

## Forecast calls for Windy City winter blues

by Irene Miles

Chicago winters can be brutal, so the thought of them easing up may sound good to many residents. But if climate predictions prevail, some winter hazards may be exacerbated for residents and city managers alike.

Climate model studies indicate that Chicago will likely be warmer and have more extreme precipitation, according to Molly Woloszyn, Illinois-Indiana Sea Grant (IISG) extension climatologist. Woloszyn, located at the Midwest Regional Climate Center, compiled this information as a part of a Chicago winter climate report.

“Snow will more likely be heavier, denser, and wetter, which tends to pile up on tree branches, houses, and power lines,” said Martin Jaffe, IISG environmental planning specialist at the University of Illinois at Chicago. Ice and heavy snow loading can lead to broken tree branches, damage to building exteriors, and blackouts. “Heavy snow is also known as heart attack snow – it’s very strenuous to shovel,” he added.

Large storms will also likely result in more flooding, especially if the ground is frozen or retention ponds are full of snow.

But warmer winters bring concerns beyond precipitation. With temperatures more likely to fluctuate between freezing and thawing, it means more potholes and stress on building exteriors. Under freeze-thaw conditions, concrete cracks more easily, leading to the need for more overall



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## Invasive mussel impacts: It's complicated

The nearshore food web may be more important to the overall health of Lake Michigan now than ever due to the spread of zebra and quagga mussels. Offshore, they have been linked to major declines in zooplankton. Nearshore, due to the mussels' constant water filtering, some species of algae and invertebrates are flourishing. As a result, some fish and other species that have historically relied on zooplankton are forced to eat bottom-dwelling nearshore species to keep from going hungry.

But there may be a silver lining here. With the lake's food web vulnerable to many threats, some dietary changes spurred on by mussels may help stabilize species populations, according to Ben Turschak, a University of Wisconsin Milwaukee graduate student who analyzed fish tissue to see how mussels have affected food chains.

"If a species eats just zooplankton, its entire population may collapse if that food source becomes scarce," Turschak said. "But that won't happen if they can supplement their diet with lakebed and nearshore food supplies. The population might not be as large or healthy, but it won't collapse."

Turschak's research is part of a larger study to map Lake Michigan's food web funded by the U.S. EPA Great Lakes Restoration Initiative and Illinois-Indiana and Wisconsin Sea Grant programs.



Courtesy of U.S. Fish and Wildlife Service



# Nearshore food web is an east-west side story

These are tough times for the Lake Michigan food web. Invasive species and a loss of nutrients have wreaked havoc on native populations with species up and down the food chain competing for less food. But there may be some good news. Differences in the lake's nearshore food webs may be providing some much-needed stability.

The biggest difference lies at the base of the food webs on the lake's eastern and western shores. Fish and other aquatic species living off of Wisconsin and Illinois rely more on organisms living on the lake floor, while their cousins to the east are mainly munching on zooplankton.

For many species that call Lake Michigan home, these differences mean more options at the nearshore buffet and less risk that whole populations will collapse when food supplies are low in some areas. The yellow perch population, for example, may dwindle if zooplankton continues to decline, but the lake as a whole could still have enough yellow perch to support fisheries and feed larger fish.

Researchers from Illinois, Indiana, and Wisconsin discovered the east-west divide after analyzing the diets of round goby, yellow perch, and spottail shiner taken from around the lake in 2010. They relied on three techniques not usually combined: gut content analyses, fatty acids, and stable isotopes. Taken together, these approaches make it possible to see what fish ate right before being captured, in the weeks prior, and throughout their lives.

"This is the first study to document very important regional differences in food web structures across Lake Michigan," said Tomas Hook, IISG associate director of research and a project lead. "Researchers have been studying Lake Michigan's food web for decades, but many linkages in the nearshore have been under-described until now."

