State of the Great Lakes

Annual Report 2004

Great Lakes Treasures

Cover: On January 26, 2004, the Michigan State Quarter was unveiled in the State Capitol building. It is the 26th in a series of state quarters being released by the United States Mint and depicts the outline of the Great Lakes and Michigan's topography.

A Message from the Governor

by Governor Jennifer M. Granholm

From 18th century poet Henry Wadsworth Longfellow to 20th century author Ernest Hemingway, the grandeur of the Great Lakes has long inspired or fueled the imaginations of any and all who cast their gaze upon their endless blue horizons.

And it is no different in the 21st century – the Lakes' allure continues to fascinate and draw millions of visitors to our state each year. Some come for the excitement of a charterboat fishing trip, others to delve into the rich maritime history of our state. Still others come to search for Petoskey stones, watch bird migrations or to look for the rare, purple-hued Dwarf Lake Iris or the willowy Pitcher's Thistle. Countless more pause at day's end to experience the beauty and tranquility of a Great Lakes sunset.

Governor Granholm kayaks at McClain State Park in Hancock.

These vast freshwater seas also provide many of our communities with water for drinking and energy for lighting our homes. They provide us with jobs, a place to play and they offer breathtaking, panoramic vistas.

For those of us who live within the Great Lakes basin, the preservation and protection of this unique resource is more than just a charge – it is a way of life for us. Our lives are inextricably tied to the Lakes, and it is our duty to be their stewards – to be ever vigilant toward their care and well-being.

I am encouraged by the public awareness initiatives that are blossoming like spring crocuses to educate our citizens about issues such as aquatic invasive species, the importance of wetlands, lighthouse preservation, and Michigan's maritime heritage. The articles in this publication share how sites such as the Detroit Riverfront and the Black Lagoon in Trenton are being restored – returning them to the vibrant, productive areas they once were; and how Michigan wildlife are also benefiting from these efforts.

We are truly blessed to live in Michigan, embraced by these beautiful blue gems that give our state her unique shape and her place in history. As we take inventory of these precious jewels, we are buoyed by their beauty and even more committed to protecting and preserving these delicate treasures.

Sincerely,

Jennifer M. Granholm
Governor

Michigan's Great Lakes Treasures

by Ken DeBeaussaert

I'm old enough to remember when, as a kid, getting a quarter was a big deal. Today's youth wouldn't normally be impressed by 25 cents but the creation of the series of state quarter designs had children of all ages looking more closely at their change in 2004 to see if it contained a Michigan treasure. Each state's design helps identify the things they value most about their state or its history. It's no surprise that virtually all proposals considered and the final selection for the Michigan quarter highlights our great treasure, our Great Lakes.

This year's State of the Great Lakes Report focuses on 2004 activities that helped restore, protect and enjoy that great treasure. The Office of the Great Lakes thanks the authors for their written contributions and for the efforts the articles represent.

A group of Collaboration participants from Michigan: (left to right) Congressman Thaddeus McCotter, Ken DeBeaussaert, State Senator Patricia Birkholz, Governor Jennifer Granholm, Mayor Jerry Irby of Marquette, Mayor George Heartwell of Grand Rapids, and Congressman Vern Ehlers

As Director of the Office of the Great Lakes, I have come to a greater appreciation for an amazing gift the Great Lakes provide. Bringing diverse groups and individuals together is often a difficult task but working on issues related to the waters of the Great Lakes is often a unifying experience that results in remarkable partnerships.

The most recent example, the Great Lakes Regional Collaboration (GLRC) began in December of 2004, with an impressive convening of Governors, Mayors, Tribal Leaders, Federal Agencies, Members of Congress and State Legislators. Hundreds of participants from across the basin are committed to the task of developing an action plan for the Great Lakes, based on the priorities established by the Council of Great Lakes Gover-

nors and highlighted in last year's State of the Great Lakes Report. The GLRC effort is scheduled to conclude by the end of 2005 and serve as the basis of identifying the region's priorities as we seek federal, state, tribal and local funding and policy commitments necessary to protect and restore our waters.

