

Workshop Outcomes and Proceedings
*Sediment Reduction in the Great Lakes Basin:
A Strategic View*

Tuesday March 2, 2004

U.S. Geological Survey
Great Lakes Science Center
Ann Arbor, Michigan

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Workshop Outcomes and Proceedings

Sediment Reduction in the Great Lakes Basin: A Strategic View

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Introduction

On March 2, 2004, a basin-wide strategic planning workshop entitled, *Sediment Reduction in the Great Lakes Basin: A Strategic View*, was held at the U.S. Geological Survey (USGS) Great Lakes Science Center in Ann Arbor, Michigan. The workshop was sponsored by the U.S. Army Corps of Engineers (USACE), the Great Lakes Commission, and the National Association of Conservation Districts (NACD) Great Lakes Committee. Staff support was provided by the Great Lakes Commission. This “by invitation” workshop was designed for resource management professionals from government agencies, non-governmental organizations, and the private sector with an interest or involvement in soil conservation and sediment reduction efforts in the Great Lakes basin. The purpose of the workshop was to gain a better understanding of existing soil conservation and sediment reduction initiatives within the basin and to identify unmet needs and potential opportunities for effective coordination and collaboration to achieve sediment reduction throughout the Great Lakes and their connecting channels. The full-day event was attended by 42 individuals representing local, state, regional, federal, and academic interests within the basin. A participant list is available in Appendix A.

Plenary presentations addressed the use of applied research as a tool for assessing soil erosion and sedimentation, and strategic collaboration among soil conservation and monitoring programs in Indiana’s St. Joseph River watershed that drains to Lake Erie. The workshop agenda is available in Appendix B. Summaries of the day’s presentations are available in Appendix C. Attendees also participated in small breakout groups addressing such topics as developing regional sediment reduction goals, tools and methodologies for achieving them, data and information needs, implementation tools and collaborative ventures. Key points and ideas generated from these discussions were recorded and are available in Appendix D.

This document summarizes the preliminary findings and recommendations from the workshop and identifies potential regional courses of action for reducing sediment within the Great Lakes and their connecting channels.

The Importance of Setting Sediment Reduction Goals

Achieving reductions in erosion and sediment loading is an important goal in many locations and for many water bodies throughout the Great Lakes basin. Under the *Clean Water Act*, the Total Maximum Daily Load (TMDL) process is underway for tributaries to the Great Lakes. This process determines the maximum amount of specific pollutants, such as sediments, that a waterbody is able to receive while meeting water quality standards as established by the U.S. Environmental Protection Agency (USEPA). However this process has not yet been extended to the open Great Lakes or connecting channels. Therefore, there is a need to develop a procedure, consistent with that established for TMDLs, that will allow managers to set sediment reduction goals for the open lakes and connection channels.

Sediment and its associated contaminants have contributed to the long-term degradation of water quality and fish and wildlife habitat. Due to specific water quality concerns, particularly in regard to excessive levels of phosphorus, some sub-basins in the Great Lakes basin ecosystem have had an extensive history of rigorous goal setting for the reduction of phosphorus loading. Since much of the total phosphorus loading was particulate phosphorus associated with suspended solids, these goals have been most often pursued and achieved through reductions in agricultural sediment loading to tributaries. In some locations, such as Northwestern Ohio, significant reductions in sediment and phosphorus loading to Great Lakes tributaries have been achieved.

Though substantial progress has been achieved in some areas of the Great Lakes basin, sedimentation still adversely affects the waters of the Great Lakes. At some locations, even without obvious plumes of turbidity, persistent toxic substances are still transported downstream impacting fishery resources and elevating the cost of navigational dredging projects. Today we more fully recognize the adverse impacts from the considerable yield of sediment that occurs due to poorly controlled development projects in urbanizing areas.

Provisions of the revised Great Lakes Water Quality Agreement call for the development and implementation of programs and measures to reduce nonpoint source inputs of phosphorus, sediments, and toxic and microbiological contaminants in drainage from urban and rural land. Accordingly, consideration of the development of sediment load reduction goal(s) for tributaries that are impaired by sediment appears to be a necessary and productive task at this time.

A summary of related sediment and contaminant reduction initiatives outside of the Great Lakes region, including the Chesapeake Bay Restoration, the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force, the Lake Champlain Basin Program's interstate and binational effort to reduce phosphorous, the Great Plains Conservation Program, and the New York City Watersheds Whole Farm Program, is available in Appendix E.

Opportunities to Advance Sediment Reduction Priorities in the Great Lakes

Within the last year there has been a surge of attention to regional issues of the Great Lakes basin that has resulted in actions by the President, Governors, members of Congress, agencies and interest groups (see Appendix F for a summary of these actions). These actions and the level of interest surrounding them have created a unique opportunity to advance

priorities to reduce soil erosion in the basin and sediment loadings to the Great Lakes and connecting channels. As a result of these actions, it is possible that a new intergovernmental organization will be established to coordinate the Great Lakes activities of federal and state agencies. It is also possible that existing coordinative bodies may be re-energized or redirected to include sediment reduction as a priority.

Soil erosion, sedimentation, and diffuse sources of pollution are a priority problem for the Great Lakes as identified by numerous agencies such as the International Joint Commission (IJC), Great Lakes Commission, U.S. Department of Agriculture (USDA), U.S. Environmental Protection Agency (USEPA), Environment Canada, and the NACD. There is also a general understanding that existing programs to address this problem rely heavily on voluntary actions at the local level. Organizations and agencies associated with sediment reduction efforts in the basin should approach the following new and existing intergovernmental Great Lakes organizations to promote the actions identified in the findings and recommendations listed below:

- Regional Working Group of Great Lakes Interagency Task Force, created by Executive Order signed by President Bush on May 18 (EPA GLNPO lead);
- Council of Great Lakes Governors, Working Group tasked with coordinating Great Lakes Restoration initiative (Council staff);
- Association of Great Lakes/St. Lawrence Mayors (Great Lakes Cities Initiative);
- U.S. Policy Committee (EPA GLNPO lead).

Findings and Recommendations

Workshop participants were asked a series of questions regarding the research, data, information, tools, and processes that are needed to set sediment reduction goals. The list of questions and responses from participants is available in Appendix D. The project steering committee consolidated the outcomes from the breakout sessions into the following findings and recommendations.

Setting Goals

Research on Feasibility, Information and Methodology

Workshop participants raised many questions regarding the feasibility and process for setting sediment reduction goals for the Great Lakes basin. One of the key questions was whether or not it was feasible or appropriate to set a common sediment reduction goal for the basin. If so, should a single, uniform goal be set or should multiple goals be established that take into account local issues? Along the same lines, at what scale or scales should goals be set – the local, watershed, ecosystem, statewide, lake or basin? And finally, if a sediment reduction goal or goals are established, how might this affect other systems and activities? All of these questions center on the process and methods needed to set sediment reduction goal(s). In order to inform this question, a review of existing efforts to set goals for reducing sediment and other nonpoint source pollutants would be useful.

- ❖ **Finding: Research is needed to assess the feasibility and identify information and methodology requirements to establish a sediment reduction goal or goals for the Great Lakes and their connecting channels.**

Recommendation 1: Identify and review existing efforts to set goals for reducing sediment and other nonpoint source pollutants in order to inform the feasibility, information, methods and processes needed to establish a sediment reduction goal or goals for the Great Lakes and their connecting channels.

Identify and review existing efforts to set regional goals for the reduction of nonpoint source pollution, including the Chesapeake Bay Program Baywide Sediment Reduction Goal and the phosphorus reduction strategies mandated under the Great Lakes Water Quality Agreement. Existing and past efforts can provide guidance for setting a sediment reduction goal or set of goals for the Great Lakes and their connecting channels. Findings can be used to inform the feasibility, information, methods and processes needed to establish a sediment reduction goal or goals for the Great Lakes and their connecting channels.

Potential Lead Implementer: NACD Great Lakes Committee

Next Steps: Supported by a 2004 Great Lakes Basin Program for Soil Erosion and Sediment Control grant (*Great Lakes Sediment Reduction*) the NACD Great Lakes Committee will convene a subcommittee or workgroup that can conduct a review of existing sediment and other nonpoint source pollutant reduction efforts both within and outside of the Great Lakes basin. This review will include an analysis of the Chesapeake Bay Program sediment reduction effort and others as appropriate.

