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THE MICHIGAN RIPARIAN

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DEVOTED TO THE MANAGEMENT AND WISE USE OF MICHIGAN'S LAKES AND STREAMS

Published Quarterly – February, May, August and November

FREIGHTER MOVING NORTH FROM PORT HURON INTO LAKE HURON

THE MICHIGAN RIPARIAN

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Don Winne

ROAD END LEGISLATION SUFFERS ROCKY ROAD IN MICHIGAN HOUSE

Legislation to guarantee public ingress and egress to navigable inland lakes was first introduced by Representative Mike Kowal by HB 4141 in November 2002. It was re-introduced by Rep. John Stakoe on February 4, 2003 and referred to the Committee on Conservation and Outdoor Recreation. The Chair of the Committee, Susan Tabor of Eaton County, held some public hearings, but the Bill was not reported out of Committee. In general, the Bill provided for access to inland lakes by way of roads that ended at lakes and streams. It prohibited the use of road ends for picnicking, sunbathing, or lounging. It also prohibited the installation of boat hoists and mooring of boats in the water adjacent to the road ends. It permitted the construction of a dock at the road end if the purpose of the dock was to "aid in the public access to the waters of the lake."

The Bill was re-introduced as House Bill 4576 by John Stakoe, together with 12 other members of the House, on March 24, 2005, and referred to the House Committee on Local Government and Urban Policy (92nd Legislature). This Committee reported it to the House for debate and passage on June 15, 2005. It was held up by the majority Floor Leader, Chris Ward, for 3 ½ months.

As a result of opposition to the Bill by Rep. Joel Sheltrown and others, the Bill was re-assigned to the House GOVERNMENT OPERATIONS COMMITTEE. Will the Bill be reported out of Committee to the House Floor for debate this year? Not unless some pressure is brought on the majority party leadership. Lake associations and individual ML&SA members need to inform Craig DeRoche, Speaker of the House, of their opinion and wishes for action.

Donald E. Winne
Editor and Publisher

In This Issue

Cover: Freighter moving north from Port Huron into Lake Huron
Photos taken by Don Winne, 2003

The Michigan Riparian magazine adds Contributing Editors to its staff. The new editors and their areas of expertise are listed below:

Dr. Lois Wolfson, Institute of Water Research, Michigan State University.
Area of expertise – Aquatic Plants.

Anthony Groves, Progressive AE of Grand Rapids.
Tony's area of expertise is Land Use and Water Quality.

Dr. Don Garling, Department of Fisheries & Wildlife, Michigan State University.
Area of expertise is Fisheries Management.

Is the Lake Huron perch fishery 'perched' on the brink of extinction?

TAWAS COMMERCIAL PERCH BOAT CAPTAIN, JERRY BROWN, WONDERS ABOUT THE FUTURE OF LAKE HURON PERCH FISHERY. (Article by Jim Dunn, Editor & Publisher of the *Northern Michigan Sun*, August 2005)

Jerry and Elaine Brown look over some old photos of the "old days," when the Brown family fishing business was going strong and the fishing was good. – *Photo by Jim Dunn*

The big twin engines rumble to life, and you can feel the sound of the idling powerplants vibrating in the pit of your stomach. The exhaust gurgles in the cold water of Lake Huron at the stern of the boat as Captain Jerry Brown of Tawas casts off the lines binding the *Miss Charity Isle* to the long wooden dock on the southern reaches of the Tawas Bay shoreline.

A light breeze holds the 47-foot, 12-ton craft back from the wooden pilings, tugging at the last line like she's anxious to get underway, to get out on the big water she's worked for the past 51 years.

These days, on board with Captain Brown are likely to be about a dozen or less still optimistic perch fishermen, mostly retirees with their grandchildren, scattered sparsely around the deck that was built to handle 36 passengers and a two-man crew. They remember hauling in big catches of yellowbellies in their younger days, and hope to share the fun of a good day of perch fishing on the big lake with the kids.

Captain Brown also remembers the big catches of "the good old days," when he fell asleep exhausted each summer night after running two, four-hour trips a day, seven days a week, with the big perch boat filled to capacity on each trip.

Those days are long gone.

Nowadays, he's lucky to fill up a boat on a weekend.

Brown said that while he's still catching some perch, the fishery is nothing compared to what it used to be.

Jerry Brown has experienced the ebbs and flows of the perch fishery, and the Lake Huron fishery as a whole, for pretty much all of his 61 years. Like his father, his grandfather, his great-grandfather and his great-great-grandfather before him, he's been a commercial fisherman working the big lake for the living it had to offer.

"My family has commercially fished off the Thumb and here since the 1800's," said Brown. "My great-great-grandfather and his brother actually rowed across Saginaw Bay from Bayport in the Thumb to buy this property, so he

could fish over here. They were hardy people back then. They kept waiting for a calm day," he laughed, "and eventually they got one."

It was apparently worth the wait, as his great-great-grandparents bought 3/4 of a mile of Lake Huron shoreline for $400 in back taxes. The years and family members that followed have whittled that expansive shoreline down to a smaller stretch where Jerry and his wife, Elaine, live and run an 80 site lakefront campground in conjunction with the perch fishing boat.

Jerry's father, Melvin, actually built the *Miss Charity Isle* himself during the mid-1950's, and captained her until his retirement in 1978. Melvin passed away in February at the age of 89.

"When my dad built this boat," Jerry explained, "it really was the heyday of perch fishing. From 1955 to 1965, there were plenty of perch. In fact, the DNR (Michigan Department of Natural Resources) decided there were too many perch. They issued permits for gill netting, and that pretty much decimated the fishery at that time," he said.

"But perch are a prolific species," he continued. "The fish came back from the gill netting era pretty quickly, and from the mid-70s to the mid-90s, fishing was good again."

For the past 10 years or so, however, Brown says that perch numbers have dropped significantly. He blames a variety of factors for the decline, but compares the fishery to the decimation it suffered from gill netting in the 1960s.

"You can't pin it on any one factor," Brown said, adding that he feels the state is not without blame, citing "poor regulation" and "poor enforcement."

"I also have a theory that the chemicals in the water are affecting reproduction," Brown added. "Add in the cormorants, which are out of control, and everything else, and it's no wonder the perch have disappeared."

Brown pointed out that at one time, there were a total of nine of the big boats taking out perch charters on Saginaw Bay, with three in Tawas alone, including the Capt. Mac, moored behind the state police post, and the Northern Star and the Miss East Tawas (later rebuilt and renamed the Holiday), plus Brown's boat, which is located just south of Alabaster. Also, Brown said, there was one boat each in Oscoda, AuGres, Pinconning, Port Austin, and Caseville.

Today, Brown said that his boat and the one in Port Austin are the only ones left in business.

"To give you an idea of the enormous economic impact this has on our side of the state, you just have to look at the numbers," he explained. "When the fishing was really good, we all ran seven days, two trips a day. Even if we weren't all full up all the time, we all ran at least 1,200 people a month out on Lake Huron to fish for perch.

