will be published with photos and general practice information in local print media, including newspapers and publications specifically serving the Amish community. This will increase education efforts beyond the one-day scheduled field day.

# **MICHIGAN**

<b>PROJECT TITLE:</b>	<b>ANTRIM CREEK/CEDAR RIVER ROAD RESTORATION</b>
<b>GRANTEE:</b>	<b>ANTRIM CONSERVATION DISTRICT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$15,000</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$18,050</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1996 - JUNE 25, 1997</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT**

In a November 1995 inventory conducted by the Antrim Conservation District and the Antrim County Road Commission, eight road/stream crossings were determined to be delivering excessive amounts of sediment to streams and/or wetlands in the area.

## **BACKGROUND**

The goal of this project was to implement the portion of the Elk River Chain of Lakes Watershed Management Plan, a product of the Elk River Chain of Lakes Steering Committee, that addresses water resource quality improvements within the watershed. Part of the plan's implementation strategy is to improve priority road/stream crossings. For this project, three severely eroded crossings in the Elk River and Grand Traverse Bay watersheds were chosen as demonstration sites: the Antrim Creek Natural Area, the Cedar River road/stream crossing, and the VanStratten Creek road/stream crossing. Sedimentation problems at all three sites result from the continuous flow of water from seeps and springs down steep dirt roads.

## **ACTIVITIES**

***VanStratten Creek:*** It is estimated that 80 tons of sediment go into this creek each year. To control this problem, a series of retention basins were installed, in conjunction with two french drains, to control a side hill seep. In addition, culvert extensions were banded to create more slope. To stabilize this critically eroding area further, rock rip-rap was placed over geo-textile fabric and the bank was seeded and mulched.

***Cedar Creek:*** The Cedar Creek road/stream crossing was a priority site due to the steepness of the road above the stream crossing and culvert. Paving the Cedar Creek road/stream crossing prevented over 100 tons of sediment from entering the creek.

***Antrim Creek:*** Antrim Creek was a high priority site for restoration because of its designation as a Natural Area and its closeness to Grand Traverse Bay. An estimated 125 tons of sediments was being washed down a road that crosses a steep bluff. Spring seeps helped contribute to the problem. Through earthwork improvements, the installation of tile and geo-textile wrapped filter beds, as well as re-seeding and mulching work, the soil erosion and sedimentation problems have been controlled.

## **RESULTS**

To promote the success of this project, the Antrim Conservation District, in cooperation with the Antrim Road Commission, sponsored a tour of the improved sites.

Annually a total of 241 tons of soil, 24 pounds of phosphorus, and 16 pounds of nitrogen have been saved as a result of this project. The number and type of audiences reached through this project include 125 residents, six township supervisors, and the personnel at three road commissions.

# **MICHIGAN**

<b>PROJECT TITLE:</b>	<b>DEERFIELD NATURE PARK EROSION CONTROL PROJECT</b>
<b>GRANTEE:</b>	<b>COUNTY OF ISABELLA PARKS AND RECREATION</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$3,925</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$1,325</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1996 - JUNE 17, 1997</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT**

The Deerfield Nature Park experienced soil erosion and sedimentation damage along a 200-foot long section of Chippewa River bank and downstream pond. The park is a popular recreation site and an important resource to Isabella County and much of mid-Michigan.

## **BACKGROUND**

Deerfield Nature Park is located in Isabella County, Michigan in the headwaters of the Saginaw Bay watershed. Saginaw Bay is a nationally renowned recreational resource located within a day's drive of millions of Americans. In recent years, significant attention had been given to water quality problems affecting Saginaw Bay, the Saginaw River and its tributaries. Much has been done to build public support for improved water quality in these waters, and improvements are being realized. Controlling soil erosion and sedimentation in Deerfield Nature Park is another meaningful step forward in confronting Saginaw Bay water quality problems.

The goal of this project was to restore and provide protection to approximately 200 feet of significantly eroded Chippewa River bank found within the park. Part of this goal was to demonstrate and promote the development of an earnest stewardship ethic for the care of mid-Michigan natural resources, especially surface water resources.

## **ACTIVITIES**

This project partially eliminated erosion and sedimentation damage being experienced in the park. Restoration goals included: 1) reducing the impact of the flow of water on a steep north facing bank in a highly energized section of river; 2) controlling surface water runoff in a manner that minimizes the creation of gullies; 3) preventing the movement of highly erodible sandy soils by protecting existing ground cover and establishing new plantings of various trees, shrubs and grass; and 4) managing the movement of park visitors through and within this beautiful portion of the park.

To control erosion at the site, structures such as a runoff diversion bar, timber and cable/half-log steps, and cedar tree trunk barriers were installed. Vegetation was planted along the rehabilitated slopes and fencing was installed to keep people off the slope. A project identification and information sign, consisting of a plaque mounted on a large boulder, was erected.

## **RESULTS**

Project efforts have effectively controlled erosion caused by the vertical movement of runoff at the site. Erosion caused by the flowing of the Chippewa River has also been significantly reduced. Placement of the cedar tree trunks along the bottom of the slope have kept river ice from gouging the shoreline.

The benefits of the project include: 1) increased public awareness about soil erosion problems as well as the steps taken to eliminate soil erosion and protect the environment of the Chippewa River; 2) elimination of an unattractive and scarred section of river bank -- replacing it with a managed, attractive setting; 3) improved habitat for aquatic life found in the Chippewa River downstream from the site resulting from a significant reduction in sedimentation from the site; and 4) elimination of a safety hazard represented by a high volume of foot traffic in an area previously containing deep gullies caused by water erosion.

# **MICHIGAN**

<b>PROJECT TITLE:</b>	<b>MONTAGUE DRAIN BIOENGINEERING 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 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1996 –</b>
<b>PROJECT TYPE:</b>	<b>TECHNICAL ASSISTANCE</b>
<b>STATUS:</b>	<b>OPEN</b>

## **PROBLEM STATEMENT**

Severe gully and streambank 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 USDA-Natural Resources Conservation Service.

## **BACKGROUND**

The goal of this project was to reduce soil erosion and the amount of resulting sediment entering White Lake. It 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 bioengineering erosion control project to remediate gully and streambank erosion around White Lake. This project helped raise public knowledge and awareness about soil erosion and the negative impacts of resulting sedimentation.

Remedial work will follow the 1995 Montague Drain Bioengineering Design that proposed vegetation, in combination 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. This proposal will be implemented by MCSCD, NRCS, and contractual staff with assistance from White Lake PAC members and community volunteers. The design consultant and NRCS staff will assist MCSCD staff in the application of bioengineering techniques to the 15 sites. MCSCD staff will coordinate with the Montague High School FFA/Agri-science class, PAC members, interested volunteers, and hired individuals to do the labor recommended for each of the 15 sites. MCSCD staff with PAC members will implement the educational component of this project. They will promote bioengineering techniques to control erosion on other streams in the White Lake watershed, increase public awareness of the detrimental effects of sediment, and encourage students in a local hands-on science application of bioengineering 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 necessary permits needed for the project.
- Contacted local landowners for their cooperation and received permission to access their property in order to deliver materials to the site.
- Videotaped 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.
- Involved students 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 bioengineering 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 highlight the collaborative approach used.
- Installed 55 tons of toe stone on the nine 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 streambank erosion.
- Repaired the 6-8 foot over fall that was cutting back up the stream bottom through the road commission.
- Completed bioengineering treatment to the 15 sites, which included 670 feet of eroded streambanks 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 MCD Annual Report published as an insert in that newspaper. Project news has been disseminated through the White River Watershed Partnership and Timberland RC&D as well. Information reached an additional 10,800 people through the *White Lake Beacon* article.

An 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>MUD BUSTERS</b>
<b>GRANTEE:</b>	<b>HURON RIVER WATERSHED COUNCIL</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$12,811</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$ 6,634</b>
<b>PROJECT DURATION:</b>	<b>SEPTEMBER 1, 1994 - MARCH 31, 1996</b>
<b>PROJECT TYPE:</b>	<b>INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT**

Urban and suburban construction activities have been identified as a significant source of sediment entering the Huron River system. Sedimentation has been reported by Michigan Department of Natural Resources (MDNR) Fisheries Division to have impacted fish species negatively in the Huron River and its tributaries.

## **BACKGROUND**

The Mud Busters program sought to strengthen enforcement of Michigan's Soil Erosion and Sedimentation Control Act (Act 347, P.A. 1972) in the Huron River watershed, and fostered a sense of shared responsibility among government, land developers, and residents for the protection of surface waters in the Huron River basin. The project supplements current interagency efforts to reduce nonpoint source pollution in a priority watershed identified by the MDNR.

The Huron River valley is home to over 445,000 people; several threatened and endangered species of fish, mussels, amphibians, and mammals; and a number of bogs, wet meadows, and remnant prairies of statewide significance. The Huron River provides a wealth of recreational opportunities to the residents of southeast Michigan and is the only state-designated scenic river in southeast Michigan. Much of the Huron River basin is coming under increasing development pressure. The Southeast Michigan Council of Governments (SEMCOG) predicts that, given existing development trends, 40 percent of the remaining open space in southeast Michigan may be lost to urban and suburban development by the year 2010. Current urban and suburban construction activities have been identified as a significant source of sediment entering the Huron system.

This project: 1) supported the formation of a Soil Erosion Control Agents' Network to foster information exchange between soil erosion control officials; 2) developed a seminar to explain the ecological impacts of soil erosion and sedimentation to developers and contractors; and 3) trained citizen volunteers ("Mud Busters") to recognize and report erosion control problems.

## **ACTIVITIES**

*Soil Erosion Control Agents' Network:* The Huron River Watershed Council has established a Soil Erosion Control Agents' Network. Members of the network meet on a quarterly basis to discuss

such issues as increasing compliance with soil erosion control regulations and ordinances. Meeting attendees have included twenty-two agents from both enforcement and non-enforcement agencies (i.e., Natural Resources Conservation Service) and from five counties: Ingham, Livingston, Monroe, Oakland, and Washtenaw.

*Developers'/Contractors' Seminar:* A workshop on soil erosion and sedimentation control for builders and contractors was held in February 1996. Twenty local builders took part in discussions on local erosion control regulations, site design, water quality concerns, and soil erosion control products. Participants rated the workshop very highly, stating that it clarified a number of concerns regarding permitting and soil erosion control requirements.

*Citizen Training:* Nineteen volunteers -- "Mud Busters" -- have been trained. Their monitoring efforts are currently focused around the headwaters of the Huron River in Oakland, Livingston, and Washtenaw counties. Training is designed to teach volunteers to identify the signs of erosion and sedimentation, to assess quickly if off-site sedimentation is occurring, and to report such sites to the proper agency. A standardized reporting form, developed by the project coordinator with input provided by local enforcement agents and MDNR personnel, was completed by volunteer teams (227 volunteer hours) for each observed construction site exhibiting off-site sedimentation. These forms were compiled by the project coordinator and sent to the appropriate local soil erosion control agencies.

## RESULTS

In addition to the people reached through the Soil Erosion Control Agents' Network, the Developers'/Contractors' Seminar, and volunteers trained as Mud Busters, the Huron River Watershed Council has undertaken a significant information and education program.

*Information/Education Activities:* Information on the Mud Busters program and the effects of erosion and sedimentation have been distributed and made available to the public through various vehicles such as the Huron River Watershed Council Newsletter (distribution of 2,300). Other information and education mechanisms include:

- Huron River clean up in Milford (approximately 100 flyers)
- Huron River Day in Gallup Park, Ann Arbor (50 flyers distributed, and demonstrations at the nonpoint source pollution booth which included a table-top runoff model of erosion and sedimentation)
- Creek Fair, sponsored by the Huron River Watershed Council's Adopt-A-Stream Program and the Washtenaw County Drain Commissioner
- Ann Arbor Flower & Garden Show (approximately 100 flyers)
- City of Ann Arbor Water Fair (table-top runoff demonstration; flyers)
- Article in the Huron River Watershed Council newsletter (circulation: 2,300)
- Articles in the Ecology Center of Ann Arbor newsletter (circulation: 2,000) and the Ann Arbor News
- Local television --Ann Arbor Cable Channel 9 broadcast of the video of the demonstration done at Creek Fair
- Information notices through the Internet

Through these means several thousand people have been informed of the Mud Busters volunteer training program and the problems associated with erosion and sedimentation. Education efforts regarding the importance of soil erosion and sedimentation control will continue through the Council's Adopt-A-Stream project, dissemination of the Council's quarterly newsletter, and through Council's on-going work with individual municipalities regarding land use and development practices.

# **MICHIGAN**

<b>PROJECT TITLE:</b>	<b>MUD BUSTERS - THE SEQUEL</b>
<b>GRANTEE:</b>	<b>HURON RIVER WATERSHED COUNCIL</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$10,000</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$ 5,053</b>
<b>PROJECT DURATION:</b>	<b>APRIL 1, 1995 - MARCH 31, 1996</b>
<b>PROJECT TYPE:</b>	<b>TECHNICAL ASSISTANCE</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT**

Studies conducted during 1970 as part of the national Urban Runoff Program, as well as recent testing conducted by the city of Ann Arbor as part of stormwater permitting requirements, revealed that urban and suburban construction activities are a significant source of sediment to the Huron system.

Mill Creek has been identified as a significant source of sediment that directly impacts the small mouth bass fishery along the main channel of the Huron River at its confluence with the creek.

## **BACKGROUND**

The Mud Buster program, initiated under a 1994 Great Lakes Basin Program grant, included training citizen volunteers to recognize and report urban, agricultural, roadway, and in-channel erosion control problems to local county enforcement agents and establishing the Huron Valley Soil Erosion Control Agents Network. The network fostered information exchange between the various soil erosion agents and officers regarding innovative enforcement techniques and best management practices.

