
MINING IDEAS 2

A Report on 106 Great Lakes Ecological Protection and Restoration Projects

U.S. Environmental Protection Agency
Great Lakes National Program Office (GLNPO)

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TABLE OF CONTENTS

page #	
iii	Executive Summary
1	I. Introduction and Background
4	II. Background Statistics
10	III. Analysis: Environmental Science and Management
10	A. Ecological Protection
11	B. Ecological Restoration
11	C. Planning, Coordination, Collaboration
12	D. Inventory, Assessment, Classification
12	E. Scientific Study
12	F. Monitoring, Indicators
14	IV. Analysis: Public Stewardship Results
14	A. Outreach, Information Exchange
14	B. Education
14	C. Partnership Building
15	D. Volunteers
16	V. Analysis: Ecosystem Theme
16	A. Agriculture, Non-point Source Pollution, Erosion Control
16	B. Alvars
17	C. Fish and Wildlife/ Biodiversity/ Rare or Threatened Species
17	D. Forests
18	E. Grasslands
18	F. Human-dominated Urban Landscapes
19	G. Invasive Species
19	H. Islands
20	I. Native Landscaping
20	J. Oak Savanna
21	K. Rivers and Streams
21	L. Sand Beaches and Dunes
22	M. Tribal Lands
22	N. Wetlands
24	VI. Analysis: Economic Impacts
25	VII. Program Evaluation
27	VIII. Conclusions

List of Appendices

- Appendix A: Project Summaries (narrative summary, project results, and project statistics) in Alphabetical Order by Project Title
- Appendix B: Project Accomplishments in Detail
- Appendix C: Partner List



List of Maps and Tables

page #	
v.	Great Lakes Biodiversity Investment Areas (M. Makdisi)
4	Map 1: Location of 91 Local Ecological Protection and Restoration Projects Funded by GLNPO
4	Map 2: Location of 9 Bioregional Ecological Protection and Restoration Projects Funded by GLNPO
5	Table 1: List of Basinwide and Statewide Ecological Protection and Restoration Projects Funded by GLNPO (FY 1992-mid 2001)
5	Table 2: Number of Projects and Total Dollar Amounts for GLNPO Ecological Protection and Restoration Projects by Year (FY 1992-mid 2001)
6	Table 3: Ecological Protection and Restoration Dollars and Number of Projects by Agencies and Organizations (FY 1992-mid 2001)
6	Table 4: Dollars Leveraged in Addition to GLNPO Dollars for Ecological Protection and Restoration Projects (FY 1992-mid 2001)
7	Table 5: Ecological Protection and Restoration Dollars and Number of Projects by Lake Basin (FY 1992-mid 2001)
8	Table 6: Ecological Protection and Restoration Dollars and Number of Projects by State (FY 1992-mid 2001)
9	Table 7: Acres Impacted by GLNPO-Funded Ecological Protection and Restoration Projects (FY 1992-mid 2001)

List of Photographs

page #	
cover	Volunteers constructing an educational kiosk at Chaumont Barrens, New York (S. Bonanno)
iii	Miller Woods, Indiana (K. Rodriguez)
II	Installing Water Control Structures, Charlemont, Ohio (Labore)
12	Studying Endangered Mussels, Fish Creek, Indiana (K. Rodriguez)
15	Studying the Grand Calumet River by Canoe, Indiana (K. Rodriguez)
16	Chaumont Barrens Alvar, New York (K. Rodriguez)
17	Federally Endangered Pitcher's Thistle, Indiana Dunes National Lakeshore (K. Rodriguez)
18	Bird Watching at the Calumet Wetlands, Illinois (K. Rodriguez)
20	Walpole Island Savanna, Ontario (K. Rodriguez)
21	Grand Sable Dunes, Michigan (S. Crispin)
22	Kakagon Sloughs, Wisconsin (K. Rodriguez)



Executive Summary

Between 1992 and 2001, more than \$17 million was awarded and leveraged for 106 projects to protect, restore, inventory, assess, classify, monitor, and study more than 17 million acres of the Great Lakes basin. The U.S. Environmental Protection Agency's Great Lakes National Program Office (GLNPO) Ecological Protection and Restoration Program awarded assistance agreements for the projects, which were supported by 650 federal, state, local, tribal and non-governmental and academic partners. This report is an analysis of the 106 final project reports. The objectives of the analysis were to determine whether GLNPO financial assistance benefitted the environment, encouraged natural resource stewardship, and contributed to local economies, and to target future funding.

The findings of the analysis are that for about a dollar an acre:

- More than 6,400 Great Lakes basin acres were protected from a variety of threats.
- The process of restoring more than 7,300 Great Lakes basin acres was begun.
- Scientists and natural resource managers collaborated to formulate plans and strategies, build partnerships, and exchange information and technologies.
- The public was included in partnerships to plan and implement protection and restoration projects.
- More than 900 people were motivated to volunteer more than 3,800 hours to protect and restore Great Lakes ecosystems.
- Thirty-one full time, 17 part time, and 14 interns and seasonal employees were retained for jobs created to carry out the projects. In all, \$933,118 was spent to retain project personnel and \$2,649,924 in project dollars was awarded to private sector contractors.
- Many inventory, assessment, and classification gaps were filled basinwide, regionally and locally.
- Knowledge of Great Lakes ecosystems was broadened through scientific study.
- Great Lakes ecosystems were monitored and contributions were made to the development of Great Lakes indicators.
- Using a variety of media, the public was informed about Great Lakes ecological protection and restoration activities.
- Educational tools were utilized to increase the understanding of more than 1,250 school children and many adults about ecological protection and restoration activities in the Great Lakes ecosystem.



One conclusion of this analysis is that a small amount of money can act as seed money, that is, jump start or catalyze a project or even draw in other funds to support a good project. Another conclusion is that protection and restoration activities are good for local economies, first, because dollars are spent on jobs, and second, because protecting natural resources can actually boost the attractiveness of an area. A third conclusion is that we seem to have made a dent in understanding the Great Lakes ecosystem. To be sure, much is yet to be studied and learned; however, the progress made in our understanding should increase our abilities to make good land and water use decisions. Fourth, people are interested in protecting and restoring their environment to the extent that they will spend their free time to support project activities. One final conclusion is that GLNPO funding of ecological protection and restoration projects is money well spent. Large scale improvements to ecosystems have been documented as a direct result of project dollars.

The 106 projects were targeted by GLNPO for funding as part of a program to improve the health of the Great Lakes ecosystem. GLNPO's Ecological Protection and Restoration Program yearly formulates funding criteria based on knowledge of issues and problems gathered from various partners. A competitive proposal review results in targeting projects for funding that show the most promise of protecting and restoring the Great Lakes ecosystems. The funding program has evolved over the years from one that awards assistance agreements to a scattering of unrelated projects, to a thoughtful construction of funding goals and a yearly deliberate targeting of funds for work necessary to improve the health of the ecosystem.

Results from the 106 projects, along with several other important paradigm-shifting activities, will inform GLNPO's funding criteria for ecological protection and restoration projects over the next years. The State of the Great Lakes Ecosystem Conferences (SOLEC) have focused binational efforts on developing indicators to assess ecosystem status, stressors, and human responses to these stressors. If indicator-informed reports show an area where GLNPO funding can protect areas from stress or restore degraded areas, funding criteria will be shifted accordingly.

SOLEC also introduced the concept of Biodiversity Investment Areas into the Great Lakes vernacular. Biodiversity Investment Areas are natural areas having high ecological value which warrant exceptional attention to protect them from degradation. Our roles in protecting these areas, with other partners, are to work within each area to identify ecological protection and restoration opportunities, to provide programmatic and financial resources to implement protection and restoration activities, and to continue to track the ecological status of each area so that management priorities adapt to changes in the landscape as a result of protection and restoration activities.

Finally, on a lakewide basis, Lakewide Management Plans (LaMP) have highlighted areas of ecologically important habitats regionally, and locally, Remedial Action Plans (RAP) have identified areas in need of protection and restoration. Working with LaMP and RAP partners, GLNPO has been attentive to ecosystem needs on a lake-by-lake basis.

The GLNPO Ecological Protection and Restoration Program has been successful in funding projects that have begun the process of protecting and restoring ecosystems, forming partnerships, and informing the public about the ecological treasures of the Great Lakes. Continued support is necessary to continue to impact Great Lakes ecosystem health.

Great Lakes Biodiversity Investment Areas



1. Superior North
2. Lake Superior Highlands
3. Great Chequamegon Region
4. Keweenaw Peninsula
5. Grand Sable Dunes
6. Batchawana Bay - Whitefish Bay
7. Eastern Lake Superior
8. St. Mary's River
9. Lake Huron North Central
10. Mackinac - Lake Michigan North Shore
11. Michigan Islands
12. Mackinac - Manitoulin
13. Green Bay Western Shore
14. Door County Peninsula
15. Chicago Wilderness
16. Saginaw Bay
17. Misery Bay
18. Lake St. Clair/Detroit River
19. Western Lake Erie
20. Presque Isle
21. Long Point
22. Kettle Point - Grand Bend
23. Bruce Peninsula
24. Eastern Georgian Bay
25. Eastern Lake Ontario
26. St. Lawrence River Corridor

Created By: Michael Makdisi



I. Introduction and Background

The purpose of this analysis is to report on GLNPO-funded ecological protection and restoration project environmental, public stewardship and economic results. The analysis will assist in GLNPO program evaluation and guide future funding.

In 1996, GLNPO published *Mining Ideas*, a report detailing the interim progress of 87 ecological protection and restoration projects. By funding projects throughout the basin, GLNPO intended to increase the quality and extent of native ecosystems of the Great Lakes basin, foster a greater understanding of ecosystem processes and functions, increase participation by partners in on-the-ground protection and restoration activities, and increase public awareness of the special and valuable nature of Great Lakes systems, communities and species. The report concluded that the projects were beginning to yield the following results:

- Our knowledge about what ecological communities and species exist and the processes and functions being impacted by project activities was increasing.
- Project activities were positively impacting vast acreages.
- New protection and restoration tools were being invented and knowledge was being accumulated and passed on to others.
- Great Lakes ecosystem gaps in scientific knowledge were being tabulated.
- An understanding of the importance of partnerships to implement project activities was increasing.
- GLNPO grant and leveraged dollars were beginning to have an impact, directly and indirectly, on local economies.
- Communities formerly unaware of the natural resources surrounding them were actively participating in protection and restoration projects.

Mining Ideas also firmly established GLNPO's role in ecological protection and restoration as one of a catalyst to facilitate action through provision funding for studies and demonstration activities. The benefits to continuing

to fund good ecological protection and restoration projects were cited and included the following: funding positive actions delays or stops ecosystem damage while building the ecological knowledge necessary to encourage good land management decisions; opens doors for leaders to protect and restore local natural resources; gives creative ideas a chance, while supporting well-established techniques in appropriate places; provides seed money to begin projects that communities consider important; and helps build networks for sharing ideas.

