UPWELLINGS

An upwelling occurs in a lake or ocean when strong, steady winds push warm in-shore surface water away from shore causing colder, nutrient-rich water to rise.

Upwellings is published quarterly by the Michigan Sea Grant College Program, a cooperative effort of the University of Michigan and Michigan State University. The program supports understanding and stewardship of the Great Lakes through research, outreach and education.

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ROUND UP OF MICHIGAN SEA GRANT HAPPENINGS

NEW FELLOWS

After a rigorous selection process, two fellows from Michigan have been chosen by the National Sea Grant Program office.

JULIE MIDA, a Michigan native, was appointed as the Great Lakes Commission Fellow. Mida recently finished an MS in Aquatic Sciences from the University of Michigan, where she researched the role of the opossum shrimp (Mysis relicta) in the altered food webs of Lakes Michigan and Huron. Her work at the Commission will focus on invasive species, habitat restoration and coastal wind development.

COLIN HUME was chosen to be part of the 2011 class of Knauss Fellows. He recently obtained an MS at the University of Michigan, with a focus on Conservation Biology and Environmental Policy. With an initial degree in biology from Western Washington University, the Seattle native has worked on a number of field research projects such as snagging bear hair for DNA analysis, tracking the movement of carnivores, and searching for amphibians in wetlands. Hume also spent time in Afghanistan and Ethiopia as a photographer, videographer and fundraising coordinator for two NGOs.

Hume said he hopes the Knauss Fellowship will deepen his understanding of environmental approaches within the public sector. Hume, along with about 40 other fellows from around the country, will find out agency assignments in November, and will head to Washington D.C. in January 2011.

PASSING ALONG KNOWLEDGE

Earlier this summer, Extension Educator Ronald Kinnunen was the recipient of the Lake Superior Binational Forum Environmental Stewardship Award. The judges recognized him for designing and conducting numerous outstanding educational programs about Lake Superior for young people.

NOTES FROM THE FIELD: MICHIGAN SEA GRANT RESEARCH UPDATES

BLOWIN’ IN THE WIND

As part of ongoing research, the Sea Grant-funded research team leading the West Michigan Wind Assessment recently released two new publications:

Wind Issue Brief #2 – Flicker, Noise and Air Quality looks at the effects energy production from various sources, including coal and wind turbines, can have on human health.

Wind Power Glossary – Everything you need to know about wind turbine parts, construction and how they transfer energy. A good primer for anyone interested in learning more about wind power.

THE RESULTS ARE IN

This summer, three Sea Grant-funded research teams that began projects in 2007 have published the results of their work. Each project tackled a different coastal management issue, performed a thorough assessment of the problem, and with the final reporting, have provided best possible solutions. Final reports, maps and other tools are available at: www.miseagrant.umich.edu/research/projects

Michigan Sea Grant is funded by the National Oceanic and Atmospheric Administration and the State of Michigan. Michigan State University and the University of Michigan are equal opportunity/affirmative action institutions.
**Rein in the Runoff** – A research team from Aniss Water Resources Institute, Grand Valley State University assessed stormwater runoff issues in the Spring Lake watershed in western Michigan. Researchers developed a variety of tools to help community leaders select and implement strategies for reducing runoff and improving water quality, including computer models of runoff in the watershed, a range of maps, a detailed comparison of stormwater management techniques and several example ordinances for cities and townships to use.

**Coastal Brownfield Redevelopment** – Researchers from Eastern Michigan University reviewed 55 brownfield projects, explored the process of redevelopment, and identified specific benefits for the surrounding neighborhoods. State decision makers and brownfield professionals are currently using the results to support redevelopment as a means of enhancing coastal access and improving public green space and community character, as well as the local economy.

**Detroit River Fish Consumption Advisories** – A research team led by Donna Kashian from Wayne State University evaluated the causes and implications of contaminants in fish. Models were used to predict PCB levels in species of fish not currently tested and to estimate the role of new and legacy pollution sources.

