

Indiana bans 28 invasive aquatic plants

by Anjanette Riley

The fight against invasive aquatic plants in Indiana was brought to local aquarium and water garden shops this fall with the approval of a rule banning the sale of 28 aquatic plants that pose a high risk of invasion. These restrictions position Indiana as one of the most proactive states in the prevention of new aquatic invasive plants and will help the state reduce the spread of known invasives.



Parrot-feather, found in Indiana's Lake Meserve in 2008, is banned under new rule.

Courtesy of Indiana DNR

"Trade is one of the strongest vectors for these species, and it is one that we can control," said Reuben Keller, an environmental scientist at Loyola University Chicago. "Trying to reduce the risk of invasion through species in trade makes a lot of sense, even if we can't guarantee that species won't get into the state another way."

The rule, which went into effect at the end of August, also makes gifting, bartering, exchanging, distributing, or transporting any of the 28 species illegal.

To determine which plants imported for the aquarium and water garden trades posed the greatest threat to the state's waterways, the Indiana Department of Natural Resources (IN DNR) relied on a risk assessment tool developed by the Aquatic Plant Working Group. The group was formed, organized, and facilitated by Illinois-Indiana Sea Grant at the request of IN DNR and included representatives from the aquatic plant industry, aquarium

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Illinois-Indiana Sea Grant

Two States Caring for One Great Lake

Brian Miller, Director

374 NSRC, 1101 W. Peabody
Urbana, IL 61801
217-333-6444

Lisa Merrifield

Assistant Director

The
HELM

Irene Miles

Editor

Anjanette Riley

Writer

Susan White

Graphic Designer



Printed on Recycled Paper

IISG online:

iiseagrant.org
lakesideviews.blogspot.com
twitter.com/ILINSeaGrant
facebook.com/ILINseagrant
youtube.com/iiseagrant



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and water garden hobbyists, state agencies, academia, and non-governmental organizations. They used information provided by University of Notre Dame researchers to develop a tool that evaluates a plant based on factors such as its history of invasion, its ability to survive in Indiana habitats, and how difficult it is to control.

Many of the plants that made the list have been used in aquariums or water gardens in Indiana for years. Others have already been discovered in waterways throughout the state, sparking large-scale eradication projects. For example, efforts to remove the fast-growing weed *Hydrilla verticillata* from Lake Manitou have been ongoing for more than six years and cost the state millions of dollars. Hydrilla is believed to have entered Lake Manitou through trade.

“With this tool, if hobbyists and water gardeners became interested in a new plant, we could assess its invasiveness before it became widespread in trade,” said Eric Fischer, IN DNR aquatic invasive species coordinator. “We also plan to adjust this rule in the future to be more proactive as we assess new species.”

The success of the risk assessment tool in Indiana has sparked interest from officials in the Great Lakes region and at a national level. In fact, researchers at the University of Notre Dame were awarded a three-year grant from the U.S. EPA Great Lakes Restoration Initiative to develop risk assessment tools for commercially sold fish, mollusks, crustaceans, reptiles, and amphibians. IISG’s aquatic invasive species outreach specialists are working with researchers to coordinate and facilitate regular working meetings with state and province resource managers to develop a single set of tools that can be used in each of the eight states and two provinces that make up the Great Lakes region.

“The Great Lakes are all interconnected. If one state bans a species but a neighboring state doesn’t, the ban is essentially meaningless in terms of keeping that species out of the lakes,” said Pat Charlebois, IISG aquatic invasive species coordinator. “The risk assessment tools we’re developing will give officials in the 10 jurisdictions the information they need to develop the consistent policies necessary to protect the Great Lakes.”

500 new aquaculture businesses grow in Africa

In part of Africa, the aquaculture industry has gotten a significant shot in the arm. Over the past few years, information, training, and incentives helped more than 500 new businesses get off the ground in Ghana, Kenya, and Tanzania. IISG's Kwamena Quagraine lent his expertise



In Changa, Tanzania, from left, IISG's Kwamena Quagraine joins three fish farmers who just completed their pond and a local animal science professor.

as an aquaculture marketing specialist and a native of Ghana.

Through funding from the United States Agency for International Development (USAID), Quagraine's efforts were part of a larger goal to encourage the development of the aquaculture industry in Sub-Saharan Africa. The work done in these three countries demonstrates a variety of approaches to fostering new businesses and helping ongoing ones.

