

Long-Term Ecological Research Program

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This presentation also details the work done by Gary Fahnenstiel.

1

Long-Term Ecological Research Program Goal

Document *and* understand long-term food web changes in response to various stressors

Document

Characterize critical state variables (observations)

Understand

Couple process research with the observations

Inputs to forecasting and ecological models



Great Lakes Environmental Research Laboratory Review – Ann Arbor, MI

November 15-18, 2010

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Unlike a “monitoring” project, we put an emphasis on both documenting and understanding changes by linking long term observations with process studies and ecological modeling within the group.

2

Advancing NOAA's Mission

NOAA 5-Year Research Plan: Ecosystems Goal

Advancing Understanding of Ecosystems to Improve Resource Management

Ecological characterizations that meet management needs

Ecosystem assessments that evaluate ecological response to anthropogenic stressors



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Ecosystem Forecasting: Ecosystem forecasting predicts the effects of biological, chemical, physical, and human-induced changes on ecosystems and their components. These forecasts, both qualitative and quantitative, offer scientifically sound state-of-the-art estimations of likely outcomes.

GLERL mission: conduct high-quality research and provide scientific leadership on important issues in both Great Lakes and marine coastal environments leading to new knowledge, tools, approaches, awareness and services.

3

Long-Term Ecological Research Program

5th largest lake in the world
12 million people living in its watershed
Only Great Lake entirely within U.S. jurisdiction



Long-term Ecological Research Program physically located on Lake Michigan

Addresses concepts and issues that reach beyond Lake Michigan

But given the importance and size of Lake Michigan, one could argue for the importance of studying Lake Michigan for its own sake.

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Past Accomplishments

- 1980s
 - Phosphorus load reductions on Great Lakes water quality and fisheries management
- 1990s
 - Weather/climate impacts on long-term water quality
- 2000s
 - Fish condition after mussel invasion, implications for fisheries management practices



Lake Whitefish




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September 2010: Special Journal Issue



GLERL Documents “Unprecedented” Change

9 papers with GLERL authors

NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

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FOR IMMEDIATE RELEASE
Sept. 27, 2010

NOAA and Partners: Decades of Research Find ‘Unprecedented’ Change in Lake Michigan

The complex network of predators and prey that inhabit Lake Michigan has changed so drastically in recent decades that future trends for the food web are murky, according to scientists at the NOAA Great Lakes Environmental Research Lab (GLERL), the NOAA Cooperative Institute for Limnology and Ecosystems Research (CI-LEER), and other academic partners. These trends are documented in a special issue of the *Journal of Great Lakes Research*.

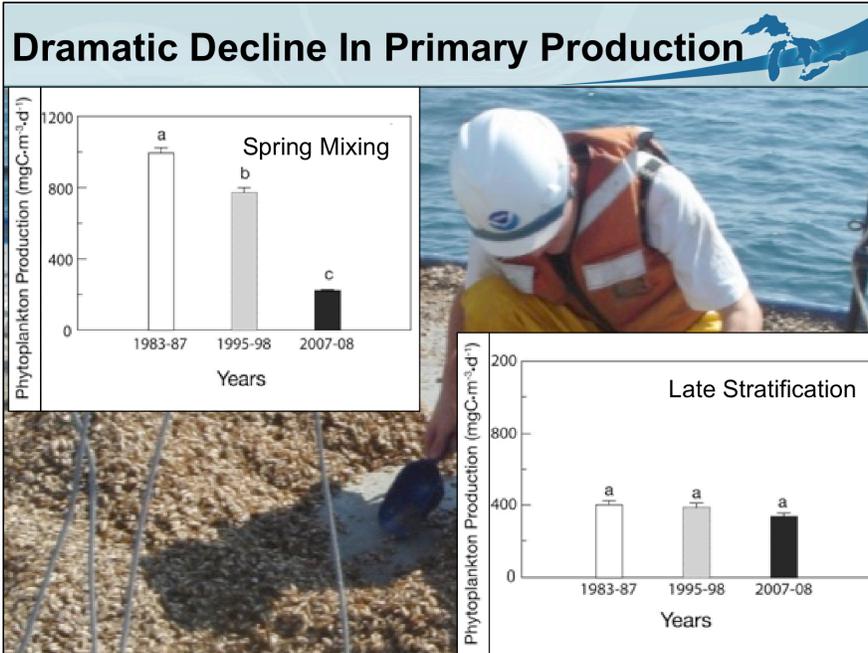
Press Release picked up by Associated Press

Press release generated wide interest

Associated Press story published by 15 media outlets, many outside the Great Lakes region

