30

Illinois-Indiana Sea Grant College Program
Milestones

Sea Grant
ILLINOIS - INDIANA

iiseagrant.org

Sea Grant, established in 1966, is a national network of 33 state programs that invest in research and foster education on coastal concerns such as aquatic invasive species, contaminated waters, loss of natural habitat, and climate change. Sea Grant specialists of all stripes provide the latest science to those who can best use the information, empowering people to solve local problems in sustainable ways.

Illinois-Indiana Sea Grant (IISG) focuses on the southern Lake Michigan region—104 miles of heavily urbanized and industrialized shoreline where you can find one-third of the Great Lakes population.

In 1982, IISG had its modest beginnings as a small marine extension project through a partnership of the University of Illinois, Purdue University, and the National Oceanic and Atmospheric Administration (NOAA). Soon the program was funding research, and over time the outreach staff grew from a single specialist to a staff of 28 located at academic institutions and agencies in the two states. In 1997, IISG was awarded College Program status by the U.S. Department of Commerce.

We celebrate our three decades of commitment to keeping the Great Lakes great with these 30 milestones.

1

Research success by the numbers

Over the last 30 years, IISG has been awarded more than $20 million to support research, outreach, and education projects on a range of Great Lakes issues. Altogether, the program invested over 7.5 million research dollars—81 projects funded from the core budget, and more than 45 supported by additional or leveraged funds. IISG researchers have shared the results of these studies through more than 130 peer-reviewed publications.

2

Seed grant funding helps projects bloom

Just as a gardener hopes that scattered seeds will eventually bloom into a lush garden, IISG has ratcheted up Discovery Grants, or seed grants; since 2009 funding 40 projects in the hopes that these initiatives will grow into something larger. IISG has funded 15 scientists or graduate students at the University of Illinois, 11 at Purdue University, and 14 more researchers at other institutions in the two states. As a result, U of I's Michael Plewa and his collaborators were able to leverage their Discovery Grant project on drinking water safety into nearly $500,000 of support from the National Science Foundation.

3

Students engage in research and outreach

Since 2000, IISG has supported nearly 350 undergraduate and graduate students engaged in research or outreach activities. For example, students have assisted scientists and specialists in their efforts to advance knowledge and change behavior in areas such as aquatic invasive species, water quality, fish consumption, and climate change. Others used Discovery Grant funding to enhance their thesis research. In 2012, IISG hired four undergraduate students as summer interns to work closely with IISG outreach specialists. These students helped launch the IISG buoy, set sail on Great Lakes research cruises, and co-authored and presented research results.

