

GREAT LAKES NEWS FROM  
MICHIGAN SEA GRANT COLLEGE PROGRAM

# upwellings

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## Treasures of the Great Lakes

*Recognizing the Value of  
Michigan's Coastal Wetlands*



  
**Sea Grant**  
Michigan

# upwellings

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**Joyce Daniels**, Managing Editor  
**Dave Brenner**, Senior Graphic Artist  
**Elizabeth LaPorte**, Communications Director

## Editorial Suggestions

Please direct suggestions for articles or editorial correspondence to: Joyce Daniels,  
Email: [joydan@umich.edu](mailto:joydan@umich.edu), Phone: 734-747-0766



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## Upwellings

Michigan Sea Grant College Program  
2200 Bonisteel Boulevard  
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## Michigan Sea Grant Management Team

**George Carignan**, Interim Director  
**William Taylor**, Associate Director  
**Jennifer Read**, Assistant Director  
**John Schwartz**, Extension Program Leader

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UNIVERSITY

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Cover Photo: Dave Brenner

## Valuing Great Lakes Coastal Wetlands

The extensive coastal wetlands of the Great Lakes are unique in ecological character, size and variety. In Michigan, they range from shoreline wetlands and marshes along our northern coastline, to the extensive wetlands of Saginaw Bay to the freshwater delta marshes of the St. Clair River. These coastal wetlands offer habitat and ecological values that are critically important to sustaining Great Lakes ecosystems and enrich our own coastal communities.

Recognizing the importance of these sensitive areas, Michigan Sea Grant adopted coastal wetlands as one of five priority issues in 2000. Since then, we've worked to help Michigan's coastal communities appreciate coastal wetlands for all of their values and ultimately take measures to protect them. Michigan Sea Grant currently supports several research projects dedicated to understanding the dynamics of Great Lakes coastal wetlands. These projects explore ways to determine the nonmarket values of wetlands, the effects of marsh fragmentation on fish diversity and productivity and the effects of excessive sedimentation on the natural decomposition process.

Sea Grant's extension agents located around the state use this research-based knowledge to educate citizens of all ages about the importance of Michigan's coastal wetlands. Notably, Extension Agent Walter Hoagman, author of *A Field Guide to Great Lakes Coastal Wetlands* and *A Field Guide to Great Lakes Coastal Plants*, has been instrumental in sharing his knowledge and passion for Michigan's coastal resources with fellow educators and the public.

Michigan Sea Grant has also helped control the invasive purple loosestrife plant in both coastal and inland wetlands. Since

1997, Sea Grant has been a partner in the Purple Loosestrife Project, an innovative biological control program with a strong educational component. Volunteers raise and release the *Galerucella* beetle, the plant's natural enemy. Recent reports indicate that the beetles have significantly defoliated purple loosestrife in mid-Michigan wetlands at Crow Island, Nayanquing Point and Shiawassee River State Game Areas, allowing native vegetation to re-emerge.

Coastal wetlands are also an important component of another initiative gaining momentum—Sea Grant's Sustainable Coastal Community Development program. A first step in the program is to gather information on resources allocated to coastal land use planning, including the number of coastal communities that have adopted wetlands regulations. This and other data will help Sea Grant's Extension Agents better assist those communities facing important planning decisions.

Through research and education, Michigan Sea Grant will continue its work to educate Michigan residents of all ages about the wonders and values of our state's remarkable coastal wetlands.

John Schwartz, Ph.D.

Michigan Sea Grant  
Extension Program Leader

# TREASURES of the GREAT LAKES

## Recognizing the Value of Michigan's Coastal Wetlands



BRENNER

*Blue Harebells grow along the wetlands of Thunder Bay Island's coast*

**Some of Michigan's most important natural resources are often overlooked: Great Lakes coastal wetlands. These unique habitats are integrally tied to the health and diversity of the Great Lakes ecosystem.**

Coastal wetlands provide important ecological functions and critical habitat for fish, birds and wildlife. Because of these features, coastal wetlands offer a variety of educational opportunities.