**INPUT NEEDED ON CLINTON RIVER WATERSHED**
Three meetings will be held this fall to discuss lake and river water levels and to ask for input from residents of the Clinton River Watershed. This Sea Grant-funded research project, led by water resource engineer Don Carpenter from Lawrence Technological University, is studying how water could be better managed in the watershed to enhance the environment and neighboring towns. The meetings are set for Waterford and Auburn Hills. More information about the meetings and early results of the research can be found at: www.ltu.edu/water/iaclintonrivershed.asp

**PLANNING FOR THE FUTURE**
This fall, Michigan Sea Grant is looking to identify issues for new research. Feedback from a range of professionals, government officials, researchers and citizens will help us choose and refine research topics. Ideas can be submitted via email or phone by October 30, 2010.

Contact Lynn Vaccaro if you would like to suggest a topic or add your name to the research e-mail list.

Email: Lvaccaro@umich.edu or Phone: (734) 763-1530.

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**RETIRING FROM THE POSITION, NOT THE FIGHT**
Carol Swinehart has been Michigan Sea Grant’s extension communications specialist and invasive species expert for more than 25 years. Last month she retired from the position that she has held since 1984, based at Michigan State University.

Carol has made a tremendous contribution in raising awareness about both native and invasive species. She has been one of the driving forces behind *The Life of the Lakes, A Guide to the Great Lakes Fishery*, as well as countless other projects and products.

Through the years she has witnessed the introduction of (and subsequent dealings with) invasive species in the Great Lakes and how we’ve addressed these challenges. Even before she came to Michigan Sea Grant, Carol was tapped into the invasive issue.

“I vividly remember being in Chicago in 1967 and seeing and smelling all of the Alewives rotting on the beach,” she recalled. Since then she’s seen the spread of zebra mussels, the control of sea lampreys and the increasing introduction of other invasives in Michigan and the Great Lakes region.

When Carol retires she will be taking quite a bit of institutional knowledge with her. But not to fear, she said, she won’t be saying goodbye completely.

“The Great Lakes are pretty much in my blood now,” she said. “I won’t be retiring from being an expert – I’m only retiring from my administrative role at the University.”

And *Helga* the *Hydrilla* may be making appearances here and there.

Reach Carol by email at CYS@msu.edu.

At the nucleus of Michigan Sea Grant educational efforts is one core belief: the Great Lakes themselves are a great educator. It’s a basic idea that has fueled Michigan Sea Grant’s mission of making science-based information about the Great Lakes available to educators, decision-makers and the general public. Studying the lakes also opens up opportunities to learn about many disciplines, including science and aquatic ecosystems, history and culture, as well as poetry and language arts.

**EMPOWERING TEACHERS AND STUDENTS**

A well-educated public makes for better decision-making; when it comes to natural resources as important as the Great Lakes, it is crucial to have wise stewards now and in the future. Michigan Sea Grant provides educators tools to incorporate Great Lakes content into existing education lessons. Programs are designed to stimulate interest in the Great Lakes and help students and adults understand their role in protecting these vital freshwater resources.

“Showing teachers how to use the environment as a classroom, and a teaching tool, is a way of empowering them,” said Brandon Schroeder, Northeast Michigan Extension Educator with Michigan Sea Grant.

Schroeder has focused on educational efforts in the Great Lakes and has partnered with many other organizations to lead education initiatives unique to Michigan. “An important aspect of training teachers is to show them how the natural resources in their own communities can be teaching tools,” he said. Often, teachers will know about a park or will explore different places in the community, but making a direct connection from the Great Lakes to their classroom can be difficult.

“Making that kind of connection to a place, connecting the classroom to what we have right here in our own backyards, that’s what we need to do more of,” said Schroeder. “Why use the rainforests to teach about trees and soil when we have forests right here? Why use the oceans to teach about aquatic ecosystems when we have the Great Lakes right here?”

**ON THE SAME TEAM: NATURE AND TECHNOLOGY**

While the education movements of incorporating more technology into classrooms and getting students out of the classroom (i.e., the *No Child Left Inside* initiative) may seem to be moving in different directions, the two can gracefully intersect. And Michigan Sea Grant educational efforts are aimed at making that happen.

