

Welcome Ontario, the Commission's newest Associate Member!
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Predicting potential nonindigenous aquatic plant species problems

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Guest editorial

Protecting the Great Lakes: Shared goals, accountability and strategic direction



By Francis X. Lyons, Regional Administrator, U.S.
Environmental Protection Agency, Region 5

One of the more challenging aspects of cleaning up and protecting the Great Lakes is ensuring that the wide variety of partners—particularly at the federal, state and tribal levels—are working on jointly developed goals and programs and that appropriate accountability exists for our efforts. In addition, there is a strong need to provide an overall strategic direction and focus on the changing Great Lakes system.

I am pleased to report that we have made progress in several of these key areas. First, we have reinstituted the **U.S. Policy Committee**, which had been inactive since the early 1990s. This group includes senior officials from the states, tribes and federal agencies who will oversee strategic directions and accountability for the U.S. Great Lakes program. Their first meeting was in November.

Second, we recently began working with our Great Lakes partners to develop a renewed **Great Lakes Strategy**, which I expect will be released in spring 2000. This will ensure that all partners are working together with common goals, shared responsibility and accountability, and improved tracking of progress.

A third major initiative is **Lakewide Management Plan (LaMP) acceleration**. During this past year, we have worked with our key partners to move the LaMPs from the planning phase to one focused on implementation. LaMPs are the primary means of ensuring that there is a delivery mechanism for environmental progress and results for each lake.

LaMPs take an ecosystem approach and apply it to the environmental challenges facing the Great Lakes. They also serve as a platform for coordinating responses to the many problems that are common to all lake basins. We expect a set of deliverables for each of the lakes by April 2000, which will further help to provide a blueprint for action over the next few years.

In addition to the work being done on four of the Great Lakes, we now have a **Lake Huron Initiative**. This is a strong effort led by the Michigan Department of Environmental Quality, in conjunction with EPA and a variety of other partners, to ensure that Lake Huron and its basin are fully protected. A management plan has been drafted and actions are being formulated. These, too, will be released in April 2000.

We are now standing on the threshold of a new millennium, one that will bring new challenges as well as greater opportunities for the Great Lakes environmental community. We know that the lakes will continue to be impacted by issues such as loss of habitat, urbanization, water quantity problems, ongoing biological changes and global climate change. It will be quite a challenge for all of us to solve existing problems while we grapple with finding answers to the new ones.

Those of us who live or work in the basin want to make sure the Great Lakes keep getting cleaner. We want to know, when we stand back and look at our accomplishments, that the Great Lakes ecosystem is fully protected and that the lakes will be clean and healthy for future generations.

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The Great Lakes Commission is an eight-state compact agency established in 1955

"to promote the orderly, integrated and comprehensive development, use and conservation of the water resources of the Great Lakes basin."

Irene Brooks, Chair; Michael J. Donahue, Ph.D., Executive Director

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Great Lakes Commission

The Great Lakes Commission, an eight-state compact agency founded in state and federal law and dedicated to the use, management and protection of the water resources of the Great Lakes basin, provides leadership in the implementation of principles of sustainable development throughout the basin. In partnership with the Great Lakes states, the Commission addresses issues of resource management, environmental protection, transportation and economic development by serving as an accurate and objective source of information; an effective forum for the development and coordination of public policy; and an active and committed advocate of basin interests.

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Welcome, Ontario, our newest member!

Have you heard the news? A new binational organization has emerged in the Great Lakes basin! It has strong state and provincial support, broad policy research and technical capabilities, and a mandate to serve as the region's advocate for a clean environment and strong economy. And, it promises to usher in a new era in basin governance and intergovernmental cooperation.

No, it's not a new political alliance, nor is it a new foundation or industry-funded association. It's the Great Lakes Commission, but with a twist: We're no longer just an interstate commission. We're a binational commission.

Ontario's Premier, Mike Harris, officially accepted Associate Member status on Nov. 24, joining the eight states and Québec in a "Declaration of Partnership," and transforming the Commission into a binational organization. That acceptance brought closure to a multi-year provincial membership initiative and, in so doing, opened a window of opportunity for the ten basin jurisdictions and their residents. Welcome, Ontario!

As adopted by the Great Lakes states some 45 years ago, the Commission's enabling legislation—the Great Lakes Basin Compact—provided for full provincial membership. The U.S. federal government, reflecting the tenor of the times, took exception to the notion of direct state involvement in international affairs. Congress ultimately consented to the compact, but not before deleting the provincial membership provision.

We've been fighting our way "back to the future" ever since. A decade ago our member states established an Observer Program to enhance provincial access to, and involvement in, Commission operations. Associate Member status takes it one step further, ensuring Ontario and Québec involvement in literally every Commission function short of voting privileges. Full member status is the next step and will finally allow us to realize the intentions of our founding fathers. Wouldn't that be an excellent goal to work toward as we approach our 50th anniversary?

In the interim, however, I hope all Commission members, Observers and other collaborators will join me as we shape the "new and improved" Great Lakes Commission. Let's take advantage of our new-found binational status to:

- promote basinwide consistency in policies and programs
 - enhance our effectiveness as a regional advocate in Washington D.C., Ottawa and every state and provincial capital
 - develop new binational initiatives that focus on hydrologic rather than geo-political boundaries
 - support, assist and influence the two federal governments—and other binational institutions—by providing convenient access to individual and collective state and provincial viewpoints on priority issues.
- The opportunities are virtually limitless. Our new state/provincial partnership is unique to North America and can play a pivotal role in both current and emerging issues.

Think of the "hot button" issues of the day, such as water diversion, consumptive use and export; lake levels management; aquatic nuisance species; Great Lakes Water Quality Agreement implementation; airborne deposition of toxic contaminants; land use management; navigation infrastructure; and transportation system marketing and promotion, to name just a few. States and provinces have a vital role to play in all these areas, and state/provincial coordination and collaboration will be vital to success.