Regional Coordination

When asked to identify a process for developing and implementing sediment reduction goal(s), workshop attendees expressed concern about the scope of the issue. Issues of concern included: coordinating input from agencies and organizations with mandates relevant to sediment reduction; generating adequate financial and political support; researching, evaluating and integrating existing reduction goals; and generating public awareness and support for the goal setting process. As a result, the workshop participants identified a series of characteristics that the process should incorporate. It should be regional in scope, include Canadian participation, and represent all levels of government, including local entities. Participants in the process should be able to guarantee participation of their organizations in working toward meeting sediment reduction goals, perhaps through a signed agreement or other mechanism. Noting the extent of ecosystem-based activity already occurring in the Great Lakes and their connecting channels, attendees wanted to ensure that this process be inclusive but not duplicative of activities already underway.

- ❖ **Finding: A multi-jurisdictional process should be established to examine the sediment reduction issue, including the convening of task forces that will**

develop and make recommendations for implementing sediment reduction goal(s) for the Great Lakes and their connecting channels.

Recommendation 2: Establish a regional technical task force charged with developing sediment reduction goal-setting methodology.

Recommendation 3: Establish a regional policy task force charged with developing policy recommendations for implementation.

Task forces should be established to 1) define the scope of the problem; 2) answer technical questions; 3) answer socio-economic questions; 4) refine a goal or goals for sediment reduction; 5) develop an implementation strategy; and 6) examine policy recommendations for implementation. Alternatively, task force activities could be incorporated into the mandate of an existing body, such as the NACD Great Lakes Committee, a subgroup of the Great Lakes Interagency Task Force (Executive Order 13340: May 18, 2004), or a subgroup of the Lakewide Management Plans (LaMPs).

It is important that these activities are coordinated with and build upon existing organizations and processes, such as the LaMPs, State of the Lake Ecosystem Conference (SOLEC), and Joint Strategic Plan Lake Committees. It is also important that all relevant stakeholders be involved in discussions of technical and policy issues, including federal, state/provincial and regional agencies and organizations with representation from groups that reflect local issues and/or concerns. Potential partners include, but are not limited to: IJC, Joint Strategic Plan Lake Committees, LaMP managers, state agencies, NACD, Great Lakes Commission, nongovernmental organizations, and universities.

Potential Lead Implementer (Recommendation 2): NACD Great Lakes Committee

Next Steps: The NACD Great Lakes Committee will establish a regional technical task force to develop a sediment reduction goal-setting methodology and recommendations for implementation of sediment reduction goals. This task force will include representatives from a variety of entities including academia; regional, state, and local agencies; and governmental and non-governmental organizations. The task force may establish topical subgroups to focus on particular issues areas such as modeling and decision support systems, data and information, BMPs, implementation and other issues as they arise.

Potential Lead Implementer (Recommendation 3): A regional entity with the ability to convene a policy-based task force (e.g., Great Lakes Commission, IJC)

Next Steps: The appropriate regional entity will convene a regional task force to develop policy recommendations for implementing a Great Lakes sediment reduction goal or goals based upon the work of the technical committee identified above.

Data and Information Needs

Sources and Loads

Workshop participants agreed that there were critical data and information gaps that must be addressed in order to establish sediment reduction goals and implementation strategies for the Great Lakes and their connecting channels. The first key information gap relates to the current status of erosion and sedimentation in the Great Lakes basin. There are no precise measurements of how much soil is eroding in the basin and being deposited in the Great Lakes. A better understanding is needed of the quantity of soil that is eroding, the rate at which it is eroding, the spatial distribution of primary sources of sediment, the projected sediment load to the Great Lakes and their connecting channels, and the environmental and economic impacts of this erosion and sedimentation.

The recent U.S. General Accounting Office (GAO) report on monitoring restoration efforts in the Great Lakes basin titled, *Great Lakes: A Comprehensive Strategy and Monitoring System Are Needed to Achieve Restoration Goals* (2004), emphasizes this need. The GAO report found that the lack of consistent, reliable information and measurement indicators makes it impossible to comprehensively assess restoration progress in the basin. Simply put, the lack of scientifically valid and reliable information makes it impossible to establish clear goals, develop effective action strategies, and monitor restoration progress.

- ❖ **Finding: There is a lack of data and information needed to establish sediment reduction goals for the Great Lakes and their connecting channels.**

Recommendation 4: Identify advanced modeling techniques and data needs to calculate soil erosion, sediment delivery ratio, and sediment load for watersheds in the Great Lakes and their connecting channels.

Unfortunately, monitored sediment data is not readily available for many watersheds. For this reason, it is important that modeling techniques be used to calculate soil erosion, sediment delivery ratios, and sediment loads for watersheds. Feedback resulting from this task will be used to inform the tasks listed under Recommendation 5.

Potential Lead Implementer: USEPA Region 5 through the Midwest Spatial Decision Support System Partnership (Midwest Partnership)

Next Steps: The Midwest Partnership will work with the regional technical task force established by the NACD Great Lakes Committee to bring together entities such as the USDA's Agricultural Research Service (ARS) and Natural Resources Conservation Service (NRCS), the USACE, the USGS, universities, and state agencies to identify the types of data and information that would be required to develop sediment reduction goals.

Recommendation 5: Conduct an inventory of data and information on erosion and sedimentation and identify any remaining critical data and information gaps that must be addressed before establishing sediment reduction goals.

In order to assess the current status of erosion and sedimentation, a thorough inventory should be conducted to determine what data is available and what data gaps exist. This should include all data types that could inform the 1) identification of sources; 2) quantification of erosion rates, sediment delivery ratios, and sediment loads; and 3) assessment of environmental and economic impacts. Examples include baseline data on sediment erosion rates and sediment loads, soils data, stream hydrology and flow data, baseline water quality and habitat data, climate data, demographic and land use data, information on the use of conservation tillage and other best management practices, among others.

As part of this inventory, information will be included summarizing what is currently known about the data and information needs and identified gaps related to sediment reduction.

Potential Lead Implementer: Great Lakes Commission

Next Steps: Building upon Recommendation 4, the Commission will work with the regional technical task force and relevant subgroups to conduct an inventory of the data and information that has been identified as essential for developing sediment reduction goals. The inventory would also identify any data gaps that must be addressed prior to/while developing sediment reduction goals.

Environmental and Economic Impacts

Available data and information do not allow for a comprehensive assessment of sediment impacts and progress toward mitigating damages from sediment. In short, little is known about the environmental and economic impacts of sediment over the entire Great Lakes basin. The 2004 GAO report on the monitoring of restoration efforts in the basin states that over \$3.5 billion has been spent on environmental restoration activities in the basin over the last decade. Program expenditures specific to sediment are not available for the region, but some national assessments have been conducted.

Researchers have estimated that erosion causes \$44 billion in damages each year in the United States and that it would take an investment of \$6.4 billion per year to reduce U.S. erosion rates to a sustainable rate (Pimental et al. 1995, 1995 dollars). Without adequate data and information, it is impossible to determine overall progress toward reducing sediment and achieving environmental and economic gains. It is also impossible to ensure that limited resources are being used effectively.

Environmental Impacts:

The first and only broad scale review of erosion and sedimentation in the Great Lakes basin was conducted in the late 1970s in a series of studies conducted by the International Joint Commission's Pollution from Land Use Activities Reference Group

(PLUARG) known as the PLUARG reports. The PLUARG reports were the first to document in detail the water quality impacts associated with land use and were one of the first significant acknowledgements of the need to move beyond point sources of pollution to consider nonpoint sources. There has been no significant assessment of erosion and sedimentation in the Great Lakes basin since this time.

In 1998, as a follow-up to the PLUARG reports, the IJC convened a workshop to assess the status of nonpoint source pollution control in the Great Lakes basin and review progress toward addressing nonpoint source pollution. The workshop participants concluded that the PLUARG reports and their associated recommendations “represented a state-of-knowledge that has remained unchallenged in the intervening 20 years.” They also concluded that the original recommendations are still valid and appropriate, but should be reevaluated and adapted, where necessary, to address emerging issues and changing land use patterns.

There are several initiatives planned or underway that address the environmental impacts of sediment. The IJC’s 2001-2003 Priorities and Progress under the Great Lakes Water Quality Agreement report recommended that the Parties undertake a major binational investigation and research effort (similar to a reference study) on the effects of urban and urbanizing development on Great Lakes water quality and develop a comprehensive response to these effects. Efforts are currently underway by the IJC to address key issues related to urbanization, though this will not likely be on the scale of a reference study such as PLUARG. While erosion is viewed as an important issue, it is not the key focus of this initiative.

The Great Lakes Commission is organizing a workshop for fall 2004 that will focus on land use issues and nonpoint source pollution, including erosion and sedimentation. The objectives of this workshop are to review progress toward meeting PLUARG recommendations; discuss current trends and emerging issues; identify and develop specific projects that address key issues and unmet needs; and identify opportunities for advancing an aggressive regional agenda in land-use management and nonpoint source pollution control.