This report, *Mining Ideas 2*, is a followup to the ideas and expectations expressed in the 1996 report. It was prompted by the desire to document changes in the Great Lakes environment resulting from GLNPO funding and to better target opportunities for future funding. In other words, how have GLNPO dollars protected the environment, encouraged stewardship of natural resources, and contributed positively to local economies? On what projects should GLNPO spend dollars in the future? Complicating the funding challenge is the reminder that many good proposals submitted to GLNPO go unfunded each year. In FY 2001, for example, more than 50 ecological protection and restoration proposals were received requesting more than \$3.5 million. Only six assistance agreements, totaling \$450,000, were awarded.

The report is also a response to a national effort to measure the success of federal programs. Assistance programs are particularly difficult to measure, in part because funding is generally awarded as assistance agreements through a competitive process. Success or environmental benefit, therefore, is as much a result of how well the program specified criteria in the funding guidance and awarded the projects as it is good work by the principal investigators.

To understand whether GLNPO dollars had a positive impact, final project reports were scrutinized for environmental, public stewardship, and economic results. Environmental Careers Organization intern Michael Makdisi began research into final ecological protection and restoration project reports in March 2001. He was curious about how a small office within a large



federal agency could have an impact in a region such as the Great Lakes basin. He suspected the final project reports would indicate a breadth of project types that were a response to needs and gaps that in some way helped to improve the native habitats of the basin, as well as demonstrate that a wide network of scientists and managers with a variety of roles and goals can lead to similar environmental results.

Mike's research led him through file cabinets, cubicles, the federal records center, and the Internet to a remarkable collection of 106 final project reports, each a story of environmental progress being made in the Great Lakes. For each final project report, Mike collected a project narrative, results, and statistics, which are summarized in Appendix A. These summaries reflect the words of principal project investigators. Summaries were sent to the GLNPO project officers and to principal investigators for review and approval. Then, GLNPO staff extracted project results from the summaries and analyzed them within several categories: environmental science and management, public stewardship, and ecosystem theme. Detailed results are found in Appendix B. In addition, the reports were scrutinized for evidence of direct and indirect economic impacts to communities.

The effort to summarize final project reports and the analysis was difficult for several reasons. First, the nature of GLNPO assistance is that it is intended for the principal benefit of the recipient; thus, as reflected in the final reports, it is the recipient and not the federal government which has the greatest interest in the project. Second, many principal investigators and GLNPO project officers have moved on, so reviews of project results may have been left to those who are less familiar with project particulars. Third, in order to conserve storage space, only the title page and the first several pages of final reports are kept in the permanent EPA file. Full final reports are kept at locations known only to GLNPO project officers and the organizations producing them. Fourth, although requirements for final reporting have changed over the years, assistance agreement results reporting for small grants (under \$100,000) is minimal. For example, there is no requirement to report to the community on the economic impact of the project.

Thus, an analysis of the economic impacts of GLNPO-funded projects is necessarily incomplete. Fifth, analyzing the work of eight years' worth of projects does not accurately reflect the evolution of the funding program itself. For that, a historical review of the preproposals received, the makeup of GLNPO staff, and the direction of both the Agency and previous directors would be necessary. Thus, this analysis, though valuable, is limited in scope. Nevertheless, the findings of the report are substantial:

- Between 1992 and 2001, \$15,441,045 was awarded in assistance agreements by the U.S. Environmental Protection Agency's Great Lakes National Program Office (GLNPO) Ecological Protection and Restoration Program for 186 projects. Through mid-2001, 106 projects have been completed for a total of \$11,402,246. The GLNPO dollars, plus \$6,654,896 leveraged dollars, supported projects that contributed to the protection and restoration of more than 17 million acres in the Great Lakes basin portion of eight states and the Province of Ontario.
- In addition to the organizations and agencies that received project assistance, more than 650 partner organizations participated in project activities.
- 31 full time, 17 part time, and 14 interns and seasonal employees were retained for jobs created to carry out the projects. In all, \$933,118 was spent to retain project personnel and \$2,649,924 in project dollars was awarded to private sector sub-contractors.
- More than 6,400 Great Lakes basin acres were protected from a variety of threats.
- The process of restoring more than 7,300 Great Lakes basin acres was begun.
- Scientists and natural resource managers

Summary of Project Results

106 completed projects
 >6,400 acres protected
 >7,300 acres begun to be restored
 >650 project partners
 1,250 school children and adults educated
 900 people volunteered >3,800 hours
 >\$11 million awarded
 >\$6 million leveraged
 62 full time and part jobs



collaborated to formulate plans and strategies, build partnerships, and exchange information and technologies. Inventory, assessment, and classification gaps were filled basinwide, regionally and locally.

- Knowledge of Great Lakes ecosystems was broadened through scientific study.
- Great Lakes ecosystems were monitored and contributions made to the development of Great Lakes indicators.
- Using a variety of media, the public was informed about Great Lakes ecological protection and restoration activities.
- Educational tools were utilized to increase the understanding of more than 1,250 school children and many adults about ecological protection and restoration activities in the Great Lakes ecosystem.
- The public was included in partnerships to plan and implement protection and restoration projects.
- More than 900 people were motivated to volunteer more than 3,800 hours to protect and restore Great Lakes ecosystems.

GLNPO dollars for ecological protection and restoration projects have been important to the ecosystems, the people, and to many local economies of the Great Lakes. GLNPO needs to continue to support projects. This analysis is expected to guide future funding. In addition, and as a result of the analysis and of internal GLNPO scrutiny of its funding program, improvements to the GLNPO funding process are being implemented. Final reports are being requested electronically and as many as possible will be put on the GLNPO web page (www.epa.gov/glnpo). Existing final reports are being collected and will be stored in a GLNPO final report library. An electronic GLNPO project tracking system will provide every GLNPO project officer a place to store records of all future reports. Finally, the tracking system should allow future analysis of final project reports in a systematic manner.

This analysis, particularly the accompanying appendices, contain a wealth of information about Great Lakes ecosystems, the partners who have shown leadership in science and management of these resources, and new techniques and tools with wide applicability. GLNPO strongly urges mining this document for ideas and techniques that may be useful to other situations and locales.

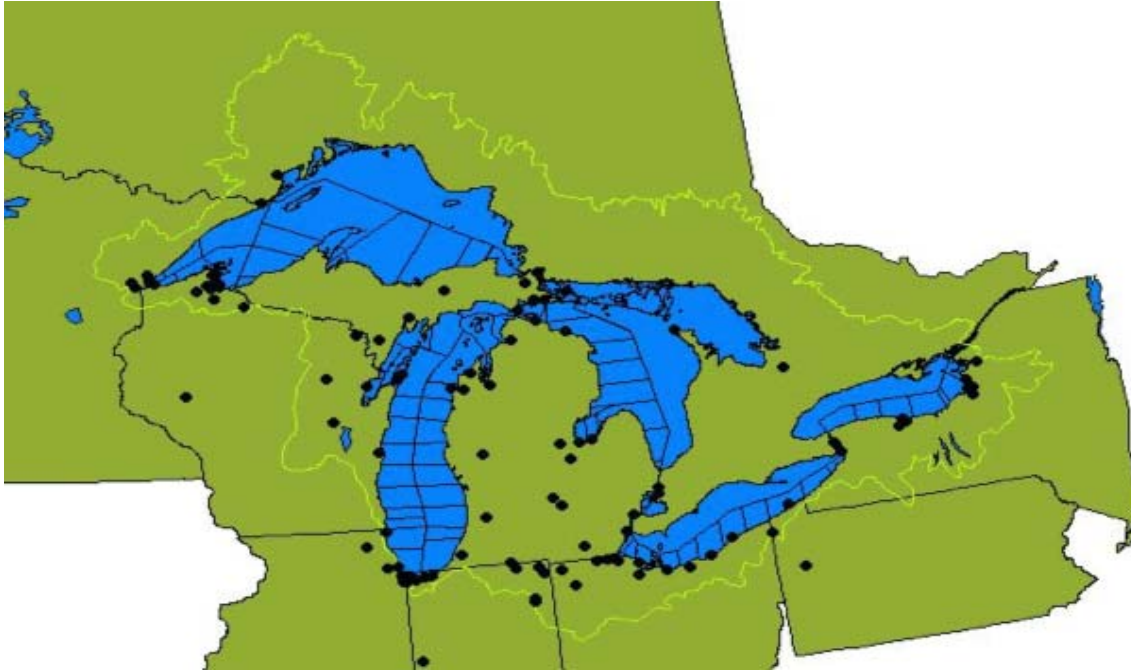
The balance of *Mining Ideas 2* is divided into eight sections and three appendices. Section II summarizes major project statistics, including maps of local and regional project sites, as well as a breakdown in dollar allocations by recipient. In section III, the environmental science and management results are analyzed for the following categories—ecological protection, ecological restoration, planning/coordination/collaboration, inventory/assessment/classification, scientific study, and monitoring/indicators. Section IV consists of an analysis of public stewardship results for four categories—outreach/information exchange, education, partnership building, and volunteers. In section V, the projects are grouped and analyzed by ecosystem theme. Direct and indirect economic impacts of the projects are analyzed in section VI. Section VII evaluates the GLNPO Ecological Protection and Restoration Program. Section VIII summarizes the conclusions of the overall analysis in terms of improvement to the Great Lakes basin ecosystem; determines whether the grant program is a good investment; and, suggests future directions. In Appendix A, a narrative summary, project results, and project statistics for each of the 106 projects are detailed. Projects are listed in alphabetical order by project title and numbered consecutively. This project number is used throughout Appendix B and is indicated in parentheses. Appendix B details the environmental science and management, public stewardship, and ecosystem theme project accomplishments. Appendix C is a list of partners that contributed to the projects.

Mining Ideas 2 analyzes the results of final project reports, and these results do indeed yield ideas worthy of closer inspection and perhaps emulation. It is the intention of GLNPO both to publicize these results and to continue to fund good projects.



