

# MEASURING AND MONITORING SUCCESS

## GOAL

Document progress and achievements resulting from implementation of the Plan.

Lamoille County NRCD



Students from Lamoille County learn to monitor streams for macroinvertebrates.

Monitoring environmental conditions in the Lake and Basin is an essential part of Plan implementation and is an integral component of measuring the success of lake and watershed management efforts. The data produced from monitoring activities provide information on natural processes occurring in the Lake, basic characteristics of the ecosystem, and water quality trends. This information aids in understanding how human activities and management actions are affecting the Lake. Managing this data and making it available to policymakers, managers, researchers, community groups, and the public maximizes the success of management efforts.

Monitoring projects in the Basin have been designed for a variety of purposes and cover a wide range of topics from forest health and biodiversity to atmospheric and surface water quality. Recent monitoring programs include the Lake Champlain Long-Term Water Quality and Biological Monitoring Program (VTDEC, et al.; 2001); the Lake Champlain Diagnostic-Feasibility Study (VTDEC and NYSDEC, 1994); the Lake Champlain Zebra Mussel Monitoring Program (VTDEC, 2000); and the Vermont Lay Monitoring Program, which has provided lakewide monitoring of eutrophication-related parameters during the summer season using citizen volunteers and a consistent EPA-approved methodology every year since 1979 (Picotte, 2000). The Lake Champlain Sediment Toxics Assessment Program (Diamond, et al.; 1999) provides a current database on concentrations of organic and inorganic toxic substances in the sediments in many areas of the Lake. The Vermont Lay Monitoring Program and the Lake Champlain Long-Term Water Quality and Biological Monitoring Program are intended to be ongoing.

## ISSUES

### Continuing the Lake Champlain Long-Term Water Quality and Biological Monitoring Program

During 1999-2000, the LCBP convened several workgroup sessions to design, assess, re-eval-

uate, and adjust the scope of the Lake Champlain Long-Term Water Quality and Biological Monitoring Program. Participants affirmed that this program should continue and should serve as a primary means for monitoring key indicators of environmental quality throughout the Basin, detecting environmental trends, predicting the effects of management actions, and guiding management actions over time.

Workgroup participants also concluded that the scope of the program should expand to support new and ongoing monitoring activities and special projects where feasible. Such activities may include monitoring toxic substances in the water, sediment, air, and biota; biological indicator organisms, including selected species of fish or other higher level organisms; exotic species; and meteorological data. The LCBP's current ecosystem indicators project may lend insight into how to best integrate this additional monitoring into the long-term monitoring program. Improved integration of these monitoring activities will make more efficient use of available resources and strengthen monitoring efforts. Statistically sound information about water quality, living resources, and habitats of the Lake Champlain Basin, and GIS applications of these data are necessary to assess progress toward achieving the goals in this Plan.

## OBJECTIVES

*(not listed in priority order)*

- 1) Monitor key indicators of environmental quality in the Lake Champlain Basin.
- 2) Track land use changes that impact environmental quality in the Lake Champlain Basin.
- 3) Coordinate management and accessibility of Lake Champlain Basin data.
- 4) Use the data assembled to assess ecosystem conditions and environmental quality; document environmental trends; predict the effects of management actions on the Lake Champlain ecosystem; and guide changes to management actions over time.

## Monitoring Land Use Changes

As noted in chapter 2, increased phosphorus loads generated by land use changes appear to be offsetting some of the gains achieved by point and agricultural nonpoint source reduction efforts. As the population within the Basin increases, particularly on the Vermont side of the Lake, more land will become developed. A reliable way of monitoring land use changes over time is needed to estimate the impacts of these changes on phosphorus loadings to the Lake (LCBP, 2000).

## Improving Coordination and Data Sharing

Recent enhancements to data sharing and dissemination include long-term water quality monitoring data that are available in electronic format upon request and a summary on the LCBP and VTDEC websites, and the work of the Missisquoi Bay Task Force that resulted in increased monitoring and stream gaging of Missisquoi Bay. Improved coordination among managers responsible for water quality, fish and wildlife, aquatic nuisance species, and human health needs to be expanded Basin-wide. A formal process to facilitate data sharing and interpretation is essential to Plan implementation. Equally important is the regular production of summary reports for the general public. The

Basin has also experienced an encouraging rise in the number of volunteer citizen monitoring groups. Improved coordination and data-sharing may be expanded to incorporate work of these groups, many of which are affiliated with the states for data quality assurance purposes.