There are other encouraging examples in this report demonstrating Michigan's long history of collaborating to protect our water treasures. The kind of public/private partnerships shown in the exciting work being done through the Detroit Riverfront Conservancy and the Rotary Charities partnership with the Great Lakes Water Studies Institute are just two examples of the progress that we can make to demonstrate by action our appreciation of these Great Lakes Treasures.

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by Steven E. Chester

The Great Lakes are truly a treasure that we, as the current stewards of our environment, must take action to protect. The State of Michigan is stepping up to meet that commitment by allocating the resources necessary for this protection through the federal Great Lakes Legacy Act and other funding sources.

An inlet called the Black Lagoon, one of the most toxic hot spots on the Detroit River, is the first Great Lakes Area of Concern (AOC) to benefit from cleanup funds under the Great Lakes Legacy Act.

The cleanup removes approximately 90,000 cubic yards of sediment contaminated with mercury, PCBs, oil and grease, lead and zinc from the bottom of the lagoon, which is a source of pollution to the Detroit River and, ultimately, Lake Erie. The City of Trenton plans to redevelop the area, and Mayor Gerald Brown has estimated the cleanup could boost nearby property values by $60 million or more.

The project is being implemented with $4.2 million in Legacy Act funding and $2.3 million in state funds from the Clean Michigan Initiative bond program.

The Black Lagoon cleanup is an important precedent for federal, state and local governments working together to fund and implement complex, costly, and large-scale contaminated sediment cleanups. Passage of the Legacy Act and funding for AOC cleanups has been a major benefit to the State of Michigan and the local communities who benefit from the activities it funds.

The Michigan Department of Environmental Quality (DEQ) is committed to ensuring that our Great Lakes stay clean and healthy for future generations to enjoy. Clean-ups such as the Black Lagoon take that a step further by giving clean water and shorelines back to communities for redevelopment, and ensuring that Michigan has a healthy environment and a healthy economy.

Transformation of the Detroit Riverfront Under Way

by Faye Alexander Nelson

The City of Detroit is moving forward these days from an economic development standpoint, and one contributor to the progress is the transformation of the Detroit Riverfront, now under way.

The vision for a transformed Detroit riverfront solidified in December 2002, when Detroit Mayor Kwame M. Kilpatrick unveiled the results of a 90-day study by a team of Riverfront stakeholders. Early in 2003, the Detroit Riverfront Conservancy, Inc. (DRFC) was formed, a 501(c)3 non-profit organization charged with undertaking the establishment, improvement, operation, maintenance, security and programming of the Detroit Riverfront, including the creation of a RiverWalk and all of the parks and green spaces along the shoreline

A key element of the riverfront transformation is the plan for a RiverWalk, ultimately extending from the MacArthur Bridge at Belle Isle to the Ambassador Bridge, a distance of about five miles. The RiverWalk is envisioned to be an average of 62-feet wide where permitted. That pathway will include a pedestrian section, a bike path and landscaping. From walking to jogging, biking or rollerblading, to fishing, recreation, art and music, the RiverWalk will be a magnet of activity. Fishing and other natural elements will be preserved. The RiverWalk and surrounding green spaces will be designed to support activities such as outdoor dining, children's playscapes, art fairs, a skate board

park for youth, and fishing areas. Concessions will be located along the pathway as well as restrooms at three to four pavilions along the RiverWalk. Detroit's history dating back to the early 1700s will be shared in a series of interpretive plazas, focusing on the many rich historical aspects of the city and the river. The RiverWalk has been designed for the possibility of water taxis to shuttle people by boat between popular stops, making the riverfront more accessible to all ages.

An artist's conception of the GM Plaza promenade

We have hired the best of the best – a convergence of people who have done international riverfront work along with the best local skills and talents. The first few months were filled with workshops and public meetings to get as much feedback on design concepts as possible. The last few months have focused on design development and the creation of construction documents.

A portion of the Detroit Riverwalk

Construction begins in fall of 2005 on phase one of the RiverWalk. Half of the RiverWalk will open by December 2005 and the entire pathway will be open by December 2006.