The most likely driver behind these regional differences is the lake itself. Much like its bordering states, the shores of Lake Michigan are very different. The east has mostly sandy nearshore



environments, more river mouths, and warmer water. Shorelines on the west are rockier and home to more upwellings that force nutrients and aquatic life from the lakebed to the surface, making bottom-dwelling prey a more readily available food source.

"The results suggest that resource managers may actually need different, more regional approaches for managing fish population and protecting the health of nearshore waters," said Sara Thomas, a project researcher at the Lake Michigan Biological Station.

The three-year project to map the food web is nearing its end, but there are a lot of questions still to answer. One of the biggest is whether patterns are the same year-to-year. Researchers also hope to learn more about how food web structures on both sides of Lake Michigan change with the seasons.

The study is a collaboration of researchers from Purdue University, the Illinois Natural History Survey, and the University of Wisconsin-Milwaukee Great Lakes Water Institute funded by grants from the Illinois-Indiana, Wisconsin, and Michigan Sea Grant Programs, the National Parks Service, the Environmental Protection Agency, and the U.S. EPA Great Lakes Restoration Initiative. It is part of a larger regional effort to understand the structure of Lake Michigan nearshore food webs led by IISG and other members of the Lake Michigan Great Lakes Regional Research Information Network.



# Student scientists explore real-world issues



Courtesy of Marea Spentzos-Inghram

Sixth graders in Chicago record squirrel sightings to share with researchers nationwide.

Middle school students at Chicago's Catherine Cook School are eagerly watching for snow this winter, but not for the usual reasons. They want to measure it and plot trends throughout the season, just like they have done with rainfall since the school year began.

It is all part of a volunteer weather-watching program – the Community Collaborative Rain, Hail and Snow Network or Co-CoRaHS – that has transformed these sixth graders into citizen scientists. Their teacher, Marea Spentzos-Inghram, got the idea to participate in the national program after a summer teacher workshop hosted by IISG introduced her to hands-on ways to bring Great Lakes science into the classroom.

“Getting out and collecting data themselves helps change how students see science. It shows them it is more than information

in a textbook,” said Spentzos-Inghram. “My goal is to connect that field experience with in-class activities to ultimately get the students thinking about issues like climate change and the role they play in it.” When they are not measuring rainfall, her sixth graders can be found collecting ants, recording squirrel sightings to help researchers better understand species diversity and range, and cleaning up their newly-adopted North Avenue Beach.

She was not the only teacher to shake up science class after attending the Great Lakes B-WET Field Experiences for Watershed Educators workshop. In Gary, Indiana, home school students are taking the “don't flush medications” message to students across the Chicago area with the help of their Wheel of Water game. The game also tests student knowledge of Great Lakes watersheds and the water cycle. LaToyia Gilbert's students, who range in age from 12 to 17, have used the game to teach middle school students in Illinois about key Great Lakes issues and plan to do the same in Gary-area schools later in the year.

“We want people to be careful with their water,” said Jasmine Brooks, one of Gilbert's students. “If a lot of people flush their medications, it builds up. This is important. When we pollute our fresh water, we are polluting the only water we will ever have to drink.”

Just south of Chicago in Sauk Village, seventh graders at Rickover Junior High are trading in their textbooks for maps of nearby forest preserves. Field trips to nearby nature centers will give students an opportunity to learn first-hand about the region's native plants and the invasive species threatening to push them out. The first trip in October was so popular that students from other classes have asked to join in, and the school's Green Club has decided to volunteer at the forest preserves next spring and summer.



Homeschoolers in Gary, IN review questions before presenting their Great Lakes watershed game to local schools.



Courtesy of Marea Spentzos-Inghram

Students at Catherine Cook School collect ants for national School of Ants project.

“Many of these students have never been to a forest preserve, so they have a lot of questions about the plants and wildlife they see there,” said Eileen DeJong, the science teacher who orchestrated the trips. “They are all very excited to go back.”

