

Profiling Culprits in the Great Lakes

by Irene Miles

“Once an invasive species becomes established in a new environment, its impact is irreversible,” said David Lodge, biologist at University of Notre Dame. But, not all exotic species present a threat to the balance of an ecosystem. Many introduced species simply do not survive or do not become a nuisance.

A Decision Tree

“If we knew which ones would be likely to present problems in the future, we could focus our efforts on preventing those particular species from taking hold,” said Lodge, who is chair of the federal Invasive Species Advisory Committee. To provide some answers, Lodge and fellow researchers are developing a risk-assessment “decision tree” that environmental agencies and managers can use to predict possible culprits of tomorrow.

“Ideally, environmental managers might choose to prevent all species from being introduced into an ecosystem under the credo that exotics are guilty until proven innocent, but from an economic point of view, that’s not practical. Some industries, such as horticulture, depend on importing new species. We need to achieve a reasonable balance between commerce and the environment.”

To create the user-friendly decision tree, Lodge, along with Cindy Kolar, a Notre Dame graduate student, studied the history of exotic species to find a common thread in those that succeed in their new environments. By profiling successfully

introduced species, they hope to identify others who have not yet been introduced, but fit the description. Lodge and Kolar, funded by Illinois-Indiana Sea Grant, focused their efforts on fishes in the Great Lakes and the Illinois River.

Digging Through Data

Using data from as far back as the glacial age, the researchers gathered information on a range of species characteristics to identify those that are likely to be adaptive in new environments. To create a list of fishes (and their characteristics) that have come to the Great Lakes from other drainages, they looked back to examples from as early as the 1600s. Lodge and Kolar developed a list of 24 nonindigenous species that firmly established themselves in the Great Lakes. How are some species able to thrive with native fish?

“Introduced species that are successful have several traits in common,” said Lodge. “More so than native fish, they adapt to habitat degraded by humans, such as murky waters due to siltation. These fishes are also smaller at maturity and have higher reproduction rates.”

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Fond Farewell to Director Phillip Pope

June 30, 2001 marked the last day of Phillip Pope's seven-year tenure with the Illinois-Indiana Sea Grant College Program. After only three years under his direction, the program was elevated to College status in 1997. Additionally, the program's budget and staff increased dramatically (five-fold) due in great part to Pope's visionary thinking and partnership building all part of his effective leadership of the program.

His final milestone with IISG was to co-chair the Coastal Communities and Economies Theme Team, a national committee, which is well on its way to helping balance economic growth with coastal resource quality by bridging gaps of information and coordination between the nation's coastal stakeholders.



Phillip E. Pope

"One of the highlights of my association with Illinois-Indiana Sea Grant has been the Research Symposium, which was the culmination of a major effort to rebuild our research program," said Pope. With a strong research program, Pope firmly believes that IISG will continue its up-to-date and progressive outreach and education programs.

Dr. Pope will continue his appointment as Associate Dean in the Graduate School of Purdue University and will return to teaching and research in the Department of Forestry and Natural Resources.

Illinois-Indiana Sea Grant staff members, as well as Sea Grant directors and National Sea Grant College Program administrators, agree that Phil Pope has set a high standard and will be a tough act to follow.



Illinois-Indiana Sea Grant is one of 30 programs of the National Sea Grant College Program created by Congress in 1966. Sea Grant is a partnership of universities, government, business and industry that addresses marine and Great Lakes needs to enhance sustainable coastal economic development. Funding is provided by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA Grant #NA86RG0048), Office of Sea Grant, Purdue University, West Lafayette, Indiana, and the University of Illinois at Urbana-Champaign. Purdue University and the University of Illinois offer equal opportunities in programs and employment.

Profiling Culprits continued

By applying the profile to fishes that have not yet been introduced to the Great Lakes, Lodge and Kolar are working to identify species that one day may pose problems. Preliminary results suggest that one example is the monkey goby, which is native to the Caspian Sea. Monkey gobies are in the same family as round gobies, which have proven to be quite successful after their introduction into the Great Lakes. On the other hand, tubenose gobies have not.

With this sort of information, prevention efforts can be targeted.

A Good Defense

"The first line of defense in preventing these potential nuisance species from making their way into our waterways is to work with aquaculture, bait, aquarium, and other industries to stop any intentional introductions of these fishes," explained Lodge.

"Unintentional introductions, such as in the ballast of ships, can be difficult to completely prevent, but we can lower the probability of these fishes being transported here. And, with increased monitoring we can take strong action to eradicate these species if they are discovered," added Lodge.

