NEWS OF
THE GREAT LAKES
FROM MICHIGAN
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PROGRAM

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Tuning in to Low Power Radio

BROADCASTS COULD BENEFIT BOATERS AND COASTAL VISITORS

Just before crossing the Mackinac Bridge, most drivers notice a large, green sign advising motorists to "tune to AM radio 530 or 1610 for Mackinac Bridge updates." The broadcast, which provides current weather conditions and other bridge information, is an example of low power radio, a micro radio system capable of broadcasting special information over a limited range.

CAROL SWINEHART

Marina services are a potential topic for low power radio broadcasts.

Low power radio (LPR) is also used at tourist destinations—Seney National Wildlife Refuge, for instance—so that tourists can tune in to learn about wildlife, organized events, and get detailed directions. In Michigan, coastal visitors and boaters could be the next group of people to benefit from the technology.

"In many coastal communities, for example, every boat has to go by a pier head to get into the harbor," said Michigan Sea Grant Extension Agent Chuck Pistis. "Low power radio could be set up to inform boaters about what kinds of services are available in each marina, whether a slip is available and the cost."

Great Lakes ecological information is another likely topic for broadcast.

"We also think that low power radio is going to be a wonderful tool to talk to boaters about issues relating to the Great Lakes like exotic species, zebra mussels for example," said Pistis, "and how boaters can play a role in reducing the spread of these organisms."

Pistis is working to educate communities in Michigan about the potential of low power radio as an environmental interpretation tool as well as a method for disseminating water safety information. LPR systems could be used in coastal environments to warn people about high water, dangerous currents or storms.

In the Upper Peninsula, the U.S. Forest Service is considering using an LPR system along a stretch of Lake Michigan beach west of St. Ignace. "It would be great if we could set up signs on the highway and people could tune in before they stop to find out what the conditions are," said Michigan Sea Grant Extension Agent Ron Kinnunen, who is also a member of the Mackinac County Water Safety Committee Review Team.

continued on next page

WHAT'S INSIDE...

JOYCE DANIELS

Big Sable Lighthouse

Use of the system in coastal environments may seem ideal, but there's one catch: people have to tune in.

IS ANYONE LISTENING?

Work by Oregon Sea Grant in recent years has provided some insights regarding listenership to low power radio broadcasts. In studies done in 1998 at Boiler Bay State Park, researchers interviewed 800 people over a five-week period to find out whether they tuned in to the park's broadcast, which was promoted on signs inside and outside of the park. The broadcast provided information on Boiler Bay points of interest, gray whale natural history and migration, and the weather.

So far, results have been encouraging. Approximately twenty percent of people interviewed said they had tuned in to the broadcasts as a result of signs posted outside the park. If the broadcast continued all year, this amount translates into approximately 20,000 listeners per year.

More than 85 percent of listening park visitors interviewed during the study liked the idea of using localized radio broadcasts to receive park information.

Another 40 percent of people interviewed said they had noticed the signs inside the park and planned to tune in before leaving. All told, more than 85 percent of listening park visitors interviewed during the study liked the idea of using localized radio broadcasts to receive park information.

BIG SABLE LIGHTHOUSE: TRAVELERS TUNE IN

In Michigan, one of the most recent applications of low power radio has been the Big Sable Lighthouse in Ludington. An LPR system was established for the lighthouse (located north of town) to provide travelers with interpretive information on lighthouse history, current activities and directions to the station. The typical broadcast range is three to five miles, and travelers can tune in as they approach Ludington.

Another benefit is that LPR messages can be recorded and changed frequently. "Information could change tomorrow, and with this system, we'll be able to change the message hourly if we want to," said Bill Baker, a former tour guide at the lighthouse. "So we're looking forward to using it to see how it's going to work for us."

To make a low power radio system work for boaters and coastal visitors, several things have to happen. Sign placement must be carefully considered, said Pistis. For vehicles, major routes must be identified as well as average speed to ensure that listeners have enough time to hear the message.

by JOYCE DANIELS

Reporting contributed by Scott Allman of ANR Communications at Michigan State University

Great Lakes and Natural Resources Camp

Forty teenagers, ages 13 to 15, attended the annual 4-H Great Lakes and Natural Resources Camp in August 1999, sponsored in part by Michigan Sea Grant. The week-long camp took place at Camp Chickagami on the shores of northern Lake Huron.