4

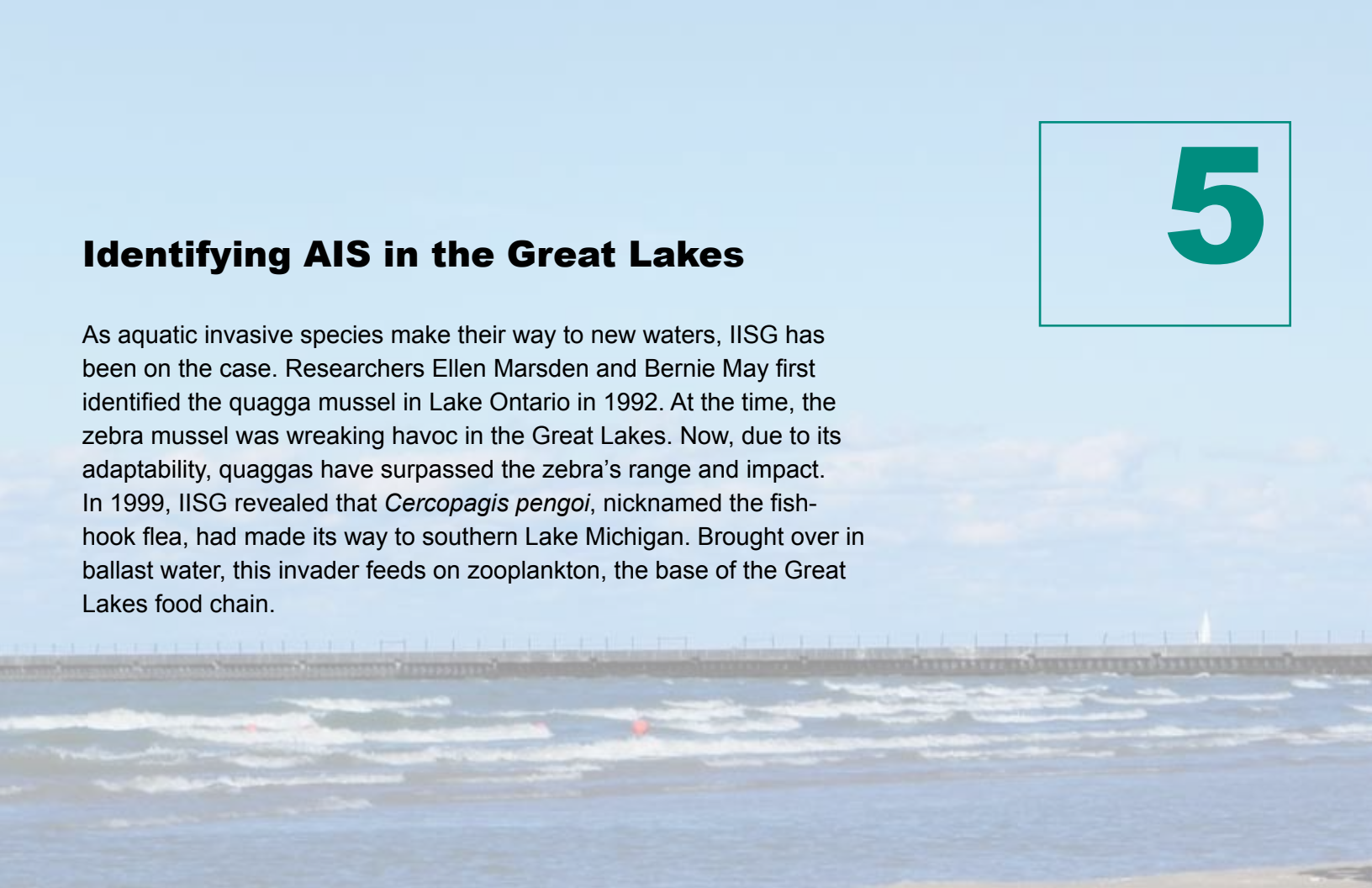
Fellowships offer career opportunities

IISG has sponsored 18 graduate students in prestigious fellowship positions in the Great Lakes region and nationally. Since 1990, 13 talented Knauss Fellows have gone to Washington D.C. to spend a year working for federal agencies or as part of the legislative branch. Many have gone on to careers in the federal government, academia, or Sea Grant. John Epifanio, the first IISG Knauss Fellow, served as the program's research coordinator in 2009. Other graduate students were IISG Fellows funded through the National Marine Fisheries Service, NOAA Coastal Management, and the Great Lakes Commission.

5

Identifying AIS in the Great Lakes

As aquatic invasive species make their way to new waters, IISG has been on the case. Researchers Ellen Marsden and Bernie May first identified the quagga mussel in Lake Ontario in 1992. At the time, the zebra mussel was wreaking havoc in the Great Lakes. Now, due to its adaptability, quaggas have surpassed the zebra's range and impact. In 1999, IISG revealed that *Cercopagis pengoi*, nicknamed the fish-hook flea, had made its way to southern Lake Michigan. Brought over in ballast water, this invader feeds on zooplankton, the base of the Great Lakes food chain.



