

GREAT LAKES NEWS FROM  
MICHIGAN SEA GRANT COLLEGE PROGRAM

# upwellings

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## Annual Report 2005 Michigan Sea Grant College Program



**Sea Grant**  
Michigan



# 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.

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## **upwellings**

Michigan Sea Grant College Program  
One Great Lakes Plaza  
401 E. Liberty, Suite 330  
Ann Arbor, MI 48104-2298

## **Management Team**

### **Director: Donald Scavia**

(734) 615-4084, [scavia@umich.edu](mailto:scavia@umich.edu)

### **Associate Director: William Taylor**

(517) 353-0647, [taylorw@msu.edu](mailto:taylorw@msu.edu)

### **Assistant Director: Jennifer Read**

(734) 936-3622, [jenread@umich.edu](mailto:jenread@umich.edu)

### **Extension Program Leader: John Schwartz**

(517) 355-9637, [schwartzj@msu.edu](mailto:schwartzj@msu.edu)

## **Communications**

### **Managing Editor: Joyce Daniels**

(734) 647-0766, [joydan@umich.edu](mailto:joydan@umich.edu)

### **Communications Director: Elizabeth LaPorte**

(734) 647-0767, [elzblap@umich.edu](mailto:elzblap@umich.edu)

### **Senior Graphic Artist: Todd Marsee**

(734) 764-2421, [marsee@umich.edu](mailto:marsee@umich.edu)

### **Publications Coordinator: Anuja Mudali**

(734) 764-1118, [amudali@umich.edu](mailto:amudali@umich.edu)

### **Extension Communications: Carol Swinehart**

(517) 353-9723, [cys@msu.edu](mailto:cys@msu.edu)

## **Extension Educators**

### **Upper Peninsula: Ron Kinnunen**

(906) 226-3687, [kinnune1@msu.edu](mailto:kinnune1@msu.edu)

### **Northeast: Brandon Schroeder**

(989) 984-1056, [schroe45@msu.edu](mailto:schroe45@msu.edu)

### **Northwest: Mark Breederland**

(231) 922-4628, [breederl@msu.edu](mailto:breederl@msu.edu)

### **Southeast Urban: Steve Stewart**

(586) 469-7431, [stew@msu.edu](mailto:stew@msu.edu)

### **Southwest: Chuck Pistis**

(616) 846-8250, [pistis@msu.edu](mailto:pistis@msu.edu)

### **Specialist: Mike Klepinger**

(517) 353-5508, [klep@msu.edu](mailto:klep@msu.edu)

### **Regional: Rochelle Sturtevant**

(734) 741-2287, [Rochelle.Sturtevant@noaa.gov](mailto:Rochelle.Sturtevant@noaa.gov)

### **Outreach Coordinator: Sonia T. Joseph**

(734) 741-2283, [Sonia.Joseph@noaa.gov](mailto:Sonia.Joseph@noaa.gov)

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COVER PHOTOS: BREEDERLAND, MARSEE, SCHROEDER, STEWART, OWENS, LAPORTE

## New Rules of Engagement

Several presenters at Michigan Sea Grant's October 2005 workshop on integrated assessments emphasized the importance of engaging stakeholders and the public in environmental decision-making.

Increasingly, this active communication process—which can bring together local residents, legislators, natural resource stakeholders, landowners, and any number of concerned citizens—is part of the fundamental groundwork that precedes significant environmental policy.

In discussions involving Traverse City's Boardman River dams, Sea Grant educator Mark Breederland refers to this public collaboration as a "transparent process." Nothing is hidden; the complexities inherent in decision-making emerge in an open forum. As this particular issue shows, these complexities can be formidable, involving not only environmental issues but an intricate array of socio-economic issues.

Such is the case in Northeast Michigan, where an ambitious integrated assessment, launched in 2005, explores ways to capitalize on the natural coastal assets that characterize the region. What types of policy decisions might stimulate economic development? How can coastal access be improved for residents and visitors alike? These are the types of questions that deserve input and expertise from a broad spectrum of stakeholders and citizens.



BREEDERLAND

This multi-level communication can take many forms. In 2005, fisheries workshops facilitated by Sea Grant staff on Lake Michigan and Lake Huron brought together not only scientists and fisheries managers but hundreds of stakeholders whose opinions and views were subsequently collected and provided to management agencies. In the Upper Peninsula and around the state, the economic interests of Michigan's commercial fishing industry are informing efforts to boost consumer awareness and marketing of Great Lakes whitefish.

These collaborative projects are among the many highlights from 2005 presented in this issue of *upwellings*. As these projects take shape in 2006, Sea Grant is looking forward to achieving common goals in concert with new and existing partners, collaborators, and stakeholders.



Donald Scavia  
Michigan Sea Grant Director



MICHIGAN STATE  
UNIVERSITY

UNIVERSITY OF MICHIGAN

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.



MARSEE



STEWART

## COSEE Great Lakes Program Links Research, Education

Students, educators and citizens in Michigan and around the Great Lakes region will soon have new opportunities to explore Great Lakes science and the connection to the world's oceans, following approval of a \$2.5 million regional program supported by the National Science Foundation and NOAA-National Sea Grant.

The Center for Ocean Sciences Education Excellence (COSEE) Great Lakes is the tenth program in the COSEE network. COSEE Great Lakes is designed to create dynamic linkages between Great Lakes and ocean research and education with the goal of enhancing scientific literacy and environmental stewardship.

"COSEE Great Lakes will serve as an excellent framework to link science and education for citizens of all ages," said Michigan Sea Grant extension educator Steve Stewart, who played a key role in developing the COSEE Great Lakes proposal.

