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Aquatic Sciences Chronicle

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

INSIDE:



Struggling Superior Siscowet



A Future in the Past



R Is for ROV



Evan Larson

WATER RESOURCES INSTITUTE RESEARCH

LEARNING FROM TREES

Climate Variability Data Found in Tree Rings

Tree rings can reveal the extent of long-term variability in rainfall and climate, offering scientists a record that extends hundreds of years into the past.

New technologies provide inspiration for some research projects, and some are a result of studies. For Evan Larson, assistant professor of geography at the University of Wisconsin-Platteville, inspiration came in the form of a bike ride.

“I was riding through the Platteville countryside, and I saw all these beautiful old oak trees,” said Larson, who also co-directs UW-Platteville’s Tree-Ring, Earth and Environmental Sciences (TREES) Laboratory (www3.uwplatt.edu/trees). “I realized the area had a lot of trees that have lingered on the landscape since before European settlement, and that those trees could tell us the history of the climate in this region.”

Larson and Christopher Underwood, an adjunct research faculty member at the TREES Lab, successfully submitted a proposal to the University of Wisconsin Water Resources Institute that was awarded two years of funding. Their project, *Establishing the Long-Term Range of Variability in Drought Conditions for Southwest Wisconsin*, involves taking core samples from more than 400 ancient oak trees throughout Wisconsin’s Driftless Region. In this first comprehensive tree coring study for the region, researchers will analyze the ring-width patterns within the cores for signs of long-term variability in rainfall and climate conditions

continued on page 6 >>

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FEATURED SOCIAL MEDIA + WEB



New Video Offers Insight into Great Lakes Investment

When polluted lakes and rivers are cleaned up, local communities can see economic benefits to the tune of billions of dollars, according to the Brookings Institute. A new video, "Revitalizing Local Waterfront Economies: The Great Lakes Legacy Act," offers a rundown on this federal and local partnership program, its procedures and successes.

The 10-minute video, funded by a grant from the Environmental Protection Agency (EPA) Great Lakes National Program Office, explores Great Lakes waterways blighted by decades of industrial discharges like heavy metals, oil and chemicals such as PCBs and PAHs. The 2002 U.S. Legacy Act created an initiative to clean up contamination in these places, designated areas of concern (AOCs) by the EPA.

The video informs anglers, boaters, marina operators and local businesses of the benefits that can come from a remediated AOC. The procedures and successes are the result of strong partnerships among states, municipalities, non-governmental organizations and businesses. Under this voluntary, collaborative program, the EPA and its nonfederal partners have allocated almost \$400 million toward sediment remediation.

"Cleaner lakes and rivers improve human health, fish and wildlife health, recreation, tourism and redevelopment so that residents can better capitalize on these opportunities," said Caitie McCoy, an Illinois-Indiana Sea Grant environmental social scientist and co-producer of the video. McCoy said she's received lots of positive feedback about the video from AOC stakeholders.

Wisconsin Sea Grant videographer John Karl shot and edited the footage for the video.

To see the video, go to seagrant.wisc.edu/videos or order a DVD from aqu.wisc.edu/publications.

SEA GRANT INSTITUTE RESEARCH

WARMING LAKE SUPERIOR

Cheers Some Sportfish, Challenges Others

Using a mix of computer modeling and temperature measurements, Wisconsin Sea Grant-funded researchers have found that water temperature changes over the past 27 years have made conditions more favorable for Chinook salmon, walleye and lean lake trout and less favorable for siscowet lake trout, which prefer colder water and have lost about 20 percent of their historical habitat. The results were recently published in PLOS One, a journal of the Public Library of Science (go.wisc.edu/o16265).

The project builds on research by the University of Minnesota Duluth's Large Lakes Observatory, which found that Lake Superior is warming at a relatively fast rate. Surface water temperatures increased 2.5 degrees Celsius between 1979 and 2006.

"People should be paying attention to Lake Superior. It's warming at one of the fastest rates of any other lake observed on Earth," said Timothy Cline, lead author of the University of Wisconsin-Madison study and now a graduate student in the School of Aquatic and Fishery Sciences at the University of Washington. "With this project, we wanted to investigate how that temperature change can alter the distribution of fish species in the lake."

