

Guest Feature

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Great Lakes restoration begins upstream

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Some aquatic ecosystems have garnered significant funding as candidates for ecological restoration, including the Florida Everglades and San Francisco Bay-Delta. The Great Lakes ecosystem may soon receive similar attention. With 20 percent of the world's freshwater supply and serving the needs of more than 30 million people in the United States and Canada, the Laurentian Great Lakes are of unquestioned importance. A major new environmental initiative by President Bush, the [Great Lakes Regional Collaboration](#), calls for a comprehensive effort to clean up the Great Lakes and its tributaries. At present, however, no systematic accounting of restoration efforts or expenditures exists (New York Times, Dec. 4, 2004).

The waterways that feed the Great Lakes are equally in need of restoration. Healthy waterways provide fresh water to inland communities, habitat for wildlife and fisheries, and recreation for many. They are central to the region's quality of life, and thus to its economies. Dams that block the movement of fishes, land-use practices that promote erosion and nutrient runoff, and a variety of urban and industrial wastes degrade river conditions and ultimately influence the lakes as well. Thus, the restoration of the Great Lakes must begin upstream by restoring the waterways that feed them.

To restore the ecological functions and human services of rivers and streams, we as a nation are making a large but poorly understood investment of billions of dollars. In an effort to evaluate the state of river restoration in the United States, a team of river scientists formed a partnership known as the [National River Restoration Science Synthesis](#) (NRRSS), led by David Allan of the University of Michigan (U-M), Margaret Palmer of the University of Maryland, and Emily Bernhardt of Duke University (<http://www.nrrss.umd.edu>).

The NRRSS has representation in all regions of the U.S., including the Great Lakes/Upper Midwest region, where Gretchen Alexander, a graduate student at U-M's [School of Natural Resources and Environment](#), is focusing her efforts. Nearly 40,000 individual cases of river restoration have been acquired and are being analyzed to assess the extent, nature, scientific basis, and success of stream and river restoration projects. Still in progress, this project hopes to inform scientists, practitioners and policy makers about best practices for river restoration.

Our data gathering in the Great Lakes/Upper Midwest region has focused on the states of Michigan, Ohio and Wisconsin, resulting in information on 1,345 projects. Data were gathered from federal and state data sources as well as



nongovernment organizations, and data completeness was verified by expert opinion. After ascertaining the most common types of restoration activities, we conducted 39 telephone interviews on a subset of common project types within the national database (instream habitat improvements, channel reconfiguration, water quality management, riparian management) to help determine whether or not funded projects achieve ecological success.

The results of the research are not surprising, but provide concrete evidence to support ideas that have long been speculated. A lot of stream restoration is occurring, a lot of money is being spent, and very few projects are being assessed for ecological success. Analyses of costs of stream restoration for the national database show that the amount of money spent on restoration nationwide has increased dramatically in recent years, and our conservative estimate is that restoration spending nationally has averaged approximately \$1 billion annually over the past ten years. In the Great Lakes/Upper Midwest region, expenditures on restoration have been rising, and for the year 2002, we conservatively estimate that \$22.1 million was spent on river restoration in these three states. With so much money being spent, one might assume that assessing the success of river restoration efforts would be a priority. However, one would assume incorrectly.

Our working group put forth five elements required of a river restoration project to constitute ecological success: 1) a dynamic ecological endpoint is identified as a priority and used to guide the restoration; 2) the ecological conditions of the river are measurably enhanced; 3) the river ecosystem is more self-sustaining than prior to restoration; 4) implementation of the restoration project inflicts no lasting harm; and 5) some level of pre- and post-project assessment is conducted and the information made available to the public.

We recognize that a project may be a success from other viewpoints, including aesthetics, learning, visual attractiveness, etc., but these criteria are different from ecological success. For the Great Lakes/Upper Midwest, using a 5-point scale, we found the average ecological success score to be 2.3, a disappointing outcome. The criterion met least well was #2, "the ecological conditions of the river are measurably enhanced."

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This result pinpoints the largest constraint to the furthering of restoration science that exists both in our region and nationwide – the lack of adequate monitoring and standardized reporting of results of river restoration projects. Nevertheless, our interviews with many individuals “on the front lines” of river restoration reassure us that a number of practitioners are pursuing appropriate projects that have substantial potential to improve stream health. But many challenges remain, including how best to prioritize projects and link multiple efforts within watersheds. There is an



Restoration of Silver Creek in Geauga County, Ohio, conducted by the Geauga Park District. The project restored 1,000 feet of the creek, a cold water stream that supports trout habitat. The project realigned and adjusted the plan, profile and cross section of the creek, and enhanced in-stream habitat, riparian wetlands and native reforestation. The white tubes protect newly-planted trees from deer browsing.

urgent need for improved information sharing and direct pre- and post-project evaluation to ensure maximum benefit from our current investments in river restoration. ♦

(1) Palmer, M.A. E.S. Bernhardt, J.D. Allan, et al. 2005. Standards for ecologically successful river restoration. *Journal of Applied Ecology* (in press).