One of the program's primary objectives is to improve communication between researchers and 4-10th grade teachers and students while enhancing teacher capabilities for delivering Great Lakes and ocean science education.

Among the planned activities are lake exploration workshops, Great Lakes curriculum enhancement and integration with ocean topics, and interactive learning events linking researchers with educators, students and the public.

A core part of Michigan Sea Grant's COSEE Great Lakes activities will focus on curriculum development using the Great Lakes Observing System, a network of environmental monitoring activities around the Great Lakes region.

Contact: [Steve Stewart](mailto:Steve.Stewart@msu.edu)  
[stew@msu.edu](mailto:stew@msu.edu), (586) 469-7431

See: [www.coseegreatlakes.net](http://www.coseegreatlakes.net)  
[www.glos.us](http://www.glos.us)

## FLOW: Top Pick for Education Curriculum

Michigan Sea Grant's online curriculum, Fisheries Learning on the Web (FLOW), was selected by educators as a top pick for February 2006 on the BRIDGE, a collection of the best marine education resources available online. FLOW received top marks in three categories evaluating educational value, content value, and usability.

"This is one of the best sites I've been asked to review," noted one teacher-

reviewer. "The layout/design is really easy to read and follow. I appreciate the fact that the national standards/benchmarks are listed..."

Geared toward educators and students in grades 4-8, Project FLOW features 15 downloadable lessons covering the aquatic food web and invasive species, water quantity and quality, and Great Lakes fisheries and careers. Each lesson is

## Michigan COSEE Collaborators

- USGS Great Lakes Science Center
- NOAA Great Lakes Environmental Research Laboratory
- Great Lakes Commission
- Bay Mills Community College
- Detroit Public Schools
- Monroe Public Schools
- Grand Valley State University
- Michigan Technological University
- NOAA Thunder Bay National Marine Sanctuary and Underwater Preserve
- Michigan United Conservation Clubs
- Michigan Alliance for Environmental and Outdoor Education
- Inland Seas Education Association

## Greatest of the Great Lakes

Lessons from Fisheries Learning on the Web and the Great Lakes Education Program were selected by a COSEE Great Lakes education committee to be part of the Greatest of the Great Lakes curriculum content, and will be used in upcoming educational programming.

## Lake Superior Exploration Workshop

July 29 – August 4, 2006

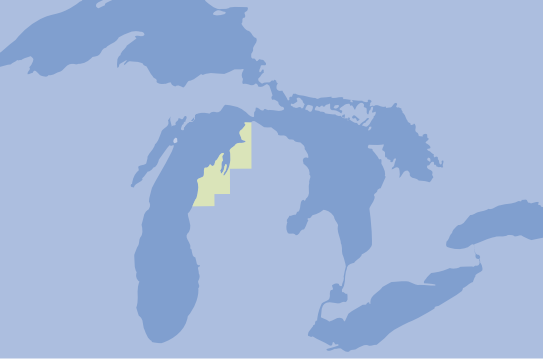
See: [www.coseegreatlakes.net/  
events/superiorworkshop](http://www.coseegreatlakes.net/events/superiorworkshop)

aligned with state and national educational standards for science and social studies.

FLOW is among the supplemental resources provided in a statewide environmental education effort coordinated by the Michigan Department of Environmental Quality.

Contact: [Elizabeth LaPorte](mailto:Elizabeth.LaPorte@umich.edu)  
[elzblap@umich.edu](mailto:elzblap@umich.edu), (734) 647-0767

See: [www.projectflow.us](http://www.projectflow.us)



## NORTHWEST DISTRICT



Mark Breederland  
breederl@msu.edu  
(231) 922-4628



BREEDERLAND

*As part of the waterfront redesign process, a group of Traverse City residents received an introduction to “walkable communities” from nationally known expert Dan Burden.*



MARSEE

*Mission Point, Grand Traverse Bay*

## Your Bay, Your Say

### West Grand Traverse Bay Regional Shoreline Improvement

Most visitors to Michigan’s scenic Traverse City are quick to appreciate its northern boundary, Grand Traverse Bay—a picturesque expanse of water framed by the historic downtown, open natural areas, and pedestrian walkways.

Local residents also value these amenities, and many are taking part in a unique collaborative process to enhance them. The waterfront redesign initiative *Your Bay, Your Say* emerged in 2005 with the goal of redeveloping two miles of shoreline along west Grand Traverse Bay, including new space where a coal-fired power plant was removed and where a local zoo was housed.

“A big part of the initiative is to improve the connection between the downtown core and the waterfront,” explains Sea Grant Extension Educator Mark Breederland. “Many of the public discussions emphasized the importance of maintaining and improving access to the shoreline.” Breederland is one of many local partners assisting in coordinating initiative activities.

Additional collaborators include an urban planning team made up of students from Michigan State University, led by Warren Rauhe, and several landscape architecture students from the University of Michigan (UM), led by Larissa Larsen.

As part of their work, the UM students created and presented a number of waterfront redesign concepts and completed a character study of the Traverse City downtown. One facet of the project involved distributing disposable cameras to 125 residents and visitors to photograph what they valued most about Traverse City. The students used the images to form a better understanding of community assets.

“Natural features including the Bay were the most frequently identified asset,” says Larsen, “and this echoes the importance of the natural environment that residents had identified in public meetings.”

Next steps in the process are to finalize a community consensus and complete detailed specifications for particular zones of the waterfront. With support from the Michigan Coastal Management Program, Traverse City will begin the process of moving from design to implementation in 2006.