Other elements of the transformation include the creation of Michigan's first urban state park, the Tri-Centennial Park & Harbor, along the Detroit River. The first phase of the park opened May 20, 2004. We are making significant strides at the Conservancy and are on target to transform the public spaces along the Detroit riverfront. The harbor now is officially open as a safe harbor to public use on a first-come, first-served basis, and was added to the Michigan Department of Natural Resource's harbor res-

ervation system. In addition, a ground-breaking ceremony for a new Port Authority building between Hart Plaza and the Renaissance Center takes place June 21, 2005 and the General Motors (GM) Plaza and Promenade, behind the GM Renaissance Center along the river, will open this fall. GM also has issued a Request For Proposals for development of River East, a parcel adjacent to the Renaissance Center. All of these initiatives signal progress along the river.

A vision for the West Riverfront has also been developed and was rolled out earlier this year, with the next step to secure partners and funding.

The significant progress made to date has been enabled by the diverse public-private partnership that is the cornerstone of the Conservancy. The DRFC Board of Directors is comprised of 44 key stakeholders, representing the City of Detroit, Wayne County, State of Michigan, Port Authority, U.S. Coast Guard, investors, community organizations, economic development organizations, educational institutions and property owners and residents.

The DRFC also has raised significant commitments to fund the construction of the RiverWalk and an endowment for maintaining and programming of the walk and green spaces into perpetuity. This total includes the full $50 million series of grants offered by the Kresge Foundation, contingent on the Conservancy achieving significant milestones in the development of the RiverWalk and other financial commitments. To that end, the DRFC has nearly $18 million in commitments to date to meet the Kresge challenge of $25 million. Other major contributors include the Community Foundation, Detroit Renaissance Companies, the Hudson-Webber Foundation and the McGregor Fund.

On December 17, 2004, the DRFC celebrated a major milestone in the transformation of the Detroit RiverFront as the GM Plaza and Promenade was unveiled in a ceremony at the General Motors' Wintergarden in Detroit. General Motors has donated the GM Plaza and Promenade to the DRFC.

This is the first of many pieces to come together for the almost five miles of RiverWalk that will ultimately span from the Belle Isle Bridge to the Ambassador Bridge and beyond. Other significant milestones achieved this year include the dedication of the Tri-Centennial State Park and Harbor, the first urban park of its kind in Michigan's history, and a new

Detroit/Wayne County Port Authority Public Dock and Terminal, which will be developed shortly. Fundraising for the DRFC is on target and will ensure that revenue is in place to not only construct the RiverWalk but to operate, maintain and program the walk and adjoining green spaces and parks.

For further updates on the Detroit riverfront, visit http://www.detroitriverfront.org.

Faye Alexander Nelson is President and CEO of the Detroit Riverfront Conservancy

Preserving Great Lakes Treasures

Walking for the Great Lakes: The Grandmother Water Walkers

by Frank Ettawageshik

It seems easy enough. Walk beside the highway and carry a copper bucket with water in it. Josephine Mandamin of Thunder Bay, Ontario, did just that. However, in the spring of 2003, Josephine, along with several other Anishinabe (Indian) grandmothers and companions, walked completely around Lake Superior. In 2004 she walked for Lake Michigan; from Walpole Island, Ontario, through the Lower Peninsula and across the Upper Peninsula to just west of Escanaba.

In all sorts of weather and traffic conditions the walkers maintained a brisk pace. When they came to a town, city or Tribal reservation many local people joined them for a brief time. In Emmet County, my wife Rochelle and I were among those who walked with them. As my normal day finds me sitting at a desk and working a computer and telephone, the 12 miles through Petoskey that I walked nearly did me in. I was sore and stiff for many days afterwards and I appreciated even more the sacrifice that these walkers were making for all of us.

The 2004 walk took place during the month of May. Also during that month, twelve federally recognized Tribal governments and the State of Michigan signed an Intergovernmental Accord Concerning Protection of Shared Water Resources. At the signing ceremony, Chief Audrey Falcon of the Saginaw Chippewa Indian Tribe told Governor Granholm that the Grandmother Water Walkers had just been at their Reservation. They were scheduled to arrive in Manistee next followed by Pshawbestown and Petoskey.

The Governor expressed interest and later issued a proclamation to honor the walkers that was presented at a ceremony at the Victories Hotel in Petoskey. While in Petoskey the walkers also visited with the staff at Tip of the Mitt Watershed Council which had partially funded the 2003 Lake Superior walk. Through the Governor's intervention, the walkers were able to secure a permit to walk the Mackinac Bridge as they crossed into the Upper Peninsula.

