Discovering the Great Lakes
Educational Opportunities for Hands-on Learning

WHAT’S INSIDE...
UM-MSU Partnership: Celebrating 25 Years
Great Lakes Education
Q & A: Grad Students Discuss Policy, Research
A Winning Model

We’re celebrating! In 2002, Michigan Sea Grant marks 25 years of unique partnership between the University of Michigan (UM) and Michigan State University (MSU).

What’s so special about this partnership? The uniqueness lies in the application of the ground-breaking research undertaken at both universities to the resource management challenges found in coastal communities and watersheds around the state. In essence, Sea Grant is the bridge between strong, university-based research on current Great Lakes issues and the communities and user-groups in Michigan that face these challenges every day.

We are able to deliver such a unique and applied program because of our federal home in the National Oceanic and Atmospheric Administration (NOAA). NOAA’s mission is to describe and predict changes in the Earth’s environment, and conserve and wisely manage the Nation’s coastal and marine resources. NOAA excels at problem-focused research that provides an immediate return on investment that pure research programs rarely achieve. At Michigan Sea Grant, our interest in helping the state’s coastal citizens address the challenges they face has thrived under our association with NOAA.

Another contributing factor to Michigan Sea Grant’s success is our innovative program structure, which allows us to effectively connect with constituents. Over the past 25 years of UM-MSU partnership, we have developed a network of Sea Grant advisory agents across the state – in southeast and southwest Michigan, northeast and northwest Michigan and the Upper Peninsula. Our agents work with their communities to help them recognize challenges, identify science-based solutions and secure the resources necessary to achieve success. The Sea Grant communications team supplies the publications, videos, web pages and other materials necessary to the success of our outreach efforts. Together Michigan Sea Grant’s advisory and communications team provides an integrated approach to managing coastal issues.

The 25th anniversary of the UM-MSU partnership gives Michigan Sea Grant an important opportunity to celebrate. Over the past 25 years, the partnership has enabled Michigan Sea Grant to bring the best and brightest the state has to offer to bear on efforts to achieve a healthy and sustainable ecosystem. Please join us as we celebrate 25 years of success and look forward to even greater things in the future.

Jennifer Read, Ph.D.
Michigan Sea Grant Assistant Director

Cover illustration: Dave Brenner, Michigan Sea Grant

Michigan State University and the University of Michigan are equal opportunity/affirmative action institutions.
Twenty-five years ago Michigan State University and the University of Michigan joined forces in Great Lakes research, education and outreach under the National Sea Grant program—addressing issues including water safety, naval architecture and marine engineering, fisheries, water quality, coastal economic development, tourism and underwater cultural resources.

Sea Grant was designed after the land-grant model, emphasizing research, education and outreach, to protect and enhance the nation’s marine and Great Lakes resources. Established in 1969, the Sea Grant program in Michigan (now one of 30 programs in the nation) was initially administered by the University of Michigan. Soon, however, it became critical to the program’s success to conduct its outreach in partnership with Michigan State University Extension.

**A Unique Agreement**

Senior scientists and administrators from both institutions—John Cantlon, Niles Kevern, Charles Overberger and Al Beeton—crafted a unique agreement that became official in 1977 and remains in power today. Michigan Sea Grant is overseen by a policy committee of university administrators and representatives of Great Lakes stakeholders. It is administered jointly by a management team with equal representation from both universities. (See www.miseagrant.org/bios). The partnership allows Michigan Sea Grant to:

- Tap a greater wealth of knowledge and experience;
- Develop synergistic partnerships; and
- Combine research and education to reach out to the public.

Within a few years of implementing its innovative partnership approach, Michigan’s Sea Grant program was awarded college status, which is bestowed on programs that have demonstrated their success over a sustained period of time.

“The strength of Michigan Sea Grant lies in its ability to apply university-based research to current Great Lakes challenges,” says Interim Director George Carignan. “The combined talents of people at University of Michigan and Michigan State University have made Michigan Sea Grant a particularly effective partnership.”