*Contact: Mark Breederland  
breederl@msu.edu, (231) 922-4628*

## Residents Weigh Pros and Cons of Dam Removal

While removing obsolete dams can foster a number of long-term environmental benefits that include improved water quality and revitalized fisheries, a successful decision-making process must also consider social and economic impacts.

Such a public consultation process began in 2005 to discuss the fate of four dams on the Boardman River in Traverse City. The dams total 103 feet of vertical head and if removed would represent the largest dam removal in Michigan.

“Many communities deal with one dam at a time. We’re dealing with four,” says Michigan Sea Grant Extension Educator Mark Brederland. “It’s the most extensive study of its kind in Michigan.”

Brederland, co-facilitator of the Boardman River Dams Committee, notes that the planning process has been “extremely transparent” and involves many local residents whose lives and homes would likely be impacted by dam removal.

Decommissioned in 2005/2006, the dams no longer generate hydropower and have reverted to city and county ownership. In light of needed repairs and high maintenance costs, the municipalities are weighing the pros and cons of removal.

A Settlement Agreement was formally signed in July 2005 to assist with decommissioning and disposition of the Boardman river dams. The Settlement Agreement team includes representatives of eight agencies including the Michigan Department of Natural Resources, Michigan Department of Environmental Quality, U.S. Fish & Wildlife Service, Michigan Hydroelectric Relicensing Coalition, Grand Traverse Band of Ottawa and Chippewa Indians, Grand Traverse County Board of Commissioners, City of Traverse City—City Council, and the Traverse City Board of Light & Power.

The group coordinated public meetings in 2005 and recently hired a facilitator to oversee the public process and comprehensive societal, economic, engineering and environmental studies to determine all reasonable and feasible options for the future of the dams, including dam retention and dam removal.

Upcoming milestones include completion of a feasibility study by fall 2007 and recommendations on the future of the four dams in 2008.

Contact: [Mark Brederland](mailto:Mark.Brederland@msu.edu)  
[brederl@msu.edu](mailto:brederl@msu.edu), (231) 922-4628



BREDERLAND

*Brown Bridge dam (above), Boardman dam, Sabin dam, and Union Street dam are the focus of public discussion in Traverse City.*

## RESEARCH UPDATE

### Mapping Forage Fish in the Upper Great Lakes

The success of restoring lake trout and other native Great Lakes predators depends in part on a stable prey base, or forage fish, including native species such as bloater, herring, stickleback, and sculpin. These fish have historically been a major component of native predator diets, explains Michigan State University scientist Kim Scribner, and play a vital role in the Great Lakes aquatic food web.

With Sea Grant funding, Scribner is leading a large-scale multidisciplinary project to utilize genetic markers to identify differences among stocks of important forage fish species. The information provides fisheries managers with a better idea of the degree of isolation and movements of the stocks within each species.

“What’s unique about this study is that it’s a comparative analysis across five species of fish,” says Scribner. With co-investigator Wendy Stott of the USGS Great Lakes Science Center, Scribner’s team is analyzing bloater, herring, sculpin, stickleback, and alewife.

CONTINUED ON PAGE 14



BREDERLAND

### Automated Buoy Launched

Live meteorological data collected by an automated buoy in Grand Traverse Bay are a valuable component of ecosystem monitoring. Launched in 2005, the buoy is part of a developing Great Lakes Observing System, modeled after the Integrated Ocean Observing System being deployed across the world’s oceans. Among the measurements collected are wind speed, wave height, current speed and direction, and surface water temperature. During active months, the real-time data is available on the Internet to a broad community of users.



## NORTHEAST DISTRICT



*Brandon Schroeder*  
*schroe45@msu.edu*  
*(989) 984-1056*



PHOTOS: SCHROEDER

*Charter fishing is one of many outdoor activities at the Great Lakes and Natural Resources Camp.*



DANIELS

*Tawas Point Lighthouse, Lake Huron*

## Great Lakes and Natural Resources Camp

Fisheries, wetlands, and coastal processes were among the many topics covered in outdoor education sessions at the annual Great Lakes and Natural Resources Camp, sponsored in part by Michigan Sea Grant.

Held at Camp Chickagami on the shores of northern Lake Huron, the one-week camp introduces young people to Michigan's natural resources through a variety of hands-on learning and recreation activities. In follow-up evaluations, the camp has been shown to stimulate participants'

interest in natural resources and influence academic choices.

Sixty-nine young people from 21 Michigan counties participated in the 2005 camp. Sea Grant Extension Educator Brandon Schroeder, Extension Program Leader John Schwartz, and Extension Specialist Mike Klepinger taught sessions on Great Lakes fisheries and coastal processes, and led sailing and other recreational activities.

*Contact: Brandon Schroeder*  
*schroe45@msu.edu, (989) 984-1056*

## Stakeholders Discuss Lake Huron Fishery

In collaboration with the Michigan Department of Natural Resources and other fisheries stakeholder groups, Michigan Sea Grant facilitated a series of workshops in April 2005 examining the status and future of Lake Huron's fishery.

The fishery has undergone marked changes in recent years following the introduction of aquatic invasive species, a rapid decline in alewife, and fluctuating populations of Chinook salmon. Sport anglers, charter captains and resource managers were among nearly 400 people who attended the workshops, which provided an opportunity for in-depth analysis of some of the major fisheries and food web concerns in Lake Huron.

"It's important that stakeholders are aware of these fishery changes that are occurring

in Lake Huron and have an opportunity to engage in discussion about these changes with researchers and managers," says Michigan Sea Grant Extension Educator Brandon Schroeder, who facilitated the workshops.

