

The International Field Years on Lake Erie (IFYLE)

by Dr. Stephen B. Brandt and Margaret B. Lansing



The National Oceanic and Atmospheric Administration's (NOAA's) Great Lakes Environmental Research Laboratory (GLERL), in collaboration with researchers from the U.S., Canada, and Europe, have initiated what is believed to be the largest, most comprehensive, multidisciplinary research effort ever conducted on Lake Erie: the International Field Years on Lake Erie (IFYLE). Lake Erie faces wide and varied threats to its health and integrity, including harmful algal blooms (HABs) in the west basin, recurring low oxygen episodes ("dead zones") in the central basin, and invasive species as well as extremes in natural phenomena such as high and low water levels, and climate variability. Each of these threats has the potential to disrupt normal food webs and ecosystem processes, and thus, jeopardize Lake Erie's ability to provide healthy fish populations, safe drinking water, and bacteria-free beaches. Since all of these factors are interrelated, the scientific framework for effective management will require ecosystem-level research, particularly relative to biological-physical-chemical interactions on a lake-wide basis and over a range of time and space scales.

During 1972-73, the scientific community of the Great Lakes came together to conduct the first International Field Year for the Great Lakes (IFYGL) on Lake Ontario. It was the largest coordinated, multi-institution aquatic research program ever carried out in the Great Lakes and focused largely on the physics. The work from that program resulted in a wealth of information that still resonates in our understanding and management of the Great Lakes. The International Field Years on Lake Erie (IFYLE) was inspired by the IFYGL but was expanded to include lake chemistry and biology as well as physics and to take advantage of the latest technological, analytical and modeling capabilities.



IFYLE is focused not only on lake-wide understanding, but ultimately on applying the science to develop tools and products useful to lake and resource managers. The project began in May 2005, with a focus on hypoxia and harmful algal blooms. The research explores both why a dead zone forms in Lake Erie and how it influences the ecology and productivity of the system

(including fish). The IFYLE program involves approximately 45 scientists from federal, state and provincial agencies, private institutions, and 17 different universities spread across 7 states and 4 countries. It involves all of the state and provincial fisheries management agencies on Lake Erie and is coordinated, in part, with the help of the Lake Erie lake committee, Lake Erie LAMP and the Lake Erie Millennium Group. The field program involved a number of research vessels, over 2,000 person-days at sea and an array of over a dozen instrumented moorings.

The three primary objectives of the IFYLE program are to:

- 1) Measure the extent of hypoxia across Lake Erie, understand its causes and develop tools that can forecast its timing, duration, and extent;
- 2) Assess the effect of hypoxia on the Lake Erie food web, particularly on the important fishes; and
- 3) Identify factors that control the development of toxin-producing harmful algal blooms in Lake Erie and to develop tools to help predict their occurrences.

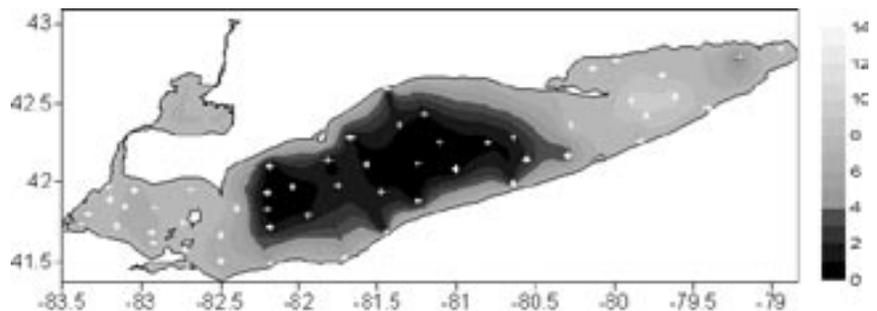
Lake Erie “Dead Zone”

Hypoxia is defined as water with low dissolved oxygen levels (<4 mg/l). Hypoxia makes it difficult for oxygen-consuming aquatic organisms, including invertebrates and fish, to survive. IFYLE scientists found an area of ~10,000 km² square miles of hypoxic water in the central basin in September, 2005 (see map). Smaller zones of hypoxia were found in July and August in the western part of the central basin.

Fish and zooplankton were noted to change behavior in the presence of this dead zone. When oxygen was sufficient, fish and zooplankton underwent normal daily migrations, aggregating on the bottom or at the thermocline by day and dispersing throughout the water column by night. During hypoxia, however, fish and zooplankton largely stayed at or above the thermocline both day and night. We are currently evaluating how these changes in distribution may affect fish feeding, growth, survival, and production.

Lake Erie Harmful Algal Blooms

Harmful algal blooms (HAB) are becoming commonplace in Western Lake Erie. Algal blooms can produce



Estimation of dissolved oxygen concentrations (mg/l) in Lake Erie during September 7-11, 2005. IFYLE Sampling stations are denoted in white. Note the large area of bottom hypoxia (i.e. dissolved oxygen levels <4 mg/l) in the central basin, which can be stressful to fish. This figure was provided by Stuart Ludsin (NOAA-GLERL) and Tom Johengen (CILER, U of Michigan).



Scientists collect data on Lake Erie

toxins. Although 2005 would be considered a low toxicity year by most accounts, several bloom events were observed. We continue to investigate why toxicity and algal blooms vary between years, including identifying the organisms responsible for the toxicity.