"Those people mostly came to this area just for that reason. They stayed in our motels, our campgrounds. They shopped in town, ate in our restaurants, bought gas for their cars. They're not coming anymore.

"Do the math," he concluded.

The loss of the perch fishing industry, when added to the decline of Lake Huron's salmon fishery, the Bovine Tuberculosis in Northeast Michigan's deer herd, and the escalating cost of gas, has some people wondering if the sun may be setting on the Sunrise Side's tourism industry.

Brown thinks that the beginning of the current decline in perch numbers started with the DNR's increase of the limit on the number of perch anglers could take in a day.

"With so many people fishing out there, we began to see the numbers dwindling in the mid-80s," said Brown. "And there was definitely a lack of enforcement. There were locals here, and probably everywhere, who were taking huge numbers of fish and selling them illegally to restaurants, and to people, downstate."

At that point, Brown collected more than 1,500 signatures asking for the reinstatement of a 50 fish per day limit and took the request to then-state representative Tom Alley of West Branch, who had a record of championing sportsmen's causes in Lansing.

"Once there were no perch left out here, they finally got the state to take action and drop the limit to 50," Brown lamented.

Brown thinks that the DNR should close the perch season during their spawning period, but says that the DNR disagrees on that subject. He also thinks that the state needs to step up its enforcement of the limit law.

"With the modern equipment on boats today, and radios to call each other, a small group of guys can clean out a school of perch real quick," Brown said.

Brown credits the DNR's introduction of the smelt into the Great Lakes with the decline of the whitefish fishery in that era.

"The DNR first planted smelt in Lake Michigan in 1922," Brown said. "They migrated to Lake Huron and shared the same waters as the spawning whitefish. My grandfather always said that the smelt were the demise of the whitefish at that time, but the DNR always denied it. But in the last 10 years or so, they've started to acknowledge it.

"And you can tell, now that the smelt have disappeared, the whitefish are coming on stronger than ever. Now they're catching lots of whitefish from the East Tawas dock in the fall, there are so many of them," he said. "That never happened before."

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While highly opinionated on the subject of the fishery, Captain Jerry Brown is also philosophical about the problem of depending on the whims of nature, and the nature of man, in making a living from the freshwater sea.

He and his wife's campground business helps to pay the bills when the fishing business is slow. They keep 10 to 20 of the 80 sites free for overnighters, but three-quarters of the campers stay the entire season, or longer. One camper has stayed all summer every year for the past 40 years.

"A lot of people come to stay overnight, but end up returning for the rest of the season, and some have stayed on for years," said Elaine. "Over the years, we've had many people who would come to fish every day, or come to camp, and we became friends. We've met so many nice people through this business," she said.

An unusual side business has also developed over the years, which involves burial at sea.

"Two or three times a summer, someone will charter the boat because a loved one wanted their remains to go into Lake Huron out from their cottage, or because they were a fisherman or a sailor," explained Brown. "It can be very emotional, but it's nice for people."

The Browns are also trying out another endeavor this year, running sightseeing tours from Northport Marina to Big Charity Island, and there's been a couple of diving groups that chartered the boat.

Like many people in Northern Michigan, Brown also supplements his income with a third job, substitute teaching and coaching basketball for the past 20 years at Tawas Area Schools. With a teaching degree with a specialization in business education, he tried teaching for a while in Olivet, but the sea and sky of Northern Michigan was tugging at his psyche.

It's been a good life, the Browns will tell you, despite the ups and downs of battling with nature for a living. Lake Huron has been good to them, even though it occasionally has tried to keep them to itself.

"There was one trip that comes to mind," Jerry related, "back in the '70s, when we were out with the kids and some people from the campground. The fishing was great, and we stayed just a little too long – but when the fishing is that good, you hate to leave."

"Nine footers blew up really quickly," added Elaine. "The boat was disappearing in the trough between the waves."

The trip in was rough, but not as scary as coming in in a dense fog in the days before high-tech electronics.

"There were times when Elaine would be on the end of the dock with a light to guide us in," Jerry remembered. "In those days we ran by compass and time. There's a fieldstone reef that runs along here, and we have a pretty narrow place we have to hit to get back in here."

Today, the Browns' kids are grown, and Jerry and Elaine are contemplating retirement, and possibly passing the torch to a sixth generation of Tawas-area Brown fishermen. Their son, Damon, an environmental engineer, is currently finishing up a teaching degree, and is interested in coming back and running the boat.

"He's talking about maybe turning the boat into a dive boat if the fishery continues to decline," said Jerry, "but we don't have all that many shipwrecks around here. He might be able to be okay doing both."

Brown is also optimistic that the perch fishery can stage a comeback, noting that the serious decline of the mid-60s turned around in five or six years.

"Nature tends to take care of itself," he mused, "no matter how much man screws up." ✦

The loss of the perch fishing industry, when added to the decline of Lake Huron's salmon fishery, the Bovine Tuberculosis in Northeast Michigan's deer herd, and the escalating cost of gas, has some people wondering if the sun may be setting on the Sunrise Side's tourism industry.

Attorney Writes

By Clifford H. Bloom
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THE BEACH WALKER CASE

The recent Michigan Supreme Court decision in *Glass* v *Goeckel*, rehearing denied, 473 Mich 667 (2005) has altered the long-standing conventional wisdom regarding the ability of members of the public to walk along the otherwise private beaches of the Great Lakes. Prior to the *Glass* v *Goeckel* decision this past July, it was assumed by the overwhelming majority of lay people and legal experts alike that members of the public could walk along private Great Lakes beaches only if they remained within the water or on the wet sand. In fact, even former Attorney General Frank J. Kelley (himself a proponent of extensive public access) gave a formal legal opinion through the Michigan Attorney General's office which limited public strolling to only the water and wet sand on the Great Lakes. In its 5-2 decision in *Glass*, the Michigan Supreme Court threw out over a century of conventional wisdom and held that the public can walk (even against the wishes of the riparian property owner involved) anywhere on the beaches of any Great Lake all the way up to the "ordinary high water mark."

The Supreme Court adopted a deliberately vague definition of "ordinary high water mark," which is as follows:

"The point on the bank or shore up to which the presence and action of the water is so continuous as to leave a distinct mark either by erosion, destruction or terrestrial vegetation, or other easily recognized characteristic. And where the bank or shore at any particular place is of such a character that it is impossible or difficult to ascertain where the point of ordinary high-water mark is, recourse may be had to other places on the bank or shore of the same stream or lake to determine whether a given stage of water is above or below ordinary high-water mark."

Unfortunately, no lay person can probably determine or ascertain where the ordinary high water mark is for a given lakefront property. Rather, the Court adopted the above definition so that the precise location of the ordinary high water mark is a "question of fact," which can only be definitively determined pursuant to extensive litigation as to a particular piece of Great Lakes waterfront property. The parties in any such litigation will also have to hire expensive legal experts (likely, hydrologists and engineers) to give opinions and testimony as to where the ordinary high water mark is located for the specific property at issue. While a statute or DNR/DEQ regulation which purports to set the ordinary high water mark (i.e., lake elevation) for a particular Great Lake for regulatory purposes might be part of the evidence considered by the judge in a specific case, such statute or regulation could not definitively determine the ordinary high water mark for any property for public trust doctrine purposes.