Michigan Sea Grant facilitated stakeholder feedback during the meetings and synthesized comments, which were then provided to the DNR Fisheries Division, Lake Huron Citizens' Advisory Committee and other partners. The stakeholder meetings represented a key component of fishery stakeholder engagement as a part of the agency's decision-making process related to salmon stocking and management in Lake Huron.

*Contact: Brandon Schroeder*  
*schroe45@msu.edu, (989) 984-1056*

## New Project Explores Sustainable Tourism and Economic Development

Coastal counties in northeast Michigan boast some of the most rugged Great Lakes shoreline in the Lower Peninsula, offering natural areas for camping, hunting and fishing as well as attractions including lighthouses and shipwrecks.

A collaborative project initiated by Michigan Sea Grant in 2005 examines ways to capitalize on some of the region's natural coastal assets to strengthen sustainable tourism and encourage economic development.

The integrated assessment, convened by Northeast Michigan Council of Governments (NEMCOG), will explore policy options for increasing access to the region and its coastal resources, strengthening regional

marketing and identity, and improving quality of life.

Sea Grant is providing technical and coordination support to the assessment, including the ecological analysis, which is being done in partnership with The Nature Conservancy, social and economic analyses being done in partnership with the National Marine Sanctuary Program, and additional stakeholder coordination for the assessment. Michigan State University Extension, through county extension directors and the Area of Expertise Team, is also providing valuable technical support.

*Contact: Brandon Schroeder  
schroe45@msu.edu, (989) 984-1056*



LAPORTE

Exploring historic shipwrecks is a major attraction in northeast Michigan. The 448-square-mile Thunder Bay National Marine Sanctuary in Lake Huron is one of only two sanctuaries in the nation created solely to protect underwater cultural resources. Michigan Sea Grant in collaboration with the Thunder Bay Sanctuary will be hosting the 2006 Great Lakes Sea Grant Network meeting.

[www.miseagrant.umich.edu/greatlakes06](http://www.miseagrant.umich.edu/greatlakes06)

## Project F.I.S.H.: Improving Aquatic Education in Northeast Michigan

Michigan Sea Grant continued partnership efforts in 2005 to deliver a coordinated approach to aquatic education in northeast Michigan.

One successful program involving youth and adults is Project F.I.S.H.—Friends Involved in Sportfishing Heritage—coordinated by the MSU Department of Fisheries and Wildlife. Project F.I.S.H. is an education and training initiative that promotes fishing and aquatic education among youth and families. The program focuses on training adult mentors who work to promote positive youth development opportunities through our state's aquatic resources.

Michigan Sea Grant, partnering with MSU Extension 4-H Youth Programs, is utilizing this program in northeast Michigan to develop community partnerships that facilitate long-term, continued contact opportunities – connecting school-based aquatic education with similar nonformal education programming in the community.

The program is supported locally by Michigan State University Extension's 4-H Youth Development Programs, regional school educational service districts, local agencies, and conservation club partners.

Michigan Sea Grant co-sponsored a summer Project F.I.S.H. training workshop for over 25 youth mentors. The workshop identified opportunities and resources for teaching angling skills, tackle crafting, aquatic ecology, and fish biology. Project F.I.S.H. participants were trained in youth development tools, and methods for helping youth understand human interactions with aquatic resources in their local communities. Trainees employed their new skills throughout northeast Michigan in school-based education efforts, summer camps and other community events, and established at least one new local Project F.I.S.H. 4-H club.

Through 2006, the Project F.I.S.H. philosophy will continue to serve as a

catalyst for enhanced aquatic education programming efforts and facilitating connections between formal and nonformal aquatic education and youth development partners. Michigan Sea Grant and partners will be exploring opportunities to support enhanced regional coordination of partners, programs, and resources in northeast Michigan.

*Contact: Brandon Schroeder  
schroe45@msu.edu, (989) 984-1056*

Project F.I.S.H.: [www.projectfish.org](http://www.projectfish.org)

### Participants in Project F.I.S.H. learn:

- Angling skills
- Aquatic ecology
- Tackle crafting skills
- Ethics and responsibility as anglers
- Fisheries management basics



## SOUTHEAST DISTRICT



Steve Stewart  
stew@msu.edu  
(586) 469-7431



MARSEE

*Soft engineering projects like this one shown above at Elizabeth Park in Trenton are helping to revitalize the Detroit River waterfront.*



MARSEE

*Humbag Marsh and Island, once slated for development, are now part of the Detroit River International Wildlife Refuge.*

## One River, Many Voices

The spirit of cooperative conservation at work in the many coastal redevelopment projects along the Detroit River received national recognition in 2005. Michigan Sea Grant educator Barry Murray was among the team who presented the Detroit River story *One River, Many Voices* for the White House Cooperative Conservation Conference in St. Louis, August 29-31.

The story highlighted the critical partnerships working together on behalf of the Detroit River International Wildlife Refuge, Greater Detroit American Heritage

River Initiative, Riverfront Conservancy, greenways initiatives and other coastal redevelopment projects including successful soft engineering efforts along the riverfront.

The Detroit River panel also included John Hartig of the U.S. Fish & Wildlife Service, Mary Bohling of DTE Energy, and Anita Twardesky, Woodhaven Parks and Recreation Director, representing the Downriver Linked Greenways Initiative.

*Contact: John Hartig  
John\_Hartig@fws.gov, (734) 692-7608*

## Great Lakes Education Program

Led by extension educator Steve Stewart, Michigan Sea Grant and partners completed the 2005 season of the Great Lakes Education Program (GLEP), marking the 15th year on Lake St. Clair and 8th on the lower Detroit River.

A total of 76 classes participated in educational cruises on Lake St. Clair, bringing the cumulative participation for GLEP/Macomb since 1991 to 33,190 students, 4,838 adult chaperones, 1,191 teachers, and 523 volunteer instructors.