II. Background Statistics

Map 1: Location of 91 Local Ecological Protection and Restoration Projects Funded by GLNPO (FY 1992-mid 2001) (*projects conducted at a specific site or location*)



Map 2: Location of 9 Bioregional Ecological Protection and Restoration Projects Funded by GLNPO (FY 1992-mid 2001) (*projects having an impact on or work conducted in one Great Lake basin, a watershed or large part of a watershed, an Area of Concern, or a Biodiversity Investment Area*)



Table 1: List of Basinwide and Statewide Ecological Protection and Restoration Projects Funded by GLNPO (FY 1992-mid 2001) (projects having an impact on or work conducted throughout the entire Great Lakes basin or throughout an entire Great Lakes state)

GL985513-0	Building a Conservation Vision for Great Lake Biodiversity (basinwide)
GL985179-01	Developing Imperiled Species Occurrence Information Eastern PA (statewide)
GL985183-01	Developing Imperiled Species Occurrence Information Illinois (statewide)
GL985184-01	Developing Imperiled Species Occurrence Information Indiana (statewide)
GL985181-01	Developing Imperiled Species Occurrence Information Michigan (statewide)
GL985187-01	Developing Imperiled Species Occurrence Information Minnesota (statewide)
GL985186-01	Developing Imperiled Species Occurrence Information New York (statewide)
GL985185-01	Developing Imperiled Species Occurrence Information Ohio (statewide)
GL985182-01	Developing Imperiled Species Occurrence Information Western PA (statewide)
GL985190-01	Developing Imperiled Species Occurrence Information Wisconsin (statewide)
X995291-01	Fisheries Objectives and Aquatic Habitat Restoration (basinwide)
GL995819-01	Great Lakes Alvar Poster (basinwide)
GL985590-01 & GL975139-01	Implementation of the Marsh Monitoring Program in the Great Lakes (basinwide)
GL973591-01	Improving SOLEC Indicator 8135: Bald Eagles (basinwide)

Table 2: Number of Projects and Total Dollar Amounts for GLNPO Ecological Protection and Restoration Projects by Year (FY 1992-mid 2001)

Between 1992 and 2001, \$15,441,045 was awarded in assistance agreements by GLNPO's Ecological Protection and Restoration Program for 186 projects. Thus far, 106 projects have been completed for a total of \$11,402,246.

Year	Number of Projects	Total Dollars Awarded
1992	12	\$791,579
1993	35	\$4,707,183
1994	15	\$1,685,516
1995	25	\$1,334,941
1996	8	\$650,344
1997	20	\$1,739,993
1998	23	\$1,234,155
1999	21	\$1,108,932
2000	16	\$1,090,622
2001	11	\$1,097,780

Notes:

1993—Dollars includes \$376,700 in second year funding for 1992 projects; Congressional add-on funding: \$1,250,000 to Erie County, New York Department of Environment and Planning; Congressional add-on funding: \$1,600,000 to The Nature Conservancy.

1994—Dollars include \$283,000 in second year funding for 1993 projects.

1995—Includes \$89,070 in second year funding for 1994 projects; \$35,000 to The Nature Conservancy for a community-based environmental protection project awarded by USEPA Headquarters with \$10,000 from GLNPO; \$220,000 for 10 projects delayed from FY 1993;

Congressional add-on funding: \$70,000 to the Fond du Lac Tribe.

1996—Due to a budget impasse between the President and Congress, GLNPO suspended its normal assistance program. However, when money became available during mid-fiscal year, those recipients who had current assistance agreements in place were able to apply for the small amount of funds available.

2000 and 2001—During each of these two years, \$400,000 of the total amount awarded each year was awarded to the Great Lakes Commission to establish a Coastal Wetland Consortium. The cooperative agreement included funds for sub-grants to establish wetland monitoring protocols.



Table 3: Ecological Protection and Restoration Dollars and Number of Projects by Agencies and Organizations (FY 1992-mid 2001)

Of the total amount awarded (\$11,402,246) for the 106 completed projects, 4% or \$438,333 went to federal partners as Interagency Agreements for 6 projects of mutual interest; 26% or \$2,971,783 went to 22 state natural resource or environmental protection agencies; 17.2% or \$1,969,998 went to 9 county and municipal agencies; 4.9% or \$554,043 went to 7 Tribes; and 47.8% or \$5,450,089 went to 62 “other” organizations including non-governmental organizations, Resource Conservation and Development agencies, Soil and Water Conservation Districts, and universities.

Agency/Organization	Award Dollars	Number of Projects
Federal	\$456,333	6
State	\$2,971,783	22
County, Municipal	\$1,969,998	9
Tribe	\$ 554,043	7
Other	\$5,450,089	62

Table 4: Dollars Leveraged in Addition to GLNPO Dollars for Ecological Protection and Restoration Projects (FY 1992-mid 2001)

GLNPO requires a minimum 5% match for all assistance agreements. The 5% match for \$11,402,246 amounts to \$570,112, far less than the \$6,654,896 actually leveraged by recipients. The maximum amount leveraged was for \$3,400,000, for a multi-agency partnership project to restore 908 acres of Lake Erie coastal wetlands. The actual amount leveraged cannot be accurately measured. Grantees typically seek to minimize the match because any money so officially designated becomes bound up with all the requirements of federal regulations.

Actual \$ Leveraged for 106 Projects	Required \$ Match	Average \$ Amount Leveraged	Minimum \$ Amount Leveraged	Maximum \$ Amount Leveraged
\$6,654,896	\$570,112	\$65,244	\$316	\$3,400,000



Table 5: Ecological Protection and Restoration Dollars and Number of Projects by Lake Basin (FY 1992-mid 2001)

Of the total amount awarded (\$11,402,246) for the 106 completed projects, 31% or \$3,579,417 was for 23 Lake Erie projects; 22% or \$2,530,443 was for 19 Lake Superior projects; 18% or \$2,071,533 was for 24 Lake Michigan projects; 6% or \$658,976 was for 8 Lake Ontario projects; 14.5% or \$1,651,746 was for 19 basinwide projects; 4% or \$483,794 was for 4 projects involving two or more lake basins; and 3.7% or \$426,337 was for 7 Lake Huron projects. Average project awards by lake were: Lake Erie—\$155,600; Lake Superior—\$133,181; two or more lake basins—\$120,900; Basinwide—\$87,000; Lake Michigan—\$86,300; Lake Ontario—\$82,300; and Lake Huron—\$60,905.

Lakes Michigan, Erie and Superior, along with Basinwide projects, were awarded the greater percentage of dollars for the greatest numbers of projects. Two reasons may help to explain lower numbers in Lakes Huron and Ontario. First, Lake Huron is a lake without a Lakewide Management Plan. Presumably, now that the Lake Huron Initiative is underway, ecological goals and objectives will spur good project proposals. Second, until recently Lake Ontario Lakewide Management Plan activities predominantly dealt with chemical stressors to the lake, not biological or physical stressors originating on the land. As a consequence, proposals for protection and restoration were not submitted as frequently as proposals addressing pollutants. Over the past several years, EPA Region 2 and GLNPO have been increasing efforts to engage New York partners in ecological protection and restoration activities.

In Fiscal Years 2001 and 2002, GLNPO altered its funding guidance and allocated approximately \$50,000 per lake basin for projects that seek to accomplish Lakewide Management Plan or Lake Huron Initiative goals. There has been no notable difference in the distribution of projects across the basin.

Lake Basin	Award Dollars	Number of Projects
Lake Erie	\$3,579,417	23
Lake Superior	\$2,530,443	19
Lake Michigan	\$2,071,533	24
Basinwide	\$1,651,746	19
Lake Ontario	\$658,976	8
2 or more lake basins	\$483,794	4
Lake Huron	\$426,337	7



Table 6: Ecological Protection and Restoration Dollars and Number of Projects by State (FY 1992-mid 2001)

Of the total amount awarded (\$11,402,246) for the 106 completed projects, 14.5% or \$1,651,746 was for basinwide projects; 4.5% or \$515,235 projects were in Illinois; 9% or \$1,016,183 projects were in Indiana; 8% or \$903,612 projects were in Michigan; 3.9% or \$452,731 projects were in Minnesota; 17.5% or \$1,995,976 were in New York; 12% or \$1,374,325 projects were in Ohio; 3% or \$355,000 were in Pennsylvania; 16% or \$1,796,426 projects were in Wisconsin; 12% or \$1,361,012 were projects in two or more states (but not all).

Two figures stand out. First, the total dollars for Michigan projects seems low compared to other states with a smaller percentage of land in the Great Lakes basin. Fewer preproposals were received from Michigan during the first several years of the funding program. Once recognized, in 1995, an effort was made to establish contact with Michigan agencies and organizations. The figure for Michigan is expected to go up as more Michigan projects are completed over the next few years.

Second, the dollar amount for New York is high compared to other states. This is due to a 1993 Congressional add-on of \$1,250,000 to Erie County.

STATE	SUM OF AWARD \$
All states	\$1,631,746
Illinois	\$515,235
Indiana	\$1,016,183
Michigan	\$903,612
Minnesota	\$452,731
New York	\$1,995,976
Ohio	\$1,374,325
Pennsylvania	\$355,000
Wisconsin	\$1,796,426
2 or more states	\$1,361,012



Table 7: Acres Impacted by GLNPO-Funded Ecological Protection and Restoration Projects (FY 1992-mid 2001)

As a result of GLNPO grants:

More than 7,300 acres are being restored and 6,400 additional acres are being protected from a variety of threats. More than 17 million acres basinwide (13% of the 201,460 square land miles in the basin) have been inventoried, assessed, classified, monitored, or studied, resulting in a variety of partnerships and education and outreach activities.

The 17 million acres are located as follows and were tabulated from statistics given in final reports. More than one project may have taken place within each location.

1,000,000–Wisconsin Lake Superior coastal areas
 1,200–Whittlesey Creek, Wisconsin
 236,000–Menominee Reservation
 658–Green Bay West Shore
 174,700–Door County, Wisconsin
 12–Northeastern Illinois
 1,835–Northwest Indiana
 5,575–Hamilton Lake, Indiana
 155,600–Michigan Islands
 2,230–Point Betsie, Michigan
 985–Grand Mere State Park, Michigan
 6,400,000–Saginaw Bay Watershed and Northern Lake Huron, Michigan
 1,828–White Lake Watershed, Michigan
 640–Ives Road Fen, Michigan
 8,800,000–Ohio Lake Erie Basin
 3,200–Presque Isle, Pennsylvania
 138,624–Genessee River Watershed, Pennsylvania
 3,461–Lakeview, New York
 1,196–Eastern Lake Ontario

All numbers are based on information from final project reports. Because it was not required, some final reports did not state the number of acres impacted. In some final reports, the acres impacted are estimated and may actually be either higher or lower than stated. The word “impact” has a range of meanings. In this report it refers to the direct protection and restoration of acreage as well as acreage that will be changed in some way as a result of information learned from the demonstration project. Inventories, therefore, do impact acres according to this definition.

The number of acres protected and restored tends to be small in part because changes may take hundreds of years. Damage to ecosystems may be permanent. We may never have all the pieces to restore a site completely. Project managers, therefore, are unwilling to confirm protection or restoration progress in the short period of time allowed by assistance agreement guidelines. At the other end of the spectrum, several projects are impacting a great number of acres quickly, sometimes by providing people with information so that good land use decisions are made by private and public property owners.