Through online curriculum and educational portals, the tools for teaching environmental science are free, accessible anytime and presented in a way students and teachers of all levels can use. These resources, combined with place-based education workshops, cruises and special initiatives to bring teachers and researchers together, succeed in getting educators and students outside to learn about the Great Lakes. Often, educators successfully blend technology and hands-on environmental experiences. Educators are quite adept at making natural resource topics relevant for students, ensuring that they can identify with environmental issues they are likely to encounter in their lives.

“Without this component, this learning to be part of the community, when the students graduate it’s like they’ve been handed different parts of a bicycle without knowing how to put them together or knowing how to ride.”

– Jon Yoder

For example, a new web portal called *Teaching with Great Lakes Data* provides real science in a format that makes it useable in a classroom. The web site, supported through COSEE-Great Lakes, the Great Lakes Observing System and researchers at Eastern Michigan University, consists of three main components: scientific data sets, ready-to-go lessons and activities, and a guided-inquiry section. All three segments can be used solely in the classroom. However, they can also easily be used as an inspiration to
do field work or pursue place-based educational opportunities. Lessons focus on subjects like how the Great Lakes have a significant impact on weather in Michigan and the region and how Michigan can produce 60 percent of the cherries grown in the entire United States.

PROVIDING PURPOSE
The classic question for most students has traditionally been: why do I need to know this? Using an environmental education approach, along with real data, encourages students to answer that question themselves. It puts the student in the role of a researcher and then challenges them to analyze issues and propose solutions to problems.

Additionally, using the environment as an integral part of teaching has shown some significant benefits. According to the National Science Foundation’s National Science Board, students not only gain knowledge about the subject they are studying, but they also show a marked improvement in other subjects, increased engagement in learning, and a greater pride and ownership in accomplishments when environmental science is used as a tool to convey the lesson.

“That’s so important,” said Jon Yoder, Secondary Education Coordinator at the Northwest Center for Sustainable Resources in Salem, Oregon. Yoder was recently in Michigan, working with Michigan Sea Grant to conduct teacher workshops focused on place-based education and community service projects.

“In any learning situation, motivation is key,” Yoder said. “This kind of learning, what I call community-based education, re-engages students and provides a meaning and relevance for what they’re learning in and out of the classroom. It intentionally connects students to their community. It’s authentic work and it reaches into so many disciplines.”

WIDESPREAD EFFECTS
Yoder said approaching education from all slants – particularly from a community standpoint – could benefit everyone in the end.

“If you look at most schools’ mission statements, they will include some component on forming partnerships and informing citizens to create a strong and sustainable community,” he said. “Without this component, this learning to be part of the community, when the students graduate it’s like they’ve been handed different parts of a bicycle without knowing how to put them together or knowing how to ride. When we send students out into the community without having some kind of education on how to be part of that community or part of our natural world, it’s the same thing.”

Education Roadmap
Michigan Sea Grant’s mission is to teach about the Great Lakes via research, education and outreach. As one of our main objectives, Michigan Sea Grant tries to extend Great Lakes education opportunities in as many ways as possible. This is a sampler of educational efforts Michigan Sea Grant supports:

GREAT LAKES CAMP
The 4-H Great Lakes and Natural Resources Camp is in session for one week every August in Presque Isle, Michigan and attracts 60-80 middle school and high school students from all corners of the state. Campers get to experience natural resources, such as fishing, sailing, swimming and beach activities or bird-watching and hiking. They also grow in awareness, appreciation and understanding of natural resources, and related careers, such as marine biology and explore 4-H and other outdoor natural resource projects, including community service. More than 1,200 teens have participated in the camp since 1984.

IMPACTS: 2009 camper evaluation data showed:

- 97% of campers rated the camp as overall excellent (79%) or good (18%).
- 75.8% of campers reported on the post-camp survey that they felt confident in their abilities to give a lesson or presentation to others about nature, the environment or the camp to others. Only 45.3% felt this way before camp.
- 68.8% intend to work with others to do a community service project within the next year to improve the environment.