6

New buoy offers real-time Lake Michigan data in Indiana

A buoy near Michigan City, Indiana is advancing the understanding of nearshore waters, alerting the public to hazardous conditions, protecting water quality, and improving weather forecasts. Launched in 2012, it is jointly owned and operated by IISG and the Purdue University Department of Civil Engineering. From April to November each year, the TIDAS 900 buoy will relay real-time information on wind speed, air and water temperature, wave height and direction, and other environmental characteristics. It is the first of its kind in Indiana waters.

7

Green infrastructure offers sensible stormwater management

In light of climate change predictions, which include bigger storm events and more flooding, managing urban stormwater will become even more critical in northeastern Illinois and throughout the state. An IISG study looking at the standards and costs of green infrastructure as a possible replacement or supplement to conventional urban stormwater infrastructure found that, on average, green infrastructure practices are just as effective as conventional practices, and less expensive. Final recommendations based on the study were presented to the Illinois General Assembly. In 2011, the first year of this annual program, the state of Illinois awarded $4.8 million to communities and organizations to install more than 24 acres of green infrastructure. As a result, there will be less flooding and water pollution on nearly 13,000 acres.

8

Tracking toxic mercury in polluted waters is easier

University of Illinois researcher Robert Hudson and his collaborators have patented a mercury analysis technique that makes testing for methylmercury, a highly toxic environmental contaminant, less expensive and much quicker. The toxin accumulates in fish and is consumed by people and wildlife, but the number and scope of mercury studies have been limited due to the extreme cost of the testing. The new test promises to drastically reduce this cost, allowing scientists to do much more monitoring and to design better remediation strategies for contaminated sites.

9

9.6 million pills collected—and counting

People in 40 states, as well as Egypt, Greece, Brazil, and Canada, were introduced to the idea of pharmaceutical stewardship through IISG's medicine disposal toolkit. More than 10,000 people have been educated since 2010, and the unwantedmeds.org website has had more than 84,000 hits. This all translates into results: IISG has helped 62 communities in Great Lakes states plan single-day or permanent collection programs, ensuring the proper disposal of 9.65 million pills (or 81,813 pounds). Additionally, IISG provided guidance to Sea Grant programs in Pennsylvania, New York, and Ohio, resulting in a collaborative project that has educated over 1 million people and collected over 2.6 million pills. This project won the 2012 Great Lakes Superior Outreach Programming Award.

10

Constructing the nearshore Lake Michigan food web

In conjunction with Wisconsin Sea Grant, IISG researchers are documenting the food web in the near shores of Lake Michigan using a comprehensive approach to analyze the diet of fish species. Most food web studies have focused on the open waters of Lake Michigan, but the nearshore food web has undergone dramatic changes in recent years. Invasive species, such as the round goby, have been introduced and native species, including yellow perch, mottled sculpin, longnose sucker, and various invertebrate prey, have declined. The researchers are hoping to understand how invasive species interact with native biota, which will help in the management of the unique ecosystem that is Lake Michigan.

11

Which species will be the new invaders?

University of Notre Dame's David Lodge and Cynthia Kolar developed an aquatic invasive species (AIS) risk assessment tool based on historical data for fishes in the Great Lakes and Illinois River. Lodge and Reuben Keller also assessed whether trade in live aquatic organisms contributes to the spread of AIS. As a result, Lodge, Keller, IISG specialists, and others have received almost $5 million in funding from the National Science Foundation, NOAA, and U.S. EPA to develop risk assessment tools focused on the Great Lakes, but with national and international implications.

The team worked with the Chicago Department of Environment on the development of an ordinance banning 26 AIS. In Indiana, IISG formed and facilitated the *Aquatic Plant Working Group* to develop a screening tool to help industries and the Indiana Department of Natural Resources assess the invasion risks of aquatic plants imported for the aquarium and water garden trades. This effort led to a law prohibiting the sale, distribution, and transport of 28 plant species that pose a high risk of invasion. Indiana is now one of the most proactive states in preventing the introduction of new invasive aquatic plants.