The researchers picked lake trout and siscowet trout (*Salvelinus namaycush*), Chinook salmon (*Oncorhynchus tshawytscha*) and walleye (*Sander vitereus*) for their importance to the economy, recreation and environment. They used a three-dimensional hydrodynamic computer model modified by co-author Val Bennington, based at UW-Madison, to map changes in Lake Superior water temperatures and match that to the temperatures preferred by the four fish species.

"We found that the number of days with preferred temperatures and the amount of water available within the preferred temperature range have increased significantly for lean lake trout, salmon and walleye," said Cline. "The number of days and amount of preferred thermal habitat for siscowet are shrinking slightly, forcing them to move farther from the coast. We also found that the eastern side of the lake is warming faster than the western side."



A siscowet lake trout held by Mike Hoff, Fish and Wildlife Service.

Does this mean fewer siscowet will live in Lake Superior in the future? Not necessarily, said Cline. "We can't say that this will change fish production," he said. "But this study is a good start to be able to answer that question. Data are being synthesized in a collaborative effort by a dozen agencies that could provide a better picture of how fish react to climate change. It depends on whether the productivity of the fishes' food source is affected. But I do think it's safe to say that we can certainly expect to see changes in the dominant players in the food web as climate change proceeds."

"Lake Superior has more fish than ever before," said James Kitchell, retired UW-Madison professor and study lead investigator. "And siscowet trout outnumber lean lake trout five to one. This could be due, in part, to a 50 percent greater spatial extent and longer durations of coldwater habitat in the past. Warming is changing fish habitats, and the extent of habitat for lean lake trout is increasing while that of siscowets is declining." —MEZ



Climate change

"Climate" describes long-term averages in the world's weather, and "climate change" refers to a change in these weather patterns. Climate change is one of today's most important and far-reaching scientific and policy challenges, destined to affect the planet's future in many ways for generations to come. Although research continues on its extent, its causes and the appropriate responses, much is already written for interested citizens wanting to familiarize themselves with the situation and the policy debates.

THE ECONOMICS OF CLIMATE CHANGE: ADAPTATIONS PAST AND PRESENT

Edited by Gary D. Libecap and Richard H. Steckel. Chicago: University of Chicago Press, 2011.

This volume takes a close look at the ways in which economies have adjusted to the challenges climate change poses, including institutional features that help insulate the economy from shocks, such as irrigation, flood control and ways of extending cultivation to new geographic areas.

MODELLING THE IMPACT OF CLIMATE CHANGE ON WATER RESOURCES

Edited by C. Fai Fung, et al. Oxford, UK; Hoboken, NJ: Wiley, 2011.

This book is a practical guide to understanding the opportunities and pitfalls in the quantitative assessment of climate change impacts and adaptation in the water resource sector.

UNDERSTANDING CLIMATE CHANGE: CLIMATE VARIABILITY, PREDICTABILITY, AND CHANGE IN THE MIDWESTERN UNITED STATES

Edited by S. C. Pryor. Bloomington: Indiana University Press, 2009.

This book focuses on the Midwestern United States—a region that contains approximately one-fifth of the nation's population, plays a critical role in national agricultural productivity and experiences a high frequency of extreme events. Employing observational data and model simulations, the research presented here provides detailed assessments of climate change, variability and predictability over the past 100 years with predictions for the coming century.

VISUALIZING CLIMATE CHANGE: A GUIDE TO VISUAL COMMUNICATION OF CLIMATE CHANGE AND DEVELOPING LOCAL SOLUTIONS

By Stephen R.J. Sheppard. Abingdon, Oxon; New York: Routledge, 2012.

Using dramatic visual imagery such as 3D and 4D visualizations of future landscapes, community mapping and iconic photographs, this book demonstrates new ways to make carbon and climate change visible where we care the most, in our own backyards and local communities.

Many of these acquisitions were purchased with a generous grant from the Friends of the UW Madison Libraries.