The youth camp is designed to build leadership skills focusing on natural resources, particularly the aquatic environment of the Great Lakes. Campers are divided into five groups (named after each of the Great Lakes), and they participate in activities related to coastal processes, wetlands, wildlife, and the Great Lakes fishery.

Sea Grant Extension Agent Mark Breederland led this year's fishing outing. "It's a good window of opportunity to talk about the Great Lakes fishery and introduce topics like exotic species," he said. Students on one boat netted 11 salmon, he added, setting a new camp record. Back on land, students clean and filet their catch as they learn about fish anatomy, physiology and contaminants.

Mark Stephens

Camp recreational activities include canoeing, sailing, field trips and a Friday night fish fry. This year, a "career night" gave the campers the opportunity to question counselors (many of whom are former campers) about their chosen careers in natural resource fields.

In 1999, Michigan Sea Grant provided a special grant to make it possible for more urban and minority youth to participate. As a result, the diversity in camp attendance was unprecedented, according to camp co-director Mary Riley. "It was an awesome experience for the kids," she commented.

More than 750 teens have participated in the camp since it began in 1983. An evaluation, conducted after 10 years of operation, has shown that camp has contributed to participants' awareness of natural resources and management issues, increased their awareness of environmental problems, stimulated their interest in the outdoors, and influenced their career decisions.

For information on next year's camp, contact any Michigan Sea Grant Extension Agent listed on page 8.

"In my second year at camp, I learned more about the Great Lakes and its wildlife and plants than I ever thought I could. What the kids here learn can have a huge effect on the world in the future."

Julie McLaughlin
1999 Camper

LOOKING BACK . . .

For former camper Heather Van Den Berg, evening campfire gatherings were a favorite time, but it was the fisheries class that she remembers most. "We would take seine nets into the river and lake, and I was so shocked that they were going to make me go into the water with my jeans on and try to catch little fish," she said. "A couple of years later, I remember finally learning how to properly identify fish by their anatomical structures rather than color and size." Heather is now a sophomore at Michigan State University and studies fisheries and wildlife. She has served as a camp counselor for three years.

Looking For Clues

SCIENTISTS INVESTIGATE SOURCE OF CONTAMINANTS IN GREAT LAKES

Levels of PCBs in Great Lakes fish began declining in the mid 1970s—partly in response to the Clean Air and Water Act—but the declines unexpectedly slowed in the late 1980s and early 1990s. Over the past two years, a group of scientists and graduate students has conducted research in Grand Traverse Bay to find out why.

"The driving question has been, 'why have concentrations in fish stabilized?'" said Colleen Masterson, a graduate student at Michigan State University. "Where are the contaminants coming from and can future declines be expected?"

Masterson outlined the scope and preliminary findings of the project at an October symposium in Traverse City sponsored by the Grand Traverse Bay Watershed Initiative. The multi-disciplinary research project is led by Nathaniel Ostrom of Michigan State University and funded by Michigan Sea Grant and the U.S. Environmental Protection Agency. The project also examines the banned pesticide toxaphene and a class of compounds known as PAHs (naturally produced and products of combustion). Project scientists suspect the contaminants are deposited by air masses from other locations, known as atmospheric deposition, or are contained in sediment.

NATHANIEL OSTROM

MSU researchers and crew of the W.G. Jackson pull in an otter trawl, used to collect fish.

When erosion or storms stir up the sediment, the contaminants could get recycled through the aquatic food web.

Once in the food web, these contaminants bioaccumulate, or become concentrated as they travel up the food chain, stored in the fat of fish and other predators. Because contaminants adhere to particles, the goal of the project is to determine the relative importance (as transfer routes) of three types of particles: sinking, suspended (in the water column) and those in the sediment.

Michigan Sea Grant Extension Agent John McKinney assists MSU graduate student Colleen Masterson.

Grand Traverse Bay in northern Lake Michigan is the research laboratory for several reasons. The bay is relatively deep yet easily accessible from land and fairly protected. Barring subtle differences, research findings will be generally applicable to the upper Great Lakes, according to Ostrom.

The multi-disciplinary project is a unique combination of biology, chemistry and physical processes.

First the biology. Scientists are analyzing the diet and fat content of three species of fish—alewife, bloater and sculpin. "Alewife, bloater and sculpin are what we call forage fish. They are important prey items for the larger fish such as salmon and lake trout in the Great Lakes," explained Ostrum. "So if we want to understand contaminant levels in these fish we need to understand the contaminant burdens of their prey. The forage fish are also closer to the bottom of the food web, which makes tracing the origins of the contaminants less complex."