Why would someone take several weeks out of their normal routine to walk such a distance, especially when it is such a hardship and so dangerous? Josephine Mandamin explained her motivation when she gave the keynote address at a gathering of Tribes and Canadian First Nations in Sault Sainte Marie, Michigan, in November 2004. She said that, in the traditional teachings of the Anishinabe people, water is the life-blood of Mother Earth. Speaking in a quiet but passionate voice she told about hearing the tears of Mother Earth as her life-blood waters became polluted and dangerous to drink. She spoke of the importance of the water in our own mother's womb within which we all start our lives. She spoke of how even this water is endangered by our neglect. She spoke of how she felt powerless to deal with the immensity of the problem.

When challenged by one of her traditional teachers to not accept that she was powerless, she came suddenly upon the idea of walking around the lakes to draw attention to the problems. Other grandmothers joined her. A small but determined core group formed.

Cold and rain, blisters and sore muscles, and lonely stretches of road all combined to challenge the walkers. But the majesty of the land and waters, laughter, singing, and the joy of meeting new people who welcomed their message made the trip rewarding.

To those of us who heard their message and songs, our encounter with them will never be forgotten. They have left us with a renewed commitment to the tradition of protecting our sacred waters. Their example has helped to make us all aware of the great peril that we face if we don't work to protect the waters of our Great Lakes, if we don't protect the waters that are within us all. And finally, the grandmothers' example helped to bring together over 100 Tribes and First Nations to sign the Tribal and First Nations Great Lakes Water Accord in which all pledge to work together to protect the waters.

On May 12, 2004, Governor Jennifer Granholm and the leaders of the twelve federally acknowledged Indian tribes in Michigan signed an intergovernmental accord stating their commitment to the preservation, restoration and enhancement of the Great Lakes ecosystem and pledged to work together to clean up the pollutants now present in the waters, eliminate exotic species, maintain and preserve diverse water resource habitats and prevent future contaminants, exotics and depletion of the waters.

As a result of the accord, the Governor's representatives and those of the tribal leaders will meet twice a year to review the quantity and quality of our water resources and develop strategies for protecting them.

In the next three years the Grandmother Water Walkers plan to walk around Lakes Huron, Erie and Ontario to complete their journey. Further information about their project, including a photo gallery, can be found at: http://www.motherearthwaterwalk.com.

Frank Ettawageshik is Tribal Chairman of the Little Traverse Bay Bands of Odawa Indians. He is also active in environmental issues serving on the board of directors of the Tip of the Mitt Watershed Council and the Little Traverse Conservancy.

Celebrating 25 years of Wetland Protection

by Peg Bostwick and Amy Lounds

Twenty-five years ago, the Michigan Legislature passed the Goemaere-Anderson Wetlands Protection Act. With passage of this historic legislation, Michigan not only became a national leader in wetland management, but played a pioneering role in the streamlining of state and federal regulations. Michigan became the first state, and remains one of only two states, to have received U.S. Environmental Protection Agency (EPA) approval to administer the federal Section 404 wetland permit program, eliminating duplicative state and federal permit requirements.

In May of 2004, many of the same interest groups that supported passage of the Wetlands Protection Act gathered for a three day conference to honor the vision of those who made Michigan's wetland management program a reality. "Michigan Wetlands: Celebrating the 25th Anniversary of the Wetland Protection Act" conference was held at the Water Studies Institute at Northwestern Michigan College in Traverse City, Michigan. The host organizations, the Department of Environmental Quality (DEQ), Department of Natural Resources (DNR), the US EPA, the Tip of the Mitt Watershed Council, and Northwestern Michigan College, were gratified by the outpouring of enthusiasm that

greeted the conference. It was eventually co-sponsored by 24 other agencies and organizations, and attended by over 350 individuals.