Words of caution to all who read this report and the project summaries in Appendices A and B: Planting native vegetation or removing invasive species or reintroducing an extirpated species on a site may be only the first in a series of steps to protect or restore that site. Not enough is known about ecosystem functioning, individual site requirements in terms hydrology, soils, requirements of individual species, or the matrix of species that existed at a particular site in pre-European settlement times. Success in terms of “acres restored” may be misleading if other requirements are not taken into consideration. And it is always better to prevent the need for restoration by practicing protection measures.



III. Analysis: Environmental Science and Management

Environmental science and management project results are noted in six categories—ecological protection, ecological restoration, planning/coordination/collaboration, inventory/assessment/classification, scientific study, and monitoring/indicators. A detailed list of project accomplishments is found in Appendix B.

The primary focus of GLNPO ecological protection and restoration funding has been on-the-ground projects, in other words, projects that implement activities resulting in measurable environmental improvements. The intention has been to demonstrate good protection and restoration techniques. However, early in the program it became apparent that in many places other needs had to be met before protection and restoration actions could take place. For example, the gaps in information about plants and animals, ecosystem functions and processes, and ecosystem stressors were too great to ignore and in some instances prevented immediate on-the-ground action. The partnerships necessary among agencies and communities were not always in place. Monitoring protocols and indicators to measure results were often under-developed.

As a consequence, early in its ecological protection and restoration program history, GLNPO acknowledged that protection and restoration actions, although still of foremost concern, were not the only needs to be addressed. Projects that laid the groundwork for action by forging partnerships, developing implementation plans, and sharing information and technologies were considered for funding. Inventories to record baseline information provided a backdrop for future projects. Scientific studies were considered necessary to the development of project goals. And monitoring and indicator development, for the purpose of tracking environmental conditions, were included in funding considerations.

Thus, environmental science and management project accomplishments from each project summary listed in Appendix A were extracted and the results quantified as much as possible. A detailed list of project accomplishments and results can be found in Appendix B. The following is an analysis of those accomplishments and results by category.

A. Ecological Protection

15 projects out of 106 (14.2%) protected more than 6,400 Great Lakes basin acres from a variety of threats. Ecological protection is defined as actions taken to prevent stress to ecosystems. GLNPO dollars were not used to acquire land, but may have been used to facilitate acquisition. Four types of protection activities are noted. Partnerships were established to protect natural resources. Physical barriers were constructed to prevent recreational damage to sensitive natural areas. Acquisition of land and protection agreements such as easements were facilitated. Best management practices were used on agricultural lands to protect adjacent natural resources.

In general, protection efforts took place in sand dune ecosystems or agriculturally dominated landscapes, generally in the lower Great Lakes. The four types of protective actions (partnerships, physical barriers, acquisition preparation, and best management practices) demonstrated an array of protection activities, including an exploration of new and innovative protection techniques, such as the economic-environmental planning that took place regarding the Les Cheneaux Islands.

Erroneously, the upper Great Lakes are considered to be largely intact. As reported in State of the Lakes Ecosystem Conference documents such as *Land by the Lakes* (Reid and Holland 1996), second home development, invasive, non-indigenous species, and poor forest management practices have put at risk areas that appear green and healthy. Protection measures are particularly needed here to prevent damage to ecosystems. Yet GLNPO-funded protection projects occurred primarily in eastern Lake Ontario, agricultural areas of Pennsylvania, and southern Lake Michigan, not north. Presumably then, the upper Great Lakes would benefit from demonstrations of protective techniques.

GLNPO needs to encourage protection of Great Lakes ecological resources by calling for innovative protection actions in the Funding Guidance; collecting and distributing protection success stories from throughout the basin; and exploring protection actions that can be encouraged within Biodiversity Investment Areas, as outlined in the *State of the Great Lakes 2001* (www.binational.net). GLNPO also needs to balance its resources between protection and ecological restoration. Since restoration of damaged land and water is more costly than protection of resources before damage occurs, it is wise to support projects that are cost effective.



B. Ecological Restoration

47 projects out of 106 (44.3%) began the process of restoring more than 7,300 Great Lakes basin acres.

Ecological restoration is the process of assisting the recovery and management of ecological integrity. Ecological integrity includes a critical range of variability in biodiversity, ecological processes and structures, regional and historical context, and sustainable cultural practices (Society for Ecological Restoration 2002). Ecological restoration was demonstrated at a variety of ecosystem types across the Great Lakes basin. Practical restoration techniques were tested in the areas of best management practices, improvements to wildlife habitat, invasive species control, and physical site improvements. Restoration of habitats at particular sites supported protection or reintroduction of specific species. Projects concentrated on specific targeted actions and did not attempt to restore entire landscapes or sites. For example, the removal of 11,000 cubic yards of woody debris from Grassy Point in Duluth, Minnesota was only the beginning, though a significant one, of restoring the wetlands at the mouth of the St. Louis River.

Although the original goal of funding on-the-ground ecological restoration projects in order to demonstrate ecological restoration at a variety of ecosystems using a variety of techniques was met, support for ecological restoration by GLNPO needs to continue provided projects are innovative, partnerships are in place, and where environmental benefits are clear. Since ecological restoration is long-term and complex, it is important to begin the process of restoration on as many acres as soon as possible, even though results may not be evident for years. Fortunately, additional funding for small projects has become available through a variety of other federal and state agency and foundation sources.



C. Planning, Coordination, Collaboration

37 projects out of 106 (34.9%) resulted in collaboration to formulate plans and strategies, build partnerships, and exchange information and technologies among scientists and natural resource managers.

Planning, coordination, collaboration is defined as the formulation of plans and strategies for protection and restoration activities, partnership building among scientists, natural resource managers, and restoration practitioners, and the sharing of information and technologies among partners. A basinwide vision was developed by and for one not-for-profit organization, The Nature Conservancy. Protection and restoration strategies were developed for three geographic regions. Eighteen protection and restoration plans that identify actions were developed at site specific locations across the basin. Several critical partnerships were formed, including a native plant growers cooperative in Michigan, the GreenWays Initiative in Southeast Michigan, and the Wisconsin Invasive Plant Council. Efforts at information sharing/technology transfer produced delivery systems including a methodology for identifying conservation strategies, a compendium of restoration tools, and a practitioner information exchange. Hundreds of people were brought together for symposia, workshops, and conferences that were binational or regional in scope, and that dealt with current issues or specific and heretofore unknown ecosystems such as oak savannas or alvars. Numerous scientific papers were published.

A basinwide ecological protection and restoration vision that transcends organizations is needed. Strategies that coordinate regional efforts and lead to local plans that together affect the basin are also needed. The partnerships that were formed illustrate the potential for both cooperative protection and restoration activities and for filling science gaps. Conferences that promote partnerships and highlight current issues are needed in order to explore new topics, share basic information, form networks that will continue to share information, and ultimately draft strategies that protect and restore or identify data gaps. A variety of additional technical transfer vehicles are needed to showcase examples, fill information gaps, and bring issues to scientists and resource managers for discussion and eventual resolution.

Conferences

10 projects out of 106 (9.4%) awarded and completed between 1992-2001 were conferences or workshops attended by more than 3,100 people.

Conferences and workshops are an excellent means of information exchange and technology transfer. Total amount awarded for the 10 projects: \$497,061. Dollars leveraged as a result of GLNPO dollars: \$49,597. Of the grant and leveraged dollars, \$42,200 went back into the community as contracts and as local salaries.



The purpose of the 10 conference grants was to facilitate communication among professional natural resource managers and scientists. The conferences covered a wide variety of contemporary issues and produced publications and papers that are accessible to a larger audience of ecological protection and restoration practitioners. Topic areas included status of fisheries objectives basinwide, alvar ecosystem information exchange, and understanding wild rice life cycle and importance to Native American Communities. GLNPO will continue to fund conferences and workshops that have ecological topic areas as a way to communicate important scientific methods and technologies.

D. Inventory, Assessment, Classification

43 projects out of 106 (40.6%) filled inventory, assessment, and classification gaps basinwide, regionally and locally. Inventory is defined as data collection on specific species, communities, threats, or historical and sociological information. Assessment is the first phase of work to determine the status of natural and human resources within a defined geographic area, their current condition, and possible future actions. Classification is the intentional grouping of species and communities according to predefined rules. Inventories were conducted at basinwide, regional, and local scales. Assessments of ecological resources were conducted for basinwide and regional systems. Two new basinwide classification systems, for Great Lakes coastal wetlands and freshwater ecosystems, were developed and tested.

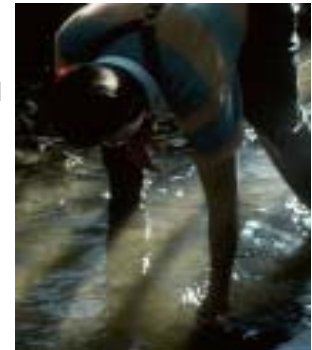
The sheer number of inventory, assessment and classification projects reflects basinwide, regional and local data gaps as well as lack of data coordination among agencies and organizations. Nevertheless, the body of knowledge about Great Lakes species and communities that has been gathered between 1992 and 2001 is unparalleled since surveyors' notes recorded their observations of the landscape more than a hundred years ago. Of particular significance are the updating of the Natural Heritage Program datasets, the single most important record of plants and animals of the basin, and the report, "Conservation of Biological Diversity in the Great Lakes Basin Ecosystem: Issues and Opportunities." Written by The Nature Conservancy's Great Lakes Office, the report provided a seminal overview of the significance of Great Lakes species and community types, an analysis of threats, and a handbook of tools for citizen participation in protecting and restoring biodiversity. Glaring gaps still remain in

our knowledge of Great Lakes basin ecosystems. Fens and bogs, for example, are inland wetlands of major importance that are yet to be inventoried in terms of extent and quality. GLNPO efforts need to be focused on filling basinwide gaps where possible, and secondarily, on securing resources for local and regional inventories and assessments.

E. Scientific Study

19 projects out of 106 (17.9%) broadened knowledge of Great Lakes ecosystems through scientific study. Scientific study is defined as inquiry into questions posed in the course of implementing project protection and restoration activities. As a result of scientific inquiry, new tools and techniques are developed. Fourteen studies, including base aquatic productivity, effects of deer browse on conifers, coaster brook trout habitat, and wild rice reproductive requirements, added to our knowledge of Great Lakes ecosystems. Seven new tools and techniques, including a technique for restoring areas covered with slag (a bi-product of the steel making process), a model for longshore sediment transport, and a methodology for conserving modestly sized forest resources, will assist in protection and restoration efforts. Six scientific reports that fill knowledge gaps about Great Lakes ecosystems were prepared.