❖ **Finding: The environmental impacts of erosion and sedimentation are largely unknown in the open Great Lakes and their connecting channel.**

Recommendation 6: Document and describe environmental impacts of erosion and sedimentation in the Great Lakes and their connecting channels.

It is unlikely that a full scale reference study, similar to the size and scope of the original PLUARG reports, will be initiated in the near future. In light of this, efforts should be made to build upon the IJC, NACD, and other regional initiatives to document and describe the environmental impacts of erosion and sedimentation in the Great Lakes and their connecting channels. Special focus

should be given to the information needed to develop sediment reduction goals, so that a direct link between sediment and its impacts can be demonstrated.

Potential Lead Implementer: Implementation of this recommendation should include a multi-jurisdictional approach involving governmental agencies, research institutions, and non-governmental organizations.

Next Steps: Identify potential participants.

Economic Impacts:

There have been no comprehensive studies that have documented the monetary costs of erosion and sedimentation in the Great Lakes basin. The total monetary costs of damages from erosion and sedimentation are largely unknown. A number of studies, conducted within and outside the basin, can shed light on the economic costs associated with sediment, however these are typically site-specific in nature. The Great Lakes Commission is developing a briefing paper on the economics of soil erosion in the Great Lakes basin that documents research and current knowledge in this area for the basin.

❖ **Finding: The economic impacts of erosion and sedimentation are largely unknown for the Great Lakes and their connection channels.**

Recommendation 7: Conduct a comprehensive analysis of the economic impacts of sediment in the Great Lakes and their connecting channels.

Building upon the Great Lakes Commission briefing paper on the economics of soil erosion in the Great Lakes basin, a comprehensive analysis of the economic impacts of sediment for the Great Lakes and their connecting channels should be conducted. This analysis should occur initially on a tributary-by-tributary basis and then be applied on a lake-wide basis.

Potential Lead Implementer: The Great Lakes partnership between the USACE, Great Lakes Commission, USDA-NRCS, National Oceanic and Atmospheric Administration, and state coastal zone management programs.

Next Steps: Establish an interdisciplinary team of resource managers, economists, and coastal zone experts.

Implementation Needs

Workshop participants were asked to identify existing tools and unmet needs for reaching sediment reduction goals. Due to time constraints, most of the discussions focused on unmet needs. Some of the needs that were identified are specific to addressing a regional sediment reduction goal, but most have relevance for any sediment reduction effort. Identified needs centered on five key areas: 1) resource needs; 2) programmatic and policy needs; 3) institutional arrangements; 4) decision-support needs; and 5) education and outreach needs. Each of these is described below.

Resource Needs

Workshop participants noted that the quality of the work and the capacity to reduce sediment was contingent upon available resources. Human resources, adequate staffing and adequate funding are essential for both sediment reduction programs and enforcement efforts.

- ❖ **Finding: Federal, state and local agency efforts to reduce sediment are restricted by lack of human and financial resources.**

Recommendation 8: Work with Congress and state legislatures to identify opportunities for increased support for sediment reduction efforts.

Potential Lead Implementer: NACD Great Lakes Committee and the Great Lakes Commission

Next Steps: The NACD Great Lakes Committee will continue to communicate with legislators at the state and federal levels, with increased emphasis on the importance of sediment reduction efforts within the Great Lakes and their connecting channels. The Great Lakes Commission will consider the opportunity to adopt the identified priorities as part of its annual legislative and appropriations package.

Programmatic and Policy Needs

Participants cited a need to review, and revise where necessary, existing guidelines and regulations, including the Clean Water Act (CWA), Water Resources Development Act (WRDA) drainage codes and laws, and land use regulations. A need for stronger regulations and better enforcement of existing regulations was also identified, as well as the need for tighter guidelines for existing programs such as CWA Section 319 and the Conservation Reserve Program), Environmental Quality Incentives Program, and Conservation Security Program under the 2002 Farm Bill. In the area of funding, participants identified the need for better targeting and distribution of funding, including targeting critical areas (both key geographic and issue areas), providing funding for problem prevention, and providing monetary incentives for sediment reduction performance.

- ❖ **Finding: Existing programs and policies have been effective at reducing erosion, but they need to be reviewed and revised, where necessary, so that they are more flexible to meet waterbody-specific priorities.**

Recommendation 9: Conduct a comprehensive review of state and federal erosion and sedimentation policies and programs to identify deficiencies and gaps in current efforts.

Potential Lead Implementer: Great Lakes Commission

Next Steps: In cooperation with the regional policy task force and relevant subgroups, the Commission will conduct a comprehensive review of state and federal erosion and sedimentation policies and programs to identify existing gaps. Outcomes from this review will inform the task stated in Recommendation 10.

Institutional Arrangements

Workshop participants cited the need for better integration and coordination among agencies in order to work more effectively and efficiently together; transcend political boundaries; and foster consistency between sediment reduction efforts. Specific needs that were cited include the need to integrate erosion control efforts with watershed planning, land use planning and community-based planning initiatives, and the need to adopt innovative zoning practices to advance land use reform.

The recent Presidential Executive Order establishing the Cabinet-level Great Lakes Interagency Task Force to coordinate Great Lakes restoration demonstrates that there is a great need for coordination throughout the basin on a variety of issues. The recent 2004 GAO report on monitoring restoration efforts in the Great Lakes basin supports this conclusion as well, as it documents how this lack of coordination has hindered assessment and restoration efforts in the basin.

- ❖ **Finding: There is a need for better coordination and integration among organizations to advance sediment reduction efforts.**

Recommendation 10: Develop recommendations for integrating erosion control and sediment reduction programs and policies with local and regional planning efforts.

Potential Lead Implementer: Great Lakes Commission.

Next Steps: Building upon the findings and outcomes of Recommendation 9, the Commission will develop recommendations for addressing any existing gaps and integrating erosion control and sediment reduction programs and policies with local and regional planning efforts. This task will be completed in the form of a white paper.

Decision Support Needs

Decision support needs focus on monitoring, modeling, and data accessibility. Monitoring needs include the installation of streamflow gauges and sediment gauges throughout the basin. There is also a need to expand authorities and funding under existing programs that address sediment reduction to include a monitoring component and to provide for data collection activities, such as the WRDA 1996 Section 516(e) program (Great Lakes Tributary Modeling Program). There is also a need to monitor best management practices (BMPs) for effectiveness. In addition, a monitoring plan is also needed to determine how much reduction has occurred to track progress toward meeting goals, building upon scientifically sound, environmental indicators. Modeling needs include sediment transport models; better modeling of aquatic communities and populations; and models of different land uses. Data accessibility needs include the need for a single database that can be accessed by anyone in the basin, along with coordination of collection protocols and methods to enhance data transferability. These efforts should tie into existing modeling and data management initiatives, such as the USGS Great Lakes Aquatic GAP analysis, Michigan State University's Digital Watershed and other web-based modeling tools, the Great Lakes Tributary Modeling Program [WRDA 1996 Section 516(e)], and the Great Lakes Observing System (GLOS).

The 2004 GAO report on the monitoring of restoration efforts in the basin strongly emphasizes the need for a basin-wide monitoring system to comprehensively assess restoration progress in the basin, as well as the development of indicators to assess progress. According to the report, lack of coordination toward these efforts thus far has impeded restoration efforts in the basin. The report is somewhat critical of existing efforts to coordinate monitoring and indicator development and describes them as ad hoc and uncoordinated. The report recommends developing an overarching strategy to improve coordination and ensure that federal dollars are effectively spent.

- ❖ **Finding: There is a need for more comprehensive monitoring, better modeling, and greater access to data and, particularly, spatial decision support systems to optimize and implement sediment reduction strategies.**

Recommendation 11: Develop a monitoring framework for erosion and sedimentation that produces scientifically sound information, supports timely and effective decisionmaking, and builds upon SOLEC and other indicators.

A monitoring framework for erosion and sediment should be developed to support management and decisionmaking. As part of this effort, information sharing protocols and standards should be developed and promoted, along with the development and maintenance of a publicly accessible database. Activities under this recommendation should tie into related initiatives to ensure consistency and coordination, such as the cabinet-level task force should be charged with coordinating Great Lakes restoration and actions taken in response to the GAO report to develop a comprehensive Great Lakes strategy. This effort should also build upon indicator development work under SOLEC, and other initiatives such as GLOS to ensure consistency with other programs. In addition to a monitoring framework, efforts should be made to support the development and transfer of models and systems to assist research, management, planning and policy.

Potential Lead Implementer: Great Lakes Observing System

Next Steps: The Indicators and Information Strategy Team will be developing a strategy to address the Great Lakes Governors' Priority to "standardize and enhance the methods by which information is collected, recorded and shared within the region." This strategy will be presented to the Collaborative in May 2005 and completed by May 2006. The strategy will include, but is not limited to, indicators, monitoring, data standards, reporting of environmental information, Great Lakes Observing System (GLOS), LaMPs, and the SOLEC process. Emphasis will be on strengthening decision support systems.