The Great Lakes-St. Lawrence system is a world-class resource and its use, management and protection demand a world-class institution. The *binational* Great Lakes Commission is up to the task and welcomes the challenges and opportunities the new millennium has in store.

Note: The March/April 2000 issue of the ADVISOR will feature a special insert introducing our Associate Members. Ontario and Québec will be highlighted, with a focus on their land and water resources, people, economy, and government. Their Commission delegates will be profiled, and the signed Declaration of Partnership will be reproduced.

Commission News and Views

By Michael J. Donahue, Ph.D.
Executive Director

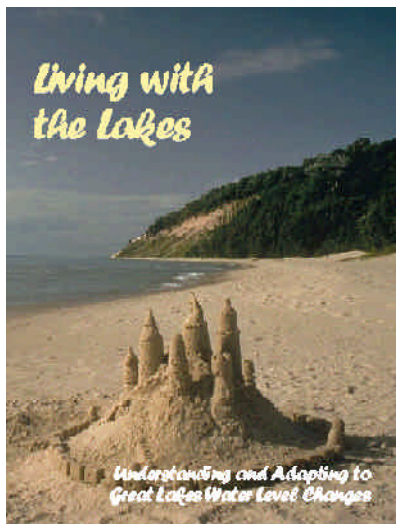


***Living with the Lakes:* New publication offers advice on Great Lakes water levels and shoreline protection**

Great Lakes boaters and shoreline property owners have seen dramatic lake level fluctuations in recent years. What causes these changes? Can anyone predict when the current low levels will rise? Can lake levels be controlled? How can shoreline property be protected? Dozens of experts in hydrology, lake level modeling, coastal management, engineering and resource policy answer these and other questions in *Living with the Lakes*, a joint product of the U.S. Army Corps of Engineers and Great Lakes Commission.

This definitive yet easy-to-read guide offers a broad overview of how water levels on the Great Lakes change and how these changes affect riparian property owners, recreational boaters and others who live or play along the shores of the Great Lakes.

Living with the Lakes covers the glacial history of the Great Lakes-St. Lawrence River system; natural factors affecting the lakes, including the hydrologic cycle and weather patterns; how water levels are regulated, measured and forecasted; effects of fluctuations; and structural and nonstructural options for shoreline protection. Also included are comprehensive maps; points of contact; and recommendations on web sites, videos and other helpful guides.



The publication will be widely distributed to planners, government officials and the general public throughout the Great Lakes basin.

The online PDF version of the publication (see <http://www.glc.org/docs/lakelevels/lakelevels.html>) features interactive links to web sites of interest and additional resources.

To order a hard copy, visit <http://www.glc.org/docs/lakelevels/levelForm.html> or send \$3 per copy (to cover shipping and handling) to Great Lakes Commission, Argus II Building, 400 Fourth St., Ann Arbor, MI 48103-4816. There is a 10 percent discount on quantities of 10 or more.

Lake St. Clair: Its current state and future prospects

More than 230 researchers, agency staff, elected officials and other stakeholders from the United States and Canada convened Nov. 30-Dec. 1 in Port Huron, Mich., to assess the status of Lake St. Clair and identify opportunities to address environmental problems in the lake and its watershed. The conference was coordinated by the

Great Lakes Commission and sponsored by the U.S. EPA, Great Lakes National Program Office in conjunction with numerous partner agencies and organizations. Rep. David Bonior (D-Mich.) keynoted the event, which featured more than 40 speakers. See additional conference coverage in future issues. Contact: Matt Doss, mdoss@glc.org.

Great Lakes subject of great big film

Finally, a film big enough to present the magnitude of the Great Lakes! eLF Pictures, a company that creates large-scale science and natural history films for museums and amusement park theaters, is developing a film about the Great Lakes basin. The film targets students, tourists and hundreds of large-format institutionally based theaters around the globe. The Great Lakes region, alone, has nearly 40 large-format theaters. The 40-minute film will be supplemented with educational materials, including the latest in electronic learning.

The film is funded through government, regional and private foundations, corporate sponsorship, private investors, and regional large-format theaters. The Great Lakes Commission is serving as a partner in the initiative and will provide technical support and assistance to eLF Pictures. Contacts: Kay Voyvodich, eLF Pictures, 415-668-0879; or Mike Donahue, mdonahue@glc.org.



Join Commission Chair Irene Brooks at these upcoming events!

Great Lakes Commission Semiannual Meeting

May 10-12, 2000 • Duluth, MN
Contact: Mike Donahue,
mdonahue@glc.org.

Great Lakes Day in Washington

March 15, 2000
Featuring the Great Lakes Congressional Breakfast and Issues Briefing. Contact: Steve Thorp,
sthorp@glc.org.

Visit <http://www.glc.org/basin/grants.html>

Innovative soil erosion and sedimentation projects online

Looking for new ideas to reduce soil erosion and sedimentation and improve water quality in local watersheds? The Great Lakes Commission's web site now presents summaries of innovative projects funded through the Great Lakes Basin Program for Soil Erosion and Sediment Control (see <http://www.glc.org/basin/grants.html>). Projects include unique demonstration, technical assistance, and information and education efforts that address urban, agricultural, streambank, shoreline, forest or roadside erosion problems. The site serves as a resource on the latest erosion control innovations for organizations working to reduce soil erosion and sedimentation. It also provides exposure for new

erosion control techniques, thereby increasing their application throughout the Great Lakes region and beyond.

The new site includes several features that make it easy to use, including clickable maps illustrating project locations and statewide project tables to assist with locating relevant projects.

To date, project pages have been completed for Illinois, Indiana, Ohio, Pennsylvania and Wisconsin. Projects in Michigan, Minnesota and New York will be added by summer 2000. Future enhancements will include search and sort functions, which will allow users to quickly find projects closest to their interests.

The Great Lakes Basin Program for Soil Erosion and Sediment Control is

funded through the U. S. Department of Agriculture's Natural Resources Conservation Service. The program provides funding for creative erosion and sedimentation control projects throughout the basin through an annual competitive grant process. Since 1991, nearly \$4.3 million in Basin Program funds have been allocated to 140 projects. Contact: Ric Lawson, rlawson@glc.org.

