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Report to Congressional Requesters

September 2004

GREAT LAKES

Organizational Leadership and Restoration Goals Need to Be Better Defined for Monitoring Restoration Progress

GAO-04-1024

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Highlights of GAO-04-1024, a report to congressional requesters

Why GAO Did This Study

The Great Lakes remain environmentally vulnerable, prompting the United States and Canada to agree on actions to preserve and protect them.

As requested, this report (1) determines the extent to which current EPA monitoring efforts provide information for assessing overall conditions in the Great Lakes Basin, (2) identifies existing restoration goals and whether monitoring is done to track goal progress, and (3) identifies the major challenges to setting restoration goals and developing a monitoring system.

What GAO Recommends

GAO recommends EPA develop controls to ensure the Great Lakes monitoring system inventory is complete, accurate, and consistent. Also, the Congress may wish to consider clarifying if GLNPO or the task force should lead restoration efforts and require development of measurable basin-wide goals with a monitoring system for measuring progress.

EPA agreed with GAO's recommendation regarding adequate inventory monitoring controls. EPA believes responsibilities and relationships for the task force and GLNPO are clearly stated in the executive order and statute but did not address GAO's concerns about how GLNPO will exercise its leadership and coordination responsibilities.

www.gao.gov/cgi-bin/getrpt?GAO-04-1024.

To view the full product, including the scope and methodology, click on the link above. For more information, contact John Stephenson (202) 512-3841 or stephensonj@gao.gov.

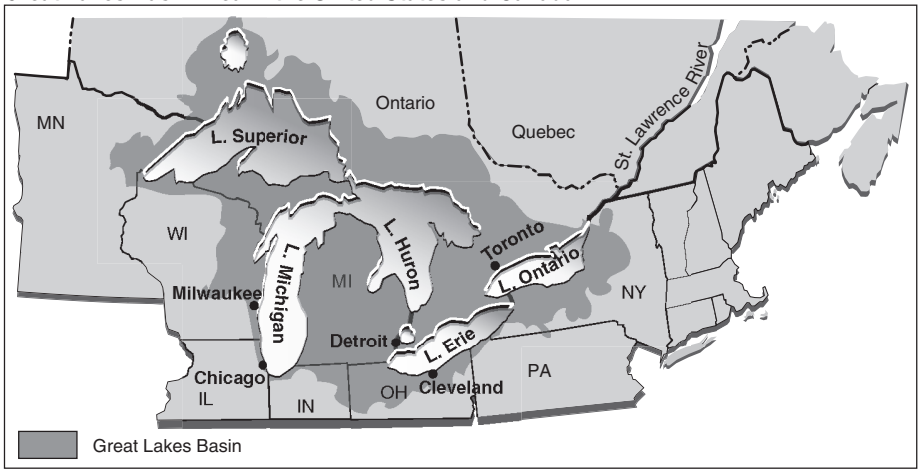
What GAO Found

Current Environmental Protection Agency (EPA) monitoring does not provide the comprehensive information needed to assess overall conditions in the Great Lakes Basin because the required coordinated joint U.S./Canadian monitoring program has not been fully developed. Information collected from monitoring by other federal and state agencies does not, by design, provide an overall assessment of the Great Lakes because it is collected to meet specific program objectives or limited to specific geographic areas.

Multiple restoration goals have been proposed through efforts by EPA and other organizations. EPA developed basin-wide goals through its *Great Lakes Strategy 2002* and goals for plans addressing individual lakes. Other organizations have also identified basin-wide restoration goals and priorities. Monitoring of progress toward goals is generally limited to tracking specific action items proposed in the *Great Lakes Strategy 2002*; other proposed goals are generally not monitored to determine progress.

Efforts to coordinate basin-wide goals and a monitoring system face several challenges. The lack of clearly defined organizational leadership poses a major obstacle. Both EPA's Great Lakes National Program Office (GLNPO) and a newly created interagency task force have coordination roles raising uncertainty as to how leadership and coordination efforts will be exercised in the future. Second, coordinating existing restoration goals and monitoring activities among the many participating organizations within the United States, and between the United States and Canada is a significant challenge. Third, centralized information from monitoring activities is not yet available, making it difficult to assess restoration progress. In addition, an inventory system developed by EPA and Canada may not have adequate controls on voluntarily provided information.

Great Lakes Basin Area in the United States and Canada



Source: GAO.

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Abbreviations

BEC	Binational Executive Committee
EC	Environment Canada
EPA	Environmental Protection Agency
FWS	U.S. Department of Interior's Fish and Wildlife Service
GLERL	Great Lakes Environmental Research Laboratory
GLFC	Great Lakes Fishery Commission
GLISP	Great Lakes International Surveillance Plan
GLNPO	Great Lakes National Program Office
GLWQA	Great Lakes Water Quality Agreement
IADN	International Atmospheric Deposition Network
IJC	International Joint Commission
LaMP	Lakewide Management Plan
NAWQA	National Water Quality Assessment
NHEERL	National Health Environmental Effects Research Laboratory
NRRI	Natural Resources Research Institute
NOAA	National Oceanic and Atmospheric Administration
ORD	Office of Research and Development
PCB	polychlorinated biphenyl
SOLEC	State of the Lakes Ecosystem Conference
TMDL	Total Maximum Daily Load
USGS	U.S. Geological Survey
USPC	U.S. Policy Committee

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United States Government Accountability Office
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Congressional Requesters

The Great Lakes, the largest system of freshwater in the world, is recognized by the United States and Canada as a natural resource that is threatened on many environmental fronts. Recently discovered conditions such as the reemergence in Lake Erie of a "dead zone"—an area that has little or no dissolved oxygen and, therefore, cannot support aquatic life—have renewed concerns about the overall ecological health of the Great Lakes Basin, which includes the five Great Lakes—Superior, Michigan, Huron, Erie, and Ontario—and a large land area that extends beyond the lakes, including their watersheds, tributaries, connecting channels, and a portion of the St. Lawrence River. While the two countries have made some progress in protecting and restoring the Great Lakes ecosystem—the air, water, land, and living organisms within the basin—polluted beaches are frequently closed to swimmers, fish are unsafe to eat for high-risk individuals, and raw sewage is still being dumped into the lakes. While some information on environmental conditions of the Great Lakes is available, questions remain as to overall conditions and the progress of restoration.

As concern increased over the contamination of the Great Lakes, the United States and Canada signed the first international Great Lakes Water Quality Agreement (GLWQA) in 1972. In the agreement, the United States and Canada agreed to restore and maintain the chemical, physical, and biological integrity of the Great Lakes Basin. The overall goals of the GLWQA are to restore and enhance water quality in the lakes. In 1978, the parties signed another Great Lakes Water Quality Agreement that reaffirmed their determination to restore and enhance water quality and called for increasing control of toxic substances throughout the Great Lakes Basin. Subsequently, amendments were made to the 1978 agreement in 1983 and 1987. The 1987 Protocol amendments added several annexes that focused on specific environmental concerns and amended one, Annex 11, on surveillance and monitoring. Annex 11 requires the two countries to undertake a joint program to, among other things, monitor restoration progress and assess the degree to which the parties are complying with the requirements and objectives of the agreement. Monitoring is accomplished through various sampling methods, such as using air monitoring equipment to measure the deposition of toxic chemicals. Monitoring may help identify the source and extent of problems and aid decision makers in

setting restoration goals, taking action, and determining the extent to which goals are being met. Goals should be stated in measurable terms in order to monitor progress. In an effort to establish restoration strategies to meet the overall goals of the GLWQA, the U.S. Policy Committee (USPC)—a forum of senior level representatives from the federal, state, and tribal government agencies that share responsibility for environmental protection and resource management in the Great Lakes—developed the *Great Lakes Strategy 2002*. EPA efforts in establishing goals also include helping to develop Lakewide Management Plans (LaMP) for each of the individual Great Lakes.

In addition, a joint effort by the two countries to assess and report on environmental conditions in the Great Lakes began in 1994, with the first State of the Lakes Ecosystem Conference (SOLEC). The conference has convened every 2 years thereafter and its proceedings are used as a basis for reporting on the state of the lakes. In the late 1990s, SOLEC began developing a comprehensive set of indicators on the condition of the Great Lakes ecosystem. SOLEC's reports have described indicators such as chemical contaminants in edible fish tissue and toxic chemical concentrations in offshore waters.

The Clean Water Act charges the U.S. Environmental Protection Agency (EPA) with leading the effort to meet the requirements of the GLWQA. The act also statutorily established the Great Lakes National Program Office (GLNPO) within EPA, charging it with, among other things, cooperating with federal, state, tribal, and international agencies to develop and implement specific action plans to carry out the U.S. responsibilities under the agreement. In addition to the various governmental agencies involved in Great Lakes restoration, several nongovernmental organizations have established restoration goals. In 2003, we reported that an overall strategy was needed to guide numerous ongoing restoration activities and that indicators and a monitoring system were needed to measure overall restoration progress.[1]

You asked us to (1) determine the extent to which current EPA monitoring efforts provide information for assessing overall conditions in the Great Lakes Basin and what information is provided by other organizations conducting monitoring in the Great Lakes, (2) identify existing restoration

[1]GAO, *Great Lakes: An Overall Strategy and Indicators for Measuring Progress Are Needed to Better Achieve Restoration Goals*, GAO-03-515 (Washington, D.C.: Apr. 30, 2003).

goals and whether monitoring is done to track goal progress, and (3) identify the major challenges to setting basin-wide restoration goals and developing a monitoring system for the Great Lakes.

To address the extent to which information derived from monitoring is useful for assessing overall conditions in the Great Lakes Basin, we reviewed information on monitoring activities conducted by U.S. and Canadian federal agencies and the eight states and two Canadian provinces that share the basin. We also examined the monitoring requirements included in the GLWQA and compared these requirements with ongoing monitoring and SOLEC activities. To identify existing restoration goals, we reviewed the goals and monitoring efforts contained in the *Great Lakes Strategy 2002* and EPA's LaMPs for four of the five Great Lakes. We also examined the restoration goals of several organizations participating in the restoration of the Great Lakes. To identify major challenges to setting restoration goals and developing a monitoring system for the Great Lakes, we obtained and analyzed information on several barriers to progress and focused on four major challenges involving organizational leadership, coordinating goals and monitoring, centralized information on monitoring activities, and environmental differences between the lakes. We conducted our work from August 2003 to May 2004 in accordance with generally accepted government auditing standards. A more detailed discussion of our scope and methodology is outlined in appendix I.

Results in Brief

Current EPA monitoring does not provide the comprehensive information needed to monitor restoration progress and assess the degree to which the parties are complying with the requirements and objectives of the agreement because the coordinated joint U.S./Canadian monitoring program mandated under the GLWQA has not been fully developed. Other federal and state organizations are conducting monitoring efforts but, while useful, they are limited to specific purposes and geographical scope. Rather than developing a basin-wide monitoring system to assess overall conditions in the Great Lakes, EPA focused its efforts on supporting SOLEC in developing a comprehensive set of environmental indicators and using some of the indicators for reporting on overall conditions in the Great Lakes Basin. While SOLEC has identified and evaluated a large number of indicators, both Canadian and U.S. officials have questioned the value of the information reported by SOLEC from these indicators because, among other things, it is not based on their decision-making needs. Specifically, SOLEC attempts to describe overall conditions based on information voluntarily provided and maintained by others, and it does

not assess whether conditions are improving or deteriorating based on measurable restoration goals. Additionally, most of the information collected from monitoring activities by other federal and state organizations does not, by design, provide an overall assessment of restoration progress in the Great Lakes Basin because it is collected to meet specific program objectives or limited to specific geographic areas—such as monitoring water quality to determine whether some beaches are safe for swimming or monitoring to support research in a particular area of the Great Lakes. State organizations generally conduct monitoring in the inland and nearshore areas while federal monitoring extends to the open lake water areas.

EPA and other organizations have proposed multiple restoration goals; however, few have monitoring activities to track restoration progress called for in the goals. EPA developed basin-wide goals through its *Great Lakes Strategy 2002* and devised goals for individual lakes in LaMPs. Monitoring progress toward achieving goals is generally limited to tracking action items proposed in the *Great Lakes Strategy 2002*; the LaMPs discuss indicators and monitoring, but they are not often linked to goals or do not show how progress toward goals will be measured. Other organizations concerned with Great Lakes restoration, such as the Council of Great Lakes Governors, have also identified basin-wide restoration goals and priorities. Several of the organizations' goals are similar, representing a relative consensus among the groups. While these goals are useful in communicating what specific issues the groups believe are important to the Great Lakes, these organizations may not have the resources or capacity to engage in basin-wide monitoring, and additional specifics may be needed to determine whether the goals are being achieved.

Those involved in protecting and restoring the Great Lakes face four significant challenges in setting measurable goals and developing a basin-wide monitoring system: the lack of clearly defined organizational leadership, the inherent difficulty associated with coordinating existing goal setting and monitoring activities among the many participating organizations in the United States and between the United States and Canada, the lack of centralized information from monitoring activities to assess restoration progress, and the unique environmental dynamics of each of the lakes. First, responsibility for leading and coordinating U.S. efforts to meet GLWQA requirements rests with EPA and GLNPO, according to the Clean Water Act. However, this role has never been completely filled by GLNPO because it has not fully exercised its coordination authority. Other organizations have attempted to fill the void.

Most recently, this executive order created a new interagency task force within EPA to coordinate Great Lakes activities, but its long-term effectiveness is unclear because executive orders may be changed or rescinded by future administrations, and this executive order cannot be enforced in court as is often the case with statutes. In addition, the future role of GLNPO and other organizations in relation to the task force is unclear. Second, existing restoration goals and monitoring activities in the United States and within Canada need to be coordinated if basin-wide goals are to be established and a joint monitoring system developed as called for in the GLWQA. Given the extensiveness of Canada's efforts, and agreements between Canada and the provinces of Ontario and Quebec, it will be a challenge to coordinate with Canada in developing basin-wide goals for measuring restoration progress. Third, the lack of an accurate, complete, and centralized source of existing monitoring information for coordinating activities and assessing basin-wide conditions is a significant challenge. GLNPO and Environment Canada have developed an Internet-based inventory for existing monitoring systems, but this inventory will rely on voluntarily provided information, which will not ensure enough control over the information so that it will result in an inventory with complete, accurate, and consistent information. Fourth, because each of the five Great Lakes has unique environmental conditions, setting measurable goals that reflect these differences and yet provide consistent basin-wide information will be difficult.