- ❖ **Finding: There is a need to review and potentially expand authorities and funding under existing programs that address sediment reduction to include a monitoring component and to provide for data collection activities.**

Recommendation 12: Identify opportunities to develop new, amend or revise authorizing language for legislation addressing sedimentation to include authority to collect the appropriate scientific data for monitoring water column sediment levels. This will enable relevant agencies to assess program effectiveness for Great Lakes and connecting channels sediment reduction.

Funding and authorization for data collection and monitoring is often limited or non-existent. Yet monitoring and data collection are critical for targeting implementation activities and assessing progress. Efforts should be made to amend or revise programs and policies where monitoring and data collection limitations exist.

One example is the WRDA 1996 516(e) program to develop sediment transport models to inform the placement and types of sediment reduction BMPs within watersheds. Funding and authority under the current WRDA legislation limits data collection and assessment activities for the 516(e) program. Expanded funding and authority for data collection would increase program efficiency and effectiveness as it allows for evaluation of progress and recalibration of models in response to evaluation outcomes.

Potential Lead Implementer: NACD Great Lakes Committee and the Great Lakes Commission

Next Steps: The NACD Great Lakes Committee will continue their communications with legislators at the state and federal levels, with increased emphasis on amending or revising authorizing legislation for programs that address sediment reduction within the Great Lakes and their connecting channels to allow for the collection of data and monitoring. The Great Lakes Commission will consider the opportunity to adopt the identified priorities as part of its annual legislative and appropriations package.

Education and Outreach Needs

Education and outreach needs were recognized as a significant component of any goal development process. People need to be aware of the issue and bought into process to ensure that there is sufficient support. This is especially important due to the fact that implementation of erosion reduction practices is often voluntary and can be costly. Workshop participants recognized a need to raise awareness of the issue and educate landowners on the benefits of soil reduction. An understanding of the public's perception and awareness of the issue would be useful to move forward with education and outreach initiatives.

- ❖ **Finding: Public education and outreach are critical to the successful implementation of sediment reduction goals.**

Recommendation 13: Develop a Great Lakes regional education and outreach strategy to raise awareness of erosion and sedimentation issues and build support for sediment reduction efforts.

A regional education and outreach strategy should be developed, in conjunction with relevant agencies and organizations to develop awareness within communities and organizations in the Great Lakes basin of the impact of erosion and sedimentation. An important first step should be to conduct a needs assessment of basin residents to assess their awareness and understanding of erosion and sediment issues. An important component of this strategy should be to educate basin residents and organizations on practices and behaviors that they can be implemented to control erosion. Providing education materials and doing public outreach at workshops and conferences should also be a part of this strategy. This strategy should build upon existing education initiatives that address education and outreach at the local level and ensure there is a balance between local and regional outreach needs.

Potential Lead Implementer: Great Lakes Commission, NACD Great Lakes Committee and the USDA's Cooperative Extension Service and Sea Grant

Next Steps: The Commission should lead the information and education activities at the regional level, while the NACD Great Lakes Committee should work through the Districts to undertake the information and education activities at the local level. These activities should be closely coordinated.

Conclusion

“Sediment Reduction in the Great Lakes Basin: A Strategic View” provided a forum to explore the scope of existing soil conservation and sediment reduction initiatives for the Great Lakes and their connecting channels. Participants identified unmet needs and potential opportunities for effective coordination and collaboration to achieve sediment reduction in the system. An important workshop finding is the need to set scientifically valid and measurable reduction goals as a means to measure sediment reduction progress. It was clear from participant input, that establishing a goal setting process is the first step in making this happen. However, it was also clear that there are significant data and information needs, including those required to underpin a strong decision-support mechanism. Participants also identified specific implementation needs including tools such as legislation, policy and programs, communication and outreach requirements, institutional arrangements, and both short and long-term funding.

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Appendix A

Sediment Reduction in the Great Lakes Basin: A Strategic View

Great Lakes Science Center
March 2, 2004

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Appendix B

Sediment Reduction in the Great Lakes Basin: A Strategic View

Tuesday March 2, 2004

Sponsored by: U.S. Army Corps of Engineers and the NACD Great Lakes Committee
Assisted by: Great Lakes Commission

U.S. Geological Survey
Great Lakes Science Center
1451 Green Road
Ann Arbor, Michigan 48105

8:30 a.m.	Welcome and Opening Remarks	Jan Miller, U.S. Army Corps of Engineers
8:40 a.m.	Introduction and Overview	Scott Hoese, NACD Great Lakes Committee Chair, and Tom Crane, Great Lakes Commission
9:00 a.m.	Using Applied Research as a Tool for Assessing Soil Erosion and Sedimentation in the Great Lakes Basin	Jon Bartholic and Da Ouyang, Institute of Water Research (Michigan State University)
9:45 a.m.	Break	
10:00 a.m.	Strategic Coordination Among Soil Conservation and Monitoring Programs in the St. Joseph River Watershed: A Tool for Sediment Reduction	Panel: Larry Clemens, The Nature Conservancy; Greg Lake, Allen County SWCD; Mary Jane Slaton, City of Fort Wayne; Jane Loomis, St. Joseph Watershed Initiative; Linda Schmidt, Indiana Dept. of Environmental Management; Ruth Shaffer, USDA-NRCS Moderated by Gary Overmier, Great Lakes Commission
12:30 p.m.	Lunch	Lunch will be provided on-site.
1:15 p.m.	Review of Objectives for Afternoon Sessions	Christa Jones, NACD
1:25 p.m.	Facilitated group discussion to evaluate sediment reduction and coordination needs within the Great Lakes basin. Main points from morning panel session will be discussed in greater detail.	All participants
3:00 p.m.	Break	
3:15 p.m.	Break Out Group Reports	Tom Crane
4:00 p.m.	Summary and Next Steps	Jan Miller and Gary Overmier
4:30 p.m.	Adjourn	

Appendix C

Summary of Presentations

Plenary Presentation:

Using Applied Research as a Tool for Assessing Soil Erosion and Sedimentation in the Great Lakes Basin

Presenters: Jon Bartholic and Da Ouyang, Michigan State University's Institute of Water Research (IWR)

This presentation discussed the results of IWR's recent study titled *Soil Erosion and Sediment Assessment in the Great Lakes Basin*, as well as various tools that can be applied by water resource professionals as they develop a watershed approach to land use decisionmaking.

Ouyang provided an overview of the methodology and objectives of the IWR study. This research effort used GIS-based erosion and sediment delivery models to estimate the potential sediment loading from agricultural croplands throughout the basin based on varying farming practices and scenarios. Over 100 8-digit hydrologic unit code (HUC) sub-watersheds from the Great Lakes basin were analyzed. This study also identified those watersheds within the basin which may act as potentially high contributors of sediment to the Great Lakes, including the Maumee River (Ohio and Indiana), Seneca River (New York), Grand River (Michigan), Saginaw River (Michigan) and others. Comparisons were then completed between sediment contribution figures predicted by the model and actual quantities of dredged materials removed from corresponding harbors. Predicted reductions in sediment contribution were also calculated for various types of farming practices such as no-till, reduced tillage, and conventional tillage.

Bartholic and Ouyang then demonstrated the Digital Watershed tool, a web-based interactive GIS system developed by IWR. This tool has been created as a potential way of distributing land use and soil erosion information to local decisionmakers. Users can retrieve site-specific information on a variety of parameters for a particular address or 8-digit HUC watershed, including agricultural erosion levels, elevation data, state soils data, locations of rivers and other water bodies, and other data and information.

To date, the Digital Watershed tool can be used to access basic data across the entire United States; however, more detailed information is currently only available for the state of Michigan and erosion data is only available for the Grand River watershed. This tool may be expanded to include additional detailed data for the entire Great Lakes basin, based on available data and current and future partnerships with the U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, and Purdue University.

In the future, users may also have the capability of identifying a particular site with the Digital Watershed tool, submitting a request for additional information to IWR, and then receiving site-specific calculations based on existing and proposed farming or land use practices. This type of evaluation could help to determine drainage pathways and predicted contributions of soil into nearby water bodies for that particular site, and then calculate potential reductions in erosion based on the placement of buffer strips or other soil

conservation mechanisms. This type of modeling approach will also be useful for application in smaller watersheds and subwatersheds.

Formal findings from IWR's study, *Soil Erosion and Sediment Assessment in the Great Lakes Basin*, have not yet been published. However, the Digital Watershed information tool can be accessed at www.iwr.msu.edu/dw.

