

Lake Michigan Lakewide Management Plan (LaMP) 2008 Status Report

Introduction

Organization of the LaMP and this Status Report for 2008

This document is intended to provide a status report on the health of the Lake Michigan ecosystem and a summary of the activities related to the Lake Michigan LaMP that have occurred during the last 2 years. Each chapter provides reports on current status, challenges, indicators, and next steps for a specific sub-goal area.

In addition to providing a status report, this report identifies new information and tools for addressing environmental problems identified within the report. These tools can be used by government and/or watershed groups to build a healthier Lake Michigan environment.

The LaMP is based upon the vision, goal and subgoals developed by a collaborative stakeholder process. The vision and goal were adopted by the Management Committee August 18, 1998.

The LaMP vision is:

The vision is a sustainable Lake Michigan ecosystem that ensures environmental integrity and that supports and is supported by economically viable, healthy human communities.



Lake Michigan beach, Empire, Michigan
Michigan Travel Bureau

The LaMP goal is:

To restore and protect the integrity of the Lake Michigan ecosystem through collaborative, place-based partnerships.

The subgoals are stated as questions and are organized in 11 chapters. The last, 12th chapter, provides information on activities related to these subgoals in the 33 subwatersheds that make up the Lake Michigan basin. The chapters are as follows:

1. Can we all eat any fish?
2. Can we all drink the water?
3. Can we swim in the water?
4. Are all habitats healthy, naturally diverse, and sufficient to sustain viable biological communities?
5. Does the public have access to abundant open space, shorelines, and natural areas, and does the public have enhanced opportunities for interaction with the Lake Michigan ecosystem?
6. Are land use, recreation, and economic activities sustainable and supportive of a healthy ecosystem?
7. Are sediment, air, land, and water sources or pathways of contamination that affect the integrity of the ecosystem?
8. Are aquatic and terrestrial nuisance species prevented and controlled?
9. Are ecosystem stewardship activities common and undertaken by public and private organizations in communities around the basin?
10. Is collaborative ecosystem management the basis for decision-making in the Lake Michigan basin?
11. Do we have enough information, data, understanding, and indicators to inform the decision-making process?
12. What is the status of the 33 Lake Michigan subwatersheds?

What is the Status of the Lake?

"Lake Michigan is an outstanding natural resource of global significance, under stress and in need of special attention." LaMP 2000

The status of the lake is measured against the long-term goals and targets for 2020. It is acknowledged



The Lake Michigan-Mississippi River basin divide: Chicago Avenue west of East Avenue in Oak Park, Illinois.
Photograph Courtesy of Jeffrey Edstrom

that much work is needed and that the added stress of climate change may significantly impact meeting our goals.

Since the release of LaMP 2000, several key indicators point to the continuing concern for the health of the ecosystem.

- Beach season still finds many days when beaches are closed due to levels of e. coli above the standard. However, the number of days beaches are closed is decreasing even with increased monitoring of beaches.
- Data reveal that a critical layer of the Lake Michigan aquatic food web continues to disappear.
- The discovery of new aquatic nuisance species – there are now a total of 185 in the Great Lakes ecosystem – threaten the integrity of the food web of Lake Michigan.
- PCBs and mercury in fish, while slowly declining, remain a problem that requires fish consumption advisories.
- Climatic pattern changes, whether temporary or permanent, help focus attention about groundwater levels and lake/groundwater interaction.

- Terrestrial and aquatic animals appear to be rebounding with eagles nesting on the southern shore of Lake Michigan for the first time in 100 years, abundance of wolves lead to delisting it from the endangered list, and a lakewide effort on restocking sturgeon is underway.
- Black Crowned Night Herons are now nesting in lakefront Chicago parks at renovated habitat.
- Following the September 11, 2001 terrorist attacks, the issue of protecting the lake's vast supply of fresh drinking water has become a higher priority.

Since 2006, new and troubling concerns emerged.

