Executive Summary

Introduction

Through a cooperative agreement, the Great Lakes Commission worked with the U.S. Environmental Protection Agency (U.S. EPA) Region 5, and its partners in the Lake Michigan Lakewide Management Plan (LaMP) process, to assess existing monitoring efforts in the Lake Michigan basin and subwatersheds, including the ten Lake Michigan Areas of Concern (AOC) and four other tributary watersheds. This report is one of the outcomes of the project, and includes a comprehensive review of monitoring programs at the federal, state and local levels for the targeted watersheds; an analysis of gaps, inconsistencies and unmet needs; an assessment of the adequacy of existing efforts to support critical ecosystem indicators; and recommendations for addressing major monitoring needs, particularly those considered most important for lakewide management decision making. The report has also been used to inform members of the Lake Michigan Forum, local public advisory councils (PACs), and other stakeholders about identifying current, local monitoring efforts and establishing community-based monitoring programs.

Monitoring was broadly defined for this project to include not only traditional water quality parameters, but also habitat, wildlife, land use, nonpoint source pollution and other measures of ecosystem health. It is intended that the report and future project outcomes will provide U.S. EPA, the PACs and other stakeholders with important tools for developing their Remedial Action Plans (RAPs) and will enable them to engage their community in a valuable dialogue regarding the status of knowledge on their local watershed. Working closely with the states and tribal authorities, they will benefit from the exchange of information and the opportunity to enhance local participation in state-sponsored monitoring programs.

Project participants were responsible for conducting this assessment at the local level in their watersheds. This consisted primarily of implementing a survey of potential local monitoring organizations and conducting follow-up interviews. The Great Lakes Commission, in collaboration with the U.S. EPA and other agencies, assessed monitoring being conducted by state and federal agencies. The Commission then compiled the results of this collaborative effort into an inventory database, which was the basis for this report. Please see the methodology chapter for a background on project participants, as well as methods used to gain information to build the inventory.

Results

The results from an analysis of the monitoring inventory are organized along several lines. First, each tributary watershed is reviewed separately, with an additional chapter on open lake and basinwide monitoring. Watersheds for the following tributaries are covered in this report:

Grand Traverse Bay
White Lake
Muskegon Lake
Grand River
Kalamazoo River
St. Joseph River
Grand Calumet River
Waukegan Harbor
Milwaukee River and Estuary
Sheboygan River
Fox-Wolf River Basin
Door County
Menominee River
Manistique River

Within each of these chapters, findings from the inventory are presented in the following nine categories:

- LaMP pollutants
- Nutrients and bacteria
- Meteorological and flow monitoring
- Sediments
- Fish contaminants, fish health, and aquatic nuisance species
- Benthos monitoring
- Air monitoring
- Wildlife monitoring
- Land use

In addition to discussing findings for each of the watersheds, monitoring locations (where available) are also displayed for each watershed. The combination of database analysis and geographical analysis was designed to present the most complete assessment of monitoring within each watershed.

Following the open lake chapter, a more general analysis of monitoring coverage is presented in chapter 18, Overall Discussion. In this section, the monitoring infrastructure was analyzed for its ability to provide sufficient data for assessing the 70 Lake Michigan LaMP indicators. A qualitative rating is given to each LaMP indicator, based on the availability and specificity of monitoring related to the indicator.

Findings and Recommendations

The final section of this report centers on general issues that were uncovered throughout the course of research. There are three key areas under which the monitoring inventory provided valuable information and recommendations for improving overall monitoring in the Lake Michigan basin. These include data gaps and unmet needs; underutilized resources; and monitoring coordination and information sharing. Findings and recommendations within these areas are summarized below. More detail can be found in the last chapter of the report. For reference purposes, sections are labeled with letters and findings and recommendations are numbered.

A. Data Gaps and Unmet Needs

This report, and the inventory on which it is based, represent the first effort to account for the range of environmental monitoring in the Lake Michigan basin. The inventory represents the initial approach toward achieving this ambitious goal. It is a framework on which a more complete inventory will eventually be built.

(1) Finding: There are several gaps in the inventory that are listed below and throughout the report. While some of these gaps are areas that have not been well covered in the inventory, others may represent gaps in the monitoring coverage. At this point, it is difficult to tell which are gaps in the monitoring inventory and which are actual monitoring gaps. Further improvement of the inventory database is needed to better clarify this distinction.

(1.1) Recommendation: *Continue to update the inventory and expand data collection to include all tributaries.*

(2) Finding: There are several key monitoring areas where little information was received, but where more monitoring is believed to exist. These areas include monitoring for *E. coli*, fish population characteristics, aquatic nuisance species, benthic organisms, wildlife, and habitat.