The Legal Basis of the Decision

Prior to this past July, there was no dispute that the portion of the bottomlands of the Great Lakes which is always submerged is owned outright by the state of Michigan. All parties to the lawsuit also agreed that some portion of the bottomlands which is periodically exposed is subject to limited public use pursuant to the "public trust doctrine." Furthermore, all parties to the lawsuit pretty much agreed that there was some "overlap" on land between where private ownership of the exposed beach ends at the water and the point upland where the public trust area terminates. In essence, the public trust area acts like a nonexclusive easement for limited public use over a certain portion of the beach owned by the private landowner. Before the Supreme Court decision this past July, however, most members of the public (together with most legal experts) believed that the public trust area only extended beyond the water to the edge of the wet sand (which could be anywhere from a few inches beyond the water on a perfectly calm day to 5 to 10 feet or more beyond the water if it is a windy day with waves). Surprisingly, the Michigan Supreme Court in *Glass* v *Goeckel* said that even where a riparian landowner on the Great Lakes owns the land down to the water's edge, the public trust area (effectively, a public nonexclusive easement) extends beyond the water (and even way beyond the wet sand mark) and all the way to the ordinary high water mark. Depending upon the topography of the beach involved, the distance between the water and the ordinary high water mark can be anywhere from 20-50 feet to several hundred feet or more.

What Does the Decision Really Mean in Everyday Terms?

While the Supreme Court explicitly decided that walking and strolling is permitted by members of the public below or "lakeside" of the ordinary high water mark, it did not expressly address issues such as whether members of the public can pull up a boat and leave it on the shore, drive an ATV or snowmobile, sunbathe, camp, or build bonfires. While the decision implies that members of the public cannot sunbathe, camp or build bonfires, the court opinion did not completely close the door to those activities.

The Supreme Court held that the public trust area can be utilized for "navigability" and activities incidental to or arising out of navigability. Traditionally, navigability meant the ability to temporarily reach shore by boat and to beach boats during an emergency. Furthermore, activities such as swimming, fishing and hunting waterfowl have been deemed incidents of navigability. In the *Glass* v *Goeckel* case, the Supreme Court held (without much discussion) that walking from one point on shore to another is a permitted incident of navigability, but the Court did not explain how walking for purposes unrelated to boating, fishing, swimming or hunting waterfowl could be deemed an incident of navigability. It is anyone's guess whether or not the Court will hold in a future case that taking a break on a beach to rest (*i.e.*, lounging or sunbathing) or to eat lunch is a necessary component of walking and strolling (people get tired and hungry) and, as such, is also a natural incident of navigability and a permitted public activity.

It is most unfortunate that the Supreme Court did not definitively rule out sedentary activities such as sunbathing,

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ML&SA NEWS

MICHIGAN LAKE & STREAM ASSOCIATIONS, INC.

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From: Dennis Zimmerman, President, Michigan Lake & Stream Associations, Inc.

To: MLSA INDIVIDUAL MEMBERS; MLSA ASSOCIATION MEMBERS; & MLSA CORPORATE MEMBERS

The Board of Directors of MLSA, (the ONLY statewide organization concerned with protecting Michigan's water resources for future generations) is once again, looking to our membership for HELP. We have come to a second major"'crossroad" in our existence. MLSA needs to continue to expand and grow, in order to meet the demand(s) for expanded Educational Outreach, Advocacy and Environmental Preservation/Remediation programs.

The primary issue is, of course, -funding-, as always. We need to figure out ways to secure on-going funding from Corporate Sponsors, Foundations, and Governmental Agencies. This will assure the continuation of current programs (such as Lake Leaders Institute, CLMP, CRMP, Schools Monitoring, etc.). It is also important that we have the ability to expand existing programs (i.e. add more testing parameters to the CLMP/CRMP), as well as introduce new programs as membership demands, dictate.

A secondary issue, also of great importance, is our Board of Directors. We have come to the realization that we are an "aging" board. The youngest member of our current Board is well over 50. Certainly we all like to believe we are immortal, but more and more we find our activities limited by health problems, by key members who travel out-of-state for part or all of the winter months, and (we suspect) by a shortage of new or fresh ideas. Sometimes we (the Board of Directors) question whether we are truly meeting the needs of our membership, since we don't hear from our members unless there is some sort of crisis.

During the past year we have effected some very in-depth planning or "visioning/futuring" sessions, mostly at the Executive Committee level. We have determined that several"'"tasks" need to be completed, and we have prioritized them, as according to our current financial limitations. These, tentatively, are:

1.) Contract with- or hire onto staff a Computer Technician (or Service) with the ability to write programs unique to MLSA, and, to fix any technical problems that may arise, and, to keep MLSA abreast of new technology;

2.) Locate and develop sources of on-going funding so MLSA can continue to serve its constituency, and expand as needed;

3.) Develop a much improved program for Public Relations and for the Publicity of MLSA – its Goals and Objectives;

4.) Determine a site for a centralized "Home" Office;

5.) Hire "trainees" for the position(s) of Executive Director and Director of Operations;

6.) Design a (more) comprehensive CLMP/CRMP Program for 2007 and beyond;

7.) Acquire and train full-time Office Staff;

8.) Hire and train three (3) PAID Regional Coordinators in the near future (up to 5 later on), whose job would be to assist Regional Vice-Presidents and Directors, and to act as "front-line" contacts for problems or questions forwarded by our membership associations;

9.) Expand (and make permanent) the Lake Leaders Institute, no later then 2007. Tentatively this would include one set of sessions for each – the upper and lower peninsula;

10.) Appoint an active committee to oversee Finance and Investment by MLSA. Hopefully these persons would be professionals and would likely come from outside the current organization.

Some of the above-listed priorities need to occur within a few months, while others may be 18 months away, thus we need your ideas, input, and, of course, funding – soon.

If you are available, and would like to offer your insight(s) and experience on any of the above priorities, or if you can find time to serve on any of our committees, we need you now. More and more our administrative activities are taking place via electronic data transmission vectors, (computer) so much of the work of the committees can be handled out of your own home.

(Continued next page)

Graduates of the Class of 2005 Lake Leader's Institute

The Lake Leader's Institute was first held in 2002 when 20 persons completed the course work and received their graduate certificate in October, 2002. The Institute was organized as a partnership between Michigan Lake & Stream Associations and Michigan State University.

The Institute provides each participant with an educational experience that improves their understanding of local water resource planning and program implementation. Howard Wandell, who works for ML&SA and MSU, plans and carries out the Institute Program.

Institute participants must commit to attending all sessions, preparing an applied project and completing the assigned homework.