The goals of this project, Mud Busters-The Sequel, is to continue the 1994 program activities as well as produce an inventory that prioritizes agricultural, in-stream channel, and road-related erosion hot spots within the Mill Creek drainage of the Huron River watershed. The inventory provided baseline data for pollution reduction planning and future fisheries restoration planning for Mill Creek. Mill Creek is the Huron River's largest tributary basin and has been long recognized as a significant source of sediment and associated phosphorus to the main channel of the Huron River.

## **ACTIVITIES**

An inventory of agricultural, streambank, and road-related erosion was conducted in the 144 square mile watershed of Mill Creek. Over eight linear miles of streambanks exhibiting severe soil erosion were identified, and agricultural fields bordering the stream and lacking vegetative buffers were estimated to contribute 1,647 tons of lost soil annually.

## **RESULTS**

The results of this analysis were compiled as *Soil Erosion in the Mill Creek Basin: An Assessment of Fields, Roads, and Creeks; Washtenaw County, Michigan* (1996) and are now being used by the Natural Resources Conservation Service and Huron River Watershed Council to facilitate streambank stabilization and buffer strip plantings so that downstream fisheries can be restored.

# **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>\$13,163.74</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$12,739 (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>OPEN</b>

## **PROBLEM STATEMENT**

A 1991 study titled *Boardman River Watershed Report* identified over 600 erosion 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 streambank erosion sites within the watershed; and (2) conducting an interactive river ecology workshop for the general public where they will improve their understanding of river system dynamics and 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, an extremely 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.

Public involvement is an important aspect of erosion control, sedimentation reduction, and the long-term protection of soil and water resources. This project will inform key stakeholders about the effects of certain activities and the dynamics of aquatic ecosystems in an effort to improve the quality of resource stewardship.

## ACTIVITIES

*Objective A:* The following work was completed to provide hands-on opportunities for riparian landowners and user groups to stabilize and revegetate streambank 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 restored 14 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 five 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, 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 through this grant, was used to demonstrate river processes and simulate restoration techniques. The second workshop, a day-long event held along the banks of the Boardman River, involved 1,500 people learning about river ecology.

## RESULTS

*Objective A:* It is estimated that 115 tons of soil per year and an associated 193 pounds per year of nitrogen and 97 pounds per year of phosphorus were prevented from entering the Boardman River as a result of these projects. Also, a total of 756 linear feet of streambank 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>RIFLE RIVER STREAMBANK STABILIZATION DEMONSTRATION</b>
<b>GRANTEE:</b>	<b>SAGINAW BAY RESOURCE CONSERVATION AND DEVELOPMENT AREA INC.</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$12,000</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$63,306</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1996 - MAY 31, 1997</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT**

Sediment deposition at the mouth of the Rifle River is interfering with navigation. Sedimentation has increased turbidity and clogged gravel beds, reducing fish reproduction habitat and invertebrate populations. Sources include streambank erosion caused by ice, water and foot traffic, agricultural erosion, road crossings, and off-road vehicles.

## **BACKGROUND**

The Rifle River watershed is located in Ogemaw and Arenac counties, draining an area of approximately 246,000 acres that outlets into Saginaw Bay. The river itself stretches over 600 miles and its tributaries cover almost 140 miles. There are 29 inland lakes covering 2,564 acres. Much of the watershed has a clay pan which results in rapid runoff. There are many high, exposed sand banks, particularly in the lower portion of the river. The Rifle River watershed is a popular recreation destination and hosts over 1,200 private camp sites and numerous canoe liveries.

The purpose of this project is to demonstrate streambank erosion control and promote the Rifle River Restoration Committee efforts. The Rifle River Restoration Committee selected ten to twelve sites to be targeted for this project from the 354 erosion sites identified through the Rifle River Streambank Erosion Inventory. Various erosion control techniques were applied including rock rip-rap, tree revetments, bank shaping and seeding, and vegetative planting.

## **ACTIVITIES**

Under this project, six sites were identified for streambank stabilization: Stoddard, River Bend Campground, Turtle Park, River View Campground, White's Canoe & Campground, and Moffat Bridge Canoe Launch. Engineering plans and designs were prepared and stabilization work was completed. A total of 1,750 tons of soil per year were saved as a result of this project.

## RESULTS

*Stoddard:* Two hundred feet of streambank on state owned land were stabilized with rock rip-rap and vegetation. A stairway to be used as a canoe launch was installed and a natural groundwater seep outlet was stabilized. A total of 200 tons of soil per year were saved.

*River Bend Campground:* Three hundred feet of streambank was stabilized with rock rip-rap, saving a total of 300 tons of soil per year.

*Turtle Park:* One hundred feet of channel was stabilized with rock rip-rap and land shaping, saving a total of 50 tons of soil per year.

*River View Campground:* Eight hundred feet of streambank was stabilized with rock rip-rap and vegetation, saving a total of 800 tons of soil per year.

*Moffat Bridge:* Completed stabilization of a canoe launch site and diverted runoff from the driveway and road. One hundred and fifty feet of channel and 200 feet of streambank were stabilized, saving a total of 250 tons of soil per year.

*Whites Campground:* One hundred and twenty feet of streambank stabilized with rock rip-rap, saving a total of 120 tons of soil per year.

In total 1870 feet of streambank were stabilized saving 1720 tons of soil annually.

# **MICHIGAN**

**PROJECT TITLE:** SOIL BIOENGINEERING EROSION CONTROL –  
TAHQUAMENON FALLS STATE PARK

**GRANTEE:** MICHIGAN DEPARTMENT OF NATURAL RESOURCES

**Basin Program Funds:** \$5,000

**PROJECT DURATION:** JUNE 1, 1996 - NOVEMBER 30, 1996

**PROJECT TYPE:** PROGRAM AND TECHNICAL ASSISTANCE

**STATUS:** CANCELLED BY REQUEST OF GRANTEE

## **PROBLEM STATEMENT**

Soil erosion is a serious problem at the Tahquamenon Falls State Park. Each year, over 500,000 people visit the park. Accessing the river for recreational purposes is a significant cause of the soil erosion problems.

## **BACKGROUND**

This project focuses on four specific areas of streambank erosion along the Tahquamenon River, Chippewa County, Michigan. All four areas are located within the Tahquamenon Falls State Park in the vicinity of the Lower Falls. These sites represent the worst streambank erosion along the entire 100 mile course of the Tahquamenon River, excluding the extensive erosion at the Rivermouth Campground of Tahquamenon Falls State Park. The goal of the project is to reduce the sediment load of the Tahquamenon River and Lake Superior by stabilizing these four sites.

Traditionally, the Parks and Recreation division has used “hard” solutions, such as geo-textiles, rip-rap and retaining walls, to control soil erosion. These solutions often consume significant amounts of time and money. Soil bioengineering is another possibility, which may prove to be a more efficient approach to soil erosion control. Since all parks within the Michigan State Park System have soil erosion problems, there is a need to demonstrate the efficiency and aesthetic advantage of soil bioengineering erosion control techniques.

Rehabilitation and stabilization efforts are needed at these sites to reduce the amount of sediment entering the Tahquamenon River. The soil erosion problems at all four project sites are the result of visitors accessing the river. Camper-made trails down the banks to the edge of the river are prone to considerable erosion. Extensive foot traffic at a day-use picnic area is causing serious riverbank erosion and increased surface runoff. A rowboat launch area has developed into a cut in the bank where raw edges are eroding. Finally, a boardwalk and observation deck area is still experiencing problems caused by the heavy foot traffic prior to its construction and needs further work.

The Great Lakes Basin Program provided \$5,000 for the design and implementation of site specific soil bioengineering solutions for each of the four areas of streambank erosion. Only plant materials native to the Tahquamenon Falls State Park were used to stabilize and revegetate the slopes. Fencing and signage were also used to help prevent future soil erosion. Structural support was added to the toe of the boat launch site.

## **RESULTS**

The majority of the streambank stabilization and vegetation planned for this project was completed. However, personnel changes toward the end of the project prevented a completion of the final reporting process.

# **MICHIGAN**

<b>PROJECT TITLE:</b>	<b>SOIL EROSION AND SEDIMENT CONTROL ON WHITE RIVER TRIBUTARIES IN NEWAYGO COUNTY</b>
<b>GRANTEE:</b>	<b>NEWAYGO SOIL AND WATER CONSERVATION DISTRICT</b>
<b>Basin Program Funds:</b>	<b>\$9,970</b>
<b>Non-Federal Funds:</b>	<b>\$9,300 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>APRIL 1, 1995 –</b>
<b>PROJECT TYPE:</b>	<b>TECHNICAL ASSISTANCE</b>
<b>STATUS:</b>	<b>OPEN</b>

## **PROBLEM STATEMENT**

Severely eroding sites at road stream crossings are depositing sediment into perennial tributaries of the White River. The Muskegon Chapter of Trout Unlimited has identified eight sites within the watershed where trout habitat is being impaired due to soil erosion.

## **BACKGROUND**

The goal of the soil erosion and sediment control project is to develop cost-effective erosion control solutions to stabilize severely eroding areas at road and stream intersections on tributaries of the White River.

It is proposed that eight of 11 problem sites identified in Newaygo County will be corrected. All eight sites along the tributaries of the White River are within the natural rivers system and are designated trout streams. The restoration of these sites will utilize biological methods to restore desirable riparian landscapes and will incorporate soil stabilization techniques with consideration for shade, habitat, and the welfare of site users. This project will implement erosion control solutions and develop standard drawings of the control solutions to assist in future efforts on similar problem sites.

## **ACTIVITIES**

The Newaygo Soil and Water Conservation District has experienced initial difficulties in implementing their eight streambank stabilization projects because of the Michigan Department of Environmental Quality permitting process. The permit was received and work began in December 1997. In addition, the number of sites has been reduced from eight to four, due to changes in sites one through four, and an increase in the cost of materials. The project is scheduled to be completed by September 1998.

## **RESULTS**

To date, several preliminary engineering phases and documentation efforts have been completed. These include numerous site inspections, site drawings, and photographic documentation as well as engaging in regular contact with the landowners and participating agencies.



# **MICHIGAN**

<b>PROJECT TITLE:</b>	<b>STREAMBANK STABILIZATION AND INTERPRETIVE SIGNAGE—RIFLE RIVER RECREATION AREA</b>
<b>GRANTEE:</b>	<b>MICHIGAN DEPARTMENT OF NATURAL RESOURCES-PARKS AND RECREATION DIVISION</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$10,000</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$13,421</b>
<b>PROJECT DURATION:</b>	<b>APRIL 1, 1995 - OCTOBER 31, 1996</b>
<b>PROJECT TYPE:</b>	<b>TECHNICAL ASSISTANCE</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT**

Sediment from streambank erosion, caused by natural and human activity, continues to have a harmful effect on water quality, aquatic habitats and the scenic beauty of the Rifle River. Anglers and canoeists traversing steep streambanks at undeveloped and non-designated access points are the main cause of streambank erosion at many sites along the river. The eroded sand and silt deposits cover valuable spawning gravel and reduce aquatic productivity such as bottom-dwelling insects valuable to the food chain of the river.

## **BACKGROUND**

The goal of the Streambank Stabilization and Interpretive Signage project is to reduce sediment loadings from streambank erosion in the upper reaches of the Rifle River and to educate park visitors about the harmful effects of streambank erosion.

The Rifle River watershed drains approximately 385 square miles of Michigan's Ogemaw and Arenac counties before flowing into the Saginaw Bay of Lake Huron. The Rifle River is a designated natural river under the authority of Michigan's Natural Rivers Act and is one of the fastest flowing rivers in Michigan's lower peninsula. Known for its scenic beauty, the river provides quality fishing and canoeing.

A 1994 U.S. Department of Agriculture – Natural Resources Conservation Service *Streambank Erosion Inventory* identified 354 streambank erosion sites that impact the Rifle River. Eight of these sites are located in the Rifle River Recreation Area, an area located in the upper reaches of the Rifle River owned and administered by the Michigan Department of Natural Resources – Parks and Recreation. The sediment created by these eroding sites impacts most of the river's 60-mile length before being carried into the waters of Saginaw Bay.

## **RESULTS**

Seven sites of streambank erosion on the Rifle River have been rehabilitated using field stone rip-rap. Voids between the stone have been filled with soil and quack grass sod. The eighth site, the

Sage Lake Road canoe launch parking lot, has been re-graded and contoured to drain runoff away from the river. Sediments reaching the river from all the eight sites have been greatly reduced.

Interpretive signs have been developed by a Parks and Recreation Division naturalist and graphic artist. In the spring of 1996, the interpretive panel was installed along a self-guided auto tour of the recreation area, which features natural resource protection and management. Approximately 107,000 people visited the park throughout the summer and had the opportunity to view the signs. To date, soil savings have not been quantified for the eight sites.

# **MICHIGAN**

<b>PROJECT TITLE:</b>	<b>SWAN CREEK BIOENGINEERING PROJECT</b>
<b>GRANTEE:</b>	<b>SUMPTER TOWNSHIP</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$3,970</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$1,130 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>SEPTEMBER 1, 1994 – AUGUST 31, 1997</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>OPEN</b>

## **PROBLEM STATEMENT**

Removal of much or all of the streambank vegetation along creeks, drains, and ditches has considerable ecological consequences, including increased biological oxygen demand, loss of habitat, and increased stream temperatures and nutrient loads. By providing local governments responsible for drain maintenance with proven, cost-effective techniques of replanting and stabilizing streambanks with local native vegetation, the negative effects of drain maintenance will be minimized.