Ghana provided Quagraine the opportunity to go back home over the course of several years to train aquaculture farmers in best management practices. For example, they learned that productivity can be increased by using the same water in farm

ponds from one season to the next. "When you drain water from the ponds, you are also draining nutrients," he explained.

Efforts in Tanzania were focused on the technology of fish production—researchers found that leaf meal from two local trees can replace costly soybean meal in tilapia diets, increasing profitability for small-scale farmers. Feed costs remain one of the major constraints to aquaculture development in Africa.

"Most of the new aquaculture businesses have been established in Kenya, where the government helped the effort out by providing incentives, like helping with pond construction and providing fish food," Quagraine explained. Many fish farmers in Kenya have large ponds, which, through the use of cages, can be used to raise several species—like catfish and tilapia—side by side.

Kenya was also where aquaculture training helped address an environmental concern. The native shark-tooth catfish is a threatened species because it is often used for bait. Farmers were trained in production and business techniques of raising juvenile catfish as an alternative to wild-caught baitfish. New farmers, including women, now successfully sell baitfish in markets along the shores of Lake Victoria throughout the year.

Catfish and tilapia were also the topics of Quagraine's marketing study of consumer preferences in Ghana and Kenya. The goal was to enable the aquaculture industry to strategize and respond to demand in the local market. In both countries, demographic differences and attitudes about health play a role in consumers' willingness to pay for farmed tilapia. On a more concrete level, the results show Ghanaian consumers prefer smoked and grilled tilapia and catfish, while consumers in Kenya prefer them fresh and fried.

...and IISG's specialist reaps award

IISG's Kwamena Quagraine was selected for the 2012 Outstanding Extension Specialist Mid-Career Award at Purdue University. This award recognizes extension leadership, excellence in delivering public education programs, innovative approaches to program development, and more. "Since joining Purdue in 2005, Kwamena has revitalized the aquaculture industry in Indiana and overseas," said Brian Miller, IISG director. "Through applied research and extension, he has expanded aquaculture funding and improved business for thousands of fish farms."

Doing real science inspires Great Lakes students

Sixth graders at Wisconsin's Superior Middle School are trading in their science textbooks for lab equipment to learn first-hand about water quality, aquatic food webs, and their interconnected

encouraging students to investigate real-world problems that affect them and providing an opportunity to discover answers on their own. In Superior, Wisconsin, for example, sixth graders are using data collected in September to investigate how water quality varies in different locations on Lake Superior. Stephanie Francis, the sixth-grade science teacher at the middle school, said students understood and related to the lake differently as soon as they began

working with the equipment. "The investigation of the day is going to be."

In Buffalo, New York, students are using the equipment to gather more precise data from nearby streams than can be collected with other tools used in the class. Sandy Cunningham, the teacher of the seventh-grade class, also hopes to take advantage of the sensor's ability to collect data at different depths to help her students investigate how water quality is related to depth in Lake Erie.

Some teachers have taken water quality activities like these one step further by integrating science education with other fields, especially mathematics and technology. Students in Cunningham's class learned to build Excel spreadsheets to record data and will be working on projects throughout the year that require math to examine water quality measurements. The same data is also being used to take a closer look at the



Courtesy of Sandy Cunningham

Seventh graders in Buffalo, NY analyze water quality data collected from local rivers.

relationship with the Lake Superior watershed. And they are not alone. Teachers throughout the Great Lakes region are expanding and strengthening their aquatic science sections with the help of the new Limno Loan program coordinated by IISG in partnership with the U.S. EPA Great Lakes National Program Office (GLNPO).

The program gives students an opportunity to collect water quality data from their local waterways using the same monitoring sensor used by scientists to examine characteristics such as pH, conductivity, and dissolved oxygen.

The handful of teachers who have participated in the program so far have told IISG that working with the equipment improves understanding of aquatic science by

working with the equipment.

"We were not even off the boat before they started asking me questions like why the water in the estuary was more turbid than in the middle of the lake," Francis said. "I have been able to let them lead the questions instead of me telling them what the ques-



Courtesy of Stephanie Francis

Sixth graders at Superior Middle school review how to use equipment before testing water quality.

historical connection in Buffalo between stormwater management and water quality. “There is so much of a relationship between historical land use, where we are today, and what our legacy will be, that to teach them independently is missing a huge opportunity,” Cunningham said.