They are one of the most valuable shore types in the Great Lakes, says Michigan Sea Grant Extension Agent Walter Hoagman, and yet these coastal ecosystems are often under-appreciated.

"Michigan has the most extensive system of coastal wetlands of any Great Lakes state," says Hoagman. "They're an invaluable part of the Great Lakes coastal zone."

### **Wetland Types and Ecological Functions**

Within the Great Lakes basin, there are many wetlands that are directly connected to the Great Lakes, with water levels that vary with lake levels. These are generally considered coastal wetlands. Thousands of additional wetlands are near the Great Lakes but not hydrologically connected.

There are at least six types of Great Lakes coastal wetlands. Among them are lagoon and barrier (the most common), ridge and swale, shoreline, embayed, riverine and delta wetlands. (See pull-out section for descriptions.)

Wetlands have specific zones, among them are the aquatic (open water) zone, the emergent zone, wet meadow, shrub, and the upland or swamp forest zone. Typical plants in each zone are specially adapted to survive different degrees of root saturation and changing conditions.

All of these coastal wetlands provide key ecological functions. Notably, wetlands help improve water quality by absorbing nutrients and some chemicals, and filtering sediments. For example, wetlands might trap agricultural fertilizers from runoff, transforming and releasing nutrients gradually into the Great Lakes.



LAPORTE

Walter Hoagman, Michigan Sea Grant Agent, helped to support the construction of birding platforms, shown above.

## Fish, Birds and Wildlife

Coastal wetlands also provide critical habitat for fish, birds and wildlife, some of which are found only in the Great Lakes coastal zone. According to the Michigan Department of Natural Resources, coastal and inland wetlands support more wildlife and plants than any other Michigan habitat type.

*“The reason people come here is for the opportunity to see an impressive number of species in a short period of time.”*



LAPORTE

Suzanne Robinson, Detroit Audubon Society

Coastal wetlands are particularly valuable as spawning and nursery habitat for fish. It is estimated that 75 percent of all Great Lakes fishes use coastal wetlands at some point in their lives. Fish such as yellow perch and northern pike attach their eggs to wetland plants, and their young remain in these wetlands for varying periods. Further, these marsh areas support the majority of small fishes used for food by recreational and commercial fish. “Essentially, coastal marshes provide cover for these forage fishes and commercially important game species,” says University of Michigan (UM) researcher Dr. Paul Webb.

Migrating birds also rely on coastal wetlands. Tawas Point, on the northern shores of Saginaw Bay, is on the migratory pathway. With extensive coastal wetland habitat, Tawas Point State Park is known as one of the premier birding spots in the Midwest, with over 290 species sighted.

Suzanne Robinson, a board member for the Detroit Audubon Society, is one of the many birders who make the trip to East Tawas each year for the spring migration. “The reason people come here,” Robinson explains, “is for the opportunity to see an impressive number of species in a short period of time. The variety of warblers is very good.” In addition to warblers, the park is a good place to see migrating water birds such as loons, grebes, gulls and divers such as red-breasted mergansers and oldsquaw. This year, bird-watchers may also have seen the endangered piping plover.

Hoagman was instrumental in obtaining funds for wildlife viewing platforms at Tawas State Park. He emphasizes that this coastal habitat is not just important for a few weeks each year during spring and fall migration.

“These coastal wetlands are important breeding areas because of the abundant food and cover,” says Hoagman. “Many of these wetlands are not right along the shoreline; they can be a half-mile or more inland.”