(2.1) Recommendation: *Establish better lines of communication with state Departments of Natural Resources (DNR), U. S. Fsih and Wildlife Service (USFWS), U. S. Forestry Service (USFS), and U. S. Department of Agriculture (USDA).*

(2.2) Recommendation: *Better integrate habitat and wildlife monitoring with traditional water quality monitoring.*

(3) Finding: Another result of this initial approach to the monitoring inventory for the Lake Michigan basin was that much of the information included only general information about the geographic location of monitoring sites. Many organizations reported monitoring for parameters across a broad geographic area but did not include specific site references. Locational information is critical if the inventory is to be brought online in a geographically-searchable format.

(3.1) Recommendation: *Improve information on the geographic location of monitoring sites.*

(4) Finding: A further gap in the monitoring information obtained for this report, was the lack of complete and continuing coverage of Lake Michigan Mass Balance data. Data obtained for this report on the Lake Michigan Mass Balance Project was limited by the timing of the release of data to the public. However, information in the inventory database will be improved when the project is finalized. Additionally, the value of coordinated sampling data (as collected in the Mass Balance project) would be greatly enhanced by a repeat of the sampling event ten years following completion of the original sampling.

(4.1) Recommendation: *Initiate planning for a coordinated sampling event for ten years following the initial Mass Balance project, and share data and modeling results with the public in a timely fashion through numerous outlets.*

(5) Finding: This initial project specifically avoided attempting to collect information about university monitoring projects. However, some academic institutions conduct a number of important ongoing, long-term projects, and information on these projects should be included in the inventory. Other programs catalog the university work they fund. Closer ties need to be established with these programs and such efforts need to be expanded throughout the basin.

(5.1) Recommendation: *Include academic research and data collection efforts in future updates to the monitoring inventory.*

(6) Finding: While a number of LaMP pollutants, such as mercury and copper, are monitored extensively across the basin, it has been difficult to find monitoring information on some of the other pollutants. These under-monitored pollutants include all the emerging LaMP pollutants, along with DDT, HCBs, toxaphene, and PAHs.

(6.1) Recommendation: *Further examine the monitoring coverage of specific LaMP critical pollutants and emerging pollutants.*

B. Underutilized Resources

Along with the gaps in monitoring coverage identified in this project, some resources in the basin were also discovered that do not appear to be fully utilized. Monitoring is an area of environmental management that has often been underfunded in the past. Therefore, in order to achieve the most complete monitoring coverage possible, all available resources must work in concert.

(1) Finding: One of these underutilized resources is volunteer groups. Most of the volunteer groups currently engage in some form of monitoring, but often their efforts are not incorporated into state or regional monitoring plans, and the information collected is only reported internally or locally.

(1.1) Recommendation: *Take better advantage of relatively untapped volunteer monitoring resources.*

(2) Finding: Another group that is underutilized is local agencies. Examples of such agencies are health departments, conservation districts and planning agencies. In many cases, these agencies are already engaged in monitoring to serve their local needs.

(2.1) Recommendation: *Take better advantage of local agencies such as health departments, conservation districts and planning agencies.*

(3) Finding: To best capitalize on these underutilized resources, it is important that these local groups (both volunteer groups and local agencies) be linked into basinwide efforts, but at the same time retain their local focus and discretion.

(3.1) Recommendation: *Establish a better framework for bottom-up monitoring program linkages.*

(4) Finding: Part of the difficulty in using data collected at the local level is that there are few standards at the basinwide level to integrate data. The local focus of the data collection effort often will leave the data incompatible with other data from neighboring localities.

(4.1) Recommendation: *Standardize data collection and reporting*.

C. Monitoring Coordination and Information Sharing

The final issue area does not involve direct monitoring, but responds to the need to coordinate monitoring efforts. There are a wide array of organizations involved in monitoring at the federal, state and local levels. However, no single organization is responsible for planning, coordinating, or disseminating monitoring efforts for the entire Lake Michigan basin.

(1) Finding: A major coordination problem is the lack of a central source for monitoring information. The inventory that this report evaluates is the first step toward creating such a central source. However, this one-time inventory is currently not universally accessible and may quickly become dated if the database is not continually updated by monitoring organizations in the basin.

(1.1) Recommendation: *Encourage state, federal, tribal, and local agencies to report monitoring coverage and results to a meta-database with universal access.*

(1.2) Recommendation: *Develop an online database of monitoring information that is geographically-based, and content-searchable.*

(2) Finding: In general, organizations make most, if not all, decisions about their monitoring programs based on goals for their local coverage areas. Rarely does this area cover the entire Lake Michigan basin.

(2.1) Recommendation: *Develop and coordinate the implementation of comparable methods to collect indicator data in a coordinated network.*