#### Winter 2010

# Aquatic Sciences Chronicle

UNIVERSITY OF WISCONSIN SEA GRANT INSTITUTE UNIVERSITY OF WISCONSIN WATER RESOURCES INSTITUTE

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## **GROUNDWATER ON THE RISE**

mages of houses tumbling into Lake Delton during record rainfalls in June 2008 remain etched in our memories. The 17 inches of rain that fell over southern Wisconsin in a 10-day period caused catastrophic flooding, and not just from overflowing streambanks.

Another more unusual type of flooding took place at the same time, less than 50 miles away. About 4,300 acres of land located near Spring Green but not in the Wisconsin River floodplain became inundated with water—water that rose from the ground and overtopped the land surface. This was groundwater flooding.

The land remained under water for more than five months. No amount of pumping would reduce the water level because there was no place for it to drain.

"People didn't understand what was going on because normally water has a place to go," stated Madeline Gotkowitz, a hydrologist from the Wisconsin Geological and Natural History Survey.

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Water surrounds a house in Spring Green. The flood was caused by groundwater flooding, instead of the more common surface water flooding.

#### Aniversity of Wisconsin

#### Aquatic Sciences Chronicle

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### FEATURED WEB TOOL Social Networking twitter.com/WiscWaterLib

For many people, the phrase "social networking" conjures up images of teenagers late at night, composing messages about their favorite rock bands. However, social networking Web sites are now a legitimate way for many organizations and businesses to reach their audiences, both near and far.

Wisconsin's Water Library is testing out two of these new technologies, Twitter and Facebook, to provide upto-date, water-related news, publications, events and resources. Twitter allows the library to send out short messages (called tweets) via its Twitter site. Tweets are limited to 140 characters. To see what we're saying, go to twitter.com/WiscWaterLib. Sign up with Twitter to receive tweets automatically.

While Twitter has "followers," Facebook has "fans." Facebook provides an excellent place to create a community of people interested in a topic—such as the Great Lakes-and post resources, links and ideas for the group. Once you have created a Facebook account, you can type "Wisconsin's Water Library" in the search box and then "fan" it.

Recent postings on both sites covered news about the new book *People of the Sturgeon*, reported on a new research report on mercury and highlighted new library resources.

The Water Library invites you to follow us on Twitter or become a fan on Facebook. And library staff always welcome comments and suggestions at the Ask Water page.

## programpeoplenews

The Aquatic Sciences Center is pleased to introduce Moira Harrington as the center's new communications manager. Harrington most recently served as the communications director for the University of Wisconsin Center for Tobacco Research and Intervention. She has a background in journalism and political science, having previously worked as a reporter at the State Capitol and as state director for U.S. Sen. Russ Feingold. "I am so pleased to be joining the UW Aquatic Sciences Center," Harrington said. "I am fortunate that in my past positions I have been able to contribute to positive

## WISCONSIN WATER EXPERTS MEET IN MIDDLETON WATER RESOURCES RESEARCH

"Emerging Challenges for the Waters of Wisconsin" was the theme of this year's annual meeting of the Wisconsin section of the American Water Resources Association (AWRA) March 4–5 in Middleton, Wis.

The meeting included more than 50 oral and poster presentations addressing a wide range of water resources topics, including endocrine disruptors in cattle farm runoff and the effect of road salt on water quality at a local, regional and national scale.

An opening plenary session highlighted emerging challenges for Wisconsin's water resources, featuring speakers Mark Borchardt, research scientist at the Marshfield Clinic Research Foundation; Jonathan Patz, UW-Madison professor and director of global environmental health; and Paul Kent, attorney with Anderson & Kent, S.C., in Madison. In addition, featured evening speaker state Sen. Mark Miller, co-chair of the Wisconsin legislature's groundwater work group, discussed efforts to develop a long-term management policy of the state's groundwater and surface water resources.

Students had been strongly encouraged to attend the annual conference to learn, network and gain experience in presenting their work. As such, the AWRA offered a special reduced student registration rate, awards for the best student presentations, and a free career workshop that followed the conclusion of the conference.