For more about birding in the Saginaw Bay and Iosco County regions, visit:

[www.saginawbaybirding.org](http://www.saginawbaybirding.org)  
[www.msue.msu.edu/iosco](http://www.msue.msu.edu/iosco)

# G R E A T L A K E S C O A S T A L W E T L A N D S



Upland zone, Alpena, Michigan



Lagoon area with emergent and aquatic plants, Bay City, Michigan



Emergent zone, Alpena, Michigan



Open lake, Lake Huron

## Benefits of Coastal Wetlands

- Improve water quality in the Great Lakes by filtering nutrients and sediments
- Protect against erosion during periods of high water
- Provide habitat for many species of fish, birds and wildlife
- Offer recreational opportunities such as bird-watching and hiking

## Types of Coastal Wetlands

**Lagoon and barrier:** This is the most common type of coastal wetland (see diagram below). It is characterized by a prominent shoreline barrier, which protects a shallow lagoon.

**Embayed and Shoreline:** These two types are the most visible coastal wetlands and provide prime nursery habitat for dozens of fish species and nesting cover for wetland birds and waterfowl. The annual cycle of growth and decay of wetland plants provides nutrients to the Great Lakes.

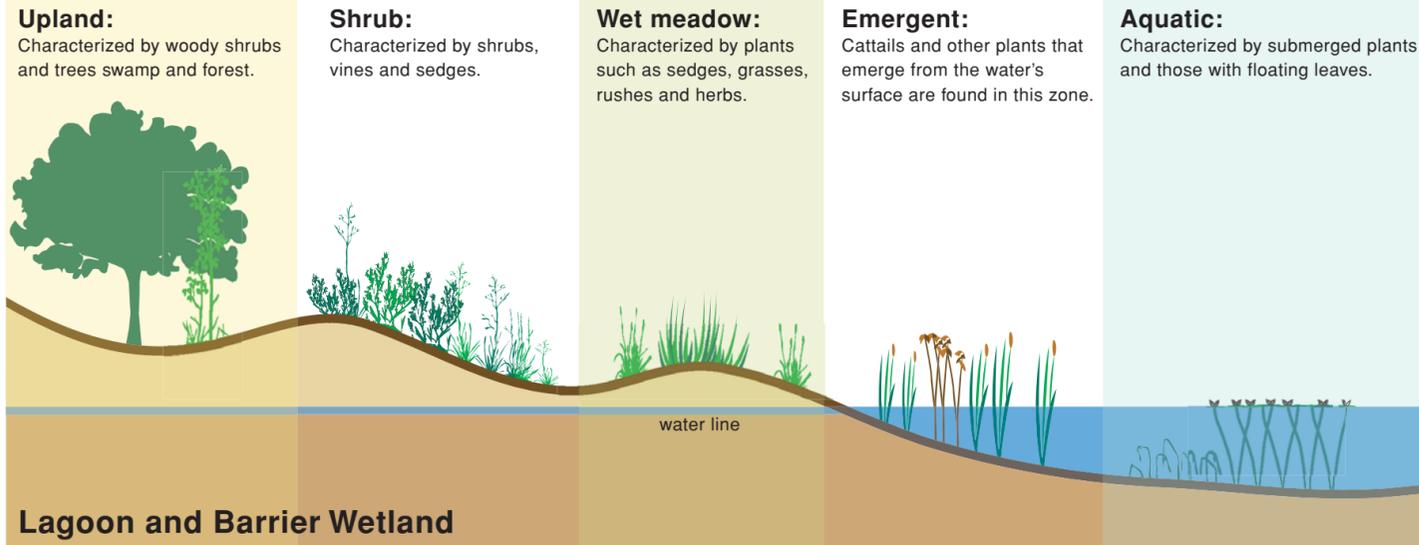
**Riverine:** These are characterized by a permanent channel that meanders through a lateral flood plain. Riverine wetlands often have many small islands that are rich in wetland plants.

**Delta:** A river delta forms when sediments flowing downstream settle near the mouth. As the sediments build up, they can form bars or islands. The result is a branched system of waterways, vegetation, mud flats and pools.

**Dune (Ridge) and swale:** Beach ridges formed when the glaciers receded. Mounds of material, parallel to shore (dunes or ridges) interspersed with flat areas (swales), characterize these coastal wetlands.