Students from 26 school districts participated in lower Detroit River cruises, bringing cumulative participation since 1998 to more than 14,280 students, 1,904 adult chaperones, and 493 teachers.

Sea Grant's strong partnership with Lake Erie Metropark continued in 2005, as each class was again involved in both an educational GLEP cruise as well as a shore-based education program focusing on wetlands, conducted by Lake Erie Metropark interpretive staff.

In follow-up evaluations, teachers gave the overall GLEP experience a perfect 4.0 on a 4-point scale, with 4 being excellent. Teachers were also asked how well GLEP helps them meet Michigan educational benchmarks on a 4-point scale, with the mean response being 3.69. The GLEP curriculum was used in the classroom by 83 percent of teachers.

*Contact: Steve Stewart  
stew@msu.edu, (586) 469-7431*



STEWART



STEWART



MARSEE

MSU extension agent Gary Williams (left) discusses the finer points of navigation with Great Lakes Education Program students. Center: GLEP students board the Clinton. Right: Participants aboard a Summer Discovery Cruise examine common Great Lakes fish.

## Summer Discovery Cruises

More than 1,100 people set sail last summer on 43 Summer Discovery Cruises, sponsored by Michigan Sea Grant in collaboration with MSU Extension and the Huron-Clinton Metropolitan Authority. The cruises drew participants from 10 counties, engaging participants in experiential learning about the Great Lakes. Cruises departed from the Metro Beach and Lake Erie Metropark marinas, and highlighted the natural and historical features of Lake St. Clair and the lower Detroit River.

On a special science cruise for educators, teachers had the opportunity to sample for plankton and benthos and learn about current Great Lakes research. Participants aboard the fisheries cruises viewed ongoing sturgeon research and examined samples of many common fish species. Nature cruises

visited the area's most important wetlands and emphasized their critical role in biological productivity and diversity.

Follow-up evaluations from cruise participants were outstanding, according to Extension Educator and Summer Discovery Cruise program director Steve Stewart. Thanks to the success of 2005 Summer Discovery Cruises, an additional week will be added to the 2006 schedule.

Contact: Steve Stewart  
stew@msu.edu, (586) 469-7431

For more information about Summer Discovery Cruises, see:  
[www.discoverycruises.org](http://www.discoverycruises.org)

## Lake Township Landowner Survey

Like many coastal communities, Lake Township on the eastern shore of Saginaw Bay is working to enhance its reputation as a desirable place to live and visit. With assistance from Michigan Sea Grant, township officials surveyed 1,529 landowners in 2005 about coastal land use practices.

Sea Grant Specialist Mike Klepinger provided technical assistance to Lake Township in the development of the survey instrument and analysis of survey responses. He presented the written report to Lake Township officials and citizens in September 2005 at a town hall meeting. The survey was funded in part by the MDEQ Coastal Management Program.

Contact: John Schwartz  
schwartzj@msu.edu, (517) 355-9637

## RESEARCH UPDATE

### Coastal Beaches as Environmental Reservoirs of Virulence and Antibiotic Resistance Genes

When officials issue beach advisories or close recreational beaches for swimming, these decisions are based on high bacteria levels measured in water. However, another important aspect of beach health is shoreline sand.

Recent studies at several Great Lakes beaches have confirmed that high densities

of the bacteria *E. coli* persist in sand throughout the beach season. Preliminary tests suggest that the *E. coli* community of Lake Huron beaches is genetically diverse and that the rate of genetic exchange among *E. coli* is high.

This reservoir of fecal bacteria may be a potential contact point between bacteria

and the public. With Sea Grant funding, investigators at Central Michigan University are using a combination of laboratory techniques to develop detection methods for pathogenic genes in beach sand.

“When high cell densities bring bacteria in close physical proximity to one another, the bacteria can exchange genetic information

CONTINUED ON PAGE 14



## SOUTHWEST DISTRICT



*Chuck Pistis  
pistis@msu.edu  
(616) 846-8250*



PHOTOS: MARSEE

*Clean Marina program collaborators shown are Jeff Spencer, MDEQ; Van Snider, MBIA; Pete Hall, Virginia Sea Grant; Chuck Pistis, Michigan Sea Grant; marina owner Mike Briskey; and Dave Kelch and Gary Comer, Ohio Sea Grant.*



MARSEE

*Warren Dunes State Park, Lake Michigan*

## Marinas Work to Protect Water Quality

Approximately 40 Michigan marinas are taking steps to protect water quality through voluntary participation in the Michigan Clean Marina Program, supported jointly by Michigan Sea Grant, Michigan Boating Industries Association (MBIA), and the Michigan Department of Environmental Quality (MDEQ). The 40 marinas, which include both commercial operations and state harbors, have pledged to work toward clean marina designations.

Two additional marinas—Walstrom Marine, Inc. in Harbor Springs and Belle Maer Harbor in Harrison Township—were officially designated as clean marinas in December 2005. The Michigan Clean Marina Program encourages cost-effective, best management practices that reduce pollutants associated with recreational boating, maintenance and storage.

“Michigan’s boating industry depends on clean water,” says Michigan Sea Grant Extension Educator Chuck Pistis, adding that marinas have an important economic stake. “By protecting the environment they protect their business.”

After signing a pledge to participate, marina managers attend workshops where they receive a clean marina program handbook, overview of the designation process and a review of key best management practices. Each management team then conducts a self-evaluation of their environmental practices to determine strengths and weaknesses. After implementing improvements and reaching a level of competencies, marina managers request a site visit by a Clean Marina consultant to evaluate environmental stewardship. If the facility reaches established goals, they receive a Clean Marina designation.