The B-WET workshop inspired these and other projects, teachers said, with its focus on local aquatic ecosystems and use of curriculum activities that can be easily integrated into the classroom. Fourteen teachers from Illinois and Indiana learned about everything from water quality and conservation to medicine disposal to climate change from IISG specialists and experts from the Peggy Notebaert Nature Museum, Indiana Dunes State Park, the National Park Service Great Lakes Research and Education Center, and the Alliance for the Great Lakes.

Specialists also discussed ideas for stewardship projects and shared four classroom-tested NOAA curricula developed in part by IISG’s education team. Teachers even got their hands dirty planting native species at the National Lakeshore Dunes Cowles Bog, testing water quality at the Nature Museum, and

## Restoration project inspires, engages students

Attia Gray, an 11th grader at the Hammond Academy of Science and Technology, likes picking up trash from beaches and river banks. She likes it so much, in fact, that she spent a summer studying marine debris and cleaning up beaches in the Bahamas. But Attia’s love for shoreline cleanup began much closer to home. The would-be marine biologist first discovered her interest while working with IISG and the U.S. EPA Great Lakes National Program Office to help restore Indiana’s Roxana Marsh.

It’s been nearly two years since the school’s eighth grade class spent a semester cleaning up shorelines, monitoring water quality, and learning about key concepts related to restoration projects. But for Attia and many others, the project has had lasting impacts.

“I really enjoyed testing the water,” said Ahtziry Andrade, an 11th grader who hopes to study marine biology at University of California San Diego. “It definitely reinforced my interest in marine biology and gave me a taste of what it is like to work in that field.”

Even those students whose life plans don’t include aquatic science said their experiences at Roxana Marsh changed their perceptions of their community and the importance of environmental stewardship.

“I never really paid much attention to the marsh before, but I do now” said Idalis Thompson, who also spoke about the project at a press event in June 2012. “And my family does as well. It feels nice to know we played a role in improving our community.”

cleaning up Fullerton Beach in Chicago.

“This was an amazing group of teachers who enthusiastically embraced the issues and immediately started sharing ways to connect the concepts with their curriculum,” said Terri Hallesy, IISG education specialist.

The workshop and teacher

stipends are funded through a grant from the NOAA Great Lakes B-WET Education Program. To learn more about the program, visit [thunderbay.noaa.gov/B-WET](http://thunderbay.noaa.gov/B-WET).



# New tool helps planners steer clear of tipping points

Land use planners have long known that building subdivisions, putting down roads, or converting prairies to farmland puts stress on local ecosystems. In fact, some changes, even small ones, can

Interactive maps and simulators show planners how much of their region is dominated by urban and agricultural land, where developed land is overstressing rivers and lakes, and what the watershed will look like if current land use practices continue. Planners can also test how developing more in one location or restoring habitats in another moves ecosystems closer to or further from tipping points. Together with recommended policies, ordinances, and outreach efforts, these features help planners prevent aquatic ecosystems from being degraded beyond repair.



Too much urban and agricultural development in a watershed can degrade aquatic ecosystems beyond repair.

push ecosystems past a “tipping point,” triggering rapid and sometimes irreversible shifts in how they function. The challenge is knowing how to steer clear of these tipping points while still meeting community needs.

A new collaboration of Sea Grant outreach specialists and researchers from universities across the Great Lakes is giving watershed planning groups the information they need to avoid tipping points. At the heart of the *Tipping Points and Indicators* program is a web-based decision support tool that reveals how close a watershed is to known tipping points and identifies the land use practices driving that.

“The tool introduces cutting-edge research to the planning process to help communities make sustainable land use decisions,” said Brian Miller, IISG director. “With this tool, planners can develop watershed-specific strategies to preserve natural resources and enhance local economies.”

“Crossing tipping points is costly,” said Bryan Pijanowski, Purdue University natural resource scientist and a lead program researcher. “Planners need to know the land use configurations that keep ecosystems in a safe zone, and this project uses the best science available to tell them what those are.”

Great Lakes Sea Grant specialists will start using the tool in their work with watershed planning groups in spring 2014. To learn more about the project and the planning tool, visit [tippingpointplanner.org](http://tippingpointplanner.org).

