Long Term Resource Monitoring Program

The mission of the Long Term Resource Monitoring Program is to support decision makers with the information and understanding needed to maintain the Upper Mississippi River System as a viable multiple-use large river ecosystem.

Positioning the Long Term Resource Monitoring Program for the Future

Strategic Plan for the Long Term Resource Monitoring Program on the Upper Mississippi River System, 2010–2014

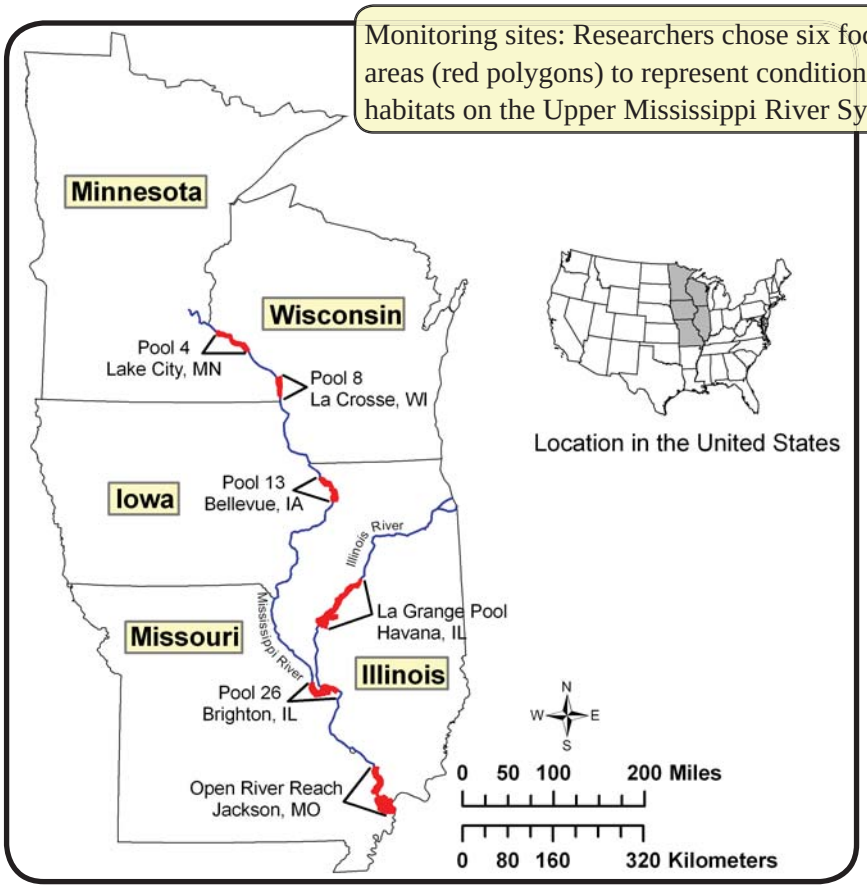
The Long Term Resource Monitoring Program (LTRMP) was created over 20 years ago as part of the Environmental Management Program (EMP) on the Upper Mississippi River System (UMRS) and is a comprehensive program of monitoring, research, and data management that provides critical information about the status and trends of key resources. The LTRMP information is used extensively by resource managers, planners, administrators, scientists, academics, legislators, and the general public for improved understanding, problem solving, and informed decision-making about issues important to the UMRS.

The Strategic Plan, developed by an interagency partnership, identifies a set of four priority outcomes for fiscal years 2010–2014 selected from a universe of possibilities. The four outcomes presented in this plan are essential to addressing UMRS information needs, understanding the river ecosystem, and and providing knowledge for informed decisions. The strategic plan continues LTRMP's state of the art science and data delivery.

Outcome 1: Enhanced knowledge about system status and trends

Six study reaches are monitored annually by the LTRMP. Standardized monitoring in these six reaches provides valuable information over the wide range of environmental and human-use gradients that exist in the UMRS. The multi-component and multi-habitat sampling design provides data on a broad range of environmental conditions and on biota at both community and species levels.

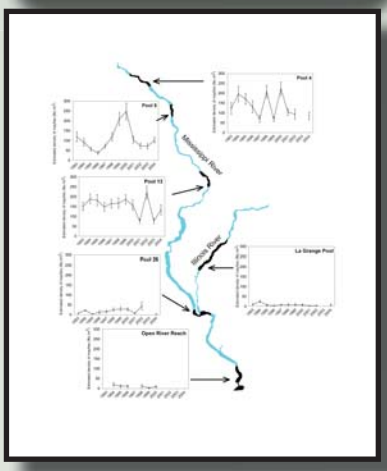
Current monitoring protocols for water quality, aquatic vegetation, fish, and land cover continue to build upon a historic database that now spans more than 20 years. Program partners have identified monitoring resource status and trends as the highest priority for LTRMP to better understand long-term cycles and complex relationships among ecological components. For large rivers that are highly variable over space and time, long-term data are essential to understanding system dynamics.