The Basin Program's Request for Proposals is available online at <http://www.glc.org/basin/rfplet00.html> or call the Great Lakes Commission at 734-665-9135. Proposals must be received by Jan. 19, 2000.

Marine sanitation devices workshop: Function, use and enforcement

All commercial cargo vessels plying the Great Lakes are required to have government-approved marine sanitation devices (MSDs) in good working order. However, there has been public speculation about a possible link between malfunctioning MSDs and beach closures resulting from bacterial contamination. The Great Lakes Commission recently convened a regional workshop on the use of MSDs on the Great Lakes, which addressed this and other MSD issues. The workshop, requested by the Commission's Indiana Delegation, was held at the Hammond Marina on Indiana's Lake Michigan shore.

One of several outcomes of the workshop was acknowledgment that there is no firm evidence linking commercial vessel MSDs and recent southern Lake Michigan beach contamination episodes. Scientists and public health officials recognize that combined sewer (storm and sanitary) overflows resulting from localized heavy rains contribute large pollutant loads to nearshore waters. Also, there is growing awareness that other bacterial sources, such as deer and goose droppings, residual bacteria in beach

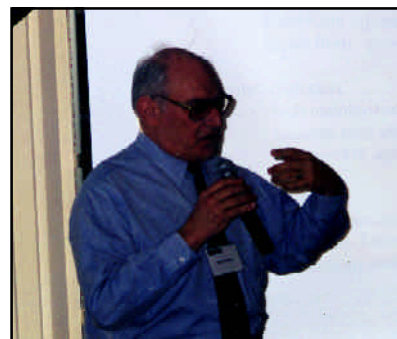
sands and inadequate septic sewage systems, may be contributing to fluctuating fecal coliform and *E. coli* levels.

Commercial navigation representatives announced a new voluntary program at the workshop whereby operators will perform and record weekly chemical and other tests, as well as provide samples of effluent twice a year for independent laboratory evaluation. This initiative is similar to an effort undertaken at the Port of Duluth-Superior in 1995-96 but is more comprehensive, encompassing all parts of the Great Lakes and including both overseas freighters and domestic lakers.

Larry Macklin, director of the Indiana Department of Natural Resources and chair of the Commission's Indiana Delegation, provided keynote remarks along with Dan Injerd, an Alternate Commissioner for Illinois. In discussing the MSD issue, Macklin said, "We heartily recognize that the commercial shipping industry is of vital interest to the Great Lakes states and Canadian provinces. On the other hand, the day is past where we trade off the environment for commerce. But neither should we pass onerous regula-

tions that do not offer significant, genuine environmental dividends."

The goals of the workshop were to provide information on MSD function, use and enforcement and to identify information and research needs regarding the commercial and recreational navigation sectors' handling of onboard sanitary waste and disposition. At the workshop, environmental and navigation interests also recognized the need to increase cooperation and communication on the MSD issue. The Commission will prepare a workshop summary that will be available in early 2000. Contact: Steve Thorp, sthorp@glc.org.



Alan Fleischer, president of Fast Systems, Smith and Loveless, Inc. (a leading MSD manufacturer) speaks at the workshop.

U.S. EPA learns about nonindigenous invasive species problems and potential solutions

A special workshop on nonindigenous invasive species (NIS) in the Great Lakes basin was conducted in Chicago, Ill., in October by the U.S. EPA, Great Lakes National Program Office with the support of the Great Lakes Commission. The workshop is one in a series that U.S. EPA is holding around the nation to raise awareness of regional NIS issues, including both aquatic and terrestrial species. Although challenging, handling aquatic and terrestrial NIS together as a single issue is considered critical to formulating an ecosystem approach to solving NIS problems, as

well as to winning political support needed to implement solutions.

To provide a platform for discussion, Great Lakes Commission staff prepared a briefing paper for participants prior to the workshop. The paper and subsequent workshop dialogue addressed why NIS are a significant problem and the future direction that prevention, control, detection and monitoring, and education and outreach efforts should take.

Preliminary recommendations from the Great Lakes workshop include stronger coordination among and within agencies and organizations about

NIS issues, prioritizing species to control and habitats to protect, better use of volunteers in monitoring programs, documenting the economic impacts of NIS and the benefits of taking action, and greater emphasis on NIS prevention. Recommendations from the workshop will be presented in a final report to U.S. EPA headquarters, along with findings from the other regional workshops held on the issue. Contact: Kathe Glassner-Shwayder, shwayder@glc.org.



Commission Executive Director Mike Donahue was a keynote speaker during a showing of "EXPEDITION: Great Lakes-The Power of Water" at the Dennon Museum Center in Traverse City, Mich. The traveling art exhibit was at the museum from September to November. Photo credits: Christine Manninen.



RAP Summit II addresses funding challenges

Funding challenges and opportunities was the theme of *RAP Summit II: Moving Toward Restoration and Delisting*, sponsored by the Michigan Statewide Public Advisory Council (SPAC) on Nov. 12-13 in Lansing, Mich. The second annual RAP (Remedial Action Plan) Summit brought together local leaders and state and federal agency staff for two days of intense discussions on maintaining progress in restoring environmental quality in Michigan's 14 Areas of Concern and, ultimately, delisting them. State Rep. William Callahan, a member of Michigan's delegation to the Great Lakes Commission, provided the keynote address, discussing the history of RAPs and the need for continued emphasis on Great Lakes water quality issues.

Participants focused on the Clean Michigan Initiative (CMI), a \$675 million environmental bond program approved by Michigan voters in 1998. Agency staff responsible for administering the CMI reviewed funding opportunities for RAP activities and responded to proposed projects. Funding opportunities from other sources were highlighted, as well.

U.S. EPA staff, including members of the agency's regional teams for lakes Michigan, Superior and Erie; SPAC members; and local stakeholders explored opportunities to better coordinate the RAPs with Lakewide Management Plans (LaMPs).