**Applied Research**

“The Michigan Sea Grant partnership allows university-based research to be developed in concert with the needs of diverse Great Lakes stakeholders and industries,” says Associate Director William Taylor. The program’s network of Extension agents disseminates the information. A small sample of these successes include:

- MSG-funded research on reviving victims of cold water, near-drowning accidents allowed Sea Grant extension agents to teach these life-saving techniques to thousands of medical professionals;
- Sea Grant research on underwater cultural resources laid the foundation for creating Michigan’s highly successful system of underwater preserves. Sea Grant extension agents have been involved in creating all ten preserves that now exist;
- Sea Grant fisheries research and extension workshops have helped natural resource managers better understand top predators such as trout and salmon.

**Looking Forward**

Today, Michigan Sea Grant applies its research and outreach capabilities to address a range of Great Lakes issues as illustrated in its five-year strategic plan, see www.miseagrant.org/sp.

Great Lakes Education
Great Lakes Coastal Wetlands
Sustainable Coastal Development
Aquatic Nuisance Species
Anticipating Great Lakes Trophic Change

In the coming years, Michigan Sea Grant will continue the successful UM-MSU partnership to address these issues. With a rich history and proven accomplishments, Michigan Sea Grant’s partnership between the University of Michigan and Michigan State University has stood the test of time.
Discovering the Great Lakes
Students, teachers learn about the lakes

For some students, the process of discovering the Great Lakes begins with a boat trip that takes them on the water for the first time. For others, learning about the lakes involves using state-of-the-art technology to explore fundamental lake processes. Wherever they are on the educational spectrum, students—and those who guide them—play an important role in ensuring the future health of the Great Lakes.

By learning about Michigan’s valuable freshwater resources, young people will be better prepared to manage those resources in the future. Through its educational programming—from camps to workshops to web sites—Michigan Sea Grant strengthens overall knowledge of the Great Lakes and works to foster concern for their long-term health.

“I think the concept of Great Lakes stewardship is important,” says John Schwartz, Extension Program Leader. “By educating students of all ages about the Great Lakes, our hope is to build a knowledgeable public—Michigan residents who understand the value of the Great Lakes and the critical issues facing them.”

Whether those students are K-12 or post-graduate, many learning opportunities exist around the state. Reaching students, however, often means reaching the many educators and volunteers who work with them. The hope is that with the guidance of teachers, young people will develop life-long stewardship practices that protect the Great Lakes. These activities may be as simple as avoiding the use of lawn chemicals that contribute to polluted runoff. Other students will make the Great Lakes the focus of their professional lives, affecting policy and management decisions for years to come.

For these reasons, Michigan Sea Grant (MSG) has made Great Lakes education one of its five strategic initiatives. MSG Extension agents and Communicators work together to provide educators with useful Great Lakes resources and to provide students of all ages with exciting opportunities to learn about the Great Lakes. It’s a tall order that takes much thought and dedication. But the return on the investment—a healthy Great Lakes ecosystem for decades to come—is a goal worthy of the effort.

On the pages that follow, MSG brings together the many facets of its Great Lakes educational programming, from special workshops and resources for teachers, to camps and activities for K-12 students, to fellowships and research assistantships for graduate students.
Great fun! Great camp! Great lakes!

For 13-15 year olds who love the outdoors and want to have fun while learning about it, the 4-H Great Lakes and Natural Resources Camp is a perfect choice. The week-long camp, sponsored in part by Michigan Sea Grant, takes place on the shores of northern Lake Huron and is packed with activities.

Campers explore wetlands, learn about coastal processes, identify plants and wildlife, take a charter fishing trip on the Great Lakes, tour a lighthouse, and learn to sail and canoe on inland lakes.

“Great Lakes Camp is a good opportunity for young adults to experience many features of the lakes first-hand,” says Michigan Sea Grant Extension Agent Walt Hoagman, who assisted in the 2001 camp. “Experts in many fields provide environmental education to small groups of eager learners. This type of setting is very effective.”

Former campers say that the Great Lakes and Natural Resources Camp has made them more aware of natural resource and management issues, stimulated their interest in the outdoors, helped develop their leadership skills and influenced their career decisions.