The study of small-scale ecological problems is the foundation for individual protection and restoration projects. Therefore, GLNPO needs to continue to fund a limited number of scientific enquiries on specific topics in order to increase project success. Accompanied by on-the-ground activities, scientific studies will increase our knowledge of Great Lakes ecosystems as well as guide projects.



F. Monitoring, Indicators

11 projects out of 106 (10.4%) monitored Great Lakes ecosystems or contributed to the development of Great Lakes indicators. Monitoring is defined as the systematic scrutiny of some part of the environment. Monitoring was conducted to collect baseline data on specific environmental components and to determine whether protection or restoration actions were effecting positive change. Indicators are signals of environmental health.



Under federal grant regulations, GLNPO grant projects must generally be completed within a three year time. Since protection and restoration projects need long term time frames to achieve maximum results, monitoring and the development of indicators are generally not included as part of GLNPO-funded project activities, rather as additions to projects that have funding from other sources. However, ten projects monitored various aspects of Great Lakes basin ecosystems including water quality, hydrology, ecosystem functions, stressors, and specific species. Three indicators were developed for the binational State of the Great Lakes Ecosystem Conference (SOLEC) 2000, and the *State of the Great Lakes Report 2001*. Two of the indicators (Indicator #4504–Amphibian Diversity and Abundance, and Indicator #4507–Wetland-Dependent Bird Diversity and Abundance) resulted from monitoring work undertaken by Bird Studies Canada as part of the basinwide Marsh Monitoring Program. The third indicator (#8135–Contaminants Affecting Productivity of Bald Eagles), was undertaken to enhance the suite of Great Lakes indicators.

For demonstration purposes, GLNPO needs to continue to fund monitoring projects that have direct relevance for protection and restoration activities. Currently, other funding programs are not generally supporting projects whose primary activity is monitoring. The hope is that such demonstrations will serve as models that will be included in protection and restoration activities, even without specific GLNPO funding for that purpose. As part of a Great Lakes-wide development of indicators at basinwide, regional and local scales, in FY 2001, GLNPO set aside \$300,000 for indicator development. \$200,000 was from ecological protection and restoration funds. Up to \$100,000 was made available for indicator development in FY 2002. Once a primary suite of indicators is developed, however, those dollars are expected to revert back to the ecological protection and restoration funding category. It is sufficient for GLNPO to demonstrate indicator development and to enhance current indicator work.



IV. Analysis: Public Stewardship

Public stewardship refers to actions taken to inform the public of or include them in ecological protection and restoration projects. Public stewardship project results are noted in four categories: outreach/information exchange, education, partnership building, and protection and restoration volunteers. A detailed list of project accomplishments can be found in Appendix B.

A. Outreach, Information Exchange

49 projects out of 106 (46.2%) informed the public, using a variety of media, about Great Lakes ecological protection and restoration activities.

Outreach and information exchange is the use of a variety of media tools to inform the public about protection and restoration plans, projects, and techniques. Informal outreach/information exchange predominated public stewardship efforts, yet little is known about whether these efforts were successful in increasing public understanding about protection and restoration efforts or establishing a constituency for protection and restoration actions. Nine projects used media coverage to publicize project activities results to the public.

Projects produced numerous publications, brochures, slide presentations, and videos as aids to informing the public. Workshops, presentations, and meetings brought together natural resource managers and scientists and the public to learn about project activities and results. Site tours and nature walks introduced protection and restoration projects to the general public. Informational signs and demonstration areas helped to focus attention on protection and restoration projects. One-to-one contact was initiated with private landowners regarding natural resource protection.

Outreach to the public is essential to enhance project effectiveness. Support for project goals and objectives is needed from the public to ensure long term success. The publications and visual aids that were produced from the projects are not readily available and perhaps some effort should be made to collect and distribute them for a larger audience. Several exceptions are the Chicago Wilderness Biodiversity Atlas, which has been used as an example throughout the basin, the alvar poster, and the report: "Conservation of Biological Diversity in the Great Lakes

Ecosystem: Issues and Opportunities," which is still being distributed by GLNPO. GLNPO needs to continue to fund outreach and information, preferably as part of larger protection and restoration project goals and to do a better job of collecting and disseminating products to a larger audience.

B. Education

20 projects out of 106 (18.9%) used educational tools to increase the understanding by more than 1,250 school children and many adults of ecological protection and restoration activities in the Great Lakes ecosystem.

Education is an interactive activity undertaken to acquire knowledge, thereby leading to a better understanding of environmental concepts and issues and to informed decision making. Educational activities may be formal, connected with school programs, or informal, deliberate one on one conversations or group seminars.

The Mighty Acorns education program in Northeastern Illinois is a wonderful example of GLNPO-funded children's education that worked. Education regarding ecological protection and restoration concepts and projects utilized workshops, curricula, and one-on-one discourses. Typically, as a result of GLNPO funding, educational protection and restoration materials have been included in school and university curricula.

Because other EPA programs yearly fund a number of environmental education projects, GLNPO funding in this area has been minimal, with education generally a secondary project goal. Unless a project is significantly innovative, GLNPO funding for education needs to continue as a supplement to protection and restoration projects and not as the primary focus of a project.

C. Partnership Building

21 projects out of 106 (19.8%) included the public in partnerships to plan and implement protection and restoration projects. Partnership building is the deliberate effort by project managers to include interested organizations and individuals in project planning and implementation. Partnerships are a necessity for successful protection and restoration, and GLNPO was instrumental in the establishment of



several with long term potential. A variety of partnerships, including committees, cooperative agreements, and advisory groups, were formed between natural resource managers and the public to further protection and restoration projects. The Presque Isle Partnership in Pennsylvania and Les Cheneaux Islands in Michigan projects are fine examples of partnerships between natural resource managers and the public whereby actions are based on ecosystem and community goals.

Funding additional partnerships that will continue to explore how to strengthen the dynamic manager-community relationship for the purposes of improving ecological integrity and empowering individuals to understand ecosystem protection and restoration as part of civic responsibility, needs to continue.



D. Volunteers

18 projects out of 106 (17.0%) motivated more than 900 people to volunteer more than 3,800 hours to protect and restore Great Lakes ecosystems.

Volunteers are citizens who donate their time to work on ecological protection and restoration projects in their locale. Volunteering includes community-based planning and decision-making for public use of the area and to determine future conditions. Citizen volunteers participated in inventory, restoration, monitoring and planning activities across the Great Lakes basin. The significance of volunteers to relieve the budget constraints of local land managers, and to promote a sense of pride in work to make an area a better place to live, should not be underestimated. Without volunteers, many projects would have no chance of successful completion because hired labor

is not available, nor would knowledge of ecosystems be as readily transferred to the community, where economic decisions affect the ecology of place.

Protection and restoration volunteers who worked on GLNPO-funded projects made important contributions, for without volunteer development and encouragement, much of the protection and restoration work in the basin would remain unfinished. GLNPO needs to continue to encourage volunteer participation in projects.



V. Analysis: Ecosystem Theme

In addition to analyzing environmental science and management and public stewardship results, projects were grouped under 14 theme categories to determine whether GLNPO dollars helped achieve any marked success in these areas of importance. The themes were chosen for analysis based on frequency of occurrence as a project topic, as well as on topic areas GLNPO felt would be of interest to a Great Lakes audience. Theme project accomplishments and partners are detailed in Appendix B.

A. Agriculture, Non-point Source Pollution, Erosion Control

10 projects out of 106 (9.4%) awarded and completed between 1992-2001 were agricultural, non-point source pollution, or erosion control projects. The total amount awarded for the 10 projects is \$1,507,981. Dollars leveraged as a result of GLNPO dollars: \$420,281. Of the grant and leveraged dollars, \$657,099 went back into the community as contract dollars to local farmers, grain elevator operators, university professors, and soil and water conservation experts.

Although the U.S. Department of Agriculture is the federal agency with primary responsibility regarding agriculture, poor agricultural practices are a main cause of non-point source pollution to Great Lakes tributaries and streams, thus threatening aquatic and wetland habitats for many rare and threatened fish and mussel species. Extra effort and funding to alleviate the problems is shared by many federal agencies.

The purpose of the ten agricultural grants was to demonstrate practices that protect or restore water quality and the diversity of aquatic life. 426 acres were restored or enhanced; 58,850 feet of filter strips were placed along riparian corridors; 4,400 acres were registered in the Conservation Tillage Program; 139,468 acres were impacted by best management practices; 534 acres were placed in conservation easements; and, 10,000 tons of soil saved from erosion from one site alone. The grants demonstrated that water quality and aquatic habitats can be improved significantly with good best management practices in place.

As a result of these projects, GLNPO needs to assist in prioritizing regions of the basin that have significant aquatic habitats and where agriculture may threaten these habitats; expand and formalize

partnerships with soil and water conservation districts, resource conservation and development councils, and agriculture extension services to continue to demonstrate best management practices to protect aquatic habitats for rare and threatened fish and mussel species; and lay out a plan to distribute information about best management practices in the priority areas.

B. Alvars

2 projects out of 106 (1.9%) awarded and completed between 1992-2001 were alvar projects. Total amount awarded for the 2 projects: \$26,000. Dollars leveraged as a result of GLNPO dollars: \$1,369.

Alvars are naturally open areas of thin soil over relatively flat limestone bedrock, which host a distinctive vegetation community, including a considerable number of rare plants. Within North America, alvar systems occur only within the Great Lakes basin, where they are scattered in an arc from Michigan's Upper Peninsula through southern Ontario to northwestern New York State. Alvars are at risk from low-density second home development, off-road vehicle use, disruption of hydrological patterns, invasive non-indigenous species, over-population of deer, overgrazing of cattle, poor logging practices, vandalism, and plant collecting. The status of Great Lakes alvars was assessed as "mixed" for the *State of the Great Lakes 2001* report (www.binational.net). More than 90% of the original extent of alvar habitats have been destroyed or degraded. Less than 20% of nearshore alvar acreage is fully protected and 60% is at high risk. Although the status of alvar ecosystems was reported at the 2000 State of the Great Lakes Ecosystem Conference (SOLEC) and in the *State of the Great Lakes 2001* report, no long term monitoring program is in place.



The International Alvar Conservation Initiative, a regional model for coordinated region protection action, was formed. The Great Lakes Alvar Conservation Conference was held in Tobermory, Ontario. Seven scientific papers about alvars are contributing to protection efforts.



As part of the Great Lakes indicator development process, GLNPO needs to encourage the development of a long term monitoring program with indicators of alvar health. Because alvars are a virtually unknown natural resource even to people in the Great Lakes basin, information about alvars needs to be distributed through websites and fact sheets. Since alvars are a “new discovery,” inventoried only within the last ten years, additional demonstration projects that address stressors are recommended.