A wetland topic for everyone

Topics addressed at the conference were as diverse as the interests of the audience, and included:

- History of the Wetland Protection Act by keynote speaker Chris Shafer, Professor at Thomas M. Cooley Law School.
- A review of national wetland issues by keynote speaker John Meagher, former Director of the Wetlands Division of the EPA.
- Great Lakes Coastal Wetlands including the ecology, the role of fluctuating water levels, monitoring programs, and fish and wildlife resources.
- Wetland restoration including how wildlife habitat organizations hope to replace a portion of the 5.5 million acres of wetlands lost in Michigan since European settlement.
- Natural history including rare wetland plants, animals and communities, amphibians and reptiles, and a presentation on the cultural significance of wetlands by Michigan's Inter-Tribal Council.
- Wetland education including tools and techniques for teachers, with Continuing Education credit available.
- Geographic Information System and computer mapping demonstrations were ongoing throughout the conference in a hands-on setting.
- Other great sessions including wetlands and watershed planning, landowner stewardship, local wetland protection, wetland monitoring, and wetland regulation including an opportunity to ask questions of state and federal regulatory staff.

This full color print by northern Michigan artist Glenn Wolff was commissioned to celebrate the 25th Anniversary of the Wetland Protection Act. Prints and tee-shirts were available during the conference, and the original hangs in the DEQ Executive Offices.

And a wetland event for everyone

The conference attendees' energy and enthusiasm spilled out of the formal presentations of the conference into other events, including:

- An opening reception with music by the local Neptune Quartet and book signings by Dave Dempsey, author of On the Brink: The Great Lakes in the 21st Century, and Dennis Albert, author of Between Land and Lake: Michigan's Great Lakes Coastal Wetlands.
- Tours of the newly opened Great Lakes Maritime Academy.
- A celebratory banquet, with local cuisine, a dinner talk by DEQ Director Steve Chester backed by a view of Grand Traverse Bay, and music by local group, Song of the Lakes.
- A choice of field trips including a Grass River Natural Area hike, wetlands of the Old Mission Peninsula, a "walk and float" trip along the Boardman River Valley, or a sail aboard the educational ship The Inland Seas.

A quarter of a century ago, a coalition of Legislators, sportsmen, environmentalists, land use planners, and other citizens recognized the value of Michigan's wetland resources and laid a firm foundation for their effective protection and management. Last May, during American Wetlands Month, Michigan citizens convened to honor the past, and demonstrate their sustained enthusiasm and unflagging dedication to the protection and management of Michigan's wetland heritage. It was a true celebration.

We heard numerous requests for future conferences. In the summer of 2006, the DEQ will be hosting a national conference focused on Great Lakes Wetlands, co-hosted by the US EPA, and the Association of State Wetland Managers.

Peg Bostwick is an Environmental Quality Specialist in the Michigan Department of Environmental Quality in Lansing. She is coordinator of Michigan's federal wetland permit program and is currently Vice Chairman of the Association of State Wetland Managers and also a member of the Society of Wetland Scientists.

Amy Lounds is an Environmental Quality Analyst in the Wetlands Program of the Department of Environmental Quality.

Life Without Alewives in Lake Huron

by Jim Johnson

In the fall of 2004, aboard the U.S. Geological Survey's (USGS) survey vessel *Grayling*, researcher Jeff Schaeffer was shocked to find almost no alewives in Lake Huron. Weeks of grueling boat time had yielded only a handful of alewives, which had until now been the staple of diets of trout, walleyes, and salmon. Surprisingly, the *Grayling* sampled dozens of wild baby lake trout. In fact, evidence of lake trout reproduction was found in nearly every sector of Lake Huron's main basin. Diet analysis being conducted by the Michigan Department of Natural Resources's (DNR) Dr. Ji showed that most lake trout and salmon stomachs were empty. In 2004 these fish had almost run out of food. In Saginaw Bay, Dave Fielder and Mike Thomas, Michigan DNR research biologists, were measuring astonishing levels of walleye and yellow perch reproduction aboard research vessels *Chinook* and *Channel Cat*. In the laboratory of the Alpena Research Station, DNR technician Steven DeWitt and I were inspecting vertebrae taken from Lake Huron Chinook salmon under a microscope. They were supposed to carry a florescent mark if they had originated from hatcheries. But 80 percent of them didn't. Since 2000 Steve and I had noticed that upwards of 75 percent of Lake Huron's Chinook salmon were wild. John Clevenger at the DNR's Charlevoix Research Station noticed in fall 2003 that a substantial number of Chinook salmon caught in Lake Michigan contained tiny coded-wire tags that identified them as having been stocked in Lake Huron. As much as 27 percent of fish stocked in Lake Huron were appearing in the catch of Lake Michigan anglers.