**Diked:** A diked wetland is an artificially-constructed shallow inland lake surrounded by a bank of dredged sediments and fill material. The original purpose of such wetlands was to attract migrating waterfowl for hunting.

## Wetland Zones



St. John's Wort



Great Egret



Black-eyed Susan



Marram grass



Dogwood, red-osier



Thistle



Great Blue Heron



Silverweed



Yellow Perch



Blue Vervain



Male Red-winged blackbird



Willow



Female Red-winged blackbird



Sedge



Mute Swan



Mallard duck family



Goat's-beard



Harebell



www.miseagrants.org



BRENNER

*Low lake levels along Saginaw Bay*

## Threats to Coastal Wetlands

Despite their ecological value, coastal wetlands are increasingly threatened. The growing popularity of coastal regions puts pressure on communities to develop their shorelines, leading to considerable loss of wetland habitat.

One primary threat to Great Lakes coastal wetlands, says Dr. Douglas Wilcox of the United States Geological Survey (USGS), is shoreline alteration.

“Most coastal wetlands require some type of protection from the wave energy of the lake, such as barrier beaches or sand spits, making them heavily dependent on sediment supply,” says Wilcox. “However, if people alter the shoreline by building rock revetments, groins or piers, it interrupts natural coastal processes and can cause accelerated erosion. This is especially true in front of revetments and in down-shore areas that are robbed of sediment trapped by the groins or piers.”

Other threats to coastal wetlands include regulation of lake levels, specifically on Lakes Ontario and Superior, which reduces natural water level fluctuation and facilitates the transformation of wetlands to other uses.

Paradoxically, human response to natural lake level fluctuations also threatens wetlands. “The main threats are draining the marshes, removing vegetation and turning wetlands into beaches,” says UM researcher Dr. Jim Diana. “This is particularly true when coupled with changing water levels. These areas often get isolated and modified during low water years. They are then unable to recover during higher water because of permanent changes and use by humans.”

Webb and Diana are conducting research in northern Lake Huron to understand the effects of marsh fragmentation on fish communities. They cite the Les Cheneaux area as an example of communities becoming interested in monitoring, protecting and enhancing their wetlands. Their current research effort there, funded in part by Michigan Sea Grant, is coupled with major work by the Nature Conservancy to promote community interest in such protection.

## Valuing Coastal Wetlands

Taking a different approach, resource economists at Michigan State University are conducting research to identify economic values of coastal

### Contacts:

Dr. Douglas Wilcox, Branch Chief of the Coastal and Wetland Ecology Branch of the USGS Great Lakes Science Center, Ann Arbor, MI.  
(734) 214-7256  
[www.glsc.usgs.gov](http://www.glsc.usgs.gov)

Dr. Jim Diana, Researcher and Associate Dean, School of Natural Resources & Environment, UM.  
(734) 763-5834  
[www.snre.umich.edu](http://www.snre.umich.edu)

Walter Hoagman, Michigan Sea Grant District Agent, Northeast District.  
(989) 984-1056  
[www.msue.msu.edu/iosco](http://www.msue.msu.edu/iosco)

Valerie Blaschka, Naturalist, Michigan Department of Natural Resources, Saginaw Bay Visitor Center at the Bay City State Recreation Area  
(989) 667-0717  
[www.michigandnr.com/parksandtrails/ParksandTrailsInfo.asp?id=437](http://www.michigandnr.com/parksandtrails/ParksandTrailsInfo.asp?id=437)

wetlands in order to reflect their true worth. Coastal wetlands have values that may not be captured by land prices. Researchers have conducted focus groups recently in preparation for an upcoming survey to identify what people know and value about wetlands. The researchers want to determine the extent to which survey methods can be used to measure the non-market values of coastal wetlands.

“People seem to have some idea that wetlands provide wildlife habitat,” says researcher Dr. Michael Kaplowitz, “but they are less aware of some of the other functions that wetlands provide.”