David Allan is a professor and Gretchen Alexander is a 2005 graduate at the University of Michigan's School of Natural Resources and Environment.

MMP ... continued from page 5.

AOC in New York and Cuyahoga River AOC in Ohio were selected for expanded MMP coverage in year one of this project. GLC and BSC staff identified suitable wetlands for monitoring in these AOCs, and are expanding wetland monitoring and volunteer recruitment in each. A similar number of U.S. AOCs will be selected for 2006 implementation of the MMP.

A common link among the AOCs is loss of beneficial uses as a result of degraded aquatic environments. Wetland habitats are one of the most sensitive and critical ecosystem types within AOCs, given their unique relationship



Steve Timmermans (center), coordinator of Bird Studies Canada's Marsh Monitoring Program, training volunteers in the Clinton River watershed. Volunteer Sherrill Jackson (right) holds a field survey form that volunteers use to record bird and amphibian monitoring data.

and function to sustain water quality and quantity between terrestrial and aquatic environments, and their support for diverse and abundant wildlife and plant communities.

In order for Remedial Action Plan (RAP) practitioners to adequately evaluate the success of their efforts to restore BUIs and the quality of the environment within Great Lakes AOCs, regular, periodic, objective and meaningful reporting on ecosystem health based on long-term monitoring (before, during and after remedial action) is essential. The MMP helps fulfill this niche.

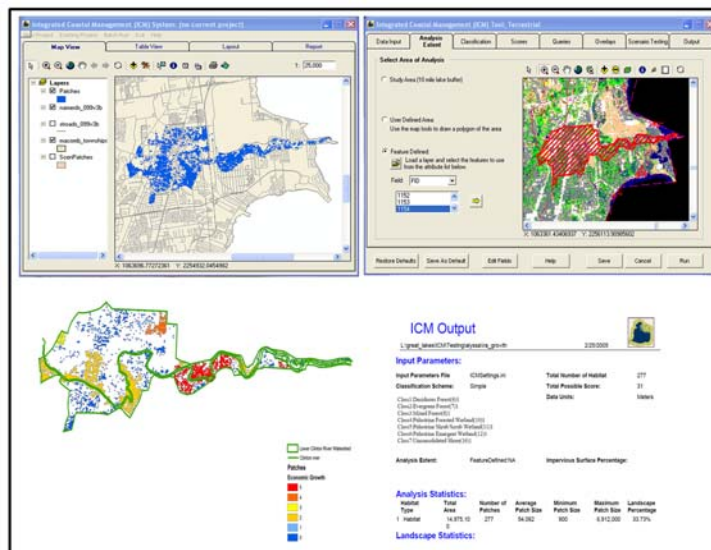
For additional information about this project contact [John Hummer](mailto:jhummer@glc.org), Great Lakes Commission, jhummer@glc.org, or [Steve Timmermans](mailto:stimmermans@bsc-eoc.org), Bird Studies Canada, stimmermans@bsc-eoc.org, or visit the MMP web site at www.bsc-eoc.org/mmpmain.html. ♦

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GIS software is needed to use the tool (ESRI® ArcMap 8.3 with Spatial Analyst®), but no in-depth GIS experience is needed.

The tool was developed alongside a Coastal Habitat Assessment that synthesizes socioeconomic and ecological data for Lake St. Clair's coastal area. The assessment identifies priority areas for coastal habitat conservation and restoration and provides guidelines for working toward this end.

A free copy of the ICM tool is available from NOAA's Coastal Services



Images from the ICM Tool showing the Clinton River and Metro Beach on Lake St. Clair. **Top Left:** The map view window where spatial data layers are viewed and colors manipulated. Tables, reports and maps are produced in this area. **Top Right:** The terrestrial setup process, where the extent of analysis is chosen, which can include a polygon (such as a watershed), a political boundary or a user-defined area. **Bottom Left:** Map output from the lower Clinton River watershed showing habitat areas (forest and wetland) facing development pressure. **Bottom Right:** Report output, which can provide information such as percentage of habitat area, percentage of impervious surface area, and information about habitat quality.

Center. The tool is packaged on a CD-ROM with installation instructions, help materials, tutorials, example projects, spatial data sets for the Lake St. Clair project area, and tool software.

Information on the ICM tool and Coastal Habitat Assessment are available online at www.glc.org/habitat/lsc/, and from [Alyssa Olson-Callahan](mailto:allyssa.olson-callahan@noaa.gov), NOAA Coastal Services Center, 843-740-1219, allyssa.olson-callahan@noaa.gov; or [Victoria Pebbles](mailto:Victoria.Pebbles@glc.org), Great Lakes Commission, 734-971-9135, vpebbles@glc.org. ♦