To help ensure the coordination of the U.S. efforts in developing basin-wide measurable restoration goals with a monitoring system, we recommend that the Congress may wish to consider clarifying whether GLNPO or the interagency task force should lead restoration efforts for the United States and require the entity it selects to develop and prioritize measurable goals for the Great Lakes Basin and develop and implement a monitoring system to measure progress toward attaining goals along with identifying actions that could assist in achieving goals.

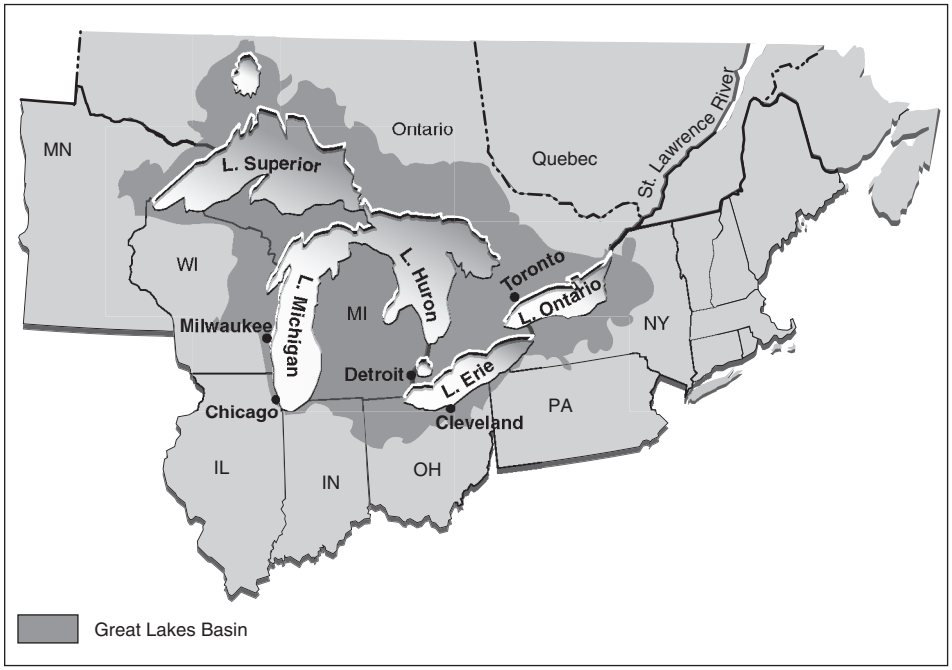
In addition, we are recommending that the EPA Administrator direct GLNPO to develop controls for the automated inventory to ensure that the information it contains is complete, accurate, and consistent.

Background

The Great Lakes contain over 95 percent of the nation's surface freshwater supply for the contiguous 48 states and more than 20 percent of the world's freshwater supply. The lakes provide water for drinking, transportation, power, recreation—such as swimming and fishing—and a host of other uses for more than 30 million people who live in the Great

Lakes Basin, roughly 10 percent of the U.S. population and more than 30 percent of the Canadian population. Spanning more than 750 miles from west to east, the basin encompasses nearly all of the state of Michigan and parts of Illinois, Indiana, Minnesota, New York, Ohio, Pennsylvania, Wisconsin, and the Canadian province of Ontario. Parts of the St. Lawrence River, the connecting channel between Lake Ontario and the Atlantic Ocean, flow through the provinces of both Ontario and Quebec.

Figure 1: Area Comprising the Great Lakes Basin



Source: GAO.

Recognizing their mutual interests in the Great Lakes and other boundary waters, the United States and Great Britain signed the Boundary Waters Treaty in 1909, which provided the United States and Canada with a framework for dealing with future issues along the border. The treaty established the International Joint Commission (IJC), comprising three commissioners each from the United States and from Canada, to help the two governments resolve and prevent disputes concerning their shared boundary waters. Among other things, the IJC also assists the governments in the implementation of the GLWQA, reports every 2 years on implementation progress, and offers nonbinding recommendations to the two governments. Signed in 1972, the GLWQA focused on restoring and enhancing water quality in the lakes and controlling phosphorous as a

principal means of dealing with eutrophication in the lakes. Under the terms of the GLWQA, the two governments are required to conduct a comprehensive review of the operation and effectiveness of the agreement every 6 years. The next review is scheduled to begin in 2004, and based upon the results, the two countries may decide to amend the agreement. The last review in 1999 found that certain sections of the agreement were outdated and revisions were needed.

As amended, the GLWQA has 17 annexes that define in detail the specific programs and activities that the two parties have agreed upon and committed to implement. Most of the annexes specify pollution prevention strategies. Annex 11 of the GLWQA calls for the parties to implement a joint surveillance and monitoring program that, among other things, evaluates water quality trends, identifies emerging problems, and supports the development of remedial action plans for contaminated areas—-referred to as areas of concern—-and LaMPs for the open waters of each of the five lakes to reduce critical pollutants and to restore and protect beneficial uses.[2] Specifically, Annex 11 calls for the monitoring program to include baseline data collection, sample analysis, and evaluation and quality assurance programs to assess such things as whole lake data including that for open waters and nearshore areas of the lakes as well as fish and wildlife contaminants; inputs from tributaries, point source discharges, atmosphere, and connecting channels; and total pollutant loadings to and from the Great Lakes system.

The monitoring program under Annex 11 is to be based on the Great Lakes International Surveillance Plan (GLISP) developed before the current requirements for a surveillance and monitoring system. Developing the surveillance plan, which involved developing a separate plan for each lake, required extensive efforts by U.S. and Canadian officials over several years. However, according to one Canadian official involved in the process, the plans were not completed to the point where they could be implemented. The IJC's Water Quality Board was involved in the management and development of the GLISP, but according to a binational review of the GLWQA in 1999, the IJC's role was reduced after the GLQWA amendments of 1987 placed more of the responsibility for data analysis and reporting on the state of the Great Lakes environment with the two

[2]We reported no the progress made on remedial action plans in GAO, *Great Lakes: EPA Needs to Define Organizational Responsibilities Better for Effective Oversight and Cleanup of Contaminated Areas*, GAO-02-563 (Washington, D.C.: May 17, 2002).

governments. IJC's role today is one of assisting in the implementation of the agreement and evaluating the actions of the two governments in meeting the objectives of the GLWQA. After the GLISP effort, the governments reduced support for the surveillance and monitoring called for in the agreement, and abandoned the organizational structure created to implement the monitoring plan, leaving in place only one of the plan's initiatives, the International Atmospheric Deposition Network (IADN), a network of 15 air-monitoring stations located throughout the basin developed in response to the GLWQA requirement of a monitoring program to allow assessment of inputs from the atmosphere affecting the Great Lakes. In addition, under a separate annex in the GLWQA (Annex 2), LaMPs are required to include, among other things, a description of the surveillance and monitoring to be used to track the effectiveness of remedial measures and the elimination of critical pollutants. The agreement requires that updates to the LaMPs be submitted to the IJC for review and comment. IJC is considering whether to conduct a review of the LaMPs in 2004.

The Water Quality Act of 1987 amended the Clean Water Act to state that EPA should take the lead and work with other federal agencies and state and local authorities to meet the goals in the agreement. It also established within EPA, GLNPO, to among other things, coordinate EPA's actions aimed at improving Great Lakes water quality both at headquarters and at the affected EPA regional offices, and to coordinate EPA's actions with the actions of other federal agencies. As of 2003, GLNPO's budget was $16 million, including $5 million allocated for program costs, which includes 47 full-time EPA staff and 13 non-EPA staff. The remaining costs included about $4.3 million per year for monitoring and monitoring-related reporting, which included about $1.4 million to operate GLNPO's research vessel, the *Lake Guardian*. For Canada, Environment Canada (EC) is the lead agency, which works in cooperation with the provinces of Ontario—in which parts of four of the lakes are located—and Quebec, which administers the St. Lawrence River. Coordination between EPA and EC is achieved through the Binational Executive Committee (BEC). Subsequent to the GLQWA amendments of 1987, the BEC was formed to coordinate programs and policies of the two parties to facilitate GLWQA implementation. BEC, co-chaired by EPA and EC, meets twice a year and membership includes federal, state, and provincial officials from organizations involved in Great Lakes activities. The BEC does not have authority to direct that projects or programs be implemented but rather makes recommendations regarding certain activities, such as the development of SOLEC. Funding provided for BEC operations is limited,

and it relies on funding from other organizations to implement its recommendations.

In addition to the BEC, several organizations serve coordinating roles, offer policy perspectives, or financially support restoration activities for the Great Lakes, including the following:

- Council of Great Lakes Governors, a partnership of governors from the eight Great Lakes states and the Canadian provinces of Ontario and Quebec, encourages and facilitates environmentally responsible economic growth throughout the Great Lakes region.

- Great Lakes Commission, an organization promoting the orderly, integrated, and comprehensive development, use, and conservation of water and related natural resources of the Great Lakes Basin and the St. Lawrence River, includes representatives from the eight Great Lakes states and the Canadian provinces of Ontario and Quebec.

- Great Lakes United, an international coalition group dedicated to preserving and restoring the Great Lakes-St. Lawrence River ecosystem, promotes effective policy initiatives, carries out education programs, and promotes citizen action and grassroots leadership for Great Lakes environmental activities. The coalition's member organizations represent environmentalists, conservationists, hunters and anglers, labor unions, communities, and citizens of the United States, Canada, and First Nations and Tribes.

- United States Policy Committee, a group of senior level representatives from federal, state, and tribal government agencies with environmental protection or natural resource responsibilities in the Great Lakes Basin. The group meets semiannually to coordinate agency actions and commitments associated with the *Great Lakes Strategy 2002*.

- Great Lakes Fishery Commission, a binational commission created by the Convention on Great Lakes Fisheries between the United States and Canada in 1955, whose primary objectives are to coordinate fisheries management and research, and to control sea lamprey. The U.S. Department of State and Canada's Department of Fisheries and Oceans provide funding for the commission.

- Great Lakes Interagency Task Force, an organization created within EPA by executive order to provide coordination of federal activities and promote regional collaboration within the Great Lakes Basin and among other things, to develop outcome based goals for the Great Lakes system.

Assisting the task force is a working group composed of regional federal officials with GLNPO providing resources for both groups.

Current EPA Monitoring Efforts Do Not Provide Comprehensive Information on the Condition of the Great Lakes and Monitoring by Other Organizations Is Limited by Purpose and Scope

Current EPA monitoring efforts do not provide comprehensive information on the condition of the Great Lakes, and the coordinated joint surveillance and monitoring program called for in the GLWQA has yet to be fully developed. Other ongoing monitoring efforts by federal and state agencies yield information that is limited to specific purposes and geographical scope. The joint efforts by the United States and Canada to develop information on Great Lakes indicators through the SOLEC process does not fulfill the monitoring requirements of the GLWQA or adequately assess basin-wide conditions of the lakes. Further, the information reported from SOLEC is of questionable value to officials making restoration decisions because it is not based on their decision-making needs. Additionally, current monitoring efforts of federal and state organizations do not, by design, provide comprehensive information on the overall conditions of the Great Lakes. Most of the information collected under these monitoring activities is designed to meet specific program objectives or is limited to specific geographic areas as opposed to providing an overall assessment of the Great Lakes Basin.

Current Efforts Do Not Fulfill Monitoring Requirements of the GLWQA

Annex 11 of the GLWQA calls for the United States and Canada to develop a joint Great Lakes system-wide surveillance and monitoring program to, among other things, provide information on restoration progress and whether the objectives of the agreement are being achieved. This program, however, has not been fully developed. Instead, officials from GLNPO look upon SOLEC as the process by which indicators will be developed to monitor environmental conditions and measure restoration progress in the Great Lakes. However, as we reported in 2003, the SOLEC process of holding conferences every 2 years to develop Great Lakes indicators and monitor environmental conditions for subsequent reporting on the state of the lakes falls short in several areas.[3] First, indicators assessed through the process do not provide an adequate basis for making an overall assessment of Great Lakes restoration because they rely on limited quantitative data and subjective judgments. Second, the SOLEC process is dependent on the voluntary participation of officials from federal and state agencies, academic institutions, and other organizations. As a result, their future commitment to providing information on indicators and monitoring

[3] GAO-03-515.

results, along with their future participation, is not assured. Finally, most of the stated objectives for SOLEC do not align with the surveillance and monitoring program envisioned in the GLWQA. The stated objectives of SOLEC are to

- assess the state of the Great Lakes ecosystem based on accepted indicators,
- strengthen decision making and management,
- inform local decision makers of Great Lakes environmental issues, and
- provide a forum for communication and networking among stakeholders.

Other than the objective for assessing the state of the ecosystem based on accepted indicators, the SOLEC objectives do not address issues related to monitoring. GLNPO officials stated that the objective of SOLEC is not to be a monitoring program but rather a reporting venue for conditions in the Great Lakes. However, it is the only ongoing effort to provide an overall assessment of the Great Lakes and, according to 23 federal, state, and other environmental program officials, a surveillance and monitoring system is still needed. For example, a Michigan state official explained that a monitoring system developed with the involvement of all stakeholders and focused on the differences in individual lakes is needed. Appendix III contains the specific comments from the officials we contacted regarding the need for a monitoring system.

SOLEC's Monitoring Information Is of Questionable Value in Decision Making

The monitoring information developed and reported by SOLEC is of questionable value to officials responsible for making restoration decisions for several reasons. First, the information is not based on their decision-making needs. State and federal agency officials stated that the SOLEC process is not connected with the policy-making process. For example, a Minnesota Pollution Control Agency official stated that the SOLEC process is oriented toward the needs of researchers and has not connected with the policy-making process for which indicators are needed. A Michigan Department of Environmental Quality official stated that SOLEC provides information based on data from only one or two sampling locations and is not relevant from a state program perspective. Canadian program officials shared these opinions, and one official added that SOLEC data does not address local community questions or program objectives.