Photo by Dr. Lois Wolfson

PICTURED ABOVE ARE THE GRADUATES OF THE 2005 INSTITUTE CLASS

***Sitting**: Cecilia Govric, Julane Quick, Peggy Bridgford, Sharon Brown, Karen Coady. **Kneeling**: Russ LaRowe, Scott Madden, Gaye Blind (front), Leslie York (back), Stephaney Keroson, Ron Overton. **Standing**: Russell LaBeau, Amy Gilhouse, Carl Russell, Jr., Bruce Noble, Miles Bridgford, Sarah Litch, Mike Litch, Wayne Anderson, Gary Swier. **Not Pictured**: Theresa Lark, Scott Brown, Paul Dominick.*

Our current Active Committees are:
- Executive Committee
- Annual Conference Committee
- Membership Committee
- Science Advisory Committee
- Education Committee
- Legislative Monitoring Committee
- Newsletter Committee

Currently Inactive – are:
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- Promotion & Advertising Committee

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PLAN NOW TO ATTEND Michigan Lake & Stream's **45th ANNUAL CONFERENCE** at the Holiday Inn in Big Rapids on April 28, 29, & 30, 2006.

More information about the Conference will be published in the February issue of *The Michigan Riparian* magazine, and placed on ML&SA's web site. If you have other questions, you may contact either of ML&SA's offices.

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Controlling Eurasian Watermilfoil in Upper Peninsula Lakes

(Excerpts from the U.S. Army Corps of Engineers report entitled "Invasion of Eurasian Watermilfoil in Lakes of the Western Upper Peninsula," August 2003 by John G. Skoberboe, Angela G. Poovey, Kurt D. Getsinger and Greg Kudray.)

BACKGROUND

Eurasian watermilfoil is an exotic aquatic plant that has been in Wisconsin and Michigan since the early 1970s (Nichols 1994), and negatively impacts biotic and abiotic lake interactions (Nichols and Shaw 1986; Smith and Barko 1990). Formation of dense surface canopies by species such as Eurasian watermilfoil reduce native plant diversity and abundance (Madsen et al. 1991; Boylen et al. 1999), resulting in a decrease in aquatic macroinvertebrate diversity (Keast 1984). Moreover, when plant coverage exceeds 30 percent of a lake littoral zone, predatory fish such as bass remain small, causing overall fish production to decline (Colle and Shireman 1980; Wiley et al. 1984; Engel 1995; Valley and Bremigan 2002). Abiotic components adversely affected by Eurasian watermilfoil's dense surface canopies are reviewed in Getsinger et al. (2002) and include anoxia below the canopy, enhanced nutrient cycling, and strong vertical gradients in pH and temperature. Pullman (1992) outlines characteristics of Eurasian watermilfoil that have contributed to its establishment as a major nuisance in Michigan's water resources.

MANAGEMENT TECHNIQUES FOR CONTROLLING EURASIAN WATER MILFOIL

BIOLOGICAL CONTROL USING INDIGENOUS WEEVIL

Management techniques for controlling Eurasian watermilfoil in an environmentally sound manner include the use of an indigenous weevil (*Euhrychiopsis lecontei* (Dietz)) as a biocontrol agent. Predictable long-term control using the weevil as an operational tool has been inconsistent (Getsinger et al. 2002). In addition, refinement of stocking rates and a better understanding of life-cycle/population dynamics is needed. An excellent review of these techniques for control of Eurasian watermilfoil in a large Michigan inland lake is provided by Getsinger et al. (2002). Other techniques are more suitable for controlling pioneer infestations of Eurasian watermilfoil, including benthic barriers, hand pulling, diver-operated suction dredging, and use of aquatic herbicides (Madsen 2000).

BENTHIC BARRIERS

Benthic barriers serve as blankets blocking light for plant growth or screens physically preventing plant growth. They are usually installed early in the spring right after ice out (Perkins et al. 1980) for one to several months. Synthetic sheeting that blankets the sediment surface may lift away from the lake bottom due to the evolution of gases from plant decomposition (Gunnison and Barko 1992). Screen barriers need to be maintained and cleaned regularly to provide multiple years of control (Engel 1984; Eichler et al. 1995). Because benthic barriers are not species selective, it is considered only when small patches of Eurasian watermilfoil are present or in areas that are ecologically sensitive.

MANUAL CONTROL—

Hand pulling is the most common form of aquatic plant control by lakeshore owners throughout the United States (Madsen 2002). Hand cutters, rakes, or bare hands remove vegetation along shorelines and around boat docks. SCUBA divers can also hand-pull vegetation near the sediment surface to remove the roots and rhizome systems. This method is labor intensive, but hand pulling is selective and can be effective in very localized areas (<1 acre). Plant beds that are too large to hand pull may be removed by a diver-operated suction dredge. A suction dredge is a hydraulic vacuum system created by a fuel-generated pump borrowed from the gold-mining industry. Divers use this method to selectively harvest vegetative stems and roots without removing the sediments. Although this method is labor intensive, it significantly reduces biomass and limits regrowth of the target plant (Eichler et al. 1993).

HERBICIDE CONTROL—2,4-D, DIQUAT, ENDOTHALL, FLURIDONE

Effectiveness of aquatic herbicides is predictable and is therefore the most common form of controlling Eurasian watermilfoil in areas too large to hand pull. Moreover, herbicides are less expensive than diver-operated suction dredging and benthic barriers (Madsen 2000). Herbicides registered for use in the United States and permitted by the State of Michigan for Eurasian watermilfoil control are: 2,4-D, fluridone, endothall, and diquat. Success or failure of a herbicide treatment designed to control submersed plants depends upon the herbicide concentration that comes in contact with the target plant concomitant with the length of time a target plant is exposed to the dissipating herbicide concentration. Understanding this concentration exposure time (CET) relationship is critical in achieving desirable control of nuisance submersed plants (Getsinger and Netherland 1997). Each herbicide has different CET requirements, which dictate circumstances where it can be most effective.

2,4-D

Exposure times of 1 to 3 days are also required for control of Eurasian watermilfoil using the low-volatile butoxyethyl ester (BEE) of 2,4-D (2,4-dichlorophenoxyacetic acid; Green and Westerdahl 1990). 2,4-D is a systemic herbicide and, once it is absorbed into

plant tissues, shoots start to decay 7 to 14 days after application. Plants decompose slowly 14 to 28 days after application. Young, actively growing milfoil plants are more susceptible to 2,4-D than are mature, slowly growing plants. In cases where milfoil is not completely killed, regrowth can occur in 8 to 12 weeks following the initial application. Control of milfoil is selective at all rates, with minimal injury to nontarget plants (Getsinger et al. 1982; Parsons et al. 2001). 2,4-D has been routinely used to selectively control Eurasian watermilfoil in Michigan lakes and other Midwestern water bodies for many decades (Pullman 1992).

DIQUAT

Diquat [6,7-dihydro-dipyrido (1,2-a:2',1'-c) pyrazinediium dibromide] is a contact herbicide that acts quickly to burn down plant foliage. Regrowth occurs within 6 to 8 weeks posttreatment. No CET relationships have been developed for diquat that would allow for its use as a method to selectively control Eurasian watermilfoil. When used at rates effective for controlling milfoil, diquat will also control other plants in the treated zone. Although it has a broad spectrum of activity, it may be used for effectively treating small plant beds or cleanup around docks, boat launches, and swimming areas. Broad spectrum removal of submersed aquatic plants in those settings would be seasonal and only represent a small proportion of the total plant community.

