

The Troubled Youth of Yellow Perch

by Irene Miles

Not long after they hatch, yellow perch larvae from the west side of Lake Michigan leave home. They are swept away by the large lake’s massive currents, possibly traveling clear across to the Michigan coast.

There, in terms of food sources, for perch it is the poor side of town. This information is critical to understanding the perils of the perch and in assessing the species’ status and managing it for the future, according to John Janssen, a University of Wisconsin-Milwaukee biologist.



(Great Lakes Fishery Commission, Department of Fisheries and Ocean)

Lake Michigan perch have had poor recruitment since the late 1980s. “If this trend continues the yellow perch populations in the lake could become critically low,” said Janssen. “This has biological implications for the entire lake food web.” Changes that have already taken place in the food web, combined with the lake currents may be taking their toll on the popular sportfish.

Zebra mussels, introduced into Lake Michigan in the late 1980s, may be the cause of depleted *Diporeia sp.* populations, the young yellow perch’s food source. *Diporeia*, an amphipod, feeds on phytoplankton that has settled on the muddy bottom. Zebra mussels siphon water just above them, so the mussels are able to feed on phytoplankton before the amphipods can.

According to Janssen and fellow researchers, the west side of Lake Michigan is rockier than the east side and it provides the preferred habitat of yellow perch for feeding and spawning. There, food is abundant. But, Janssen has documented that tiny yellow perch larvae that hatch on the rocky west side of the lake are swept into the sea-like currents of Lake Michigan. They travel for 40 or more days, adrift in the water column—away from the food source they will need when they grow larger, and towards Michigan, where this soft-bottomed region has become a veritable desert in terms of *Diporeia*.

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Great Lakes Monitoring Provides Management Cues

The health of the Great Lakes region as a whole depends heavily on the health of the lakes themselves. In light of this, the U.S. EPA has developed several long-term projects to monitor and model contaminants in the Great Lakes. Now, in partnership with Illinois-Indiana Sea Grant, the results of these studies are being made available to resource managers, policy makers, and other interested organizations and individuals.

SOLEC

The State of the Great Lakes Ecosystem Conference, or SOLEC, is a multi-agency effort led by the U.S. EPA and Environment Canada as part of the bi-national Great Lakes Water Quality Agreement (revised in 1987). Every two years since 1994 the current conditions of the lakes are assessed using key indicators. These indicators, such as chemical and bacteria concentrations, status of fish and wildlife populations, and water usage in the region, are tools to monitor change over time.



(David Riecks, University of Illinois)

“SOLEC reports provide a snapshot of the entire system related to the chemical, physical, and biological health of the lakes,” said Kate Beardsley, IISG Great Lakes ecosystem specialist, who works with the U.S. EPA’s Great Lakes National Program Office. “At the conferences, experts and others interested in the lakes are brought together to discuss the status of the Great Lakes through the evaluation of these indicators.”

The conferences and reports are part of an evolving process to accurately assess the health of the Great Lakes. “A key example of what can be done through the SOLEC process is the creation of the Great Lakes Coastal Wetland Consortium,” said Beardsley. “This group was created to define and assess indicators that were not already in place, but are critical to the restoration and protection of wetlands.”

From the data, discussions, and technical reports, Beardsley has developed a series of fact sheets to answer three key human health questions for those living in and around the Great Lakes Basin: Can we drink the water? Can we swim at the beach? Can we eat the fish? Based on SOLEC indicators, each fact sheet provides clear and concise summaries and assessments of the data collected over the years.

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These fact sheets have been distributed to state and federal decision makers in the region to inform them about key SOLEC findings that may affect their geographical area, constituents, or economy. Future publications will address ecological health questions.

LMMB

The Lake Michigan Mass Balance Program (LMMB) is another U.S. EPA effort to assess and project the health of the Great Lakes over time. LMMB was developed to measure and model the movement of four key pollutants in the Lake Michigan ecosystem: atrazine, mercury, PCBs, and trans-nonachlors. "Mass balance is based on the premise that the amount of a pollutant entering a system should equal to the amount of that pollutant leaving, trapped in, or chemically changed in the system," said Beardsley.

For two years, beginning in 1994, over 20,000 samples were collected from open waters, tributaries, food webs, and from the atmosphere. The data have provided the basis for ecological modeling that can help define where the contaminants originated and how they are moving through the lake and its food web. The

models also project contaminant levels in the future under various pollution reduction scenarios and address whether strategies to reduce contaminants can be successful.