## **BACKGROUND**

The goal of the multi-partner Swan Creek Bioengineering Project is to research and report on the effectiveness of three bioengineering techniques to stabilize the banks of newly cleaned or maintained stream channels in the Swan Creek watershed, a Lake Erie tributary. In an effort to prevent flooding, and to promote the drainage of agricultural fields, many communities in the Great Lakes basin clean out, deepen, or widen streams and drains. In Sumpter Township, more than 35 miles of drains are scheduled for cleaning. This maintenance procedure often involves the removal of much or all of the riparian and streambank vegetation on one side of the channel to allow access for machinery. Also, streambanks are often left with slopes that are too steep to reestablish successful vegetation. These factors increase both sloughing and the amount of sediment entering the stream from channel erosion and overland runoff. The conditions that initially necessitated the maintenance are thus exacerbated.

## **ACTIVITIES**

1) Live stakes were installed in early April 1995 along 35 yards of Sumpter Township Number 6 Drain to stabilize an 840-square-foot area (0.02 acres) of streambank following recent channel excavation. Approximately 75 percent of the 150 live stakes planted were willow species, and about 25 percent were dogwood species. Nearly 60 percent of the stakes sprouted by the second week of May. In proportion to the species of stakes planted, the majority of stakes that sprouted were willows. Willows exhibited the greatest amount of growth, with shoots reaching lengths of 3-½ feet. Among dogwoods that sprouted, shoots grew less than 1 foot.

2) In mid April 1996, live fascine bundles were installed along 25 yards of Swan Creek to stabilize a 750-square-foot area (0.02 acres) following channel excavation. This site showed evidence of slope instability due to the removal of a large tree and root wad from the channel bank. Approximately 400 branches for fascine bundles were cut in lengths of 6-10 feet and 50 three-foot stakes were prepared. Plant materials consisted of approximately 80 percent willow and 20 percent dogwood species. Two rows of fascine bundles were placed approximately 2 ½ feet apart in shallow benches excavated on the western slope of the creek. Vegetative growth of the fascines amounted to approximately 50 percent of the fascine bundles one month after installation; 10 percent of the fascines showed vegetative growth one year after installation -- the majority of the vegetative growth was from the dogwood species. No live stakes used in the live fascine installation were viable one year after installation.

3) In early April, a vegetative live crib wall was installed along 35 yards of Swan Creek to stabilize a 1,365-square-foot site (0.03 acres). The site was chosen because of severe erosion at a sharp bend on the east side of the drain that was washing away the outside corner and creating a steep slope. Over 50 dead logs and 75 live stakes were used to construct the crib wall. Approximately 500 branches were used for the vegetative layers. The vegetative layers within the crib wall were back-filled with over 40 cubic yards of sand. After construction, the project site was seeded with grass.

Approximately 75 percent of the vegetative layers sprouted the first month after installation; three months after installation approximately 75 percent of the vegetative layers were still viable. Approximately 60 percent of the live stakes used to secure the crib wall sprouted and remained viable three months after installation. Vegetative coverage on the project site, including willow, dogwood, and grass, was approximately 85 percent by July 1997 with the crib wall intact.

## **RESULTS**

Sediment and attached nutrient reduction values were calculated for all three installations using the Channel Erosion Equation, nutrient concentration values, and soil texture correction factors. Total sediment reduction is 28.95 tons per year, total phosphorus reduction is 24.60 pounds per year, and total nitrogen reduction is 49.22 pounds per year.

# **MICHIGAN**

<b>PROJECT TITLE:</b>	<b>THUNDER BAY RIVER STREAMBANK RESTORATION</b>
<b>GRANTEE:</b>	<b>THUNDER BAY RIVER WATERSHED COUNCIL</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$10,000</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$10,000</b>
<b>PROJECT DURATION:</b>	<b>APRIL 1, 1995 - DECEMBER 7, 1996</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT**

Sediment introduced by erosion from river banks, shorelines, and road/stream crossings is having a serious and increasingly negative impact on area water quality. This is apparent in the gradual, but demonstrable, decline in the quality of fisheries habitat throughout the Thunder Bay river system.

## **BACKGROUND**

The purpose of the Thunder Bay River Streambank Restoration project is to install streambank erosion control demonstration sites at selected locations along the Thunder Bay River to serve as a catalyst for future stabilization projects.

Five high visibility sites have been chosen to demonstrate the effective use of stabilization techniques to prevent further soil erosion. An information/education component of the project will publicize the results of the demonstration projects through various vehicles such as newspaper articles, the *Thunder Bay Watershed Council* newsletter, and television coverage.

## **ACTIVITIES**

Seven streambank sites, totaling 2,380 linear feet, have been rehabilitated using various techniques such as rock rip-rap, toe stabilization with tree revetment, and bank seeding with jute netting. Approximately 125 cubic yards of sand per year have been prevented from eroding at these restored sites.

## **RESULTS**

One of the demonstration sites has been publicized through the Thunder Bay Watershed Council's newsletter (distribution of 200), the Huron Pines RC&D newsletter (distribution of 250), the Alpena local newspaper (distribution of 12,000) and at a USDA - NRCS meeting attended by 250 people. This site demonstrates the use of the whole tree revetment anchoring method, seeding, hay mulch, and jute netting. This technology has been transferred to an engineering firm doing similar restoration at the Air National Guard base in Alpena.

As an off-shoot of this project, the Thunder Bay Watershed Council has collaborated with the U.S. Federal Energy Regulatory Commission (FERC) in developing actual restoration scenarios and cost estimation for restoration associated with hydroelectric generation.



# **MICHIGAN**

<b>PROJECT TITLE:</b>	<b>WETLANDS, WILDLIFE AND YOU TOO</b>
<b>GRANTEE:</b>	<b>BRANCH COUNTY SOIL CONSERVATION DISTRICT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$9,900</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$19,300</b>
<b>PROJECT DURATION:</b>	<b>APRIL 1, 1995 - OCTOBER 1, 1996</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION; INFORMATION AND EDUCATION; TECHNICAL ASSISTANCE</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT**

Heavy recreational and agricultural use, along with the progressive development of the Great Lakes, have resulted in increasingly eutrophic surface waters. This condition has been caused by large amounts of sediment and associated nutrients entering the surface water through soil erosion. Compounding the problem is the destruction of valuable wetlands that previously acted as natural filters protecting this valuable resource.

## **BACKGROUND**

The goal of the Wetlands, Wildlife and You Too project was to establish a permanent natural filtering system for surface and groundwater through wetland restoration. The restored wetlands will minimize the sources of off-site damages to streams; reduce soil, associated nutrients, and toxic contaminant loadings; and improve fish and wildlife habitat.

Branch County is located in south central Michigan along the Indiana border. It is a traditionally agricultural area that is experiencing population growth in its unique lake areas and towns. There are over 91 lakes in the county and over 1,000 miles of streams. Increased soil erosion from agricultural use and land development are impacting Branch County water quality.

With this project, Branch County Soil Conservation District: 1) restored wetlands; 2) educated the public on the importance of wetlands; 3) established coalitions with various federal, state, and local agencies involved in wetland restoration; and 4) encouraged the establishment of outdoor education laboratories to increase experimental learning and promote students' understanding of the importance of a sustainable wetland.

## **ACTIVITIES**

The Branch County area gained a much greater appreciation of wetlands through the demonstrations, education, and publicity programs that were part of this project. Additionally, several Branch County wetlands were restored. One of these areas became a public demonstration site with signs along a major highway in Branch County. A number of partnerships were formed and publicized through articles and photographs in the county newspaper. Organizations forming these partnerships include the Branch County Sportsmen Club, Branch County Chapter of Ducks Unlimited,

Branch County Chapter of Pheasants Forever, Michigan Department of Natural Resources Wildlife Division, U.S. Fish and Wildlife Service, the Branch County Soil Conservation District, and the Great Lakes Commission. Members of these various organizations distributed information about wetlands both to their respective organizations and at their individual places of employment.

## **RESULTS**

All students of Branch County elementary schools learned about wetlands and gained an appreciation for the importance of preserving the remaining wetlands of Branch County. With the help of teachers at the Quincy Community School, a curriculum was developed, printed, distributed, and taught to students. A video entitled "Our Wetlands Need You" was professionally produced for the purpose of educating the public on various types of wetlands and their functions. The video is to be shown in the schools and to every major Branch County community service group. A slide presentation and picture display was developed as an offshoot of the video project, which is to be used at county functions such as the 4-H Fair, Ag Day, and Home Show. Quincy fourth grade students studied wetland plants, developed a presentation, and assisted 600 elementary students in the planting of 12 different types of wetland plants. Wetland lessons were used as part of the Quincy Summer School curriculum. Area science teachers have used selected lessons as teaching material. An Albion College Summer Enrichment class used lessons as part of a thematic unit based on Kalamazoo River study. *Wetlands, Wildlife and You Too* has reached an audience of 10,400 people.

Students from local schools have contributed time and effort to surface water quality projects, testing, planting aquatic vegetation, and studying best management practices to protect and restore wetlands and improve water quality. From these wetland restoration efforts, the project restored 11 wetlands, converting 41 acres of upland back to wetland habitat. The project has educated students and staff from the local school districts regarding the importance of the wetland restoration process and has fostered an environmental ethic that includes stewardship of the land and positive attitudes about natural resources.

# **MINNESOTA**

<b>PROJECT TITLE:</b>	<b>DUNE STABILIZATION ON MINNESOTA POINT</b>
<b>GRANTEE:</b>	<b>SOUTH ST. LOUIS COUNTY SOIL AND WATER CONSERVATION DISTRICT</b>
<b>Basin Program Funds:</b>	<b>\$ 9,284</b>
<b>Non-Federal Funds:</b>	<b>\$ 7,705</b>
<b>PROJECT DURATION:</b>	<b>APRIL 1, 1995 - AUGUST 31, 1996</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT**

The beach dunes on Minnesota Point are highly susceptible to wind erosion, especially where vegetation has been disturbed. An evaluation of Minnesota Point after storm events revealed that erosion is accelerated where heavy foot traffic occurs. Extensive cleanup of streets, driveways and sidewalks is required after each significant wind event. Vast amounts of sand cross the point and are deposited in Superior Bay, increasing the frequency of required dredging.

## **BACKGROUND**

The goals of the dune stabilization project were to reduce the environmental degradation and negative economic impact caused by wind-blown sands on Minnesota Point; to identify and map highly degraded and/or highly sensitive areas of the Minnesota Point beach dunes; to stabilize beach dunes with vegetation; and to raise awareness and solicit cooperation of Park Point residents and visitors to minimize disturbance of the existing vegetation.

Minnesota Point, also known as Park Point, is part of the longest freshwater sand bar in the world. It stretches in length approximately 10 kilometers and varies in width from 90 to 425 meters. The area is home to a diverse mix of animal and plant species, homes, and businesses, including about 1,500 permanent residences. The Park Point Recreation Area attracts tens of thousands of visitors annually for swimming, sun-bathing, wind surfing, and related activities. The need to protect this unique resource was expressed by the International Joint Commission in their 1993 *Review of the St. Louis River System Stage I Remedial Action Plan*. The project mapped the most sensitive areas, planted vegetation and educated the public through the use of signs at preferred entrance points as well as an informational sign at the Park Point Recreational Area.

## **ACTIVITIES**

Approximately 45,000 square feet of previously eroding dune has been stabilized. The SWCD supervised the planting of 20,000 culms of American beach grass and 2,000 sand cherry shrubs on two selected sites that exhibited a high degree of erosion and potential for further degradation. The beach grass provides maximum ground cover and dune stabilization, and the placement of the shrubs protects the grass and encourages traffic toward formal dune crossings.

## **RESULTS**

Approximately 10,000 yards of sand have been conserved, assuming conservatively that the depth of sand scoured from a blow hole is six feet. The Park Point shoreline, vegetative line, and road coverage has been digitized and is now on a GIS layer. This will be used for future planning and reference concerning the migration of sand and the changing vegetation line. Three major blow holes, two planted and one unplanted, have been surveyed to determine the present volume of the holes so the value and success of this project can be determined. All educational signs have been placed at the appropriate locations.

# **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 &amp; SOIL RESOURCES</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$9,258</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$15,000 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>AUGUST 1, 1996 –</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>OPEN</b>

## **PROBLEM STATEMENT**

The goal is to train SWCD staff to inspect construction projects in progress. This will enable the recently established Minnesota Board of Water and Soil Resources (BWSR) engineer, a state appointee, to focus on project design.

## **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 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 revetment projects, covering approximately 269-feet of Lake Superior shoreline, were built using this grant. 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 manual was also developed and distributed to appropriate SWCD technicians and SRF state engineers. A training session was

also held as part of a USDA– NRCS TR-2 workshop on Lakeshore Protection Training which had over 41 attendees.

The completed projects will save an estimated 171 tons of soil per year. An additional 64 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 235 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>ENHANCEMENT OF LAKE SUPERIOR'S WATER QUALITY</b>
<b>GRANTEE:</b>	<b>NORTH SHORE MANAGEMENT BOARD</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$7,519</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$4,006</b>
<b>PROJECT DURATION:</b>	<b>SEPTEMBER 1, 1994 - NOVEMBER 11, 1996</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT**

Deterioration of Lake Superior's water quality due to sedimentation, erosion, runoff, and failing septic systems has been a problem for many years. Necessary steps in developing and implementing effective solutions include identifying specific locations on the North Shore where such contamination currently occurs, as well as implementing public education efforts for north shore residents and local officials.

## **BACKGROUND**

The Enhancement of Lake Superior's Water Quality project along Minnesota's north shore is an inter-agency effort to improve water quality by identifying specific contaminated sites along the shoreline. Locations have been identified and the information shared with landowners about possible corrective actions that might be taken to remediate the identified problems.

Lake Superior's water quality has been deteriorating for many years. Identification of specific locations where contamination occurred was needed in order to develop effective solutions. The goals of this project were to: 1) identify water quality problem areas due to erosion, development and failing septic systems; 2) educate north shore residents and local units of government about local water quality problems; and 3) facilitate solution implementation efforts.