2 public radio stations in Great Lakes Basin ran stories

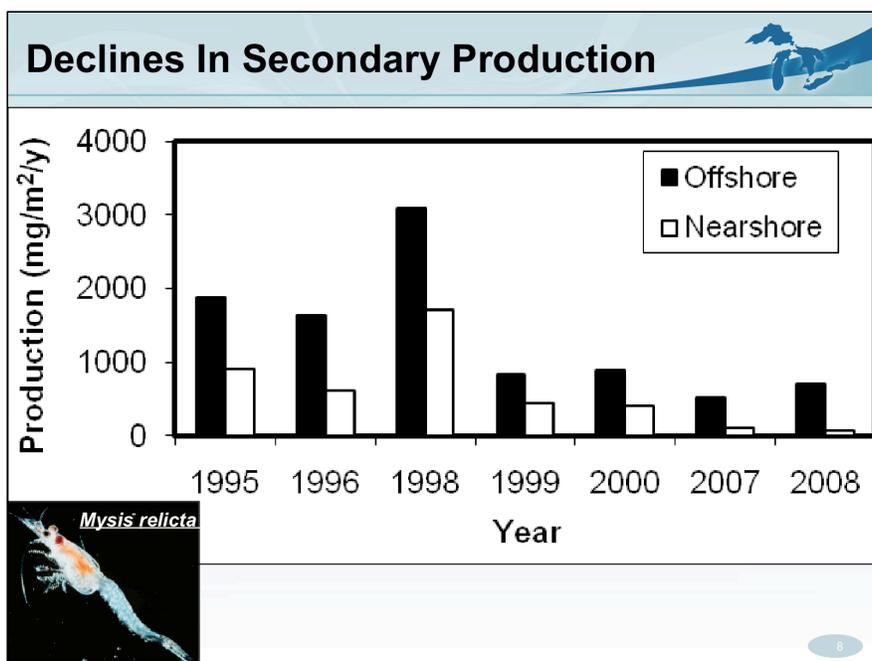
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Measure process rates (primary production), not just state variables (chlorophyll), different from what Environmental Protection Agency is doing.

FAHNENSTIEL, G.L., S.A. POTHOVEN, T.F. NALEPA, H.A. VANDERPLOEG, D.M. Klarer, and D. Scavia. Recent changes in primary production and phytoplankton in the offshore region of southeastern Lake Michigan. *Journal of Great Lakes Research* 36:20-29 (2010).

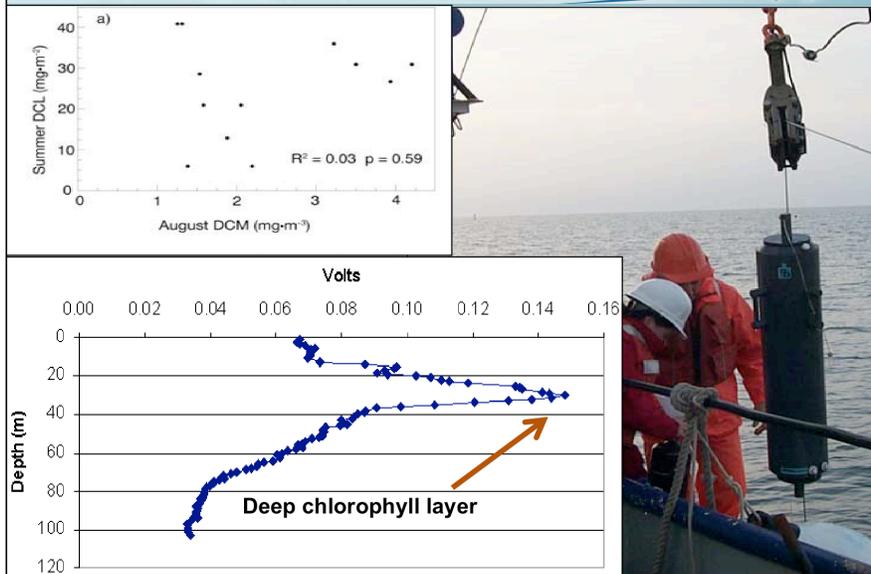
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POTHOVEN, S.A., G.L. FAHNENSTIEL, and H.A. VANDERPLOEG. Temporal trends in *Mysis relicta* abundance, production, and life-history characteristics in southeastern Lake Michigan. *Journal of Great Lakes Research* 36:60-64 (2010). <http://www.glerl.noaa.gov/pubs/fulltext/2010/20100022.pdf>

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Importance of High Frequency Sampling