The comments by program officials are supported by results from a peer review of SOLEC in 2003 by an international panel of experts in large indicator systems. While the panel had many favorable observations of SOLEC, they noted a disconnect between the development of the indicators and their usefulness to policy makers. The peer review stated that, to be effective, the actual users must define indicators, with policy makers and environmental managers involved in the early stages of indicator development. In addition to these observations, in the latest report on the state of the Great Lakes, one of the management challenges discussed is how to better assist managers given the large number of indicators.[4] Specifically, the challenge is to find a method of indexing indicators that better assists managers and leads to more useful, informed decision making. The disconnect between SOLEC and decision makers is further illustrated by the fact that only two of the eight Great Lakes states we contacted were reporting information from local monitoring efforts to support the SOLEC process and that none of the states reported using the monitoring information published by SOLEC to describe conditions of its local water bodies or to measure restoration progress. One Minnesota official stated that the former head of the state environmental agency viewed SOLEC information as irrelevant to describe conditions within the state.

A GLNPO official working on SOLEC stated that developing effective indicators requires that you first ask what is to be measured, what the best indicator is for this measurement, how much data are needed, who will collect and handle the data for consistency, and how often the measurement will take place. He stated that the need to ask these questions dates back to the early 1980s, but actions to implement this indicator-monitoring program never materialized. Instead, different indicators and monitoring programs are being conducted by various agencies using different sampling methodologies and protocols, and this inconsistent local program information cannot, after the fact, be used to make decisions about system-wide needs or environmental conditions.

Second, SOLEC information is based on limited data that further detracts from its usefulness to decision makers. For example, of the 80 SOLEC indicators reported to describe the Great Lakes Basin in 2003, evaluative data were only available for 43 of them. Often this data was geographically

[4]Environment Canada and U.S. Environmental Protection Agency, *State of The Great Lakes 2003*, EPA 905-R-03-004.

limited and did not address conditions within the entire basin. Additionally, the IJC reported in its 2002 biennial report that sufficient data were not being collected from around the Great Lakes and that the methods of collection, the data collection time frames, the lack of uniform protocols, and the incompatible nature of some data jeopardized their use as indicators.[5]

Third, there is no guarantee that SOLEC information will be consistently collected or will be available in the future. As we reported earlier, the SOLEC process involves individuals providing information on a voluntary basis with the indicator data residing in a diverse number of sources with limited control by SOLEC organizers.[6] Therefore, there is no assurance that the information will continue to be collected or consistently reported over time. Environmental program officials from federal, state, and provincial agencies stated that the process lacks sufficient and consistent monitoring information to measure environmental restoration progress. The SOLEC peer review group found that the SOLEC process has serious flaws regarding lack of repeatability and transparency. According to GLNPO officials, SOLEC organizers attempted to address the issue of repeatability and transparency in 2003 by issuing a technical report, which provides additional information on data sources. Further, the process is lacking in standard methodology, and SOLEC has yet to establish standard protocols to improve data comparability and reliability.

One attempt to measure restoration progress in the basin using SOLEC indicators is presented in EPA's fiscal year 2005 budget justification. To measure progress, a single quantitative score is derived based on a formula using eight SOLEC indicators. Each indicator is given a score from 1 to 5 based on the professional judgments of individuals providing the indicator information. A score of 1 is considered poor, and 5 is considered good. Totaling the individual indicator scores resulted in a score of 20 based on a total 40-point scale for the Great Lakes. While this is an attempt to measure overall progress, the scoring process is based on a limited number of indicators, and the point scores are based on subjective judgment. Further, the indicators described in the budget justification do not align with the ones used in developing the scores. According to GLNPO officials, this may have resulted from information being submitted at different times during the development of the budget justification.

[5]IJC, *11th Biennial Report on Great Lakes Water Quality*, (Sept. 12, 2002).

[6]GAO-03-515.

Information from Other Federal and State Monitoring Efforts Is Limited by Purpose and Geographic Scope

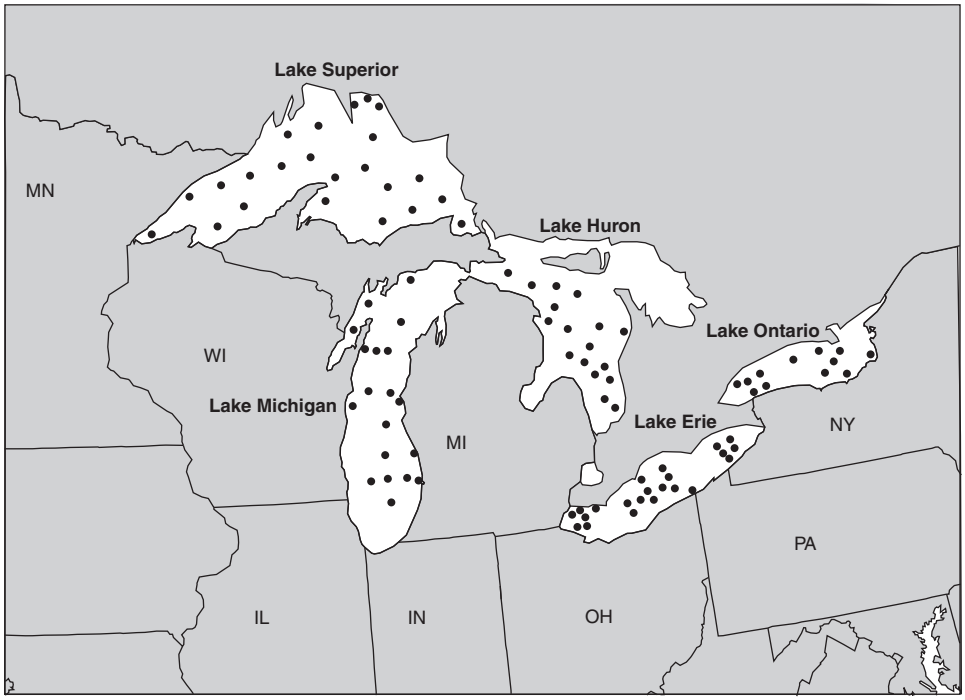
In addition to EPA's efforts, several federal and state agencies conduct monitoring for specific purposes within the open waters, nearshore, and inland areas of the Great Lakes Basin.[7] Monitoring is done in these areas for assessing environmental conditions, as part of ongoing federal or state programs, or for research purposes. The geographic areas monitored are generally limited and only specific conditions are monitored. In a few cases, such as monitoring the air deposition of toxic substances, monitoring of specific conditions covers an extensive area. Monitoring by state organizations is generally limited to federal or state program purposes and conducted in the nearshore or inland areas of the basin, such as identifying impaired waterways that may be tributaries to the lakes under the Clean Water Act. Open lake monitoring is generally done by federal agencies, like GLNPO, for specific research or program purposes and not as part of an overall assessment of the Great Lakes.

Monitoring by Federal Agencies

Four federal agencies, EPA, National Oceanic and Atmospheric Administration (NOAA), U.S. Geological Survey (USGS), U.S. Department of Interior's Fish and Wildlife Service (FWS), and one international commission, the Great Lakes Fishery Commission (GLFC), have ongoing monitoring activities for specific purposes within limited areas of the Great Lakes Basin. EPA's GLNPO conducts four monitoring activities. First, GLNPO conducts annual monitoring of open lake water areas for the specific purpose of gathering information on water quality and biological conditions. The information gathered includes toxic pollutant levels of persistent substances, such as phosphorous. These sampling efforts are generally conducted twice each year, once in spring and once in summer, when the *Lake Guardian* travels to various fixed sampling sites on each of the lakes (see fig. 2). Sampling information collected during these assessments is stored in an automated database and is limited to assessing long-term trends in open lake waters. GLNPO officials stated that it takes about 6 to 7 years of data before enough information is available to identify a long-term trend.

[7]Inland areas include rivers, tributaries, and streams flowing into the lakes; nearshore includes the shoreline out to where the open lake begins, which is where water is 30 feet deep or a distance of 2 miles from the shoreline, according to GLNPO officials.

Figure 2: GLNPO's Water Quality Survey Sampling Stations



Sources: EPA and GAO.

Second, GLNPO conducts monitoring of sediment contaminants in the nearshore areas of the Great Lakes that involves biological and chemical sampling for benthic-bottom soil-contamination. Data is collected from several sampling stations throughout the lakes to assess, among other things, the presence of small invertebrates in bottom sediments.[8] These data are assessed with open lake data to determine possible adverse impacts on the food web that ultimately pose a human health risk. The scope of sediment monitoring is limited to certain areas, and GLNPO officials stated that they believe their main responsibility is open lake monitoring under the GLWQA and that the Great Lakes states are responsible for inland and tributary monitoring. Third, GLNPO conducts the U.S. portion of IADN for the specific purpose of monitoring toxic substances deposited through the air. Monitored toxic substances include

[8]Small invertebrates in sediments are bottom-dwelling organisms that can become contaminated and consumed by birds or fish, which can adversely affect the food web once humans eat these birds or fish.

polychlorinated biphenyls (PCB) and trace metals, such as lead and cadmium, that have entered the watershed. While GLNPO is responsible for monitoring in the United States, EC is responsible for Canadian locations. IADN consists of 5 master sampling stations and 10 satellite stations located throughout the basin and is limited to identifying substances deposited through the air. Fourth, GLNPO conducts an annual fish program to monitor concentrations of contaminants in Great Lakes fish. GLNPO has agreements with the Universities of Minnesota, Indiana, and Wisconsin, along with USGS, to collect specific fish species from each lake and grind them into paste to analyze for contaminants that might pose a risk to humans if consumed.

In addition to GLNPO's monitoring efforts, EPA's Office of Research and Development (ORD) funds research activities involving developing indicators and Great Lakes monitoring. There are four divisions within ORD's National Health Environmental Effects Research Laboratory (NHEERL), and one of these—the Mid-Continent Ecology Division located in Duluth, Minnesota—conducts research related to fresh water issues involving human health, which includes the Great Lakes. In addition to the research conducted by this office, ORD, through its National Center for Environmental Research, has an ongoing cooperative agreement with the Natural Resources Research Institute (NRRI) of the University of Minnesota, Duluth, to develop environmental indicators specifically for the nearshore areas of the Great Lakes. Once NRRI develops indicators for all of the nearshore areas, the results will be published and submitted to ORD for developing an implementation plan measuring environmental conditions in the Great Lakes, according to NRRI researchers.

Two other federal agencies, NOAA and USGS, conduct monitoring for specific purposes within the basin. NOAA's Great Lakes Environmental Research Laboratory (GLERL) located in Ann Arbor, Michigan, has 15 specific legislative mandates for research or monitoring, according to a GLERL official. Specific research efforts by NOAA are in areas such as water quality, quantity, and levels. NOAA is also developing an experimental Great Lakes Observing network. This network will consist of observation buoys that are linked to satellites, strategically located throughout the five Great Lakes, for collecting specific chemical, physical, and biological information needed for ecosystem forecasting. A NOAA prototype system is deployed in Lake Erie, using three buoy sites, and focused on gathering information on the reemergence of the lake's dead zone.

USGS conducts monitoring in the Great Lakes through its Great Lakes Science Center located in Ann Arbor, Michigan. This monitoring is conducted in the open lake areas as part of its fish assessment program. The center operates five research vessels, one for each of the five Great Lakes, to conduct research and monitoring for specific purposes, such as determining the volume and presence of predator fish. USGS also conducts monitoring in the Great Lakes Basin through its National Water Quality Assessment (NAWQA) program to determine the presence of pesticides, nutrients, volatile organic compounds, and other contaminants in streams, groundwater, and aquatic ecosystems. Of the 42 NAWQA studies conducted nationwide, 2 are within the Great Lakes Basin.

Finally, FWS and other organizations conduct monitoring to determine the sea lamprey impact on specific fish species, such as the lake trout. This monitoring is funded by the GLFC and according to several restoration officials, is the most comprehensive, coordinated, and consistently funded monitoring efforts ongoing in the Great Lakes. The commission receives about $16 million annually from the United States and Canada to carry out activities to control the sea lamprey population and monitoring activities to measure the success of these control efforts. In addition to monitoring the sea lamprey, each of the Great Lakes states monitors fish populations and their habitats as a major component of the fish monitoring program. The primary objective of the fish monitoring program is to assess changes in fish populations for the purpose of restocking to meet local community and angler objectives. The fish monitoring programs are generally initiated and funded by state agencies, with monitoring results coordinated by the GLFC.

Monitoring by State Organizations

In each state, monitoring in the Great Lakes Basin is a mix of activities done for both federal and state requirements. Each of the Great Lakes states conducts monitoring for federal program requirements, which include identifying impaired water bodies within the state, including the Great Lakes Basin, and developing Total Maximum Daily Load (TMDL) limits for identified pollutants as required under the Clean Water Act. However, because each state uses its own criteria and time schedule for identifying impaired water bodies, the process is not done consistently throughout the United States or the Great Lakes Basin.[9] Another example of a federal program involving state monitoring is the Beach Monitoring

[9]GAO, *Water Quality: Inconsistent State Approaches Complicate Nation's Efforts to Identify Its Most Polluted Waters*, GAO-02-186 (Washington, D.C.: Jan. 11, 2002).

Program under the Beach Act. This program involves sampling of only the nearshore waters of state beaches for the presence of bacteria to determine if the water is safe for swimming.

In addition, states conduct monitoring in the Great Lakes Basin for state requirements. For example, in Ohio, two state agencies—the Ohio Environmental Protection Agency and the Ohio Department of Natural Resources—conduct routine monitoring in Lake Erie's nearshore and inland areas for several state and federal programs. These agencies conduct monitoring to assess water quality in the state's streams and rivers, ambient groundwater quality, tributary quality, and changes in fish and wildlife populations. Appendix IV contains information on nine programs involving monitoring activities in Ohio. In addition to federal program monitoring, some states fund and conduct their own monitoring activities in the Great Lakes Basin. The extent to which states conduct their own monitoring activities beyond federal requirements is closely tied to available state funding for monitoring.