Jo Lynn Traub, director of U.S. EPA's Water Division, reviewed severe funding cuts facing the agency's RAP

and LaMP programs. All participants agreed on the need to explore creative solutions to maintaining support for critical RAP and LaMP efforts. The SPAC will convene meetings of agency and nongovernmental funders to identify alternative approaches to funding these programs. In addition, the SPAC will communicate funding needs to state and federal elected officials and coordinate with Great Lakes Commission advocacy efforts to bolster resources available under U.S. EPA's Coastal Environmental Management Program.

The RAP Summit was coordinated by the SPAC's support staff at the Great Lakes Commission with funding from U.S. EPA. Contact: Matt Doss, mdoss@glc.org.

Baltic Fellowship Exchange Program: Be a host organization!

The Baltic Fellowship Exchange Program enables scientists from Latvia, Lithuania, Estonia, Poland or Russia to conduct research in the Great Lakes region with a host organization. The program, coordinated by the Great Lakes Commission in partnership with U.S. EPA, promotes environmental solutions for the Great Lakes and the Baltic Sea. If your organization is interested in hosting a Baltic fellow, contact Julie Wagemakers, juliew@glc.org.

Two fellows have been placed thus far. Henn Ojaveer of the Estonian Marine Institute is working with the U.S. EPA, Great Lakes National Program Office on the fishhook flea (*Cercopagis pengoi*), an invasive species problem shared by the Great Lakes and Baltic Sea (see page 9 for more on *Cercopagis*). Ojaveer is studying the spatial distribution pattern

of this exotic species in Lake Ontario by estimating its abundance and biomass values.

"I've been doing work similar to what I did at the Estonian Marine Institute, but a number of different opportunities here have allowed me to add significant scientific evidence to the current understanding of the invasion of *Cercopagis*," says Ojaveer. "This visit has been very important for my scientific career and future academic work. I hope this cooperation will continue."

The second fellow, Jevgenijs Cernihovics, is from the Laboratory of Ecology at Daugavpils Pedagogical University in Latvia. His work at Environment Canada and the U.S. EPA, Great Lakes National Program Office will follow up environmental indicator work related to the State of the Lakes

Ecosystem Conference (SOLEC). He is specifically interested in identifying sets of water quality indicators that can be used to compare North American approaches to environmental quality management with those of the Baltic Sea basin.

Updates on the fellows' research will be posted and applications for Baltic fellowships for FY2000 are now online at <http://www.epa.gov/glnpo/baltic/>. Opportunities vary, depending on current research interests and needs of host organizations. Generally, fellowships will be available to support technical and policy research on toxic substances; integrated watershed or lake management; modeling, monitoring and surveillance; exotic species; and eutrophication.

In other news...

GLIN featured at international web symposium

In conjunction with the annual meeting of the American Water Resources Association (Dec. 5-9 in Seattle), a unique symposium demonstrated how the World Wide Web is revolutionizing the way we obtain and exchange water information. Christine Manninen, Commission Project Manager, served on the symposium's technical committee for the last year and presented a paper titled "The Great Lakes Information Network: Trials and Triumphs of an Integrated Approach to Web Design." Manninen also moderated sessions highlighting educational and regional water web sites. Fittingly, this is AWRA's first effort to produce an all-electronic proceedings. This "snapshot" of state-of-the-art web applications will be published on CD and the AWRA web site: <http://www.awra.org>. Contact: Christine Manninen, manninen@glc.org.

Area contingency planning

Commission staff recently distributed draft review maps of environmentally and economically sensitive areas of the northern third of Michigan's Lower Peninsula and the entire Upper Peninsula. Draft maps of other areas, including western Lake Superior, northwest Indiana, and western and southeast Michigan, will be distributed soon. Maps of the central basin of Lake Erie and the middle Ohio River will be final in December. In conjunction with the mapping effort, Commission staff have been assisting U.S. EPA, the U.S. Coast Guard and Environment Canada on the Canada/U.S. Joint Inland Contingency Plan, the Southeast Michigan Area Contingency Plan and the Western Michigan Area Contingency Plan. Commission staff will present these products at the No Spills Conference in Acme, Mich., in February and the Freshwater Spills Symposium in Albuquerque, N.M., in March. Contact: Tom Rayburn, tray@glc.org.

Lake Michigan: State of the Lake '99

This conference, held Nov. 8-9 in Muskegon, Mich., provided an opportunity for the scientific community, government agencies, and the general public to discuss issues affecting Lake Michigan. The goal of the conference, convened by the Robert B. Annis Water Resources Institute at Grand Valley State University, was to increase awareness and understanding of Lake Michigan issues and management. Commission Project Manager Matt Doss spoke on efforts underway to assess and coordinate monitoring efforts in the Lake Michigan basin. The conference helped set the stage for release of the Lake Michigan Lakewide Management Plan in April 2000. Contact: Janet Vail, vailj@gvsu.edu.

Great Lakes water export issues gain national, international attention

On Nov. 22 the Canadian federal government announced it would ban the bulk removal of water from its boundary waters, including the Great Lakes, by amending the International Boundary Waters Treaty Act. Environment Minister David Anderson and Foreign Affairs Minister Lloyd Axworthy say the government is moving to protect Canada's freshwater from prospective exploitation by U.S. and Canadian companies.

"These amendments represent an important step toward the protection of Canada's freshwater resources," says Anderson. "We know that single and cumulative bulk removals of freshwater can have serious impacts on the environmental, social and economic health of communities and ecosystems that depend on these watersheds."

In early December, however, at a meeting of the Canadian Council of Ministers of the Environment, five provinces (British Columbia, Alberta, Saskatchewan, Manitoba and Québec) declined to support a Canada-wide accord proposed by the federal government. While the ministers didn't object to the notion of prohibiting bulk export, newspaper reports cite federal/provincial relations and associated political issues as reasons for declining to support the federal initiative.

Despite concerns that water exports could trigger a challenge under the North American Free Trade Agreement (NAFTA), the Canadian government says that prohibiting bulk water removal is consistent with Canada's international trade obligations, because water is regulated in its natural state, before it

has become a commercial good or a salable commodity.