This year’s camp takes place July 28-August 3, 2002 at Camp Chickagami in Presque Isle County. Campers must be 13 years old by July 1, 2002. 4-H membership is not required.

All hands on deck! Why kids love GLEP

Hands-on activities are a key element of the Great Lakes Education Program (GLEP) for fourth-grade students in Southeast Michigan. Sponsored by Michigan Sea Grant since 1991, GLEP is designed to stimulate an interest in the Great Lakes and promote stewardship.

GLEP begins with a classroom component that introduces students to concepts such as the aquatic food web, the water cycle, the effects of exotic species, and water quality parameters. With this basic background, the students board a “schoolship” for a half-day cruise on either Lake St. Clair or the Detroit River. The educational cruise gives students the chance to collect and examine plankton samples, test water clarity, practice marine knot tying, take temperature readings, and determine their location on a navigation chart.

Back in the classroom, the young limnologists use the data and samples they’ve collected to conduct experiments and discuss what they’ve learned. With its multidisciplinary curriculum, GLEP touches on aspects of geography, geology, physics, biology, chemistry, mathematics, literature and the arts.

“Surprising to many is the fact that most GLEP participants have had little or no chance to directly experience the Great Lakes before,” says Michigan Sea Grant Extension Agent Steve Stewart, who coordinates the program. “Through the use of active sampling, examination, and experimentation, GLEP gives students a learning experience that has proven to be both enjoyable and effective.”

Resources

Great Lake Education Program
Contact Steve Stewart, stewart@msue.msu.edu, or visit www.miseagrant.org/glep

4-H Great Lakes and Natural Resources Camp
Contact Dean Kiesling, kiesling@msue.msu.edu, (517) 432-7604; the MSU Extension 4-H staff member in your county; or your nearest Michigan Sea Grant Extension agent (listed on page 15). See also www.miseagrant.org/greatlakescamp
An ocean of knowledge

Think fast: Who invented SCUBA? Where is the Cromwell Current found? If you’re a teen and these questions pique your interest, you could be a future participant in the National Ocean Sciences Bowl (NOSB).

The NOSB is an academic “quiz bowl” competition among high school teams testing knowledge of ocean science topics including physics, chemistry, biology, geology, social sciences and technology. The competition is designed to promote literacy in science and mathematics through improved understanding of the world’s oceans and Great Lakes.

The Midwest regional competition, held in Ann Arbor in February, is one of 16 regional events held across the country. Teams of four students, one alternate and a coach compete in rapid-fire question and answer matches during the day-long competition. Winners of the regional competitions win a paid trip to the national competition, to be held this year in Providence, Rhode Island in late April.

The Midwest regional competition is coordinated by the Great Lakes Environmental Research Laboratory (GLERL), with support from Michigan Sea Grant and several other organizations.

(Answers to questions above: Jacques Cousteau and Emile Gagnon in 1942; Pacific Ocean.)

Contact Carole Fletcher, fletcher@glrl.noaa.gov, (734) 741-2370, or see www.nosb.org

Manistee County Day with Nature

Each year, one question tops the list of beach-related topics that Manistee County fourth-graders want to know about: What is that black stuff?

The “black stuff” the kids are referring to, explains Michigan Sea Grant Extension Agent John McKinney, is the black sand-like deposits along Magoon Creek where it flows into Lake Michigan. The substance is called magnetite iron ore, and it’s commonly found in the area.

McKinney covers this and many other subjects each year during the annual “Day with Nature” event for fourth-graders in Manistee County. The event is held at Magoon Creek Nature Area every spring. Over the course of two days, the students learn about forestry, wildlife conservation, soil erosion, history, the Great Lakes and a host of other topics from brief presentations given by local experts.

McKinney—who conducts his presentations on the beach—talks about Great Lakes water levels, fishing, stream ecology, shipping, coastal wetland changes and other issues related to water and beaches.

“Essentially I talk about coastal changes in a way that the kids, their teachers and chaperones can understand and take back to enrich classroom activity and home life,” says McKinney.