12

If you can't beat 'em, eat 'em

How can we reduce the number of Asian carp in the Illinois River and ease the threat they pose to the Great Lakes? IISG organized a summit to discuss how best to market these fish. Experts and stakeholders agreed that high-value Asian carp fillets marketed to restaurants and retailers may provide the financial incentive for extensive harvesting. Looking to have immediate impact, they also recommended that whole fish be exported in high numbers to Asian markets, where these species are already a popular food fish. The Illinois Department of Natural Resources is furthering these goals through three pilot programs, including Asian carp food-handling training, as well as marketing and food web studies.

13

The ‘Do Not Flush Medicine’ message goes Big Apple

Times Square—some call it the crossroads of the world. Annually, over 450 million people pass through this historic and dazzling site. Beginning in late 2011 (which included the world famous New Year’s Eve celebration), Sea Grant and the American Veterinary Medical Association (AVMA) introduced audiences to the issue of medicine disposal through the CBS JumboTron “Super Screen.” The 15-second spot ran 18 times a day for three months, raising awareness on the importance of not flushing unused medicine. NOAA National Sea Grant College Program and AVMA have joined forces on the issue of disposal of human and veterinary medications. This partnership was initiated by and is conducted through IISG.

14

AquaNIC led the way in online aquaculture information

IISG and the Mississippi-Alabama Sea Grant Consortium worked together for 14 years to provide aquaculture-based research and outreach materials. In its heyday, the AquaNIC website was the number one electronic aquaculture resource in the world. In 2007, over 2.6 million people in over 162 countries obtained science publications and outreach products to inform their aquaculture businesses. These visitors viewed 5.3 million resources. The AquaNIC team also coordinated with the World Aquaculture Society to provide online employment resources. AquaNIC included an extensive contact directory and a calendar of aquaculture events around the world.

15

MarketMaker makes seafood and aquaculture matches

MarketMaker, which was created by a team from University of Illinois Extension, has become a national resource that “connects willing markets and quality sources of food from farm and fisheries to fork.” It is a multi-state partnership of land grant institutions and state agricultural agencies. The fish and seafood component of MarketMaker came about with help from aquaculture specialists from IISG and extension programs in Illinois and Indiana. Together they designed the site’s section for fish farmers, processors, and distributors. Since going live in 2010, 19 states have used MarketMaker’s seafood and aquaculture component to connect fisherman and aquaculture producers with markets.

16

Illinois tests drinking water for pharmaceutical contamination

Medicines that are flushed away are not all filtered out in the wastewater treatment process and, as a result, can contaminate nearby waterways and harm aquatic wildlife. IISG and the National Prescription Drug Disposal Program worked closely with Illinois EPA, keeping the agency informed on the growing evidence of pharmaceuticals in streams and rivers. When the Associated Press reported in 2008 that it found pharmaceuticals in the drinking water supplies of at least 41 million Americans, Illinois became the first state to test drinking water for these chemicals.

17

Communities stay informed through the cleanup process

The Great Lakes Legacy Act provides funding for communities to clean up waterways identified by U.S. EPA as Areas of Concern. IISG and the U.S. EPA Great Lakes National Program Office have helped residents in 10 communities make informed decisions during the cleanup process and subsequent restoration. IISG works with local partners to produce a variety of media to inform residents and address local concerns. Since 2004, more than 2.2 million cubic yards of contaminated sediment have been remediated throughout the Great Lakes. In addition, 169,000 cubic yards of sediment will soon be remediated. In northwest Indiana, as the Grand Calumet River and Roxana Marsh were cleaned up, IISG worked closely with students in two schools, engaging them in hands-on water monitoring activities and other learning opportunities. These activities are being formalized in a curriculum that can be used in schools around the Great Lakes.

18

Regional planning agreement offers broad vision

The Wingspread Accord, originally signed in 2002, was a historic agreement in which planning agencies from Illinois, Indiana, and Wisconsin joined forces to tackle environmental and economic issues in the southern Lake Michigan region. In 2010, an updated accord was signed with a Michigan planning agency on board—encompassing more people, land, and municipalities and an even broader vision. The Southwest Michigan Planning Commission joined the Chicago Metropolitan Agency for Planning, the Northwestern Indiana Regional Planning Commission, and the Southeastern Wisconsin Regional Planning Commission in this new agreement to plan more comprehensively in the region. Throughout the Wingspread process, IISG provided critical expertise and support.