- In 2007, an invasive virus, viral hemorrhagic septicemia (VHS), was discovered in Lake Michigan fish.
- In Fall of 2006 and 2007, large bird die offs along the north Michigan coast were attributed to botulism caused as a result of shore birds eating fish that had the toxin.
- These events have pointed out the need to sample and research the nearshore to gain a better understanding of its unique dynamics.

Despite these concerns, Lake Michigan supports many beneficial uses. In addition to providing a drinking water supply for 11 million people; it has internationally significant habitat and natural features; supports food production and processing; supplies fish for food, sport, and culture; has valuable commercial and recreational uses; and is the home of the nation's third-largest population center. Furthermore, significant progress is being made to remediate the legacy of contamination in the basin. Specifically, ongoing actions to restore the Areas of Concern (AOCs) have been successful and have received new resources from the passage of the 2002 Great Lakes Legacy Act. Their status is outlined in Chapter 7. The Lake Michigan Watershed Academy was launched in 2003 and has brought together the regional planning agencies of four states for the first time to align their work with Lake Michigan trends and Phase 3 of this work is beginning.

What was Accomplished?

Accomplishments include the following:

- Selection of Lake Michigan as one of three pilots to test a new national monitoring design (see Chapter 11).
- Reporting on collaborative monitoring of the basin

Table A-1. Lake Michigan Pollutants Proposed in 2004 and Revised in LaMP 2006.

Pollutant Classification	Final LaMP 2006 Pollutants Revision of 2004 Proposed Pollutants
Critical Pollutants	PCBs, mercury, DDT and metabolites, chlordane, dioxin, and pathogens (E. coli, Cryptosporidium, Giardia, Salmonella).
Pollutants of Concern	Siltation, sediments, organic enrichment/low dissolved oxygen (DO), nutrients, phosphorus, metals, arsenic, cadmium, copper, chromium, lead, zinc, nitrogen, total (nitrates + total Kjehldal nitrogen), and TDS (conductivity).
Watch List	PBDEs, PCNs, PFOS ¹⁷ , asbestos, PAHs, selenium, radioactive material, toxaphene, sulfur, atrazine & degradation products, metolachlor & degradation products, acetochlor & degradation products, glyphosate & degradation products, 1,4-dichlorobenzene

in 2005 (See chapter 7).

- Setting targets for reduction of critical pollutants and stressors (see Chapter 7 and Chapter 4),
- Reviewing the LaMP list of contaminants and stressors based on new monitoring and reports (see Appendix A).
- Identifying data gaps as part of the national monitoring design pilot (see chapter 11).
- Identifying ecologically rich areas and habitats (see Chapter 4 and Chapter 12).
- Adding climate change into the concept of sustainability and stewardship (see Chapter 6 and Chapter 9).
- Convening public conferences and workshops for beach management, monitoring issues, and watershed management (see Chapter 1, Chapter 4, and Chapter 12).
- Holding the 5th State of Lake Michigan conference in October 2007 in Traverse City, Michigan.
- Further developing remedial action plans and developing delisting targets by 2008 for the 10 Lake Michigan AOCs.
- Convening of Ports workshops and project developed.

Progress made on accomplishing these objectives is outlined in this status report.

Adaptive Management

One of the key functions of the LaMP process is to identify pollutants that are or have the potential to adversely affect the Lake Michigan ecosystem. In Appendix A of previous LaMPs the two-year cycle of pollutant identification, an adaptive management process, for three categories of Lake Michigan LaMP pollutants, was outlined.

- Critical pollutants meet any one of four criteria,

pollutants needing an open water TMDL, pollutants exceeding a GLI water quality criteria, pollutants causing a fish consumption advisory, or associated with other lakewide lakewide designated uses. Critical pollutants connote the need for a lakewide TMDL.