"This information will be very useful for resource managers as they develop TMDLs (Total Maximum Daily Loads)," said Beardsley. "For example, the results from the LMMB modeling may provide a sense of how much mercury a river can accumulate before human health and ecological health risks are likely."

The LMMB modeling results will be presented in meetings for state officials and others who are involved with resource management, including those who create TMDLs. "Sea Grant will play a key role in organizing and facilitating these meetings as well as in the development of publications, products, and follow-up actions that will help management and policy decision makers apply LMMB modeling results," said Beardsley.

If you would like more information about SOLEC, go to www.binational.net. To learn more about LMMB, click on www.epa.gov/glnpo or email beardsley.kate@epa.gov.

Consortium to Plan for Tri-State Water Supply

The Tri-State Water Supply Consortium has been established to plan for a sustainable, high quality water supply for future generations in the greater Chicago metropolitan area. Leaping beyond state borders, this effort includes 17 counties, nearly 8,000 square miles, and more than 1,500 government entities in northeastern Illinois, southeastern Wisconsin, and northwestern Indiana.

"Interstate cooperation is the only way to protect the region's water supply and to use it sustainably," said Martin Jaffe, IISG coastal business and environment specialist, who is a member of the consortium steering committee.

"Water supply will be the critical issue of the future in this region, despite the fact that these three states sit on the edge of Lake Michigan," said Sarah Nerenberg, Northeastern Illinois Planning Commission (NIPC) director of natural resources. "The lake is already being used to its legal limit and there are many assumptions and unknowns about local groundwater supplies; more research is necessary."

NIPC's Strategic Plan for Water Resource Management has forecasted where populations in northeastern Illinois are most vulnerable to water shortages. "The plan's recommended strategies, the signing of the Wingspread Accord in 2001, and funding from Illinois-Indiana Sea Grant were the driving forces in the development of the consortium," said Nerenberg. The

Wingspread Accord is an agreement between four planning agencies in the three states to work together on economic and environmental issues critical to the region.

The Tri-State Water Supply Consortium consists of water managers, engineering consultants, and university experts, as well as representatives from state agencies, environmental groups, and the business community from the three states. The consortium, initially funded by IISG, meets regularly and has active work groups that focus on plan development and implementation, public outreach, and continuous funding for these efforts. The vision of the consortium is to develop a formal plan that ensures a sustainable water supply for the region and an administrative structure that allows for the plan's implementation.

"One of the first efforts of the consortium will be to educate the public and regional, county, and municipal decision-makers and legislators on the link between land use decisions and future water resources," said Nerenberg.

Find Your Niche in Aquaculture

Bill Blythe, who's been involved in aquaculture for the past 18 years, learned the importance of diversification in the fish farming business several years ago. The tilapia market dropped in 1999, and that year Blythe could count on little return for his time and investment in that species. This year he's raising striped bass and freshwater shrimp, in addition to tilapia.

In Illinois and Indiana, where food and facility resources are on hand, aquaculture can provide a viable means for grain and livestock producers to enhance their income. But, as with any new enterprise one might take on, there are no guarantees. Whether this venture proves to be a wise choice for a producer hinges on several key factors.

Check Your Resources

"If you are considering expanding or shifting your agricultural production into aquaculture," said Charles Felkner, Illinois-Indiana Sea Grant aquaculture extension specialist, "you first need to assess your available resources."

"First and foremost, an adequate water supply is critical, either in the form of surface water or a heavy producing well," said Felkner. "Your land resources are also a key component. If you don't have an available pond, do you have a location where you might build one? The costs involved may depend on the soil type and topography of your land. If you are considering indoor facilities, do you have a building that can be easily converted for aquaculture?"

Just like any other enterprise, aquaculture takes capital investment. This investment depends on your available resources and your level of involvement in the business. If you just want to get your feet wet in aquaculture, putting cages in an existing pond involves a low initial investment. At the other end of the cost spectrum is an indoor recirculating system that maintains water temperatures, dissolved oxygen levels, and other water quality characteristics.

Marketing Is Key

Regardless of your investment, success will depend heavily on your ability to market your product. "Before you buy the first fish fingerling, you need to know the market for that fish," said Felkner. "You need to plan ahead."