The International Alvar Conservation Initiative needs to be promoted as a model for other ecosystem protection and restoration partnerships.

C. Fish and Wildlife, Biodiversity, and Rare or Threatened Species

13 projects out of 106 (12.3%) awarded and completed between 1992-2001 focused on fish and



wildlife, biodiversity, and rare or threatened species. Total amount awarded for the 13 projects: \$1,154,985. Dollars leveraged as a result of GLNPO dollars: \$461,424. Of the grant and leveraged dollars, \$81,822 went back into the community as contract dollars and \$361,796 went for personnel costs.

Protection of single species is, in general, the purview of many federal, state and tribal natural resource agencies. However, EPA has a responsibility to support the work of these agencies where possible, particularly to fulfill its federal role of support for the Endangered Species Act.

More than 3,100 acres are being protected and restored for fish and wildlife. Habitat for Osprey, Coaster brook trout, Mussel species, Trumpeter swans, the Karner blue butterfly, Northern pike, and the Bald eagle was inventoried, evaluated, and improved at various locations throughout the basin. Knowledge about species was collected, organized, and disseminated to a variety of people. Fish and wildlife populations were re-established, monitored, and indicators developed to track them.

GLNPO's role needs to be one of support to other agencies whose main responsibility is to focus on protection and restoration of single species. Partnerships to protect and restore habitat for species need to be established and projects funded accordingly.

D. Forests

3 projects out of 106 (2.8%) awarded and completed between 1992-2001 were forest projects. Total amount awarded for the 3 projects: \$323,976.

Dollars leveraged as a result of GLNPO dollars: \$402,277. Of the grant and leveraged dollars, \$84,568 went back into the community as contracts and as local salaries.

The complete cut over of Great Lakes forests by 1900 contributed to severe erosion and sedimentation, resulting in a decrease in the quality of lakes and streams, including the Great Lakes, as well as loss of plant and animal diversity. Today, national and state forests, tribal lands, and thousands of acres in small privately owned tracts, hold the keys to both biodiversity and economic well being in the upper Great Lakes and parts of the eastern Lake Ontario basin. Many federal and state agencies have responsibility for Great Lakes publically owned forest resources. However, privately owned forest lands, particularly smaller tracts owned by individuals, receive little attention even though their inconsistent management leads to overall forest fragmentation.

The projects achieved a better understanding of the impacts to and tools needed to restore northern Great Lakes forest ecosystems; furthered the development of a new tool, the forest bank, to conserve modestly sized, privately owned forest resources without causing economic hardship; and disseminated information about model sustainable forestry practices through a conference for loggers, a brochure “Menominee Tribal Enterprises”, a technical manual “The Menominee Forest Management Tradition”, a sustained forest yield video, and a final project report on the GLNPO website.

No forest acres were claimed to have been restored or protected as a result of the three projects. The projects served to fill information gaps and assist in conservation efforts through new tool development. In a new project just begun, a multi-agency task force will recommend to 2002 State of the Great Lakes Ecosystem Conference participants a suite of forest ecosystem health indicators that can be applied basinwide.



Innovative forest projects need to continue to be funded by GLNPO. Federal, state and tribal forest resource agency partnerships need to be strengthened. A suite of forest indicators needs to be developed so that a basinwide, coordinated forest ecosystems monitoring and reporting system can be put in place.

E. Grasslands

5 projects out of 106 (4.7%) awarded and completed between 1992-2001 were grassland projects. Total amount awarded for the 5 projects: \$202,566. Dollars leveraged as a result of GLNPO dollars: \$91,874. Of the grant and leveraged dollars, \$42,000 went back into the community as contracts and as local salaries.

Although much of the Great Lakes basin was originally grassland, including tallgrass prairie, less than .01 percent remain in Illinois and Indiana. The loss is due in part to the replacing of hundreds of prairie plant species with row crops. Pesticides used in agriculture also played a significant part in eradicating native plants and animals.

Utilizing a variety of techniques, more than 1,000 acres of tallgrass prairie are being restored at more than 50 different sites and more than 3,800 acres were inventoried and monitored.

Remnant Great Lakes grasslands have been largely identified and grassland community plants and animals inventoried. Because they tend to be small and fragmented, management is apportioned among many landowners. Several forums for the study and sharing of ecological restoration techniques are in place, for example, the North American Prairie Conference. However, a Great Lakes-wide accounting of the quantity and quality of grasslands has not been done. A suite of grassland indicators needs to be developed; stressors to remaining grassland fragments need to be identified and assessed; cooperative links among grassland managers need to be established.

F. Human-Dominated Urban Landscapes

10 projects out of 106 (9.4%) awarded and completed between 1992-2001 were projects taking place in primarily human-dominated urban landscapes. Total amount awarded for the 3 projects: \$2,328,126. Dollars leveraged as a result of GLNPO dollars: \$875,205. Of the Grant and leveraged dollars, \$903,197 went back into the community as contracts and as salaries.



The Great Lakes basin has a population of 55 million people concentrated primarily in the lower lakes and the southern portions of the basin.

New tools for dealing with urban ecological problems were developed. Ecological restoration and protection activities were initiated in Northwest Indiana, Northeast Ohio, and Buffalo, New York. Education and outreach tools were used to disseminate information about urban ecological protection and restoration projects. Partnerships were developed to assist in urban protection and restoration project planning and implementation. Inventories and assessments were conducted of biodiversity, threats, and land ownership.

Urban protection and restoration projects need creative solutions to problems arising from highly fragmented and impacted landscapes. As well, inviting public participation in project activities may be problematic due to highly diverse attitudes with regard to ecosystems and their intended uses. Yet, protection and restoration of even tiny areas may be of benefit to an urban population. A restored wetland may help alleviate flooding; streambank protection may protect passive recreational water uses; urban green space provides an aesthetic backdrop for the spiritual needs of many.

GLNPO needs to balance urban protection and restoration projects with the protection and restoration needs of wilder, less inhabited portions of the basin, understanding that at first, urban results will be measured not so much in terms of acres as in how many people have access to wild areas, and not so much in terms of quality of restoration as in preservation of what is left.



Areas of Concern (AOC)

7 projects out of 106 (6.6%) awarded and completed between 1992-2001 began to address Remedial Action Plan goals in Areas of Concern.

Total amount awarded for the projects: \$843,396. Dollars leveraged as a result of GLNPO dollars: \$510,668. Of the grant and leveraged dollars, \$448,508 went back into the community as contract dollars. Three of the seven AOC projects are considered “urban” projects and are also included in the above human dominated landscape analysis. Although 20 projects funded by GLNPO have been within Great Lakes Areas of Concern, only seven directly cite Remedial Action Plan (RAP) goals and objectives as the basis for project actions.

Among the many project accomplishments in Areas of Concern, two have basinwide applicability. All 43 AOC’s were surveyed to determine the status of fisheries objectives. As part of the Marsh Monitoring Program, 493 volunteers monitored and submitted data regarding birds, amphibians, and habitats along 575 routes in Canadian and United States AOC wetlands.

The projects demonstrate the wide variety of ecological problems being addressed by RAPs. GLNPO should continue to support AOC projects that further RAP goals and objectives, as well as those that demonstrate innovative approaches to AOC ecological problems.

G. Invasive Species

14 projects out of 106 (13.2%) awarded and completed between 1992-2001 had invasive species control components. Total amount awarded for the 14 projects: \$1,001,904. Dollars leveraged as a result of GLNPO dollars: \$312,515. Of the grant and leveraged dollars, \$99,430 went back into the community as contracts and as local salaries.

Many non-indigenous invasive species are destructive to the Great Lakes ecosystem. Time, money, and resources are being spent on controlling these species, yet additional species are being introduced from many parts of the world each year.

The purpose of the 14 invasive species projects was to demonstrate on-the-ground techniques for controlling a variety of plant and animal species. Invasive non-indigenous species were controlled on more than 4,100 acres in Northwest Indiana; Toledo, Ohio Metroparks and preserves; Michigan and Minnesota coastal and riverine areas; Chicago

Wilderness; Presque Isle State Park, Pennsylvania; and New York wetlands. Control methods were improved upon and included: physical and chemical removal of invasive plants, prescribed burning, and hydraulic manipulation. Inventories of aggressive species were done, and maps and management control plans developed at most sites. In one project, the actions of the invasive Ruffe in the presence of different pheromones were examined as a possible control method. The projects demonstrated control techniques in a variety of discreet locations and throughout many ecosystem types. Together, the projects illustrate the difficulties of control, as well as why uncoordinated efforts on a few problem species may be having little effect on the problem as a whole.

Primarily as a response to the growing concern about basinwide ecosystem damages caused by non-indigenous invasive species, GLNPO has allocated limited funds for invasive species projects. Currently, projects that explore invasive species prevention practices or new technology for control are viewed more favorably than control projects. In the future, GLNPO needs to fund additional prevention demonstrations. However, funding also needs to be directed toward the formation of collaborations similar to the Wisconsin Invasive Plant Council and to workshops and information exchange forums such as the Plants Out of Place Conference.

Although news coverage in the Great Lakes regarding non-indigenous invasive species has increased over the last decade primarily because both ballast water introductions and the Asian longhorned beetle have popularized control issues, several parts of the problem that might have a significant impact on prevention and control have yet to be addressed. Working with states, GLNPO could begin a dialog with plant nurseries, some that still sell invasive species. The aquaculture business may also impact the rate of invasive species introductions, and is therefore another sector where dialog is necessary. One other avenue that needs to be explored is a possible partnership with corporations in the region. Some large corporations are impacted tremendously by invasive species and may favor working together to come up with prevention mechanisms.

H. Islands

3 projects out of 106 (2.8%) awarded and completed between 1992-2001 were island projects. Total amount awarded for the 3 projects: \$125,494. Dollars leveraged as a result of GLNPO dollars: \$63,069. Of the grant and leveraged dollars, \$72,260 went back into the community as contracts and local salaries.



More than 30,000 Great Lakes islands provide opportunities to study ecosystems under conditions that, in many instances, are less altered than the mainland from pre-European settlement landscapes. Grossly understudied, little is known about Great Lakes island ecology with the exception of Isle Royale National Park and Apostle Islands National Lakeshore. GLNPO funding was concentrated on the Michigan Islands, the Les Cheneaux Islands of northern Lake Huron, and a tiny island in Duluth, Minnesota, Hearing Island.

The biodiversity of six Lake Michigan and Lake Huron islands (Beaver, Hog, Garden, Bois Blanc, Drummond, Marquette, LaSalle) was inventoried. The present and desired vegetation of Beaver Island in Lake Michigan was digitized and mapped. An economic/environmentally sustainable plan for the Les Cheneaux Islands on Lake Huron was developed. Invasive plant species were removed from Hearing Island and native species planted.