19

Planning for a sustainable Chicago water supply

IISG joined forces with the Chicago Metropolitan Agency for Planning (CMAP) and University of Illinois Extension to provide economic research expertise and outreach leadership to support the development and implementation of *Water 2050: Northeastern Illinois Regional Water Supply/Demand Plan*. The Chicago water supply plan was unanimously approved by the Regional Water Supply Planning Group in 2010. IISG provided critical data on key components of the plan—water pricing and conservation strategies, which form the foundation for implementation strategies employed by CMAP as the plan moves forward.

20

Smart growth in coastal counties can protect natural resources

IISG worked closely with two Indiana counties as they updated their comprehensive land-use plans. Porter and LaPorte counties, which sit along Lake Michigan, have incorporated smart growth principles into plans for the future. Porter County, home to sand dunes and beach ecosystems, developed a Traditional Neighborhood Design ordinance and adopted a Watershed Overlay District, establishing riparian buffer zones on streams and rivers in the county. LaPorte County has incorporated environmental protection language into its land-use plan. In addition, Hendricks County now has a conservation design subdivision ordinance and, Dearborn County has added a hillside development ordinance to protect natural resources as the county grows.

21

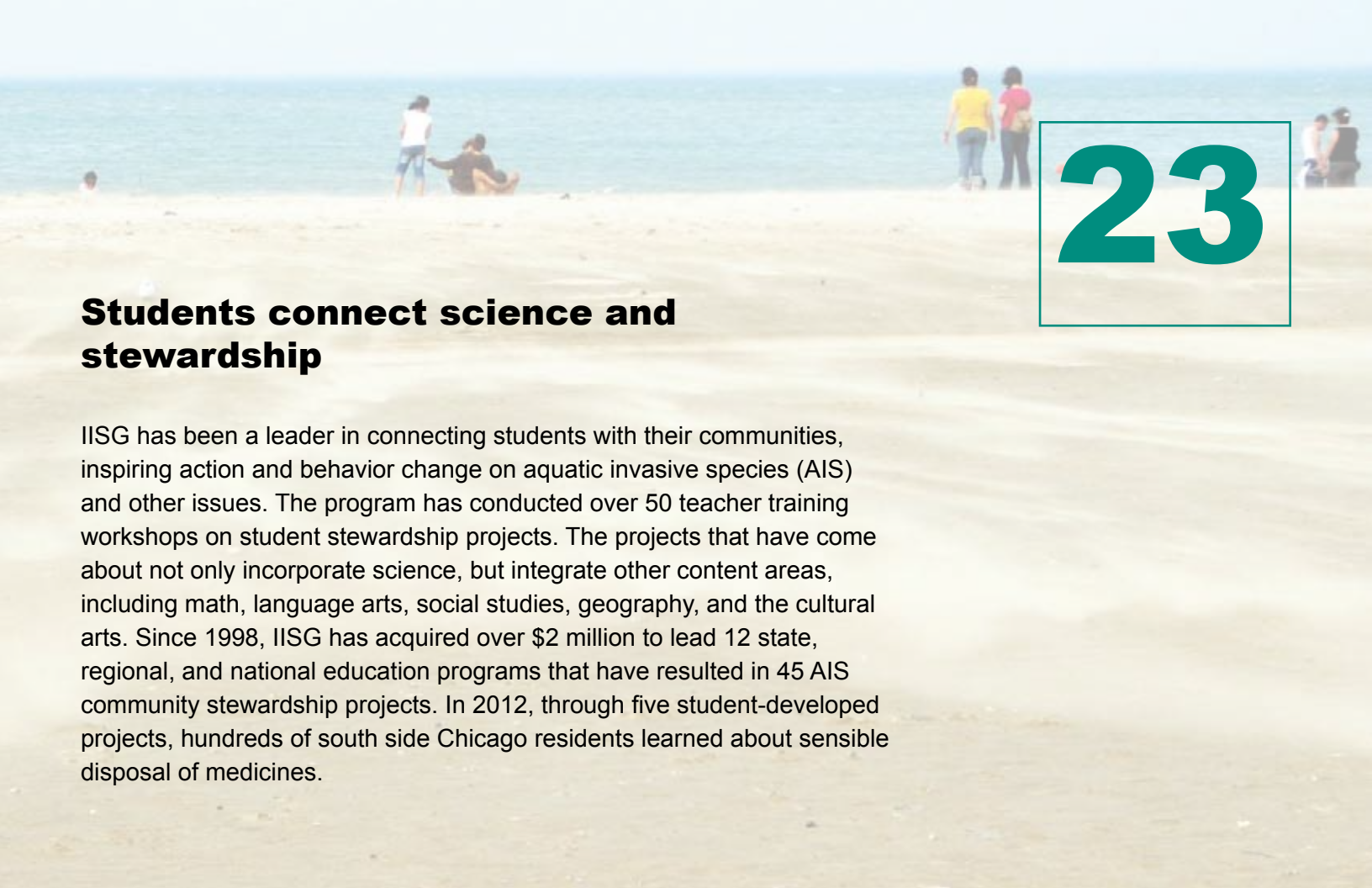
Educational AIS website displayed at the Smithsonian