Felkner recommends finding a marketing niche for your product. "Find buyers who are interested and devise a plan to provide for their needs." Blythe, whose Hi-Bred Aquaculture Farm has been around for five years, suggests developing three or four potential markets. One may become a steady customer. "I give away a lot of product at local markets to attract new business," he explained.

The more creative you can be, the more opportunities there are. "In addition to farmer's markets, local groceries and restaurants, agrotourism provides a venue to sell your seafood," said Felkner. "Some freshwater prawn producers throw a weekend festival for folks to come to the farm and buy prawns, eat some gumbo or shrimp kabob, and have a good time."



IISG's aquaculture specialist Charlie Felkner stocking fingerlings into cages. (LaDon Swann)

New IISG Research Addresses Coastal Concerns

Illinois-Indiana Sea Grant's 2004 research agenda is focused on assisting local decision making through science in the area of coastal business and environment. This year, Sea Grant's research objectives are broadened beyond traditional environmental research and are directed towards stakeholders actively involved in coastal environment and development decisionmaking.

The Calumet Area Ecological Management Strategy: Measuring the Non-Market Economic Benefits

Dan McGrath and Richard Kosobud, University of Illinois at Chicago

Assessing the value of recreation sites through time and travel costs and one's willingness to pay will help estimate the non-market economic benefits accruing to citizens of the region from the City of Chicago's proposed restoration of a wetland habitat site in the Calumet region, Hegewisch Marsh, and its development as the Ford Calumet Environmental Center.

Water Supply Planning Modeling Tool for Local Governments

Sarah Nerenberg, Northeastern Illinois Planning Commission

A graphic, interactive, real-time planning and modeling tool will be developed to help communities visualize the impact of long-range policy, planning and land use decisions on water demand and supply. This new planning tool will assist local government officials in planning growth to ensure more sustainable water supplies.

Reconstructing Low Lake Levels of Lake Michigan

Timothy G. Fisher, University of Toledo

Research on past low lake levels will be used to develop more accurate lake level forecasts for the Great Lakes. The impacts of low lake levels—less shipping capacity, remobilization of contaminated sediments through dredging, increased flood risks, changes in coastal water thermoclines, and needed modifications of water intakes and other coastal infrastructure—can better be assessed and planned for if better lake level forecasts are developed.

Urban Stream Naturalization—A System Context for Practice Implementation

Edwin Herricks and Bruce Rhoads, University of Illinois at Urbana-Champaign

Focusing on two watersheds in the southern Lake Michigan urban area, this project will develop new methods for integrating hydraulic, geomorphological, and ecological information to derive measures of ecological performance. The results will help provide for efficient best management practices and for in-stream management practices operating within a watershed.

Quantifying the Impact of Land Cover Change and of Climate Change on Floods in Northeastern Illinois

Sally McConkey, Illinois State Water Survey

New models that better assess the relationships between changes in land cover and changes in precipitation patterns on flood discharge will be developed. These models will provide engineers with better tools for computing flood discharges and enable stormwater managers to better prioritize watersheds on the basis of future flood risks.

Camping Out With Sea Grant

Sea Grant educators were camp counselors for a day as they teamed up with the College of Engineering for its “Summer Water Camp” at the University of Illinois. The camp provided opportunities for minority students to soak up knowledge through hands-on activities and field trips about how science, technology, and engineering help improve water quality, conservation, and safety.

Ten high school boys from central Illinois engaged in experiments and games as they learned about impacts of eight aquatic invaders. First, the campers clogged up simulated pipes with varied amounts of pebbles to see how zebra mussels slow water flow. Next, they played the roles of ruffe, round goby, sea lamprey, purple loosestrife and other exotic species in Sea Grant’s “Don’t Stop for Hitchhikers” game. Through this activity, the students learned how these species were transported to Lake Michigan, why they’re a problem, and how they are being controlled. At the end of the game, native walleye in the lake—whose habitat and food are being taken over—are attacked by sea lamprey, demonstrating the effect that aquatic invaders have on native species.

After trying their hand at fishing for exotic species in a simulated pond and answering questions about these invaders, the campers took on new roles. As detectives, they created wanted posters for aquatic plant and animal invaders. One student said, “This was fun because we got to create cartoon drawings while we learned about the problems the invaders create.”