ENDOTHALL

Endothall [7-oxabicyclo (2.2.1) heptane-2,3-dicarboxylic acid] is also a contact herbicide. Research of endothall CET relationships conducted at the ERDC have indicated that milfoil injury was directly proportional to the length of time plants were in contact with a given endothall concentration (Netherland et al. 1991). Control of Eurasian watermilfoil may last 8 weeks or longer. Endothall rates that are effective for milfoil control should have at least 18- to 24-hour exposure times for best results (Netherland et al. 1991). Given these exposure times, water in treatment areas should be quiescent, with minimal flow. Small-scale research has shown that using low rates and exposure times of 1 to 3 days, endothall can be efficacious against Eurasian watermilfoil with minimal damage to nontarget vegetation (Skogerboe and Getsinger 2001, 2002).

FLURIDONE

Fluridone (1-methyl-3-phenyl-5-[3-(trifluoromethyl) phenyl]-4(1*H*)-pyridinone) is a systemic herbicide that requires a 45- to 60-day exposure time to be effective. Once the herbicide is absorbed by the plant leaves and stems, fluridone interrupts the carotenoid biosynthetic pathway; carotenoid pigments are necessary for plants to photosynthesize. Susceptible plants die and decompose slowly. If the treatment is effective, target plant regrowth usually does not occur for more than 12 months (Netherland and Getsinger 1993, 1995a, 1995b). Although a broad-spectrum herbicide, it can be used to selectively control Eurasian watermilfoil with minimal damage to most native aquatic plants using low rates (Netherland et al. 1997; Getsinger et al. 2002).

A permit is required by the State of Michigan for all aquatic herbicide applications. There are special regulatory requirements regarding granular applications of endothall and 2,4-D. Currently, fluridone applications are restricted to spring applications with limits set on application rates. For complete use restrictions of any chemical product, refer to the product label. For permit and application restrictions contact the Michigan Department of Environmental Quality (MI-DEQ).

TRICLOPYR

Triclopyr (3,5,6-trichloro-2-pyridinyloxyactetic acid) is a newly registered herbicide for aquatic uses. Similar to 2,4-D in its mode of action and translocation, this systemic herbicide is also effective against Eurasian watermilfoil requiring exposure times of 1 to 3 days (Netherland and Getsinger 1992). Stem epinasty and browning occurs 1 to 2 days after application, while plant decomposition occurs 14 to 28 days after application. Triclopyr is most efficacious against young, actively growing plants. Eurasian watermilfoil may be controlled for 3 years, including the year of treatment, with no adverse effects on native vegetation (Getsinger et al. 1997). Nonetheless, plant regrowth may occur in 4 to 6 weeks if Eurasian watermilfoil is not completely killed during herbicide application.

lounging, camping and bonfires last July in its *Glass* v *Goeckel* decision. It would have been very easy to do so. Unfortunately, appellate courts have an annoying habit of only deciding precisely the specific issues before them, which, while probably a prudent rule in theory, often creates havoc in the real world. Since pursuant to the motion for reconsideration (as discussed below) the Supreme Court chose not to clarify whether or not the public trust rights do or do not include sunbathing, lounging, bonfires, etc., riparians along the Great Lakes will have to wait until a case squarely involving those issues works its way through the trial court, Michigan Court of Appeals and, potentially, Michigan Supreme Court stages. That will likely take at least a few years, and could even take several decades or longer.

Options Regarding the Effects of the *Glass* v *Goeckel* Decision

1. The Motion for Reconsideration — The riparian property owner involved in *Glass* v *Goeckel* filed a motion for reconsideration by the Michigan Supreme Court. During mid-September of 2005, the Court declined to reconsider its July decision in *Glass* v *Goeckel* and also refused to clarify its decision with regard to issues such as sunbathing, picnicking, bonfires, beaching boats, and camping.

2. A Federal Lawsuit — Some riparians have discussed filing a federal lawsuit based on a "takings" claim or other basis. However, it is highly unlikely that those riparians would prevail in a federal lawsuit, since the federal courts look to the real property law in the state of Michigan as absolutely governing real estate issues in Michigan. The Michigan Supreme Court is the ultimate arbiter of real property law in Michigan.

3. Suing for a "Taking" — Some Great Lakes riparians have discussed the idea of filing a state or federal lawsuit claiming that the decision by the Michigan Supreme Court effectively "takes" property away from the riparians without due process of law (including without just compensation being paid by the government). In other words, they assert that the Michigan Supreme Court has now effectively imposed a public easement upon parts of their riparian property. Given how the Supreme Court crafted its decision, it is highly unlikely that a "taking" claim would prevail.

Why would a takings lawsuit probably fail? Quite simply, the Michigan Supreme Court says that it is merely confirming the long-standing common law in the area and that Great Lakes riparian property owners have always received their land titles subject to the public trust area going up to the ordinary high water mark. The majority opinion in *Glass* v *Goeckel* stated that while most riparian landowners on the Great Lakes probably own title all the way to the water (which is a "movable freehold"), any land which they own below the ordinary high water mark has always been subject to the public trust area up to the ordinary high water mark. In other words, riparian property owners cannot complain now about the taking away of property rights which they supposedly never had. Furthermore, as discussed above, the federal courts look to state law regarding real property rights, of which the Michigan Supreme Court is the ultimate referee.

4. Pushing to Have Real Property Tax Assessments Lowered — Some riparians have already argued that because the Supreme Court's decision in *Glass* v *Goeckel* has taken away some of their property rights and, consequently, has lowered their property value, the property tax assessments for lakefront property on the Great Lakes should be dropped dramatically. In this area too there is probably little hope for success. The likely lack of property tax relief in the form of lowered assessments is based on two factors. First, local tax assessors in the state of Michigan will undoubtedly argue that the Supreme Court was merely reaffirming the long-standing case law in this area (which is what the Court itself said). Since supposedly no rights were taken away, the property tax assessments cannot be lowered. Second, property tax assessments are supposedly based on "fair market value" and not mechanical items such as the size of a lot, whether a property is subject to an easement, etc. Although the characteristics of property ownership might be tools used to determine fair market value for taxation purposes, the true value in the market must govern. Accordingly, unless riparians can show that the real estate market actually responds negatively to the *Glass* v *Goeckel* decision in an objective, visible fashion by lowering the property values of Great Lakes lakefront properties, there will likely be no property tax relief via lowered tax assessments.