In 2010, *Nab the Aquatic Invader!* was featured at the Smithsonian National Museum of Natural History as part of the Ocean Today Kiosk in the Sant Ocean Hall. It was also on display at Coastal Ecosystem Learning Centers throughout the country, including the John G. Shedd Aquarium in Chicago. This educational website was created by IISG along with Sea Grant programs in New York, Louisiana, Connecticut, and Oregon and uses aquatic invasive species as colorful characters in a crime-solving theme. The project expanded to include species from coastal regions around the country. The Ocean Today Kiosk, developed by NOAA in partnership with the Smithsonian Institution, presents news, video stories, and in this case, interactive pages, which highlight some surprising and pressing issues facing our ocean today.

22

Shedd Aquarium exhibit focuses on Great Lakes Invaders

IISG collaborated with the John G. Shedd Aquarium in Chicago on the exhibit *Great Lakes Invasions*. IISG specialists and researchers, including University of Notre Dame biologist David Lodge, supplied essential data as well as video of jumping Asian carp—a prominent feature of the exhibit. The aquarium is visited by almost two million people each year.



23

Students connect science and stewardship

IISG has been a leader in connecting students with their communities, inspiring action and behavior change on aquatic invasive species (AIS) and other issues. The program has conducted over 50 teacher training workshops on student stewardship projects. The projects that have come about not only incorporate science, but integrate other content areas, including math, language arts, social studies, geography, and the cultural arts. Since 1998, IISG has acquired over $2 million to lead 12 state, regional, and national education programs that have resulted in 45 AIS community stewardship projects. In 2012, through five student-developed projects, hundreds of south side Chicago residents learned about sensible disposal of medicines.

24

500 new aquaculture businesses spring up in Africa

In Africa, the aquaculture industry has gotten a significant shot in the arm. IISG has provided information and training that have helped more than 500 new businesses get off the ground in Ghana, Kenya, and Tanzania. Small- and medium-scale fish farmers learned all aspects of aquaculture supply chain management and marketing, as well as the potential environmental effects of their activities. Through funding from the United States Agency for International Development, the efforts of IISG's Kwamena Quagrainie (who is a native of Ghana) were part of a larger goal to encourage the development of the aquaculture industry in Sub-Saharan Africa.