At the end of the day, Sea Grant’s Robin Goettel and Valerie Eichman gave the boys ideas for marine careers they might pursue after college, such as marine biology, ocean engineering, and aquaculture. This workshop helped tomorrow’s leaders to learn how water has shaped life around the globe, to learn what lives in local ponds, and to find out about careers in science, particularly in the areas of water research and education.



*College of Engineering water campers learn firsthand how zebra mussels clog pipes. Susan Herricks, (right), education coordinator for the Water Camp, commented that the workshop role-playing activities seemed to be particularly effective in exposing the campers to invasive species problems.
(Robin Goettel, IISG)*

■ ■ ■ ■ ■ ■ ■ ■ Coming Soon to the World Wide Web . . .



Later this year, a new education site on the Sea Grant Nonindigenous Species Web site will provide numerous “crime-solving” opportunities for young detectives in the fight against invasive aquatic species. We are looking for teachers in grades 4-10 to pilot test the site with their students from April 1-June 11. Visit www.iisgcp.org/applets/contest1/sgniskids.pdf for pilot test information.

New Curriculum Guide Premieres in Chicago

by Jennifer Fackler



It may sound like the title of an old-fashioned horror film, but *The Great Lakes Invasion* is an informative, activity-packed curriculum guide designed to educate teachers and students about aquatic exotic species. As in the horror films, the lead characters--species that have been sharing our ecosystem for decades--are driven from their home by invaders. These antagonist invaders include the round goby, zebra mussel, purple loosestrife, and sea lamprey—just to name a few.

The Great Lakes Invasion curriculum guide was produced and directed by the Illinois-Indiana, Pennsylvania, and Minnesota Sea Grant Programs in cooperation with the *Chicago Tribune* News in Education Program. The curriculum guide contains activities from the *Exotic Species Compendium of Activities (ESCAPE)* and information to help teachers and students learn about the spread and impacts of invading species. This guide was distributed in November by the *Tribune* to Chicago teachers participating in the News in Education Program.

The premier of *The Great Lakes Invasion* curriculum guide was held on October 22, 2003 at a teacher’s workshop at the Shedd Aquarium. Twenty-two teachers got first glimpse of the guide and participated in a few of the activities. “Many good ideas were available in the curriculum as well as ways to adjust to different grade levels,” reported one of the teachers. Two student contests were also announced at the workshop. For the secondary grades, The *Chicago Tribune* hosted an essay contest (sponsored by Minnesota Sea Grant) and for the junior high grades, Illinois-Indiana Sea Grant offered a creativity contest. The high school contest asked students to creatively design new strategies for preventing spread and minimizing impacts of invasive species. The contests for the middle schoolers encouraged student to think of ways to spread the word about informing friends and family about these invaders.

THE TEACHERS CRITICS RAVE!

"There is something for everyone in this guide; teachers have a lot of options."

"The activities provided a wealth of information to help me broaden my science curriculum. I teach a unit on Illinois ecosystems and this will be a great addition."

If you are interested in downloading *The Great Lakes Invasion* guide, please visit our Web site at www.iisgcp.org/edu/br/grlksinv.pdf.

Reporting New Aquatic Invaders is a Mouse Click Away

If you think you've happened on a new aquatic nuisance species (ANS) or an invasive species in new waters, reporting the details to the State of Illinois is now as easy as going online. The newly-remodeled Illinois Aquatic Nuisance Species Program Web site provides this feature, as well as information on State ANS laws, the State management plan, and the latest on hot topics such as the threat of Asian carp.

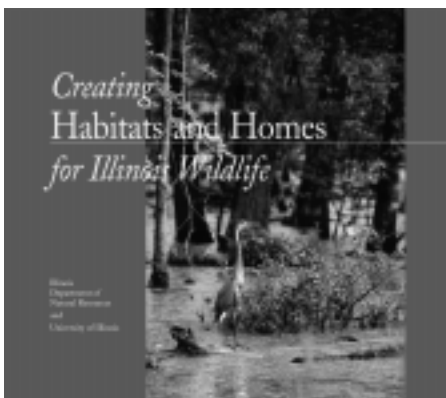
"With links to a number of other Web pages, the site is a gateway to ANS information resources," said Pat Charlebois, Illinois-Indiana Sea Grant biological resources specialist. "In addition to learning what you can do to prevent the spread of invasive species, you can read about what the State of Illinois is doing to address this issue."