The project conducted an aerial assessment flight, ground-truthing (landowner contact), public education, and produced final reports. The 154-mile environmental assessment flight of the north shore from Encampment Island to the Canadian border completes the inventory for Minnesota's Lake Superior shoreline.

## **ACTIVITIES**

An aerial assessment flight of 154 miles was conducted by A.W. Research Laboratories from Encampment Island to the Canadian border along the North Shore of Lake Superior. High priority point and nonpoint contamination activities were photographed and developed into slides. A final report was completed and presented to the North Shore Management Board.

Fifty-eight locations of concern were documented with the developed slides. Of these, 25 were natural point sources such as streams. Relatively few sites were instances of human-induced

conditions, and most involved inconsistency with the current setback criteria. There were three areas exhibiting intensive industrial development. Sedimentation was also noted in several areas along the shore. Finally, septic system contamination was generally only visible in a few heavily populated areas. This report completed Phase I of the project.

Phase II of the project involved ground-truthing, or making landowner contact for the sites that were identified as high priority in Phase I. The North Shore Management Board staff met with the technical staff of Cook and Lake Counties to determine the procedure and assess costs for the ground-truthing and landowner visit process. Letters were mailed to affected landowners explaining that the ground-truthing process was advisory and educational only, not regulatory. Forty of the site visits were completed where the landowners had the opportunity to discuss with technical staff the property care and remedial options available to them. Landowners' overall perception of the program has been positive.

The final component of the project involved public education. In addition to the ground-truthing conducted in Phase II, there were also a series of mailings and property care planning assistance sessions available to landowners. Each Lake Superior shoreline owner in Cook and Lake counties, 1,350 households in total, was mailed a packet of information tailored to the specific issues that county technical staff felt were most critical to their location. Property care planning assistance sessions were held on three occasions to give property owners the opportunity to have their soil tested and discuss with technical staff and gardeners the appropriate techniques for managing and caring for their property.

## **RESULTS**

The North Shore Management Board mailed information packages to 1,350 households and held three planning sessions. As a result of this project, the North Shore Management Board and Cook County received a total of \$100,000 from the State Revolving Loan Fund for establishment of local revolving loan funds to assist with septic system upgrades for residential property owners.

# **MINNESOTA**

<b>PROJECT TITLE:</b>	<b>KINGSBURY CREEK EROSION PROJECT</b>
<b>GRANTEE:</b>	<b>SOUTH ST. LOUIS SOIL AND WATER CONSERVATION DISTRICT</b>
<b>BASIN PROGRAM FUNDS (U.S. EPA):</b>	<b>\$75,000</b>
<b>NON-FEDERAL FUNDS:</b>	<b>NOT AVAILABLE</b>
<b>PROJECT DURATION:</b>	<b>OCTOBER 1, 1993 – OCTOBER 31, 1996</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION; INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT**

Accelerated erosion is continuing on a high, steep slope along Kingsbury Creek that discharges into the St. Louis Bay, despite the implementation of erosion control efforts, including re-vegetation of the slope in 1991. Erosion and groundwater seepage problems have prevented successful re-vegetation of the slope. The slope that requires stabilization is approximately 100 feet high and 100 feet wide with an estimated annual soil loss of 500 tons. This soil loss figure was estimated by measuring the changes of the slope over the past 30 years using historical aerial photography. The St. Louis River Basin Remedial Action Plan has identified sedimentation into the bay to be impairing beneficial uses.

## **BACKGROUND**

The Kingsbury Creek Erosion Project is a cooperative effort between the Minnesota Department of Transportation, the city of Duluth, and the South St. Louis County Soil and Water Conservation District. The goals of the program were to stabilize a high, steep slope to control erosion and sedimentation into Kingsbury Creek which discharges into St. Louis Bay and Lake Superior. The project developed innovative techniques to install tile lines used to intercept groundwater seepage. An information and education program was also developed. The construction results will be presented to the St. Louis River Basin Remedial Action Plan committee and at regional and local technical conferences. Additionally, the project will include photographic monitoring of the slope for three years after completion.

## **ACTIVITIES**

In 1994, the project was not initiated due to insufficient staff and equipment capabilities in the Minnesota Department of Transportation. When the contract perspective bids were finally let, the bids were too high. The second submission for bids generated a bid that fell within the allotted amount. The work was completed as required in December 1995; however, in the spring of 1996, severe storms caused the bank to fail in two locations. The contractor was required to fix the problem under a change order, issued by the city engineer. The final work was completed on October 31, 1996.

## **RESULTS**

Soil erosion has been reduced by 400 to 425 tons per year as a result of the project.



# **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</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>OPEN</b>

## **PROBLEM STATEMENT**

Tree plantings, 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 Lake Superior's 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 streambank erosion and sedimentation, excessive fluctuations of stream flow, and changes in water temperature. Furthermore, cumulative hydrologic effects have combined over the years to impact negatively on the Knife River system's water quality and quantity.

The goal of this project was to prevent and minimize the soil erosion and sedimentation in the Knife River Watershed that directly impacts Lake Superior in order to protect water quality and wildlife and fish habitat. This goal will be reached by producing a Knife River Watershed newsletter covering conservation practices, distributing the newsletter to watershed landowners and local organizations and agencies, producing a Knife River Watershed educational fact sheet, posting educational signs in the watershed, planting trees to stabilize banks and prevent soil erosion, and producing a geographic information system (GIS) of the watershed.

## **ACTIVITIES**

The project goals are being accomplished through both short-term and long-term objectives. The short-term objectives completed include two *Edge of the Knife* newsletters that discuss the necessity

of riparian tree establishment, existing tree species, historical data of the Knife, 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 project partners have received these newsletters. In addition, over 1,700 trees were planted on private and public lands, well over the 750 proposed. This was largely due to 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 GIS is underway. Maps of political boundaries, national wetlands, highways and roads, rivers and streams, and/or watershed boundaries can be generated. Currently, GIS maps have been produced and included in the *Edge of the Knife* newsletters. To date, the GIS has been a tool to give the landowners a visual idea of how large the watershed is, where beaver dam sites are located, and how many tributaries and sub-tributaries there are. This GIS will eventually be used for planning purposes and will generate important information about the watershed for local professionals, local units of government, and citizens for future planning and decision-making activities.

## **RESULTS**

An estimated 20 tons per year of soil will be saved as a result of 1,800 feet of forested filter strips, 300 feet of vegetative stabilization, and 3,000 feet of riparian tree planting.

# **MINNESOTA**

<b>PROJECT TITLE:</b>	<b>SHORELINE BEST MANAGEMENT PRACTICES WORKSHOPS IN THE MINNESOTA LAKE SUPERIOR DRAINAGE BASIN</b>
<b>GRANTEE:</b>	<b>MINNESOTA BOARD OF WATER AND SOIL RESOURCES</b>
<b>Basin Program Funds:</b>	<b>\$9,450</b>
<b>Non-Federal Funds:</b>	<b>\$31,275</b>
<b>PROJECT DURATION:</b>	<b>APRIL 1, 1995 - NOVEMBER 20, 1996</b>
<b>PROJECT TYPE:</b>	<b>INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT**

On a watershed basis, tributary sediment and nutrient loadings to Lake Superior are substantial. Approximately 60 miles of unstable clay shoreline areas exist along the Minnesota shore of Lake Superior. Several reports including the North Shore Management Plan, drafted in 1988, and the Stage I and Stage II reports of the St. Louis Remedial Action Plan (RAP) have identified soil erosion problems.

## **BACKGROUND**

The goal of this project was to provide private shoreline landowners and local units of government with practical information on the installation of best management practices (BMPs) for the reduction of sediment and nutrient loadings to Lake Superior and its tributaries.

Nonpoint source pollution of Lake Superior is occurring along the shoreline and within the watershed. The Soil Water Conservation Districts (SWCD) are the local units of government primarily responsible for erosion and water quality BMP implementation. The districts are well equipped to educate and inform landowners, local units of government, and the general public about the importance of using BMPs to control erosion and sedimentation.

## **ACTIVITIES**

Although only three workshops were planned, growing interest supported an additional three. Five separate state and local agencies combined resources to coordinate and conduct the workshops which focused on Shoreline BMPs in the Lake Superior watershed. The workshops educated landowners and local units of government on topics such as potential structural and non-structural practices for shoreline erosion control, regional shoreline geology, permitting processes, and sources of assistance in the Lake Superior drainage basin.

Due to the success of the six workshops, at least four northern Minnesota inland counties are now planning similar workshops in their regions. The additional workshops and informational workbook will be patterned after the format and contents of the original six workshops.

Also, Lake County utilized the BMP steering committee and BMP workshop outline to conduct a separate workshop that focused on construction BMPs along Lake Superior. This workshop attracted more than 35 regional contractors who typically work in the Lake Superior watershed.

The high landowner interest from this project will also be used in other initiatives. For example, the Board of Water and Soil Resources (BWSR) and the SWCDs have drafted a legislative proposal for the Lake Superior Basin in Minnesota. EPA 319 funds and Great Lakes Protection Fund dollars have also been solicited using the results from this project.

## **RESULTS**

One hundred thirty-two private property owners attended the workshops. Three hundred workbooks were prepared and each workshop participant received a copy. Twenty-five individuals who could not attend a workshop also received workbooks. The remaining workbooks are being used by the SWCDs to bring the shoreline BMP message to additional property owners seeking assistance.

One direct result of the workshop series is that approximately 50 property owners have requested additional technical and financial assistance from a SWCD and/or BWSR to help apply some of the more detailed BMPs to their eroding shorelines. The total Lake Superior frontage owned by these property owners is approximately 10,000 feet. At the workshops, many questions were asked concerning how to apply the BMPs and where to go for assistance.

The actual quantities of sediment and nonpoint pollution cause by erosion entering Lake Superior that will be reduced by the practices presented at the workshops is difficult to determine at the present time. However, due to the positive response and high level of property owner participation, a significant reduction can be anticipated. Many property owners who live directly in the Lake Superior watershed now have an increased awareness of shoreline erosion control BMPs at their disposal.

# **MINNESOTA**

<b>PROJECT TITLE:</b>	<b>SUSTAINABLE DEVELOPMENT INITIATIVE FOR COOK COUNTY</b>
<b>GRANTEE:</b>	<b>MINNESOTA BOARD OF WATER AND SOIL RESOURCES</b>
<b>Basin Program Funds:</b>	<b>\$9,600</b>
<b>Non-Federal Funds:</b>	<b>\$3,760</b>
<b>PROJECT DURATION:</b>	<b>JULY 1, 1995 - SEPTEMBER 5, 1996</b>
<b>PROJECT TYPE:</b>	<b>TECHNICAL ASSISTANCE</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT**

Land alteration for commercial development and seasonal residences is rapidly increasing in Cook County, Minnesota. This development brings an increase in stormwater runoff, wetland and habitat impacts, and affects surface water and groundwater. The Cook County Soil and Water Conservation District (SWCD) has specific approval authority regarding erosion control under Zoning Ordinance #37, especially on driveway and Lake Superior Shoreline development. However, there is little enforcement due to lack of staff and training.

## **BACKGROUND**

The goal of the Sustainable Development Initiative was to demonstrate the need for increased technical assistance for the Cook County SWCD in an effort to provide increased resource protection in this fragile region.

Cook County is located in the far northeastern part of Minnesota. It shares borders with Lake Superior, Lake County, and Canada. It is unique among Minnesota's counties in that it consists of land that is historically non-agricultural and, to a large extent, owned by the state and federal governments.

Currently, tourism, recreation, and seasonal residential development are flourishing in Cook County. The most significant need identified in the Lake Superior Association of SWCDs' Watershed Plan, of which Cook County SWCD is a member, is to enhance local staffing and technical capabilities to provide increased technical assistance to landowners.

The project: 1) supported a technical staff person to inspect building sites to ensure that the county zoning ordinance is followed; 2) formalized an agreement between Cook County and the Cook SWCD regarding erosion control duties; and 3) demonstrated the effectiveness of a seasonal, full-time SWCD inspector.

## **ACTIVITIES**

A seasonal erosion inspector was hired to inspect erosion control practices at new building construction sites and road and driveway development sites. The erosion inspector was also responsible for providing reports at monthly SWCD board meetings and regular updates to county planning and

zoning staff, as well as revising the Cook SWCD Annual Plan to reflect sustainable development concerns in Cook County.

Thirty new building sites were visited. Nine of the sites required some form of technical assistance to prevent soil loss. This indicates a 30 percent improvement or "success rate" for 1995 developments. In all cases, the sites were assessed and the landowners sent information and recommendations regarding the appropriate soil control measures.

In order to increase the effectiveness of the limited resources of the SWCD, the inspector recommended that a one-page informational flyer be developed to describe the objectives of the SWCD and to list their services available to the public. A packet of best management practice guidelines are now issued to every new construction permittee.

The inspector visited ten Lake Superior shoreline property sites. Pictures of the problem areas were drawn, and maps were developed to show the proximity of septic systems, buildings, other possible accelerators of erosion problems, and potential obstacles to beach side construction of preventative structures. This information was passed on to the Cook and Lake County SWCD conservation specialist for further assessment.

The majority of county roads and 17 old gravel pits were also assessed for potential erosion problems. A 1993 Soil Conservation Service/Cook County roadside erosion survey was reviewed to compare erosion rates between then and now and the effectiveness of measures taken. The primary erosion contributors in 1993 are no longer problem areas; however four new problem areas were identified.

The inspector prioritized erosion problems in the county to be Lake Superior shoreline, followed by road erosion and new construction site erosion.

## **RESULTS**

To date, nine acres of construction sites have included soil erosion best management practices, 30 individuals have been reached, and 90 tons of soil per year have been saved.