"An immediate rapid response to a species that is a likely threat even if it is fairly expensive might save a great deal of money and effort, and reduce environmental effects, down the road," said Lodge.

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Interim Director Steers IISG into the Future

As the Illinois-Indiana Sea Grant College Program navigates through new waters, searching for a new director and moving its administrative home from Purdue University to the University of Illinois, it is the job of Dick Warner, a U of I ecologist with extensive administrative experience, to steer the course.

As interim director, Warner brings a background rich in fisheries and wildlife research with an emphasis on problem-solving. “As an ecologist, I’ve used a systems approach, combining different knowledge bases and schools of thought. I think its important to bring together a variety of agencies to address problems and to consider solutions,” said Warner.

“I see my role as interim director of Sea Grant as one of building on the momentum that has already been established.”

Warner began his research career at the Illinois Natural History Survey (INHS) in 1975 and was awarded his doctorate in interdisciplinary environmental studies from the U of I in 1981. In 1990, he took on an administrative role as the INHS director of the Center For Wildlife Ecology.

Since then he has held a number of administrative and academic positions at the U of I, including interim associate director for the Office of Research in the College of Agricultural, Consumer and Environmental Sciences (ACES). Currently he is the assistant dean for research in ACES.

Warner has had a long association with Illinois-Indiana Sea Grant (IISG). Formally, he has been a member of the Sea Grant Administrative Oversight Committee and has served on the Competitive Grants Review Panel. Informally, Warner has been a supportive voice providing advice and advocacy.

“I see my role as interim director of Sea Grant as one of building on the momentum that has already been established,” said Warner. “I want to make sure everyone is equipped to carry on with the important work underway. I’m assuring our partners that we are moving forward. At the same time, I am also optimistically peering into the future at some new possibilities that are emerging.”

“I’d like to set Illinois-Indiana Sea Grant apart from other Sea Grant programs. To give us a competitive edge, I’m knocking on our partners’ doors and doing a great deal of listening. I’m looking for ways to add further value to what we do.”

In addition to the tasks of interim director, Warner is overseeing the transition of the administrative home base of IISG from Purdue in West Lafayette, Indiana, to the U of I in Urbana-Champaign, Illinois.



Dick Warner

“This transition provides an opportunity to elevate the importance of the Sea Grant program at both universities,” said Warner. “I’d like to get attention focused on Sea Grant in a new way. I believe that this program is at the heart of issues that will drive global decisions in the future.”

Experts Gather to Explore **River Restoration**

In Illinois and Indiana, as around the country, many rivers and streams have been channelized, drained, impounded, armored, altered or had their vegetation removed. Frequently, the result of this manipulation is degraded water quality and a loss of wildlife habitat, plus increased flooding and property damage.

At a hands-on river restoration workshop on June 12 and 13, 2001, a range of experts shared their ideas and techniques to repair deteriorating waterways. Over 110 participants, including city planners, park planners, government agency representatives, consultants, and representatives from environmental grass root organizations, met at Elgin Community College in Elgin, Illinois, to hear the latest management options. The workshop was sponsored by Illinois-Indiana Sea Grant and the Chicago Wilderness Consortium.



Field-trippers see stream restoration for themselves and Joan O'Shaughnessy answers questions at the Chicago Botanic Gardens.

“The goal of the workshop was to provide necessary information, along with ideas for engineers, consultants and planners to begin to address the problems of degraded water resources,” said Leslie Dorworth, IISG aquatic ecology specialist. These approaches can be applied in rural or urban areas, on small streams or larger rivers. Ultimately, implementation of appropriate stream restoration techniques will not only improve aquatic habitat, but can also enhance aesthetics, improve water quality, reduce erosion and flooding damage, and lower maintenance costs, added Dorworth.

The first day of the workshop was devoted to a series of talks on streambank stabilization, buffer strips and riparian wetland restoration, dam modification or removal, instream habitat restoration, and stream re-meandering.

“We found that there is great interest in having additional workshops on some specific topics such as streambank stabilization and dam removal,” said Dorworth.

The second day, the focus was field trips so that workshop participants could see how the techniques presented have been put into action. At the Chicago Botanic Gardens, some viewed restoration of the Skokie River Corridor where streambanks have been stabilized, streamside buffer habitat has been enhanced, and in-stream water quality has been improved using a range of approaches. Others went to McHenry County, where the Nippersink Creek has undergone extensive restoration, including a re-meandering of over three miles of the channel that had been straightened for agricultural production in the 1950s. At the Waubonsie Creek near Oswego, Illinois, field trippers got a first-hand view of a dam removal project.