In essence, researchers hope to understand the trade-offs that people are willing to accept in relation to wetlands, such as ecological functions, wildlife habitat, recreational, educational and aesthetic value. In this way, says Kaplowitz, communities will have more accurate knowledge of the economic value of wetlands as they face planning and development decisions.

Resource managers, individual residents and shoreline property owners all play a role in wetland protection. Sea Grant and other organizations provide educational materials for managers, local politicians, homeowners and others on how to manage wetlands and coastal areas in an environmentally sensible way.

The political arena is also important. “Education must extend to our lawmakers,” says Webb. “Understanding the importance of wetlands in terms of ecological services such as water purification is critically important.”

Recognizing the many recreational opportunities that wetlands provide may also encourage their protection, says Sea Grant’s Walter Hoagman. He notes that as more people visit coastal areas to participate in bird watching and other recreational hobbies, the economy of small communities will benefit.

“We need to recognize that these diverse coastal wetlands are here,” says Hoagman, “and work to educate people about their critical values in order to protect them for years to come.”



The Saginaw Bay Visitor Center in the Bay City State Recreation Area is one of the state’s most important wetland education centers. Each year, more than 50,000 students visit the nature center, participating in guided tours and interactive wetland displays. Michigan Sea Grant assisted with the content of several of the displays.

“The ecosystem that’s preserved here is one of best examples of a freshwater coastal ecosystem in the United States,” says naturalist Valerie Blaschka of Michigan’s Department of Natural Resources.

“The key to educating kids about wetlands,” says Blaschka, “is to tie that education in with things they are already learning in school, so that it’s a reinforcement.” From the kids’ point of view, interaction is the key. Blaschka has learned that displays featuring topics such as wildlife, birds and waterfowl grab their attention. In essence, she says, “anything with movement and sound.”

During the summer, the park supports daily wetland activities open to the public, including wetland hikes, a junior explorers group and water exploration projects.

# Where's the Beach?



BRENNER

Bay City State Recreation Area coastline

## Low water levels expose valuable shoreline

Low water levels in the Great Lakes have helped create a critical coastal habitat referred to as an “emergent wetland.” These areas are characterized by large expanses of vegetation and sometimes a soft mud zone, separating upland from water.

These fertile wetlands have returned in dramatic fashion to the shoreline in some areas of the state, most noticeably in the Saginaw Bay region.

“Saginaw Bay has a gradual slope to the shoreline,” explains Michigan Sea Grant Extension Agent Walter Hoagman. “Consequently, low water levels expose extensive mudflats, which sprout up quickly with wetland plants.”

Although these emergent wetlands are part of a natural process, not everyone sees their beauty. The plants block access and views of the water, and the soft mud deters swimmers.

As a result, many shoreline property-owners in the Saginaw Bay area have plowed or graded their beaches, added sand or built footbridges to the water. All of this is done in an effort to make the beach more inviting for swimmers, park visitors and tourists or simply to improve the view of the water.

The trouble, according to Daniel Morgan of the Saginaw Bay district office of the Michigan Department of Environmental Quality (DEQ), is that many of these activities are being conducted in ecologically sensitive areas that are protected by federal and state regulations.

Without a proper permit, says Morgan, the activities are illegal and will result in significant natural resource damage.

“The bottomland and waters of the Great Lakes are held in public trust,” says Morgan. “It’s the responsibility of the state to be concerned with multiple uses—not only with users on shore, but with wildlife habitat, clean water and protection from erosion.”

### Low-cost Shoreline Protection

Like other wetlands, emergent wetlands provide many benefits. Erosion control is one. A network of vegetative roots and rhizomes holds surface sand in place. During periods of high water when these wetlands are submerged, this zone acts as a buffer to strong waves. Destruction of this shoreline vegetation can lead to long-term loss of shoreline protection, often requiring structures to be built to control erosion.