Monitoring sites: Researchers chose six focal areas (red polygons) to represent conditions and habitats on the Upper Mississippi River System.

Output 1.1: Status and trends information based on long-term data sets for aquatic vegetation, water quality, fish, and land use/land cover.

By maintaining sampling designs and procedures, the relevance of a monitoring program increases over time. Longer data strings mean that changes in status and trends can be more reliably detected against the background of long-term cycles and wide variation.



Current sample design

	Study Area					
Component	**4**	**8**	**13**	**26**	**La Grange**	**Open River**
Vegetation[1]	X	X	X			
Fisheries[2]	X	X	X	X	X	X
Water Quality[3]	X	X	X	X	X	X
Land Cover - Information on land cover is obtained from aerial photography collected approximately every 10 years to document changes over time in response to both natural and human disturbances. Systemic land cover of the Upper Mississippi River System has been mapped twice as part of the Long Term Resource Monitoring Program; 1989 and 2000.						

[1] Principal aquatic vegetation data collected are species composition, relative and percent frequency, abundance estimate, and distribution. Submersed aquatic vegetation is not currently sampled in Pool 26, La Grange, and Open River because of low frequency of occurence.

[2] Principal fish data collected are species composition, relative abundance (catch-per-unit-effort), and length distribution of catches.

[3] Principal limnological data collected include physical and chemical characteristics, suspended solids, chlorophyll *a* , phytoplankton, and major plant nutrients.

Output 1.2: Indicators of success at system, floodplain reach, and geomorphic reach-scales based on system goals and objectives.

The UMRS resource managers and scientists recently developed ecosystem restoration goals for the UMRS. Development of geomorphic reach (a segment of channel with similar geometry and bank treatments) objectives has been initiated and is expected to be completed within the next few years. The LTRMP will continue to use its rich historical database to refine the list of indicators in the 2008 Status and Trends Report and to develop new key system and reach scale ecosystem health indicators. The monitoring program can be used to track the status and trends of select indicators over time to measure progress towards meeting system and reach goals and objectives.

Output 1.3: Additional information for status and trends knowledge regarding mussels, bathymetry and floodplain elevation, floodplain forest, and invertebrates.

Data from additional resource variables are needed to broaden our understanding of the relationships among ecosystem components and processes and to track the status and trends of important species or guilds. The LTRMP partnership have identified native mussels, bathymetry and floodplain elevation, floodplain forest, and macroinvertebrates as priority resource areas over the next five years.

Output 1.4: Data collected at spatial scales that are appropriate to monitor progress toward meeting system and reach goals and objectives.

After river goals, objectives, and indicators are established at various geographic scales, additional status and trends information at corresponding spatial scales may be needed to enhance our ability to track success in meeting those goals within UMRS geomorphic and floodplain reaches, and the system. This information will provide decision makers with enhanced understanding of the dynamics of large floodplain rivers and facilitate successful multi-purpose resource management.

Outcome 2: Enhanced knowledge about system process, function, structure, and composition

Effective management requires knowledge about factors controlling the dynamics and interactions of important system components. To gain this knowledge, the program should continue on a logical growth path by expanding from a primary focus on data collection to additional emphasis on analyses, research, and model building. This will require development of a science-management process that provides for integration and coordination of research and monitoring activities. In addition, this will require using information and research capabilities to build on past efforts, particularly in producing models and decision support tools for managers.

Output 2.1: Insights about river process, function, structure, and composition based on long-term data sets.

The LTRMP has created an unprecedented, multidisciplinary data set that provides a tremendous opportunity for developing increased scientific understanding through data analyses. Expanded analyses will concentrate on improving our knowledge of system structure and function as related to management needs. Such analyses will explore patterns in the data (among pools, strata, years, or seasons), relationships among variables, evaluation of various metrics as potential indicators, or generate new variables from existing data (e.g., length frequencies, growth, year class strength, production). We will build on past analyses, contribute to the focused research agenda (Output 2.2), engage others outside the LTRMP partnership in conducting analyses, and use data sets outside of the LTRMP as needed.

Output 2.2: Information generated from focused research agenda—setting management objectives, aquatic vegetation, native mussels, floodplain connectivity, and landscape patterns.