If you wish to see more books on this topic, visit our recommended reading list at go.wisc.edu/giz969

Anyone in Wisconsin can borrow these books. Just email askwater@aqua.wisc.edu.



Caitlin Zant Future Maritime Archaeologist

It was Caitlin Zant's first real shipwreck, and it went well.

Zant, a North Carolina resident and graduate of Wisconsin's Carthage College, is one of a group of 30 graduate students from East Carolina University who surveyed the wreck of the *Adriatic*, a 19th century-era self-unloading schooner-berge abandoned and sunk in the shallow waters of Sturgeon Bay, Wis. It's located off the shore of the Bay Shipping Co.

Led by Tamara Thomsen and Chad Gulseth, a pair of maritime archaeologists with the Wisconsin Historical Society, each diver took a section of the wreck to survey. Once underwater, the divers measured and sketched out their sections, then compiled their drawings into a full-scale image of the wreck.

Zant, 23, has completed her first year in the maritime studies program at East Carolina University, and she was on the *Adriatic* survey team thanks to funding from Wisconsin Sea Grant.

"For most of us, this is the first wreck we've mapped, or even seen underwater in its natural state," said Zant, who noted that typically, students practice on staged wreckage in swimming pools.

"Luckily, the wreck is fairly intact," said Zant. "It's held up better than we expected to see. We figured the number of ships traversing the bay would have had negative effects, but there's been no further damage."

The *Adriatic* has a rich history. Constructed in 1889 by timber magnate James Davidson, it became the first wooden schooner with self-unloading equipment to sail the Great Lakes. It was converted to a self-unloading barge, and became a fixture of the Sturgeon Bay stone trade until it was retired and abandoned in 1930. Over the course of its lifetime, it suffered more than \$2,000 in fire damage, and one of its captains died shortly after the self-unloading boom fell on him.

Zant has now begun another school project in the field, mapping a wreck on the outer banks of North Carolina. Eventually, she'd like to return to Wisconsin.

"The way my research is going, I'd like to come back to the Great Lakes—it's always been a part of me," she said. "It has a fascinating maritime heritage that's not given the same amount of attention as the ocean coasts. There's a lot still to be looked at in Lake Michigan." —ARC



Photos by Tamara Thomsen/
Wisconsin Historical Society

OUTREACH



Marie Zhuikov/Aquatic Sciences Center

The River Talks

Wisconsin Sea Grant is teaming up with the Lake Superior National Estuarine Research Reserve (NERR) to start a series of science café-type evening talks about the St. Louis River Estuary. These informal "River Talks" will begin in September and will be held on the last Tuesday of the month through spring, starting in Superior, Wisc., and then moving across the estuary to Duluth, Minn.

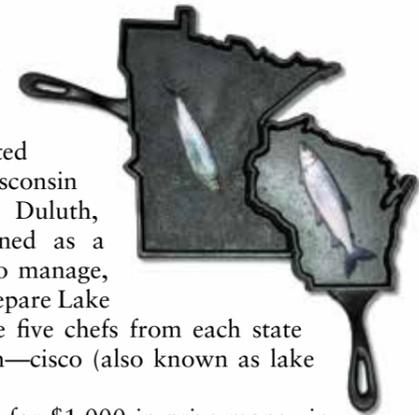
"Our goal is to engage Twin Ports residents in discussions about the St. Louis River Estuary in a social environment with the organizations and individuals that value the estuary and work to address critical issues to its health and the health of surrounding communities," said Becky Sapper, assistant reserve manager of the Lake Superior NERR.

Topics will include river restoration, research and outreach projects. Speakers will include agency representatives, scientists, tribal representatives, artists and businesses.

See seagrant.wisc.edu/home/Topics/HabitatsandEcosystems for details.

Lake Superior Fish Classic: Minnesota vs. Wisconsin Chefs

Judge for yourself: Are Wisconsin or Minnesota chefs better at cooking Lake Superior fish? Find out on Oct. 4, 2013, at an evening taste-testing hosted by the Minnesota and Wisconsin Sea Grant programs in Duluth, Minn. The event, designed as a tribute to the people who manage, harvest, sell, study and prepare Lake Superior fish, will feature five chefs from each state cooking two types of fish—cisco (also known as lake herring) and whitefish.