Conducting the session on the beach makes everything more interesting. “The beach zone is where the action is—where land and water meet. The kids and teachers love being there, having their questions answered and doing hands-on activities like measuring lake levels and water temperature.”

Contact John McKinney, MSG Extension Agent, (231) 922-4628.
Kids Experience Life of Lake Superior

A boat trip to Grand Island, an afternoon at Pictured Rocks National Lakeshore and a tour of commercial fishing operations are all part of this year’s “Life of Lake Superior” event. Approximately 60 fourth- through eighth-grade students from Alger County will participate in this year’s event, which will take place July 9, 11, 23 and 25 in Michigan’s Upper Peninsula.

Joan Vinette, a Family Strengths Agent for the Alger County MSU Extension Office, coordinates the event with assistance from Michigan Sea Grant Extension Agent Ron Kinnunen and 4-H youth agent Rachel Lindquist.

“Many of our young people live next to Lake Superior and don’t get a full appreciation of the resources that the lake offers and its importance to many businesses,” says Vinette.

Some of those businesses are commercial fishing operations. Last year, the kids had the opportunity to board a commercial fishing boat to learn about trap and gill nets and various navigational instruments, such as GPS and radar. They also visited a tribal licensed commercial fishing operation, where they learned about the 1836 treaty, boarded a gill net tug and discovered how fish are processed and smoked.

“It’s important that young people learn about the native fishes of Lake Superior and their value to both the commercial and recreational fisheries” says Kinnunen. “Many times these young people see Lake Superior only from the surface and never have a chance to see the fishes that live in it. This event gives them the opportunity to learn about the fishery first-hand.”

Seventy-five professionals and volunteers gave presentations at last year’s event, covering a variety of Great Lakes topics.

Contact Joan Vinette, Alger County MSU Extension, vinettej@msue.msu.edu, or call (906) 387-2530.

Resources

Michigan Alliance for Environmental and Outdoor Education (MAEOE)
Contact Mike Klepinger, MSG Extension Associate, klep@msu.edu or call 517/346-6473.

National Ocean Sciences Bowl
Contact Carole Fletcher, fletcher@glerl.noaa.gov, (734) 741-2370, or see www.nosb.org

Inland Seas Education Association (ISEA)
See www.greatlakeseducation.org

Manistee County Day with Nature
Contact Manistee County MSU Extension, (616) 889-4277 or call John McKinney, MSG Extension Agent, (231) 922-4628.

Northwest Michigan Environmental Education Consortium
Contact John McKinney, MSG Extension Agent, mckinney@msue.msu.edu, (231) 922-4628, or see www.eteach.net.

Life of Lake Superior
Contact Joan Vinette, Alger County MSU Extension, vinettej@msue.msu.edu, or call (906) 387-2530.

Lake Superior Youth Symposium
See http://emmap.mtu.edu/gem
The Purple Loosestrife Project has a lot going for it. Kids like it because they get to raise beetles and turn them loose in a wetland. For teachers, the beetles are an interesting way to teach students about wetland ecology, exotic species and biological control. And project coordinators know that all of this activity contributes to the management of Michigan’s natural resources.

How? The beetles, called *Galerucella*, feed exclusively on the invasive purple loosestrife plant. Native to Europe, the colorful plant has aggressively invaded many wetlands in Michigan. Once established, purple loosestrife overtakes native vegetation and can form nearly impenetrable stands. By raising and releasing *Galerucella* beetles, teachers, students and other volunteers help to reduce purple loosestrife around the state.

“It’s really an innovative project,” says Michigan Sea Grant Extension Associate Mike Klepinger. “Participants in the Purple Loosestrife Project get to learn about Michigan’s wetlands first-hand while helping to protect them at the same time.”

The first step is for interested educators and volunteers to attend the annual purple loosestrife workshop held at Michigan State University (MSU) each spring. Once they attend the workshop, they’re qualified to get beetles from the MSU lab. Educators and students rear the beetles in their classrooms, usually on a windowsill. The number of beetles may multiply to 2000 over the course of a couple months. “Then the kids troop out into the wetland and release them in early June,” adds Klepinger. “It’s the last thing they do.”