State organizations generally conduct monitoring activities in the nearshore or inland areas. For example, Michigan has a state program to address water quality issues with funding specifically devoted to monitoring. Voters approved a special state bond issue authority—the Clean Michigan Initiative—in 1998, which provided funding to the Michigan Department of Environmental Quality for surface water quality monitoring. Supported by initial Clean Michigan Initiative funding in 2000, the Michigan program funds monitoring activities in the state's rivers, streams, tributaries, and Great Lakes water bodies. Among other things, monitoring is conducted to assess contaminant levels in fish and other wildlife, as well as water and sediment.

Multiple Goals Exist for Monitoring Restoration Progress

Multiple restoration goals have been proposed by EPA and other organizations that could be a basis for monitoring restoration progress. EPA developed basin-wide goals in its *Great Lakes Strategy 2002* and goals for individual lakes in LaMPs. Other organizations concerned with Great Lakes restoration, such as the Council of Great Lakes Governors, have also identified basin-wide restoration goals and priorities. Monitoring progress toward achieving goals is generally limited to tracking specific action items contained in the *Great Lakes Strategy 2002*; other proposed goals do not have associated monitoring activities or monitoring plans to determine progress. Additional specifics for many of the proposed goals and monitoring plans may be needed if the goals are to be used in determining whether progress is being achieved.

EPA's Efforts Have Produced Basin-Wide and Lake-Wide Goals

EPA's efforts in developing the *Great Lakes Strategy 2002* and LaMPs have resulted in proposed goals for the overall basin and for individual lakes. USPC—a group of mainly federal and state officials from the Great Lakes states coordinated by GLNPO—developed and published the *Great Lakes Strategy 2002*, which sets forth 4 overarching goals, 33 subgoals, 23 objectives, and 103 key actions for the Great Lakes. For example, one goal is "to protect human health and restore and maintain stable, diverse, and self-sustaining populations of plants, fish and other aquatic life, and wildlife in the Great Lakes ecosystem." A key action under this goal is to continue human health studies under the Great Lakes Human Health Effects Research Program and make the results available to environmental managers and the public. For monitoring the progress in achieving the strategy's goals, GLNPO is tracking the implementation status of the actions in the strategy and, as of May 2003, seven actions were reported by GLNPO as completed.

In addition, EPA has participated in developing LaMPs that are the primary means for coordinating and planning ecosystem projects for each lake, according to the *Great Lakes Strategy 2002*. The GLWQA requires that LaMPs be developed for each lake, with the United States and Canada responsible for preparing the plans in consultation with relevant states and provincial governments.[10] A GLNPO manager for each LaMP coordinates EPA's efforts to develop the plans. In developing LaMPs, the parties have agreed that they will report progress every 2 years and that updates to each LaMP will be submitted to the IJC for review and comment.

LaMPs have been prepared for four of the five Great Lakes—Erie, Michigan, Ontario and Superior—and they present overviews of lake conditions and general restoration needs.[11] For example, the Lake Michigan LaMP sets forth one overall goal—to restore and protect the integrity of the Lake Michigan ecosystem through collaborative partnerships—and 11 subgoals. These subgoals are stated as general questions, such as "can we drink the water," or "can we swim in the water." The LaMPs also generally discuss indicators and monitoring, but they are not often linked to goals or how progress toward goals will be

[10]Lake Michigan lies entirely within the United States and, therefore, EPA is solely responsible for the Lake Michigan LaMP under the GLWQA and the Clean Water Act.

[11]Lake Huron currently has an initiative action plan, which is similar but is not considered a LaMP.

measured. For example, the Lake Erie LaMP states that a working group discussed indicators, but none were selected. While each LaMP describes monitoring efforts to some extent, they usually do not define how progress to achieve goals will be tracked. An exception to this is a section of the Lake Superior LaMP addressing critical pollutants. See appendix V for goals and monitoring information contained in LaMPs for four of the Great Lakes.

Other Organizations Have Developed Basin-Wide Goals

Three organizations—the Council of Great Lakes Governors, Great Lakes Commission, and Great Lakes United—have independently of EPA developed goals for the Great Lakes Basin. The goals are presented in general terms, such as stopping the spread of invasive species or cleaning up contaminated areas. Several of the organizations' goals are similar, representing a relative consensus among the organizations. While the goals are useful in communicating what specific issues the groups believe are important to the Great Lakes, additional specifics, such as which invasive species are to be controlled or by what time frame, may be needed to determine whether the goals are being achieved. It should be noted that these organizations do not have the resources of federal or state agencies to address proposed goals and priorities and must rely on others to take action. For some of the priorities, specific federal agencies are identified to take actions. The goals or priorities developed by the three organizations are summarized in appendix VI.

One recent set of priorities was prepared by the Great Lakes Governors' Priorities Task Force, which consisted of governors' representatives for the eight Great Lakes states. After deliberating for approximately 2 years, this group reached consensus in 2003, on nine priorities to guide Great Lakes restoration and protection efforts. These priorities addressed a range of issues including protecting human health and enhancing information collection and standardization. The priorities are defined in general terms, such as "control pollution from diffuse sources into water, land, and air." Details on the type and causes of pollution to be assessed and the desired outcomes are not further defined. After the priorities were reported, public sessions were held in Great Lakes states to obtain reaction and input on the Governors' goals. These sessions, however, are not expected to result in further refinement of the priorities.

Similarly, the Great Lakes Commission, which includes representatives from the eight Great Lakes states and the Canadian provinces of Ontario and Quebec, established seven priorities for the Great Lakes such as cleaning up toxic hot spots, controlling nonpoint source pollution, and

preventing the introduction or limiting the spread of invasive species. Its report outlining the seven major priorities identifies an overall goal for each priority.[12] Each of the goals contains recommendations for actions, and many goals are stated in general terms with funding requests for a particular federal agency or organization for implementation. For example, one action item under the goal for cleaning up toxic hot spots recommends "ensure that polluters responsible for sediment contamination pay their fair share—$5 million annually to the U.S. Fish and Wildlife Service—for Great Lakes projects." While the Great Lakes Commission lists their seven priorities, it is unclear what specific actions are necessary to achieve the priorities.

Great Lakes United, a binational coalition that promotes citizen action and grassroots leadership for Great Lakes environmental activities, published a citizen's action agenda for the Great Lakes in 2003. This document, and its summary version, describes what members consider to be the seven major challenges to be addressed in the Great Lakes, such as toxic cleanup, protecting and restoring species, and sustaining and restoring water flows.[13] Under each challenge, the agenda recommends several action items for restoring the Great Lakes Basin. Some of these action items have established time frames.

Significant Challenges Exist for Setting Basin-Wide Goals and Developing a Monitoring System for the Great Lakes

Coordinating the establishment of measurable goals and developing a monitoring system for tracking progress in the Great Lakes are difficult tasks that face significant challenges. Of great importance, no single organizational entity has exercised leadership responsibility for coordinating the establishing of specific goals and a monitoring system. As we reported previously, under the Clean Water Act, GLNPO has coordination authority over many Great Lakes activities but has not fully exercised it. Further, it is uncertain whether the Executive Order issued in May 2004, creating a Great Lakes Interagency Task Force, will provide the needed stability in leadership.[14] Second, the restoration goal setting and monitoring efforts ongoing by numerous governmental and nongovernmental organizations in the United States and Canada will

[12]Great Lakes Commission, *Great Lakes Program to Ensure Environmental and Economic Prosperity* (March 2004).

[13]Great Lakes United, *Citizen's Action Agenda for Restoring the Great Lakes—St. Lawrence River Ecosystem*, and *Great Lakes Green Book* (June 2003).

[14]Exec. Order No. 13340, 69 Fed. Reg. 29043 (May 18, 2004).

create a challenge for coordinating within and between the two countries. Specific obstacles include coordinating the goal setting efforts of the various Great Lakes organizations and accounting for ongoing agreements within Canada when developing the joint monitoring system called for in the GLWQA. Third, coordinating information derived from the various monitoring activities of the numerous groups involved in the Great Lakes is a significant challenge. The lack of a centralized repository of monitoring information makes it difficult to assess restoration progress. Fourth, because each of the five Great Lakes has unique environmental conditions, it will be difficult to establish measurable goals that reflect these differences and yet provide consistent basin-wide information. One restoration effort, the Chesapeake Bay Program, has developed measurable goals and a defined organizational structure that may offer valuable lessons for restoration efforts in the Great Lakes.

Great Lakes Restoration Efforts Lack Clearly Defined Organizational Leadership

Organizational leadership for setting goals and developing a monitoring system has yet to be realized for the Great Lakes. Several attempts at providing organizational leadership have not resulted in a stable structure for leading Great Lakes restoration efforts. We previously reported that, within the Great Lakes several entities are involved in coordinating and planning, which has resulted in confusion by federal and state officials as to which entity bears ultimate responsibility.[15] We further reported that the responsibility for leading the U.S.'s Great Lakes efforts rests with GLNPO and that it is not fully exercising its authority under the Clean Water Act for coordinating Great Lakes restoration programs. We recommended GLNPO fulfill its coordinating responsibilities and develop an overarching Great Lakes restoration strategy. EPA promised to provide a detailed response to our recommendations, but has not yet done so. However, in 2003 an EPA official stated in congressional testimony that the Clean Water Act does require EPA, and more specifically GLNPO, to serve as the lead entity for coordinating the protection and restoration of the Great Lakes system. The same official stated in 2004 congressional testimony that our recommendations are answered by the Executive Order and again promised a detailed response to these recommendations. However, the Executive Order does not address our recommendations.

As a result of the Executive Order issued in May 2004, which created a Great Lakes Interagency Task Force within EPA, how GLNPO's leadership

[15] GAO-03-515.

role and coordination responsibilities will be exercised in the future is unclear. Task force members include representatives from EPA, eight other federal agencies with Great Lakes program responsibilities, and the Council on Environmental Quality. Under the Executive Order, one of the purposes of the task force is to coordinate government action associated with the Great Lakes. The EPA Administrator chairs the task force that is also charged with developing outcome-based goals and collaborating with Canada and its provinces and with other binational bodies involved in the Great Lakes region regarding policies, strategies, projects, and priorities for the Great Lakes. The head of GLNPO, the Great Lakes National Program Manager, chairs the working group, and GLNPO staff are to assist both the task force and the working group in performing their duties. While the Executive Order addresses GLNPO's role with respect to the task force and working group, it does not address GLNPO's existing responsibilities under the Clean Water Act for coordinating EPA's activities with other federal agencies and state and local authorities to meet GLWQA goals. The coordination role for the task force under the Executive Order is very similar to GLNPO's coordination role under the Clean Water Act. However, because the Executive Order does not affect the statutory obligations of federal agencies, GLNPO is still under a statutory obligation to fulfill its coordination role. Moreover, under the Clean Water Act, GLNPO is required to not only develop but also implement specific action plans to carry out the responsibilities under GLWQA. However, according to the Executive Order, GLNPO will participate on a Great Lakes Regional Working Group that is responsible for coordinating and making recommendations for implementing the task force polices and strategies, but it will be the task force that actually implements recommendations.

Existing coordination activities of USPC are also uncertain in light of the Executive Order. The USPC is focused on coordinating federal, state, and tribal government activities related to fulfilling the GLWQA, and it developed the *Great Lakes Strategy 2002* to set restoration goals and actions. Membership on the USPC is similar to the newly formed working group in that it includes regional federal officials, and the GLNPO program manager chairs both groups and also serves as the Acting Assistant Administrator for EPA's Office of Enforcement and Compliance Assurance. According to the Director of GLNPO, as of July 2004, when the last USPC semiannual meeting was held, there were no plans to change the role of the USPC. Therefore, the USPC, the task force working group, and GLNPO all seemingly are engaged in coordinating federal regional activities in the Great Lakes Basin.

Coordinating Great Lakes research is another responsibility provided to the task force under the Executive Order, but other organizations have research responsibilities by statute. Specifically, NOAA's Great Lakes Research Office, acting through the GLERL and other entities, is responsible under the Clean Water Act for conducting Great Lakes research and monitoring activities and annually reporting issues, on which Great Lakes research is needed, to the Congress.[16] Each year GLERL and GLNPO are to prepare a joint research plan and to provide a health research report to the Congress. Thus far, GLERL and GLNPO have not prepared these plans or reported to the Congress because funds were not requested or provided for the coordination and reporting activities, according to agency officials. The GLERL Director stated that they have about 15 specific legislative mandates involving Great Lakes research. Coordinating and prioritizing research is also an activity of the IJC's binational Council of Great Lakes Research Managers. This council, established in 1984, proposes priority research areas for the Great Lakes, and some of the proposals are priorities for GLERL, in part, because the council is currently co-chaired by the GLERL Director. Future councils, however, may not be co-chaired by the GLERL Director, and priority research areas may not be addressed because research managers are not bound to follow council priorities.

Finally, the creation of the task force and working group by the Executive Order also raises questions about the permanency of this organizational structure for addressing the long-term restoration needs of the Great Lakes. Executive orders, such as the one creating the task force, stay in effect despite changes in administrations, but they may be amended or rescinded by a subsequent President. Moreover, the Executive Order cannot be enforced in court, unlike statutory provisions that can often be judicially enforced. Therefore, the task force may prove to be a temporary rather than a permanent attempt at coordinating and developing goals for the Great Lakes. Legislation was proposed in 2004 to enact the provisions of the Executive Order into law, but this legislation remains pending in the Congress.

[16] 33 U.S.C. § 1268(d).

Coordinating Restoration Goals and Monitoring Activities within the United States and Canada Poses Challenges for a Basin-Wide Approach

Many organizations participating in the restoration of the Great Lakes have independently developed goals for the Great Lakes Basin. However, these organizations have tended to develop goals independently of EPA and one another, resulting in duplicative efforts and the lack of prioritization of goals. We previously reported that the numerous restoration strategies containing goals developed by various organizations did not provide an overarching approach that can be used as a blueprint to guide overall restoration activities.[17] The situation remains the same today with several organizations developing strategies and goals, without clearly defined leadership responsibilities to bring together or coordinate the various efforts. In some cases, the goals developed are very similar to each other. For example, the Council of Great Lakes Governors and the Great Lakes Commission both have similar goals relating to cleaning up of areas of concern[18] and stopping the spread of invasive species. Yet, consensus has not been reached by the various organizations as to specifically how such goals should be measured.