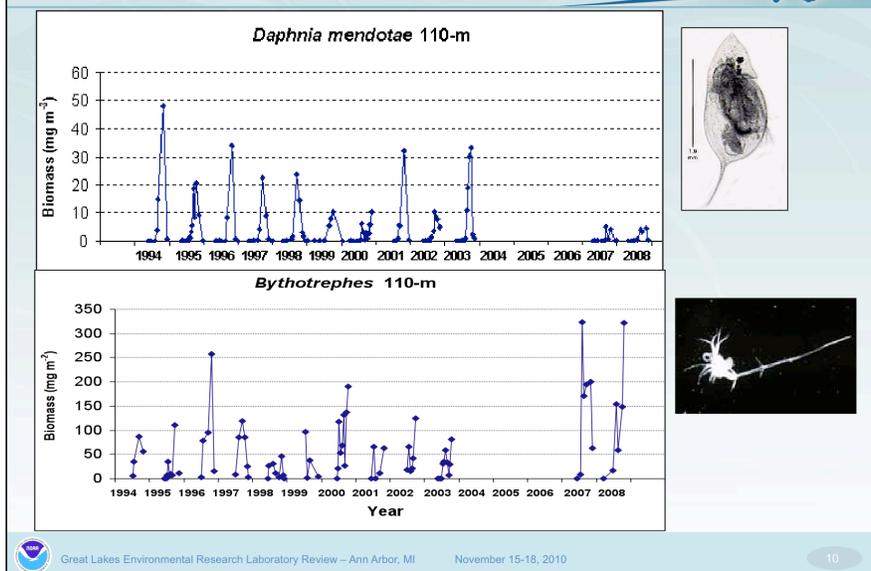
High frequency sampling (biweekly to monthly) at one spatial location to capture temporal variation.

Miss important temporal features if you don't sample with high frequency at one location.

Results collected at the same time throughout the region as at our offshore site suggest our site is representative of the offshore region (see Mida, J.L., D. Scavia, G.L. FAHNENSTIEL, S.A. POTHOVEN, H.A. VANDERPLOEG, and D.M. Dolan. Long-term and recent changes in southern Lake Michigan water quality with implications for present trophic status. *Journal of Great Lakes Research* 36:42-49 (2010).

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Importance of Temporal Variation



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Customers

1) Informed resource managers and policy makers

- State Department of Natural Resources (MI, WI, IL)
- Great Lakes Fishery Commission
- International Joint Commission

2) Informed public

- Sea Grant fishery workshops
- Healing Our Waters
- Michigan United Conservation Club
- Sport fishing clubs
- Commercial fishermen



3) Information to research partners

- U.S. Geological Survey, U.S. Environmental Protection Agency
- NOAA National Estuarine Research Reserve System
- University of Michigan, Michigan State University, University of Wisconsin, Purdue University, Grand Valley State University



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Invited to address policy groups; Great Lakes Fish Commission and technical committees

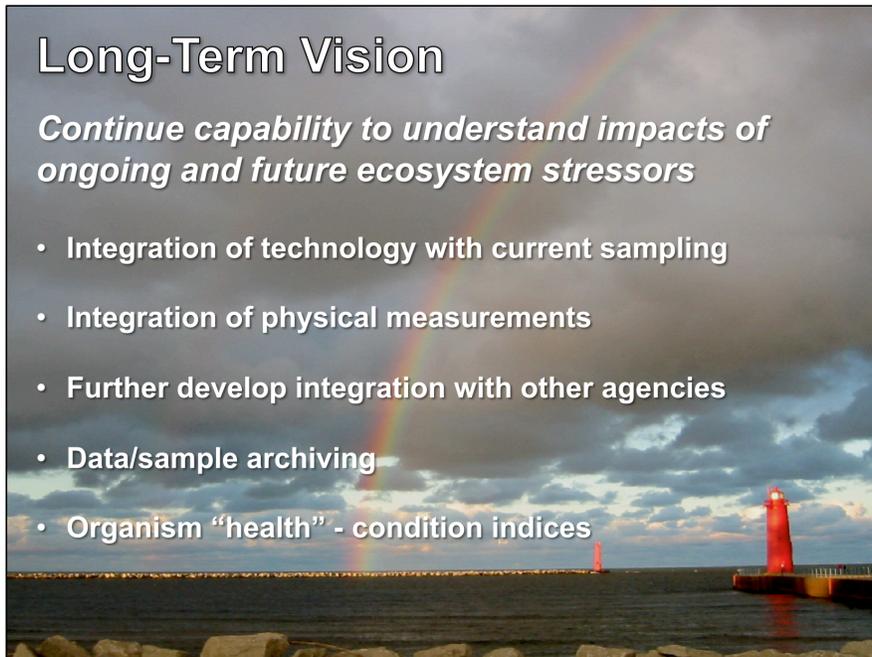
Highlight commercial fisherman, and Sea Grant connection

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Long-Term Vision

Continue capability to understand impacts of ongoing and future ecosystem stressors

- Integration of technology with current sampling
- Integration of physical measurements
- Further develop integration with other agencies
- Data/sample archiving
- Organism "health" - condition indices



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