- Pollutants of Concern meet any one of three criteria, including needing a TMDL in nearshore waters or a tributary mouth, pollutants causing an AOC impairment, or pollutants associated with regional use impairments. Pollutants of concern connote regional or AOC action.
- Watch List pollutants meet all three of these criteria--potential to impact the Lake Michigan ecosystem, presence in the watershed, and bioaccumulation potential, persistence in water or sediment, or toxicity singly or through synergistic effects,. Proposed watch list pollutants must be investigated to confirm that all three criteria are substantiated and should be prevented from reaching the open waters.

The LaMP committed to an adaptive management approach which for the pollutant list, means a data review in order to prepare each LaMP. Subsequently, a five year cycle of an intensive monitoring year for each of the five Great Lakes evolved. It is proposed for discussion that our review of the pollutants follow the five year cycle which will provide the data needed for a review. A Next Step for the LaMP Technical Coordinating Committee is to review Appendix A- the guide for the adaptive management pollutant list review process. There are issues that need clarification and refinement. A few of these include: Do we propose and confirm a watch list pollutant based on potential to impact the lake itself or the lake ecosystem? How should the Clean Water Act section 303(d) process factor into the review? Are we in alignment with other reviews like the Great Lakes Binational Toxic Strategy? Other

state and federal agency lists and reviews? The work will be published in LaMP 2010 and a status report will be presented at The State of Lake Michigan Conference 2009 in Milwaukee, WI.

LaMP 2008 Data and Information

A key to targeting actions is engaging the necessary partners in a common, accessible, and scientifically sound body of knowledge. In 1999, the Lake Michigan LaMP formed a basinwide coordinating and monitoring council to coordinate and promote common protocols and comparability in monitoring. The goal is to facilitate data sharing across agencies as well as among academic and research disciplines. To provide adaptive management, there is a continuing need for monitoring and reporting of the lake's current status as conditions change and targets move (see chapter 11).

Most, but not all of the data we use, has been peer reviewed in its original development. The use in the LaMP is considered secondary data. New data are provided by:

- Researchers who publish and present at conferences.
- Researchers who receive USEPA grants and provide new data and insights.
- Scientists who volunteer and report on Great Lakes indicators every two years at the State of the Lakes Ecosystem Conference.
- Short and long-term monitoring by many different agencies for different aspects of the lake and tributaries (See chapter 11).

Ongoing monitoring is essential to assess the health of coastal ecosystems and detect changes over time. More than any other measure, monitoring provides accountability for management actions. Lake Michigan needs a coordinated, comprehensive monitoring network that can provide the information necessary for managers to make informed decisions, adapt their actions as needed, and assure effective stewardship of Lake Michigan. The proposed National Monitoring Network design sets clear, specific goals and objectives for a coordinated Lake Michigan monitoring network. The proposed network, which would provide critical information about the quality of coastal waters and their tributaries, does not incorporate or replace all ongoing water quality monitoring. Current synoptic

monitoring approaches are not effective for determining trends over time due to annual and seasonal rainfall and runoff variability. A focus on the nearshore monitoring to fill gaps is called for.

A Focus on the Future: Sustainability, Stewardship and Climate Change

While partnerships can leverage resources, they also must be led and supported. Setting shared goals, objectives, and indicators in alignment helps to conserve resources but does not do away with resource needs. The interdependencies inherent in the ecosystem approach require a balance among three fundamental elements: environmental integrity, economic vitality, and sociocultural well-being. The ability of these elements to function in balance over time is one measure of sustainability. Complex ecological processes link organisms and their environment. These processes are often referred to as "ecological services" because they perform functions that combine to sustain life in the ecosystem. The significant natural features of Lake Michigan, such as its encompassing the world's largest collection of freshwater sand dunes, supporting 43 percent of the Great Lakes' large sport fishing industry, and providing drinking water for over 10 million residents, means billions of dollars not only to the economies of the four states that share the lake but also to the nation as a whole (see Chapter 5 and Chapter 6).

A target of reaching sustainability on the way to the ultimate goals of ecosystem integrity is reflected with the nomenclature for the "meter" box at the start of each chapter "not sustainable to sustainable".

