

FISHERY RESEARCH PRIORITIES: LAKE ONTARIO Great Lakes Fishery Commission

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This listing was compiled based on input from the Lake Ontario lake committee and its technical committee and from discussions within the Council of Lake Committees (for more information go to <http://www.glfsc.org/lakecom.php>). Order of listing does **not** imply relative ranking of priorities for the Fishery Research Program funding.

Research Priorities

The Lake Ontario ecosystem is extremely dynamic, and has experienced rapid and significant change in the last decade. The following research priorities were developed by the Lake Ontario Technical Committee, and are presented in the framework of “Fish Community Objectives for Lake Ontario” (Stewart et al. 1999, http://www.glfsc.org/pubs/SpecialPubs/Sp99_1.pdf). Please note that the current fish community objectives (FCO) document was prepared in 1997, and recent/ongoing disruptions in food web dynamics have rendered some objectives obsolete.

1. Nearshore Fish Community

The nearshore fish community will be composed of a diversity of self-sustaining native fish species characterized by:

- a. Maintenance of existing walleye populations and expansion of walleye populations into favorable habitats
 - What are the impacts of thiamine deficiency on walleye?
 - Other than the Bay of Quinte, are there other sources of walleye recruitment to the Eastern Basin and other area of Lake Ontario?
 - Can walleye spawning runs be re-established in Eastern Basin tributaries, and is there adequate forage to sustain additional recruitment from restoration efforts?
- b. Maintenance of existing yellow perch populations and expansion of yellow perch populations into favorable habitats
- c. A population recovery of the lake sturgeon sufficient for its removal from New York’s list of threatened species
 - Where are the primary sources of lake sturgeon recruitment to Lake Ontario, and can they be enhanced and/or better protected from perturbations?
 - How will round goby colonization affect growth and contaminant levels in lake sturgeon?
- d. Population levels of smallmouth bass, largemouth bass, and sunfishes attractive to anglers
 - How will round goby colonization affect growth and contaminant levels in smallmouth bass?
- e. Increasing numbers of American eels consistent with global efforts for their rehabilitation
 - What local and global management actions are necessary to ensure the future of

American eels in the Lake Ontario/St. Lawrence River system?

- How can we increase passage of American eels into Lake Ontario, and how can we improve survival of out-migrating adults?

Also:

- Continued study of holistic models (gaming/risk analysis), with respect to long-term focus on alternate states/management in the nearshore ecosystem
- Specific to areas colonized by double-crested cormorants (DCC), what is an acceptable level of cormorant predation (feeding days) that will not adversely impact sportfishing quality (model development)?
- What lethal and non-lethal control alternatives can be used to manage DCC numbers?
- Causal mechanisms of Type-E botulism outbreaks in Lake Ontario; links to exotic species?
- Impacts of round goby colonization (egg predation on native species, food web/energy flow implications (includes contaminant loading, changes in fish growth/behavior/movements/angler catch rates, potential implications for long term fish assessment data series).
- Efficacy of implementing water level control/fish passage in wetland habitats to improve habitat/fish recruitment
- Impacts of submerged aquatic vegetation control on embayment fish communities
- Fish health issues – *Heterosporis*, etc.

2. Offshore Pelagic Fish Community

The offshore pelagic fish community will be characterized by:

- a. A diversity of salmon and trout
 - Nutrient deficiency impacts, particularly with respect to thiamine, on trout and salmon species including reproductive success, behavioral, neurological, etc.
 - Tributary mouth habitat/water clarity influence on predation of juvenile salmonids
- b. Chinook salmon as the top predator
- c. Abundant populations of rainbow trout (steelhead)
- d. Fishable populations of coho salmon and brown trout
- e. Populations of Atlantic salmon at levels consistent with investigating the feasibility of restoring self-sustaining populations
 - Atlantic salmon strain evaluations for reintroduction programs
- f. Amounts of naturally reproduced (wild) salmon and trout, especially rainbow trout, that are consistent with fishery and watershed plans
 - Contribution of wild vs. stocked salmonines (also, development of cost-effective batch marking/mark reading techniques, refinement of stable isotope techniques)
- g. A diverse prey-fish community with the alewife as an important species

- Determine causal mechanisms of exotic species impacts on lower food webs (*Dreissenids*, *Cercopagis*, *Echinogammarus*, *Neogobius*, etc.)
- Impacts of *Diporeia* and *Mysis* declines on alewife condition/survival, as well as the bioenergetic impacts on predator species?
- What are the food web mechanisms that influence thiaminase and related conditions such as Early Mortality Syndrome?
- Refinement of hydroacoustic preyfish assessment techniques/interpretation

Also:

- Fish health issues – atypical *Furunculosis*, etc.

3. Offshore Benthic Fish Community

The offshore benthic fish community will be composed of self-sustaining native fishes characterized by

- a. Lake trout as the top predator
 - causes for continued lake trout decline and low survival including egg predation (possible link to gobies), contaminants, thiamine deficiency related to prey and thiaminase, dreissenid colonization and other mechanisms reducing success of or act of natural reproduction
 - Food web changes and resulting changes in biomagnification, Poly brominated diethyl ether (PDBE's): impacts on humans, impacts on lake trout reproduction.
- b. A population expansion of lake whitefish from northeastern waters to other areas of the lake
 - Impacts of dreissenid colonization on whitefish bioenergetics
 - Sustainability of lake whitefish in Lake Ontario
 - Stock discrimination
 - Early life history, growth and survival
- c. Rehabilitated native prey fishes
 - Investigations to advance native prey-fish reintroduction initiatives, particularly bloater/deep water ciscoes. Also, investigations into use of historic lake herring spawning sites (Chaumont Bay, Irondequoit Bay, etc.)
 - Feasibility of restoration of extirpated species given recent changes in environment, food web, predator-prey complex, and the predominance of alewife.

Also:

- Impacts of *Cercopagis* blooms on juvenile smelt/other species
- What are the impacts of round goby colonization on slimy sculpin, log perch, others?
- Impacts of dreissenid colonization on other benthic invertebrates/benthic food webs

4. Others:

- Relationship between lipid content vs. wet weight for fish condition analysis
- Coastal GAP Analysis – characterization of coastal segments and fish

communities

- Tributary GAP Analysis – habitat assessment/mapping/GIS layer development; development of correlation models for habitat/fish species
- Substrate characterization of Niagara Bar; significance to fisheries
- Sediment mapping
- Development of offshore bioenergetics model that is holistic with respect to the offshore ecosystem