## ACTIONS

*(not listed in priority order)*

### 1) Continue to Monitor Key Baseline Parameters in the Lake Champlain Basin

- a) *Continue the bistate Lake Champlain Long-Term Water Quality and Biological Monitoring Program and related monitoring in Québec.*
- b) *Continue the USGS stream gauging network.*
- c) *Continue basic meteorologic monitoring.*
- d) *Develop annual data reports, annual load estimates, and periodic trends analyses.*

**Potential key LCBP partners:** NYSDEC, VTDEC, NYS Biological Survey, USFWS, USGS, QC MENV, LCRC, USEPA, other relevant state, provincial, and federal agencies

**Cost estimate:** \$600,000 per year

**Potential funding sources:** Federal and state appropriations, and in-kind participation of other federal and state agencies

**Timeframe:** Ongoing

**Benchmark:** Continuation of programs listed above, documentation of trends, direction and assessment of management efforts

## 2) Continue and Expand Companion Monitoring Programs Essential for Particular Management Concerns

a) Provide a statistically sound data set on toxic substances in fish and wildlife tissue for coordinated management use by both human health officials and fish and wildlife managers.

b) Document the introduction, spread, economic impact, and management of aquatic nuisance species.

c) Periodically measure toxic substances, including contaminants of concern and new generation chemicals in the water column and lakebottom sediments.

d) Monitor point source wastewater discharges, as necessary, to help measure success towards phosphorus and other point source reduction goals.

e) Expand monitoring at tributary mouths to obtain data sufficient to calculate annual loadings, and to measure success towards phosphorus reduction goals more accurately.

f) Periodically update information on land use, agricultural practices, and extent of natural habitats in the Lake Champlain Basin.

g) Expand monitoring in targeted watersheds to evaluate effectiveness of BMP implementation for control of nonpoint source pollution.

h) Periodically collect quality assurance samples from wastewater treatment facilities to ensure accurate estimates of point source phosphorus loads.