Chuck Pistis and Communications Director Elizabeth LaPorte coordinate Clean Marina activities on behalf of Michigan Sea Grant. LaPorte received a 2005 Lighthouse Award from the Michigan Boating Industries Association for her contributions to the development of the Michigan Clean Marina Program.

*Contact: Chuck Pistis  
pistis@msu.edu, (616) 846-8250*

### Clean Boating Tip Sheets

Best management practices for clean boating are summarized in a series of tip sheets available online. Topics include:

- Clean Boating and Maintenance
- Vessel Sewage
- Petroleum Control
- Waste Containment and Disposal

See: [www.miseagrant.umich.edu/cmp](http://www.miseagrant.umich.edu/cmp)



BRENNER

## Rip Current Signs Address New Audiences

In an effort to address both English and Spanish-speaking audiences along the Lake Michigan coastline, Michigan Sea Grant purchased 30 new beach signs to help raise awareness about Great Lakes rip currents. The new beach signs will be installed before the 2006 swimming season. According to the Commission on Spanish-Speaking Affairs, Hispanics will compose the country's largest minority population within the next decade.

Addressing children and teens, the Grand Haven Beach Safety Task Force is working with a group of Michigan science teachers to develop curriculum materials explaining the dangers of rip currents and how to escape them. Sea Grant Communications Director Elizabeth LaPorte serves on a curriculum advisory team currently in the process of developing educational content on rip currents for K-5 students and teachers.

Contact: Elizabeth LaPorte  
elzblap@umich.edu, (734) 647-0767

## Experts Discuss Rip Currents

Michigan Sea Grant convened a second conference on Great Lakes rip currents in Ludington in June 2005, bringing together key representatives from several state park beaches along Lake Michigan and personnel from Sleeping Bear Dunes National Lakeshore. Presentations covered dynamics of rip currents, educational efforts and practical actions that can be taken along beaches susceptible to rips.

Contact: Mark Brederland  
brederl@msu.edu, (231) 922-4628

## RESEARCH UPDATE

### Lake Michigan 'Doughnut Effect' Linked to Deep Water Production

Using recent advances in remote sensing technology, researchers at Michigan Technological University are examining the formation and food web implications of a late winter "doughnut" pattern in the open waters of southern Lake Michigan.

Driven by winter storms, the circular ring of *chlorophyll a* persists for several weeks in March and April. With Sea Grant funding, W. Charles Kerfoot is leading a team of investigators to document the occurrence and magnitude of this unusual event, which temporarily circulates sediment and nutrients.

According to researchers, the circular pattern coincides with a late-winter distribution pattern of phytoplankton and zooplankton. The winter productivity pulse marked by the "doughnut" helps explain how



*Circulating sediment, nutrients, and chlorophyll a form an unusual doughnut pattern in southern Lake Michigan. Sea Grant researchers are studying the impact of the phenomenon on winter food web productivity.*

certain native zooplankton species can successfully over-winter through what was previously thought to be a very unproductive period.

Cross-lake profiles confirmed the *chlorophyll a* pattern and revealed an underlying vertical structure. Phosphorus-rich coastal sediments were detected at key areas and are believed to enhance deep-water production.

Contact: W. Charles Kerfoot  
wkerfoot@mtu.edu, (906) 487-2769

## Workshop Addresses Status of Chinook Salmon in Lake Michigan

More than 100 fishery stakeholders representing all states surrounding Lake Michigan participated in an April 2005 workshop examining the status of Chinook salmon in Lake Michigan.

Sea Grant Extension Educator Chuck Pistis collaborated with Lake Michigan fishery management agencies to coordinate the event, which was held in Benton Harbor. The one-day workshop featured research characterizing the dynamics of the Chinook fishery and its forage base.

"We sought to reach a consensus with stakeholders on how to deal with potential problems related to maintaining an appropriate predator-prey balance," said Pistis.

Michigan Sea Grant Communications produced a CD containing all workshop presentations, subsequently distributed to all participants.

Contact: Chuck Pistis  
pistis@msu.edu, (616) 846-8250



## UPPER PENINSULA DISTRICT



Ronald Kinnunen  
kinnune1@msu.edu  
(906) 226-3687



ALGER COUNTY MSU EXTENSION

*More than 400 students have participated in the Life of Lake Superior Youth Program since it began in 2000.*

## Life of Lake Superior Youth Program

A glass bottomed boat offered a new perspective on Lake Superior for participants in the 2005 Life of Lake Superior Youth Program. The unique vessel, typically used for shipwreck tours, was just one aspect of the award-winning outdoor education program for young people, ages 9-14, and their parents.

Following a “workshop-on-the-move” framework, the four-day program features sessions taught by a variety of working professionals about how Lake Superior influences the natural sciences, recreation, tourism, business, culture, heritage and careers in the region.

“The camp experiences really help kids understand their connection to Lake Superior in a new way,” says Sea Grant Extension Educator Ron Kinnunen, one of a team of volunteers who coordinates the annual program.

Some of the speakers in 2005 included Dave Guenther of the National Weather Service, who showed satellite imagery of weather conditions leading up to the sinking of the *Edmund Fitzgerald*, U.S. Fish and Wildlife Service biologists from the Sea Lamprey Control Unit who conducted an invasive species program at Furnace Creek, and an environmental scientist from the Neenah Paper Mill who explained the inner workings of this large waterfront industry.

This year’s program is set for June 20 and 27 and July 11 and 18, 2006. The first day is scheduled to feature field trips to a fish hatchery, fisheries lab, research vessel, Coast Guard station, and maritime museum.