The teachers were introduced to the Limno Loan program, along with other classroom resources, during a week-long Shipboard and Shoreline Science Workshop. This annual workshop gives teachers and non-formal educators from various disciplines the opportunity to work alongside scientists and Sea Grant specialists aboard the U.S. EPA’s *R/V Lake Guardian*. This year, participants collected samples from different depths and locations on Lake Huron to study water quality and the species found in different habitats. They even dissected fish to learn about the lake’s changing food web. Hands-on research was paired with curriculum activities to help teachers incorporate Great Lakes science into their classrooms.

“The cruise is an amazing opportunity to learn first-hand about the Great Lakes in general and the specific issues facing the particular lake studied that year,” said Kristin TePas, IISG community outreach specialist and a coordinator of the annual teacher workshop. “Activities are tailored to make the science accessible and to increase Great Lakes literacy.”

Although the equipment will be available to more teachers in the future, right now the loan program serves as a way to help workshop participants bring some of the experiences and knowledge gained aboard *Lake Guardian* to their classrooms.

Great Lakes Shipboard and Shoreline Science Workshops are held annually by the Center for Great Lakes Literacy, each year on a different lake. Workshops are funded by the Great Lakes Restoration Initiative and coordinated by Sea Grant and EPA GLNPO. For more information and to apply for next year’s workshop on Lake Ontario, visit www.cgll.org.

More hands-on teacher workshops

In November, IISG joined Chicago’s Shedd Aquarium, the National Park Service Great Lakes Research and Education Center, and the Dunes Learning Center in a two-day workshop for 13 teachers to engage in scientific data collection and hands-on field work.



Top photo: Teacher Ron Hall is trying out the Hydrolab water sensing equipment in Chicago’s Burnham Harbor. Middle photo: Through Enviroscope, teachers can see how lawn care practices impact waterways. Bottom photo: Teachers learn how to create a stewardship project by doing—helping to restore an Indiana Dunes National Lakeshore wetland.

Online access to fish consumption advisories

Fish consumption advisories for recreationally caught fish are nothing new in Indiana, where state environmental and health agencies have been monitoring the safety of fish in water bodies for more than 30 years. For most of that time, though, advisories were distributed in a small number of booklets that were difficult to find and even harder to use. That is, until Purdue University researcher Charles Santerre partnered with Indiana agencies to develop an online, real-time database that gives Hoosiers direct access to information on how much and how often recreational fish can be consumed safely.

Angling Indiana visitors can use the database to find information in English or Spanish for specific counties and water bodies. Separate advisories also help pregnant or nursing women, who are more susceptible to contaminants commonly found in fish. The database was created through an IISG Discovery Grant.

For years, Santerre's group has been manually converting state-wide advisory booklets into single-page county fact sheets. This took time and often meant that consumers were learning information affecting them as much as two years after data was collected. Now, the same fact sheets are automatically created when someone accesses the website and are updated immediately after being certified by state agencies.

"We knew this was an important thing to do, and we needed to find a better way to do it," said Santerre. "It is important that pregnant and nursing women can easily access this information. This cooperative effort is making important strides to protect babies."

Visit the database at www.fish4health.net and click on Indiana.

Consumers would pay more for U.S. seafood

The majority of seafood in American grocery stores and on our dinner plates today is imported from China and other Asian countries. But U.S. aquaculture producers have an opportunity to expand the market for domestically-grown products, according to an IISG-funded study.

David Ortega, a graduate student at Purdue University, used survey data to investigate how much American consumers would be willing to pay for seafood products with a variety of safety and quality features. The study found that consumers are willing to pay the most for seafood grown in the U.S. and more for imported seafood when safety practices are U.S.-certified.

"China is getting a negative reputation, and consumers are aware of this," said Ortega. "Domestic aquaculture producers can capitalize on that reputation. American consumers are always going to have a preference for

domestically-grown aquaculture products."

People are willing to pay between \$5.41 and \$10.65 per

pound for shrimp from the U.S, depending on growing and safety testing methods used. In contrast, they will pay only \$3.71 and \$4.12 for Chinese and Taiwanese shrimp, respectively, that passed rigorous safety screenings.

And while buyers are wary of imported seafood, the survey showed a willingness to pay as much as \$6.02 per pound for Chinese tilapia that has been certified by the U.S. government.