The leadership to coordinate goal setting efforts has not yet materialized. There is no one organization or group of organizations that is recognized as the leader. For example, at a Senate hearing on Great Lakes restoration efforts in 2003, the hearing chairman asked a panel of federal agency officials, including the Great Lakes National Program Manager, if there was an orchestra leader for the efforts in the Great Lakes, and none of the panel members volunteered a response. Similarly, during an IJC conference session in 2003, where the leadership for the various Great Lakes organizations was addressed, the Great Lakes National Program Manager stated that because of the number of groups involved in the Great Lakes, there is a need to find a way to work together toward goals; however, he was reluctant to lead this effort. The recently created Great Lakes Interagency Task Force was charged with establishing a process for collaboration among task force members to, among other things, develop outcome-based goals for the Great Lakes system. The desired outcomes are conditions such as cleaner water or sustainable fisheries.

Federal and state program officials acknowledge that limited coordination of monitoring activities now exists and that there is no single organization in place to direct the coordination of monitoring efforts. One attempt to coordinate monitoring involving research vessels on the Great Lakes

[17] GAO-03-515.

[18] Areas of concern are specific areas of contamination in the Great Lakes.

began in 1997, by the IJC's Council of Great Lakes Research Managers. The impetus for this effort was that over 60 research vessels were operating independently in the basin without coordination or collaboration and with limited monitoring funds. Since that time the IJC has been developing an inventory of Great Lakes research vessels that was placed on a Web site designed to identify the ships, scientific equipment, general research schedules, and points of contact to aid in coordinating operations and sharing resources. The extent that this inventory has facilitated coordination has yet to be determined, however, coordination has begun through sharing of information on research vessels, according to an IJC official.

Further, existing agreements on restoration goals and monitoring between Canada and its provincial governments of Ontario and Quebec will need to be considered in developing basin-wide goals if a joint U.S.-Canada monitoring system is to be developed as required under the GLWQA. Four of the five Great Lakes are shared by the United States and Canada and share many of the same environmental problems. The restoration goals and monitoring efforts developed in Canada to address these problems are important for a coordinated effort by the two countries. One set of goals to consider are in an agreement reached in 2002, between the governments of Canada and Ontario on overall goals and actions to be taken to protect, restore, and conserve the Great Lakes Basin ecosystem. This agreement—the Canada-Ontario agreement—contains four annexes that address areas of concern, harmful pollutants, lakewide management, monitoring, and information management. Each annex contains overall goals to be achieved over a 5-year period and results that the parties have agreed to achieve together or individually. For example, one result under the lakewide management annex is "reductions in the release of harmful pollutants on a lake-by-lake basis."

Another agreement containing goals that should be considered involves restoring the St. Lawrence River. This agreement—the St. Lawrence Action Plan—was reached in 1988, between officials of Canada and the province of Quebec and was a 5-year plan to address major problems of industrial pollution threatening natural habitats. While the St. Lawrence River is not geographically part of the Great Lakes Basin, it is the connecting channel from Lake Ontario to the Atlantic Ocean, and Quebec representatives participate in several of the organizations and activities involving the Great Lakes such as the BEC, SOLEC, and the Council of Great Lakes Research Managers. Since the first 5-year plan in 1988, subsequent 5-year agreements, referred to as phases, have focused on specific environmental priorities. The most recent agreement, Phase III,

also referred to as the St. Lawrence Vision 2000, has three major objectives: protecting ecosystem and human health, involving riverside communities in the process of helping to make the St. Lawrence more accessible, and recovering its former uses. An updated agreement, Phase IV, was being developed as of July 2004.

In addition to agreements, Canada and the two provinces have ongoing monitoring activities that provide information on environmental conditions in the Great Lakes Basin that will need to be considered in developing a joint basin-wide monitoring system. For example, the Ministry of the Environment, Ontario, conducts a Great Lakes nearshore monitoring and assessment program that contains five monitoring efforts. One of these involves sampling water quality at 66 sites within the basin on a rotating basis to determine how water quality is changing over time. Another component of the Ontario program is monitoring of Great Lakes tributaries for toxic contaminants. This monitoring is done to identify those tributaries to each lake having significant concentrations of persistent bioaccumulative substances, such as pesticides. In addition to monitoring conducted by the province of Ontario, monitoring and reporting is done by Conservation Authorities within the province. The Authorities consist of 36 local community-based organizations established by provincial legislation that manage watersheds throughout Ontario. The Authorities' monitoring efforts are concentrated on tributary, stream, and inland areas of the Great Lakes Basin, and reports are issued to the public on the state of the watersheds.

For the St. Lawrence River in Quebec, a monitoring component for the St. Lawrence Vision 2000 plan was developed by two Canadian federal agencies, the Quebec Ministry of Environment and a nongovernmental organization, to provide information on the environmental conditions in the St. Lawrence River Basin. The program began in 2003, with the four parties agreeing to conduct 21 monitoring activities until 2010, to analyze and report on the results. The 21 activities are ongoing activities by governmental organizations and were selected based on the descriptive information provided on St. Lawrence conditions. Several environmental issues are addressed, such as contamination of water, sediments, and biological resources by toxic substances. To better integrate the ongoing monitoring activities of the different organizations, the parties agreed to improve the spatial and temporal coverage of certain indicators, develop new indicators, and strive for better collaboration.

In addition to efforts conducted by the provinces and others, EC conducts monitoring in open lake waters, connecting channels, and tributaries of

the Great Lakes Basin. Open lake monitoring is conducted at various sites for ensuring compliance with GLWQA water quality objectives, evaluating trends, and identifying emerging issues. The monitoring focuses on two lakes each year, with the exception of Lake Michigan where it is the responsibility of the United States, to gather information on contaminants, nutrients, metals, and physical parameters at specific locations in each lake. Other monitoring programs involve pesticides and emerging chemicals monitoring in selected watersheds and embayments, and water quality monitoring of the Niagara, St. Lawrence, St. Clair, and Detroit Rivers. For example, the monitoring of the Niagara River is done as part of an agreement reached between EC, EPA, Ontario Ministry of Environment, and the New York Department of Environmental Conservation to reduce toxic chemical pollutants in the Niagara River. Monitoring is done at an upstream location near Lake Erie and downstream near Lake Ontario.

Lack of Centralized Information from Monitoring Activities Makes Coordination to Assess Restoration Progress Difficult

There is currently no centralized repository of information on monitoring activities. As a result, it is difficult to coordinate existing data and determine what additional information is needed to establish baseline conditions and assess progress toward restoration goals. Two related efforts are, however, under way to develop inventories of the existing monitoring programs within the Great Lakes. One effort is being led by the Great Lakes Commission, funded by grants from the Joyce Foundation and GLNPO, to develop a comprehensive inventory of environmental monitoring programs in the Great Lakes Basin. Information is being gathered from existing sources and through surveys and interviews with program officials. The information will be placed in a database, analyzed to identify monitoring gaps in existing programs, and used by the BEC to develop a monitoring coordination framework, according to Great Lakes Commission officials. This project, however, was funded on a one-time basis and does not include plans for updating the inventory of monitoring data.

A related effort is being conducted by GLNPO and EC under the direction of the BEC and is focused on developing an Internet-based inventory of existing monitoring systems. The inventory will not contain monitoring data, but rather a database of monitoring sources, referred to as metadata by GLNPO officials.[19] The inventory of existing monitoring sources will

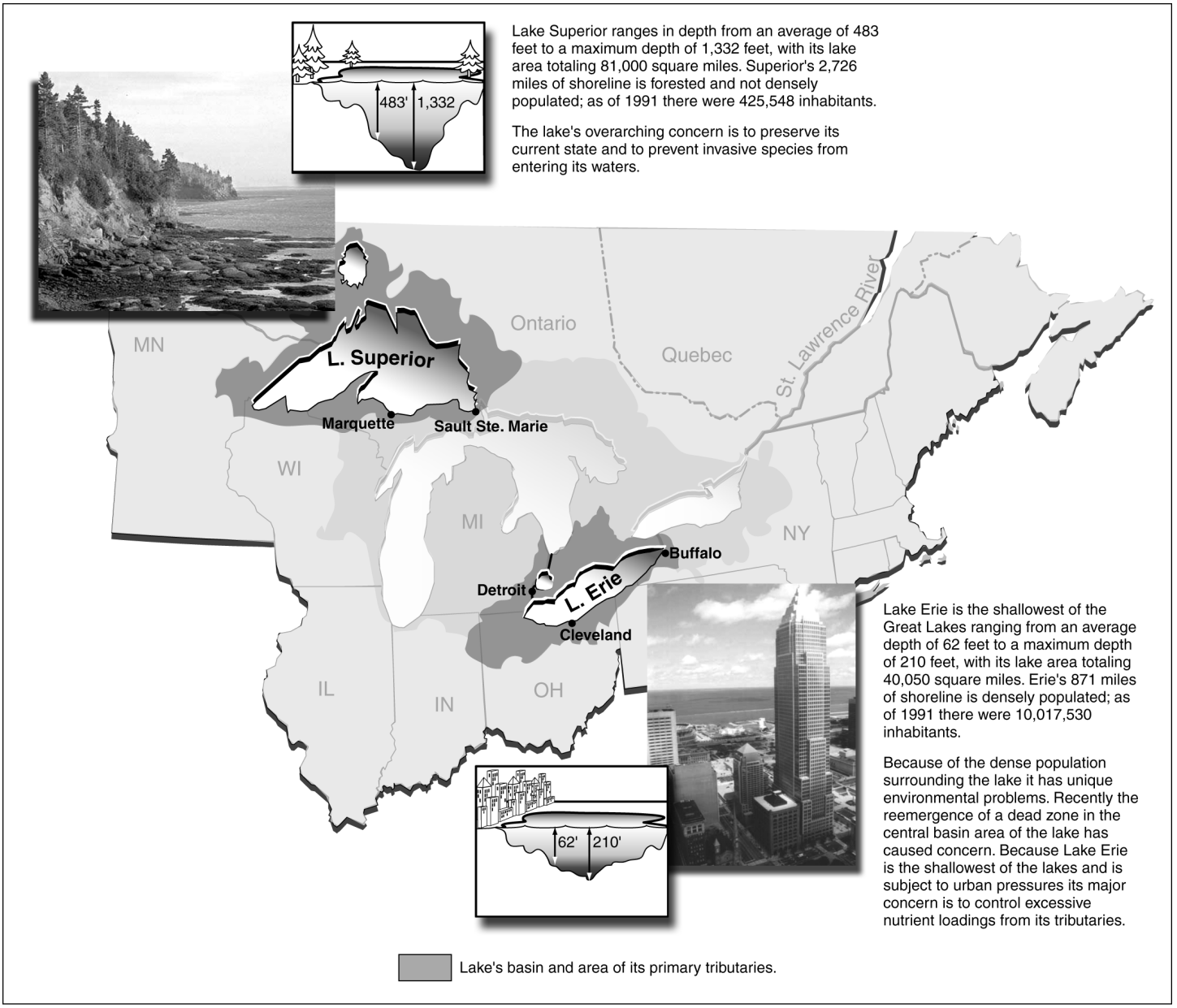
[19]Metadata are data about databases describing various attributes such as who is responsible for the database and the data content.

rely on common data fields and terminology for standardization of information, and GLNPO plans to manage the database. To create the database, the BEC will request the various federal and state agencies and other organizations conducting monitoring activities to input information into the database, according to GLNPO officials. Ultimate responsibility for data completeness and quality rests with the BEC. However, it is unclear how this will be accomplished since the BEC has limited resources to carry out this responsibility. Further, since the input and annual update of monitoring information is voluntary, it is unclear how a complete and accurate inventory can be assured since there is no independent verification of the data. GLNPO officials stated that, as of July 2004, the Web-based system is developed, and they are awaiting organizations to enter information on monitoring systems into the database.

Unique Environmental Conditions for Each Lake Makes Setting Basin-Wide Goals Difficult

While basin-wide goals are useful, existing goal-setting efforts are complicated by the unique characteristics of each lake. The physical magnitude of the basin is often recognized as a daunting challenge for setting measurable restoration goals. Although the Great Lakes are connected through rivers and channels, they are not one contiguous water body but rather distinct lakes with unique environmental conditions. The Great Lakes Basin area spans 750 miles and has multiple environmental challenges. This presents challenges to setting goals and developing a monitoring system that can be used to describe restoration progress across the basin and also capture the uniqueness of each lake. The distinct physical characteristics of the lakes are illustrated by the differences between Lakes Superior and Erie. (See fig. 3.)

Figure 3: Differences in Characteristics of Lake Superior and Lake Erie



Source: GAO analysis of Lake Superior LaMP 2002 and Lake Erie LaMP 2002; photos of the shoreline of Lake Superior and cityscape of Cleveland, Art Explosion; maps Map Art.

Lake Superior is a larger, deeper lake with a relatively sparse human population within its watershed. Most of the shoreline of Lake Superior is forested and not host to the extensive urban development along its shores that Lake Erie has. For Lake Superior, the overarching concern is to preserve current conditions and keep pollutants and invasive species from entering the lake. Lake Erie has other unique environmental problems, the most recent being the reemergence of a dead zone in the central basin of the lake that is void of oxygen and cannot support aquatic life. Recently, the phosphorus levels of the lake have exceeded acceptable levels as the result of unknown causes. Research efforts are now focused on determining the cause of the rise in phosphorous levels, which cause harmful algae blooms. Because Lake Erie is the shallowest of the Great Lakes and is subject to urban pressures, it is sometimes cited as the lake that first develops environmental problems within the Great Lakes Basin.

The differences between the Great Lakes pose a challenge to setting basin-wide goals. While goals are needed to determine basin-wide progress, goals for each lake are also needed to address specific problems or public concerns for each lake. For Lake Superior, a major concern is stopping pollutants from entering the lake, which is addressed through a program that established a goal of zero-discharge for point source pollutants.[20] For Lake Erie, goals developed by the Lake Erie Commission address other problems, such as how remediating contaminated sediments in Lake Erie's harbors and tributaries. The future challenge will be how to build on the existing goal-setting efforts for each lake in developing measurable goals for the Great Lakes Basin as a whole.