*Contact: Ron Kinnunen  
kinnune1@msu.edu, (906) 226-3687*



MARSEE

*Miners Castle, Pictured Rocks National Lakeshore, Lake Superior*

### Youth Program Receives National Award

The National Extension Association of Family and Consumer Sciences Program honored coordinators for the Life of Lake Superior Youth Program with an environmental education award in September 2005. Joan Vinette, Alger County MSU Extension, accepted the award on behalf of the team.

### Mackinac County Water Safety Review Team

Sea Grant Extension Educator Ron Kinnunen highlighted efforts to promote water safety and rip current awareness in the Upper Peninsula at the 2005 rip current conference in Ludington. Kinnunen is one of several members working on behalf of the Mackinac County Water Safety Review Team.



MARSEE



LAPORTE

## Effects of Boating on Critical Fish Habitat

Michigan's bays and channels are ecologically valuable coastal resources that provide nursery areas for fish and resting and feeding areas for migrating waterfowl.

Over the past few decades, this near shore habitat has undergone dramatic changes in response to residential development and increased human activity. Escalating boat traffic and boat sizes compound these impacts, especially in areas with seawalls. According to University of Michigan biologist Paul Webb, waves generated by boats are reflected lakeward, and this magnified turbulence affects the stability of critical fish habitat.

"On sheltered water bodies, these waves are the equivalent of boat-induced storms," says Webb. "The waves are more frequent and unpredictable for the fish community than naturally occurring storm waves."

CONTINUED ON PAGE 14

## Lake Whitefish: Michigan's Heritage Fish

Competitive marketing of Michigan Great Lakes whitefish—one of the state's heritage foods—is a critical need of the commercial fishing industry. Sea Grant Extension is working with Michigan fish producers to improve their marketing practices and diversify their products.

Among the strategies being used or developed are:

**Sensory testing.** Consumers participating in tests conducted at Michigan State University in 2005 preferred Michigan's fresh Great Lakes whitefish two to one, over a non-Great Lakes whitefish product.

Sensory tests comparing frozen whitefish products are scheduled in February 2006.

**Branding.** Producers are developing stringent quality standards for Michigan Great Lakes whitefish to carry a brand label.

**Consumer education.** Consumers will be able to learn about various aspects of Michigan Great Lakes whitefish through a web site with health and nutrition information and point-of-sale materials such as recipe cards and posters.

*Contact: Ron Kinnunen  
kinnune1@msu.edu, (906) 226-3687*

## New Leadership Model

### Eastern U.P. Water Guardians Help Monitor Water Quality

An innovative program in the eastern Upper Peninsula enlists the help of older citizens to help monitor the region's water quality and protect the health of residents. The Eastern U.P. Water Guardians voluntarily monitor the region's ground- and surface water to help identify potential problems.

Michigan Sea Grant's Ron Kinnunen was one of several educators who conducted train-the-trainer sessions for the Water Guardian program in 2005. Kinnunen is also assisting in curriculum development, which covers water chemistry basics, watersheds, and common contaminants and their origins in rural areas.

Following training sessions on field sampling techniques and quality control,

Water Guardians collect and submit water samples at local areas of concern. They also serve as knowledgeable resources for their communities. The efforts will help local units of government respond quickly to water quality problems at public beaches and other areas.

The Chippewa / East Mackinac Conservation District coordinates the Eastern U.P. Water Guardian Program, with funding from the U.S. Environmental Protection Agency, and cooperation from educational institutions, non-profit organizations, and local government units.

*Contact: Ron Kinnunen  
kinnune1@msu.edu, (906) 226-3687*

## HACCP Seafood Safety

All commercial fish processors are required to operate in accordance with Seafood HACCP (Hazard Analysis and Control Point) guidelines that help ensure the safety of the products they produce. This in turn provides customers with a sense of confidence that they are consuming a product that meets food safety regulations.

Michigan Sea Grant conducted two Seafood HACCP workshops in 2005 at Bay Mills and Red Cliff Indian Reservations. Several Michigan tribes require their fishermen and processors to attend the Seafood HACCP courses before they can be licensed to fish commercially or participate in fish processing projects associated with the tribes.

**NORTHWEST DISTRICT**  
CONTINUED FROM PAGE 5

The far-reaching study has capitalized on long-term data collection conducted by the USGS at sampling sites throughout the upper Great Lakes.

To date, researchers have genetically analyzed 4,500 fish. Laboratory results reveal how isolated or genetically different certain fish stocks are.

“We’re essentially testing the extent of interbreeding among populations,” says Scribner. “Estimates of genetic affinities between populations provide a measure of whether a fish from one geographic location is reproductively isolated from fish from other parts of the lake basin.”

**Improving Fisheries Management**

This degree of detail helps fisheries managers set harvest quotas and make stocking decisions that ultimately impact

lake trout, salmon and other economically important species. It also improves predictive capabilities. If a fish population declines, managers might be able to predict how fast it can be expected to rebound based on immigration from other populations, which can be inferred based on the degree of genetic affinity to other populations.

Some fundamental genetic distinctions have already emerged. The biggest difference, according to researchers, is the clear dividing line between fish in Lake Superior and those in Lakes Huron and Michigan. They’ve also found that within a lake basin, slimy sculpin, lake herring and bloater showed the most spatial structuring, or distinct populations with some degree of genetic difference.

Another unique component of the collaborative project involves correlating genetic information with environmental data. Researchers hope that by looking at environmental variables such as productivity and water temperature, or ecological factors such as habitat or water depth, the information will further explain the spatial genetic relationships, making it even more usable by management agencies.