Since the Purple Loosestrife Project began, more than 4,000 volunteers have participated, including an estimated 2,500 K-12 students. As a result of project activities, significant reduction in purple loosestrife has begun to occur in several areas of the state.

The Purple Loosestrife Project was co-developed by Michigan State University and Michigan Sea Grant in 1997, building upon work initiated by the Michigan Department of Natural Resources in 1994.

See www.miseagrant.org/pp
An Exotic Opportunity for Teachers

In early August, the lazy days of summer are coming to an end for many teachers, as thoughts turn to lesson plans for the fall. If exotic species — zebra mussels, purple loosestrife, round gobies and Eurasian water milfoil — are part of those plans, teachers can find new resources at Michigan Sea Grant’s Exotic Species Day Camp for Teachers.

This year’s camp, scheduled for August 1 at Belle Isle in Detroit, will feature the great new E.S.C.A.P.E.— an Exotic Species Compendium of Activities to Protect the Ecosystem. The compendium consists of 36 user-friendly sets of lessons that incorporate experiments, art, music and games. The collection was developed by educators who have attended the Exotic Species Day Camp in previous years.

Participants will also become familiar with other Sea Grant tools for teaching about aquatic nuisance species such as the Zebra Mussel Mania Traveling Trunk and the Aquatic Exotics Traveling Trunk.

The only requirement for this year’s camp is a commitment to use the E.S.C.A.P.E. compendium and share it with colleagues.

For more information contact: Valerie Eichman at (217) 244-8809 or eichman@uiuc.edu, Illinois-Indiana Sea Grant College Program.

Resources

Purple Loosestrife Project
Contact Mike Klepinger at klep@msu.edu, (517) 353-5508, or see www.miseagrant/pp

Biological Control of Purple Loosestrife 4-H Manual and 4-H Leader’s Guide
Designed for educators and high-school aged students, the 4-H Leader’s Guide and the 4-H Manual use a workbook approach to discuss the problem of purple loosestrife, biological control and basic wetland ecology.

Purple Loosestrife Cooperators Handbook
The Cooperator’s Handbook is designed for teachers and others interested in participating in the Purple Loosestrife Project. Learning activities focus on wetland stewardship, habitat protection and biological control of invasive species. The Cooperator’s Handbook features six sections, including a supplemental wetland handbook for landowners. To order, contact Michigan Sea Grant at (734) 764-1118 or see www.miseagrant.org/pubs.

Exotic Species Day Camp
To register, contact Steve Stewart at stewart@msue.msu.edu, (589) 469-7431 or Mike Klepinger at klep@msu.edu, (517) 353-5508, or see www.miseagrant.org.

ESCAPE Compendium
The ESCAPE Compendium provides educators with 36 hands-on, multi-disciplinary activities to teach students about exotic species. See www.iisgcp.org/edu/escape to learn more about the compendium, special game set, sample activities, and ordering and pricing information.
Behind the Scenes
Fellowships offer on-the-job experience

When it comes to Great Lakes education, there’s no substitute for practical experience. Several fellowships sponsored in part by Michigan Sea Grant offer invaluable on-the-job opportunities for talented college-level students interested in Great Lakes policy and decision-making. The fellowships provide a way for students to work in a chosen field or in many cases to identify a career path. Here, two graduate students, who have earned one-year paid fellowships, discuss their responsibilities, what they’ve learned and their future plans.

Sea Grant Knauss Fellowship
Laura F. Cimo

Term:
Feb. 2001- Feb. 2002

Work location:
I worked in the office of Congressman Ron Kind (D-WI) as a liaison for the Upper Mississippi River Congressional Task Force. The task force represented the five states within the Upper Mississippi River Basin, including Wisconsin, Minnesota, Illinois, Iowa and Missouri.

Primary topics:
I worked on all issues related to the Upper Mississippi River basin and the Great Lakes including: nutrient and sediment management; aquatic habitat restoration; invasive species; ecosystem health for aquatic flora and fauna; floodplain management; navigation; wildlife management; and wetland protection.