If you are interested in a copy of the workshop guidebook, *River Restoration: Practices and Concepts*, which includes detailed papers from the workshop, plus descriptions and some analysis of the field trip sites, contact Leslie Dorworth at (219) 989-2726 or email dorworth@calumet.purdue.edu. You can also look for a downloadable version on the IISG Web site at www.iisgcp.org/pubs/wq/proc.htm.

Students Set Sights on Community Awareness

by Valerie Eichman

Illinois-Indiana Sea Grant is pleased to announce its newest publication, *Community Stewardship Projects on Exotic Aquatic Species*. Developed for use in the classroom, this publication goes way beyond lesson plans. It describes 15 community stewardship projects, all created by students to engage local citizens in taking action to improve their environment. These impressive projects use a variety of approaches to reach out to the community, such as bumper stickers, videotaped programs, t-shirts, large school displays and events, artwork, murals, posters, and flyers.

Several Sea Grant programs partnered with the Geographic Alliances of Louisiana, Indiana, and Illinois to train teachers at the “Exotic Aquatics on the Move” workshops. The focus was geographic applications with community awareness as the goal.

After attending the workshop, teachers then brought these concepts (e.g., movement, consequences, solutions) back to their students. To create awareness, the young stewards developed key messages such as “Don’t Dump Your Aquarium” and “Be Careful with Purple Loosestrife, It’s Pretty but It Kills.” Students met with reporters, placed flyers in doctor and dental offices and exhibited student projects at community educational facilities. Students from other parts of the country met with the public at boat shows, marinas, and educational events, such as the Great Lakes Student Summit. Others reached out to the Hispanic community with a play in Spanish about purple loosestrife, as well as a merengue dance that demonstrated how native plants are “bumped out” of their habitat by purple loosestrife.

“This project made the kids very aware of a problem that they didn’t know about,” said Jeanine Staab, a seventh grade teacher in Medford, Wisconsin. “Since exotic species came into our area from elsewhere, we were able bring in the global aspect. Students felt that having knowledge made them feel empowered—that they could make a difference. This project was something they will remember forever.”

In Mickey Penrod’s high school special-needs class in West Lafayette, Indiana, students “felt great pride in their project and fully included in the school when their “Waterworld” simulation brought them into a whole-building event. Becoming experts and answering questions from other students helped build self-esteem,” Penrod explained.

If you would like to learn more, go to the “Exotic Aquatics on the Move” Web site, iisgcp.org/EXOTICSP/. The stewardship guide can be downloaded from the Web site. For a complimentary copy of the printed version, contact Valerie Eichman, eichman@uiuc.edu or 217-244-8809.



Whether it was sharing flyers with Louisiana anglers on how they can help prevent exotic species from spreading or creating an aquatic nuisance display in an Indiana school, students shared important messages with community members.



Have you done a stewardship project on exotic aquatic species with your students? We’d enjoy knowing more about it and would consider including it on our Web site. By raising awareness and taking responsibility, we can work together to make a big difference on the local, regional, national, and global scale!

Research Takes the Stage



The Ralph Metcalfe Federal Building in Chicago, Illinois was the site for the first Illinois-Indiana Sea Grant Research Symposium.

by Debra Levey Larson

On a Thursday morning in April, researchers, Illinois-Indiana Sea Grant staff, and members of the media attended the first Illinois-Indiana Sea Grant Program Research Symposium. It was held at the Ralph Metcalfe Federal Building in downtown Chicago, which also houses the Illinois Environmental Protection Agency.

“One of our recent goals has been to publicize and share the results of research funded by Illinois-Indiana Sea Grant,” said Richard “Rip” Sparks, research coordinator for the program. “We want to bring research to the attention of the public, management agencies, and other potential users and to promote the exchange of information among the researchers themselves.” IISG scientists are located at four-year colleges and universities scattered throughout the two states and have little opportunity for interaction.

“We decided to host a research symposium every two years,” continued Sparks, “to highlight several research projects and provide a venue for networking amongst the Sea Grant staff, the researchers, and staff from interested agencies. We believe that the symposium will encourage and facilitate research and funding partnerships to solve Great Lakes problems.”