Also following the conference, the WICCI (Wisconsin Initiative on Climate Change Impacts) Water Resources Working Group held a workshop for conference attendees to help develop and prioritize water resource management adaptation strategies for the state of Wisconsin that can be applied on local, regional and statewide scales as part of WICCI's first Climate Change Adaptive Assessment report.

For more information about the conference, visit awra.org/state/wisconsin. The meeting is hosted annually by the AWRA-Wisconsin Section, UW Water Resources Institute, Center for Watershed Science and Education at UW-Stevens Point, Wisconsin Department of Natural Resources, Wisconsin Geological and Natural History Survey, and the Wisconsin District of the U.S. Geological Survey. – KSK

initiatives, whether it be enacting progressive public policies through my political work or influencing healthy behaviors through my most recent public health role. This opportunity, too, will be a meaningful and important experience for me. I look forward to meeting and learning from all of the dedicated folks who already are a part of this effort to provide research, outreach and education on groundwater and the Great Lakes."

Wisconsin's Water Library welcomes new student assistant **Omar Poler**, a second-year graduate student in the School of Library and Information Studies. Poler brings a wide range of experience and a keen interest in outreach to Wisconsin's American Indian communities.



#### wisconsin'swaterlibrary



## **Too Cold to Dive? Grab a Book** and Read!

Winter in Wisconsin is not the time for diving on shipwrecks, but it is a terrific time to dive into a book. Immerse yourself in one of these great titles on Great Lakes Shipwrecks. Each one illustrates the treasure trove of historical artifacts in the underwater world of the Great Lakes.

#### **GRAVEYARD OF THE LAKES BY MARK L. THOMPSON. DETROIT: WAYNE STATE**

**UNIVERSITY PRESS, 2000.** An historian and seasoned sailor, Thompson examines Great

Lakes shipwrecks that have occurred over the last 300 years to find their causes. He suggests that most have resulted from human error, ranging from simple mistakes to obvious lack of skill.

#### **MYSTERIES AND HISTORIES:** SHIPWRECKS OF THE GREAT LAKES **BY WES OLESZEWSKI. MARQUETTE, MICH.: AVERY** COLOR STUDIOS, 1997.

The author of seven books on Great Lakes maritime history, Oleszewski concentrates on 17 unsolved and little-known Great Lakes shipwrecks.

#### THE NIGHT THE FITZ WENT DOWN

#### BY HUGH E. BISHOP AND DUDLEY PAQUETTE. DULUTH, MINN.: LAKE SUPERIOR PORT CITIES, 2000.

Captain Paquette was on Lake Superior the night the Edmund *Fitzgerald* went down. He experienced the storm firsthand and has formulated his own theory about the sinking of the iron ore carrying Fitzgerald

#### SHIPWRECKS AND LOST TREASURES, GREAT LAKES: **LEGENDS AND LORE, PIRATES AND MORE!** BY MICHAEL J. VARHOLA AND PAUL G. HOFFMAN. **GUILFORD, CONN.: GLOBE PEQUOT, 2008**

Twenty-one riveting stories and illustrations about ships that met their end in the treacherous waters of the Great Lakes.

#### THE 'UNHOLY' APOSTLES: SHIPWRECK TALES OF THE APOSTLE ISLANDS **BY JAMES M. KELLER. CHELSEA, MICH.: BOOKCRAFTERS**,1993.

This is a carefully researched shipwreck history of the Chequamegon Bay area of Lake Superior-comprehensive, authoritative and exciting reading.

Please visit the Water Library at aqua.wisc.edu/waterlibrary for more information.

Anyone in Wisconsin can borrow these books. Just e-mail askwater@aqua.wisc.edu





## Wisconsin Shipwrecks Impress New Zealand Visitor

"Even from as far away as the other side of the world, the Great Lakes have a reputation for having some of the best-preserved wooden shipwrecks around," said maritime archeology student Matt Carter from New Zealand. When Carter was awarded the Our World Underwater Australasian Rolex Scholarship for 2009, he travelled to Wisconsin in October 2009 as part of a worldwide tour of maritime archaeological projects. Working with Keith Meverden and Tamara Thomsen of the Wisconsin Historical Society, Carter was able to dive the Lake Michigan wrecks of the Daniel Lyons, Fleetwing, Frank O'Connor, Australasia, Rouse Simmons, Walter B. Allen and Ocean Wave.