Responsibilities:
I was responsible for drafting legislation and letters of support for various natural resource and environmental protection programs; coordinating educational briefings on legislative topics on behalf of the Upper Mississippi River Congressional Task Force and the Northeast-Midwest Institute; and building coalitions of support for program appropriations and legislation.

Learning opportunities:
I was given a number of different responsibilities in the office, and with each responsibility came a new challenge and a new educational opportunity. I learned about the legislative and appropriations processes. As I faced challenges regarding how to bring more resources to our region, I learned how to effectively build a bipartisan coalition of support for programs of regional interest, and help ensure their continuity through negotiations with other congressional staff, agencies and organizations.

Benefits of the fellowship:
I will benefit from the fellowship through my increased understanding of how to obtain funding for important scientific research and outreach programs, how to communicate the importance of these programs, and how to compromise and negotiate with different interests and organizations.

Value of the fellowship:
The experience far outweighed my expectations. I worked with a dedicated and talented staff. They were a wonderful team, and I had a great experience because of them. I worked on a host of natural resource and environmental issues, and I learned a tremendous amount.

Future plans:
I will be working as a Legislative Assistant for Congressman Kildee (D-MI). In this position, I will be responsible for the House Resources Committee, environment, energy, trade, transportation, agriculture, housing/economic development, appropriations and grants.
Great Lakes Commission/Sea Grant Fellowship

Elizabeth Moore

Term:
June 2001 - June 2002

Work location:
Great Lakes Commission, Ann Arbor, Michigan

Primary topics:
I am involved in a number of different projects at the Commission, working in the areas of resource management and policy analysis. These projects include: A Comprehensive Management Plan Initiative for Lake St. Clair; the Great Lakes Areas of Concern Program; the Ohio Watershed Planning Training Project; and the Great Lakes Basin Program for Soil Erosion and Sediment Control.

Responsibilities:
I have a number of different responsibilities related to the various projects listed above. These include conducting background research, developing reports, writing grants, conducting data analysis, providing web support and assisting with meeting coordination.

Learning opportunities:
My primary interests lie in the areas of collaborative resource management, institutional arrangements for resource management and water resources policy. At the Commission, I am directly applying the concepts and theories that I studied in graduate school to real-world issues. I am gaining practical experience for how the various mechanisms for collaboration and policy development and coordination are implemented. This applied experience serves as a critical supplement to the knowledge acquired through my graduate studies.

Benefits of the fellowship:
The benefits of this fellowship are not restricted to the valuable experience gained by “working in the field.” I am afforded opportunities to travel to different conferences and workshops of interest to me, which have furthered my understanding of Great Lakes issues and the processes used to address them. I am encouraged to explore projects outside of my focus area, thus exposing me to new topics. Finally, I have had opportunities to network with various government officials, Sea Grant staffers, and others working on Great Lakes issues, which have provided me with numerous professional contacts in my field.

Value of the fellowship:
I have learned so much about Great Lakes policy coordination and resource management in such a short period of time; it has been an invaluable experience.

Future plans:
I would like to continue working on Great Lakes issues, focusing on collaboration and policy coordination. I have considered going back to graduate school to earn a doctorate, but I would first like to gain more work experience.

Fellowship Opportunities and Resources

Great Lakes Commission – Sea Grant Fellowship
Contact Jennifer Read, jenread@umich.edu or see www.miseagrant.org/research

Knauss Marine Policy Fellowship
Contact Jennifer Read, jenread@umich.edu or see www.miseagrant.org/research

NOAA Coastal Management Fellowship
Contact Jan Kucklick, Jan.Kucklick@noaa.gov or see www.csc.noaa.gov/cms/fellows.html

Summer Student Fellowship Program
Sponsored by the GLERL and CILER. Contact Sarah Mark, sarah.mark@noaa.gov or see www.glerl.noaa.gov/pr/ssfp/ and www.ciler.org

Additional grant and fellowship resources
Great Lakes Information Network at www.glin.org