At the beginning of the day’s agenda, Phillip E. Pope, director of Illinois-Indiana Sea Grant gave a brief history of the program, from its early years as a simple extension unit to 1997, when it became a full College Program. At that point, Illinois-Indiana Sea Grant added

a state-directed research program, explained Pope to more than 90 symposium attendees.

IISG, with help from National Sea Grant, now contributes about \$500,000 per year to research; with match funds the total becomes \$750,000 dedicated to research in Illinois and Indiana.

“I’m really quite pleased with that. We’ve still got room to grow, but the research provides visibility in the states, the region, and the nation,” said Pope.

He attributed the success of Sea Grant to researchers.

“I firmly believe that research drives the rest of the program. Without it, we wouldn’t have up-to-date, cutting edge outreach or education programs. Your (the researchers’) success is our success.”

Throughout the day, seven IISG-funded researchers presented talks about their current projects: Martin Berg provided information on the Russian round gobies and their impacts in the Great Lakes; Chris Rehmann talked about zebra mussel transport in the Illinois and Hudson Rivers and prospects for impeding transport as a way of controlling zebra mussels; David Lodge gave a presentation first to the press, then later in the symposium, about predicting what new nonindigenous species might pose the greatest threats to the Great Lakes; Rick Goetz gave a talk on the use of growth hormones in aquaculture; Martin Jaffe talked about

“We want to bring research to the attention of the public, management agencies, and other potential users and to promote the exchange of information among the researchers themselves.”

water supply constraints in Chicago; Gary Lamberti presented his findings on multiple interactions and effects of what he calls “the exotic triad” zebra mussels, round gobies and Eurasian ruffe; and Charles Tseng described his DNA fingerprinting techniques for tracking the sources of *E.coli* that contaminate beaches. During lunch, researchers presented twelve posters on their projects.

“I liked how the topics all related to one another,” said one person who attended the symposium. “I noticed how the projects built on one another, even though each scientist may have been looking for entirely different outcomes. To hear about the impact of zebra mussels on the Great Lakes and then go to a talk on how their larvae are transported, made for a perfect transition.”

A summary of the research symposium is available on the Illinois-Indiana Sea Grant Web site at <http://www.iisgcp.org/symposium/index.html>

DNA Fingerprinting Can ID *E.coli* Contamination

The use of DNA science in the world of criminal justice has led, in many cases, to a high degree of certainty in terms of suspects’ or even convicts’ guilt or innocence. Scientists are now using the precision of DNA fingerprinting to pinpoint sources of *E.coli* that cause water contamination and beach closings. Tracing the *E.coli* contamination to its source makes it possible to clean up the site and prevent future bacterial outbreaks.

E.coli is a bacterium found in the digestive tract of humans, farm animals, birds and other wildlife animals. When the bacterium is detected in water in significant numbers it indicates fecal contamination. While *E.coli* itself is harmless in most cases, its presence indicates that other more harmful bacteria are also likely to be in the water.

Charles Tseng and Evert Ting, biologists at Purdue University Calumet, have tracked the specific host species from over 400 *E.coli* samples.

“These *E.coli* DNA fingerprints of known sources will be used to determine the source of *E.coli* from environmental samples. To date, DNA fingerprints of over 50 isolates from beach sand and lake water have been prepared,” said Tseng. “The goal is to create a comprehensive *E.coli* database that will eventually have over 1,000 samples.”

In Lake Michigan, high levels of *E.coli* are the main cause of area beach closures during the summer. Nationwide, there were nearly twice as many beach closings and advisories in 2000 than there were in 1999, according to the National Resource Defense Council. Much of this increase can be attributed to increased monitoring, but nonetheless, the vast majority of beach closings were due to high levels of bacteria in the water.

Tseng and Ting, funded by Illinois-Indiana Sea Grant, are using two DNA fingerprinting techniques to create their *E.coli* database. One is the random amplified polymorphic DNA method, known as RAPD, in which short DNA sequences, called “primers,” are used to amplify DNA fragments. Different fragment patterns are analyzed to distinguish genetic difference in *E.coli* samples. Tseng and Ting focused on three specific primers that provided the necessary information. The second method is ribotyping, a cutting-edge, automated technology that can create fingerprints from ribosomal genes. By combining the two methods, the researchers are looking to further ensure the accuracy of their results.



Martin Berg shares his discoveries on the impact of round gobies in the Great Lakes.