Future Plans

IFYLE is a 5-year program. Data collected in 2005 and analyzed in 2006 will be used to guide and focus additional field programs in 2007 and 2008. For more information about IFYLE, visit: <http://www.glerl.noaa.gov/ifyle/>.

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Fish Stocking as a Management Tool in the Great Lakes

by Gary E. Whelan

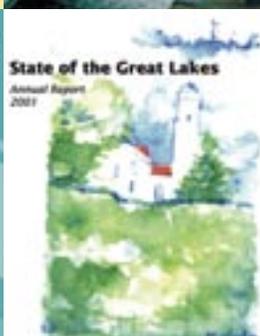
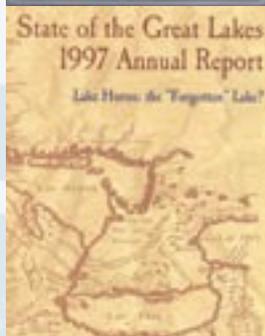
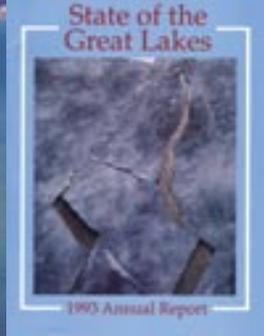
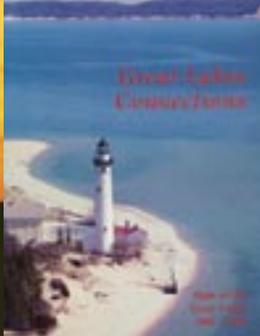
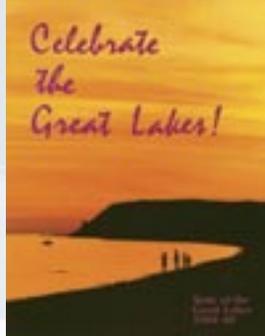
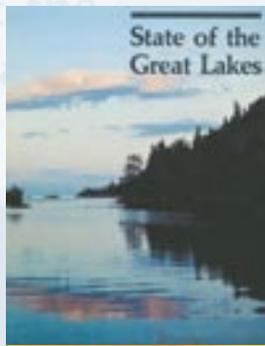


The creation of most fisheries agencies during the period from 1860-1880 in the United States can be traced back to the desire for more fish as most of the accessible and sought after fish stocks were rapidly declining due to overharvest, landscape level changes in land use, and pollution. The creation of the Michigan Fish Commission in 1873, the ancestor of the Department of Natural Resources - Fisheries Division, can be directly linked to the demand for more fish in Great Lakes waters and more “desirable food fish” in inland waters. To address this call, the State of Michigan implemented fish stocking as a management tool, and continued the practice for the next 133 years.

From 1873 to 1897, the Michigan Fish Commission stocked millions of lake whitefish and lesser numbers of many other species

State of the Great Lakes

20th Anniversary



A Message from the Governor

by Governor Jennifer M. Granholm



Anniversaries are benchmarks that provide us the opportunity to reflect on accomplishments of the past and to plan our direction for the future. They also serve as moments to celebrate our progress and our perseverance.

The year 2005 was a year of many anniversaries significant to Michigan. The Soo Locks, a fabled international waterway, celebrated 150 years of operation. Imagine the countless ships that have carried cargoes ranging from furs and lumber to iron ore and soybeans to ports around the world.

The Michigan Department of Transportation (MDOT) also celebrated its 100th anniversary in 2005. MDOT has overseen the conversion of original Native American trails to plank roads to freeways that now carry 180,000 vehicles each day; not to mention the construction of Michigan's unrivaled transportation bridge system.

Another anniversary celebrated in 2005 was that of the Office of the Great Lakes which provides Michigan state government offices and the public with a single information center on issues affecting or involving the Great Lakes. Created by Governor James J. Blanchard and the Michigan Legislature in 1985, the office guides the development of government policies, programs, and procedures that protect, enhance, and manage our Great Lakes resources. Given the recent issues of water diversion and aquatic invasive species, this office faces ever-growing responsibility and numerous challenges.

As we move forward together, we are encouraged and inspired by the history and the tenacity of those who have gone before us. They helped shape our future because they were able to adapt to changing times and situations; and they not only prevailed - they flourished.

I know you will enjoy these anniversary stories and more in this edition of the State of the Great Lakes Annual Report. Inside, you'll also find stories about dam removal, water monitoring, and the International Field Year for Lake Erie.

Our state has a rich and diverse history, and the Great Lakes are a vital component of that chronicle. As we reflect on our accomplishments of the past, let us commit ourselves to an even greater future. I invite you to celebrate our Great Lakes!

Sincerely,

Jennifer M. Granholm, *Governor*



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The Office of the Great Lakes in the Michigan Department of Environmental Quality publishes the *State of the Great Lakes Annual Report*. It welcomes, but is not responsible for the opinions expressed by contributing authors.

Layout and Graphic Design

Steve Bolt, *Printing Services, Michigan Department of Management and Budget*



As a "Michigan Great Printer," Print and Mail Consulting Services is significantly committed to environmental stewardship by employing environmentally sound practices in the lithography industry.



December, 2006

Prepared by the Office of the Great Lakes —
Michigan Department of Environmental Quality
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<http://www.michigan.gov/deq>

Pursuant to Public Act 451 of 1994 for Governor Jennifer M. Granholm

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