National Marine Fisheries Service – Sea Grant Joint Graduate Fellowship Program
Contact Dr. Emory D. Anderson, emory.anderson@noaa.gov or see www.nsgo.seagrant.org/research/rfp/index.html
Making Waves
Graduate students vital to Sea Grant research

Call it passion with a purpose. Two things Michigan Sea Grant student researchers have in common are a love of nature and a respect for science. Undergraduate and graduate research assistants are an integral part of research projects supported by Michigan Sea Grant. Currently, more than 25 students assist scientists on a variety of topics. Projects take them to all corners of the state, studying everything from coastal wetlands to fisheries to the mysteries of the Great Lakes aquatic food web. Many of these students earn their Master’s and Doctoral degrees based on Sea Grant-funded work. Profiled here are two student researchers contributing to innovative projects in northern Michigan.

The Marshes of Les Cheneaux
Jennifer Jacobus MacKay

Primary activity:
Our research team collects and records observations about fishes in the coastal marshes of the Les Cheneaux Islands in the Upper Peninsula of Michigan on the north coast of Lake Huron. Sampling gear includes minnow traps and fyke nets. We count all fishes caught and return them to the marsh. We also measure other variables that describe the physical environment, including vegetation and water temperature.

Project significance:
Our work will aid the Les Cheneaux community with future conservation planning and maintaining biological diversity in coastal ecosystems. Les Cheneaux residents acknowledge that fragmentation poses one of the largest threats to the health of their marshes. This study of how fish use marsh habitat will help resource managers assess how human activities might impact fish assemblages if fragmentation continues. Fish are good taxa to use for monitoring the biological integrity of marshes because they are relatively easy to identify and can be collected in an efficient, cost-effective manner.

A memorable moment:
Catching our first fish in the fyke net—a 28-inch northern pike—was quite a thrill! He managed to thrash and squirm his way out of the net, which shocked and stupefied everyone.

A surprising fact you’ve discovered:
The amount of work involved to produce substantial, high-quality research, which includes everything from sound preliminary planning, to adapting the experimental design to actual field conditions, to the importance of detailed note-taking, to the physical demands of follow-through and persistence.

Like most:
I love my work because I’m outside interacting with and observing the processes of a dynamic ecosystem. This is also an applied ecological project that will benefit the local community in future conservation efforts.

Typical conditions:
Beautiful! Peaceful! Tranquil! The Les Cheneaux region is one of the most pristine areas of coastal marsh on Lake Huron.
Primary activity:
During the field season, I work aboard a research vessel. I routinely take vertical profiles using various scientific instruments and periodically collect zooplankton samples. Time and weather permitting, we conduct numerous “flights” in which the instruments are undulated throughout the water column while being towed behind the boat.

Purpose:
We’re studying the spatial and temporal distribution of zooplankton in Lake Superior off the northwest shore of Michigan’s Keweenaw Peninsula. Zooplankton are tiny aquatic animals that are essentially “at the mercy of currents,” however, they are an integral component of the aquatic food web, linking lower trophic levels (bacteria, algae) to upper trophic levels (small planktivorous fish, larger piscivorous fish). We’re investigating the interactions of the organisms with their environment — how physical, chemical, and biological factors influence zooplankton community structure and their distributions through space and time.

Who do you work with?
My study is part of the five-year KITES project (Keweenaw Interdisciplinary Transport Experiment in Superior), which has given me the opportunity to work with scientists from a variety of disciplines and numerous institutions — from biologists and engineers to chemists, geologists and physical oceanographers. The investigators study “pieces of the puzzle,” to further the collective understanding of large-scale lake processes.

Impact of technology:
Our study utilizes a developing technology in limnological and oceanographic research: an optical plankton counter or OPC. As the OPC is towed behind a vessel or lowered for vertical profiles of the water column, plankton passing through the instrument’s flow channel are counted and sized as they interrupt a rectangular beam of light within the channel.

A memorable moment:
I remember one cruise in particular when three- to five-foot waves quickly built up into 10- to 20-foot waves while we were still five kilometers out! We raced full-steam back to harbor, but when we tried to dock it was so rough that the boat was being smashed into the piles, forcing us to head back into the lake to ride out the storm for the next five hours!