Chesapeake Bay Program May Offer Lessons Learned for Developing an Organizational Structure and Setting Restoration Goals

The Chesapeake Bay Program, a restoration effort lead by EPA, has demonstrated that quantifiable and prioritized goals with definitive time frames can be developed for measuring restoration progress. While the Great Lakes have unique challenges, such as coordination with Canada, the bay program also provides an example of how an organizational structure can be created to successfully coordinate goal setting.

Unlike the restoration goals prepared for the Great Lakes, the Chesapeake Bay Program has specific, measurable goals with definitive time frames

[20]Point source pollutants are those that contribute pollutants directly to a body of water from a pipe or other discrete conveyance.

that are linked to indicators and a monitoring and modeling program.[21] Overall goals developed for the program are stated in a general fashion similar to many developed for the Great Lakes and are to (1) address water quality and clarity problems caused by excess nutrients, sediments, and toxics; (2) maintain and restore living resources of the bay, such as controlling exotic species and protecting crabs and oysters; (3) protect and restore vital habitats, such as wetlands and submerged aquatic vegetation; (4) make sound land use decisions, such as land conservation; and (5) engage the community through education and outreach. However, the general goals are further defined as specific commitments that are used to measure program progress.

As of December 2003, the program was endorsing over 40 measurable environmental commitments for the watershed. The program has prioritized commitments included in the most recent bay agreement, Chesapeake 2000, by identifying the 10 most important "keystone commitments" for the bay for focusing their efforts on critical needs and making the best use of resources and capabilities. For example, one keystone commitment for the overall goal of maintaining and restoring living resources in the bay, is that by 2010, at a minimum, a tenfold increase in native oysters should be achieved in the Chesapeake Bay, using a 1994 baseline. In addition, this commitment involves developing appropriate research and management strategies for attaining this increase.

According to program officials, defining measurable goals and commitments up front is the key to the success of the Chesapeake Bay Program. If the goals are developed first, then they can be linked to the appropriate measurement and tracking activities and indicators to evaluate progress. Once program officials analyze the data collected from monitoring, modeling, and tracking programs to determine progress, they can decide on the appropriate actions to take to maintain or improve conditions. Officials from organizations involved in the restoration and protection of the bay agree that defining goals up front is important to the restoration effort and that the Chesapeake Bay Program has done a good

[21]The Chesapeake Bay Agreement in 1983 established the Chesapeake Executive Council to assess and oversee the implementation of coordinated plans to improve and protect the water quality and living resources of the Chesapeake Bay estuarine systems. Subsequent Chesapeake Bay agreements in 1987, 1992, and 2000 defined the agenda for the Chesapeake Bay Program setting forth strategic plans with measurable goals and objectives for the bay watershed.

job in this regard. For example, an official from the Chesapeake Bay Foundation—the largest conservation organization dedicated to saving the Chesapeake Bay watershed—stated that the Chesapeake Bay Program does a good job in establishing clearly defined goals and commitments and linking them to indicators and monitoring to reflect the current overall conditions of the bay. In addition, State of Maryland officials from the Department of Environment and Department of Natural Resources stated that the goals and commitments of the program mirror those established by the state and that they are adequately linked to the monitoring and indicators used by the program. Recently, however, concerns were raised regarding how accurately the program's computer model estimates projected reductions in nutrients. According to one program official, the controversy highlights the need for reaching consensus on appropriate measurement approaches and the need for peer review of all monitoring and modeling protocols.

Finally, the program is an example of how a permanent organizational structure was established to set measurable goals and to coordinate restoration efforts. The organizational structure of the Chesapeake Bay Program is founded on an agreement between three states, the District of Columbia, and EPA with an executive council leading the program. This council consists of three governors, the Mayor of the District of Columbia, EPA's Administrator, and a representative from the Chesapeake Bay Commission. The council establishes measurable program goals and commitments in such areas as water clarity after receiving input from several program committees and subcommittees. Restoration and monitoring efforts are coordinated by a number of written agreements between federal agencies and other organizations to focus resources in certain areas, such as an agreement between the FWS and EPA to provide technical assistance for various activities including habitat classification and mapping, resource assessments, and field surveys and inventories.

Conclusions

A clearly defined organizational leadership structure is needed for restoring the Great Lakes and in particular for developing measurable basin-wide goals and a monitoring system as called for in the GLWQA and the Clean Water Act. Several organizations have offered basin-wide goals over the years, but none are guiding restoration efforts and measurable progress remains an elusive information component. The required monitoring system has not been fully developed and the vision of having information to guide restoration efforts remains unfulfilled. While the recent Executive Order creates a Great Lakes Interagency Task Force within EPA to develop measurable goals and coordinate federal activities,

it is uncertain whether this task force will provide definitive, stable leadership needed over time because it may be readily changed by future executive orders. Additionally, while GLNPO has existing statutory responsibility for coordinating Great Lakes activities, it is unclear how its responsibilities and those of other organizations fit with the coordination activities of the new task force. EPA is now taking steps to implement the Executive Order; however, it is unclear whether this fulfills its responsibilities under the Clean Water Act. Absent a clearly defined leadership structure, setting measurable goals and monitoring progress in the Great Lakes is unlikely to be accomplished, and duplicative responsibilities for coordination, goal setting, and monitoring may be inevitable. EPA has recently demonstrated leadership on monitoring by developing an inventory of all monitoring activities in the Great Lakes. While we believe this is a worthwhile effort, controls should be in place to ensure the completeness and accuracy of the data in the inventory.

Matter for Congressional Consideration

In light of the uncertainty regarding how GLNPO's responsibilities fit with the newly created Great Lakes Interagency Task Force and to help ensure the coordination of U.S. efforts in developing basin-wide measurable restoration goals for the Great Lakes, as well as the development of a joint monitoring system based on those goals, the Congress may want to consider

- clarifying whether GLNPO or the task force should lead the U.S. efforts in restoring the Great Lakes and requiring this entity, in consultation with Canada, the governors of the Great Lakes states, federal agencies, and other organizations, to develop and prioritize specific measurable restoration goals for the Great Lakes Basin within a certain time frame; and

- requiring the entity to develop and implement monitoring activities to measure progress toward attaining goals and identify actions that could assist in achieving these goals.

If the Congress decides that the task force should have the leadership role, it may also want to consider whether additional Great Lakes Basin stakeholders should be task force members, such as representatives of states and other organizations.

Recommendation for Executive Action

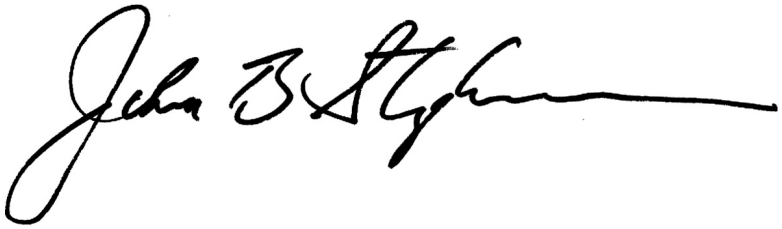
To facilitate the coordination of monitoring activities by the various federal, state, and other organizations within the Great Lakes Basin, we recommend that the EPA Administrator direct GLNPO to develop adequate controls for the inventory of monitoring systems to ensure that inventory data is accurate, current, and complete so as to facilitate users' efforts to coordinate monitoring activities.

Agency Comments and Our Evaluation

GAO provided EPA with a draft of this report for its review and comment. The agency generally agreed with the findings and recommendations in the report. EPA stated that the inventory of monitoring activities is a critical component for monitoring and reporting efforts, and adequate controls are needed to ensure that data are accurate, current, and complete in order to facilitate users' efforts to coordinate monitoring activities. Accordingly, EPA stated it has begun taking steps to develop these controls. Specifically, GLNPO will lead the U.S. efforts to track entries into the inventory database to ensure that data from all agencies are included. GLNPO will also request annual verification and updating by organizations of their information to ensure that the database is accurate and current. If effectively implemented, these steps should help ensure the accuracy and usefulness of the inventory for coordination purposes. Regarding our matter for the Congress to consider clarifying leadership responsibilities, EPA stated that it believes the responsibilities for organizational leadership in the Great Lakes for both GLNPO and Great Lakes Interagency Task Force are clearly stated in the Clean Water Act and the Executive Order, respectively. While EPA describes the overall structure and responsibilities of the task force and GLNPO to support its position, it does not address our concern that similar coordination responsibilities are assigned to different organizations under the Executive Order and the Clean Water Act. EPA states that the Executive Order appoints the Great Lakes National Program Manager as chair of the Great Lakes Regional Working Group and that this will enhance GLNPO's ability to meet its statutory obligation to coordinate federal restoration activities. However, this does not address our point that the Clean Water Act assigns GLNPO the responsibility of implementing specific action plans to carry out U.S. responsibilities under the act, while under the Executive Order, it is the task force, not GLNPO that will implement recommendations of the working group. Further, EPA did not address our concern that the task force does not provide the definitive, stable leadership that is needed over time given that its responsibilities may be changed by future executive orders. The full text of EPA's comments is included in appendix VII.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies of this report to appropriate Congressional Committees; the EPA Administrator; various other federal departments and agencies; and the International Joint Commission. We also will make copies available to others upon request. In addition, the report will be available at no charge on the GAO Web site at http://www.gao.gov.

If you or your staff have any questions, please call me at (202) 512-3841. Key contributors to this report are listed in appendix VIII.



John B. Stephenson
Director, Natural Resources
and Environment

List of Congressional Requesters

The Honorable Mike DeWine
United States Senate

The Honorable Russell Feingold
United States Senate

The Honorable Carl Levin
United States Senate

The Honorable Debbie Stabenow
United States Senate

The Honorable George Voinovich
United States Senate

The Honorable John Conyers, Jr.
House of Representatives

The Honorable John Dingell
House of Representatives

The Honorable Rahm Emanuel
House of Representatives

The Honorable Vernon Ehlers
House of Representatives

The Honorable Marcy Kaptur
House of Representatives

The Honorable Dale Kildee
House of Representatives

The Honorable Ron Kind
House of Representatives

The Honorable Mark Kirk
House of Representatives

The Honorable Dennis Kucinich
House of Representatives

The Honorable Steven LaTourette
House of Representatives

The Honorable Sander Levin
House of Representatives

The Honorable Candice Miller
House of Representatives

The Honorable James Oberstar
House of Representatives

The Honorable Jack Quinn
House of Representatives

The Honorable Bart Stupak
House of Representatives

Appendix I: Scope and Methodology

To determine the extent to which information derived from monitoring is useful for assessing overall conditions in the Great Lakes Basin, we gathered and analyzed information on efforts to develop indicators through the State of the Lakes Ecosystem Conferences (SOLEC), which is a jointly sponsored effort by EPA's Great Lakes National Program Office (GLNPO) and Environment Canada (EC). We also gathered and analyzed information on monitoring activities obtained from state agency officials in each of the eight Great Lakes states—Illinois, Indiana, Ohio, Michigan, Minnesota, New York, Pennsylvania, and Wisconsin; eight federal agencies; two Canadian federal agencies; and provincial agencies in Ontario and Quebec, Canada. For each agency, we obtained information about ongoing monitoring efforts including the purpose of the monitoring efforts, type of information collected during monitoring, how the information was analyzed and used, and how monitoring was coordinated with other federal or state agencies. A detailed listing of the federal, state, and Canadian agencies that provided monitoring information is included as appendix II. We reviewed the monitoring requirements contained in the Great Lakes Water Quality Agreement (GLWQA) and compared these requirements with the ongoing monitoring activities.

To identify existing restoration goals and whether monitoring is done to track goal progress, we obtained and analyzed Great Lakes restoration goals prepared by several organizations including the Council of Great Lakes Governors, Great Lakes Commission, Great Lakes United, and U.S. Policy Committee. We analyzed the goals contained in the *Great Lakes Strategy 2002* and reviewed information on monitoring the progress in achieving the goals. We further reviewed the restoration goals and monitoring efforts contained in Lakewide Management Plans (LaMP) prepared for four of the five Great Lakes. We interviewed LaMP managers to determine the process followed for setting goals and related monitoring activities. We also interviewed officials conducting the monitoring for the *Great Lakes Strategy 2002* and reviewed monitoring progress reports.

To identify major challenges to setting restoration goals and developing a monitoring system for the Great Lakes, we identified barriers to accomplishing these tasks and gathered information on four major challenges involving organizational responsibilities, coordination of monitoring activities with Canada, centralized information on monitoring activities, and unique lake environmental conditions. We gathered and analyzed information on existing organization responsibilities, including those established by the GLWQA, statutes, and administrative decisions, along with the organizational responsibilities set forth in a May 2004 executive order. We interviewed officials and gathered information from

EC, the Ontario Ministry of Natural Resources and Ministry of the Environment, and the Quebec Ministry of Environment to identify their ongoing monitoring activities and challenges to Canada's participation in developing and implementing a comprehensive monitoring system for the Great Lakes. We identified and analyzed efforts for inventorying and coordinating monitoring activities in the Great Lakes Basin and obtained and analyzed information on a proposed Web based inventory of monitoring efforts from GLNPO officials. We obtained and analyzed documentation about the environmental conditions for each of the Great Lakes and discussed with federal and state officials the difficulties in developing a basin-wide monitoring system. Finally, we gathered information on goals, monitoring, and the organizational structure for the Chesapeake Bay Program. We interviewed program, state, and nonprofit officials about how goals were developed, monitored, and results communicated.

We performed our work from August 2003 to May 2004 in accordance with generally accepted government auditing standards.