In the United States, the Clinton Administration recently declined to seek legal assurance from the World Trade Organization (WTO) that international trade rules would not compromise future efforts to ban bulk sales of Great Lakes water. The request

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Photo credit: Christine Manninen

Is there a mass extinction in our midst?

For many, the word "extinction" conjures images of furry mammals, rainforest insects, frail orchids and ferocious dinosaurs. Few of us, however, picture fish, mollusks, crayfish and amphibians at the word's mention. A study published in the journal *Conservation Biology* this October may begin to change that.

Using an exponential decay model, Anthony Ricciardi, of Dalhousie University in Halifax, and Joseph B. Rasmussen, of McGill University in Montreal, calculated that recent and future extinction rates for North American freshwater fauna are five times higher than those for terrestrial fauna and three times higher than those for coastal marine mammals. This places freshwater fauna extinction rates within the range of those in tropical rainforest communities, previously thought to be being depleted faster than any other biome.

The Ricciardi and Rasmussen model calculates recent extinction rates based on the number of extinctions recorded for at least the last century (123

freshwater faunal species). It projects future rates by assuming that all species currently endangered or threatened will go extinct within the next century. Currently, endangered and threatened species account for 48.5 percent of all North American freshwater mussels, 22.8 percent of freshwater gastropods, 32.7 percent of crayfish, 25.9 percent of amphibians and 21.3 percent of freshwater fish species.

The model predicts that nearly four percent of all freshwater fauna will become extinct in North America each decade in the absence of effective conservation measures. Ricciardi and Rasmussen attribute this tremendous loss of biodiversity to extensive habitat deterioration caused by the widespread human modification of lakes and rivers. Modifications have included sediment loading and organic pollution from land-use activities, toxic contaminants from municipal and industrial sources, stream fragmentation and flow regulation by dams, channelization and dredging projects, and the invasion of exotic species. The authors suspect that

freshwater fauna are disproportionately imperiled on other continents, as well, given that human activities have heavily impacted freshwater bodies worldwide.

Recent Great Lakes extinctions have included the blue pike (*Stizostedion vitreum glacum*), formerly found in lakes Erie and Ontario, and the shortnose cisco (*Coregonus reighardi*), formerly found in lakes Huron, Michigan and Erie. The blue pike was declared extinct in 1983, and the shortnose cisco was last seen in 1985.

"In the Great Lakes basin, freshwater mussels, and perhaps aquatic invertebrates, in general, are the group of species most at risk," say Kim Mitchell and Ron Refsnider, endangered species experts in the USFWS Great Lakes-Big Rivers Region 3. "We don't know enough about the status and trends of most invertebrates, particularly aquatic invertebrates, but in the future there are likely to be a number of aquatic invertebrates considered for listing as we learn more about these species." Contact: Anthony Ricciardi, ricciard@is.dal.ca.

Trout restoration focus of collaborative efforts in lakes Superior, Michigan

Two collaborative efforts are underway to restore trout populations in the Great Lakes.

In the Lake Superior basin, Trout Unlimited, Trout Unlimited Canada and Great Lakes United have joined forces to restore coaster brook trout. Their support comes in response to a brook trout rehabilitation plan recently approved for Lake Superior by the Great Lakes Fishery Commission.

Coaster brook trout have a unique life history, spending only part of their lives in the Great Lakes and preferring nearshore lake habitat (hence the name "coaster"). The species once provided a productive fishery along shoreline areas and in tributary streams that supported spawning populations. Only three viable U.S. populations are known to exist, while the Canadian side of the lake supports slightly more.

"The coaster brook trout is a unique and valuable component of the natural

biodiversity of Lake Superior," says Margaret Wooster, executive director of Great Lakes United. "As long as a few populations still persist, we have an obligation to make a full effort to bring them back."

The state of Michigan has announced a plan to reintroduce the fish in its Upper Peninsula with the help of Trout Unlimited members. The U.S. Fish and Wildlife Service (USFWS) will cooperate in the effort.

In Lake Michigan, a study is underway to determine the success of stocking lake trout directly over traditional spawning reefs. The USFWS will survey 31 lake trout spawning reefs across northern Michigan, assisted by fishery staff from the Sault Ste. Marie Tribe of Chippewa, Little Traverse Bay Band of Odawa, Grand Traverse bands of Ottawa and Chippewa, Little River Band of Ottawa, USGS-Great Lakes Science Center and

the Michigan Department of Natural Resources. Sampling will occur on reefs from Ludington, Mich., to Algoma, Wis., each fall for the next three years. Stocking over traditional spawning reefs has taken place since 1985, but funds to evaluate this method were unavailable until now.

"This project will not only teach us a great deal about the ability of stocked fish to repopulate a reef area, but how to improve lake trout stocking methods in general," says Mark Holey, fishery biologist and project leader at the USFWS Fishery Resources office in Green Bay, Wis.

An average of two million lake trout are stocked in Lake Michigan annually by the USFWS. Contacts: Maggie Lockwood (coaster brook trout), 703-522-0200; and Mark Holey (lake trout), 920-465-7435.

Public comments welcome: GLWQA review

Annex X of the Great Lakes Water Quality Agreement requires the governments of Canada and the United States to conduct a review of its operation and effectiveness every six years.

A comprehensive review of the agreement is now underway and will determine if changes will improve the agreement's operation and effectiveness. For example, several annexes may require revision in order to make them more relevant to current programs and/or to the current state of scientific knowledge. Presently, the agreement review process is focusing primarily on the following annexes: 1. Specific Objectives, 2. Remedial Action Plans and Lakewide Management Plans, 3. Control of Phosphorus, 7. Dredging, 11. Surveillance and Monitoring, 12. Persistent Toxic Substances and 14. Contaminated Sediments.

A 60-day review period for public comment will begin in early 2000. A paper outlining options for each annex under review will be available in January at <http://www.cciw.ca/glimr/> and <http://www.epa.gov/glnpo/>.