Like most:
Simply being out on the lake is so rewarding: nothing compares to watching the aurora borealis from the stern of a research vessel after twenty-two straight hours of sampling.

A surprising fact you’ve discovered:
A band of algae concentrates at a depth of about 35 meters during mid-summer (called the deep chlorophyll maximum, or DCM), but until now we’ve known nothing about where the zooplankton — the organisms that graze on the algae — are distributed in relation to the DCM. Interestingly, my data reveal high concentrations of zooplankton occupying a layer immediately above the DCM within a steep density gradient. For now we can look at other factors and hypothesize about the observed distributions, but it will take additional fieldwork to clarify the interactions and their implications for the system.

Project significance:
It’s easy to underestimate the significance of human activities on Lake Superior. The fact is, though, that human use and misuse of this precious freshwater resource is having an impact, with coastal development, watershed land practices, industrial and mining activities, and invasions of exotic species imposing increasing stresses on the lake. By studying Lake Superior now and learning about the interactions of the various physical, chemical and biological components we will be able to understand how human-induced changes will affect the lake and develop better management practices for the future.

David J. Osterberg
M.S. candidate
Michigan Technological University

Project:
Ecosystem Mosaics: Modeling Pattern and Process Using Remotely Sensed Imagery

Principal Investigator: Dr. Judith Wells Budd

A suite of instruments including an Optical Plankton Counter (OPC) takes various lake measurements as it’s towed through the water.
Web Resources for Northeast Michigan

Michigan’s northeast coastline is rich in natural and cultural resources—from abundant species of plants and birds to historic lighthouses and shipwrecks. Web pages created by Michigan Sea Grant Extension Agent Walter Hoagman provide a flavor for this unique area of the state.

**Thunder Bay Shipwrecks**
Read the stories behind some of the most famous shipwrecks in Thunder Bay, illustrated with dive photos and animations.
www.msue.msu.edu/iosco/thunbaywrecks.htm

**Birds of Lake Huron**
See photos of waterfowl, shorebirds, gulls, terns, geese, raptors and other birds likely to be seen along the Lake Huron shoreline.
www.msue.msu.edu/iosco/huronbirds.htm

**Straits of Mackinac Shipwrecks**
View illustrations and read about the ships lost in the Straits of Mackinac.
www.msue.msu.edu/iosco/straitswrecks.htm

**Wetlands of the Great Lakes**
Take a photographic tour of the unique coastal wetlands of the Great lakes.
www.msue.msu.edu/iosco/wetlandshome.htm

**Webfoot for Kids**
A special “coloring book” web page features photos of common plants and ducks that can be printed out as illustrations for coloring.
www.msue.msu.edu/iosco/kidspage1.htm

Contact Walter Hoagman at hoagman@msue.msu.edu. (989) 984-1056

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**Publications**

**Great Lakes Wetlands A Field Guide**
This popular guidebook, authored by Walter Hoagman, describes the different types of Great Lakes coastal wetlands and features 134 illustrations of common wetland plants.

**Great Lakes Coastal Plants: A Field Guide**
Author Walter Hoagman uses clever memory aids, plant descriptions and pen and ink drawings to help amateur naturalists identify 110 Great Lakes coastal plants.

**Discovering Great Lakes Dunes**
Great Lakes dunes are home to habitats, microclimates, plants, and animals not found anywhere else in the world. Color photographs and easy-to-read text tell the story of these Great Lakes treasures.

**Great Lakes Facts**
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Check it Out!!
The Michigan Sea Grant Web site has a new face and lots of improved features, some of which are highlighted below.

What's new:
- Fisheries news
- Grants and Fellowships
- Detroit River features
- History: UM/MSU 25-year anniversary
- Great Lakes Education Project
- Text-only navigation at the bottom of each page
- More Great Lakes photos

What's improved:
- Bios of extension agents and other staff
- User-friendly directory
- Meets 508 compliance guidelines for accessibility
- Purple Loosestrife “Purple Pages”
- Bookstore
- Google search engine

Visit Michigan Sea Grant’s web site at www.miseagrant.org
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