Additional island work needs to be undertaken. At this time, the U.S. Fish and Wildlife Service has undertaken Great Lakes islands as an initiative. GLNPO will support this initiative where possible. A first collaborative activity is the convening of island experts to take place in 2002 or the spring of 2003. The results of that meeting will be the beginning of the development of Great Lakes island indicators of health, as well as a plan to inventory and protect island biodiversity.

I. Native Landscaping

3 projects out of 106 (2.8%) awarded and completed between 1992-2001 were native landscaping projects. Total amount awarded for the 3 projects: \$241,350. Dollars leveraged as a result of GLNPO dollars: \$38,210. Of the grant and leveraged dollars, \$1,800 went back into the community as contracts and as local salaries.

The Great Lakes basin landscape is not contiguous or pristine. Efforts to reestablish native plant populations are made more difficult by a lack of viable native plant and seed sources. GLNPO funding was used to demonstrate the benefits of native landscaping to the environment, and to showcase ecological protection and restoration techniques.

Demonstration gardens to showcase native plants and growing techniques were established at several locations. Brochures about native landscaping were distributed to thousands of homeowners.

Loss of native plant materials and sources for native seeds as a result of displacement by cultivated or invasive species and by human landscape manicuring is well documented throughout the Great Lakes basin. Public ignorance about native plant materials, their uses, and their importance in supporting the ecosystem services needed to maintain life is also recognized as a barrier to protection and restoration of ecosystems, including habitat for animal populations. Native landscaping projects funded by GLNPO have demonstrated the uses of native plant gardens in education about ecological restoration, and have provided the impetus for promotion of native landscapes. GLNPO staff are collecting and distributing information on native landscaping. Additional funding for native landscaping projects needs to be targeted so that fragmentary land-scapes are bridged and sources of plants and seeds are enhanced. By creating an interest in native landscaping, existing nurseries might increasingly offer native plants to their customers.

J. Oak Savanna

6 projects out of 106 (5.7%) awarded and completed between 1992-2001 impacted more than 7,500 acres of oak savannas. Total amount awarded for the 6 projects: \$559,242. Dollars leveraged as a result of GLNPO dollars: \$153,187. Of the grant and leveraged dollars, \$44,350 went back into the community as contracts and as local salaries.

From Wisconsin to New York, oak savannas were once widespread throughout the Great Lakes basin. Now the most endangered of Midwestern eco-



systems, remaining oak savannas are being studied, protected and restored.

Oak savanna protection and restoration activities included plant and animal inventories, physical barriers to keep out vehicular traffic and protect against off-road vehicles and midnight dumpers, trash removal, prescribed burns, filling ditches, seeding with native species, private landowner registry, acquisition, canopy thinning, and invasive plant removal. The Midwest Oak Ecosystems Recovery Plan gave impetus to projects such as the Toledo Oak Openings work to restore more than 300 acres.



Since the largest oak savanna tracts are now known, prioritization of activities needs to take place, and indicators and monitoring programs established to measure progress. GLNPO would welcome projects that reaffirmed and highlighted Recovery Plan goals.

K. Rivers and Streams

10 projects out of 106 (9.4%) awarded and completed between 1992-2001 were rivers and streams projects. Total amount awarded for the 10 projects: \$1,174,368. Dollars leveraged as a result of GLNPO dollars: \$542,566. Of the grant and leveraged dollars, \$267,983 went back into the community as contract dollars.

Hundreds of rivers and streams feed into the Great Lakes. For a number of reasons, including non-point source pollution runoff, dams and barriers, destruction of the flow regime, and poor upstream land practices, few Great Lakes streams and rivers are of a quality that will support the full array of native plant and animal species. Many contribute to problems in the lakes themselves.

Using best management practices and bioengineering techniques, ecological restoration and protection activities were initiated along ten Great Lakes rivers and streams. Education, training and outreach tools were used to disseminate project information. Watershed partnerships were developed to assist in river and stream protection and restoration project planning and implementation. And inventories and assessments were conducted of river and stream flora and fauna, as well as of problem sites.

Given the immense impact of rivers and streams on the water and habitat quality of the Great Lakes, funding for projects by GLNPO seems largely inadequate. However, rivers and streams projects funded by GLNPO are a small part of watershed projects being initiated and funded by other entities all over the Great Lakes basin. And upstream projects funded by GLNPO and others are alleviating some stream and river problems as well. GLNPO needs to focus its resources in two areas: first, projects to protect the most biodiversity-rich segments of Great Lakes rivers and streams as identified by The Nature Conservancy's aquatic work (a project funded in part by GLNPO); second, projects in urban areas that are innovative in terms of partnerships or techniques.

L. Sand Beaches and Dunes

8 projects out of 106 (7.5%) awarded and completed between 1992-2001 were sand beaches

and dunes projects. 462 acres and 2,030 linear feet of sand beaches and sand dunes were protected or re-stored. Total amount awarded for the 8 projects: \$578,767. Dollars leveraged as a result of GLNPO dollars: \$175,606. Of the grant and leveraged dollars, \$219,915 went back into the community as contract dollars to hire stewards and buy the services of lumberyard products, contractors, and publishers; for 1.5 seasons, local stewards were employed; and 8 part time, temporary workers were employed.



Great Lakes sand dunes comprise the largest collection of freshwater coastal dunes in the world. They occur on all five lakes. In the State of Michigan, there are 275,000 acres of which 70,000 acres are protected. Sand beaches and dunes contribute to a diversity of habitats for animals and plants, are home to species that live nowhere else in the world (endemic species), protect the land from lake storms, and are worth billions of dollars a year in recreational potential. Sand from Lake Michigan dunes is used in automobile manufacturing and other industries. The sand communities of the Great Lakes are moderately degrading due to invasive species, shoreline residential development, off-road vehicles, pedestrian recreational overuse, and sand mining. Needed protection actions include removal of invasive plant species and partnerships to protect and restore sensitive areas.

The purpose of the eight sand beach and sand dune grants was to demonstrate practices that protect or restore Great Lakes sand communities. The grants demonstrated that sand transport mechanisms are poorly understood. They also demonstrated that recreational users need to be primary targets for education and outreach efforts because their activities significantly impact sand communities. A dune steward program may be the best way to undertake education and outreach. Due to the success demonstrated in



Eastern Lake Ontario (<http://www.epa.gov/glnpo/ecopage/lakeont.html>), GLNPO recently awarded a grant to the Conservation Fund to undertake actions to protect and restore the sand communities along the eastern shore of Lake Michigan.

A measure of the health of Great Lakes sand communities needs to be reflected in the indicators of basinwide health being developed for the State of the Lakes Ecosystem Conferences (SOLEC). Therefore, steps should be taken to work with sand community experts to develop the indicators and a coordinated monitoring program.

M. Tribal Lands

7 projects out of 106 (6.6%) awarded and completed between 1992-2001 were undertaken on Tribal lands. Total amount awarded for the 7 projects: \$607,043. Dollars leveraged as a result of GLNPO dollars: \$105,883. Of the grant and leveraged dollars, \$226,559 went back into the community as contracts and as local salaries.

Traditional ecological knowledge is embedded in the cultures of 42 United States Great Lakes Tribes. Thus, it is essential that tribes be given the opportunity to protect this knowledge and the resources that the knowledge governs. The purpose of the seven projects was to provide financial assistance to protect ecologically important Tribal natural resources in ways determined by the Tribes themselves. The projects were diverse in their goals and included work on three culturally significant natural resources, wild rice, coaster brook trout, and lake sturgeon.

Proportionately to the lands they control relative to total lands in the Basin, Tribes have been quite successful in obtaining GLNPO funding. About 20% to 25% of the proposals submitted by Tribes each year are funded, a greater percentage than in other GLNPO funding categories.

The natural resource needs of Tribes differ from needs of the general Great Lakes population. Tribal lands are most in need of protection, assessment, and inventories, not restoration or remediation. Federal funds, including project funds, are subject to the requirements of the Freedom of Information Act and project results are public. Tribes do not necessarily wish to publically acknowledge natural resource inventories.

GLNPO is seeking to find ways to provide funding to protect Tribal natural resources that fits both GLNPO goals and tribal needs, such as through increasing Tribal involvement in the State of the Great Lakes Ecosystem Conferences (SOLEC), where traditional ecological knowledge is helping to underpin the development of indicators. The Tribes and First Nations of Canada have expressed interest in SOLEC Biodiversity Investment Areas as a way to acknowledge Tribal care of natural resources. What is certain is that GLNPO and partners must find ways to encourage trust between Tribes and agencies. Continuing to include Tribes in conferences, work-shops, and meetings to explore future collaborations and projects is necessary.

N. Wetlands

16 projects out of 106 (15.1%) awarded and completed between 1992-2001 protected or began to restore more than 1,700 acres of wetlands. Total amount awarded for the 16 projects: \$1,438,335. Dollars leveraged as a result of GLNPO dollars: \$4,060,959. Of the leveraged dollars, \$3,400,000 were leveraged for one project, Metzger Marsh National Wildlife Refuge on Lake Erie. Of the Grant and leveraged dollars, \$624,702 went back into the community as contract dollars and \$163,285 went for personnel costs.



EPA has limited regulatory responsibility for the nation's wetlands, the U.S. Army Corps of Engineers having primary responsibility. Nevertheless, the importance of wetlands for water quality, as well as fish and wildlife habitat, is well understood. Also, the great loss of wetlands, ranging from 60-90% from state to state, has been well documented. Therefore,



GLNPO has put emphasis on funding wetland protection and restoration projects.

A comprehensive ecological assessment of all natural quality coastal marshes of significant size in the US portion of the Great Lakes was completed. The results of protection and restoration of more than 1,700 wetland acres include an increase in rare flora and fauna habitats, the establishment of a biological corridor between a refuge and a state park, and mitigation of agricultural runoff. A detailed inventory, assessment and evaluation of the types and functional values of coastal wetlands, altered wetlands, and other critical areas in approximately one million acres of Wisconsin's Lake Superior basin was conducted. Wetlands in the Bad River/Kakagon Watershed of Wisconsin were inventoried, assessed and stressors identified. Information about wetlands and management activities was shared among the non-management public and led to greater participation in project activities. Wetland monitoring provided information for several projects. Project activities included education and outreach.

As a result of the projects as well as reports from the State of the Great Lakes Ecosystem Conferences, GLNPO came to the conclusion that no unified monitoring and reporting system of the quantity and quality of Great Lakes coastal wetlands exists. In Fiscal Years 2000 and 2001, therefore, \$400,000 was awarded as a cooperative agreement to the Great Lakes Commission to pull together a consortium of scientists and natural resources managers to develop a long-term monitoring program that can be readily implemented. That work is still underway and is expected to yield a monitoring program and a model for cooperation that could be used for inland wetlands or other ecosystem types. In the meantime, good wetland projects still need to be funded by GLNPO and others to continue to add to our growing body of information. In particular, fens and bogs have received little attention overall and need additional project dollars.