Hard copies can be obtained by contacting the following:

Karl Schaefer
Great Lakes Corporate Affairs Office
Environment Canada - Ontario Region
867 Lakeshore Road, P.O. Box 5050
Burlington, ON L7R 4A6
Attention: Review of GLWQA
Fax: 905-336-8901
E-mail: glwqareview@ec.gc.ca

James Schardt
Great Lakes National Program Office
U.S. EPA
77 West Jackson Boulevard (G-17J)
Chicago, IL 60604
Attention: Review of GLWQA
Fax: 312-353-2018
E-mail: schardt.james@epa.gov

Water export

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came from congressional leaders of the Great Lakes Task Force. The WTO has never addressed international water export issues and, according to Deputy U.S. Trade Representative Richard Fisher, "Doing so would risk creating an international issue where none currently exists."

In the Great Lakes region, the International Joint Commission and its International Study Team are working toward a February 2000 final report on the topic. The Great Lakes governors and premiers have agreed to work on a standard, agreement and information system to enhance the region's water management capabilities. In a statement released Oct. 15, the Council of Great Lakes Governors affirms, "We, the Great Lakes Governors, have the authority and we will exercise it appropriately to address any attempts to export bulk quantities of Great Lakes waters." Contact: Mike Donahue, mdonahue@glc.org.

New biological invasion hits Lake Michigan

Cercopagis pengoi (fishhook flea) is one of Lake Michigan's newest biological invaders. First reported in Lake Ontario in August 1998 by Canadian scientists, the species was discovered in Lake Michigan early this fall by Tom Kelly of the Inland Seas Education Association. *Cercopagis* is related to *Bythotrephes cederstroemi* (spiny water flea), an exotic crustacean discovered in the Great Lakes in 1982.

Cercopagis, a zooplankton approximately one centimeter in size, is native to the Caspian, Azov and Aral seas. It was discovered in the Baltic Sea in 1992, and researchers suspect it was transported from Baltic ports to North America in the ballast water of ocean-going vessels.

Scientists are concerned that the tremendous reproductive potential of *Cercopagis* may generate high densities of the species throughout the Great Lakes. It can reproduce sexually or asexually, producing up to 13 offspring at a time and creating as much as one generation per week. The species also can produce resting eggs, which remain viable through harsh conditions, including winter.

Although it's too early to know what ecological impacts high densities of *Cercopagis* would have on the Great Lakes ecosystem, scientists do have some predictions.

"The fact that *Cercopagis* feeds on other zooplankton and is not easily consumed by [small] fish could have detrimental impacts on all levels of the food web," says Patrice Charlebois, biological resources specialist for Illinois-Indiana Sea Grant. Zooplankton is a primary food source for juvenile and small fish populations, and *Cercopagis*' long, barbed tail—comprising nearly 80 percent of its body length—makes it too large for these fish to eat. "The food web has already been compromised by other exotics such as the spiny water flea and the zebra mussel," Charlebois adds.

According to Dr. Hugh MacIssac of the University of Windsor, "The introduction of *Cercopagis* and *Bythotrephes* has added another trophic level to the food chain, which may result in increased biomagnification of hazardous compounds in Great Lakes fish." Currently, there is a study underway comparing mercury concen-

trations in alewives before and after the water flea introductions in Lake Ontario.

Cercopagis also may have serious economic impacts, particularly for the fishing industry. Its long tail can become entangled in fishing lines and nets in clumps of hundreds of individuals. There have already been reports of anglers cutting their fishing lines, unable to reel them in due to *Cercopagis*. Contact: Debra Levey Larson, Illinois-Indiana Sea Grant, dlarson@uiuc.edu, 217-333-8055.



Cercopagis pengoi sexual female with resting egg. Photo credit: Igor Grigorovich, courtesy of Hugh MacIsaac, Great Lakes Institute for Environmental Research, University of Windsor.

Zebra mussels cycling Great Lakes contaminants

Zebra mussels are contributing to the cycling of PCBs through the Great Lakes food chain, according to research by Dr. Susan Fisher and Dr. Paul Baumann of The Ohio State University. PCBs (polychlorinated biphenyls) are insoluble organic chemicals used in some industrial products prior to being banned in 1979. The chemicals are known to persist in animal tissue and the environment for years and to cause cancer and birth defects in humans.

Ninety-seven percent of PCBs released are estimated to be retained in sediment, including that at the bottom of the Great Lakes. Originally, it was believed PCBs were relatively safe there, locked within the sediment. However, recent studies have found

zebra mussels with significant levels of PCBs in their tissue.

Because they persist in animal tissue, PCBs biomagnify (increase) at each trophic level. Therefore, the contamination of zebra mussels, near the bottom of the food chain, could have dire consequences for the rest of Great Lakes fauna, including humans.

Ohio Sea Grant research conducted by Fisher and Baumann quantifies biomagnification of PCBs at three trophic levels, an important step in assessing the risk of fish consumption for humans. Through laboratory and field work, Fisher found that zebra mussels' PCB concentrations were approximately 100 parts per billion (ppb) after eating contaminated

sediment and algae. According to Fisher, "Round gobies provide an interesting link within the food chain because they are one of the few species that feeds on zebra mussels." She found PCB concentrations in this species ranged from 200 to 800 ppb, while smallmouth bass (a predator of round gobies) had concentrations up to 1,800 ppb. Concentrations this high have raised public health concerns. Fisher plans to test additional trophic levels later this year. Contact: Dr. Susan Fisher, fisher.14@osu.edu, 614-292-2133.

Editor's note: This article is based on "Zebra Mussels: Key to Contaminant Cycling," which appeared in Ohio Sea Grants' Twine Line newsletter, Vol. 21 No. 4.

Around the Lakes

This information is excerpted from a December 1999 report by the Northeast-Midwest House and Senate Coalition Great Lakes Task Force. The table addresses selected aspects of the Great Lakes Commission's federal legislative and appropriations priorities statement released in May. The appropriations listed are subject to rescission. Contact: Rochelle Sturtevant, 202-224-1211, rochelle_sturtevant@levin.senate.gov.