Through management, research, and outreach, the Illinois Comprehensive Management Plan for ANS works to prevent new introductions of invasive species, limit the spread of established populations, and lessen harmful impacts from ANS infestations. "The program addresses all pathways of introduction and spread, which includes informing relevant audiences that careful action can prevent the spread of invasive species," said Charlebois.

The management program has also developed the online reporting system for aquatic nuisance species sightings. "These notifications help us track the introduction and spread of ANS, and provide information necessary for management decisions," said Charlebois. "All data are entered into a state-wide database."

This Web page was developed through Illinois-Indiana Sea Grant, the Illinois Natural History Survey, the Illinois Department of Natural Resources and the U.S. Fish and Wildlife Service. The Web address is www.iisgcp.org/il-ans. If you would like to report an ANS sighting by phone, call 847-872-8677.

Create Wildlife Habitat in Your Own Backyard



If you haven't thought to create or enhance wildlife habitat on your property, you may become inspired after looking through *Creating Habitats and Homes for Illinois Wildlife*, a new guide book on this topic. This beautiful coffee-table book of over 200 pages of information, practical advice, and rich photographs was published by the Illinois Department of Natural Resources and the University of Illinois.

IISG Director Dick Warner and IISG Research Coordinator Phil Mankin, both wildlife ecologists at the U of I, co-wrote the book with Debbie Scott Newman, who has written for Illinois Audubon for many years.

"Our goal was provide scientific information on wildlife habitats to Illinois citizens throughout the state," said Warner, "from downstate farmers to Chicago birdwatchers. And we made sure the resources described here are generally available."

The book covers the range of natural habitats found in Illinois, including grasslands, woodlands, wetlands (and other aquatic habitats), croplands, and backyards. For each, issues, options, and management plans are presented. Throughout the book, close-up photographs of Illinois wildlife and habitats enhance the information.

If you would like a brochure for more information or would like to purchase *Creating Habitats and Homes for Illinois Wildlife*, contact the Illinois Conservation Foundation, One Natural Resources Way, Springfield, IL 62702, or call toll free in Illinois 1-800-720-3249, outside Illinois 217-782-1687. The cost of the book is \$25, plus shipping and handling.

SEA GRANT STAFF UPDATE



Elizabeth Anderson is IISG's program assistant, which means she assists the director and others with document preparation, including the omnibus and the annual report. Anderson spent her first life at the Illinois Natural History Survey where she was the administrative assistant to the Director of the Center for Wildlife Ecology. After 30 years at the survey, she retired and has begun again with Sea Grant.

Jennifer Fackler joined Illinois-Indiana Sea Grant as a communications assistant, replacing Valerie Eichman. She is focused on outreach and marketing of educational opportunities. Originally from Champaign-Urbana, she returned home after several years in "The Sunshine State," where she worked in marketing and communications for a variety of businesses. She came home with twin baby girls.



The Water Wheel — Where it Stops, Players Learn

Do you know what percent of the world's water is available to drink? Do you know what alien species killed off the lake trout in Lake Michigan during the 1940s and 50s? Illinois-Indiana Sea Grant's Water Wheel of Information provides the answers to these and many other aquatic questions.

The water wheel is geared towards children as well as adults. Players spin the wheel until it stops on one of six categories, then fish for a question in the matching bucket. After choosing answers, participants can see whether they were correct. Everyone who plays wins a prize.

This exhibit has entertained and informed audiences at several major events in Illinois and Indiana, including the Indiana State Fair, the Farm Progress Show, and the University of Illinois College of Agricultural, Consumer, and Environmental Sciences Open House.



(Robin Goettel, IISG)

Yellow Perch (continued from page 1)

“We were able to measure the movement of the larvae directly by towing out our nets while riding on research ships on other missions. Two weeks after hatching, the larvae had traveled 20 miles,” said Janssen.

Originally, perch evolved in smaller water bodies, where the current effect is less dramatic on the tiny larvae. Janssen compares the flows in the Great Lakes to oceans where marine fish larvae frequently drift far from coral reefs and other feeding grounds. “To get a good year class of perch for the west side of Lake Michigan may require unusual current patterns to return the young fish to the west side,” said Janssen.

By adding further evidence that perch prefer rocky habitat, Janssen’s research illustrates that using trawls on soft bottoms to assess young-of-the-

year perch is probably ineffective. This sampling method is commonly used in Lake Michigan.