The chefs will compete for \$1,000 in prize money in a judged competition and for the public's taste bud approval with a people's choice award. While savoring the flavors, diners can listen to live music and chat with the chefs and sustainable fisheries experts. At the end of the evening, the winners will be announced and door prizes delivered.

Tickets to the event are \$15. For more information, visit seagrant.umn.edu or call (218) 726-8106.

TREE RINGS

continued from page 1

Have an old oak in southwestern Wisconsin? WRI researchers want to hear from you.

Top: The bur oaks and white oaks common to the rolling hills and savannas of the Driftless Area in southwestern Wisconsin can live for hundreds of years and hold stories within their annual growth rings. (Photo taken near Mineral Point in southwest Wisconsin.)

Bottom: Tom Wilding and Ben Gultch, research associate and student at UW-Platteville, respectively, coring an old oak at the Swamp Lover's Oak Savanna restoration site.

to lay the foundation for similar efforts across the state.

"Trees are excellent recorders of their environment," Larson said. "Wide rings indicate years of good growth while narrow rings represent stressful times. Using these patterns of growth, we can expand our perspective on climate beyond what instrumental records can tell us, moving further into the past to build a more complete picture of the range of potential drought conditions we may face as a region."

Sara Allen, a UW-Platteville geography and history double major, will help spearhead the project as a post-bachelor research fellow, along with six to eight undergraduate students.

"Southwestern Wisconsin is an agricultural area, and the drought that affected crop production last year had a negative impact on the farmers throughout the region. Looking into historical drought patterns can help us better prepare for possible water deficits in the future," Allen said. "This project will give me the opportunity to move into a mentoring role after I graduate in May. I'm excited to teach undergraduates about the applications of tree-ring research and help prepare the next wave of enthusiastic dendrochronologists."

Dendrochronologists study the growth rings of trees with a variety of tools. For this project, researchers will take samples from living trees with increment borers—essentially a hollow drill bit, turned by hand, that removes a pencil-width piece of wood from the tree. Drilling into the tree, Larson said, is akin to taking a blood sample from a person and does not cause the tree lasting damage.

Although Larson's bike ride helped pinpoint the location of some trees, the researchers need help from the public to find others.



Evam Larson

"What makes the Driftless Area of southwestern Wisconsin so beautiful are the rolling hills and hidden valleys that were once covered by oak savannas," Larson said. "But this beauty also makes it difficult to conduct a thorough inventory of the area for old trees. There are simply too many hidden hollows and valleys for us to explore."

Landowners in southwestern Wisconsin who have oak trees they suspect may be hundreds of years old on their property are invited to contact Larson if they would like their trees considered for the project.

"There is something about oak trees that resonates with people, and this often leads to curiosity about their ages," said Larson. "Although we cannot always determine the exact age of a tree because of rot or the precision needed to cross the very center of a trunk with an increment borer, we can provide a good estimate in most cases."

The researchers hope that in exchange for permission to sample the rings of old oaks, they can offer property owners a glimpse into the environmental history of their land.

Larson can be reached at (608) 342-6139 or larsonev@uwplatt.edu. —MEZ

R Is for ROV

Wisconsin Sea Grant is poised to add a cool new tech tool to its education outreach arsenal—an underwater remote-operated vehicle (ROV).

Kathy Kline, Wisconsin Sea Grant's education outreach coordinator, has been featuring an ROV as part of the presentations she makes to children and families at the UW-Madison's annual Grandparents University event. It's a great, hands-on way to talk about how marine researchers and divers use the device to perform key tasks like water sampling.

But each time, she's had to borrow a unit from researchers at the UW-Milwaukee School of Freshwater Sciences. Given the extravagant cost of most high-end ROVs—"as much as a Toyota Corolla," Phil Moy, Wisconsin Sea Grant's assistant director for research, is fond of saying—acquiring an ROV seemed impossible.