Congressional action on selected Great Lakes programs (As of December 1999) <i>Funding in millions of dollars</i>	Great Lakes Commission request	FY2000 House	FY2000 Senate	Omnibus Conference
Agriculture				
Great Lakes Basin Program for Soil Erosion and Sediment Control	0.75	0.6	0.5	0.5
Commerce, Justice and State				
National Sea Grant College Program	65.8	58.5 including 3 ANS	60.5 including 3 ANS	59.25 including 3 ANS
Great Lakes Environmental Research Laboratory (NOAA)	7.5	6.825 OAR ¹	6.825 NOS	6.825 OAR
NOAA/NOS Great Lakes Water Level Gauges		0.39 ²	0.39 ²	0.39
Great Lakes Fishery Commission	9.353	8.353	9.353 ³	9.353 ⁴
International Joint Commission	4.5	3.432	3.432	3.432
Energy and Water				
Water Resources Development Act (WRDA)				
Environmental Dredging (Sec. 312)	20	Ashtabula River 0.6, Indiana Harbor 0.1, Muskegon Lake 0.1, White Lake 0.1, Detroit River 0.1	Ashtabula River 0.6, Detroit River 0.1	Ashtabula River 0.6, Indiana Harbor 0.1, Muskegon Lake 0.1, White Lake 0.1, Detroit River 0.1
Restoration of Environmental Quality (Sec. 1135)	20	8.5	10 including sea lamprey 0.2 ⁵	10 including sea lamprey 0.2
Beneficial Uses of Dredged Material (Sec. 204)	5	0.35 ⁶	1	1
Sediment Transport Models and Sediment Management Planning (Sec. 516)	1	0	0	0
RAP Assistance (Sec. 401)	1.5	0.5	0	0.5
Improvement of Soo Lock	Necessary construction funds	0	0.4	0.2
Dispersal Barrier Demonstration (NISA, Sec. 1202)	0.6	0.3	0.1	0.3
Interior				
National Invasive Species Act				
Aquatic Nuisance Species Program (F&WS)	4.7	4.192 ⁷	3.2	4.692 ⁸
Great Lakes Science Center (USGS/BRD)	6.8	6.575	6.575 + 0.5 for vessel retrofit ⁹	6.575 + 0.5 for vessel retrofit
Transportation				
Icebreaker <i>Mackinaw</i>	Continued operation	Continued operation + 13 ¹⁰	Continued operation + 3	Continued operation + 13
Ballast Water Guidelines and Prevention Program (NISA) <i>Includes Ballast Discharge Study and Information Clearinghouse</i>	4	4 ¹¹	3 + 1.5 R&D ¹²	3.5 + 0.5 R&D ¹³

1 "The Committee has continued funding for GLERL within OAR, given the other Great Lakes-related programs contained in this line office. Should NOAA propose to consolidate all related programs into one line office, the Committee would be willing to consider such a transfer in accordance with the direction included under the National Ocean Service."

2 Senate: DeWine-Levin amendment provides for upgrade of the 13 stations slated for closure. House: Ehlers amendment provides same.

3 The Committee recommends \$9.353 for the Great Lakes Fishery Commission "including \$8,724,000 for the sea lamprey operations and research program, of which not less than \$200,000 shall be used to treat Lake Champlain. The GLFC is directed to give priority to states that have provided matching grants when distributing lampricide funds."

4 "The conference agreement adopts...language in the Senate report on funding for the Great Lakes Fishery Commission (GLFC), including sea lamprey operations and research, costs of treating Lake Champlain, and priority to states providing matching funds."

5 "The recommendation includes \$200,000 for planning and design upon successful completion and approval of the Preliminary Restoration Plan for the Great Lakes, Sea Lamprey Control program, and the submission of a formal study request by the Great Lakes Fishery Commission."

6 The Committee directs the Corps to "emphasize projects that use dredged material to recreate habitat, such as those in Duluth Harbor, MN and Cat Island Chain, WI."

7 The Committee provided \$1 million less than the President's request for the overall Fisheries/Fish and Wildlife Management account, with an earmark of \$500,000 for fish passage (not included in the President's budget). The Committee did not specify which programs should bear the cut, leaving that decision to the discretion of the agency. Numbers included here reflect discussion with senior FWS employees.

8 May be subject to the 0.38% general reduction.

9 "The Committee understands an additional \$500,000 will be required to complete the

retrofit, an amount that the Center is encouraged to seek from some of the many beneficiaries of the research vessel's lab work.

10 Section 345 specifies that \$10 million of this funding is to support a portion of the acquisition cost, and is available until September 30, 2005.

11 "Of the funds provided, \$4 million is only to continue and broaden the national ballast water management program. The current program allows Coast Guard boarding officers to monitor industry compliance with voluntary guidelines regarding the management of ballast water. The inadequate attention to proper ballast handling procedures leads to the propagation of invasive aquatic species."

12 "Within the amount provided for marine environmental protection, the Committee has included not less than \$1,500,000 to continue the development and testing of methods to verify the occurrence of ship ballast exchange to ensure that alien aquatic species are not introduced into American waterways."

13 "Conferees agree...\$500,000 is to address ship ballast water exchange issues..."

Great Lakes environmental writers and their homes

by Steve Thorp, Great Lakes Commission

The Great Lakes region has been home to many famous people, including authors. This article presents four who have made significant contributions to conservation and environmental protection and the places that inspired them.

Gene Stratton-Porter (1863-1924)

As a child, Gene Stratton-Porter's solitary habits were focused on nature study. She loved to observe birds and all manner of living things. This passion and a desire to support herself led to a career writing articles, which she illustrated with her own photographs. Her fiction, an immediate hit with national magazines, evolved into popular novels and poetry. Many of the books were based on nature themes and strong characters, such as in *The Girl of the Limberlost*. She became Indiana's most popular writer with a claimed 50 million readers, and eight of her books were made into movies. Her influence caused Americans to rethink the country's headlong rush into resource depletion and led the way for national conservation initiatives. In 1912, she purchased land on Sylvan Lake in northeast Indiana to build a second log home. This place, "Wildflower Woods," became an outdoor laboratory where she created research gardens and a wildlife refuge.