Staff Update



Greg Hitzroth is IISG's new aquatic invasive species specialist. From the Chicago Botanic Gardens in Glencoe, IL, Greg works with IISG's Aquatic Invasive Species team to develop and implement programs that raise awareness of strategies to prevent the spread of invasive species in the Great Lakes region. His work specializes on aquatic species that enter Indiana and Illinois waterways through commercial trade. Greg came to Sea Grant from a research assistantship with the Botanic Garden's Plants of Concern Program. He holds an MS in Biology from Northern Arizona University.



IISG's new science writer is Anjanette Riley. She works with the communication team and researchers to create materials that communicate research results and inform the public of IISG's initiatives and outreach projects. Anjanette holds an MA in English Studies from Illinois State University. She brings the experience of a technical writer and journalist, having written for several newspapers and magazines across the country.

Large sprawling yards can lead to more runoff

Protecting water quality by converting low-density residential neighborhoods into urban areas sounds counterintuitive, but that is exactly what a researcher at University of Wisconsin-Eau Claire recommends after spending two years studying the relationship between land use practices, climate change patterns, and water quality.

Cyril Wilson's Discovery Grant study used simulations of different land use and climate scenarios to see what pollution levels in the Chicago-area Des Plaines River Watershed may look like in 2020 and 2030. Although results varied, the study reveals that changing climate patterns will increase the concentration of pollutants like phosphorous and sediment that enter waterways from soil erosion, stormwater run-off, and industrial waste.

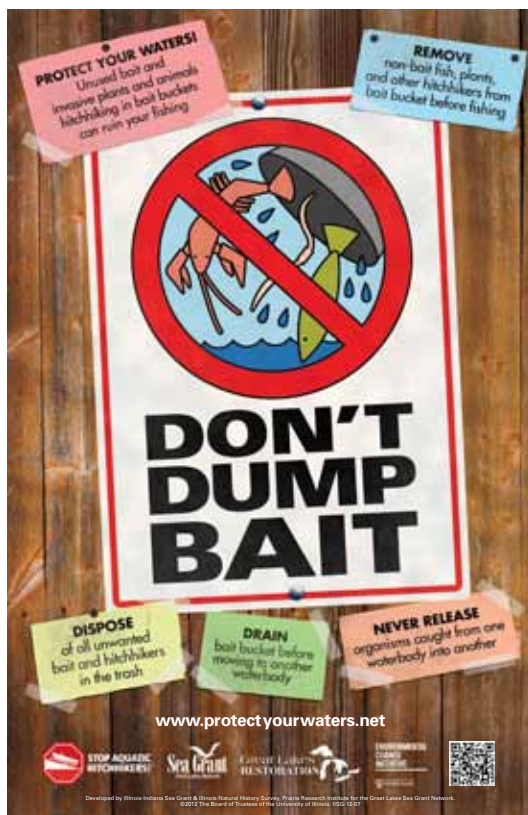
Sediment levels are expected to be at their highest in winter months and in low-density areas, where there is less infrastructure designed to channel stormwater run-off and more open spaces that wash away in storms.

"When you get outside of the city, there are more undeveloped spaces and homes with large yards," Wilson said. "There is more sediment to be flushed into waterways. The more developed an area is, the less sediment there is to wash away."

For aquatic life living in the Des Plaines River Watershed, increased sediment means rising water temperatures and less oxygen to support biological diversity. Particulates can also clog fish gills, decrease resistance to disease, and reduce reproduction rates by suffocating eggs and newly-hatched larvae.

University of Illinois at Urbana-Champaign
Illinois-Indiana Sea Grant College Program
374 NSRC, MC-635
1101 W. Peabody Dr.
Urbana, IL 61801

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New “Don’t Dump Bait” poster

Fishing is a fun and popular recreational activity, but also a potential pathway for the spread of aquatic invasive species (AIS). Unfortunately, invasive plants and animals hitchhiking in bait buckets can ruin fishing opportunities. This new, 11x17 repositionable poster explains how to make sure our local waters are protected from AIS. The tips are simple and include: remove non-baitfish, plants, and other hitchhikers from the bait bucket before fishing; dispose of unwanted bait and hitchhikers in the trash; drain the bucket before moving to another waterbody; and never release organisms from one waterbody into another.

Thanks to a collaboration with University of Notre Dame, this poster has been distributed to bait shops near Lake Michigan in Illinois and Indiana. To download or order a copy of this poster, visit www.iiseagrant.org and go to the AIS Products page. You can also order a free bait bucket sticker.