## **NEW YORK**

<b>PROJECT TITLE:</b>	<b>BEST MANAGEMENT PRACTICES FOR WATER QUALITY ON FOREST LAND</b>
<b>GRANTEE:</b>	<b>CHEMUNG COUNTY SOIL &amp; WATER CONSERVATION DISTRICT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$13,000</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$11,344</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1996 - AUGUST 1, 1997</b>
<b>PROJECT TYPE:</b>	<b>INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

### **PROBLEM STATEMENT**

Without proper guidance on the use and implementation of best management practices (BMPs), local ordinances to regulate timber harvesting fall short of minimizing off-site damages to streams, fish, wildlife habitat, and other water bodies.

### **BACKGROUND**

According to a statistic prepared by the U.S. Forest Service, 62 percent or 18.6 million acres of New York's land area in 1993 was forested. Timber harvesting, if managed properly, can have long-term benefits to wildlife, water resources, and recreational opportunities. However, timber harvesting is also a disruptive affair even under the best of circumstances. If not planned and implemented properly, the four major elements of logging -- truck roads, skid trails, landings, and tree falling -- can have major negative impacts on forest and water resources. According to U.S. Forest Service research, improperly installed skid trails can result in excess of 800 tons of soil being eroded per acre each year.

In the late 1970s, Chemung County, New York witnessed firsthand the direct result of improperly installed skid trails and truck roads. In efforts to prevent future problems, many local municipalities enacted ordinances and/or notification requirements to regulate logging. Such ordinances require BMPs to be implemented that will minimize soil erosion and protect water quality. However, these legislative actions are often enforced by personnel with little or no knowledge on how to plan and implement BMPs.

### **ACTIVITIES**

To ensure that BMPs for timber harvesting activities are properly planned and implemented, the Chemung County Soil & Water Conservation District (SWCD) undertook a two-pronged approach to disseminate information about BMPs on forest lands the Chemung SWCD: 1) prepared a field manual pertaining to forestry titled *Best Management Practices During Timber Harvesting Operations*; and 2) developed and published an informational pamphlet called *Do You Own Forest Land?* for private landowners.

Information for these products was obtained from the U.S. Environmental Protection Agency, U.S. Forest Service, New York State Department of Environmental Conservation, and State University of New York College of Environmental Science and Forestry. Local ordinances from towns in Chemung County were also collected.

The manual was reviewed by a technical committee that included representatives from the New York State Department of Environmental Conservation and the U.S. Department of Agriculture — Natural Resources Conservation Service. The completed manual consists of a full-color laminated cover and approximately 40 pages of text, photographs, and illustrations. The manual includes sections on nonpoint source pollution, timber harvesting, forest roads and skid trails, stream-side management zones, freshwater wetlands and permit requirements, stream crossing structures and permit requirements, soil stabilization, financial and technical assistance, and best management practices as well as a glossary of terms. Several reference appendices are also included containing information on technical assistance sources, regulations, and financial assistance opportunities.

The pamphlet is a tri-folded 8-½ by 11-inch sheet with information about owning forest land printed on both sides. The pamphlet includes a matrix to assist landowners in finding the appropriate sources of assistance for commercial logging, timber stand improvement, erosion control, education, tree planting, financial assistance, and stream permits.

## **RESULTS**

A total of 2,500 copies of the pamphlet were printed.

## **NEW YORK**

<b>PROJECT TITLE:</b>	<b>COLD BROOK STREAM IMPROVEMENT</b>
<b>GRANTEE:</b>	<b>STEBEN COUNTY SOIL AND WATER CONSERVATION DISTRICT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$14,000</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$ 25,778</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**

Due to unchecked streambank erosion, Cold Brook has left its channel approximately three miles south of Keuka Lake and now flows across adjacent cropland before it reenters the permanent channel another mile down stream. The change in direction of Cold Brook has caused an increase in streambank erosion and cropland erosion now covered by the channel, and an increase in the transportation of nutrients and other pollutants through the system.

### **BACKGROUND**

Cold Brook is located in Steuben County and is considered to be one of the best rainbow trout nurseries in New York. However, severe soil erosion problems have caused the river to leave its channel over a one mile reach and flow across adjacent cropland. This has had a dramatic impact on drinking water and aquatic habitat quality due to increased sedimentation, elevated nutrient loading, and decreased channel depth. All have contributed to a decline in rainbow trout population in both Cold Brook and Keuka Lake.

Steuben County is located in the south central part of New York State at the foot of the Finger Lakes region. The physiography of the county is characterized by steep rolling hills with steep, narrow valleys traversed by high gradient, fast flowing, very erosive streams. According to the *New York Erosion and Sediment Inventory*, published by the U.S. Department of Agriculture - National Resources Conservation Service, approximately 515,000 tons of soil are being eroded each year from some 2,070 miles of streambanks in the county. In response, the Steuben County Soil & Water Conservation District established priorities for projects that are jeopardizing water quality, public and private properties, as well as fish and wildlife habitat. The section of Cold Brook described above is one of the top priorities.

The goal of this project was to improve the water quality of Cold Brook and Keuka Lake by reducing streambank erosion and decreasing sedimentation. As part of this goal, project planners intended to improve the cold water fisheries in Cold Brook and Keuka Lake. The project also limited nutrient and other nonpoint source pollutant input into Keuka Lake and protected soil resources of nearby crop land.

## **ACTIVITIES**

Project personnel surveyed and designed restoration plans for the project areas and secured permits for the required work. They removed gravel bars, brush and snags and installed rock rip-rap along 3,000 feet of channel. They constructed a sedimentation basin to trap sediments. In addition, they used biotechnical engineering techniques, consisting of willow planting and hydro-seeding, to help stabilize the streambanks.

## **RESULTS**

This project has resulted in improved fishing on Cold Brook, a popular public access fishing stream since it is the main channel for Keuka Lake rainbow trout propagation. Fish habitat has been improved by uncovering existing wooden habitat structures and increasing the potential for survival. Erosion control and restoration of the brook to its original channel has begun to return the channel's bed to a gravel composition, thereby improving spawning habitat. Water temperatures are also more conducive to fish habitat. Controlling the streambank erosion has also improved fish migration. Previously, the high sediment loads resulting from crop field and streambank erosion impeded the migration of rainbow trout upstream.

Keuka Lake is also an important drinking water supply. This project has reduced the sedimentation to Keuka Lake as well as possible phosphorus contamination which could impact water quality, increase weed growth, and impair swimming opportunities.

## **NEW YORK**

<b>PROJECT TITLE:</b>	<b>KASHONG CREEK WATERSHED STREAMBANK FILTER STRIPS</b>
<b>GRANTEE:</b>	<b>YATES COUNTY SOIL AND WATER CONSERVATION DISTRICT</b>
<b>Basin Program Funds:</b>	<b>\$10,000</b>
<b>Non-Federal Funds:</b>	<b>\$ 5,354</b>
<b>PROJECT DURATION:</b>	<b>SEPTEMBER 1, 1994 - APRIL 30, 1997</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

### **PROBLEM STATEMENT**

Approximately 75 percent of the targeted area is in intensive agricultural production for vegetable and small grain crops. These crops are being grown on very productive and highly erodible sandy silt loam soils. It has been calculated, using the universal soil loss equation, that the average annual soil loss is 5.26 tons per acre. This figure represents soil movement from sheet and rill erosion only. Due to the high volume crops grown in the Kashong Creek watershed and corresponding inputs, sediments that enter the tributaries may have excess fertilizers and pesticides attached.

### **BACKGROUND**

The goal of the Kashong Creek Watershed Streambank Filter Strips project was to reduce sediment loading from agriculture into Kashong Creek and its tributaries, reduce stormwater runoff, and maintain soil productivity. The project worked at creating landowner awareness of water quality issues and nonpoint source pollution, and to reduce sediment impacts on lakeshore property owners in the Kashong Bay area.

The Kashong Creek watershed is located in the Finger Lakes region of western New York. The watershed contains approximately 20,150 acres, with agriculture comprising 75 percent of the land-use practice. The Kashong Creek watershed is included on the New York State Priority Water Problems list as being impacted by agriculture, and is also identified in the Yates and Ontario County Water Quality Strategies. Kashong Creek and its main tributaries are 27 miles in length and flow through Ontario and Yates Counties and outlet into Seneca Lake.

Vegetable crop and small grain, corn and cash crop operations are the most prevalent agricultural operations in the watershed, with dairy a distant third. Excess water removal has been the most common type of conservation practice applied rather than erosion and sediment control. A strong demonstration program is needed to show the utility of filter strips, placed along streambanks and across field slopes, as a means for controlling soil erosion and sedimentation. It is estimated that 100 acres of filter strips are needed to treat the entire watershed.

## **ACTIVITIES**

During the summer of 1995, two college interns did an assessment on all the tributaries, drainage ditches, and waterways that feed into Kashong Creek. They categorized the streams into low, medium, and high risk areas using the Stream Corridor Worksheet from the Lake Champlain manual, *Erosion, Land use and Stream Ecology*. This information was used to target sites for remediation.

Switch grass filter strips were installed along waterways in agricultural fields. These filter strips were installed with a no-till drill. Switch grass is a slow growing plant material and is slow to become established. It will be two years before these strips reach their full effectiveness.

## **RESULTS**

Filter strips were established along 4.1 miles of tributaries and five acres across slopes in agricultural fields. The success has been reasonable. In areas where the average loss was greater than "T", it is anticipated that these soil losses will be halved. Approximately 2.5 tons of soil per acre, 4.3 pounds of nitrogen and two pounds of phosphorus will be saved per acre per year. This amount may increase after the seedlings are established.

The soils in this watershed are very valuable. It was difficult to find agricultural producers that were willing to take any land out of production. This limited the area that was actually planted. Additional incentives will be needed if this program is repeated.

## **NEW YORK**

<b>PROJECT TITLE:</b>	<b>LAKE ONTARIO/OSWEGO COUNTY SHORELINE SURVEY</b>
<b>GRANTEE:</b>	<b>OSWEGO COUNTY SOIL AND WATER CONSERVATION DISTRICT</b>
<b>Basin Program Funds:</b>	<b>\$5,750</b>
<b>Non-Federal Funds:</b>	<b>\$4,438</b>
<b>PROJECT DURATION:</b>	<b>APRIL 1, 1995 - AUGUST 1, 1997</b>
<b>PROJECT TYPE:</b>	<b>INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

### **PROBLEM STATEMENT**

Many shoreline property owners and local officials do not recognize the consequences of excessive coastal erosion and its impact on water quality. Inadequate understanding of the role that sediment plays in the transport of chemicals and degradation of habitat impedes comprehension of water pollution dynamics. Additionally many do not understand the engineering aspects of shoreline protection. The workshops will attempt to improve the linkage between erosion control and water quality programs.

### **BACKGROUND**

Many shoreline property owners and local officials do not recognize the consequences of excessive coastal erosion and its impact on water quality. A lack of understanding about the role of sediment in transporting chemicals and nutrients that degrade water quality is a serious impediment toward developing an understanding of the dynamics of water pollution. Additionally, there is little understanding of the engineering aspects of shoreline protection.

The Oswego County Soil and Water Conservation District proposed developing a video that could be used as part of an education program for soil erosion and sediment control. The project was intended to evaluate the effectiveness of various low-and-high cost shoreline protection measures that have been installed over the years as well as provided an historical record of current coastal shoreline conditions affecting water quality and nonpoint source pollution.

Through the educational component of this project, workshops for interested individuals and groups, particularly shoreline property owners and local municipal officials, as well as one-on-one technical assistance, will be used to educate individuals and decisionmakers about all aspects of the coastal environment.

### **ACTIVITIES**

The Oswego Soil and Water Conservation District produced a video of footage taken from the air. The video was distributed to: Oswego County government officials and Departments; Ontario Dune Coalition's Resource Library at the Snow Memorial Library-Pulaski, NY; New York State agencies involved in soil erosion and sediment control. A number of videos were kept for lending

to interested individuals, civic groups, and organizations. Several orders to purchase the video have also been placed. In addition, an earlier version was viewed by more than 100 people and some copies were loaned out to governmental agencies and local governments, such as the New York State Department of Environmental Conservation and the town of Sandy Creek, for their review.

Two formal presentations of earlier versions of the video occurred on October 11, 1995, to The Ontario Dune Coalition (TODC), and on December 21, 1995, to the Oswego County Water Quality Coordinating Committee (WQCC). The TODC is an alliance of private property owners' associations, not-for-profit organizations, local governments, and state agencies, all of which have an ownership, regulatory, or other official interest in the eastern Lake Ontario dune system.

The final video tape version has locator maps throughout, highlighting the specific regions of shoreline being viewed at any one time. It also documented the environmental conditions of the lake shore at the time of videotaping, as well as the condition of structural and other human-made features installed for shoreline protection.

A variety of workshops and/or presentations to local town planning or zoning boards that share property boundaries with Lake Ontario will be scheduled as an ongoing approach in increasing awareness of soil erosion, natural resource protection, and properly planned land use development.

The video will act as the impetus for continued documentation efforts in controlling the long-term erosion along the eastern end of Lake Ontario. Further on-site investigation at critical benchmarks along the videotaped shoreline will provide additional information for future aerial documentation. Understanding the goals and objectives of The Ontario Dune Coalition, this video is a greatly needed step in documenting the physical changes to the relationship of land and water in the eastern Lake Ontario basin.

## **RESULTS**

To date, 44 farmers, students, and watershed residents have been reached through the video. In addition, 25 tons of soil per year, 20 pounds of phosphorus per year, and 43 pounds of nitrogen per year have been saved.