See: www.miseagrant.umich.edu/education/greatlakes-camp.html

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**SUMMER DISCOVERY CRUISES**
Cruises offer a variety of themes to choose from and focus on the diversity of plants, birds and other species along the Detroit River or Lake St. Clair. The cruises are open to the public and reach across many demographics. The program is a partnership between Michigan Sea Grant, MSUE and the Metroparks.

**IMPACTS:** More than 1,400 participants enjoyed their hours exploring Detroit-area waterways in 2009. Returning cruisers reported that they increased their participation in Great Lakes stewardship practices as a result of learning more about the lakes. Over 6,600 people have participated in discovery cruises from 2002 to 2009.

See: www.discoverycruises.org

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**TEACHING WITH GREAT LAKES DATA**
Found at www.greatlakeslessons.com, *Teaching with Great Lakes Data* is a free, comprehensive web portal designed to serve educators in the Great Lakes region. The website includes physical and biological data sets, lessons, a glossary and pedagogical tools. All lessons are matched with standards, and researchers are invited to submit additional data sets for inclusion in the materials. There are three primary components to the *Teaching with Great Lakes Data* website:

- Great Lakes water data sets.
- Inquiry-based teaching methods and tools for guided inquiry projects.
- Structured lessons on an array of Great Lakes topics.

**IMPACTS:** The portal has just launched. Michigan Sea Grant and partners will host teacher education workshops throughout the fall and winter.

See: www.greatlakeslessons.com

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**MICHIGAN CLEAN MARINA PROGRAM VIRTUAL CLASSROOM**
Marinas in the Michigan Clean Marina Program voluntarily pledge to maintain and improve Michigan’s waterways by reducing or eliminating releases of harmful substances and phasing out practices that can damage aquatic environments. Through the virtual classroom, marina owners and operators have a resource they can access, without leaving the marina. The self-paced, online course includes details on recommended and mandatory practices, photos and videos of best practices, nine units on various topics from and focus on the diversity of plants, birds and other species along the Detroit River or Lake St. Clair. The cruises are open to the public and reach across many demographics. The program is a partnership between Michigan Sea Grant, MSUE and the Metroparks.

**IMPACTS:** The online classroom recently accepted its first round of students. Overall, there are nearly 80 total participants in the Clean Marina Program – more than 40 marinas have pledged to work toward certification and more than 30 marinas have been awarded certification. In the past year, 16 marinas were awarded certification and 9 were re-certified.

See: www.michigancleanmarina.org

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**FLOW – FISHERIES LEARNING ON THE WEB**
FLOW is a comprehensive curriculum about the Great Lakes ecosystem with three core units: Food Web, Water and Fish. Geared toward upper elementary and middle school educators, standards-based lesson content features hands-on activities. FLOW has been used regionwide as as a best practice template. Each lesson incorporates objectives, is aligned with standards and includes rubrics. Lesson materials offer:

- Specific educational objectives, based on standards and benchmarks.
- Assessment tools, based on learning objectives.
- Fun downloadable materials, such as an invasive species board game, a dichotomous key, a land use game and fish cards.

**IMPACTS:** In the last three years, FLOW has been accessed via the Michigan Sea Grant web page more than 160,000 times. It has received several national and local awards, including the National Association of Government Communicators Gold Screen award.

See: www.projectflow.us

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**GREAT LAKES EDUCATION PROGRAM**
The Great Lakes Education Program, or GLEP, introduces fourth-grade students to the unique features of the Great Lakes through a combination of classroom learning and hands-on experience. The program integrates elements of geography, history, biology and physical sciences in each of its three compo-
In early August, I spent two blissful days at the Great Lakes and Natural Resources Camp supported by 4-H, Michigan State University (MSU) Extension and Michigan Sea Grant. Camp is in session for one week every August in Presque Isle, Michigan and attracts 60-80 students ages 13-15 from all corners of Michigan. I was interested in camp because in past lives, I’ve taught high school and performed field research on Great Lakes wetlands. At Sea Grant, I help coordinate the research program and work on related outreach projects. The following is my dispatch from the field.