Gene Stratton-Porter's home on Sylvan Lake. Photo credit: Steve Thorp.

Aldo Leopold (1887-1948)

Aldo Leopold grew up in a handsome home overlooking the Mississippi River and was always in touch with his natural surroundings. Whether playing on the bluffs, hunting with his father or inventing a wooded domain as a young forester from Yale, Leopold took serious note of landscapes and their natural features. As a professor of game management at the University of Wisconsin, he pioneered many basic principles of ecosystem management, specializing in predator-prey relationships. It was a volatile field, requiring careful balance among the politics of hunting, goals of

wilderness protection and wise use of natural resources. Leopold relaxed at a rural acreage about an hour's drive north of Madison. Here the activities of family life included efforts to restore vegetative health to the former farm. "The Shack," once a chicken coop, provided shelter, but the entire property was a contemplative retreat for Leopold. His famous book, *A Sand County Almanac*, crystalized here.



Aldo Leopold's "Shack." Photo credit: Steve Thorp.



Listening Point on Burntside Lake in northern Minnesota. Photo credit: John Weller.

Sigurd Olson (1899-1982)

Sigurd Olson, a self-described conservationist, is remembered as an environmental philosopher. His principal subject matter was wilderness and, for many, his ardent support of wilderness preservation bordered on religion. Olson believed wilderness enabled people to feel the timeless, creative force of the universe. His own serene experiences canoeing on the Minnesota-Ontario border were incomparable treasures. A longtime resident of Ely, Minn., he fought developers and logging interests who sought to exploit the nearby Superior National Forest. His success resulted in lasting protection of the 1,000,000-acre Boundary Waters Canoe Area and designation of Voyageurs National Park. Through his writings, including *The Singing Wilderness*, as well as his

environmental activism, he developed a national reputation. He became president of the National Parks Association and lobbied for the Wilderness Act, signed in 1964. He maintained a cabin on nearby Burntside Lake, a place that inspired the book, *Listening Point*.

Rachel Carson (1907-1964)

The modern environmental movement was boosted, if not launched, by the publication of the 1962 best-seller, *Silent Spring*. The book's author was Rachel Carson from Springdale, Pa. In 1900, her family bought some hillside property on the Allegheny River a few miles outside of Pittsburgh. The five-room clapboard house had no central heating or indoor plumbing. It was here that the young Carson, guided by a mother interested in nature study, began to construct her world view. She spent a great deal of time outside, deciding to learn as much about the environment as possible. Her studies took her to Johns Hopkins University for graduate work in marine biology. She worked for the federal government as a natural history writer while she cared for her parents and siblings, leaving little time for a personal life. Several books, including *The Sea Around Us*, brought her fame, but her biggest literary accomplishment was *Silent Spring*. This book, linking indiscriminate pesticide use with bird population declines, took on the chemical industry. Her tremendous courage in the face of an orchestrated disinformation campaign and personal attacks by her detractors, while suffering from cancer, is her legacy to us all.



Rachel Carson's childhood home in Springdale, Pa. (with later addition). Photo credit: Steve Thorp.

Great Lakes Calendar

This calendar is a compilation of selected events of interest to the Commission. Further details and a more extensive calendar are available online via the Great Lakes Information Network (www.great-lakes.net). We encourage your input on the calendar. If you know of an event you'd like us to include, please contact Courtney Shosh, ADVISOR editor, at 734-665-9135; cshosh@glc.org.

Commission events

March

15 Great Lakes Day in Washington. Washington, DC. Contact: Steve Thorp, sthorp@glc.org.

April

4-6 HAZMAT 2000 Spills Prevention Conference. St. Louis, MO. Contact: Tom Rayburn, tray@glc.org.

May

10-12 Great Lakes Commission Semiannual Meeting. Duluth, MN. Contact: Mike Donahue, mdonahue@glc.org.

17-19 International Great Lakes St. Lawrence Mayors' Conference. Gary, IN. Contact: Steve Thorp, sthorp@glc.org.

October

15-16 Great Lakes Commission Annual Meeting. Hamilton, ON. Contact: Mike Donahue, mdonahue@glc.org.

Basin events

January

11-13 Dredged Material Assessment and Management Seminar. San Diego, CA. Contact: Billie Skinner, 601-634-3701, skinneb@wes.army.mil.

15 Ecological Monitoring and Assessment Network's Sixth National Science Meeting Environmental Monitoring Workshop. Toronto, ON. Contact: Brian Craig, 905-336-4431, brian.craig@cciw.ca.

February

2-4 No Spills Conference. Acme, MI. Contact: Kathy Simmons, 616-439-3333.

14-18 International Aquatic Nuisance Species and Zebra Mussel Conference. Toronto, ON. Contact: Elizabeth Muckle-Jeffs, 800-868-8776, profedge@renc.igs.net.

March

6-8 Third Biennial Freshwater

Spills Symposium. Albuquerque, NM. Contact: U.S. EPA, Office of Emergency and Remedial Response, oilinfo@epa.gov.

13-16 GIS 2000. Toronto, ON. Contact: Matt Ball, 303-544-0594, mball@aip.com; or info@GIS2000.com.

April

13-14 Third Annual Conference on Great Lakes' Law, Science & Policy. Toledo, OH. Contact: Gary Overmier, 419-530-4179 or 419-530-2882, govermi@pop3.utoledo.edu.

25-27 National Water Quality Monitoring Council Conference. Austin, TX. Contact: Abby Markowitz, 410-356-8993, sam71862@aol.com.

May

21-26 43rd Annual IAGLR Conference: Great Lakes, Great Rivers 2000-A Vision For Tomorrow. Cornwall, ON. Contact: Christina Collard, 613-936-6620, ccollard@riverinstitute.com.

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