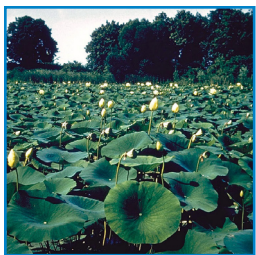




**International Association for
Great Lakes Research**

The Great Lakes—At a Crossroads

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I. The Great Lakes are essential to our economy and quality of life

- The Great Lakes are the economic engine of the region. 40% of the Canadian and 15% of the US Gross Domestic Product originates within the basin.
- The Great Lakes contain 18% of the world's surface freshwater and 95% of North America's surface freshwater.
- 42 million people depend on the Great Lakes for their drinking water.
- 56 billion gallons (210 billion liters) of water are used each day for municipal, agricultural, and industrial uses.



Consider the economic cost of controlling aquatic invasive species like lamprey eel or zebra mussels, or the economic value of sports fishing, boating, and other recreational pursuits on the Great Lakes. Healthy lakes provide clean drinking water, fewer contaminants in fish, and beaches for swimming. Industries and municipalities rely on an abundant supply of clean, fresh water; that's what brought them to the Great Lakes basin in the first place. Clean lakes are far more valuable than polluted lakes, and will be far more effective at attracting new industry, businesses, tourists, and residents to the Great Lakes basin.

II. Ecological Concerns within the Great Lakes Basin

The Outreach Committee of the International Association for Great Lakes Research supports the *Great Lakes Regional Collaboration Strategy to Restore and Protect the Great Lakes* (www.glrc.us) and the *Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem* (www.on.ec.gc.ca/coa) which identify the following priorities and strategies for restoring and protecting the Great Lakes:

Priorities of the Great Lakes Regional Collaboration:

Aquatic Invasive Species
Loss of Habitats & Native Species
Coastal Health
Areas of Concern/Contaminated Sediments
Nonpoint Source Pollution
Toxic Pollutants
Sustainability Indicators & Sound Information Sustainable Development

Priorities of the Canada-Ontario Agreement:

Areas of Concern
Harmful Pollutants
Lake & Basin Sustainability
Coordination of Monitoring, Research & Information

Aquatic Invasive Species

PROBLEM: Aquatic invasive species threaten biodiversity nationwide, especially in the Great Lakes. The primary pathway for these aquatic invaders is ballast associated with maritime commerce. Other important pathways for non-native species include canals, live food fish, aquariums/water gardens, recreational boating and angler (bait bucket) introductions. New invasive species become established somewhere in the Great Lakes at a rate of about 1 every 8 months. More than 180 foreign species of plants and animals now call the Great Lakes their second home. This is creating havoc on the Great Lakes ecosystem. Species, such as the zebra mussel, round goby, spiny water flea, and fanwort, threaten commercial, agricultural, aquacultural, and recreational activity.

Invasive species are an economic drain. Estimates of the economic damage caused nationwide by invasive species are as high as \$137 billion annually. Once an exotic species establishes itself, it is almost impossible to eradicate, extremely difficult to prevent from spreading, and very expensive to control.

SOLUTION: Prevention can be achieved through stricter legislation, education about the consequences of invasive species spread, and research on control technologies and risk assessment of species, sources, and vectors before establishment.



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To learn more:

www.invasivespeciesinfo.gov/aquatics/main.shtml

Lists 12 species of invasive aquatic plants, 16 species of invasive aquatic animals, and web resources to learn about ballast water management and research. Maintained by the U.S. Department of Agriculture

www.iaglr.org/scipolicy/ais

Research and management priorities for Aquatic Invasive Species in the Great Lakes

www.invadingspecies.com/indexen.cfm

Provides species accounts, information on prevention, and links to programs, news archive and other information on invasive species. Maintained by the Ontario Federation of Anglers and Hunters, in partnership with the Ontario Ministry of Natural Resources

www.miseagrant.umich.edu/ais/index.html

Provides information on 16 aquatic invasive plants, animals, and microscopic organisms that have caused serious problems in aquatic ecosystems in the Great Lakes basin

www.protectyourwaters.net

Explains how boaters and anglers can prevent boat and bait introductions

www.habitattitude.net

Explains how pet owners and aquarium owners can prevent invasive introductions from aquaria



Contaminated Sediments

PROBLEM: Contaminated sediments resulting from years of industrial discharges into the Great Lakes represent a significant factor in limiting the ability to achieve a healthy, sustainable environment and economy. There is a clear link between the sediment contamination and the restrictions placed on eating Great Lakes fish, the loss of fish and wildlife habitat, and the degraded natural communities that exist throughout the entire Great Lakes basin. Cleaning up the “toxic hot spots” in the Great Lakes is a serious challenge.

SOLUTION: Research is needed to better understand the relationship between sediment contamination and ecosystem quality and the use of ecologically-based decision-making tools to achieve measurable environmental improvement.