Fish and wildlife also benefit from emergent wetlands. A variety of birds, waterfowl, fish and wildlife rely on this coastal wetland habitat for foraging, nesting and shelter during periods of both high and low water. When grading or plowing removes native plants and exposes subsurface clay, it not only destroys this habitat but also allows non-native or exotic plant populations to take hold. Plants, such as purple loosestrife and giant reed, that provide little food and habitat value for wildlife, are quick to colonize disturbed soils and are difficult, if not impossible, to remove.

*“In these periods of low water, the wetlands are doing exactly what they need to do—restructuring and regenerating wetland habitat.”*

#### Contact:

John McKinney, Michigan Sea Grant  
District Agent, Northwest District  
(231) 922-4628  
[www.miseagrant.org/bios/mckinney.html](http://www.miseagrant.org/bios/mckinney.html)

Walter Hoagman, Michigan Sea Grant  
District Agent, Northeast District.  
(989) 984-1056  
[www.miseagrant.org/bios/hoagman.html](http://www.miseagrant.org/bios/hoagman.html)

## A Line in the Sand?

Yet, value is often a matter of perception. What's valuable from an ecological standpoint is small comfort to many homeowners and businesses that prefer a sandy beach. Property owners have options, but the first step is to understand the regulations. These regulations hinge on a critical factor: the ordinary high water mark.

In general, property-owners need a permit for any dredging, filling or alteration of any land *below* the ordinary high water mark. This is the dividing line between state and private ownership.

The ordinary high water mark is a fixed elevation above sea level. For Lakes Michigan-Huron, the ordinary high water mark is 580.5 feet. This means that in relation to August water levels (578.5 feet) on Lakes Michigan-Huron, the ordinary high water mark was about two feet above the still (calm) water level.

Most experts agree that the only precise way to know the location of the ordinary high water mark is to contact the U.S. Army Corps of Engineers or obtain an engineering survey. The Corps of Engineers shares regulatory jurisdiction over Great Lakes bottomlands and shoreline wetlands with the DEQ.

The important thing to remember is that Great Lakes water levels fluctuate and will eventually rise. Over the long term, Great Lakes' water levels fluctuate by as much as six feet. This lake level fluctuation is critical.

"About every 30 to 33 years, high water levels with intervening lows are what controls the diversity of coastal wetlands," says Dr. Douglas Wilcox of the United States Geological Survey. Wilcox is Branch Chief of the Coastal and Wetland Ecology Branch of the Great Lakes Science Center in Ann Arbor.

In the last few years, Great Lakes water levels have been comparable to low levels experienced in the 1960s.

"In these periods of low water, the wetlands are doing exactly what they need to do—restructuring and regenerating wetland habitat," says Wilcox. "These wetland plants are the fish habitat of the future when lake levels go up."

## Options for Shoreline Property Owners

The Michigan Dept. of Environmental Quality provides several options for property owners during periods of low water levels in the Great Lakes.

- 1) The DEQ allows property owners to mow vegetation in front of their property if the location is not a designated environmental area. The activities are "permit by rule," which means that no permit is needed if property owners follow DEQ guidelines.
- 2) Property owners can "groom" the first 30 feet from the still (calm) water shoreline if the area is primarily sand or pebbles (not a vegetated area). A permit is required from the U.S. Army Corps of Engineers. The U.S. Army Corps of Engineers suggests that anyone wishing to perform vegetative control work along the shoreline of Saginaw Bay contact the Corps at (989) 894-4951.
- 3) Property owners are free to clean up beach debris by hand, using a rake or shovel. Mechanized equipment is not allowed due to the potential to alter a large area.
- 4) With the proper permit, property owners may create a six-foot-wide path to the water not to exceed 200 feet in length.
- 5) The DEQ has placed a permitting priority on beaches that are used for public recreation. The agency is also more generous in allowing activity at waterfront resorts and those businesses whose economic livelihood depends on public beachfront.

## State and Federal Regulations Governing Great Lakes Bottomlands

The ordinary high water mark is permanently fixed by statute for all of the Great Lakes. Under the Submerged Lands Act of 1955 (Michigan Act 247), this boundary must not be crossed when considering construction, placement of structures, dredging or filling without a proper permit from the Michigan Department of Environmental Quality.