## **NEW YORK**

<b>PROJECT TITLE:</b>	<b>STEWARDSHIP AWARENESS AND WATER QUALITY PROTECTION DEMONSTRATION PROJECTS IN THE CHITTENANGO BASIN WATERSHED OF THE LAKE ONTARIO BASIN</b>
<b>GRANTEE:</b>	<b>ONONDAGA COUNTY SOIL AND WATER CONSERVATION DISTRICT</b>
<b>GREAT LAKES BASIN FUNDS:</b>	<b>\$11,730</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$4,980</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1996 - JUNE 23, 1997</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION; INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

### **PROBLEM STATEMENT**

Based on the 1995 Needs Assessment conducted by the Onondaga County Soil and Water Conservation District (SWCD) a set of priority needs, concerns, and problems within the Chittenango basin were identified. Enhancing and expanding educational programs and demonstration projects were identified as the areas that needed the most attention.

### **BACKGROUND**

Under a 1995 Great Lakes Basin Program grant, the Onondaga County SWCD conducted a Needs Assessment consisting of surveys and focus group meetings. The Needs Assessment focused on three audiences: science teachers, planning board members, and farmers. This project has been developed out of the necessity to respond to the Needs Assessment by providing educational programs and materials and implementing demonstration projects. The goal of this project is to improve and protect the water quality within the Chittenango basin watershed by providing a two-phase educational program: stewardship awareness and water quality protection demonstration projects.

Phase I of this program focused on the development and dissemination of educational materials on watersheds, nonpoint source pollution, agricultural best management practices (BMPs), and erosion and sediment control techniques to teachers, planning board members and the farming community. Phase II of this program consisted of completing a streambank erosion inventory and implementing two demonstration projects that illustrated and encouraged effective and efficient use of erosion and sediment control measures.

### **ACTIVITIES**

The key tasks implemented by this grant focused on three audiences: science teachers, planning boards, and farmers. The SWCD office has become a focal point for educational materials on watersheds, nonpoint source pollution, BMPs, and erosion and sedimentation control measures. Information was disseminated to all three audiences as follows:

*Science Teachers:* The SWCD compiled educational information and material relating to nonpoint source pollution, soil erosion, water quality, and rural and urban BMPs into a resource booklet and made it available to science teachers. An educational watershed model was made available to teachers as well as planning boards and community groups. The model was demonstrated at the Water Week Fair, and a presentation on the model was given at a science teacher fair with 75 attending teachers.

*Planning Boards:* Fact sheets and pamphlets on water quality, nonpoint source pollution, soil erosion and sedimentation were distributed. Copies of the *New York State Guidelines for Urban Erosion and Sediment Control* were purchased and provided to local planning boards. In addition, a workshop on soil erosion control and stormwater management was held for planning board members.

*Farmers:* Through newsletter and other material, information about water quality BMPs was disseminated to area farmers. As a result of the Great Lakes Basin Program project, the SWCD was able to secure a New York State Agricultural Nonpoint Source Abatement & Control Grant of \$64,000 to install a manure storage structure on a high priority farm within the watershed.

The streambank stabilization demonstration project was also completed. First, project personnel conducted a streambank erosion study and prioritized sites. A severely eroded site on Butternut Creek in the town of Lafayette, New York was chosen as a demonstration site. A combination of rock rip-rap and willow matting was installed to stabilize a sharply curved eroded bank. The total length of the stabilization was 134-feet, and the willows were used to secure the bank to a height of 20-feet.

## **RESULTS**

Many people were reached through workshops, newsletters and the science teacher fair. Additionally, the streambank stabilization demonstration site will save an estimated 9.24 tons of soil annually. This demonstration site will be promoted through newsletter articles and conservation tours.

## **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</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>OPEN</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 and soil erosion and resulting sedimentation. Much of the degradation can be linked to the large scale "ditching" efforts that 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 fishing industry tourism revenues. 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 & 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 educational outreach and a viable demonstration project. Great Lakes Basin Program funds will be used to lease skid-steer type excavation equipment, cover consultant fees, and 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 a significant challenge to overcome. After many designs, meetings and conversations with the U.S. Army Corps of 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.

### **RESULTS**

The process is still underway.



# **OHIO**

<b>PROJECT TITLE:</b>	<b>BLUE CREEK STABILIZATION DEMONSTRATION AREA</b>
<b>GRANTEE:</b>	<b>PAULDING SOIL AND WATER CONSERVATION DISTRICT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$10,000</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$28,690 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>APRIL 1, 1995 –</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>OPEN</b>

## **PROBLEM STATEMENT**

Land drainage practices in the Maumee River and Blue Creek watersheds have caused excessive erosion and sedimentation, creating severe water quality problems in some parts of the watersheds. The Blue Creek watershed is one of the most erosive in the Maumee River watershed. During public meetings held in 1994, landowners, local and state public officials and state agency personnel supported vegetative streambank erosion control as one solution to the deteriorating condition of Blue Creek.

## **BACKGROUND**

The Blue Creek watershed drains 67,000 acres, and has 37 miles of main stream and more than 200 miles of modified open ditches. The main stream itself has a very flat grade, and the extremely crooked nature of the creek results in continuous erosion and sedimentation. Wide, grassed berms that had been established and maintained by landowners in the area have fallen into the creek at a rapid rate, leaving half of the main streambanks devoid of any vegetation. This results in thousands of tons of new sediment entering Blue Creek each year, which increases water quality degradation. Past drainage projects did not properly assess the hydrology of the watershed in their design, which has left Blue Creek as one of the most erosive water courses in the Maumee River watershed.

The purpose of the Blue Creek Stabilization Demonstration project is to show the viability of vegetative streambank stabilization as an alternative to rock channel lining. This will demonstrate that erosion and sedimentation can be controlled at a reduced cost, while maintaining habitat and water quality. This project will be a starting point for other vegetative stabilization projects that are needed along a 20-mile stretch of Blue Creek, as well as for other ditch maintenance projects throughout Paulding County. The project area will also be used as a field study site for an educational program involving both the land users and county high school students. The intent of this information/education component is to increase awareness of the linkage between land uses, drainage techniques, soil erosion, and their impacts on water quality in the Blue Creek and Maumee River watersheds.

## **ACTIVITIES**

Dry conditions and low stream flow allowed for successful completion of all phases of construction in 1995. All eroded streambank slopes (1:1-0:1) were excavated to 2:1 slopes prior to final

finish and application of seed, plant materials, and experimental materials. In all, 5,000 linear feet were treated in an area of five stream miles in length. In addition, 1,800 pounds of grass were seeded on ditch slopes, berms, and disturbed areas totaling 45 acres along the creek.

After seeding, six different types of mulch netting were laid down and stapled to the toe of the slope at various locations for a study of effectiveness. One area was hydro-seeded with wood cellulose mulch. Next, 1,550 Bankers willows and 2,770 Streamco willows were planted in three rows, three feet apart in the toe of the slope.

The project area was utilized for engineering and conservation education programs before, during and after construction of the area. Activities included:

- Participation of three area school districts (275 students). Twelve classroom presentations were given as well as two field presentations.
- The site hosted a two day Joint Agency Stream Management Workshop conducted by the Ohio Environmental Protection Agency (EPA). There were approximately 31 in attendance from the Ohio EPA, U.S. Army Corps of Engineers, USDA Natural Resources Conservation Service, Ohio Department of Natural Resources (DNR), area Soil and Water Conservation District and area county engineers.
- The district's congressional representative visited the site.
- As part of an Ohio DNR/SWCD Technical Tour, 40 participants from ten northwest Ohio County SWCD's visited the site.
- All phases of the project have been videotaped with hopes of producing a complete story and "Do it Yourself" video.
- Operation Greenstripe allowed students to evaluate the need for filter strips for erosion control.

## **RESULTS**

The severe 1995-96 winter conditions damaged the mulch netting; however, there was little erosion and most of the willows remained. In a normal year, the netting would have helped to establish a solid seeding at the toe of the slope. But the possibility of extreme weather always exists and for that reason alone, the netting as a replacement for permanent channel lining, such as rock, is risky.

The willow plantings have proven to be very resilient and tough. Cuttings transplanted from local stock have proven more effective than using commercially supplied cuttings. The new willow plantings established through this grant provides the SWCD a good nursery from which fresh cuttings can be taken and transplanted as dormant sticks, which will be easier than planing rooted plants.

The SWCD plans to continue to use vegetative methods to control erosion on Blue Creek. Other methods such as willow posting and brush revetments will be used, as well as hard practices such as rock rip-rap.

More than 300 people were shown the techniques used as the stabilization area through classroom and field demonstrations, workshops, and site visits. Those benefitting from these educational efforts included students, other Ohio SWCD personnel, an Ohio congressional representative, and representatives from agencies such as the Ohio EPA, Ohio DNR, U.S. Army Corps of Engineers, and U.S. Department of Agriculture — Natural Resources Conservation Service.

# **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 (PROPOSAL)</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1996 –</b>
<b>PROJECT TYPE:</b>	<b>TECHNICAL ASSISTANCE</b>
<b>STATUS:</b>	<b>OPEN</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 know specific best management practice (BMP) information or where to go to create changes in the existing system.

## **BACKGROUND**

This grant is intended to help 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 during 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 planned for production. These booklets addressed issues such as the NPDES 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 Conservation Site Permit holders. Additionally, the SWCD held a training workshop for engineers and related land use professionals that introduced attendees to the new Ohio urban BMPs handbook. Not only did attendees receive the new handbook, but they had access to eight distributors of BMP products and services. Representatives from the U.S. Army Corps of Engineers, Ohio EPA, U.S. Department of Agriculture — Natural Resource Conservation Service, and Cuyahoga SWCD gave presentations.

## **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 introduced the new Ohio urban BMPs to 140 attendees.

<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</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>OPEN</b>

## **PROBLEM STATEMENT**

One of the most frequent complaints of those working in the erosion and sedimentation control field is that it is like “pulling teeth” to get most developers to apply erosion control measures promptly. For most developers, erosion control is a nuisance, costs money and is therefore 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 and builders may voluntarily implement control measures while 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 the timing of residential lot sales. Residential lots on new developments in Geauga

County were selected at random for the establishment of vegetative cover (grass). The timing of lots sales was 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 (grass). Once seed was established, photographs of both the green and 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 five 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.

## **RESULTS**

The results of this study have been presented to a number of audiences. To date, the project has reached approximately 130 professionals through presentations at regional and international meetings of organizations such as the Ohio Association of Conservation Districts and the International Erosion Control Association. A final project publicity phase is planned for October at a demonstration site. The results of this project will be 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. Project personnel are making progress on tracking lot sales and setting up the questionnaire to be used in the lot valuation study.

# **OHIO**

<b>PROJECT TITLE:</b>	<b>MULTI-DISCIPLINARY ASSISTANCE FOR STREAMBANK STABILIZATION AND HABITAT RESTORATION PROJECTS IN OHIO AREAS OF CONCERN</b>
<b>GRANTEE(S):</b>	<b>OHIO DEPARTMENT OF NATURAL RESOURCES AND OHIO ENVIRONMENTAL PROTECTION AGENCY</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$10,912</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$60,229</b>
<b>PROJECT DURATION:</b>	<b>APRIL 1, 1995 - JUNE 30, 1996</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT**

There is a need in Ohio's Areas of Concern (AOCs) for expertise to target, design, and implement streambank stabilization and habitat restoration projects. Skilled resource people can be found in a variety of government agencies, academic institutions and the private sector. However, it is often difficult to assemble the cross section of skills necessary to plan and design these projects. The project will utilize the Ohio Department of Natural Resources' (DNR) multi-disciplinary Stream Team approach as a basis for building a larger network of cooperators in the region. In addition to the RAP community, other groups interested in water quality improvements through erosion control will benefit from the experience and information exchange resulting from the project.

## **BACKGROUND**

The goal of the Multi-Disciplinary Assistance for Streambank Stabilization and Habitat Restoration in Ohio Areas of Concern project was to strengthen sediment reduction efforts in the Lake Erie basin by establishing a protocol and a regional/state pool of expertise for strategically implementing streambank and habitat restoration projects in Ohio AOCs. The protocol will facilitate the strategic and skilled implementation of Remedial Action Plan (RAP) recommendations for streambank stabilization and habitat restoration. The protocol and expertise pool were developed as demonstration projects designed and installed in three of Ohio's four AOCs. Installation was followed by a workshop for the RAP committees and other Lake Erie basin groups to promote the use of the interdisciplinary process and stabilization techniques.

## **ACTIVITIES**

A core team of three Ohio Environmental Protection Agency (OEPA) staff and seven ODNR staff assembled and drafted a guidance document for stream habitat restoration, which included criteria for setting priorities on stabilization/enhancement projects.

Agreements were reached with four landowners to construct, maintain, and evaluate biotechnical projects and to conduct guided tours at pre-arranged times. The landowners agreed to long term (minimum ten years) maintenance on the projects.

Project teams and volunteers, ranging from 20 to 40 people, from the Cuyahoga, Black, and Maumee RAPs constructed four biotechnical projects at the following sites: restoration of 200 linear feet at Swan Creek Metro Park (Maumee AOC); restoration of 102 linear feet at Tinkers Creek in a Cleveland Electric and Illuminating right-of-way (Cuyahoga AOC); and restoration of 507 linear feet at Indian Hollow Lake Golf Course and Black River Reservation (Black River AOC). The teams involved professionals and volunteers from federal, state, and local agencies, private companies, and non-profit organizations. A total of 809 linear feet of streambank were restored.

The projects will be evaluated annually by the Ohio DNR and Ohio EPA during spring high flow and autumn low flow periods to ensure stability and determine maintenance needs. The landowners will also submit a report annually to the U.S. Army Corps of Engineers (copying ODNR and OEPA) outlining the revetment condition and any maintenance performed.