Funding Boosts Ideas into Action

On the Internet, in classrooms and museums, with industries and through municipalities, Illinois-Indiana Sea Grant looks to broaden awareness of aquatic nuisance species. A number of researchers hope to measure the impact of these species and try control methods to limit their spread. Other scientists strive to improve water quality. And, an Illinois researcher looks to help the oyster industry in the Gulf of Mexico as it deals with disease problems.

These plans just got a giant boost with more than \$880,000 of funding in Sea Grant's National Strategic Initiatives Competition. Eight outreach, research and industry projects have been funded for 2001-2003.

Outreach

Robin G. Goettel (partnering with the Louisiana, Pennsylvania, New York, Ohio, Michigan and Minnesota Sea Grant Programs)

ESCAPE from Exotics: Break Out of Your Classroom Routine By Exploring the Interesting World of Exotic Species

Brian K. Miller (partnering with Wisconsin Sea Grant)

Transferring Sea Grant Aquatic Nuisance Species Research and Outreach Results to the Nation Using a World Wide Web Server

Patrice M. Charlebois (partnering with the Minnesota, Michigan, Pennsylvania and Ohio Sea Grant Programs)

A National ANS-HACCP Training Initiative to Prevent the Spread of ANS in Baitfish and Fish for Stocking

Research

Mark A. Pegg and John H. Chick, Illinois Natural History Survey

An Evaluation of Barriers for Preventing the Spread of Bighead Carp to the Great Lakes

Carla E. Caceres, University of Illinois and John M. Dettmers, Illinois Natural History Survey (partnering with New York Sea Grant)

Aquatic Nuisance Species: Effects of Invasive Invertebrate Predators on the Food Webs of the Great Lakes

Chris R. Rehmann, University of Illinois (partnering with New York Sea Grant)

Aquatic Nuisance Species: Metapopulation Dynamics and Control of the Zebra Mussel in Freshwater and Estuarine Systems: The Effects of Hydrodynamics, Larval Supply, and Embayments

Charles C. Tseng and W.T. Everett Ting, Purdue Calumet

Use of Automated Ribotyping System for Tracking the Source of E.coli Contamination

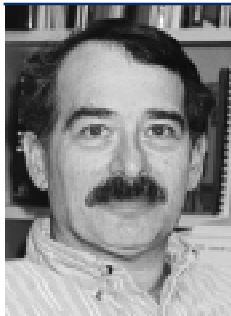
Gulf Oyster Industry Program

Peter J. Slade, Illinois Institute of Technology

Modeling the Inactivation of Vibrio parahaemolyticus in Oysters by High Pressure Processing (HPP)

All Aboard!

In recent months, the Illinois-Indiana Sea Grant staff has bid a fond farewell and bestowed many thanks to some familiar faces who have moved on to other opportunities. And, we've extended a hearty "welcome aboard" to some new shipmates.



Martin Jaffe is now the interim coastal business and environmental specialist. In this role, he works with industry, agencies and local government to help balance economic growth and healthy environmental resources. Jaffe is an associate professor in the Urban Planning and Policy Program at University of Illinois at Chicago and is also a research associate in the Great Cities Institute. He has succeeded Daniel McGrath who left IISG to be involved in a special project focusing on the power crisis in California.



Angela Archer is the new multimedia Web specialist. She will be building on the accomplishments of Joy Wheeler, IISG's designer who created the Web page's new look. Archer will add technology and try new techniques to keep our site user-friendly and up-to-date. Archer has worked for several years with AquaNIC, the aquaculture Web site. Wheeler, who had been with IISG for 6 years, has returned home to New Mexico.



Irene Miles has taken on the role of communications specialist, media writer, and editor of *The HELM* newsletter, succeeding Debra Levey Larson who is now a full-time science writer for the University of Illinois' College of Agricultural, Consumer and Environmental Sciences (ACES). Miles comes to Sea Grant with six years of experience as a writer with News and Public Affairs in the College of ACES.

IISG would also like to thank Michele Browna, program manager, who has moved on to motherhood and other opportunities. Located at Purdue University, her responsibilities included office management, post-award grants administration, fellowship programs and federal grant preparation. Future program manager responsibilities will be positioned at the University of Illinois.

New IISG Research Makes a Splash

Five research projects have been funded by Illinois-Indiana Sea Grant for the years 2002-2004.