Carter reported, "I had heard that the visibility of the lakes was amazing and this, combined with the fantastically preserved shipwrecks, meant that I was very keen to get out diving. Our first day of diving was to the wreck of the Ocean Wave, a wooden schooner that sank in 1869. As we entered the water and descended, I caught my breath as the wreck came into view. Although she had been sitting on the lake bed for 140 years, the Ocean Wave was amazingly intact with her bowsprit still standing and eagle figurehead still clearly evident. What made this dive even more incredible was the visibility, which was at least 130 feet. I had never experienced this before in any of my diving around the world."

Explore Wisconsin's shipwrecks by visiting our Web site: wisconsinshipwrecks.org/.



### **SEA GRANT OUTREACH Web Page Provides** Latest Information on **Asian Carp**

Phil Moy, UW Sea Grant's fisheries and aquatic invasive species specialist, was one of hundreds of scientists at the Chicago Sanitary and Ship Canal in December 2009, where rotenone was applied to kill fish while the electronic barrier designed to keep Asian carp out of Lake Michigan was down for maintenance. The barrier serves as a last defense mechanism against the invasion of the carp that are predicted to wreck havoc on the Great Lakes. One bighead carp and several grass carp-two of the four Asian carp species-were found during the poisoning. Moy served as the demobilization unit leader during the operation. He serves as co-chair of the 27-member, multiagency Aquatic Nuisance Species Advisory Panel that provides input and guidance to the U.S. Army Corps of Engineers. The latest information about the carp can be found on Moy's Web page: seagrant.wisc.edu/AIS/. He was featured in two news broadcasts on Wisconsin Public Television and was interviewed in many major news stories. wpt2.org/npa/HAN823\_moy.cfm wpt2.org/npa/han823\_asiancarpreport.cfm



About 350 people came together in late September 2009 to attend a joint conference on the state of Lake Michigan and Great Lakes beaches. Vicky Harris, UW Sea Grant's water quality and habitat specialist, co-chaired the conference. More than 150 presentations were given covering 23 topics, including contamination cleanup, climate change impacts, wetlands, predicting beach contamination and swimming advisories, Lake Michigan wind power, invasive species, and nuisance and harmful algal blooms.

"The great attendance at the conference shows the high level of interest in Lake Michigan's water quality and beach health," said Harris. "President Obama's Great Lakes Restoration Initiative holds great promise and has people excited about making

Left to Right: Phil Moy prepares to net dead fish after a rotenone treatment in the Chicago Sanitary and Ship Canal in December 2009 (credit: Steve Pescitelli). Asian carp jumping (credit: Illinois River Biological Station - Illinois Natural History Survey). Harbor corrosion (credit: UW Sea Grant/Gene Clark). Below: ASC Aquaculture Specialist Fred Binkowski and Librarian Anne Moser enjoy a tour of Sweet Water Organics, one of five field trips offered at the State of Lake Michigan Conference (credit: UW Sea Grant/Carolyn Rumery Betz).

### Harbor Corrosion Culprit Identified

Recently published research has identified one mechanism that may be responsible for accelerated steel corrosion in the Duluth-Superior Harbor. A specific sequence of biological, chemical and physical events is apparently to blame for the corrosion found on 20 kilometers of steel sheet piling and structures around the harbor. The process involves oxygen-reacting bacteria and high levels of copper in the water, encouraged by ice scraping against steel structures in the frozen harbor each winter. (For more information, please visit seagrant.wisc.edu/coastalhazards.) "This study confirms that ongoing repair and mitigation studies in the local harbor are on the right track," said UW Sea Grant Coastal Engineering Specialist Gene Clark, who has served on a steering committee investigating the accelerated corrosion since it was first identified four years ago. Clark is assisting efforts to develop methods to slow down or stop the corrosion before the damaged steel must be entirely replaced. He is also encouraging other Great Lakes ports, harbors and marinas to examine their infrastructure for similar damage.