## RESULTS

The restored sites have been cataloged in a file of biotechnical projects constructed in the state. The file is housed at the Ohio DNR, Division of Water. The information is being used to develop a Stream Management Guide fact sheet that will identify each project's location, elements, and a contact person for site visits.

Two stream management guides were produced and printed, and illustrations for evergreen revetment and fascine construction fact sheets were created.

The equipment purchased to conduct site restorations is available for use on future biotechnical work in the RAP areas and the Lake Erie basin. Two kits of equipment are housed at the Ohio EPA Northeast District Office for primary use by the Cuyahoga, Black and Ashtabula RAP communities. One kit is housed at the Ohio EPA Northwest District Office for primary use with the Maumee RAP, and one kit is housed at the ODNR Division of Water for use by ODNR staff-supported projects, primarily in the Ohio River Basin.

The construction training sessions created a high level of enthusiasm and feeling of accomplishment for the RAP workgroup members. Several of the local newspapers covered the projects, including the *Toledo Blade*, circulation of 332,943; Elyria Ohio's *Chronicle-Telegram*, circulation of 56,746; and two articles in the *Cleveland Plain Dealer*, circulation of 505,616, bringing the message of erosion reduction and habitat restoration to a large audience. Many workgroup members and other participants are now comfortable with the concepts and are planning additional projects. Landowners have approached participants about applying these practices on their land, and the Black and Cuyahoga RAPs are moving toward more comprehensive habitat restoration strategies and landowner partnerships.

Although the demonstrations will result in reduced rates of soil loss at the four remediated sites (809 linear feet in total), the net effect for the watersheds will be minimal. The successes of this project were providing the skills necessary to reproduce the installation of biotechnical practices and producing an understanding of where future efforts can be most beneficial considering the modified hydrology of these watersheds.

# **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 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1996 –</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>OPEN</b>

## **PROBLEM STATEMENT**

In Pennsylvania, sediment basins are required to be large enough to completely capture a 5-year return period runoff event. Poor design, construction, and maintenance practices have led to unacceptably poor sediment retention. There is a need for research to determine appropriate methods for selecting basin size and detention time.

## **BACKGROUND**

Sedimentation basins are currently used for two reasons: to remove the eroded soil mass from the effluent leaving a site and to store that sediment. Experiments in 1992 and 1995 at Penn State University showed that from 90 percent 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 undertaken by 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 de-

signed 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 that meet Pennsylvania Department of Environmental Protection's (DEP) size regulations. The specific objective 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 was tested three times with 85,000 liter, simulated runoff events containing 454 kilograms 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 3.7-11micro-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>STREAM CROSSINGS FOR LOGGING OPERATIONS: A VIDEO</b>
<b>GRANTEE:</b>	<b>THE PENNSYLVANIA STATE UNIVERSITY</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$10,000</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$7,190</b>
<b>PROJECT DURATION:</b>	<b>APRIL 1, 1995 - NOVEMBER 26, 1996</b>
<b>PROJECT TYPE:</b>	<b>INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT**

Erosion and sedimentation problems associated with stream crossings in forestry practices have been relatively high. While there has been some work on forest practice effects on water quality, research focusing on the sediment delivered by stream crossings for haul roads and skids trails has, until recently, been very sparse.

## **BACKGROUND**

Erosion and sedimentation have been identified as major sources of water quality degradation in the Great Lakes basin. Increased sediment delivery from streams entering the Great Lakes can carry excessive nutrients and toxic chemicals that can cause aesthetic, biological, physical, and chemical degradation of the Great Lakes ecosystem. The increased focus on nonpoint sources of pollution has heightened interest in the identification and control of sources of sediment from all land use activities. In Pennsylvania and throughout the Great Lakes basin, commercially valuable forests are prevalent and forest harvesting activities are common. In order to gain access to many logging sites, haul roads and skid trail networks must often be located across headwater streams and associated riparian wetlands. The common methods for crossing headwater streams include culverts with various types of fill, permanent or portable bridges and fords. Unfortunately, stream crossings, road construction, and related disturbances often result in high erosion rates especially when best management practices are not followed.

This project describes and promotes proper methods for crossing small headwater streams during logging operations to reduce erosion and impacts from sedimentation. A video presenting recently completed research at the Pennsylvania State University was prepared to increase awareness of the erosion and sedimentation problems within the Great Lakes basin by demonstrating to forestry professionals the relationship between logging practices and water quality. The video analyzes the results from several recent studies and synthesizes the information so landowners, government officials, and foresters may use it to help reduce erosion and sedimentation caused by logging activities. The video is being used as a vehicle to strengthen coalitions, coordinate efforts, and facilitate information transfer between federal, regional, state, and local conservation groups.

## **ACTIVITIES**

An 18 minute video titled *Stream Crossings During Forest Harvesting Activities in the Great Lakes Basin* was produced to educate forestry professionals, landowners, and the general public on proper methods of crossing streams during forest harvesting activities to minimize erosion and sedimentation.

## **RESULTS**

Copies of the video have been distributed to the Cooperative Extension Water Quality Coordinator and Natural Resources Department in each of the eight Great Lakes states. An additional 60 copies of this video have been distributed to forestry professionals, Cooperative Extension offices, and state forestry departments throughout the Great Lakes region.

# **WISCONSIN**

<b>PROJECT TITLE:</b>	<b>CLEAN BAY BACKER EROSION AWARENESS PROJECT</b>
<b>GRANTEE:</b>	<b>WISCONSIN DEPARTMENT OF NATURAL RESOURCES</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$19,800</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$19,700</b>
<b>PROJECT DURATION:</b>	<b>APRIL 1, 1995 - APRIL 15, 1997</b>
<b>PROJECT TYPE:</b>	<b>INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT**

The Lower Fox River and Green Bay, identified as an Area of Concern (AOC) by the International Joint Commission under the Great Lakes Water Quality Agreement, is plagued by both conventional and toxic pollution problems. The primary causes of most of the AOC's 11 impaired uses are nonpoint sources of phosphorus and suspended solids delivered to the Fox River and lower Green Bay. Progress in improving water clarity and restoring the quality of the Fox-Wolf Basin depends upon an informed and educated public to promote actions that reduce the flow of nutrients and suspended solids.

## **BACKGROUND**

The "Clean Bay Backers" made their debut in May of 1994 with the kickoff of a year-long polluted runoff awareness campaign that utilized radio, television and billboard advertising to promote the *How to Be a Clean Bay Backer* booklet. This booklet was prepared with Great Lakes Basin Program assistance from an earlier grant. The goals of this phase of the project were to inform citizens throughout the Fox-Wolf Basin about the nonpoint source pollution issues and problems; to motivate citizens to take individual actions to report, reduce, and prevent nonpoint source pollution; to help the public make informed decisions about water resources and freshwater coastal management; and to promote the benefits of restoring water quality in the Fox-Wolf Basin.

## **ACTIVITIES**

Clean Bay Backers continued to distribute the booklet, *How to be a Clean Bay Backer* produced under the earlier grant. Through successful television, radio, and billboard advertisements the Wisconsin Department of Natural Resources was able to exceed their goal of raising awareness of the Clean Bay Backers and the causes of polluted runoff, as well as awareness of reduction steps that individuals can take.

The toll-free phone number established under the previous year's grant award was maintained. A database was established that listed the name and address of the caller, the nature and location of the erosion problem, and how he or she heard about the hotline.

Radio advertisement copy for the summer and fall schedules was developed and approved by the Remedial Action Plan (RAP)-Public Education and Participation Committee. These advertisements,

including in-kind spots donated by WIXX radio, reached approximately 120,600 (18 and older age group) people in the total Green Bay survey area on a monthly basis. A 30-second television commercial featuring Billy Beaver was aired during evening newscasts and during Green Bay Packer pre-season football games. The commercial asked callers to dial the toll-free number to report erosion problems.

The billboard campaign placed one billboard in a different location in the Green Bay area every month for six months. The design displayed Billy Beaver fixing a fallen-down silt fence at a river bank and bore the message:

*Be a Clean Bay Backer, Report Erosion Problems, call 800-470-4420*

## **RESULTS**

Demand for the *How to be a Clean Bay Backer* booklet exceeded the previous year with over 15,000 copies being distributed. The booklets are now being revised and reprinted in 1998 with the assistance of local business donations. In all, 30,000 copies have been distributed to schools, civic groups, and the general public.

Approximately 216 people from throughout the watershed utilized this service while many more people called simply to request water quality information. An analysis of the database revealed radio and television to be the most effective media outlets. Television spots reached approximately 120,600 adults aged 18 and older monthly. According to the billboard company used (Orde Advertising), approximately 85 percent of the adults in the Green Bay metropolitan area saw the Clean Bay Backer billboard 14 times per month during the campaign.

The success of this grant has precipitated several other educational efforts such as the production of a children's video about polluted runoff and the Clean Bay Backers, the design for a portable RAP/Clean Bay Backers display, incorporation of Clean Bay Backer materials into the Green Bay Metropolitan Sewerage District Environmental Education Center, and the production of 6,000 *I'm a Clean Bay Backer* buttons.

# **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 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>SEPTEMBER 1, 1996 –</b>
<b>PROJECT TYPE:</b>	<b>INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>OPEN</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 Wisconsin 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 Wisconsin Bay-Lake region contains approximately 450 miles of shoreline, encompasses three designated Areas of Concern (Marinette, Green Bay, and Sheboygan), and includes 185 units of local government. A majority of these governmental units 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 are 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 cost of maintenance dredging of the more than 70 marinas and harbor facilities in the Bay-Lake region, and the impact of these costs 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 applied 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 that had been issued within the study area by the Wisconsin Department of Natural Resources and the U.S. Army Corps of Engineers. The inventory was used to create a database containing information on dredging material and dredging costs. The material component of the database included 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 relevant to the cost of upland streambank protection and policy and planning development, both general in scope and specific to the watersheds located within the Bay-Lake region, was compiled and analyzed. 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, the Manitowoc and Kewaunee harbors was determined and analyzed through utilization of past planning documents.

## **RESULTS**

The Bay-Lake Regional Planning Commission completed *An Inventory & Assessment of Dredging in the Bay-Lake Region*, which was distributed to the Technical Review Committee of the Bay-Lake Regional Harbor Council. The information will also be disseminated through newsletter articles and reports to appropriate regional commissions and committees.

# **WISCONSIN**

<b>PROJECT TITLE:</b>	<b>PORTABLE BRIDGE PROJECT FOR TEMPORARY WATER CROSSINGS IN THE LAKE SUPERIOR WATERSHED</b>
<b>GRANTEE:</b>	<b>BAYFIELD COUNTY FORESTRY DEPARTMENT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$4,897</b>
<b>NON-FEDERAL FUNDS:</b>	<b>\$1,809</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1996 - JUNE 17, 1997</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT**

The soils in approximately one third of Bayfield County are characterized as highly erodible calcareous red clay. Nearly all of those soils are located in the Lake Superior watershed, along with a range of soils from deep glacial outwash composed of sands to silt loams. Timber harvesting, a major part of the county's economy, has a significant impact on these soils. Poor forestry practices, including poor forest road construction and poorly designed or inadequate stream crossings, are a major source of silt eroding into area streams.

## **BACKGROUND**

Slightly less than 800 square miles of Bayfield County drains into Lake Superior, with forested lands making up the majority of that land area. Timber harvesting is a major part of the county's economy. Currently, there are 159.7 miles of Outstanding Resource Waters (ORW), 91.6 miles of Exceptional Resource Waters (ERW), and 181 miles of other perennial streams in the county. Logging practices often impact these water resources, and poor practices have historically been a significant contributor to nonpoint source pollution problems and water quality degradation in the Lake Superior basin.

The goal of this project was to demonstrate the feasibility of using portable timber bridges for temporary stream crossings for timber harvesting equipment in order to reduce nonpoint source pollution in the Lake Superior watershed. Portable bridges have not been widely used in the region, therefore this is an opportunity to provide information about the cost and sources of portable bridges as well as to encourage their use. The advantages of this type of crossing is that it requires no in-stream construction or fill material placed in the channel, has a low potential for introduction of sediment into the waterways, does not restrict fish movement, and offers minimal resistance to flood waters. Portable bridges may also assist logging contractors or other forest users that require temporary water crossings to access woodlands in an efficient, cost-effective, and less damaging manner. This project should effectively demonstrate these benefits.

## **ACTIVITIES**

The bridge was designed, ordered, and delivered. Project personnel applied for and received a navigable stream crossing permit. The bridge was then moved to a site, but could not be installed

due to poor weather and road conditions. Another site was then selected and the bridge was installed. Demonstration materials and related information were gathered and prepared, and notices about the first demonstration day were sent to forestry staffs and other interested parties. The first demonstration day was held and information was disseminated to a large number of people in the forestry industry about the costs and benefits of temporary stream crossings.

After the first demonstration, a draft contract outlining bridge use by other organizations was produced and approved by the Bayfield County Corporation Council. The bridge was then made available for mechanical operations with stream crossings within the Lake Superior watershed. A suitable project with permits from the Department of Natural Resources was approved and the bridge was installed across a Class 1 trout stream. Once installed, the bridge was available for other agency personnel and loggers to view. When harvesting operations across the stream were completed, analysis of the bridge was conducted which concluded that it reduced the amount of nonpoint source pollution entering the stream. Customized designs for different types of harvesting operations and equipment have been developed.

## **RESULTS**

Overall, the project has been quite successful, and has stimulated considerable interest and discussion in the region about the use of portable bridges for temporary stream crossings.

# **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 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1996 –</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>OPEN</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 that limit the abundance and diversity of aquatic communities.

## **BACKGROUND**

The primary goal of this project is to reduce soil erosion and sediment delivery from targeted high sediment delivery agricultural fields located in the Stony Creek watershed. A related goal is 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 is 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.