After decades of relative stability, things were changing in Lake Huron and changing fast. In the 1940s Lake Huron's native fishes were on the ropes due to overfishing, sea lamprey depredation, and pollution. Nonnative alewives and rainbow smelt exploded and by the 1960s, lacking a suitable predator to control them, their carcasses were littering the beaches of the Great Lakes. Then came lamprey control and the introduction of salmon in the late 1960s. Alewife numbers came under the control of trout and salmon. Recreational fisheries of enormous value developed. Today,

we tend to take these fisheries for granted; they have been stable for 25 years. What many do not realize is these fisheries are sustained by stocking; there has been precious little evidence that trout, salmon, or walleye could reproduce in Lake Huron. Until now. And while invasive species continued to rain on Lake Huron's parade, the great fishing only seemed to be getting better. Now everything seems to be changing, especially for Lake Huron's offshore species, particularly alewives and Chinook.

Evidence of change came as early as 1987, when two Ontario biologists observed Chinook salmon spawning in the North Channel of Lake Huron. These salmon were not spawning in a tributary, but instead in an isolated bay. Until then, Chinook were known to spawn only in flowing waters. During spring of 1988 Chinook fry appeared at the nesting locations. Other Ontario biologists began noting sizable spawning runs into many of Ontario's tributaries of Lake Huron. Ontario and Michigan biologists joined ranks in an international effort to mark all stocked Chinooks to determine how significant this reproduction was. By 2004 it was clear that most Chinook in Lake Huron were wild. Lake Huron now hosted the largest known reproducing stock of freshwater Chinook salmon.

Meanwhile, Steven Pothoven and Tom Nalepa of the National Oceanic and Atmospheric Administration (NOAA) were analyzing findings of their research on the Great Lakes: in the era since zebra mussels were discovered food webs were undergoing sweeping change. Nutrients that once were available to plankton and alewives were being trapped by the new invaders, evidently at the expense of plankton and alewives. Prior to 1992 the Great Lakes food web was rather simple: nutrients in bottom sediments, mostly from settling phytoplankton, were consumed by two kinds of freshwater "shrimp" known as Diporea and Mysis. The shrimp went on nightly migrations into the upper layers of the water column where they became available to fish such as alewives. Alewives, in turn, were eaten by salmon. Sediment, shrimp, alewives, salmon: a formula for one of the best salmon fisheries on earth. Zebra mussels were first seen in Lake Huron in the early 1990s; by the late 1990s both quagga mussels and round gobies had also colonized Lake Huron. A new food chain had appeared: sediment, mussels, gobies. Although the mechanism is not clearly understood, shortly after these invasions, Diporeia declined or disappeared from NOAA's bottom samples of lakes Huron and Michigan. Absent Diporeia, the vertical recycling of

nutrients from the sediments to alewives community slowed. Production of alewives declined.

The combination of increasing predation by Chinook salmon and loss of nutrients was too much for the alewives, resulting in the alewife collapse. What were the salmon to do, now that their chief prey was gone? Salmon migrate thousands of miles in their native waters of the Northwest, and they appear to be doing likewise in the Great Lakes. Lake Michigan's alewife supply appears to be holding up well. There is less Chinook reproduction in Lake Michigan than Lake Huron. It appears many Lake Huron Chinooks have discovered greener pastures in Lake Michigan. Over a fourth of Chinooks stocked in Lake Huron found their way to Lake Michigan during 2003. In Lake Huron, anglers are used to finding salmon where alewife numbers were high. Now salmon are feeding on smelt, plankton, insects, and not alewives, meaning they are no longer to be found in their traditional haunts. In 2004 salmon were caught by walleye anglers fishing in shallow waters, as well as in very deep waters where once only lake trout were found.