5. Pursuing Reasonable Regulatory Legislation — The Michigan Legislature has full authority to adopt a statute to regulate what public uses can occur within the public trust area. In fact, by adopting new legislation, the state of Michigan could limit beach walking by the public to within a certain distance of the wet sand (for example, ten feet), ban sunbathing, vehicles, bonfires and camping and impose other regulations on public use. In fact, the majority opinion in *Glass* v *Goeckel* implies in several places that such legislation might be a reasonable compromise. In my opinion, the legislative solution is the only practical way available to soften the adverse impacts of the *Glass* v *Goeckel* decision. Nevertheless, any proposed legislation should be "balanced" so as to be acceptable to all groups.

Possible legislation could include the following provisions:

- The legislation would apply only to private riparian properties and the beach and shoreline adjacent thereto—it would not apply to public property, such as public beaches, public road ends and similar public properties.
- The public would be limited to walking on the beach within, for example, 10 feet of the water or the wet sand, whichever extends further. Any member of the public could go outside of that area only with the express permission of the riparian landowner.
- Members of the public could walk within the area allowed, but would not have the right to lounge, sunbathe, park/moor a boat, drive a motorized vehicle, picnic, build a campfire or do other sedentary activities on any portion of the beach.
- Littering would be subject to a minimum $500 fine. Furthermore, members of the public would have to confine their dogs to the permitted area, and would have to remove and carry out any waste from their dog.
- Any riparian or other person who unlawfully interferes with the rights of the members of the public to walk and stroll would be in violation of the statute. A violation of the statute (with the exception of littering) would be a municipal civil infraction, which permits a Michigan district court to not only impose reasonable fines, but would also give the court the ability to order the person involved not to violate the law again.
- Beef up the exiting statutory prohibition language and penalties where a riparian installs a fence, deck, stairs or other structure lakeward of the ordinary high water mark without all required governmental approvals and permits.
- Increased fines and penalties for any member of the public who vandalizes or damages any property belonging to a riparian. ❖

Fly Fishing for Steelhead in the Manistee River

Article and picture from Jim Reed, Howell, Michigan. The following information is from an E-mail letter from Jim to Don Winne on July 29, 2005.

I am a very avid fly fisherman and fly tyer who has frequently fished in Montana and Idaho, and other places like Saskatchewan, Catskills in New York, New England and Alaska, and all over the Great State of Michigan.

My fly tying skills keep me busy as I do demonstrations around Michigan, including the Great Lakes Council Federation of Fly Fishers and Trout Unlimited.

I do demonstrations for the Inter-national Federation of Fly Fishers at their Annual Conclave in Montana, and at the International Fly Tying symposium in Somerset, New Jersey. Some of my flies were most recently published in the *Art of Angling Journal*.

The Michigan steelhead in the photo was caught on a yarn egg pattern and after the photo the fish was released back into the Manistee River.

I am also filling out the subscription form for the *Riparian* magazine. Keep up the good work and thanks for doing what you do.

Best Regards, Jim Reed

Picture of Jim Reed and Steelhead caught in the Big Manistee River near Wellston, Manistee County

Higgins Lake Road Ends – Backlotters Lose Again

By Cliff Bloom

On October 20, 2005, the Michigan Court of Appeals again reaffirmed that backlot owners cannot utilize certain public road ends at Higgins Lake for permanent boat mooring, picnicking, lounging, sunbathing, and similar activities. See *Higgins Lake Property Owners Association v Gerrish Township*, Case No. 262494. A visiting (and impartial) judge allowed a sign to be posted at the road ends listing prohibited activities. The visiting judge also held that overnight boat mooring was prohibited. Finally, the visiting judge held that people who use the road ends improperly can be found to be in contempt of court, even if they were not a party to the earlier litigation.

The Court of Appeals upheld the decisions of the visiting trial court judge. This case is yet another decision in a long line of Michigan cases which prohibits permanent boat mooring, lounging, sunbathing, private shorestations, and similar matters at public road ends, and confirms once again that the Higgins Lake backlot owners involved are not above the law.

NEWS FROM LAKES AROUND THE STATE

GULL LAKE QUALITY ORGANIZATION, KALAMAZOO COUNTY
John Luchsinger, President

Fisheries Report

If you were snoozing the first three weeks of March you were loosing. Rainbow Smelt have returned to Gull Lake with a vengeance. Over 50 fishermen were catching 50 to 100 smelt per night on the north end. If you have any memory left, you will recall that the last smelt fishery in Gull ended in 1983! The last introduction effort was 2002 when the DNR Fisheries Division placed several burlap bags, covered with Lake Michigan smelt eggs in Prairieville Creek between M-43 and the mouth. We are pretty sure you have forgotten that Prairieville Creek is closed to all fishing from Sept. 1 to May 31, therefore we do not expect anyone to be trying to dip smelt in April.

The DNR Fish Report that we have been waiting for since 2001 is finally nearing completion! A sneak preview of the creel survey indicates that rock bass, blue gill, pike and bass fishing remains good. The yellow perch are coming back slowly. The Fisheries Division will be introducing 4,000 rainbow trout and 12,000 brown trout this spring. Because rainbows have not done well in recent years, this may be the last "planting;" may try Great Lake Steelhead in the future. P.S. Your fishing license expired March 31, go buy a new one.

MAGICIAN LAKE IMPROVEMENT ASSOCIATION, CASS & VAN BUREN COUNTIES
Kay Dukesherer, President

Water Testing

Water testing will continue in 2005. The results from last year will be published in the spring (May) newsletter, as we will receive results from Michigan State University. The cooperative program with Dowagiac High School will continue this year with visits by the students in May and September. The last two years we have talked about the nuisance of exotic plants and how they will affect our lake if they are found. The three most common are Eurasian Water-milfoil, hydrilla, and Purple loosestrife. Pictures of these are in the November *Riparian*. We ask for help from everyone to be on the lookout for these villains as they are bad, bad, bad for our lake.

Magician on the Web

If you're into web surfing, you can learn more about our lake at http://www.lake-link.com and search for Magician Lake in the lake finder section. There's information about the various species of fish, weather reports, and personal reviews of our lake and you can add your own, too. You can also go to a DNR site and search by waterbody to find our lake. Try http://www.mcgi.state.mi.us/mrbis/ to get there.

MORTON TOWNSHIP TRI-LAKES ASSOCIATION, MECOSTA COUNTY
Kevin Doyle, President

Same Stuff – Different Look

Maybe you don't want all the particulars about septic systems or wells. Let's just get down to the nitty gritty —

• Living on a lake: most of you are practically sitting on top of the water table. How you treat this water is very important.

• Septic system: all wastes from your cottage / home goes down the drain and into the septic tank. There is a formula for how large the tank should be based on number of persons occupying the structure using the septic tank. Waste is kept in the tank and broken down as much as possible by microbes. (No - flushing microbes down your toilet will not help the tank. They are dead before they leave your house.) From the tank your waste goes to your septic and drain field.

• Drain field: your waste flows through the gravel filling of the drain field and then seeps into the soil beneath and beside the perforated pipe. The waste then percolates through unsaturated soil and 1) eventually evaporates, 2) is taken up by plants, and 3) percolates into the groundwater.

• Groundwater: ground water is where your well takes up the water for your home / cottage. You use this water to drink, bathe, and clean with.