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Panel Session:

Strategic Coordination Among Soil Conservation and Monitoring Programs in the St. Joseph River Watershed: A Tool for Sediment Reduction

Panelist: Larry Clemens, The Nature Conservancy

Subject: Fish Creek and Upper St. Joseph River Project

This presentation focused on the sediment and erosion problems and solutions encountered by project partners within the Fish Creek and Upper St. Joseph River watersheds, which are located along the state lines of Indiana and Ohio. Two major concerns within these watersheds are agricultural runoff and sedimentation, which are mainly due to the altered hydrology and alteration of the lands to make them suitable for agriculture. Fish Creek, a subwatershed of the St. Joseph River, is known as one of the most biologically diverse streams within the Great Lakes basin with 31 species of muscels and 43 species of fish.

In 1988, a study was completed by researchers at the Ohio State University and Ohio Department of Natural Resources which looked at the muscels and aquatic biodiversity within the St. Joseph River basin. This study helped to highlight critical areas negatively impacting the watershed's biodiversity, the greatest of which was the Fish Creek subwatershed. From this research, a partnership was formed between several state and federal agencies and other organizations with an interest in Fish Creek. In 1992, The Nature Conservancy was chosen by the partnership to lead the Fish Creek project.

According to Clemens, an adaptive management conservation approach was used to set priorities, develop strategies, take conservation action, measure success, and then reassess and set new priorities. A strategic plan was developed for the Fish Creek and Upper St. Joseph River Project, highlighting the project strategies of targeting critical habitat areas, conservation tillage, reforestation, Amish animal waste management, headwater habitats, and building local capacity.

An Ohio Department of Natural Resources AGNPS model assessment was completed for the watershed, which enabled project partners to prioritize critical areas. From this assessment, it was determined that conservation tillage could provide significant results and

help to achieve sediment reduction within the watershed. Conservation action was then taken by the implementation of traditional soil conservation best management practices (BMPs) within the watershed.

In assessing success within the watershed, it was recognized that key environmental factors and ecological thresholds for freshwater systems still need to be identified; assessments are needed of where, within a watershed, restoration and other conservation practices will provide the greatest benefits; a wider range of well-studied economic incentives, alternative farming practices and land uses should be identified; and an assessment must be completed of how and where to deploy land use practices and in what combinations to achieve the project goals at the lowest cost. After this 10-year project, results have shown that the BMPs that have been implemented in the watershed are indeed critical and may actually be maintaining the current biological system.

The project partners are now refocusing and setting new priorities. To ensure long-term viability of the biodiversity within Fish Creek, two-stage ditch design is being investigated for implementation within the watershed as a type of drainage system that is both functional and provides a benefit to the ecosystem. Studies are also needed to identify the sediment tolerance levels for certain species. According to Clemens, a broader range of economic incentives and alternative farming practices and land uses for farmers must also be considered to achieve the project goals.

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Panelist: Greg Lake, Allen County SWCD

Subject: Linking Partnerships and Opportunities to Programs

In response to a 1995 report by the Environmental Working Group titled *Weed Killers by the Glass*, a partnership now known as the St. Joseph River Watershed Initiative, was formed to address the report's findings that the City of Fort Wayne had the highest number of detectable pesticides and the second highest concentration of atrazine of all cities sampled in the United States. To address the concern about pesticide levels in the water, the partnership was able to look upstream to try to mitigate the problem by attempting to reduce loads coming down the river rather than having to address the pesticides after they had already been introduced into the water supply. The St. Joseph River Watershed Initiative is housed with the Allen County SWCD and includes representation from the City of Fort Wayne, soil and water conservation districts, natural resource conservation agencies, industries, and other interested organizations and groups within the Cedar Creek watershed. This partnership has fostered open communication and cooperation among stakeholders.

The St. Joseph River Watershed Initiative first identified four water quality concerns, including pesticides, pathogens, nutrients, and sediment, which led to a three-year baseline

study of water quality in 1996, 1997, and 1998, to try to identify the true cause of the pesticides in the water. Following the baseline analysis, the Initiative then developed a strategic plan to identify strengths and weaknesses, and a watershed management plan to identify resource needs and support smaller, localized watershed plans through staff, programs, water quality monitoring, and financial assistance when possible.

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Panelist: Mary Jane Slaton, City of Fort Wayne

Subject: Strategic Coordination - A Tool for Sediment Reduction

The City of Fort Wayne and surrounding areas depend on the St. Joseph River to supply water for over 200,000 people. In order to supply a consistent and high-quality product to its water customers, the City of Fort Wayne must be aware of physical (e.g., pesticides, pathogens, nutrients, sediment) and perceptual (e.g., color, odor, taste, reputation) characteristics affecting water quality. Of these characteristics, sediment and turbidity act as primary indicators for the quality of the water and can be a general indicator of the effectiveness of the city's water treatment process.

The city is interested in the quality of water reaching the city's water treatment systems because the lower the quality of water, the more difficult and costly it is to treat. Managing turbidity costs the city about \$300,000 annually in chemical costs, with \$140,000 budgeted annually to rebuild one filter per year. Sediment reduction would help to limit siltation in the city's water impoundment areas and prevent additional expenditures to remove the sediment. To counteract sediment and turbidity within the St. Joseph River and to achieve a reduction in treatment costs, the city joined a multiple barrier approach with other partners in the watershed. To reach out to the upper St. Joseph River watershed, the city contacted the Allen County Soil and Water Conservation District and has partnered with the St. Joseph River Watershed Initiative to make contacts throughout the watershed and to educate citizens.

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Panelist: Jane Loomis, St. Joseph River Watershed Initiative

Subject: Current St. Joseph River Watershed Initiatives Projects

This presentation focused on the importance of partnerships to achieve watershed goals. Loomis suggested that partnerships are important to increase the reach of individual organizations; tune into local politics; develop appropriate solutions to problems; take advantage of more funding options; attract more volunteers; and utilize expertise in science, technology, and experience. Examples of St. Joseph River Watershed Initiative (SJRWI) partnerships are their water sampling and monitoring programs. This effort has been supported by several federal Clean Water Act (CWA) Section 319 grants through the Indiana Department of Environmental Management (IDEM); the City of Fort Wayne laboratory provides the analysis for the samples (testing for pesticides, nutrients, bacteria, and sediment); and then the water quality data is made available to the public. Other recent or ongoing partnership projects include the following:

- CWA Section 319 (IDEM): Water Sampling, outreach education (’98-2002)
- Great Lakes Aquatic Habitat Fund: River Friendly Farmer Program (’98-99)
- U.S. Environmental Protection Agency (U.S. EPA) Great Lakes National Program Office: Farmer-to-Farmer (’99-2002)
- Great Lakes Commission: Farmer-to-Farmer (2002-2003)
- The Nature Conservancy/Monsanto: Project Administration (2000-2003)
- Fort Wayne Community Foundation: Bacteria Source Tracking Project startup (2001)
- CWA Section 205(j) with City of Fort Wayne: Data and Geographic Information System data (2002-2003)
- CWA Section 319 Water Sampling, Watershed planning, BST (2002-2004)
- U.S. Department of Agriculture (USDA) Agricultural Research Service/America’s Clean Water Foundation: Source Water Protection Initiative (2002-2006)
- CWA Section 319 Conservation Tillage (2002-2004)

Future plans for the SJRWI include watershed management plans for the Lower St. Joseph and Bear Creek watersheds, installation of BMPs and additional conservation tillage, continued Farmer-to-Farmer outreach, work to reduce pathogens within the watershed, convening a drainage conference, volunteer monitoring through Hoosier Riverwatch, and habitat restoration.

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Panelist: Linda Schmidt, Indiana Department of Environmental Management

Subject: Watershed Planning Hoosier-Style – Indiana’s Approach to the Planning Process

Within the state of Indiana, the Indiana Department of Environmental Management (IDEM) works to encourage communities to establish watershed initiatives within the state.

IDEM has been funding watershed work since 1992 through the Clean Water Act (CWA) Section 319 to reduce nonpoint sources of pollution and to help watersheds meet state water quality standards. IDEM project managers are now responsible for watershed areas instead of counties within the state. Roughly 50 local or regional groups are either in the planning process or already have a watershed plan. Often, these plans are sponsored by soil and water conservation districts, regional planning commissions, environmental organizations, conservancies, lake associations, cities, and county governments. Many of these plans are driven by total maximum daily load (TMDL) work; however, IDEM would like to begin working with watersheds earlier in the effort.

Projects need money and manpower to be able to complete monitoring, coordination, and analysis within their watershed. The largest source of funding for watershed planning in Indiana is the CWA Section 319 grant program. Support for monitoring and analysis can also be provided by the Indiana Department of Natural Resources' Lake and River Enhancement (LARE) program. Other types of financial support can include energy companies, planning commissions, or non-governmental organizations. Plan implementation support can come from the Environmental Quality Incentives Program (EQIP), LARE, CWA Section 319, and other local funders.