Scientists have shown that alewives may have been the cause of reproductive failures of native Great Lakes fishes. Alewives eat the fry of other species and compete with them for food. Diets dominated by alewives produce thiamine deficiencies which ultimately lead to a kind of reproductive failure known as early mortality syndrome. Evidently, yellow perch, walleyes, and lake trout are now capitalizing on the disappearance of alewives and reproducing again. Significant walleye reproduction had not been measured in Saginaw Bay since the Second World War, but strong year classes of wild walleyes were measured in the Bay in 2003 and 2004. Yellow perch reproduction was the strongest since at least 1980. Lake trout reproduction has been almost nonexistent since about 1950. Wild baby lake trout were sampled by USGS and DNR survey vessels near Detour, Hammond Bay, Thunder Bay, and Oscoda during 2004, suggesting that at long last lake trout may be on a trajectory that could lead to recovery.

Exactly where Lake Huron's ecosystem is headed, however, is uncertain. While reproduction of native species is a positive sign, the fact that three invaders were able to become dominating forces in Lake Huron in just one decade suggests how vulnerable the lake is to exotic species. Will the now empty alewife niche be filled by a native species such as lake herring or by yet another invader? Has

"Scientists have shown that alewives may have been the cause of reproductive failures of native Great Lakes fishes."

the food web shift increased or decreased the ecosystem's resistance of further invasion? Will lake trout and walleyes recover to near their historical abundance and become forces for stability, roles they once served when these were the "keystone" predators of Lake Huron?

Only time, and hopefully more effective controls of invasive species, will tell.

Jim Johnson is a research biologist with the Michigan Department of Natural Resources. He is head of the Alpena Fisheries Station.

The Impact and Potential of Wind Generation in the Great Lakes

by Dr. David I. Johnson and Dr. Lynn Hamilton

The Great Lakes are a well-established resource for fresh water supplies, shipping, commercial fishing, wildlife habitat, recreation and scenic beauty. Most of us know that coal and nuclear power plants near the shore extract water from the lakes and use it to produce steam and provide cooling. Many rivers entering the Great Lakes have low head dams where flowing water power turbines to produce electricity. The Ludington Pump Storage Facility pumps water uphill at night using inexpensive electricity which is released during the day to run electrical generators when electrical prices are at a premium. It should be clear to all of us that the Great Lakes and energy production in Michigan are already intimately intertwined.

New wind maps of Michigan, released in October by the state Energy Office, show that the Great Lakes have incredible potential for wind energy generation. The National Renewable Energy Laboratory in Golden, Colorado, has completed some conservative calculations that suggest that Michigan has over 16,000 megawatts potential in wind energy over the land mass, but over 45,000 mega-

watts if wind generators were to be located in the lakes. One megawatt is the amount of energy used by 250-300 homes.

Europe is the world leader in both on- and off-shore wind. According to the European Wind Energy Association, at the end of 2003 there were 326 turbines off the coasts of Denmark, Sweden, Germany, the Netherlands, Ireland and the United Kingdom, producing 600 megawatts of electricity. That's in addition to nearly 28,000 megawatts installed on land. This electricity is now being generated at $.03/kWh, and is less expensive than the subsidized Clean Coal Initiative in the Bush Energy Plan. By comparison, Michigan currently produces 2.4 megawatts of wind energy, and the entire U.S. generates 6,740 megawatts of wind energy. There are no off-shore wind turbines in the U.S.

Currently, there are several proposed U.S. off-shore wind projects, but none are in the Great Lakes. One of the most well-known is the proposed Cape Wind project, just off Cape Cod, Massachusetts. If built, it will be the largest wind farm in the world with 153 turbines producing 454 megawatts of electricity.

Why the strong push behind wind energy, and the more recent interest in off-shore wind? Well, we have become more aware in recent years not only of the high cost of fossil fuel energy, but of the hidden costs of health and environmental impacts of non-renewable energy. Recent data compiled by the Army Corp of Engineers on two Massachusetts power plants gives us insight into more specific impacts of coal-fired power plants. Salem Harbor Station is responsible for 53 premature deaths, 570 emergency room visits, and 14,400 asthma attacks every year, according to a 2000 study by the Harvard School of Public Health. Brayton Point emitted: 44,586 tons

of sulfur dioxide (acid rain), 13,636 tons of nitrogen oxide (smog), 7,925,715 tons of carbon dioxide (contributes to global warming), and 240 pounds of mercury (enough to poison 120 million pounds of fish). If the Cape Wind project were to replace the electricity of these power plants, the average estimated monetary savings for health effects would exceed $53 million each year.