Current annual research projects will be replaced with a five-year focused research plan for each major question that can be implemented as funding and opportunities allow. The annual scope of work will follow the 5-year focused research plan with minor annual adjustments as we learn and get feedback from within and outside the program. Along with research efforts within the program, we will look for opportunities to leverage other programs and funding sources, and to engage others outside the LTRMP partnership (e.g., academics) in pursuing this agenda.

Output 2.3: Decision support tools (e.g., models of system structure and function) to facilitate improved scientific understanding and restoration management.

Efforts under this output will be driven by the need to provide data and tools that enhance knowledge and help managers make informed management decisions. Modeling will be critical for developing effective adaptive management plans and for directing efforts in data analyses and focused research.

Output 2.4: Operational framework for adaptive management that clarifies relationships at multiple scales among past, present, and future adaptive management projects.

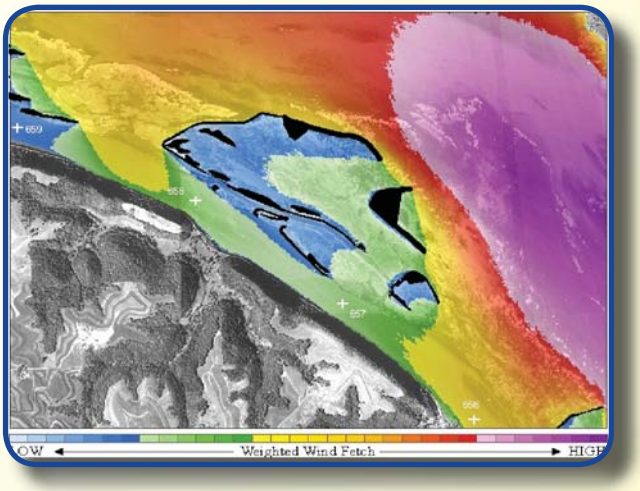
Ultimately, rehabilitation of the UMRS will be achieved by an accumulation of management actions that build on, and learn from, each other. Successfulness of project objectives has been measured for past habitat rehabilitation and enhancement projects (HREPs) and lessons learned have been incorporated into new projects and documented. The learning opportunities provided by HREPs for both project performance and ecological effects can be further enhanced through a more formalized and intentional process of adaptive management.

Outcome 3: Enhanced use of scientific knowledge for implementation of ecosystem restoration programs and projects

Effective ecosystem restoration involves using the best available information and decision support tools to formulate, design, and evaluate management actions that address system, reach and site-specific goals and objectives. This outcome envisions a greater linkage between river managers who design restoration projects and LTRMP staff who conduct monitoring and research so that restoration projects are developed with the best available scientific information.

Output 3.1: Use LTRMP infrastructure, data sets, and expertise to help formulate, design, and evaluate ecological restoration projects.

The purpose of this output is to ensure that the LTRMP information and staff are integrated into ecosystem restoration efforts at system, reach and site-specific levels, and that lessons learned are shared. Priority will be placed on ensuring existing knowledge and expertise are used to inform ecosystem project design and evaluation studies. The LTRMP personnel and infrastructure will also continue to support completion of site-specific project evaluations.

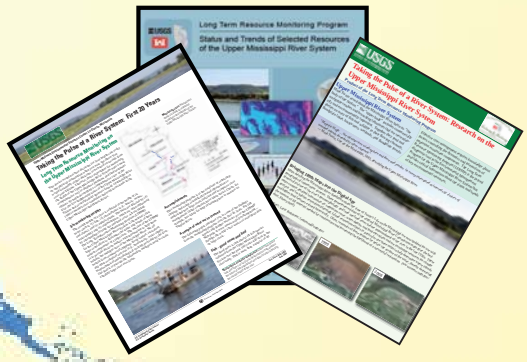


Outcome 4: Enhanced ecological understanding to inform decisions

Critical to the success of EMP is providing decision makers with targeted, easily accessible, and usable information regarding the UMRS ecosystem. This will require both the development and delivery of important information that is responsive to identified needs.

Output 4.1: Key decisions are informed by LTRMP data, research, and decision support tools.

Output 4.2: Key decision makers are satisfied with LTRMP information and decision support system.



The actions presented in this plan are essential to understanding the river ecosystem, and helping decision makers make informed choices.

The LTRMP Partnership:

USGS science for a changing world

ILLINOIS NATURAL HISTORY SURVEY

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

DNR

Minnesota DEPARTMENT OF NATURAL RESOURCES

WISCONSIN DEPT. OF NATURAL RESOURCES

For further information visit the LTRMP Web site: http://www.umesc.usgs.gov/ltrmp.html