Appendix II: Federal, State, Canadian, and Other Organizations That Provided Great Lakes Monitoring and Research Information

Federal Agencies

Environmental Protection Agency

- Great Lakes National Program Office
- Office of Research and Development
- Chesapeake Bay Program
- Region V

Department of Interior

- U. S. Fish and Wildlife Service
- U. S. Geological Survey

Department of Commerce

- National Oceanic and Atmospheric Administration

Department of Agriculture

- Forest Service

State Agencies

Illinois

- Illinois Environmental Protection Agency

Indiana

- Indiana Department of Environmental Management

Ohio

- Ohio Environmental Protection Agency
- Ohio Department of Natural Resources

Michigan

- Michigan Department of Environmental Quality

Minnesota

- Minnesota Pollution Control Agency

New York

- New York State Department of Environmental Conservation

Pennsylvania

- Pennsylvania Department of Environmental Protection

Wisconsin

- Wisconsin Department of Natural Resources

Canadian Agencies

- Environment Canada—Ontario Region
- Environment Canada—Quebec Region
- Ontario Ministry of Natural Resources
- Ontario Ministry of the Environment
- Ontario Great Lakes Fisheries Management
- Conservation Ontario
- Quebec Ministry of the Environment

Other Organizations

- Great Lakes Commission
- The Nature Conservancy
- Great Lakes Cities Initiative
- International Joint Commission
- University of Minnesota's Natural Resources Research Institute

Appendix III: Comments by Officials on Need for Indicators and Monitoring in the Great Lakes Basin

Nearly all of the officials we contacted endorsed the need for a comprehensive surveillance and monitoring system and their comments include why a system is needed or factors to consider in developing a system. See table 1 for a summary of these comments.

Table 1: Summary Comments by Officials on the Need for Indicators and Comprehensive Monitoring in the Great Lakes Basin

Agency/organization	Comments
Department of Interior: U. S. Geological Survey (USGS)	• A comprehensive surveillance and monitoring system with indicators is needed and should be developed cooperatively between federal and state agencies. • No one agency has the capability to adequately monitor and assess the Great Lakes ecosystem. • The Environmental Protection Agency's (EPA) Great Lakes National Program Offices' (GLNPO) strength is in open lake surveillance monitoring, but the other agencies like USGS that have expertise in tributary, wetland, and groundwater issues should come together to develop a monitoring system.
USGS—Great Lakes Science Center	• A comprehensive surveillance and monitoring system and indicators are necessary for the Great Lakes. • The Great Lakes Science Center integrates monitoring systems and indicators with scientifically based proactive research; a similar approach should be used to develop a comprehensive system.
Department of Commerce: National Oceanic and Atmospheric Administration (NOAA)	• It is strongly believed that a comprehensive surveillance and monitoring system, with indicators, is needed for the Great Lakes. • The International Joint Commission's (IJC) Science Advisory Board recommended that the U.S. and Canadian governments, while considering revisions to the Great Lakes Water Quality Agreement (GLWQA), consider requiring implementation of a systematic, science-based program that has data quality objectives and data collection plans driven by ecosystem behavior and contaminant fate and develop binational surveillance programs for water quality management similar to the Integrated Atmospheric Deposition Network.
Department of Interior: Fish and Wildlife Service	• A well-coordinated, comprehensive basin-wide surveillance and monitoring system with indicators for the Great Lakes is needed to measure outcomes of programs, public investment, and status of ecosystem health, while targeting actions strategically and allowing for informed environmental decisions. • A real-time comprehensive system of mapping, modeling, and statistical assessment is needed to evaluate conservation and restoration efforts.
Department of Agriculture: Forest Service	• It would be valuable to have comprehensive monitoring of social, economic, and environmental conditions in the Great Lakes Basin. • Data of this kind, consistently collected at regular intervals, is rare. • Comprehensive monitoring could cover the range of economic sectors; be grounded in suitable scientific disciplines; and address information needs of city, county, state, and federal governments, as well as other agencies, organizations, and individuals that invest resources for public benefit.

Agency/organization	Comments
Environmental Protection Agency: GLNPO	• A comprehensive surveillance and monitoring system, with associated environmental indicators, is necessary for the Great Lakes if we are to be able to track environmental trends, understand emerging threats to the ecosystem, implement appropriate control strategies, and assess the effectiveness of our programs. • With programs such as the State of the Lakes Ecosystem Conference (SOLEC), the Binational Executive Committee's inventory of monitoring programs, and the Presidents' recently signed an executive order calling for a Great Lakes Interagency Task Force to plan and coordinate Great Lakes activities, improvements are expected.
Illinois Environmental Protection Agency	• A comprehensive surveillance and monitoring system with indicators is needed and should be developed as a joint effort of the Great Lake states, GLNPO, the Great Lakes Commission, and others, including university researchers, to identify current and future potential problems, develop and implement monitoring strategies, and seek options for both short-term and long-term problem resolution.
Indiana Department of Environmental Management	• A comprehensive surveillance and monitoring system with indicators is needed. It should be developed in a cooperative effort by EPA Region 5 and GLNPO, the International Joint Commission, the Great Lakes Commission, Environment Canada, and the EPA Region 5 states.
Michigan Department of Environment Quality	• A comprehensive monitoring system for the Great Lakes is needed; however, such a system must be developed with involvement from all parties that have a stake in what happens in the Great Lakes. • Each lake must be looked upon individually when it comes to indicators because of their differences. One set of indicators will not fit all the lakes. • To address environmental conditions and know if things are getting better or worse requires quantitative answers to specific problems related to each individual lake.
Minnesota Pollution Control Agency	• A comprehensive system is needed, but it must address both ambient indicators such as fish, water, and beaches and the source indicators needed to assess regional progress. The system should also be flexible since there is no single set of indicators that apply to all the lakes. • A lake trout indicator for Lake Superior might not be appropriate for Lake Erie, and a yellow perch indictor well suited for Lake Erie would not make sense for Lake Superior. The system should also use existing monitoring and indicator systems as much as possible.
New York State Department of Environment Conservation	• A comprehensive system is needed, but it must be mandated by law and adequately funded to support staff and equipment resourcing, analytical analysis, and reporting over a long-term period.
Ohio Environmental Protection Agency and Ohio Department of Natural Resources	• It is important for the Great Lakes to have a long-term surveillance and monitoring system with indicators. Appropriate indicators are probably the most important things needed. • A carefully chosen set of indicators that provide the best information on the state of the lakes should be established before the monitoring program is designed. We need to know the reasons why we should monitor. • Comprehensive monitoring for surface and groundwater in the Great Lakes basin is needed to understand the availability, limits and impacts of water withdrawals, as well as to support science-based decision making under the agreement.

Agency/organization	Comments
Pennsylvania Office of Environmental Protection	• There are a number of systems already in place to survey and monitor environmental parameters within the Great Lakes, such as SOLEC and Lakewide Management Plans (LaMP). • The bigger problem is in coordinating the surveillance and monitoring and having enough resources to do a comprehensive job. A lot of resources go into monitoring and surveillance, but the results are not always shared with those who need the information.
Wisconsin Department of Natural Resources	• One environmental official believes existing systems are adequate to accomplish the stated tasks. Instead, better acceptance is needed by concerned agencies and a willingness to provide funds for efficient and technically credible monitoring efforts. • Another environmental official believes some surveillance and monitoring is needed; however, it should involve a limited number of indicators and biological measures established by system ecologists as a starting point. More in-depth comprehensive surveillance and monitoring should be targeted to problem areas and resource management concerns across the Great Lakes.[a]
Great Lakes Commission	• There is a great need for a comprehensive monitoring plan for the Great Lakes, but to be effective it must have buy-in from all federal state and local organizations with responsibility for activities in the Great Lakes. • The GLWQA is believed to be the tool needed to harmonize the U.S. and Canadian governments' objectives for the Great Lakes; however, a comprehensive indicator and monitoring system is required to accomplish this.
Nature Conservancy	• The lack of monitoring activity is a problem throughout the ecosystem, and the development of a comprehensive monitoring system is becoming more and more important each day. However, monitoring must be based on documented and tested scientific information because of the turnover of staff personnel in environmental and conservation areas.
Great Lakes Cities Initiatives	• Because of philosophical differences and complexities among Great Lakes Governors, monitoring at the state level is even more difficult and requires the input of city mayors. There is a grave need for someone to set priorities for restoration activities. • With tight state budgets, there must be a collective body to set priorities and oversee projects to prohibit duplicative spending. There is a need for indicators and monitoring to say whether things are getting better or worse in the Great Lakes. • Currently, people are deciding independently what is most important, and sufficient and accurate information is not available to assess conditions.
Environment Canada—Ontario Region	• Developing indicators for the Great Lakes is a work in progress, and it is essential that these efforts continue. Appropriate indicators must be developed and they must have linkage. • A comprehensive monitoring system with indicators is needed, but everyone with a vested interest in the Great Lakes must take part in developing the indicators and the surveillance process to monitor them.
Ontario Ministry of Natural Resources	• A comprehensive monitoring strategy and indicators are needed for the Great Lakes; however, the development of such a strategy will be a significant challenge. There has been significant progress made in restoration of the Great Lakes by various federal, state, and provincial organizations. • The problem is that there are too many different people with different interests who do not always talk to each other. The sum of the parts from various Great Lakes projects has been good, but the results are by fluke, not by plan. There must be a process where everyone participates and talks to each other.

Agency/organization	Comments
Ontario Great Lakes Fisheries Management	• A comprehensive monitoring system is needed. Threats to the biological, physical, and chemical integrity of the Great Lakes require an ecosystem and collaborative approach to objective setting, indicator development, monitoring, and reporting.
Environment Canada— Quebec Region	• Such a program is definitely needed to report on the state and evolution of the ecosystem. Considering the size of the drainage basin, such a program should answer questions at the lake, river, and basin levels. It should be based on a wide array of environmental indicators and not just on a few highlighted ones. • These indicators need to be useful and significant for government and nongovernment managers and interested communities in order to have a lasting impact. The indicators and monitoring must support the decision-making process.
Quebec Ministry of the Environment	• There is a need to monitor all the Great Lakes and the St. Lawrence to determine progress toward restoring these watersheds. We must know where we are and where we want to go before we can know if things are getting better. • There must be a relationship between the state of the environment and the pressures placed on it from various contaminants and users. We can't just monitor the lakes for the sake of monitoring. • Monitoring in and of itself is not a good goal. Monitoring must be done to answer specific management questions and make decisions about what needs to be done.
IJC	• A system of monitoring to measure indicators of ecosystem health is essential for the Great Lakes. Without it we have no way of knowing either the state of the lakes or whether our policies and programs are effective in protecting the Great Lakes and those who rely on them for drinking water, commerce, and quality of life. • We need a coordinated approach across a multiplicity of institutions to include EPA; Environment Canada; fisheries and natural resource agencies; and federal, state, and provincial governments. • Presently there is growing enthusiasm for a Great Lakes observing system, possibly lead by NOAA and coordinated with help from the IJC's Council of Great Lakes Research Managers.

Sources: USGS, NOAA, FWS, FS, EPA, IL, IN, MI, MN, NY, OH, PA, WI, Great Lakes Commission, Nature Conservancy, Great Lakes Cities Initiatives, Environment Canada, Ontario Ministry of Natural Resources, Quebec Ministry of the Environment, Ontario Great Lakes Fisheries Management, International Joint Commission, and GAO.

[a]There was no definitive yes or no response from Wisconsin officials, see the comment box.

Appendix IV: State of Ohio Lake Erie Programs and Initiatives with Monitoring Activities

Programs and initiatives with monitoring activities	Program objectives or focus	Program responsibility
Fish Consumption Advisory Program	Analysis of sport fish caught in Ohio waters for toxins; results are basis for fish consumption advisories.	State funded program, state administered.
Clean Water Act, Section 305 (b)	Biennially assess Ohio's water bodies and report the status of impaired waters.	Federally requirement, jointly funded by federal and state; administered by stste.
Clean Water Act, Section 303 (d)	Protect impaired or threatened waters by developing total maximum daily load limits by 2013.	Federally requirement, jointly funded by federal and state; administered by state.
Ohio Department of Natural Resources Coastal Urban Streams Program	Conduct nonpoint pollution abatement program with focus on urban, residential, and commercial sources.	State initiated, jointly funded by federal and state.
Phosphorus Reduction Strategy	Long-term program to reduce phosphorus loading into Lake Erie.	Joint federal and state funded program; administered by state.
Ohio Department of Natural Resources Bald Eagle Management Program	Program to reestablish the bald eagles throughout Ohio	State initiated and funded.
Biological Indices Program	Indices measuring the health of streams based on health and diversity of aquatic communities.	State initiated jointly funded by federal and state.
Bacterial Beach Monitoring Program	Monitor swimming beaches for fecal bacteria contamination using E. coli as test organism.	Joint federal and state funded program; administered by state.
Ohio Tributary Monitoring Program	An analysis of water samples collected within the Lake Erie basin to assess sediment, nutrient, and metal compositions.	State initiated and funded.

Sources: Ohio Lake Erie Protection and Restoration Plan and GAO.

Appendix V: Observations on Goals and Monitoring Information Contained in LaMPs for Four Great Lakes

Lake Erie

The Lake Erie Lakewide Management Plan (LaMP) contains goals stated as four ecosystem management objectives focused on land use, nutrients, aquatic and terrestrial species, and contaminants. For example, one objective addressing contaminants is that toxic chemical and biological contaminant loadings within the basin must decline to a level that would permit sustainable use of natural resources. Each of the objectives have two to four subobjectives that along with the objectives, are not expressed in quantitative terms, priorities, or with established time frames. One subobjective under the contaminants objective is that toxic substances shall not exist in amounts detrimental to human health or wildlife and that exotic species should be prevented from colonizing the ecosystem, controlled where feasible, and reduced to a point where they do not impair the ecological function of Lake Erie. The plan does not state how progress in achieving these objectives will be tracked or when the objectives should be met. According to the plan, indicators were discussed but not selected by a LaMP working group, and tracking progress toward goals will not begin until indicators are selected. While indicators were not selected for the LaMP, the LaMP stated that extensive monitoring activities were ongoing and that an inventory conducted by Environment Canada showed that there were over 90 independent monitoring programs under way within the Lake Erie Basin. According to the LaMP, the indicators ultimately chosen will determine whether current monitoring will continue or new monitoring efforts will be initiated.

