

US EPA Mid-Continent Ecology Division

Research Project Summary

Great Lakes Nearshore Assessment Research

Overview

Monitoring and assessment research is needed to assist the US and Canada with fulfilling their Great Lakes Water Quality Agreement (GLWQA) requirements and goals to protect and restore the chemical, physical, and biological integrity of Great Lakes Basin waters and their aquatic ecosystems. This work is a continuing effort of EPA's Environmental Monitoring and Assessment (EMAP) program to provide the national condition assessment methodology for all surface waters. The next generation of Great Lakes monitoring and assessment requires consideration of how to keep track of conditions not only in the offshore waters (as presently carried out by the Great Lakes National Program Office), but also along the Lakes' coastal margins. Ecosystems and habitats of the coastal zone are very biologically active and diverse, and also represent a "frontline" that directly receives many inputs and potential stressors from anthropogenic activities in adjacent watersheds.

The coastal region across the Great Lakes is morphologically diverse and ecologically very dynamic. Spatio-temporal variability in both the environment and biology complicate our ability to read environmental signals, accurately describe trends in conditions, and attribute changes to causal factors. In part, because of these issues, there is no existing, consistent Lakes-wide strategy of coastal monitoring in spite of strong recognition of the need for it. We currently lack the scientific foundation to answer such fundamental questions as:

1) What measures should we include in a nearshore/coastal monitoring program? What scales and sampling styles can be used? What would these measures indicate in terms of ecological health?

2) Are there definable units of the nearshore and coastal zones (key ecosystems or habitats) that we can monitor? How do we define and classify these as sample populations and determine their reference ecological condition and expected biological communities? How do these areas ecologically interact with, and how could monitoring of them contribute to, understanding of present and future trends in the lake as a whole?

The Division's Great Lakes nearshore research is crafted to evaluate some critical next steps in evaluating indicators and their associated sampling styles; define monitor-able resource classes (such as open nearshore, tributary receiving areas, and embayments); and understanding the potential for assessment designs which will enable comprehensive, consistent coastal monitoring effort across the Great Lakes. There are two near-term objectives:

Objective 1: Develop tools to characterize biological resources in the nearshore zone. We are presently exploring a variety of techniques that include synoptic in-situ mapping technologies to evaluate selected measures. Efforts focus on feasibility and efficiency of measurements, and sites have been chosen to provide strong sense of individual measure's responsiveness to landscape-level disturbances across the Great Lakes. A zooplankton

indicator development project of this nearshore program is summarized separately. The work connects directly with that of the STAR-sponsored Great Lakes Environmental Indicator Project (see link).

Objective 2: Identify patterns and scales that help define ecologically-distinct resource classes which could be included in Lakes-wide assessment designs. Measurements include a variety of biological and chemical measurements in water and in bottom sediments, and of the food web which connect these two components of shallow aquatic ecosystems. Coastal ecosystems are being evaluated in a progression of field studies that include numerous sites on each of the Lakes (Superior, Huron, Michigan, Erie, and Ontario) and examine embayments as well as open shorelines.

Key Products

Recent presentations include:

National Water Quality Monitoring Conference, Madison, WI.

Lake Superior Ecosystem Status Conference, Houghton, MI.

American Society of Limnology and Oceanography, Salt Lake City, UT.

International Association for Great Lakes Research, Chicago, IL.

International Estuarine Research Federation Conference, Seattle, WA.

Scharold JV, Lozano SJ, and Corry TD. 2004 . Status of the amphipod *Diporeia* spp. in Lake Superior, 1994-2000. Journal of Great Lakes Research 30 (Supplement 1):360-368.

Finding the nature and scales of response to landscape disturbance gradients within the nearshore zone of the Great Lakes (Kelly et al. In preparation)

Annual milestones (APMs) planned:

2004--Evaluation of nearshore designs and indicators across the Great Lakes.

2005--Report on sampling design and indicators for Great Lakes embayments.

2006--Initial assessment report on factors affecting nearshore conditions in the Great Lakes.

STAR-funded Great Lakes Environmental Indicator Project at <http://glei.nrri.umn.edu/>

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