One way to trace the origin of contaminants is by conducting extensive chemical analysis. The researchers have found, for example, that sinking particles have a high concentration of PCBs. They also know that the three types of particles—sinking, suspended (in the water column) and those contained in sediment—each

continued on page 7

Exotic Water Flea Enters Lake Michigan

A tiny water flea native to the Caspian Sea has turned up recently in Grand Traverse Bay. Students aboard the schoolship *Inland Seas* witnessed the discovery in September, as they hauled in a plankton net that contained a few of the exotic zooplankton. Using a video microscope, an instructor noticed the strange, nearly-transparent organism, but no one could identify the species.

"They saw it and didn't know what it was," said skipper Tom Kelly, who later did some investigating. He remembered hearing reports of a new species discovered in Lake Ontario last summer and eventually found a photo on a Web site: "It sure looked like what we had."

Confirmation came from Canadian scientist Hugh MacIsaac of the University of Windsor, who first reported the organism, known as *Cercopagis pengoi*, in Lake Ontario last summer during routine sampling. Since then, the aquatic invader has spread to six of the Finger Lakes in New York, but its presence in Lake Michigan is troubling.

"I more or less expected it to spread but was surprised at how quickly," MacIsaac said, adding that the organism was probably transferred to northern Lake Michigan via ballast water. Its move from Lake Ontario to the Finger Lakes, however, was likely due to boating and fishing activity, he said, particularly when anglers transfer the contents of bait buckets or live wells from lake to lake.

In Lake Ontario, the creature is already making its presence known by fouling fishing lines. "It poses a real problem for sport and commercial fishermen," said MacIsaac. Its long tail spine accounts for more than 80 percent of the creature's total length (about one centimeter). "It sticks to everything," he added.

The species was also found in southern Lake Michigan in late October, according to Illinois-Indiana Sea Grant. Like its cousin *Bythotrephes*, the new invader could be a problem because it feeds on smaller zooplankton, reducing food for young fish. In turn, young fish may find it difficult to eat *Cercopagis* because of the barbs on its tail. In the absence of natural predators, the flea could reproduce rapidly.

For more information or to view photos of *Cercopagis*, visit:

http://www.epa.gov/glnpo/monitoring/exotics/ceropagis.html

Winning Program

EXOTIC SPECIES DAY CAMP EARNS NATIONAL RECOGNITION

The Great Lakes Sea Grant Network's "Exotic Species Day Camp Education Project" received an Outstanding Educational Program Award from ADEC, the American Distance Education Consortium. The award was given to recognize a team for innovation and excellence in the development and delivery of credit or noncredit programs with consideration given to both technological and pedagogical innovation. The project was selected among 12 nominated projects.

The project educated teachers in remote locations throughout the Great Lakes region about the availability and benefit of classroom teaching resources focusing on the biology, spread, and impact of aquatic exotic species.

Project participants included the following: Mike Klepinger and Steve Stewart of Michigan Sea Grant; Pat Charlebois, Brian Miller, Clarissa Gentzler, Jeffery Kohmstedt and Robin Goettel of Illinois-Indiana Sea Grant; Doug Jensen of Minnesota Sea Grant; Jim Lubner of Wisconsin Sea Grant, Helen Domske of New York Sea Grant; and Rosanne Fortner of Ohio Sea Grant.

announcements

10th Annual Zebra Mussel Conference

The 10th International Aquatic Nuisance Species and Zebra Mussel Conference will be held Feb. 14 to 18, 2000 in Toronto, Ontario, Canada. The conference will be hosted by Fisheries and Oceans Canada and will take place at the Westin Harbour Castle.

The conference is considered the most comprehensive international forum for experts to present results of their research, outreach, and technological developments concerning biology, ecology, control and management, and impacts of marine and freshwater aquatic nuisance species.

For more information, call 800-868-8776 or visit the conference Web site: www.zebraconf.org

SEA GRANT ARCHIVES

Superior Storms

Storms on the Great Lakes are most likely to occur in spring and late fall when cold air from the north and warm air from the south collide over the upper Midwest.

Some storms on the Great Lakes can match the intensity of hurricanes in the Atlantic Ocean, according to coastal engineer Phil Keillor of the University of Wisconsin Sea Grant program. Keillor discovered this recently when he compared weather data from Hurricane Dennis with similar data about a storm that hit Lake Superior a year ago. Keillor said the Lake Superior storm last November had wind speeds that were as high as those in Hurricane Dennis when it was off the Atlantic Coast in late August.