## **GROUNDWATER ON THE RISE** continued from page 1



Gotkowitz developed a computer model that showed the groundwater level in the shallow aquifer had risen by as much as 12 feet. The modeling results were supported by real-time measurements from nearby monitoring wells. The monitoring well data suggest that groundwater flooding is likely to occur every 13.5 years in this region.

The town of Spring Green applied for FEMA mitigation grant funds to buy out 28 homes that had sustained damage to more than 50 percent of the structure. Flooding—in this case, groundwater flooding—predicted to occur more frequently than once every 15 years makes a buyout cost-effective and therefore eligible for FEMA funds.

The cost of the buyout is \$5.37 million according to Roxanne Gray, hazard mitigation officer for Wisconsin Emergency Management (WEM). The funds are provided through FEMA's Hazard Mitigation Grant Program. FEMA provides 75 percent of the funds, WEM provides 12.5 percent and, in this instance, a Community Development Block Grant provides the remaining match. The town of Spring Green will purchase and own the land, which will be deed restricted, meaning no development will take place in the future. "Without Madeline's scientific expertise in groundwater hydrology, we would never have been able to help the people in the town of Spring Green," said Gray. "She was the key to our being able to determine where and how frequently groundwater flooding will take place."

Scientists and policymakers can use real-life extreme weather events like those in Spring Green to help predict where groundwater flooding may occur in other geologically similar areas of the state. Gotkowitz and her colleagues had been awarded a 2009 grant from the Groundwater Coordinating Council to make such assessments. The study, which is ongoing in 2010, will apply a series of climate forecast and hydrologic models to selected landscapes that are vulnerable to water table rise and groundwater flooding.

Communities can use the results of these predictions to develop more environmentally sensitive land use plans. Some communities in Waukesha and Dane counties, for example, may incorporate the information on high groundwater levels into their zoning codes. Areas that are vulnerable to groundwater flooding should not be used for future development. "It is important to know where groundwater plays a role in flooding," said Gotkowitz. "I am hoping that communities will be able to use the results of this project to evaluate the need for stricter planning and zoning." - CRB



One former student, University of Puerto Rico Professor José Manuel López, said that the course was his first research experience at sea. "This experience was fundamental in my decision to continue in the Ph.D. program in Oceanography and Environmental Sciences."

UW Sea Grant provides support for the interdisciplinary "Problems in Oceanography" course at UW-Madison. Offered biennially since 1968, the course enables graduate students to obtain field experience during a week-long trip to a research station at Sapelo Island, Ga., where they learn firsthand about estuarine ecology. This popular course has been a turning point in the education of many students who later pursued careers in marine science as a result of the experience.

#### Aniversity of Wisconsin

When called into the disaster area, the Federal Emergency Management Agency (FEMA) admitted never having dealt with groundwater flooding, only surface water flooding. Fortunately, Gotkowitz was able to provide the expertise in groundwater hydrology that the agency needed. She concluded the sand and gravel aquifer in the area fills rapidly from runoff coming from areas of fine-grained sediments to the north.



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## **Aquatic Sciences Chronicle**

a joint newsletter from UW Sea Grant and UW Water Resources



#### **CALENDAR** OF EVENTS

MARCH 4-5, 2010 American Water Resources Association– Wisconsin Section 33rd Annual Conference Middleton, Wis. state.awra.org/wisconsin

#### APRIL 23-25, 2010

National Ocean Sciences Bowl St. Petersburg, Fla. oceanleadership.org/education/national-ocean-sciences-bowl

#### MAY 17-21, 2010

IAGLR's 53rd Annual Conference Toronto *iaglr.org/conference* 



**CATCH** OUR LAKE STURGEON EXHIBIT AT SCIENCE EXPEDITIONS 2010! APRIL 10, 2010

University of Wisconsin-Madison science.wisc.edu/sciex2010

#### Did you know?

The lake sturgeon is the largest fish in the Great Lakes and is considered a living fossil because it has survived—virtually unchanged—for more than 150 million years.