“The perch’s preference for rocks also suggests that it may be a good idea to manage the yellow perch in terms of sources and sinks,” said Janssen. “We might aim for robust populations off the rocky coasts of Illinois and Wisconsin, but to be less concerned about maintaining significant populations along Michigan. Accomplishing this would require well-integrated multi-state coordination and cooperation.”

This project was funded by Illinois-Indiana Sea Grant and coordinated with the Lake Michigan Yellow Perch Task Force.

Fellowship Opportunities

We are requesting proposals for three fellowships:

- Sea Grant Industry Fellows
- NOAA Coastal Management Fellows
- Great Lakes Commission-Sea Grant Fellows

Applications are due in early February. More information is available at www.iisgcp.org/funfell

Niche in Aquaculture (continued from page 4)

You can also be creative by dipping into several aquaculture markets. While it takes time to grow many food fish species to a desirable size, by diversifying into the ornamental, baitfish, or restocking markets, you can provide yourself a quicker turnaround on your investment and a more stable income stream that comes from a diversified portfolio.

“Aquaculture does not hold the promise of getting rich quick, but for someone who has a keen interest in raising fish and can develop niche markets, there are opportunities for a good income in this business,” said Felkner.

Where do you turn?

If you are interested in finding out more about aquaculture, Felkner suggests you talk to someone already in the business or contact your local Extension office. Sea Grant has a workbook/CD-Rom titled, *Getting Started in Freshwater Aquaculture* (see next page for more information). You can also go online to www.aquanic.org, which is visited by producers from all over the world.

Felkner will be holding a series of workshops on freshwater prawns in late January. For information or to register, call him at 765-412-2134 or email cfelkner@purdue.edu.



Illinois-Indiana Sea Grant Publications



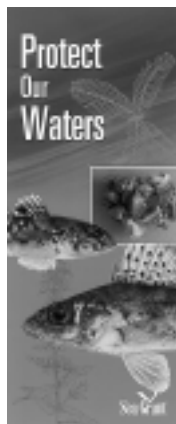
Bighead and Silver Carp Watch Card

Would you know an Asian carp if you saw one? This watch card includes color photos, drawings, and general characteristics of bighead and silver carp. If you think you've caught one of these Asian carp, the card provides reporting information. Single copies are free. Sold in sets of 100 for \$7.00. IISG-03-07. To order, contact Susan White at 217-333-9441 or white2@uiuc.edu.



Getting Started in Freshwater Aquaculture

CD-ROM and workbook introduces future aquaculturists to concepts and issues they must consider upon the onset of such a career. This educational material focuses on aspects of biology, water quality of production systems, marketing, and business planning. 208p. \$42 IISG-98-18. To order go the IISG Web site at www.iisgcp.org/pubs/aq/cd.htm.



Protect Our Waters

This full-color brochure includes just about everything you need to know to help prevent the spread of invasive species into local waters. Examples of key species are provided, including round goby, Eurasian ruffe, zebra mussels and some invasive plants, along with detailed photos and illustrations. For boaters and anglers, critical actions are listed that can help prevent the spread. A "Stop Aquatic Invaders!" baitbucket sticker included in the brochure allows you to put this information where you need it. To order a single copy, contact Susan White at 217-333-9441 or white2@uiuc.edu. Also available in packages of 50 for \$12.50: contact Cyndi Moore at 1-800-345-6087 or email cjmoore@uiuc.edu.



Contaminants in Fish & Seafood: A Guide to Safe Consumption

Fish are an excellent source of protein, but did you know that some fish can contain harmful contaminants? This is of special concern if you are pregnant, nursing, or have a young child. This 12-page brochure provides critical information about which fish are safer to eat and which cooking methods result in safer fish, as well as recommendations on how often to eat certain fish. To obtain the brochure, contact Susan White at 217-333-9441 or white2@uiuc.edu.



Happenings & Education around Lake Michigan (*The HELM*), reports on Illinois-Indiana Sea Grant research, extension, education and other Lake Michigan issues and activities.

For a free subscription, program information or to send suggestions for articles or editorial correspondence write to us at the address below or contact

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Visit our Web site at:
www.iisgcp.org

Illinois-Indiana Sea Grant College Program fosters the creation and stewardship of an enhanced and sustainable environment and economy along southern Lake Michigan and in the Great Lakes region through research, education and outreach.

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