The researchers are currently analyzing the genetic data. “These data are very valuable,” notes Stott. “We now have a shared resource. Any other data collected can build on this.”

Contact: Kim Scribner, [scribne3@msu.edu](mailto:scribne3@msu.edu), Wendy Stott, [wstott@usgs.gov](mailto:wstott@usgs.gov)

**SOUTHEAST DISTRICT**  
CONTINUED FROM PAGE 9

readily,” says biologist Elizabeth Alm, leading to the emergence of new disease causing or antibiotic-resistant strains of bacteria.

Researchers collected samples of beach sand at several Lake Huron beaches in St. Clair and Macomb counties in 2005. In lab analyses, researchers have detected genes associated with pathogenic strains of *E. coli* and another bacteria, *Shigella*, from this sand.

In previous studies, researchers found that approximately one third of *E. coli* isolated from Lake Huron beaches are resistant to commonly used antibiotics; in sand microcosms incubated under simulated beach conditions, the *E. coli* were able to exchange genes encoding antibiotic resistance.

Contact: Elizabeth Wheeler Alm, Central Michigan University, [alm1ew@cmich.edu](mailto:alm1ew@cmich.edu), (989) 774-2503



LAPORTE

**UPPER PENINSULA DISTRICT**  
CONTINUED FROM PAGE 13

Webb is leading Sea Grant funded research in the Les Cheneaux region of Michigan’s eastern Upper Peninsula to help clarify the link between natural- and human-generated waves on the near shore aquatic environment and fish community response.

Using the principles of fluid dynamics, researchers are comparing wave and water flow patterns on several bays that differ in exposure, bathymetry and boat traffic. In 2005, investigators surveyed contrasting sites at Marquette Bay, Cedarville Channel, Cedarville Bay and Boot Island.

Project results will help guide management and restoration of shoreline habitat to protect and improve biological functions of this important aquatic zone.

Contact: Paul Webb, University of Michigan, [pwebb@umich.edu](mailto:pwebb@umich.edu), (734) 763-2332

For a complete list of funded research see: [www.miseagrant.umich.edu/research](http://www.miseagrant.umich.edu/research)

# MICHIGAN SEA GRANT ANNUAL PROGRAM FUNDING

March 2005 - February 2006

1. Research	\$503,922	
2. Administration	\$398,737	
3. Outreach & Education	\$1,389,175	
4. Fisheries Extension Enhancement	\$166,130	
5. Aquatic Invasive Species	\$50,000	
6. Other	\$638,166	

Totals for research, outreach and administration include matching funds from non-federal sources.

**\$3,146,130 Total Program Funding**

## Publications Distributed 2005

Web site document downloads: 78,638  
 Print products distributed: 66,575  
**Total products distributed: 145,213**



BRENNER

## Aquatic Invasive Species Education and Prevention

Michigan Sea Grant staff collaborates with state agencies and other partners to raise awareness of the problem of aquatic invasive species. Significant 2005 activities are summarized below.

### Great Lakes Regional Collaboration

Michigan Sea Grant staff members assisted in writing the Aquatic Invasive Species strategy as part of the regional collaboration focusing on Great Lakes restoration.

### Upper Great Lakes Region

Sea Grant staff highlighted the Michigan perspective at the 2005 conference on Aquatic Invasive Species in the Upper Great Lakes Region. The event was a working conference for regional, state, and local land and water managers to enhance regional cooperation and collaboration.

### Hydrilla Hunt

Volunteer efforts continued in 2005 to monitor Michigan waters for signs of the invasive aquatic plant, Hydrilla. To date,

the plant has not been found in Michigan. The efforts are part of a statewide invasive species rapid response plan, developed in 2004 with support from Michigan Sea Grant.

### AIS HACCP

Sea Grant staff conducted an AIS program for 50 state agency personnel outlining HACCP (Hazard Analysis and Critical Control Point) techniques to prevent the introduction and spread of aquatic invasive species in Michigan waterways.

### Getting the Word Out

In cooperation with the Michigan Department of Environmental Quality, Michigan Sea Grant distributes thousands of watch cards, brochures and other materials, including AIS signs at boat launches, to encourage public participation in prevention and control efforts. Michigan Sea Grant recorded more than 25,087 visits to the program's AIS web site in 2005 and distributed more than 50,000 print and online AIS publications.

# VIRTUAL RESOURCES TO GREAT LAKES EDUCATION AND RESEARCH



## Online Library

Michigan Sea Grant recently developed a virtual library allowing easy access to fact sheets, reports, and articles about the Great Lakes. All documents are in portable document format (PDF).

See: [www.miseagrant.umich.edu/library](http://www.miseagrant.umich.edu/library)

## Online Bookstore

Order educational materials for classrooms, including posters, books, and more through the Michigan Sea Grant Bookstore. Many full-color posters are suitable for framing or for classroom use. Educators: look for the links to standards-based lessons (Project FLOW - Fisheries Learning On the Web).




To order these products, please visit Michigan Sea Grant's online bookstore:  
[www.miseagrant.umich.edu](http://www.miseagrant.umich.edu)



## Lake Sturgeon Exhibit

A life-like model of a six-foot lake sturgeon is now on display at the New Detroit Science Center. Developed by Michigan Sea Grant, the engaging display lets visitors see and feel this ancient fish. The display, which runs for the next six months, also features historic photos and information, current activities to restore this once-abundant species, and a DVD component featuring interviews with scientists.

See: [www.miseagrant.umich.edu/sturgeon](http://www.miseagrant.umich.edu/sturgeon)

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Michigan Sea Grant College Program  
401 E. Liberty, Suite 330  
Ann Arbor, MI 48104-2298

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