VI. Analysis: Economic Impacts

More than \$11,000,000 was awarded by GLNPO, for 106 protection and restoration projects completed between 1992 and 2001. **More than \$6,000,000 was leveraged** from agencies and organizations to supplement GLNPO dollars. Leveraged dollars reported in project budgets include the non-Federal 5% match required by GLNPO, as well as dollars leveraged beyond the match. However, because projects demonstrated the feasibility and economic soundness of protection and restoration activities, contributions from other funding sources was often forthcoming as a followup to GLNPO assistance agreements. These contributions have likely been under-reported. For example, a small \$38,000 grant to Michigan Rails to Trails led to \$15 million additional funding from foundations and corporations to support the Southeast Michigan GreenWays Initiative. These dollars will be awarded as grants to Southeast Michigan organizations for the purposes of open space preservation and ecological protection and restoration training for local environmental organizations and municipal groups.

Aside from dollars awarded and leveraged, GLNPO Ecological Protection and Restoration Program assistance had positive direct and indirect impacts to the Great Lakes economy. Direct impacts include jobs created and personnel and contractors retained in communities where projects were taking place. Indirect impacts are expressed in narrative statements of benefits resulting from project work or foreseen as future benefits of the work.

The following statistics were tabulated from information in the final project reports and financial statements. Although not required, some project reports included narratives of indirect benefits. However, because reporting on economic aspects of projects was limited to assistance agreement requirements, the real value to the Great Lakes economy of GLNPO assistance agreements may be underestimated.

Direct Economic Impacts:

31 full time jobs for the duration of projects; many jobs were subsequently retained and funded by other sources after GLNPO assistance agreement completion.

More than 17 part time and several short term jobs, for the duration of projects.

14 interns and seasonal employees assisted in project activities.

In all, \$933,118 was spent to retain project personnel. \$2,649,924 in project dollars was sub-contracted, including partial funding to support locally hired stewards, services and products from lumberyards, a publisher, partial funding for several university researchers, a local printer for newsletter job, and the training of three information management assistants.

Indirect Economic Benefits:

Increase in tourism dollars.
 Increase in consumptive recreation (hunting, trapping, fishing, etc.),
 Increase in non-consumptive recreation (birdwatching, canoeing, photography, etc.).
 Water quality/water supply improvement.
 Improved water quality has increased the property values in the area surrounding the project.
 Reduced flooding.
 Cost effective, more efficient use of fishery resources.
 Lower agricultural costs due to sheet erosion control.
 Public and private mitigative actions were offset.
 Future remediation costs were reduced due to greater attention and efforts toward protection of key resources and prevention of damage.

The economic results of GLNPO assistance agreements include present and future business opportunities: a periphyton sampler was designed to cost-effectively continue aquatic monitoring; land and legal services were purchased; funds were raised to support a watershed project office; opportunities were identified for ecologically compatible and sustainable development; moneys were found to continue native plantings; large tracts of land are now available to be reclaimed for parkland; and, increased interest and requests regarding ecological protection and restoration from landowner, is increasing the amount of contract dollars available for projects.



VII: Program Evaluation

To some extent, GLNPO relies on its funding program to maintain and restore the health of the Great Lakes ecosystem as called for in the Great Lakes Water Quality Agreement. The small GLNPO staff of 40 people utilizes assistance agreements to encourage and assist local, tribal, state and federal partners in ecological protection and restoration of the basin's natural resources. Measuring the effectiveness of such a funding program is challenging.

Each federal assistance program is constructed differently because requirements are specific to legislation enacted by Congress. GLNPO's funding is discretionary and staff and management fortunately have latitude in deciding what types of projects are important to fund. In early 1992, the GLNPO director recognized that protecting and restoring the basin's natural resources was important to the water quality of the Great Lakes themselves and to the restoration of the Great Lakes ecosystem. Ecological protection and restoration became a distinct office funding category. The program has evolved from one that awards assistance agreements to a scattering of unrelated projects, to a thoughtful construction of funding goals and a yearly deliberate targeting of funds for work necessary to improve the health of the Great Lakes ecosystem.

GLNPO has long recognized the requirements of a good funding program. These requirements are the keys to measuring program success. First, funding organizations need to understand and acknowledge issues and distribute funds with the view toward solving problems. Being in touch with current events and problems requires effort. GLNPO has conscientiously sought out the wisdom of scientists and natural resource managers, as well as municipal leaders and the public, to understand local, regional, and basinwide natural resource issues. Travel dollars are used to visit sites and attend meetings and conferences all over the basin in order to best formulate funding targets.

Second, the process by which funds are awarded needs to be fair and equitable in order to allow the best projects and new ideas to flourish. GLNPO's competitive funding process took several years to develop. It is lengthy and sometimes cumbersome because project proposal reviews require the time of numerous people. The ecological protection and restoration proposal review has three tiers. A technical review by EPA staff along with other federal liaisons to GLNPO, is conducted on all

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In the first Mining Ideas report, GLNPO expectations for the ecological protection and restoration program funding were laid out. Were our expectations met? Although difficult to measure quantitatively, it is certain that our knowledge about what ecological communities and species exist and the processes and functions being impacted by project activities has increased greatly. Project activities positively impacted more than 17 million acres throughout the basin. New protection and restoration tools were invented or tested, and knowledge was accumulated and passed on to others. Major ecosystem gaps in scientific knowledge are now known and are being filled by numerous scientists and natural resource managers. Partnerships are critical to the implementation of project activities and GLNPO support has led to new partnership efforts. GLNPO project and leveraged dollars have had direct and indirect benefits to local economies. And participation by local communities, as evidenced by the more than 900 people who volunteered more than 3,800 hours toward project implementation, increased.

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VIII. Conclusions

GLNPO has shifted from funding isolated, unconnected projects and is targeting problem areas. For example, in Fiscal Year 2000, the Great Lakes Commission was awarded a cooperative agreement to draw together Great Lakes coastal wetlands experts to develop basinwide indicators and implement a long term monitoring program. This binational Coastal Wetlands Consortium is tackling the difficult task of formulating monitoring protocols and determining what organizational structure is needed to sustain a long term program. Another example is the amount of funding set aside from ecological protection and restoration funds for the last two years to develop basinwide Great Lakes ecological indicators. This report gives direction to GLNPO in terms of future funding that has the potential to be as directed and helpful as the Consortium and indicator development.

Results from the 106 projects, along with several other important paradigm shifting activities, will inform GLNPO's funding criteria for ecological protection and restoration projects over the next years. The State of the Great Lakes Ecosystem Conferences (SOLEC) have focused binational efforts on developing indicators to assess ecosystem status, stressors, and human responses to these stressors. If indicator-informed reports show an area where GLNPO funding can protect areas from stress or restore degraded areas, funding criteria will be shifted accordingly.

SOLEC also introduced the concept of Biodiversity Investment Areas into the Great Lakes vernacular. Biodiversity Investment Areas are natural areas having high ecological value which warrant exceptional attention to protect them from degradation. Our roles in protecting these areas, with other partners, are to work within each area to identify ecological protection and restoration opportunities, to provide programmatic and financial resources to implement protection and restoration activities, and to continue to track the ecological status of each area so that management priorities adapt to changes in the landscape as a result of protection and restoration activities.

Finally, on a lakewide basis, Lakewide Management Plans (LaMP) have highlighted areas of ecologically important habitats regionally, and locally, Remedial Action Plans (RAP) have identified areas in need of protection and restoration. Working with LaMP and RAP partners, GLNPO has been attentive to ecosystem needs on a lake-by-lake basis.

More specifically, the following recommendations will serve to guide future GLNPO ecological protection and restoration funding:

- Balance funding between protection and restoration projects. Protection measures are less defined and would benefit from demonstrations in different locations and ecosystems. Funding for restoration needs to be targeted in places that will benefit most or toward new and innovative technique development. The balance must take into account urban versus rural needs and needs on a lake by lake basis.
- Balance funding between projects that build on previous work and that are new and may be somewhat risky. Keeping both options open will invite new ideas and at the same time allow good work to continue.
- Fund a limited number of scientific enquiries on specific topics in order to increase project success. Accompanied by on-the-ground activities, scientific studies will increase our knowledge of Great Lakes ecosystems as well as guide projects.
- Fund monitoring projects that have direct relevance for protection and restoration activities.
- Continue to fund outreach and information exchange as part of larger protection and restoration project goals and do a better job of collecting and disseminating products to a larger audience.
- Fund additional partnerships that will continue to explore how to strengthen the dynamic manager-community relationship for the purposes of improving ecological integrity and empowering individuals to understand ecosystem protection and restoration as part of civic responsibility.
- Continue to encourage volunteer participation in projects. Assist in prioritizing regions of the basin that have significant aquatic habitats and where agriculture may threaten these habitats.
- Promote projects such as The International Alvar Conservation Initiative as models for other ecosystem protection and restoration partnerships. Support the development of suites of Great Lakes indicators for forests, grasslands, islands, sand beaches and dunes, and other ecosystems. Target funding for native landscaping projects so that fragmentary landscapes are bridged and sources of plants and seeds are enhanced.
- Reaffirm and highlight Oak Savanna Recovery Plan goals. Provide support for aquatic river and stream projects that protect the most biodiversity-rich segments of Great Lakes rivers and streams.
- Continue to support projects in Areas of Concern that reaffirm Remedial Action Plan goals.
- Focus special efforts on encouraging Tribal projects on Tribal lands.



- Continue to co-sponsor conferences and workshops that encourage information exchange and problem solving.

A small amount of money can act as seed money to jump start or catalyze a project or even draw in other partners. This is good for local economies, first, because dollars are spent on jobs, and second, because protecting natural resources can actually boost the attractiveness of an area. It is also good because these projects are helping us to understand the Great Lakes ecosystem. To be sure, much is yet to be studied and learned, however, the progress made in our understanding should increase our abilities to make good land and water use decisions. People are interested in protecting and restoring their environment. They will spend their free time to support project activities. Volunteers are as yet an untapped resource. One final conclusion is that GLNPO funding of ecological protection and restoration projects is money well spent. Large scale improvements to ecosystems are direct results of project dollars.

The GLNPO Ecological Protection and Restoration Program has been successful in funding projects that have begun the process of protecting and restoring ecosystems, forming partnerships, and informing the public about the ecological treasures of the Great Lakes. Continued support is necessary to continue to impact Great Lakes ecosystem health.