Using the old noodle, it is safe to figure that if your septic system (tank and drain field) are not working properly then your waste is going into the lake that you swim and fish in and it's going into the ground water where your well water comes from.

Now, you haven't noticed anything in particular wrong with your system so what's the big deal? According to Christine Curel, Water Quality specialist with the Mecosta / MSU Extension office, a septic system has a life span of 20 years.

Have you replaced or updated your septic system since 1985? Have you had your well checked and your water tested? Why not? Are you afraid? If you're up to snuff then you should still be afraid – you have neighbors!

LAKE MARGRETHE, CRAWFORD COUNTY
Joe Porter, President

Zebra Mussel Fund

Jim and Janet Williams started this fund on 11-23-03 and requested we find ways to stop the spread of ZM in Lake Margrethe. The ZM continues to spread in our lake as well as others. We are working with Huron Pines to develop literature that will instruct boaters on the proper way to clean their boats and trailers to prevent the spread of ZM.

KLINGER LAKE ASSOCIATION, INC., ST. JOSEPH COUNTY
Keith Cochran, President

Purposes

To preserve, protect and improve Klinger Lake and surrounding property, and to keep all members informed of activities and conditions affecting the welfare of the area. In particular, but not exclusively, the corporation shall be directly concerned with the following:

1. to represent the interests, welfare, rights, and privileges of the majority of the lake property owners at Klinger Lake,

2. to monitor lake water conditions and the general environment,
3. to control lake levels,
4. to monitor the lake and surrounding areas,
5. to consider safety codes and regulations on or adjacent to Klinger Lake,
6. to monitor marine wildlife habitat, and
7. to maintain a directory of lake property owners.

THREE LAKES ASSOCIATION,
ANTRIM & KALKASKA COUNTIES
Dick Garcia, President; Tim Hannert, Executive Director

Oxygen Levels

On a recent, blustery, winter's day a team of Three Lakes Association researchers carefully walked a half mile out to the middle of Torch Lake to measure and record oxygen levels from the top to the bottom, 260 feet down. No one has had the capability to do this until Three Lakes invested almost $5,000 in an oxygen meter with a 300-foot cable. Norton Bretz, Three Lakes Association Instrument Specialist, led the team out to the sampling site. He carefully chopped small holes in the ice every 100 feet to check the thickness while those following held onto the rope tied around his waist from the safety of a thirty-foot distance. Team members were relieved when Bretz reported six-inch thick ice all the way to the sampling site.

"It is critical to know the amount of oxygen at the bottom of the lake during the winter," said Dean Branson, Water Quality Model Project Leader, when asked why take such risks and endure such bitter cold. "If the oxygen gets too low at the bottom of a lake nutrients like phosphorus come out of the sediment into the water. This fertilizes the lake and that causes problems with water quality."

The oxygen meter indicated 80% oxygen saturation at the bottom of the lake.

LAKE SOMERSET ASSOCIATION,
HILLSDALE COUNTY
Tony Harsett, President

Kaiser Water Gauges

Last fall, the LSPOA Board hired Kieser and Associates to help develop a water quality management plan for Lake Somerset. The plan will include short-term, near-term and long-term management strategies, plans, and policies for the lake.

Kieser installed two staff (water level) gauges (one at the upstream side of the Goose Creek inflow; one on the lake side of the northern outflow) to help examine the contributions of the various flows of water into Lake Somerset. LSPOA members monitor the gauges, and record the readings every one to two weeks. A rain gauge will be installed this spring (2005).

The staff gauges will help Kieser paint a picture of the current conditions of Lake Somerset as well as predict short-term conditions as they relate to water quality, sediment accumulation and aquatic plant growth.

SILVER LAKE IMPROVEMENT ASSOCIATION,
GRAND TRAVERSE COUNTY
Jim Lievense, President

Beaver Battle

The following was submitted by Kevin McElyea, Grand Traverse County Drain Commissioner, who has been hard at work since early spring keeping the lake drain open. (We have edited the submission to fit available space.)

Since the end of March, we have found debris clogging the Silver Lake Drain which impedes flow through the drain. We removed debris daily. About mid-April we determined beavers were responsible.

We initiated research to determine best management practices. Some recommended we declare the beavers a nuisance and dispose of them. Others cautioned against disposal. Research suggested beavers have an ecological importance far greater than the small biomass they represent. Beavers increase biological productivity. Wetlands they create increase landscape diversity. Their rooting, feeding, and digging till the soil and recirculate nutrients. Their activities break up monocultures like cattails and reed grass, creating a diverse habitat that is accessible to more species.

The Drain Commissioner's office strives to respect beaver populations compatible with public uses of land while attempting to minimize their negative impacts on humans. Additionally, your County Drain Commissioner is committed to performing the duties and responsibilities of the office–such as maintaining court mandated lake levels to promote the health, safety and welfare of people.

PORTAGE, BASE & WHITEWOOD OWNERS ASSOC.,
LIVINGSTON & WASHTENAW COUNTIES
David Spielman, President

Livingston County Circuit Court Rules on Lake Access

For the second time in four years the court has ruled that private road ends are to be used only as the deeded access allows. The road-end issue has been challenged in court many times and the courts have always ruled that unless specifically granted; the only right for the back-lot owner is ingress and egress to the water. This means you can walk down to the water and go for a swim, water your horse or collect a bucket of water. No mooring of boats. No loitering, no sun bathing, no picnicking, no parking of vehicles. You walk in and you walk out.

PAINTER, JUNO, & CHRISTIANN LAKES ASSOC.,
CASS COUNTY
Clint Draeger, President

Board Meetings

The first Board meeting of 2005 was held at Dot Ghyselinck's house on April 19 from 7 until 8:10 p.m. IN time. We approved a donation of $200 for the fireworks display that Wildwood will be presenting on Saturday, July 2. We agreed to continue stocking Walleye fingerlings again this year. We will be working on the method of raising funds for this worthwhile endeavor at the next meeting. A second board meeting was held at Beanie Schmokel's house on May 17. Past President Jerry Marchetti volunteered to head up the Walleye stocking initiative this year. Donations for this worthy cause will be collected at various locations as well as at the Annual Membership Meeting.

Catching a Wave ~

Applying Radar Waves & GPS Data to Coastal Weather Forecasting

The weather along Lake Erie can be as unpredictable as it can be violent. To better understand the climatic changes and movement in the Great Lakes region, scientists are using the latest technology to measure minute variations in order to improve coastal forecasting reliability.

Great Lakes coastal forecasting has historically been based upon data obtained from satellite winds and temperature and water level gauges. Although accurate, these methods have been limited in the winter and clouds and could be benefited by other spatial data (such as water vapor and wind speed) useful for precise forecasting. Incorporating all-weather satellite radar altimeters and Global Positioning System navigation satellites (GPS) into the existing forecasting system, however, can potentially enhance the precision and the predictability of Great Lakes weather forecasting, says C.K. Shum, an Ohio Sea Grant researcher at Ohio State University.