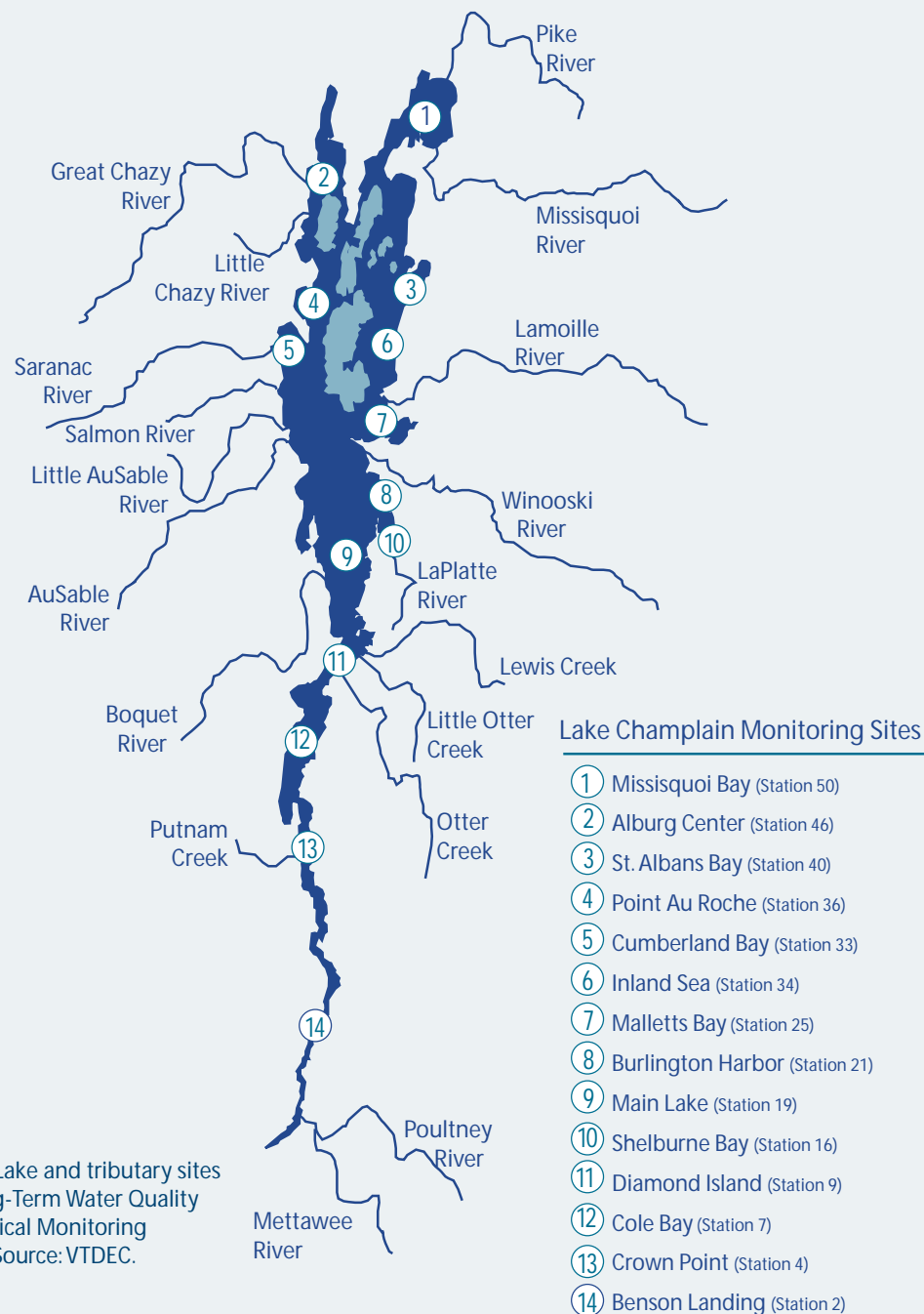


Figure 12: Lake and tributary sites in the Long-Term Water Quality and Biological Monitoring Program. Source: VTDEC.

## ACCOMPLISHMENTS

### WATER QUALITY MONITORING SHIFTS TO TREND DETECTION

After 10 years of building a comprehensive database of Lake Champlain water quality and biological information, the lake monitoring program is shifting from data collection to overall trend detection. Trends will determine whether water quality improvement targets are being met. All the data is readily accessible in electronic and paper formats.

### EFFECTIVENESS OF BEST MANAGEMENT PRACTICES (BMP) IS BEING DECIPHERED

Two long-term projects are evaluating the effectiveness of BMPs to reduce nonpoint source water pollution. The projects focus on urban and agricultural sources of nonpoint source water pollution. These projects contribute to solutions for hard-to-solve phosphorus reduction challenges.



A "Real-time" stream gauge monitors results.

*i) Measure land use changes to assess their impacts on nonpoint source loads.*

*j) Improve understanding of Lake Champlain hydrodynamics and its effects on in-lake phosphorus concentrations, toxic substances, and pollutant transport to drinking water intakes. Potential monitoring parameters could include water level, temperature, and water current.*

**Potential key LCBP partners:** Federal, state, provincial, and local agencies (including USGS, NOAA, USFWS, state and federal agricultural agencies); LCRC; lay monitoring programs, watershed associations; QC MENV; USEPA

**Cost estimate:** \$250,000 per year

**Potential funding sources:** Federal appropriations and in-kind participation of other federal and state agencies; USEPA EMAP, Clean Lakes program, federal and state appropriations

**Timeframe:** Ongoing

**Benchmark:** Periodic monitoring reports incorporating these activities into the long-term monitoring program (in Action 1) where appropriate

### 3) Develop and Use Indicators of Environmental Quality

*a) Identify environmental indicators through the current ecosystem indicators project.*

*b) Identify appropriate additional monitoring sites and parameters throughout the Basin to support the use of these indicators.*

*c) Ensure that major habitats and management concerns are addressed.*

**Potential key LCBP partners:** LCRC, USFWS, NYSDEC, VTANR, VTDOH, NYSDOH, LCFWMC, USEPA, universities, QC MENV

**Cost estimate:** \$150,000 per year and in-kind participation of agency representatives

**Potential funding sources:** State and federal appropriations

**Timeframe:** Ongoing

**Benchmark:** Identification of indicators and monitoring sites

### 4) Create a Unified Data Access System for Coordination and Data-Sharing among Stakeholders in the Basin, and Produce Timely and Accessible Summary Reports for the General Public

*a) Establish an online information center with searchable data sets and links to repositories.*

*b) Identify and locate existing data sets, including historical data where appropriate.*

*c) Update existing data repositories and establish new ones where important gaps in data exist.*

*d) Identify protocols for data input, data summaries, and accessibility, and ensure that new data collected follow these protocols.*

**Potential key LCBP partners:** Federal, state, and local agencies (including USFWS, USGS), USEPA, LCRC, universities, lay monitoring programs, watershed associations, the Province of Québec.

**Cost estimate:** \$25,000 to \$50,000 per year

**Potential funding sources:** State and federal appropriations, in-kind contributions

**Timeframe:** Ongoing

**Benchmark:** Expand the process for data-sharing; publication of status and trends report for the public