Quantifying Pathways of Nonindigenous Aquatic Species

David Lodge, University of Notre Dame

Chemical Speciation and Availability of Metals in Wetlands

Jean-Francois Gaillard, Northwestern University

Mercury Methylation and Demethylation in a Contaminated Urban Watershed

Robert Hudson, University of Illinois at Urbana-Champaign

Targeted Inactivation of the Fish Aromatase Gene

Paul Collodi, Purdue University

Bighead Carp in the Upper Mississippi River: Competition with Native Filter-Feeding Fishes and Potential Threats to the Great Lakes

John Chick and Mark Pegg, Illinois Natural History Survey

BeachWatch
E. coli at the beach?

E. coli is a bacteria found in the feces of birds and animals, including humans. When high levels are discovered in the lake, the beach is closed to keep people from getting sick.

Here are three of the ways you can help prevent *E. coli* contamination at the beach:

1. Remember to clean up after your dog.
2. Keep food in closed containers and remove all litter so birds and animals will not be attracted to the beach.
3. Since diapers can leak and release bacteria into the water, remember to change your child's diaper frequently.

Let's keep our beach safe and healthy!

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BeachWatch

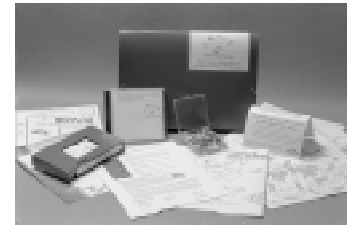
As cold weather settles in, how about taking a break from reality to think about beaches? Illinois-Indiana Sea Grant has developed a series of posters and postcards that provide clear and concise information about beach and water quality issues. Topics range from whimsical, such as "Singing Sands" to down and dirty *E. coli* issues. Visit www.iisgcp.org/beachwatch/ on our Web site to view all 16 poster topics.

While you're there you can take a *BeachWatch* survey. Click on "Delicate Dunes," "Toilet on Board?," "Why Does the Water Taste Bad?," or "*E. coli* at the Beach." If you are one of the first 100 respondents you will receive a free mini beach ball or sponge!

If you are interested in ordering a complete set of *BeachWatch* posters, call Irene Miles at 217-333-8055. The series is available in several sizes and is also offered mounted on heavy poster board for institutions that educate and inform the public.



Publications Order Form



Exotic Species Compendium of Activities to Protect the Ecosystem (ESCAPE)

A collection of multi-disciplinary activities developed from the Exotic Species Day Camp Project for Educators. This package includes 36 user-friendly sets of lessons that incorporate experiments, art, music and games. For use by educators of grades K-12.

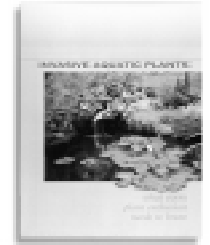
item no. **IISG-01-17**, \$58 quantity _____

Invasive Aquatic Plants: What Every Plant Enthusiast Needs to Know

This full-color brochure offers suggestions to water gardeners on how to help prevent the spread of invasive species while building a garden, as well as when choosing, buying and disposing of aquatic plants. It provides characteristics of invasives and explains how they are spread and includes a list of "outlaw" plant species.

item no. **IISG-01-22**, \$4.50 for set of 25 quantity _____

(For a free single copy, please contact Robin Goettel at 217-333-9448 or goettel@uiuc.edu.)



Zebra Mussels: Questions and Answers for Inland Lake Managers

A fact sheet that provides information on how zebra mussels reproduce and spread and why lake managers should take notice. It also provides advice on how managers can prevent zebra mussels from entering their lakes and who should be contacted if these invaders are spotted.

item no. **IISG-01-20**, free (single copy)



Catching the Current

The 2001 guide to Illinois-Indiana Sea Grant research. The 44-page booklet presents 23 projects, each explained in terms of the problem addressed, the nature of the project and the outcomes and impacts.

item no. **IISG-01-1**, free quantity _____

Making Waves

A guide to the latest public service activities of Illinois-Indiana Sea Grant. Outreach activities involve adult and youth education and discussion in a range of areas, including aquaculture, coastal community development, land use and resource planning, water quality and fisheries and non-native species.

item no. **IISG-01-2**, free quantity _____

Please return a copy of this entire form along with a check or money order made payable to University of Illinois, Illinois-Indiana Sea Grant Publications, Attention: Cyndi Moore, 1917 S. Wright St., Champaign, IL 61820, or call 1-800-345-6087 or fax 217-333-3917. Ask about multiple copy discounts.

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For a free subscription, program information or to send suggestions for articles or editorial correspondence write to us at the address above or contact **Irene Miles at 217-333-8055 miles@uiuc.edu**

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Visit our Web site at:
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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