Technical assistance, if funded through IDEM, is available in the form of project managers, watershed specialists, and IDEM's *Watershed Planning Guide*. In order to apply for Section 319 funding, watershed plans are required to meet a checklist based on Natural Resources Conservation Service (NRCS) planning principles, EPA guidance, and IDEM program experience. Once the watershed plan has been approved by the NRCS, IDEM project manager, and IDEM Section Chief, the project is then eligible to apply for Section 319 funding, and with additional items, to apply for LARE Land Treatment money. One challenge to date has been following the EPA guidance for their elements of the watershed plan checklist; IDEM is now using EPA's most recent 2003 guidance. If a watershed plan does not meet all elements of the checklist, IDEM will work with the group to meet those remaining elements so that they can reapply. It has been found that a good coordinator can help to facilitate the process and provide needed support for these types of projects.

Sediment is one of the parameters most consistently identified in watershed plans as a cause of impairment. Other impairments such as *E. coli*, high bacteria counts, and impaired biological communities can also be related to sediment. Indiana does not have water quality standards for sediment. Thus, reduction targets are generally set locally.

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Panelist: Ruth Shaffer, USDA-Natural Resources Conservation Service

Subject: About the USDA-NRCS

The NRCS provides leadership in a partnership effort to help people conserve, maintain, and improve our natural resources and environment. The NRCS partners with conservation districts, local and state government agencies, private landowners, other USDA and federal agencies, and tribal entities to provide technical assistance based on sound science. This assistance is tailored to meet customer needs on a voluntary basis and can be geared towards soil, water, air, plants, animals, and conservation planning.

The NRCS directs four cost-share programs related to watershed efforts and sedimentation, including the Environmental Quality Incentives Program (EQIP), the Wildlife Habitat Incentives Program (WHIP), Watershed Protection Projects (PL-566), and the Emergency Watershed Protection (EWP) program. Other programs include the Wetlands Reserve Program (WRP) and the Conservation Reserve Program (CRP). Technical assistance is also provided through the Resource Conservation and Development (RC&D) Program, which helps to improve the capability of local leaders to plan and carry out projects for resource conservation and community development.

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Appendix D

Summary of Breakout Group Discussions

Workshop participants were assigned to one of four breakout groups based on their background and/or affiliation in order to enhance group discussions. The nominal group process was used in the breakout sessions to ensure consistency in approach and maximize the opportunity for participant input. Workshop participants were given background information and instructions on using the nominal group process and were asked the following series of questions related to the issue area:

- 1) What important questions need to be asked and answered in order to research and develop a common sediment reduction goal? (e.g., what is an appropriate goal? what tools and methodologies are available to establish sediment reduction goals?)
- 2) What data and information are needed to establish a specific sediment reduction goal for the Great Lakes?
- 3) Identify existing implementation tools and unmet needs for reaching sediment reduction goals (e.g., changes to existing programs, policies, use of computer-based models).
- 4) Identify what process is needed to facilitate this type of strategic goal-setting throughout the basin (e.g., set up task force, white papers).

Based on these questions, the breakout sessions generated the following ideas for developing an action plan for the coordination and collaboration of sediment reduction within the Great Lakes basin:

Question 1: What important questions need to be asked and answered in order to research and develop a common sediment reduction goal? (e.g., what is an appropriate goal? what tools and methodologies are available to establish sediment reduction goals?)

Key Questions

- What is the problem definition?
- What has been done/what's being done?
- What agencies are responsible for sediment control?
- Are there any existing sediment reduction goals or agreements? If so, can/should we be consistent with them?
- What is a reasonable goal based on past participation and available funds?
- What are the benefits of sediment reduction programs, besides reduction in dredging?
- What scale would be used for developing a sediment reduction goal or goals (i.e., local, watershed, ecosystem, statewide, per lake, basinwide)?
- Is a common sediment goal feasible and appropriate?
- Should multiple goals be uniform throughout basin or site specific based on local issues?
- How are different goals prioritized?
- What's the timeline for developing a goal? Meeting the goal?
- What level of participation do we need? Who's on board? Who's the lead?

Scientific Questions/Needs

- What are the primary sources of sediment?
- What are the real costs (off site, on site) of soil erosion/sedimentation?
- Do we know the impairment of current sediment load?
- How has land use impacted sediment loadings?
- What is the projected load with current trends and practices?
- What is the reliability of tools to estimate current and future sediment loads?
- What is the threshold level at which there's a biological/ecological/economical/social impact?
- How much sediment is inevitable, even with best conservation practices?
- What would be the impact of a 40% reduction in sediment (on ecosystems, productivity, etc.)? Is 40% enough? What is the end use of the goal?
- Sustainability: Can this goal or level of sediment reduction be maintained economically?
- Need to consider costs and benefits of sediment reduction and program costs. (i.e., Does the economic/environmental impact of sediment outweigh the costs to reduce sediment to our goal?)
- Need accurate models and baseline data for erosion/sedimentation (local and basinwide).
- Need to use results from studies and models more effectively in the field.
- Can a sediment reduction goal be measured? How? Need to identify relevant measures of success (e.g., dredging/infrastructure/biological).
- Can the goal be tied to ecological indicators?
- Need research on what sediment levels affect communities and how.
- Are some sediments worse than others?
- What areas will be sampled (e.g., edge of field, tributary, lakes, seaway)? How will they be chosen?
- Need to define hydrologic/geographic distribution of sediment reduction.
- What research is available on the effectiveness of BMPs, wetland restoration, etc.?
- Need to match BMPs to soil/land use. How do they affect productivity?

Other Considerations

- Need coordination of goals, groups, funding, scientific methods.
- Great Lakes vs. national priorities
- What other systems/activities are related or would be affected?
- Does the "fix" create new problems?
- Is there a need for increased regulation?
- Can sediment reduction be achieved voluntarily?
- Will there be educational material? How do we get public support? Need to promote public awareness and define impacts on public without a reduction of sediment.
- Do we have examples of effective approaches to reducing sediment?
- Do we need implementation at the federal/international level?
- What is the role of Canadian partners?

Question 2: What data and information are needed to establish a specific sediment reduction goal for the Great Lakes?

Data and Information

- Sediment sources
- Baseline sediment loads in streams – long-term data with event-specific measurements at greater resolution
- Quantification of sediment delivered from main tributary watersheds
- Characteristics of different types of sediment (e.g., How fast does it move?)
- Pollutant nature of sediment
- Relationship of sediment loads to impairments - ecosystem model
- Consistent soils data
- Sediment gauges throughout basin
- Sediment transport models
- Stream hydrologic and flow data
- Stream geomorphology - watershed approach
- Climate data and storm events
- Baseline water quality and habitat data
- Baseline populations of indicator species
- Need better modeling of aquatic communities and populations
- Social/Economic/Water Quality impacts from sediment in the lakes
- Human population growth, demographics
- Historical land use and land use change projections
- Models of different land uses (i.e., ag/forest/urban)
- Cost/benefit analysis of dredged soil and of sediment reduction
- Data on conservation tillage and no-till practices
- Tracking of BMPs and soil reduction
- BMP effectiveness & opportunity to install
- Impacts of farm policies
- Need monitoring plan to determine how much reduction has occurred
- Collection protocols and methods
- Conversion trends/rates
- One data base
- Case studies of success projects
- Sample watershed implementation plan at 11 digit level – Are sediment goals included?

Question 3: Identify existing implementation tools and unmet needs for reaching sediment reduction goals (e.g., changes to existing programs, policies, use of computer-based models).

Existing Tools

- GIS Land Use decisions models
- Historical records
- Expert opinions

Unmet Needs

- Coordination of standards and methods among groups
- Management agencies need to prioritize
- Fed/state programs need to work more effectively together
- Work beyond political boundaries
- Address reluctance to participate, accountability
- Quality of work based on available funding
- Human resources and staffing for programs
- Focus programs on single issues - Current response to customers is too broad
- Need tighter guidelines for existing programs (CRP, 319, EQIP, CREP, CT, state programs)
- Need to enforce existing regulations
- More regulation to go with voluntary programs
- Quantify urban sources and impacts
- Public policy change such as MSU requirements
- Adjust national goals for fishing, swimming, drinking water
- Improve drainage codes/laws
- Zoning for land use reform and community-based planning
- Make use of prioritization tools, modeling, GIS – promote awareness of tools
- High spectral images linked to stream bank erosion, land use, and BMPs
- Monitoring tools
- Need more streamflow gauges
- Incentives/Disincentives to meet goals
- Monitor BMPs for effectiveness
- BMP handbook & targeting
- Accessible data to facilitate targeting of BMPs
- Upfront funding for BMPs
- Target funding to critical areas (CSP)
- More local targeting of funds
- Change how funding is distributed - pay for sediment reduction performance
- Funding for problem prevention
- WRDA 516(e) program to include more areas without navigation
- More 516(e) data collection
- Research on 2-stage channels and stream morphology
- Raise erosion awareness – show benefits to landowners
- Activities to inspire stewardship - Re-connect public with land use
- Use more wetland restorations

Question 4: Identify what process is needed to facilitate this type of strategic goal-setting throughout the basin (e.g., set up task force, white papers).