For the U.S. Army Corps of Engineers, the pertinent legislation governing beach alteration is the Rivers and Harbors Act of 1899 (Section 10), which addresses shoreline structures in relation to the ordinary high water mark; and the Clean Water Act of 1977 (Section 404), which addresses wetland areas.

## Resources

*Protecting Wetlands along the Great Lakes Shoreline* (brochure), Michigan State University Extension.

For more information about the benefits of emergent wetlands and the relevant legislation, visit the Corps web site at [www.lre.usace.army.mil/functions/rf/html/sagbay.html](http://www.lre.usace.army.mil/functions/rf/html/sagbay.html)

# Monitoring Effects of Sedimentation in Wetlands



NEELY  
*Examination of litterbag from treatment enclosures at the Lake Erie Marshlands Park, Gibraltar, MI.*

*“This dead plant material is acted on by microscopic organisms, and together they form the basis of wetland food chains,”*

Under natural conditions, coastal wetlands intercept and trap sediments as water slows and moves through dense plant growth. But what happens when this sediment is excessive due to urban runoff or erosion from agricultural practices?

Researchers at Eastern Michigan University (EMU) and the University of Toledo suspect that accelerated rates of sedimentation inhibit the microbial activity associated with plant decay, which is vital to a healthy wetland. When plants such as cattails, bulrushes and sedges die and fall into the water, they eventually become colonized by algae, bacteria and other organic matter.

“This dead plant material is acted on by microscopic organisms, and together they form the basis of wetland food chains,” explains ecologist Dr. Robert Neely of EMU. In a project funded by Michigan Sea Grant, Neely and researcher Dr. Robert Sinsabaugh are measuring the effect of sedimentation on the rate of decomposition.

The experimental design includes a total of 30 enclosures at two locations—Winous Point in Maumee Bay, Ohio and Lake Erie Marsh in Gibraltar, Michigan at the mouth of the Huron River. Project assistants have placed litter bags (mesh bags with carefully weighed aquatic plants) inside the enclosures. Over the past two years, each of the enclosures received one of three sediment treatments; some received no sediment at all, while others received a silt mixture or a clay mixture.

Researchers have periodically collected the litter bags to analyze the results. The complex part of the project, says Neely, is in the analysis, which measures growth rate and composition of various microscopic organisms such as fungi, bacteria and algae.

Although the data is plentiful, says Neely, the main question about sedimentation has yet to be answered. The drought this past summer has altered the wetland habitat, so that plant material could not be suspended in water and exposed to sediment as planned.

Still, the experiment has revealed other important information. “What’s really interesting,” says Neely, “is that the two sites are profoundly different.” For instance, enzyme activity and fungal biomass were much higher at the Lake Erie site. This site is drier than Winous Point, and Neely suspects sedimentation may not be as important for similar wetland types. “Our results thus far suggest that wetland attributes will vary tremendously with the characteristics of the site.”

For more information on preliminary results of the study, visit the EMU water resources website at [www.emich.edu/wrc](http://www.emich.edu/wrc)

# Communications Liaison joins Sea Grant



Michigan Sea Grant and the Department of Fisheries and Wildlife at Michigan State University (MSU) are pleased to announce that Patricia Stewart has joined their teams. Stewart will

work with both organizations, serving as external relations communicator for Michigan Sea Grant and director of communications for MSU's Department of Fisheries and Wildlife.

With more than 15 years of public and media relations experience, Stewart will lead Michigan Sea Grant's legislative, agency and foundation outreach efforts.

"Pat brings to the table the experience with natural resources communications and state agencies needed to help advance Michigan Sea Grant to the next level of support in our research and outreach capabilities," said George Carignan, interim director for Michigan Sea Grant.

She will also direct and manage the communications and public relations programs for the MSU Department of Fisheries and Wildlife.