A Focus on Climate Change as a Stressor

According to the Center for Science in the Earth System Joint Institute for the Study of the Atmosphere and Oceans (University of Washington ICLEI Local governments of Sustainability), climate change is projected to have important impacts on Midwest water resources. More extreme events will occur, both in terms of droughts and rainfall. Overall, water levels in the Great Lakes are expected to decline significantly through evaporation due to increasing temperatures. These declines are likely to lead to more competition for water within the region and between the U.S. and Canada, decreased

hydropower generation, fewer wetlands, and increased water-based transportation costs. Projected increases in heavy precipitation events are likely to lead to more flooding and non-point source pollution due to runoff.

With respect to human health impacts, the Midwest is likely to benefit from fewer extreme cold outbreaks with the potential for more heat-related illnesses during the summer. Heat-related stress is particularly a concern for urban areas where the concentration of paved surfaces elevates nighttime temperatures. Finally, the projected increase in extreme precipitation events may lead to an increase in insect or tick-borne disease.

Agricultural production is generally expected to increase due to lengthening of the growing season and carbon dioxide fertilization effects, but not in all areas. Increased use of fertilizers for the longer growing season will lead to increased nonpoint source runoff from farm fields. Warmer air



Goldenrod, Unknown location
National Park Service, Indiana Dunes National Lakeshore

temperatures and reduced soil moisture are expected to increase forest fire risk and forest susceptibility to disease and insects, contributing to declines in both coniferous and deciduous trees. Impacts on the forest industry could be significant particularly when combined with the pressure to convert forest land to other land uses.

Major changes in freshwater ecosystems are expected. Warmer water temperatures favor warm water fish species over cold water fish species and increase the risk of invasive species. The potential for more nutrient pollution and warmer water temperatures increases the risk for algae growth in freshwater lakes. As noted previously, declining lake levels throughout the region could reduce wetlands habitat. This has implications for the migrating birds and other wildlife dependent on wetland systems for all or part of their life stages.

A Focus on Ecosystems and Watersheds

In 1995, the Federal Interagency Ecosystem Management Task Force defined an ecosystem as “an interconnected community of living things, including humans, and the physical environment with which they interact. As such, ecosystems form the cornerstone of sustainable economies.” With regard to ecosystem management, the Task Force explained that “the goal of the ecosystem approach is to restore and maintain the health, sustainability, and biological diversity of ecosystems while supporting sustainable economies and communities. Based on a collaboratively developed vision of desired future conditions, the ecosystem approach integrates ecological, economic, and social factors that affect a management unit defined by ecological—not political—boundaries.”

In response to the changing dynamic of environmental management, the Lake Michigan Management Committee adopted the ecosystem approach in 1998. The significance for the Lake Michigan LaMP was in the intent to address not only the 10 areas that had been formally designated AOCs by the 1987 GLWQA amendments, but also other areas that were responsible for impairing the lake’s ecosystem. The prime example was the Chicago area. Because of the rerouting of the Chicago River into the Mississippi River system, Chicago’s surface water has been diverted out of the basin; however, groundwater from the Chicago

area has not been diverted, and the city's large airshed has been shown to be a source of pollutants that are deposited in and affect the lake. The watershed/diversion connection is currently critical as steps are underway to prevent invasive or aquatic nuisance species from entering the Lake from the Mississippi River system (See chapter 8).

A Focus on Partnerships, Innovation, and Shared Information

Addressing the goals of a broad-based ecosystem approach requires a new management framework. As LaMP 2000 pointed out, the framework is based on "partnerships of organizations brought together to solve problems too large or complex to be dealt with by one agency with a limited mission. This approach also has the potential to leverage and direct local, state and federal, and private resources into a coordinated effort. The challenge is to create the framework for participating organizations to contribute their expertise and resources, often on an uneven basis, but in a manner that allows all partners to participate in the decision making on an even basis" (see chapter 10).