Lake Michigan

The Lake Michigan LaMP sets forth one overall goal—to restore and protect the integrity of the Lake Michigan ecosystem through collaborative partnerships—and 11 subgoals. These subgoals are stated as general questions, such as "can we drink the water," or "can we swim in the water," with additional detail on the status of reaching the subgoal, challenges, and key steps to be taken to achieve the subgoal's target. However, while these subgoals and key steps do contain some quantitative information and time frames, they are not prioritized and cannot be linked to indicators and monitoring so that progress under the subgoal can be measured. For example, under the subgoal "can we swim in the water," the LaMP states that there were 206 beach closures in 2000, and progress toward reaching the goal is "mixed." It further identifies a challenge to develop real-time beach monitoring and that, in 2004, the Great Lakes states should adopt criteria, standards, and monitoring programs for beach bacteria. The LaMP acknowledges that goals need to be linked to indicators and then to a monitoring strategy for tracking restoration progress. However, according to the LaMP Program Manager, the selection of indicators for Lake Michigan is still in process, and the scope of

monitoring efforts being conducted in the Lake Michigan basin needs to be determined and coordinated. As a first step in developing a coordinated strategic monitoring plan, a monitoring group—the Lake Michigan Monitoring Coordination Council—has an effort under way to determine ongoing monitoring activities in Lake Michigan at the state and federal levels, according to the official.

Lake Ontario

For Lake Ontario, U.S. and Canadian officials derived the LaMP's three overall ecosystem goals from an earlier plan—the Lake Ontario Toxics Management Plan—that was prepared in the late 1980s. For example, one goal derived from the plan for the LaMP is "to maintain the Lake Ontario ecosystem, and as necessary, restore or enhance it to support self-reproducing and diverse biological communities." Under the three overall ecosystem goals, the LaMP also included the management plan's ecosystem objectives in five areas: aquatic communities, wildlife, human health, habitat, and stewardship. These objectives describe in general terms the conditions necessary to achieve the overall ecosystem goals, but they are not stated in quantitative terms, prioritized, and do not contain time frames. The Lake Ontario LaMP also contains 11 indicators based on the Lake Ontario Toxics Management Plan and State of the Lakes Ecosystem Conference indicator work. According to the LaMP, most indicator monitoring needs are being met with existing monitoring programs, but further monitoring efforts are planned to provide a more complete assessment of lake conditions. The LaMP states that now that indicators have been adopted, U.S. and Canadian officials will work to develop a "cooperative monitoring" approach for promoting increased communication and coordination between their monitoring programs.

Lake Superior

The Lake Superior LaMP differs from other LaMPs in that it was developed from an ongoing program—the Lake Superior Binational Program. This program was established in 1991 to restore and protect Lake Superior, and it is a partnership between the United States; Canada; the states of Minnesota, Wisconsin and Michigan; and the province of Ontario and tribal government representatives that develop policies through a number of task forces, workgroups, and committees. The LaMP is one of the products developed by the program. The LaMP focuses on six areas: critical pollutants, habitat, terrestrial wildlife communities, aquatic communities, human health, and lake basin sustainability. While these areas are not

prioritized, for critical pollutants, the LaMP provides specific, measurable goals for reducing nine bioaccumulative toxic chemicals.[1] For each chemical, a 1990 baseline amount was established, along with targets, for chemical load reductions to be achieved every 5 years. For example, reducing mercury sources 60 percent by 2000, 80 percent by 2010, and a 100 percent by 2020. Similar goals are set for the other pollutants. While the goals are specific, the description of the monitoring process to measure progress is less specific with little detail on the monitoring required to measure progress toward goals. For the critical pollutants, a menu of possible monitoring activities is mentioned, and the LaMP states that more work is needed to develop a coordinated monitoring program to evaluate progress toward goals and that data from state sources is needed for measuring progress. According to Minnesota officials responsible for tracking progress, they have difficulty collecting information from state regulatory agencies and, therefore, do not have sufficient information to measure progress toward reaching goals. They added that funds are not available for the monitoring needed to measure progress.

The goals for the other five areas in the Lake Superior LaMP are not as specific and do not link indicators and monitoring to goals leaving unclear how progress toward goals will be measured. For example, the LaMP lists several strategies for pursuing sustainability, such as developing recycling programs and attracting industries that use recycled material but no quantitative information, prioritization, or time frames are given for these strategies. The LaMP mentions several indicators that have been developed to track progress in promoting sustainability, however, these are not linked to specific measurable goals. Sustainability indicators will be used, according to the LaMP, to assess how fully the Binational Program's vision statement is being realized. Ecosystem indicators for aquatic and terrestrial species are still under development.

[1]The targeted critical pollutants are dioxin, mercury, polychlorinated biphenyls, hexachlorobenzene, octachlorostyrene, and the pesticides chlordane, DDT, dieldrin/aldrin, and toxaphene.

Appendix VI: Goals and Priorities Established by Three Great Lakes Organizations

Council of Great Lakes Governors—Priorities Task Force

- Ensure the sustainable use of water resources while confirming that the Great Lakes states retain authority over water use and diversion of Great Lakes waters.
- Promote programs to protect human health against adverse effects of pollution in the Great Lakes ecosystem.
- Control pollution from diffuse sources into the water, land, and air.
- Continue to reduce the introduction of persistent bioaccumulative toxics into the Great Lakes ecosystem.
- Stop the introduction and spread of non-native aquatic invasive species.
- Enhance fish and wildlife by restoring and protecting coastal wetlands, fish, and wildlife habitats.
- Restore to environmental health the areas of concern identified by the International Joint Commission as needing remediation.
- Standardize and enhance the methods by which information is collected, recorded, and shared within the region.
- Adopt sustainable use practices that protect environmental resources and may enhance the recreational and commercial value of our Great Lakes.

Great Lakes Commission—The Great Lakes Program to Ensure Environmental and Economic Prosperity

- Restore and maintain beneficial uses in each of the 31 U.S. and binational areas of concern or "toxic hot spots," with a special emphasis on remediation of contaminated sediment.
- Restore and protect the ecological and economic health of the Great Lakes by preventing the introduction of new invasive species and limiting the spread of established ones.
- Improve Great Lakes water quality and economic productivity by controlling nonpoint source pollution from water, land, and air pathways.
- Restore 100,000 acres of wetlands and critical coastal habitat while protecting existing high quality fish and wildlife habitat in the Great Lakes Basin.

- Ensure the sustainable use and management of Great Lakes water resources to protect environmental quality and provide for water-based economic activity in the Great Lakes states.
- Meet domestic and international Great Lakes commitments through adequate funding for, and the efficient and targeted operation of, federally funded and management and research agencies.
- Maximize the commercial and recreational value of Great Lakes waterways and other coastal areas by maintaining and constructing critical infrastructure and implementing programs for sustainable use.

Great Lakes United—A Citizens Action Agenda for Restoring the Great Lakes and St. Lawrence River Ecosystem

- *Toxic Cleanup Action Agenda*
  Lists five areas where action is needed, such as funding toxic cleanups, coordinating cleanup efforts, and treating contaminants.
- *Clean Production Action Agenda*
  Lists seven areas where action is needed, such as design of manufacturing products, minimizing resource extraction, and planning and managing food production and agriculture in relation to the surrounding ecosystem.
- *Green Energy Action Agenda*
  List five areas where action is needed, such as promoting energy efficiency, conservation, and renewable energy sources.
- *Sustainable Water Quantities and Flows Action Agenda*
  Lists eight areas where action is needed such as implementing water withdrawal reform and restoring basin ecosystem functions damaged or lost due to harmful water withdrawal practices.
- *Protecting and Restoring Species Action Agenda*
  Lists 13 areas where action is needed to address invasive aquatic and terrestrial species, and protect threatened species.
- *Protecting and Restoring Habitats Action Agenda*
  Lists 24 areas where action is needed to protect and restore aquatic, forest, urban, and interconnecting habitats; and limit sprawl.

Appendix VII: Comments from the Environmental Protection Agency

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

SEP 20 2004

OFFICE OF WATER

Mr. John B. Stephenson
Director
Natural Resources and the Environment
U.S. Government Accountability Office
Washington, DC 20548

Dear Mr. Stephenson: John

Thank you for the opportunity to review and comment on the Government Accountability Office (GAO) draft report entitled Great Lakes: Organizational Leadership and Restoration Goals Need to Be Better Defined for Monitoring Restoration Progress. We appreciate GAO's understanding of the dynamics of monitoring issues in the Great Lakes and the complexities of coordinating among Federal, State, Provincial and local monitoring programs. We have reviewed the report carefully giving full consideration to the facts, conclusions and recommendations. Below are the Environmental Protection Agency's (EPA) comments that focus on the Matter for Congressional Consideration and the Recommendation for Executive Actions.

Matter for Congressional Consideration

The Matter for Congressional Consideration (pages 38-39) concerns a perceived uncertainty between the relationship and responsibilities of EPA's Great Lakes National Program Office (GLNPO) and the Great Lakes Task Force. Contrary to the report's findings, EPA believes that the relationships and responsibilities of each are clear as stated in the Clean Water Act and the Executive Order 13340 (EO) signed by President Bush on May 18, 2004. By establishing a Cabinet-level Task Force, the EO focuses attention on the Great Lakes region, expands the scope of collaboration among Federal entities, and establishes a forum for high-level coordination of Federal Great Lakes restoration and protection efforts.

The EO also establishes a structure of Federal coordination at the sub-cabinet level. It establishes a Great Lakes Regional Working Group (Working Group) composed of the appropriate regional administrator or director with programmatic responsibility for the Great Lakes system for each agency represented on the Task Force. The Working Group will coordinate and make recommendations on how to implement the policies,

strategies, projects, and priorities of the Task Force. The EO appoints the Great Lakes National Program Manager as chair of this Working Group. This will enhance GLNPO's ability to meet its statutory obligation to coordinate activities among the Federal agencies responsible for contributing to the environmental restoration and natural resource protection in the Great Lakes Basin.

The EO also directs the Task Force to convene and establish a process for collaboration among the Task Force and Working Group members with the Great Lakes States, local communities, tribes, regional bodies, and other interests in the Great Lakes region. Just as in the Chesapeake Bay, which you mention as a model in your report, there are multiple entities with jurisdiction in the Great Lakes. The Executive Order recognizes that there is a need for broader coordination in the Great Lakes. By building a coalition in the region, the Task Force will further the opportunities for coordination of basin-wide efforts. Development of the Regional Collaboration is underway and a tenet of the organizing group is the need to build upon the existing consensus and progress in the region. As such, the issue of monitoring, which has been identified by a number of regional groups as a consensus priority, will be one of the issues addressed by this region-wide effort.

Recommendation for Executive Actions

The Recommendation for Executive Actions (page 39) addresses the development of adequate controls for the inventory of monitoring systems to ensure that data are accurate, current and complete. We agree with the recommendation and have taken steps to plan, coordinate, monitor and develop indicators for measuring the health of the Great Lakes.

The Parties to the Great Lakes Water Quality Agreement (GLWQA) -- the governments of Canada and the U.S. -- established the Binational Executive Committee (BEC) to coordinate the efforts of Federal, State and Provincial environmental and natural resource agencies to restore and maintain the chemical, physical and biological integrity of the Great Lakes Basin ecosystem. Restoration goals are listed in the GLWQA and detailed in the Lakewide Management Plans, the *Great Lakes Strategy 2002* and the Canada-Ontario Agreement. Other organizations, such as the International Joint Commission (IJC), Great Lakes Commission, and Council of Great Lakes Governors have also proposed goals, objectives and milestones for the restoration efforts.

To track progress toward the goals and objectives, BEC has endorsed an integrated system of monitoring and reporting that includes the following ongoing and future actions:

1. **Indicators:** A comprehensive suite of Great Lakes Basin indicators was developed under BEC direction and first proposed at the State of the Lakes Ecosystem Conference (SOLEC) in 1998. Since then, the suite has been updated and revised every two years. During 2003 and 2004, the indicators were reviewed by two peer review panels, and recommendations for improvements resulted in several adjustments to the indicators. The indicators were developed based on information needed about Great Lakes ecosystem components, not on currently existing monitoring programs.

2. Monitoring Inventory: To develop a comprehensive integrated system to collect vital information on the Great Lakes, BEC and other agencies want to evaluate the existing monitoring programs, what important information is not collected currently, and what information could be collected with the availability of additional resources. The binational Monitoring Inventory is a critical component to the restoration of the Great Lakes.

3. Cooperative Monitoring Program: The intent of the BEC direction is to collect critical information about the Great Lakes ecosystem to make better management decisions in an efficient and effective manner. The Monitoring Inventory will provide data on duplicative efforts between programs to correct potential inefficiencies. Environment Canada and EPA are leading multi-agency discussions toward more integrated, cooperative monitoring and data sharing based on information as identified in the suite of Great Lakes indicators.

4. Reporting: A data collection program is useful if the data and the subsequent information derived from the analysis are accurate and provided in a timely manner. SOLEC provides regular, consistent reporting on the state of the Great Lakes ecosystem components. The *State of the Great Lakes* reports provide information by each indicator and a synthesis of the data in a Great Lakes ecosystem context.

The binational Monitoring Inventory is a critical component for monitoring and reporting efforts. BEC has a long-standing interest in the accuracy, timeliness and completeness of the inventory data. GLNPO will lead U.S. efforts to track the entries to the database and ensure that the data from BEC agencies are included.

GLNPO will work with organizations to assure that the inventory data is accurate, current and complete. As part of this effort, GLNPO will request annually that organizations verify and update their information to ensure that the database is accurate and current. Furthermore, GLNPO will coordinate with Environment Canada to maintain and enhance the capabilities of the Monitoring Inventory database.

EPA is committed to the restoration and protection of the Great Lakes. Through the efforts of the U.S. and Canadian governments, we have improved the environmental conditions of the Great Lakes. I appreciate the efforts of GAO to review and report on this important matter and EPA will consider the issues and recommendation presented in the report.

I appreciate the opportunity to review and comment on the draft report. Once released to EPA, we will respond to the report recommendation, as appropriate. Mr. Gary Gulezian, Director of the Great Lakes National Program Office, is available to provide additional information and clarify issues identified in the report. He may be reached at 312-886-4040.

Sincerely,

Benjamin H. Grumbles
Acting Assistant Administrator

Appendix VIII: GAO Contact and Staff Acknowledgments

GAO Contact

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Staff Acknowledgments

In addition to the individual named above, Willie Bailey, Greg Carroll, Nancy Crothers, John Delicath, Michael Hartnett, Karen Keegan, Amy Webbink, and John Wanska made key contributions to this report.

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