"This position is another step forward in continuing our collaborative efforts with the University of Michigan and Michigan State University Michigan Sea Grant College Program," said William Taylor, associate director for Michigan Sea Grant and chairperson for MSU's Department of Fisheries and Wildlife. "Pat's extensive background in public relations and

marketing will be a tremendous asset in developing a communications strategy for the Fisheries and Wildlife Department at MSU."

Stewart's outreach efforts will focus on building relationships with not only federal and state agencies, but also with great lakes, environmental and research organizations. She will also devote energy to the Partnership for Ecosystem Research Management team, a collaboration between Michigan State University, the Michigan Department Natural Resources (MDNR), the Great Lakes Fishery Commission and the Great Lakes Science Center formed to work with their stakeholders in identifying and conducting research on ecosystem problems and their solutions.

Stewart was formerly director of communication and education services for the National Food Safety and Toxicology Center (NFSTC) at MSU, where she directed and managed the NFSTC's communications and public relations program. She has worked as a natural resources and environmental communication consultant for Public Sector Consultants, Inc., a research organization specializing in areas of the environment, public health, education, economics and public policy. Stewart's career also includes working with MDNR as its press secretary and assistant director for the Public Information Office in Lansing, where she managed the agency's news and marketing programs.

Stewart can be reached at (517) 355-1821 or via email at [stewartp@msu.edu](mailto:stewartp@msu.edu)

## Communications Staff Recognized

Michigan Sea Grant Communications staff members received several awards recently.

Managing editor Joyce Daniels received an APEX 2002 Award of Excellence for feature writing in the Fall 2001 issue of *Upwellings*.

Senior Graphic Artist Dave Brenner was part of a team of Communicators from Alaska Sea Grant who received an APEX 2002 Award of Excellence for conference program materials.

APEX awards are based on excellence in graphic design, editorial content and ability to achieve overall communications excellence. The awards are administered by Communications Concepts, Inc., of Springfield, Virginia.

Communications Specialist Carol Swinehart received a third place award for a Great Lakes Facts media kit from the Michigan Outdoor Writers Association.

## contact us

### Michigan Sea Grant

([www.miseagrant.org](http://www.miseagrant.org)) is dedicated to the protection and sustainable use of Great Lakes and coastal resources. A cooperative program of Michigan State University and the University of Michigan, we utilize community, academic and professional resources to advance understanding of the Great Lakes.

**Upper Peninsula:** Ron Kinnunen  
email: [kinnunen@msue.msu.edu](mailto:kinnunen@msue.msu.edu)  
(906) 228-4830

**Northwest:** John McKinney  
email: [mckinney@msue.msu.edu](mailto:mckinney@msue.msu.edu)  
(231) 922-4628

**Associate:** Mike Klepinger  
email: [klep@msu.edu](mailto:klep@msu.edu)  
(517) 353-5508

**GLERL:** Rochelle Sturtevant  
email: [sturtevant@glerl.noaa.gov](mailto:sturtevant@glerl.noaa.gov)  
(734) 741-2287

**Southeast:** Mark Brederland  
email: [brederm@msue.msu.edu](mailto:brederm@msue.msu.edu)  
(810) 989-6323

**Southeast Urban:** Steve Stewart  
email: [stewart@msue.msu.edu](mailto:stewart@msue.msu.edu)  
(586) 469-7431

**Southwest:** Chuck Pistis  
email: [pistis@msue.msu.edu](mailto:pistis@msue.msu.edu)  
(616) 846-8250

**Northeast:** Walt Hoagman  
email: [hoagman@msue.msu.edu](mailto:hoagman@msue.msu.edu)  
(989) 984-1056

Michigan State University  
334 Natural Resources Bldg.  
East Lansing, MI 48824-1222  
(517) 353-9568

University of Michigan  
2200 Bonisteel Blvd.  
Ann Arbor, MI 48109-2099  
(734) 763-1437





**Michigan Sea Grant College Program**  
2200 Bonisteel Boulevard  
Ann Arbor, MI 48109-2099

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