Not anymore, thanks to a pair of underwater robot enthusiasts who formed a project called OpenROV, an open-source, do-it-yourself community of explorers dedicated to making ROV tech accessible to the masses. They've created an ROV kit that's affordable for programs like Wisconsin Sea Grant to purchase and use for science and education.

ROVs offer several functional advantages, including the ability to reach underwater places where divers can't



UW Sea Grant Information Systems Engineer James Grandt displays the ROV at UW-Madison Day at the Wisconsin State Fair.

go. Wisconsin Sea Grant plans to use it to collect water samples and capture underwater video at shipwreck sites in the Great Lakes. Kline also plans to take it out into the field, letting kids test-drive it in the waters near the docks of various Madison-area lakes.

"It's a nice way to bring in some engineering to our presentations," said Kline. "And of course, the kids all think it's cool—wow, an underwater robot! They're also a lot better at driving it than I am," Kline joked. —ARC

programpeoplenews



Jeremy Jones on the Tournament Circuit

The 2013 fishing tournament season is beginning to wind down, but major events are still occurring in states across the Midwest. Delivering the Stop Aquatic Hitchhikers!™ message to tournament organizers and thousands of anglers is a complicated task. Wisconsin Sea Grant made it slightly easier by adding Jeremy Jones to its aquatic invasive species outreach team this past summer.

Jeremy Jones, a 33-year-old graduate student currently pursuing a degree in water resources management at the University of Wisconsin-Madison's Nelson Institute for Environmental Studies, will spend next summer working part-time as an outreach specialist as well. He's joined a team that already includes Phil Moy, Wisconsin Sea Grant's assistant director for research, and Tim Campbell, Wisconsin Sea Grant's aquatic invasive species specialist.

Jones, who hails from Michigan, has a background that's prepared him well for the job. He spent a decade as a program manager with the Seattle-based EarthCorps, disseminating information about invasive plants and insect species to local landowners and the public.

"In working with anglers, the trick is to not get in the way of fishing," said Jones. "Really, it's about the resources. Once fishermen understand that their actions can have a big impact on fish populations, they're usually willing to listen and act."

Jones holds anthropology and zoology degrees from the University of Michigan. He enjoyed the 2013 summer travelling across the state, visiting Wisconsin's lakes and interacting with anglers.

"The tournament organizers, they get it," Jones said. "They know that education's a key way to stop invasive species, and now they're thinking about the best ways to communicate it." —ARC

Terril Liebmann/Aquatic Sciences Center

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CALENDAR OF EVENTS

OCT. 6-11, 2013

5th World Conference on Ecological Restoration

Madison, Wis.

ser2013.org/about/ser-25th-anniversary

OCT. 10-12, 2013

Wisconsin Association for Floodplain, Stormwater and Coastal Management Conference

Madison, Wis.

wi.floods.org/Annual_Conference

OCT. 15-17, 2013

Lake Michigan State of the Lake and Great Lakes Beach Association Conference

Sheboygan, Wis.

aqua.wisc.edu/solm

NOV. 4-7, 2013

2013 AWRA Annual Water Resources Conference

Portland, Ore.

awra.org/meetings/Portland2013



Download Podcast Series and Learn About Surfing, Food Webs, Shipwrecks and More

Let the waves of lakes Superior and Michigan lap against your computer or portable device. Take in the rhythms of originally composed and performed music by Sea Grant's Audio Specialist Chris Bocast. Meet the people who live, work, recreate on and study Wisconsin's Great Lakes. It's all possible by visiting seagrants.wisc.edu/podcasts and playing or downloading two podcast series—"Sea Grant and Lake Superior, Sustaining the Freshwater Sea" and "Sea Grant and Lake Michigan, Waters in Transition."

The seven-part series on Lake Superior covers topics such as shipwrecks, harbor steel corrosion, coastal land use and a wave sensor safety project at the Apostle Island sea caves. The 10-part series on Lake Michigan covers topics such as a changing food web, beach health and surfing.