To learn more:

www.great-lakes.net/envt/pollution/consed.html

News about contaminated sediments in the Great Lakes collected by the Great Lakes Information Network

www.iaglr.org/scipolicy/issues/contamseds.php

International Association for Great Lakes Research web site for science and policy information on contaminated sediment in the Great Lakes

www.seagrant.wisc.edu/communications/publications/One-pagers/contamsed.html

Wisconsin Sea Grant online fact sheet on contaminated sediments and the Great Lakes



Loss of Great Lakes Wetlands and Shoreline Habitat

PROBLEM: The shores and wetlands along the Great Lakes are critical to the well-being of the lakes and the life in them. Great Lakes coastal wetlands filter water, provide wildlife a place to live, and help prevent erosion. It is estimated that 80% of all Great Lakes fishes use coastal wetlands for spawning or nursery habitat. Scientists have shown that alteration and/or removal of wetlands harms fish populations. Much of the biological diversity and productivity of the Great Lakes are found in coastal wetlands and shoreline areas. These sites not only play a significant roll in cycling nutrients into the aquatic food web, but also provide critical habitat for the life cycle of fish, bird, mammal, reptile, and invertebrate species. The filling and draining of wetlands, clear cutting of wood lots, and the development of urban areas causes the loss of these marsh and shoreline areas. That decrease in aquatic environments results in the loss of species and community vitality by fragmenting their support system and compressing the remaining natural areas so populations become too small to survive.

SOLUTION: Changes in land-use practices to stop the loss of wetlands and shoreline habitat and education on the critical importance of protection and restoration are needed.

To learn more:

www.epa.gov/owow/wetlands

U.S. Environmental Protection Agency website on general wetland information

www.glahabitat.org

Great Lakes Aquatic Habitat Network & Fund web site

www.on.ec.gc.ca/wildlife/factsheets/fs_coastal_wetlands-e.html

Environment Canada Great Lakes Coastal Wetlands Science and Conservation online fact sheet



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Degraded Water Quality from Various Pollution Sources

PROBLEM: Over 23 billion gallons of raw sewage were dumped into the Great Lakes in 2006, contaminating drinking water, closing beaches, and sending kids to the emergency room. Population expansion is straining the capacity of many sewage systems. Combined sewer systems collect domestic sewage, industrial wastewater, rain, and snowmelt in the same pipe. During periods of heavy rainfall or snowmelt, the volume of water entering the treatment plant exceeds the capacity to be treated and wastewater is discharged directly into nearby streams or lakes.

The top five leading sources of water quality impairment for rivers and streams are agriculture (48%), hydrologic modifications (20%), habitat modification (14%), urban runoff (13%), and forestry (10%), according to the *National Water Quality Inventory: 2000 Report to Congress* (US EPA, 2002). Non-point source (NPS) pollution is the primary reason that approximately 40 percent of surveyed rivers, lakes, and estuaries are not clean enough to meet basic uses such as fishing or swimming.

Atmospheric transport of toxins, such as mercury and PCBs, is the primary means for these chemicals to enter the Great Lakes food web. Toxin-laden emissions from industrial smoke stacks, power plants, and waste incinerators settle onto land and water, where they are taken up by plants and move up the food chain, impairing fish, wildlife, and ultimately threatening public health. They are of particular concern to newborns, children, and women of child-bearing age.

SOLUTION: Funding is needed for communities to upgrade their sewage infrastructure and to separate their storm water collection systems from their wastewater treatment collection pipes. Communities also need to adopt stormwater best management practices, and in some cases, storm water ordinances may be needed. By controlling NPS and maintaining a shoreline buffer of vegetation, we can prevent fertilizers and animal/human wastes from reaching rivers and lakes.

To learn more:

www.iaglr.org

The International Association for Great Lakes Research web site

cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm

Menu of U.S. best management practices for stormwater



III. How IAGLR members can inform public policy and become involved in public education

- Share the results of your research with policy-makers, key Great Lakes stakeholders, and the general public.
- Publish your work in management and popular publications, as well as in scientific journals.
- Participate in public decision-making processes as both an involved citizen and a scientist.
- Advocate for the application of scientific method and accurate science in decision-making processes at all levels.
- Be a clear voice for science – differentiate what science can and cannot bring to public debate.
- Learn more about how to effectively engage in educational outreach.

IV. How policy-makers can help advance Great Lakes science and better use science to inform their decision-making processes

- Seek scientific perspectives on the issues.
- Understand what science can and cannot tell you about an issue.
- Support adequate funding for research that will inform policy and management decisions.
- Support adequate funding for basic research which leads to new advances in understanding.

V. What scientists recommend the public do to protect the Great Lakes

- Inform yourself about the science behind the issues.
- Understand what science can and can't tell you about an issue.
- Share your knowledge of science with your community.
- Invite scientists to attend your local public meetings.
- Include scientific perspectives in public meetings.

The **International Association for Great Lakes Research** is a scientific organization comprised of researchers studying the Laurentian Great Lakes and other large lakes of the world, as well as those with an interest in such research. For more information, visit: www.iaglr.org