Dam removal opens new habitats

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IISG workshops have helped inform the decision process for communities and natural resource managers addressing stream restoration issues, including dams that have outlived their lifespan. As a result, the South Batavia Dam on the Fox River in Illinois was removed. Another dam in LaPorte County, Indiana was purposely breached, preserving more than 100 acres of high-quality wetlands and restoring the stream channel. Elsewhere, new fish passages and bypass channels have opened more habitats for fish in local waterways.

26

Curricula bring Great Lakes issues to classrooms

IISG has overseen the development of nine curricula that have enlightened more than 110,000 students on critical Great Lakes issues. These collections are problem-based, peer-reviewed, and multi-disciplinary, and they all enhance traditional school-mandated education. The program's commitment to informing students on aquatic invasive species has resulted in curricula developed by teachers who took part in IISG workshops. In recent years, IISG educators have also worked with nine teachers to compile stewardship-based curricula on medicine disposal. The most recent classroom tool, *Fresh and Salt*, integrates Great Lakes and ocean literacy principles and a stewardship focus.

27

Data tools can inform local planning decisions

Planning for the future is easier and more efficient if you have a clear sense of where you currently stand. IISG and Purdue University Centers for the Environment and Regional Development developed Local Decision Maker (LDM) to assist Indiana communities with comprehensive land-use planning. This web tool offers over 350 data layers to help inform local planners as they make land-use, school district, and economic development decisions. From 2008-2011, 50 cities in 35 counties regularly used LDM for natural resource planning.

Taking this one step further, IISG, the NOAA Great Lakes Environmental Research Lab, and university scientists in the region are defining environmental tipping points, which can predict when aquatic ecosystems are headed towards trouble. IISG is collaborating with Purdue University and Sea Grant programs throughout the Great Lakes to develop a web-based modeling tool that can help communities create action plans to sustain aquatic resources.

28

Chicago flooding is higher than expected

Flood peaks in the Chicago metropolitan area are higher than they used to be, and they are also higher than estimates currently used by water managers. Momcilo Markus, a researcher at the Illinois State Water Survey, studied Chicago area flood trends using data from the U.S. Geological Survey and NOAA. He found that the steady increase in flood discharges in small streams over the past 100 years is due to increases in urbanization and precipitation, with urbanization playing the major role.

Estimating future flood peaks accurately is critical for allocating resources to minimize damage from these events. Underestimating or overestimating 100-year flood levels can result in large economic losses on one hand, or increased environmental degradation on the other.

29

Zelda the Zebra Mussel gets the word out

Zelda is IISG's "spokesmussel," with a mission to heighten awareness about her fellow aquatic invasive species. As someone who likes to see and be seen, Zelda has appeared at university events, conferences, environmental and state fairs, farm and boat shows, Earth Day celebrations, and the Field Museum's Wild Chicago event. She has traveled to six states in the Great Lakes region and educated well over 4,000 people about aquatic invaders.

Zelda's fame is spreading thanks to her "one-mussel" show called *Confessions of an Exotic Aquatic*, a skit written as a classroom activity by a an IISG teacher workshop attendee. It has since been revised to incorporate other invasive species, such as Helga the Hydrilla.

30

Teachers go shipboard to learn Great Lakes science

Since 2006, IISG has led the Great Lakes Sea Grant Network in partnership with the U.S. EPA Great Lakes National Program Office to coordinate onboard teacher workshops on each of the Great Lakes. At the 2010 Lake Michigan Shipboard Science Education workshop on the *R/V Lake Guardian*, fifteen educators expanded their knowledge of Lake Michigan and gained experience in monitoring and data analysis. This hands-on training has made science more accessible and helped increase Great Lakes literacy for 1,100 students annually.

Three scientists also came away that much better. Not only did the teachers assist them in their research, they taught the scientists how to connect with a broader audience and present research results to students in a way that is understandable and useful. This project was funded through a Centers for Sciences Education Excellence Great Lakes initiative. In 2012, U.S. EPA took over support through the Great Lake Restoration Initiative, establishing the Center for Great Lakes Literacy.

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