In 2007, a number of public discussions were held in conjunction with new state-issued permits as part of the NPDES system. Questions were raised about the state of knowledge of what is going into the lake. GLNPO monitoring program samples the lake to find what is entering the system from non-point, unpermitted sources like air pollution and storm water runoff. There is also an on-line database for all permits and their limits. USEPA is working to provide data on a watershed basis online and in a user-friendly format (See chapter 11).

Background on the LaMP

Under the Great Lakes Water Quality Agreement (GLWQA), as amended in 1987, the United States and Canada agreed "to restore and maintain the chemical, physical and biological integrity of the waters of the Great Lakes Basin Ecosystem." To achieve this objective, the parties agreed to develop and implement, in consultation with state and provincial governments, LaMPs for open waters and remedial action plans for contaminated AOCs. In the case of Lake Michigan, the only one of the Great Lakes wholly within the borders of the United States, the Clean Water Act (Section 118c) holds the U.S. Environmental Protection Agency (USEPA) accountable for the LaMP.

In 2000, the Binational Executive Committee determined that an adaptive management approach would guide the LaMP process, making it an iterative approach.

Work on the Lake Michigan LaMP began in the early 1990s with a focus on critical pollutants affecting the lake. At that time, monitoring data showed that point source regulatory controls established in the 1970s and 1980s were reducing the levels of persistent toxic substances such as polychlorinated biphenyls (PCB), DDT, and other pesticides. Monitoring results also indicated that nonpoint sources of pollution such as runoff and air deposition, as well as aquatic nuisance species, were stressing the Lake Michigan ecosystem. LaMP 2000 states that "pathogens, fragmentation and destruction of terrestrial and aquatic habitats, aquatic nuisance species, uncontrolled runoff and erosion are among the stressors contributing to ecosystem impairments."

Increased water quality protection for the Great Lakes watershed is now being implemented with the adoption of more stringent water quality standards for the Great Lakes basin drainage by each Great Lakes state (the Great Lakes Initiative or GLI), with the goal of having the new standards reflected in all permits by 2006 or as new permits are issued.

Lake Michigan presents a set of difficult, persistent, and multifaceted problems. In response, agencies must develop new tools, refocus their strategies and methods, and continually obtain new data. The LaMP recommends using a watershed framework as the most effective scale and structure for working on these problems and provides draft fact sheets for the 33 major Lake Michigan watersheds. Updated versions are provided in Chapter 12.

Linking LaMP Goals to RAPs: Remedial Action Plans (RAP) for 10 Lake Michigan Areas of Concern

The GLWQA amendments of 1987 also called for the development of RAPs for specific Areas of Concern. The two Federal governments of the U.S. and Canada were directed to cooperate with the state and provincial governments to develop and implement RAPs. The RAPs and LaMPs are similar in that they both use an ecosystem approach to assess and remediate environmental degradation of the 14 beneficial use impairments outlined in GLWQA, Annex 2, and rely on a structured public

involvement process. RAPs, however, encompass a much smaller geographic area, concentrating on an embayment or stretch of a river within a single watershed with contaminated sediments leading to fish advisories.

Forging a strong relationship between the LaMPs and RAPs is important to the success of both efforts. The RAPs serve as point source discharges to the lake as a whole. Improvements in the AOC areas will eventually help improve the entire lake. Much of the expertise and land use control of use impairments, possible remedial efforts and watershed planning reside at the local level. Cooperation between the two efforts is essential in order for LaMPs to remove lakewide impairments and for the RAP watershed to be able to restore integrity. The State of Michigan, with 14 AOCs, has developed, and USEPA has approved, methodologies for setting delisting targets for beneficial use impairments.

Great Lakes Regional Collaboration

In October 2003, the Great Lakes Governors identified nine critical environmental priorities for regional action. These were adopted by the Great Lakes Mayors and the Great Lakes Commission. In May 2004, President Bush signed an Executive Order creating a Cabinet-Level Task Force to bring an unprecedented level of collaboration and coordination among, State, Federal, and local governments, tribes, and other interests in the United States and Canada to accelerate protection and restoration of the Great Lakes. This led to the development and announcement of a series of recommendations from stakeholders in a final Great Lakes Regional Collaboration Report in December 2005 after a year-long process of research and consensus building.