As part of a project within the National Ocean Service (NOS) Partnership, Dr. Shum along with other researchers of Ohio State's Laboratory for Space Geodesy and Remote Sensing began an international project in 2001 to improve long-term monitoring of the Great Lakes. The project included establishing permanent GPS base stations at more than 10 Great Lakes stations with each having wind sensors, water temperature sensors, and other meteorological sensors (for air temperature, barometric pressure, and relative humidity), around the U.S. and Canadian coasts of the Great Lakes.

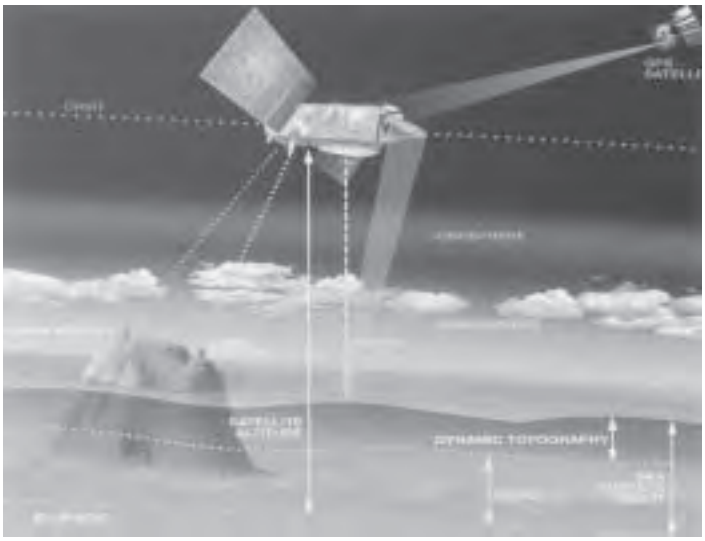
"These satellite radar altimeter missions provide an unprecedented opportunity to use five concurrent operating radar altimeters to enhance the temporal and spatial resolution of the oceans as well as large inland lakes," says Kevin Cheng, Shum's research associate of the project.

Employed for over a decade, spaceborne altimeters such as NASA's and CNES' (French Space Agencies') TOPEX/POSEIDON satellite, bounce radar waves off the Earth to precisely measure the precise height of an ocean or lake's sea surface with respect to the center of the Earth. The altimetric satellites also measure the amount of integrated (total) water vapor in the air along the radar path, as well as wind speed and wave height at the radar footprint on the water surface. In addition, the permanent GPS stations around the Great Lakes provide integrated water vapor measurements along the GPS radar path from their antennas to the respective GPS satellites which are orbiting some 20,000 km above the Earth. "All such factors can then potentially be added to existing models for ultimately better weather forecasting," states Shum.

GPS and specifically the use of GPS-buoys within the Great Lakes waters determine accurate geocentric sea or lake elevation measurements and possibly wave measurements. "The advantage of a GPS-buoy as compared to conventional water level gauges is it can theoretically be deployed in the middle of the lake or further away from the shoreline for data gathering," explains Shum. Unlike water level gauges that are influenced by the moving land (erosion or uplift), GPS buoy water level measurements uses the center of the earth as its measurement benchmark.

Because of this project, it has been demonstrated that the use of data from five altimeters for the Great Lakes could potentially evolve into an operational observing system that can measure lake level changes in the Great Lakes with an accuracy of less than three centimeters and with measurements as frequent as daily.

That ability to measure specific points at small intervals of time is extremely important when it comes to monitoring the progress of phenomena like postglacial rebound in the Great Lakes region.



The altimeter emits a radar wave and tracks the return signal that bounces off the sea surface. Sea surface height is the difference between the satellite-to-ocean range (calculated by measuring the signal's round-trip time) and the satellite's position on orbit with respect to an arbitrary reference surface (the Earth's center or ellipsoid). Besides sea surface height, altimeters can measure wave height and wind speed by looking at the return signal's amplitude and waveform.

Postglacial rebound is a phenomena resulting from solid Earth slowly rebounding from the weight of ancient ice sheets covering North America (from Hudson Bay to most of the Great Lakes) since the last Ice Age 18,000 years ago. "Using a decade of TOPEX/POSEIDON radar altimetry and several decades of water level gauge data, our research is finding that the lands surrounding the Great Lakes region are currently uplifting between one to five millimeters each year. Continually documenting these changes will better predict future changes," emphasizes Shum.

To begin recording the lake level changes, the research team analyzed an historic water database from 25 water level gauge stations of NOAA and 23 Canadian stations. The database included radar altimetry data from 1989 to the present.

What the researchers observed was a significant absolute lake level drop measured by the TOPEX/POSEIDON radar altimeter in Lake Erie, Lake Michigan, and Lake Huron since mid-1997. "Over a long time span (1993-present) the entire Great Lakes has been falling at a rate of 5.3 centimeters per year," states Shum. "Lake Erie specifically has been falling at a rate of 6.9 centimeters per year."

During the second and third years of the project, the researchers used GPS-buoys to link to existing water level gauges at Marblehead and Cleveland, Ohio, in Lake Erie to create accurate reference datums. Water level measurements (from the water gauge) were converted into geocentric measurements (from the GPS system) and linked to the benchmarks at the water level gauges. These measurements also complemented another research project which, led by Dr. Ron Li of Ohio State, includes precise mapping and prediction of Lake Erie shoreline changes.

The expectation is this information can serve as a complementary dataset to help models better measure global sea level and climate changes. "Space geodetic measurements are cost-effective means to help provide all-weather data for monitoring environmental concerns of the Great Lakes. Our plan is by proposing to incorporate such data into existing coastal forecasting models, we could potentially improve their future accuracy and reliability," concludes Shum.

For more information about this Sea Grant research or the NOS partnership research, contact Dr. Shum at 614.292.7118 or *ckshum@osu.edu* or Kevin Cheng at *cheng.168@osu.edu.*

(Article from the Twine Line — March / April 2004)

Contributions to Michigan Lakes and Streams Foundation are deductible on federal tax returns

The Corporation was formed exclusively for the benefit of and to help carry out the purposes of Michigan Lake & Stream Associations.

The Corporation was given a 501 (c) (3) status by the Internal Revenue Service on January 12, 2004. Bequests, legacies, devises, transfers or gifts to Michigan Lakes and Streams Foundation are deductible for federal estate and gift tax purposes if they meet the applicable provisions of Code sections 2055, 2106, and 2522. You should consult with your attorney for the most appropriate way to make your bequest.

Contributions may be made in any amount and may be made by check, credit card or other method you may choose. Checks should be made out to: **Michigan Lakes and Streams Foundation** and mailed to P.O. Box 303, Long Lake, MI 48743.

The Michigan Lakes & Streams Foundation

Respectfully Acknowledges Gifts of Thoughtful Appreciation in Memory of those who cared about Michigan's lakes and streams.

In Memory of Joseph Navarre III

- Roberta M. Hill
- Sue Hayhow
- Viking Recreational Club
- Barry Hill

In Memory of Verne E. Sorge

- Walter and Nancy Coby
- James and Joan Fleser
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