– Lynn Vaccaro, Michigan Sea Grant Coastal Research Specialist

“I just found the mother load! Come see!” yelled one of several students crouching around a cluster of low-lying dune plants—plants that most of us would walk by. But today we are on a hunt for a state and federally threatened plant—Pitcher’s thistle (*Cirsium pitcheri*)—a stout, blue-green dune thistle that, unlike most weedy thistles, requires up to 10 years to mature and flower. “I’ll stay with these plants until Tameka counts them. Did you get a picture?” another student asks.

Tameka Dandridge, a biologist with the U.S. Fish and Wildlife Service, led this plant hunt and used the help of 15 campers to survey the dunes and count the number of Pitcher’s thistles in four different life stages. I followed the group, marveling at this unique convergence of people, science and learning along the scenic shores of Lake Huron. At the end of the hour-long hunt, we had counted 42 Pitcher’s thistle plants and got a taste of real-life conservation biology.

Great Lakes Camp offers nearly everything that first got me hooked on science: field investigations in a beautiful setting, outdoor adventure, camaraderie, passionate mentors and a sense of purpose. This is experiential education at its best. Carefully designed experiences and focused reflection are used to help campers develop knowledge, skills and values.

Each morning, campers explore a different science topic through hands-on investigations like gillnetting fish, trapping forest critters, or surveying carnivorous and invasive wetland plants. In the afternoon, campers choose their own adventure, such as snorkeling, kayaking or fossil collecting with staff; evening activities are all about teamwork, leadership, presentation skills, and a bonfire with strange visitors.

Great Lakes camp is a career-oriented program. Many of the campers come back for two or even three summers, and some are recommended for college scholarships from 4-H. A number of campers are invited to serve as counselors when they turn 16, and some come back as paid staff years later. To provide a taste of different natural resource careers, camp leadership recruits a diverse group of instructors. This year’s camp included botanists from Michigan Natural Features Inventory, graduate students in MSU’s Fish and Wildlife Department, lamprey researchers from the Great Lakes Fishery Commission and charter boat captains.

The program is influential. In 2009, the number of campers who felt confident giving a lesson or presentation about nature, the environment or camp increased from 45 to 76 percent during the week. At the end of camp, 83 percent of campers said they were interested in a career outdoors, wanted to work with the Great Lakes, or wanted a job related to environmental science.

On my last night at camp, I watched as groups of kids transformed themselves into interconnected pirate boats and then navigated a dangerous course of tropical storms and ridiculous challenges set by gleeful staff and counselors. It became clear that Great Lakes Camp isn’t just for kids. It’s also a retreat for staff who manage to fit a week of camp into their busy work lives. Like many of the campers and staff, as I drove away from Presque Isle, I immediately began scheming about how I would return next year to get another dose of inspiration and fun with this unique community.
Michigan Watersheds Map

NOW AVAILABLE!

MICHU-10-706

Watersheds are the jigsaw pieces that make up Michigan’s water landscape. This map shows how each piece eventually flows to one of the Great Lakes.

The full-color map is perfect for the classroom or home. It shows watershed boundaries at a local level, and also at a “greater” level, demonstrating how drainages can be divided on different scales. Along with the graphic elements, basic text defines watersheds and provides examples of how actions can affect what happens downstream.

The map is 26 inches wide x 37 inches tall, printed on chlorine-free, 100% recycled paper with vegetable-based ink.

Purchase your map at: www.miseagrant.com

Connect Data with the Classroom

Teaching with Great Lakes Data is a new web portal featuring real science data enhanced for classroom use along with inquiry-based teaching guides and complete lessons.

Learn about dead zones, climate and weather, storm surges, and fish habitat in the Great Lakes; and learn how to use real-time and historical data to teach about these topics. Lessons are aligned with Michigan Grade Level Content Expectations and National Science Education Standards. Geared toward grades 5-7. All content is free.

Find it at: www.greatlakeslessons.com

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