

Preface

The Aquatic Ecosystem Health & Management Society (AEHMS) has been organizing a series of “State of the Lake” conferences around the world, including Lakes Baikal, Erie, Michigan, Winnipeg, Superior, Victoria and Tanganyika. The AEHMS has always followed up conferences with peer – reviewed publications which include integration and synthesis of state of the art information about these lakes. The papers resulting from these conferences have been published either as a peer-reviewed book, or as a special issue of AEHM (see www.aehms.org). This issue pertaining to Checking the Pulse of Lake Ontario (POLO) is part of this series.

The Lake Ontario ecosystem is experiencing significant ecological change. Phosphorus abatement implemented in the 1970s under the auspices of the Great Lakes Water Quality Agreement (GLWQA) has resulted in low spring total phosphorus levels in offshore waters while nutrients like silicon and nitrate have increased over this period. Consistent with declines in phosphorus have been significant reductions in phytoplankton and zooplankton, compositional changes, dominance of smaller sized organisms in primary productivity and the important role of the microbial food web. Quagga mussels now dominate waters <90 m and few zebra mussels remain. The native amphipod, *Diporeia*, is nearly extinct at depths >90 m and its future as a stakeholder in the historic food web is bleak. Invasive *Cercopagis* and *Bythotrephes* are now significant players in the lower foodweb while *Mysis* populations remain stable. Recently *Hemimysis* has been discovered in the near shore regions of the lake. Alewife populations continue to decline in response to predation by top piscivores.

Historically, most of the work on Lake Ontario, as well as other Great Lakes, has been conducted in the offshore waters (>20 m) with the exception of some harbors and embayments (Toronto Harbour, Hamilton Harbour, Bay of Quinte, Oswego) as part of the Areas of Concern program under the GLWQA. Very little is known about the dynamics and linkages between the shoreline, nearshore and offshore zones. In particular, the cumulative impacts of multiple stressors on the structure and function of the food web in the shoreline area have been ignored and the threats and challenges are largely unknown. Consequently, the Checking the Pulse of Lake Ontario symposium was a timely event and was organized as a special session of the 49th Annual Conference on Great Lakes Research (IAGLR) held at the University of Windsor, May 22-26, 2006. The response to the session was overwhelming with a record 29 papers. The papers covered a broad range of topics including:

- Physical and chemical regime
- Food Webs: lower and higher trophic levels (bacteria to fish), including benthos and water birds
- Status of nearshore zones and embayments
- Impacts of invasive species and species at risk
- Emerging technologies

Due to the differing stages of submission of various manuscripts, including peer-review and processing for publication, it has been decided to publish the papers in two parts in order to expedite their release to the scientific community. The current issue includes 7 manuscripts from the POLO symposium focusing on lower trophic levels, fish communities and invasive species. Currently the Lake Ontario food web is facing serious impairments and more threats to its integrity are emerging including:

- climate change
- discovery of new chemicals with human health effects (carcinogenic, endocrine disrupters, behaviour modifiers)

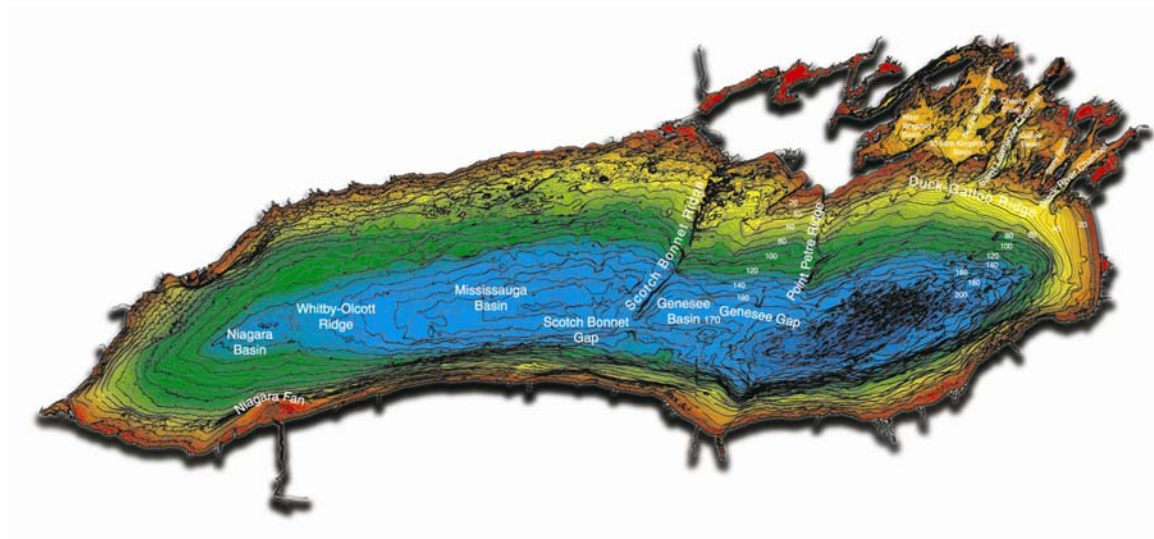
- new invaders
- toxic algal blooms
- disease pathogens-Botulism, VHS

The pulse of Lake Ontario must be maintained in order to respond to crises and ecological surprises as well as to understand and manage the health of the ecosystem. Application of new ecological technologies, bi-national coordination, stakeholder involvement, integrated, multi trophic and frequent assessments are critical ingredients to maintaining a healthy pulse for Lake Ontario now and in the future.

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Lake Ontario bathymetry courtesy of NOAA