Because of the high costs involved with establishing a quality alfalfa field, the Door County Land Conservation Committee approved an additional \$5,000 from county funds to compliment the

program's goals. Seven farmers signed cost-share applications for 12 fields totaling 216.9 acres at an estimated total landowner cost of \$32,024.76, with a related grant encumbrance of \$18,715.27. All twelve fields had a sediment delivery rate of at least 0.35 tons per acre per year. The worst field inventoried had a sediment delivery of 5.07 tons per acre per 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 an 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 versus 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.

## **PROGRAM YEAR 1998 APPROVED PROJECTS**

The Soil Erosion and Sedimentation Task Force met on March 18, 1997 in Ann Arbor, Michigan to review, discuss and evaluate project proposals submitted for funding under the Great Lakes Basin Program for Erosion and Sediment Control. Approximately \$250,00 was available under the cooperative agreement with the U.S. Department of Agriculture – Natural Resources Conservation Service. The following 20 projects were selected to receive funding totaling \$250,630:

### **INDIANA**

**Cedar Creek Streambank Stabilization Demonstration Project** -- The Dekalb Soil & Water Conservation District will receive \$10,600 for a one-year project to showcase bioengineering streambank stabilization techniques at highly visible points along Cedar Creek. The goal of this project is to decrease sediment loading in Cedar Creek, St. Joseph River, and Maumee River and to provide additional fish habitat. Contact: Randy Jones, Dekalb SWCD, 942 West 15<sup>th</sup> Street, Auburn, Indiana 46706, (219) 925-1417.

### **MICHIGAN**

**Great Lakes Better Backroads Education Program** -- The Huron Pines Resource Conservation and Development Area Council, Inc., will receive \$15,000 for a 16-month project to provide organizations in northern Michigan responsible for the maintenance of roads with an educational workshop, accompanied by a comprehensive manual describing best management practices for road/stream crossings. Contact: Brian Benjamin, Huron Pines Resource Conservation and Development Area Council, Inc., 501 Norway Street, Grayling, Michigan 49738, (517) 348-9319.

**Rapid River Road Restoration Project** -- The Kalkaska Conservation District will receive \$15,000 for a one-year project to work with the Kalkaska County Road Commission to implement a portion of the Elk River Chain of Lakes Watershed Management Plan that focuses on improving priority road/stream crossings to prevent erosion and sedimentation. Once improvements have been made, the sites will be used as part of an educational campaign. Contact: Ursula Gilmour, Kalkaska Conservation District, 605 North Birch Street, Kalkaska, Michigan 49646, (616) 258-3307.

**Riparian Homeowner's Stewardship Project** -- The Mid-Michigan Environmental Action Council will receive \$9,500 for a one-year project to foster short and long-term improvements in water quality by teaching sound stewardship techniques to homeowners along the Red Cedar River. The focus of this effort will be to reduce sediment pollution from four major Homeowner Association properties through education and soil erosion stabilization projects. Contact: Alice Austin, Mid-MEAC, P.O. Box 27555, Lansing, Michigan 48909-7555, (517) 337-2237.

**Vegetative Barriers to Prevent Soil Erosion and Increase Biological Pest Control in Agricultural Landscapes** -- The Department of Entomology at Michigan State University will receive \$14,860 for a one-year project that will demonstrate how vegetative barriers can increase biological control of insects and weed pests in agricultural cropland and help reduce the need for pesticides, thereby reducing nonpoint pollution. Contact: Douglas Landis, MSU Department of Entomology, 243 Natural Science Building, East Lansing, Michigan 48824, (517) 353-1829.

**York Creek/Alpine-Walker Drain Streambank Stabilization Project** -- The Grand Valley State University Water Resources Institute will receive \$4,482 for a nine month project that will work toward the stabilization of eroded streambanks in the Alpine-Walker Drain and the reduction of

sediment inputs that are impairing a designated cold water fishery. Contact: Ed Frye, GVSU Water Resources Institute, 118 Padnos Hall, Allendale, Michigan 49401, (616) 895-3722.

## MINNESOTA

**Lake Superior Low Cost Shoreline Erosion Control Demonstration Projects --** The Minnesota Board of Water and Soil Resources will receive \$13,500 for a one-year project to work with local government units and private property owners to design, implement, and provide construction oversight for several low cost shoreline erosion control demonstration projects along the Minnesota Lake Superior shoreline. Contact: Gene Clark, Minnesota Board of Water and Soil Resources, 394 South Lake Avenue, Duluth, Minnesota 55802, (218) 723-4752.

**Lake Superior Shoreline Vegetation Demonstration Project For Erosion Control and Bluff Stability--** The Minnesota Board of Water and Soil Resources will receive \$14,700 for a one-year project for the preparation of a Lake Superior Shoreline Vegetation Selection fact sheet and shoreline vegetation demonstration projects to be planted at several locations along the North Shore of Lake Superior. Contact: Gene Clark, Minnesota Board of Water and Soil Resources, 394 South Lake Avenue, Duluth, Minnesota 55802, (218) 723-4752.

**Watershed Guardian Program --** The St. Louis River Citizen Action Committee will receive \$10,000 for a one-year project to carry out stream restoration demonstration projects and cultivate public awareness of the role stormwater plays in water quality. The stream side revegetation will help reduce peak stream flows by desynchronizing spring snow melt and increasing on-land retention time for stormwater. The project will also create an Internet site, establish a two-year pilot volunteer water quality monitoring program, and carry out an area-wide storm drain stenciling initiative. Contact: Brian Fredrickson, St. Louis River Citizens Action Committee c/o Minnesota Pollution Control Agency, P.O. Box 57, Duluth, Minnesota 55801-0057, (218) 723-4663.

## NEW YORK

**Oswego River Erosion Control Project --** Oswego County Planning and Community Development will receive \$13,058 for a one-year project that will work to reduce streambank erosion, sedimentation, habitat disruption, and the declining natural character of riparian areas along a 24-mile stretch of the Oswego River. This will be done through assessing current conditions, making recommendations for both preventative and remedial efforts, and conducting a multiple audience educational outreach effort. Contact: Karen Noyes, Oswego County Planning and Community Development, Oswego County Office Building, 46 East Bridge Street, Oswego, New York 13126, (315) 349-8292.

**Road Ditch Stabilization Demonstrations for Town Highway Superintendents --** The Yates County Soil and Water Conservation District will receive \$15,000 for a one-year project designed to reduce the impact of sediment on lakeshore property owners and aquatic habitat. The project will stabilize severely eroding road ditches and work to educate highway superintendents about stabilization techniques, the economic benefits of stabilization, and the impacts of nonpoint source pollutants on water quality. Contact: Lester Travis, Yates County SWCD, 110 Court Street, Penn Yan, New York 14527, (315) 536-5188.

**Seneca County Grazing Land Initiative** -- The Sullivan Trail Resource Conservation & Development Council will receive \$15,000 for a one-year project that will identify three demonstration farms where Intensive Rotational Grazing (IRG) systems will be established as a means of controlling soil erosion, reducing chemical dependency, reducing livestock waste, and enhancing biodiversity and ecological balance on these farms. Contact: Richard Winnett, Sullivan Trail RC&D Council, 3 Pulteney Square East, Bath, New York 14810, (607) 776-9631 ext. 2603.

**Yates County Model Site Plan Review** -- The Yates County Planning Department will receive \$7,000 for a one-year project to develop a model code for local Site Plan Review to be adopted by educated local governments, thereby employing the "home-rule" authority of New York state localities and address concerns about degraded water quality from nonpoint source pollution related to new development. The model ordinance will be based on geographic area as opposed to the standard New York state model based on land use and will address stormwater management, erosion and sedimentation control for all forms of rural development. Contact: Richard Brown, Yates County Planning Department, 110 Court Street, Penn Yan, New York 14527, (315) 536-5153.

## OHIO

**An Rx for Lake Erie Streams** -- The Izaak Walton League of America, Ohio Division, will receive \$15,000 for a one-year project that will train volunteers and agency staff in the Lake Erie basin to teach stream monitoring for nonpoint source pollutants, encourage greater use of urban stream protection practices, and promote citizen action to initiate watershed protection projects. Contact: Raymond Zehler, The Izaak Walton League of America, Ohio Division, 900 Norman Road, Hamilton, Ohio 45013, (513) 868-3179.

**Cost Shares for Urban Streambanks** -- The Lake County Soil and Water Conservation District has received \$10,160 for a 16-month project that will allow the District to pilot a program offering urban riparian landowners technical assistance and small financial incentives for stewarding their streambanks. Contact: Duane Binkley, Lake County SWCD, 125 East Erie Street, Painesville, Ohio 44077, (216) 350-2730.

**Cost Study of Stormwater Erosion Control Best Management Practices** -- Seventh Generation has received \$13,750 for a one-year project to encourage the use of best management practices (BMPs) for erosion and sedimentation control at residential and commercial/industrial construction sites, determine the actual cost of using BMPs and compare that with the potential cost to the developer/builder of the failure to meet regulatory requirements. Contact: George Espy, Seventh Generation, 25 Lake Avenue, Elyria, Ohio 44035, (216) 322-4187.

**Strip-Till Equipment Lease Program: Reducing Soil and Nutrient Runoff** -- The Toledo Metropolitan Area Council of Governments will receive \$15,000 to lease strip-tilling equipment for the Wood Soil and Water Conservation District to promote the concept of strip-tilling to farmers in northwest Ohio. This one-year project will gain recognition for new equipment and procedures to enhance yields that allow for residue to be left on the field to control sediment and nutrient transport. Contact: Jenny Carter, Toledo Metropolitan Area Council of Governments, P.O. Box 9508, Toledo, Ohio 43697-9508, (419) 241-9155 ext. 125.

## PENNSYLVANIA

**Demonstrating the Effectiveness of Skimmers to Control Dewatering of Sedimentation Basins** -- The Pennsylvania State University Department of Agricultural and Biological Engineering will receive \$10,000 for a 16-month project designed to encourage the adoption of the skimmer principal spillway technology in sedimentation basin designed by erosion control engineers, regulators, conservation district personnel, and developers. The skimmer principal spillway was chosen as

the target technology based on previous sedimentation basin research at Penn State University. This project will install skimmers in six sedimentation basins across the state that will serve as demonstration sites. Contacts: A. J. Jarrett or Robert Killoren, 209 Agricultural Engineering Building, University Park, Pennsylvania 16802, (814) 865-5661.

**Grazing/Water Supply Erosion Control Demonstration** -- The Penn Soil RC&D will receive \$15,000 for a one-year project to install alternate energy sources for grazing water supply. Program funds will be used to employ a technician that will be responsible for project implementation and to purchase the necessary solar panels, pumps and material for a solar watering system. The watering system will be set up as a demonstration site at a selected location within the Lake Erie basin. Contact: Harvey Pinkerton, Penn Soil RC&D, R.R. 3, Box 261, Clarion, Pennsylvania 16214-8702, (814) 226-6118.

## **WISCONSIN**

**Construction Site Erosion Control Demonstration for Roads** -- The Ashland, Bayfield, Douglas and Iron County Land Conservation Department (ABDI-LCD) will receive \$14,020 for a 17-month project to demonstrate cost-effective erosion control alternatives for roadway stabilization in the Wisconsin Lake Superior coastal counties. These demonstrations will be used as educational tools to promote the use of erosion control measures designed to reduce nonpoint source pollution, specifically erosion and sedimentation, to the Lake Superior basin. Contact: Sandra Schultz, ABDI-LCD, 2012 West 3<sup>rd</sup> Street, P.O. Box 26, Ashland, Wisconsin 54806-0267, (715) 682-7187.

## **CONCLUSIONS**

Over the past seven years, the Great Lakes Basin Program has provided the resources to gather technical information to help evaluate soil erosion and sediment problems, to demonstrate various best management practices (BMPs) to control soil erosion and sedimentation, and to educate the public on the impacts and solutions for controlling soil erosion. Ninety-nine grants have been awarded to more than 54 organizations totaling \$3.69 million. All eight Great Lakes states have received Great Lakes Basin Program dollars and are involved in some form of soil erosion prevention and control.

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 79 projects awarded between 1991 and 1996. The 20 projects awarded in this program year have not been included in the results measurements since they have just commenced.

The total savings resulting from the various control measures put in place as a result of the 79 grants awarded amounts to more than 440,000 tons of soil, and more than 500 tons of phosphorus and nitrogen. 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; the savings listed above have been calculated only for the duration of the project period. In addition, the saving results are representative of Great Lakes Basin Program sites only and excludes 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 communications, site visits, and aerial assessments, for future soil erosion and sediment control projects. Although no soil savings can be attributed 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 sediment control. 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. Communities are beginning to see the benefits of these practices as the natural gravel bottoms of streams are once again becoming exposed, allowing the fish and aquatic insects to return. Excess aquatic plant growth is decreasing with the reduction in nutrients, and overall water quality is improving.

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. Hundreds of thousands of 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 sedimentation. Target audiences under this program are landowners, farmers, zoning officials, planning officials, students, teachers, developers and contractors, and agribusinesses. Over the past project year, education and information programs were particularly strong. More than 20,000 people were reached directly with soil erosion and sediment control information. Additionally, public information spots and stories in the print, radio and TV news media reached tens of thousands more.

The numerous local/state contributions to the individual projects is an indication of the program's success. The Basin Program is acting as a springboard for others to become involved and share their expertise. Over the seven-year life of the program, an additional \$1.75 million (32 percent of total project costs) have been contributed from state and local sources. This is \$827,500 more than the minimum nonfederal match required under the program.

Other benefits not as easily quantified, but just as important, include increased community awareness and demonstrations of successful control practices, such as the use of zone-tillage, mulch and seed at construction sites, and various bank stabilization techniques. State economies have also been impacted through an influx of resources, the formation of spin-off businesses, and the development of successful partnerships.