"The winds were about the same in Hurricane Dennis as they were on Lake Superior," Keillor said, "but the air pressure was about an inch lower on the Great Lake, and that's sort of surprising."

Lower air pressure in a storm usually means greater wind speeds, Keillor noted. The winds in turn drive up the height of waves, Keillor explained, and it's the waves that are the most destructive feature of Great Lakes storms.

"It's really the waves and not the wind that does the damage," he said. "It's the waves that come in and attack the shore."

The storm last year on Lake Superior caused about $40 million in damage, according to John Knox of Valparaiso University. Knox teaches geography and meteorology at Valparaiso and studies Great Lakes storms. He said the November storm was noteworthy, but it's still small compared to hurricanes.

"In terms of loss of life or amount of damage, these storms through the upper Midwest are small compared to what a hurricane or damaging tornado could do," Knox said.

Storms on the Great Lakes are most likely to occur in spring and late fall, he added, when cold air from the north and warm air from the south collide over the upper Midwest.

According to Knox, a storm on Lake Superior similar to the one last year helped sink the Edmund Fitzgerald in 1975. He said a combination of high waves that hit the ship from different directions played a large role in bringing it down.

by MATT NILSSON

Originally broadcast by Earthwatch Radio, a service of the Wisconsin Sea Grant Institute and the Institute for Environmental Studies at the University of Wisconsin-Madison.

IAGLR Launches New Web Site

Point your browser to **http://www.iaglr.org/** to explore the new web site for the International Association for Great Lakes Research.

IAGLR is dedicated to the promotion and communication of research on large lakes, particularly the North American Great Lakes. The new site features a "Hot Topics" area, a "Research Highlights" page and a section on Frequently Asked Questions for those unfamiliar with the organization.

The site also contains information on next year's IAGLR conference, including instructions on submitting abstracts via the Web site, the association's professional journal, and on scholarships and awards.

Breederland Recognized for Efforts on Behalf of Detroit River

Michigan Sea Grant Extension Agent Mark Breederland recently received an award from Michigan State University Extension (MSUE) for his contribution to enhancing the Detroit River corridor.

The Detroit River was named one of 14 American Heritage Rivers in July 1998, due in part to Breederland's leadership. He was involved in the entire process, from nomination through project implementation, and has fostered cooperation among constituents at the local, state, national and international levels. This five-year project is expected to attract federal government support for projects in environmental improvement, economic development and historical/cultural preservation.

For additional information on the American Heritage Rivers, see the Spring 1998 edition of upwellings or contact Breederland at (810)469-6085.

Visit the AHR website at:
www.epa.gov/rivers/98rivers/detroit.html

Looking for Clues

continued from page 4

has a different chemical or isotopic signature. By analyzing the ratio of carbon and nitrogen isotopes in fish, the researchers can determine the source of the contaminants. (A sinking particle, for example, indicates that the ultimate source may be atmospheric.) The researchers found that alewife, an open-water fish, had a greater concentration of PCBs than sculpin, a bottom-dwelling fish. They suspect, however, that this might be partly because alewife have a higher growth rate, consume more food and consequently more toxins.

Physical processes are another factor in the research. Project scientists know that PCBs adhere to organic particles, such as those created in algal blooms. "We see that each season shows a peak in PCB concentration early in the season then declines throughout the season," said Masterson. "Algal blooms may be the source of PCBs getting into the food web." The researchers are also monitoring water currents and short-term changes in water levels to see how these changes affect the movement of contaminants.

How these chemicals are entering the food web may reveal another important fact: how long it will take for them to dissipate. The length of time chemicals stay in the water is called "residence time," and knowing this will reveal how long it takes the Great Lakes to respond to changes in input, explained environmental chemist Joel Baker. "We really want to get at two questions," said Baker. "One is, if society deems certain contaminant levels are too high, how much do we have to reduce loadings? And two, once we make the change, how long will it take the system to respond?"

The reduction of toxins contained in sediment is actually occurring faster than the reduction in airborne contaminants, Baker explained. If sediment is the major source of contaminants that ultimately end up in fish, the fish may gradually show signs of improvement as the aquatic ecosystem flushes itself.

The project will result in a computer model that can be used by researchers and resource managers to understand how contaminants move through the aquatic ecosystem.

by JOYCE DANIELS

publications

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