The *Tipping Points and Indicators* outreach and web tool are coordinated by IISG. Partners include Purdue University, University of Michigan, Michigan State University, University of Minnesota Duluth, University of Windsor, NOAA, the Great Lakes Environmental Research Laboratory, the Cooperative Institute for Limnology and Ecosystem Research, the Great Lakes Restoration Initiative, and the Great Lakes Sea Grant Network. Funding for the project comes from the U.S. Environmental Protection Agency and NOAA.

## Staff Update



Jenna Zieman has joined the team as IISG's fiscal coordinator. Located at the University of Illinois Urbana-Champaign, Jenna provides day-to-day fiscal support for the program. She came to Sea Grant from Northwestern University, where she was a research administrator for the Department of Medicine. Jenna holds MAs in information science and social work from the University of Michigan in Ann Arbor.



IISG's newest outreach specialist is Courtney Blouzdis. From her office at Purdue University Calumet, Courtney works to improve Great Lakes water quality by developing tools to help northwestern Indiana communities reduce stormwater runoff. Prior to joining the program, Courtney worked as a GIS technician for Plum Creek Timber Company in Michigan, where she researched and analyzed geographic data to create more accurate maps and statistics. She earned a bachelor's degree in natural resource planning and decision making from Purdue University.

## New research will inform natural resource decisions

The latest round of projects awarded IISG funding address some of the biggest concerns facing the Great Lakes. The three chosen projects will receive more than \$300,000 in funding over the next two years. And their results will help policy makers and natural resource managers preserve Lake Michigan habitats and strengthen lakeside communities.

IISG continues its commitment to better understanding nearshore food webs with a study using location monitoring data and tissue samples from fish to identify the types of wetlands sports fish rely on most for food and shelter. For this project, Gary Lamberti from University of Notre Dame will work with University of Wisconsin-Green Bay researcher Patrick Forsythe, who is funded by Wisconsin Sea Grant.

The other projects will use Sea Grant funding to better understand how the make-up and perceptions of lakeside communities and the individual

motivations of their residents interact with efforts to improve water quality. For example, Bethany Cutts and Andrew Greenly from the University of Illinois at Urbana-Champaign are analyzing the impacts of past sediment removal projects on community vulnerability to pinpoint the best ways to help communities weather environmental hazards such as pollution, natural disasters, and climate change. And Purdue University researchers Linda Prokopy and Nicholas Babin are examining what motivates landowners to adopt and continue practices that reduce stormwater runoff, such as rain barrels and rain gardens.

To learn more about past research projects and their results, visit [www.iiseagrant.org](http://www.iiseagrant.org) and click on the research page.

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maintenance to the built environment. More frequent thaws also change water pollution patterns. Instead of a big spring thaw that leads to a spike in pollution, contaminants will be released more steadily throughout the winter.

Jaffe and Woloszyn will submit this research report to the City of Chicago to help officials plan for these new conditions. The project was funded by the Great Lakes Integrated Science and Assessment Center at the University of Michigan and Michigan State University. This report is groundbreaking – little research has been done thus far on the winter impacts of climate change.

Key to the report is recommendations to help Chicago officials mitigate some of the impacts of warmer winter hazards. “Inspections might need to be more frequent, especially on buildings with balconies or signs that project over walkways,” Jaffe said.

In parks and public areas, the city can be proactive about heading off tree damage by planting more species that have branching patterns less susceptible to breaking under the weight of snow. Jaffe also recommends a larger margin of safety in the design of retention ponds and rain gardens. In other words, make them bigger. They are now sized to accommodate historical precipitation.

Some recommendations are more directly focused on public health concerns. For example, more frequent power blackouts may increase the risk of food spoilage and neighborhoods without heat. “We will need better guidelines on food safety, and we may need to create warming centers during winter power blackouts,” said Jaffe, “just as we will need cooling centers during summer heat waves.”