The recommendations, while not official government policy, reflect the consensus of the wide range of stakeholders involved in the collaboration process. GLRC action items and goals key to Lake Michigan are listed at the beginning of each LaMP chapter in next steps. Chapter 10 details the current status of the GLRC.



Great Lakes Water Quality Agreement Review

The governments of Canada and the United States conducted a year long review process involving over 350 stakeholders representing a broad cross section of the Great Lakes community. Upon completion of public comment period, a final Agreement Review Report was presented for consideration to the Binational Executive Committee of Environment Canada and USEPA in Fall 2007. Environment Canada and USEPA are considering the Final Agreement Report and will provide advice, respectively, to Foreign Affairs Canada and the U.S. Department of State. The governments will then determine next steps for the Agreement, including whether it will be revised. The mandated review of the GLWQA every six years, does not obligate the governments to amend or modify the Agreement.

More information is available at www.epa.gov/glnpo/glwqa.

What Do the First Two Pages of Each Chapter Explain?

Page one of each chapter provides the current status of the goal and the 2020 target that we are striving to meet. It also lists the indicators that informs the status statement and the challenges and next steps that are needed with in the next two years.

Why is Some Material Repeated and Some More Detailed than Others?

Material in the LaMP is the most up-to-date that we were able to obtain. There is often a lag time between an activity and its final report, repeated material is left to provide context. Each LaMP has provided more details on a subject of importance or recently released information.

Climate Change—Adaptation and Mitigation

Both mitigation and adaptation actions are required as a balanced response to climate change. Mitigation measures are geared to reduce emissions and increase sinks of greenhouse gases,

while adaptation actions seek to increase resilience by reducing risks and taking advantage of opportunities due to a changing climate."

What are the "Text" Boxes and What Do They Provide?

Throughout the document, "text" boxes are employed to portray examples of work underway in the basin, or, in some cases, a noteworthy event. They are also used to provide details of what is being discussed in the chapter. They often contain a web address where the reader can follow up if interested. The information does not necessarily imply activity done under the auspices of the LaMP, but provides examples of how LaMP goals can be accomplished.

What is a Subgoal and How Does it Relate to the Sustainability Target?

The LaMP goals were developed collaboratively in 1998 and are the end points we hope to achieve working under the GLWQA goal of protecting and restoring the chemical, physical, and biological integrity of the Great Lakes basin. The LaMP committees chose 2020 as the target date where monitoring results should indicate substantial progress toward the goal. The sustainability targets describes the 2020 milestone year id progress is being achieved



What is the "Lake Michigan Toolbox"?

The 2008 Lake Michigan LaMP document has a series of "Lake Michigan

Toolboxes" that provide links to resources that can be applied to basin problems and exchange shared experiences. They are targeted to assist local government and watershed groups as they work to better manage their local ecosystems. The tools include example and model ordinances, manuals and resources for local officials, planners, developers, individual citizens, and other interested parties.

Where Can I Find LaMP Reports and Where Do I Send Public Comments?

Lake Michigan LaMP 2000, 2002, 2004, and 2006 are available on line at www.epa.gov/glnpo/michigan.html. For a CD or printed copy of the LaMP or to make a public comment, contact the U.S. Environmental Protection Agency, Mail Code T-17J, 77 West Jackson Boulevard, Chicago, IL 60604. Public comments are factored into LaMP deliberations and will be reflected in LaMP 2010.

How Can I Get Involved and Keep Up-to-Date?

The Lake Michigan Forum is an EPA-sponsored stakeholder group that meets quarterly, undertakes projects that implement the LaMP. In addition, it has a web site and a listserv. For more information, see www.delta-institute.org.

USEPA, the Lake Michigan Forum and others sponsor a State of Lake Michigan conference every two years. The next conference is planned for October 2009 in Milwaukee, Wisconsin. The conference provides opportunities for attending presentations and networking.