Process/Strategy

- Develop a task force (potential membership: International Joint Commission, Lake Committees, LaMP managers, State agencies DNR/EPA/EQ, National Association of Conservation Districts, Great Lakes Commission, NGOs, Universities)

- Task Force Duties: Define scope, answer technical questions, answer socio-economic questions, redefine goal, develop strategy
- Need someone to commission a study
- Develop fact sheets
- Evaluate existing groups, organizations, activities - Will an existing entity or partnership suffice?
- Develop a method to establish consensus on goal/methodology
- Try to fit local goals into larger basin wide goals
- Reach out to existing groups – Form new ones where needed
- Involve key players, leaders of agencies/organizations, elected officials
- Strong market and political approach - considering different issues related to the problem (farming, land use, urban, transportation) – Could site PLUARG study
- Secure commitment of states, provinces, federal agencies, tribal communities, local groups (start with local input)
- Create a “virtual” organization – use e-mail lists and websites
- Need to assemble answers to these questions before we proceed to goal setting
- Science Committee/Task Force to organize data/science and to work with local watershed groups
- Define what questions are best addressed at basin level as opposed to subbasin watershed
- Define the science for the issue – set benchmarks, acquire baseline data
- Data gap analysis/center (i.e. web site)
- Multi-state task force for each Great Lake to supplement larger task force
- Let basin wide stakeholders set approach
- Locally led approach with regional funding
- Identify and acquire resources to accomplish plans
- Set sediment reduction goal or goals – recommendations?
- Develop white papers
- Endorsement of outcomes – signatures
- Public “events” to support goal - Use opportunities at: IAGLR, SOLEC, GLFC upper lakes
- Information/Education

Appendix E

Regional Sediment and Nutrient Reduction Initiatives in the U.S.

Current and past efforts to establish regional sediment or nutrient reduction goals can provide guidance for setting sediment reduction goals for the Great Lakes basin. While each area is unique, the programs described below can be used to inform the feasibility, information, methods and processes needed to establish sediment reduction goals across county, state and national boundaries.

Chesapeake Bay Restoration

In 2003, regional Bay restoration leaders for the first time agreed to reduce baywide sediment loads to provide water clarity necessary for underwater grasses to thrive. Bay states and the District of Columbia agreed to reduce land-based sediment runoff entering the Bay and its rivers from the current 5.04 million tons per year to no more than 4.15 million tons per year. Throughout 2004, Bay Program partners will supplement land-based sediment reduction goals by focusing on nearshore sediment problems – such as shoreline erosion and the resuspension of shallow water sediments – that directly impact underwater grasses. Shoreline-based sediment reduction goals will be developed as part of each state’s local tributary strategy process and work to reduce problems in areas most critical to improving underwater grass beds. To drive aggressive sediment reductions, Bay Program partners also agreed to increase the existing bay grass restoration goal from 114,000 to 185,000 acres baywide by 2010. Scientists believe increasing bay grass coverage beyond today’s 85,000 acres will result in dramatic improvements throughout the entire Bay ecosystem.

To determine optimal nutrient and sediment allocations, Bay watershed partners developed several simulations for analysis by the Chesapeake Bay Watershed and Water Quality models. Next, these results were run through the Bay Water Quality Model, which makes more than a trillion calculations and provides Bay scientists with a visualization of future Bay and river water quality conditions resulting from each scenario. Using these results, scientists were able to establish baywide sediment reduction goals, and restoration leaders developed several approaches to allocate pollution reduction responsibilities to each state in the watershed. While the primary focus of the new nutrient and sediment reduction goals is to provide the water quality necessary for the Bay’s plants and animals to thrive, the equitable distribution of nutrient reduction responsibilities was important to Bay watershed partners as well.

Many important factors were part of the final allocations equation, including pollution prevention strategies already implemented by each state, proximity to sensitive areas of the Bay, the overall effectiveness of proposed reductions and each state’s relative contribution to water quality impairments. Bay Program partners will use the new goals to develop and hone plans to encourage residents, farmers, local governments, wastewater treatment plant operators and community watershed organizations to reduce the amount of nutrients and sediments flowing into local waterways.

More on the Chesapeake Bay Program can be found here: www.chesapeakebay.net

Mississippi River/Gulf of Mexico Watershed Nutrient Task Force

Scientific investigations in the northern Gulf of Mexico have documented a large area of the Louisiana continental shelf with seasonally depleted oxygen level due to nutrient overenrichment from human activity. Most aquatic species cannot survive at such low oxygen levels. The oxygen

depletion, referred to as hypoxia, forms in the middle of the most important commercial and recreational fisheries in the conterminous United States and could threaten the economy of this region of the Gulf.

As part of a process of considering options for responding to hypoxia, the U.S. Environmental Protection Agency (EPA) formed the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force during the fall of 1997, and asked the White House Office of Science and Technology Policy to conduct a scientific assessment of the causes and consequences of Gulf hypoxia through its Committee on Environment and Natural Resources (CENR). A Hypoxia Working Group was assembled from federal agency representatives, and the group developed a plan to conduct the scientific assessment. The charge to submit a scientific assessment of hypoxia and a plan for reducing, mitigating, and controlling hypoxia in the Gulf of Mexico was written into law at the end of the 105th Congress (section 604(a) and (b) of Public Law 105-383).

The National Oceanic and Atmospheric Administration (NOAA) has led the CENR assessment, although oversight is spread among several federal agencies. The objectives are to provide scientific information that can be used to evaluate management strategies, and to identify gaps in our understanding of this complex problem. While the assessment focuses on hypoxia in the Gulf of Mexico, it also addresses the effects of changes in nutrient concentrations and loads and nutrient ratios on water quality conditions within the Mississippi–Atchafalaya River system.

As a foundation for the assessment, six interrelated reports were developed by six teams with experts from within and outside of government. Each of the reports underwent extensive peer review by independent experts. After public comments and peer reviews were received and considered, the CENR condensed the findings and recommendations of the six reports into a single integrated assessment of the causes and consequences of hypoxia in the Gulf of Mexico. These assessments can found here: CENR reports on the Gulf of Mexico hypoxia assessment (www.nos.noaa.gov/products/pubs_hypox.html) and Gulf of Mexico hypoxia integrated assessment (www.epa.gov/msbasin/ia/)

EPA incorporated CENR's recommendations in its "Action Plan for Reducing, Mitigating, and Controlling Hypoxia in the Northern Gulf of Mexico," published July 11, 2000. The Action Plan sets two principal goals: (a) to reduce, by 2010, annual discharges of nitrogen to the Gulf from the Mississippi/Atchafalaya Rivers by 350,000 to 650,000 metric tons -- equivalent to a 20 to 40% reduction in the annual average loading during the period 1980-1996. This reduction should be pursued through a combination of actions to curb direct discharges of nitrogen bearing domestic and industrial wastewater, to reduce losses of excess nutrients from agricultural operations, and by intercepting and processing nutrients in riparian buffers and constructed or restored wetlands. A second goal is (b) to reduce the 5-year running average areal extent of Gulf of Mexico hypoxia to less than 5,000 square kilometers by the year 2010.

More information on the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force can be found here: www.epa.gov/msbasin/hyp2.htm

Lake Champlain Basin Program: Interstate and Binational Effort to Reduce Phosphorus

Lake Champlain was designated a resource of national significance by the Lake Champlain Special Designation Act (Public Law 101-596) which was signed into law on November 5, 1990. The Act's goal was to bring together people with diverse interests in the Lake to create a comprehensive pollution prevention, control, and restoration plan for protecting the future of the Lake Champlain

Basin. The Lake Champlain Basin Program (LCBP) was established to coordinate the activities outlined in the Act. The LCBP is a federally funded initiative working in partnership with agencies, organizations and individuals and jointly administered by the U.S. EPA, the states of Vermont and New York, and the New England Interstate Water Pollution Control Commission.

Phosphorous is the nutrient that poses the greatest threat to Lake Champlain. Reducing phosphorus input to the lake is a top goal for the program. In 1996, representatives from the states of Vermont and New York and U.S. EPA used phosphorus modeling and optimization procedures to develop a new bi-state process for phosphorous reduction. Following extensive analysis of numerous reduction scenarios, the group selected a load reduction process that was considered both fair and cost-effective. This process distributes the responsibility for phosphorus reductions among 12 of the 19 watersheds in the basin. The group agreed that the loading targets would be adopted by the states, and the state of Vermont would seek an agreement with the Province of Quebec to ensure that both entities contribute to the attainment of phosphorus reductions. They also agreed that each state could adjust its load targets for each watershed, as long as the adjusted loads meet the in-lake phosphorus concentration goals.

In 2000, the LCBP released a *Preliminary Evaluation of Progress toward Lake Champlain Basin Program Phosphorus Reduction Goals*. The report evaluated progress toward the twenty-year phosphorus reduction goal and investigated the feasibility of accelerating phosphorus reduction efforts to achieve that goal sooner. The report predicts that Vermont, New York, and Québec will have reduced the phosphorus inputs to Lake Champlain by about 38.8 mt/yr by 2001, far exceeding the five-year interim reduction goal.

The report also concluded, however, that not all lake segments can be brought to the loading targets needed to meet the in-lake phosphorus criteria by relying solely on existing reduction programs. By 2002, most of the planned reductions from wastewater treatment plant upgrades have been funded, leaving the remaining phosphorus reductions to come from nonpoint source reductions, especially from agricultural lands. The report estimated that after implementation of agricultural Best Management Practices (BMPs) on all of the remaining farms in the Vermont and Québec portions of the Basin needing treatment, the loads would still exceed the twenty year nonpoint source target for the Vermont and Québec parts of the Basin, not accounting for any other changes within the Basin. Accelerating the timeframe for meeting the reduction targets will require new techniques and higher annual funding commitments than in the past.

More information on the Lake Champlain Basin Program can be found here:
www.lcbp.org/welcome.htm

Great Plains Conservation Program - Public Law 84-1021

The Great Plains Agricultural Council, born during the drought and subsequent devastating soil erosion of the 1930s, had begun to develop a long-range soil erosion reduction program. Representatives of the USDA met with council members on May 31-June 2, 1955, to develop a program. A later meeting, July 25-27, refined the proposals. President Dwight D. Eisenhower transmitted the council's "Program for the Great Plains" to Congress on January 11, 1956. The program did not specify that cost-sharing for conservation practices would be offered through contracts with farmers and ranchers. It did, however, call for sharing the cost of "installing and establishing those practices which are most enduring and most needed but which are not now a part of their normal farm and ranch operations. The ... cost-sharing program on those practices that are

intended to bring about those land use adjustments required for a long-range program will be accelerated and rates of payments made more flexible."

Congressman Clifford Hope of Kansas introduced a bill (H.R. 11833) on June 19, 1956, that was to become the Great Plains Conservation Program - Public Law 84-1021. The bill provided that the Secretary of Agriculture could enter into contracts, not to exceed ten years, with producers. No contract was to be signed after December 31, 1971.

More information on the Great Plains Conservation Program can be found here: www.nrcs.usda.gov/about/history/articles

New York City Watersheds Whole Farm Program

In 1991, New York City and an Ad Hoc Task Force on Agriculture reached a consensus on a comprehensive program for farming in the New York City watersheds that satisfactorily addresses the City's objectives for drinking water quality protection and compliance with federal and state rules and standards, as well as the farm community's concerns for sustaining and enhancing the agricultural economy and way of life.

A voluntary Whole Farm Program with 100% cost sharing in place of regulation has been developed. Farmers will be encouraged, through demonstration projects and a range of cost-sharing and other incentives, to work with their Soil and Water Conservation District, Cooperative Extension and Soil Conservation Service to develop individual farm plans to control point and nonpoint sources of pollution. These plans will cover the entire spectrum of farm management, including practices to improve farm profitability and sustainability. It is the Task Force's and New York City's intention that not one farm will be put out of business by this program. While actively participating in the development and implementation of their Whole Farm Plans, farmers will not have to pay for the planning, implementation, maintenance or operation of Best Management Practices recommended to meet New York City's water quality objectives outlined in the Whole Farm Plan.

City-Farm Partnership: The Watershed Agricultural Council: To help this voluntary Whole Farm Program, a Watershed Agricultural Council, representing local, state and City governmental agencies and the farm community, was established as a permanent institution to replace the Ad Hoc Task Force. The Council will be instrumental in evaluating the program; advising the New York City Department of Environmental Protection Commissioner; reviewing individual farm plans; providing liaison to the larger agricultural community; reviewing the impacts of non-agricultural watershed regulations on agriculture; and dispute resolution.

More information on the Watershed Agricultural Council can be found here: www.nycwatershed.org

Appendix F

Great Lakes Regional Initiatives

There are a variety of agencies and organizations with an interest in reducing soil erosion and sedimentation in the Great Lakes basin. Furthermore, there has been a recent surge of attention to regional issues in the basin by the President, Governors, Members of Congress, agencies and other interest groups. The following activities and/or publications provide a unique opportunity to advance priorities to reduce soil erosion in the basin and sediment loadings to the Great Lakes and tributaries.

The Council of Great Lakes Governors' priorities for Great Lakes Restoration

The Council of Great Lakes Governors has identified nine priorities for Great Lakes Restoration, three of which are consistent with reducing sediment to the Great Lakes. They are: “controlling pollution from diffuse sources into water, land and air; enhancing fish and wildlife by restoring and protecting coastal wetlands, fish and wildlife habitats; and adopting sustainable use practices that protect environmental resources and may enhance the recreational and commercial value of our Great Lakes.” www.cglg.org/1projects/priorities/index.asp

Great Lakes Interagency Task Force

On May 18, President Bush issued an Executive Order (EO 13340) that established a Cabinet-level task force charged with coordinating Great Lakes restoration. The Task Force, and a Working Group composed of the heads of federal regional offices will focus on cleaner water, sustainable fisheries and developing measurable results. www.epa.gov/greatlakes/taskforce/index.html

Great Lakes Strategy 2002: A Plan for the New Millennium

In 2002, the U.S. Policy Committee, an interagency organization led by Environmental Protection Agency's (EPA) Great Lakes National Program Office released the *Great Lakes Strategy 2002: A Plan for the New Millennium (A Strategic Plan for the Great Lakes Ecosystem)*. The strategy proposes a series of coordinated federal actions that, when implemented, will help improve Great Lakes water quality without requiring an increase to programs or the development of new policies. The strategy calls for the establishment of 300,000 acres of buffers in the Great Lakes Basin by 2007 (base year 1999), using existing non-regulatory Federal and State programs. Progress should be tracked under US Department of Agriculture's Conservation Reserve Program. www.epa.gov/glnpo/gls/gls03.html.

The International Association of Great Lakes and St. Lawrence Mayors

The International Association of Great Lakes and St. Lawrence Mayors are seeking a “place at the table” to represent the interests of cities and municipalities on Great Lakes issues. Their priorities include problem areas that are impacted by sediment loadings, such as water and wastewater infrastructure, beach closings, and water quality. www.glc.org/mayors/

SOLEC Indicators

EPA is also cooperating with Environment Canada to develop a series of environmental indicators that describe the state of the environment in the Great Lakes basin. Developed and refined at a series of State of the Lakes Ecosystem Conferences (SOLEC) these indicators are popularly known as SOLEC Indicators. Several relate specifically to sediment or the ecological consequences of excess sediment in the system. www.epa.gov/glnpo/solec

Ninth Biennial Report on Great Lakes Water Quality

In 1998, the International Joint Commission issued its *Ninth Biennial Report on Great Lakes Water Quality* as required under the 1978 Great Lakes Water Quality Agreement. The Commission reports on Canada and US progress in implementing the Agreement. In 2000, the Commission recommended that the parties work to “place at least 55 per cent of the Great Lakes basin row-crop acreage into conservation tillage by 2002; and ...increase buffer-strip mileage in the Great Lakes basin by at least 30 per cent by 2002.”

www.ijc.org/php/publications/html/9br/achievec.html#sources

GAO Report - Great Lakes: A Comprehensive Strategy and Monitoring System Are Needed to Achieve Restoration Goals

The General Accounting Office (GAO) has undertaken several studies of Great Lakes policies and programs in recent years. In particular, a 2004 study titled, “Great Lakes: A Comprehensive Strategy and Monitoring System Are Needed to Achieve Restoration Goals,” brings together lessons learned from the GAO studies leading up to this report and recommends, in particular, that EPA “develop environmental indicators and a monitoring system for the Great Lakes that can be used to measure overall restoration progress.” www.gao.gov/new.items/d04782t.pdf