In Michigan, the U.S. Environmental Protection Agency (EPA) estimates that every year 981 lives are lost from particulate pollution. These very small particles that reach deep into lung alveoli cause a loss of 142,468 work days, 968 hospitalizations, and 24,645 asthma attacks; 1,431 of which require hospital visits. The EPA attributes 115 lung cancer deaths and 1,728 heart attacks annually to Michigan power plant pollution.

With the longest shoreline of any Great Lakes state, Michigan is in a unique position to explore off-shore wind energy and become a leader in renewable energy, rather than its current status as a laggard. Sooner or later we need to face the brutal facts that we will need more electricity at reasonable prices to help preserve our vital industries. One answer, although not the only answer, will be off-shore wind generation, which can produce energy without destroying land, contaminating ecosystems, or contributing to global warming.

Dr. Johnson, Department of Fisheries and Wildlife, and Dr. Hamilton, Department of Agricultural Economics, are working with the Michigan State University Extension Wind Energy Education project, funded by the State Energy Office and the U.S. Department of Energy, to provide outreach to Michigan farmers about wind and other renewable energy options.

Frog and Toad Survey 2004

by Lori Sargent

The Michigan Natural Heritage Program conducts field surveys to locate and identify threatened and endangered species and communities throughout the state. Michigan has been a part of a coordinated program to monitor the populations of many wild species. For a number of years, frogs and toads have declined in many parts of the world, including the U.S. and in Michigan. This program attempts to monitor the populations of these amphibious species. Several species are approaching the extirpation state in Michigan with others showing declining numbers.

There were 1755 unique sites surveyed in 2004, resulting in a decrease from the number of sites surveyed the year before. A few of the species (i.e. Fowler's toad, Blanchard's cricket frog, and mink frog) have ranges that include only a portion of the state. As was done in previous years, only data from those sites within the native range of those species were used in analyses.

Once again, the spring peeper was the most frequently heard species and heard in most counties. Mink frog observations are still on the decline from last year, but data on this species is highly dependent on the amount of data submitted and the timing of the observations. However, the complete lack of any observations of mink frogs in the western Upper Peninsula is of concern. There are still thoughts among the scientific community that mink frogs are actually declining in Michigan. Pickerel frog occurrence remains low, possibly a result of confusion between this species' calls and that of the Northern leopard frog. Pickerel frog occurrences have been known to be lower than the leopard frog in other Great Lakes states. Occurrences of the Cope's gray treefrog continue to be low, relative to the Eastern gray treefrog. Occurrences declined once observations were required to be validated. Data for the Cope's gray treefrog and the Blanchard's cricket frog have to be confirmed either by recording or validation by an "expert". As observers gain experience through the years, differentiations between similar-sounding species should become clearer.

"Most species trends appear to be stable with some slight declines."

Data on wood frog observations should be interpreted cautiously due to their brief calling periods and associated difficulty of conducting the first run when wood frogs are calling. Green frogs seemed to be on the verge of a decline in all zones, but made a comeback in 2004. Continued low abundance of Fowler's toads is becoming more troublesome and hopes are that this documentation will lead to future research projects to investigate the reason(s) for decline. Using all the routes that submitted data in 2004 the percentage of sites at which a species was heard per route was calculated for each zone.

A statewide, nine-year analysis was done again this year. The average number of sites per route at which a species was heard for all the routes was charted by year for each species. Trends were calculated for each species. Negative trend numbers indicate a decline and vice versa. For most species the trends are similar between zones. Most species' trends appear to be stable with some slight declines. The reasons for these trends are unknown at this time.

Lori Sargent is a nongame wildlife biologist with the Wildlife Division of the Michigan Department of Natural Resources. She is the Frog and Toad Survey Coordinator with the Natural Heritage Program.

Report of the U.S. Commission on Ocean Policy

by Cathie Cunningham Ballard

In September, 2004, the U.S. Commission on Ocean Policy (Commission) completed its final report, "An Ocean Blueprint for the 21st Century." The report culminated more than two years of research, public meetings, and site visits in every coastal region of the country, and review of reams of written testimony. The impetus behind this effort was the Oceans Act of 2000 (Public Law 106-256), which included provisions establishing the Commission and directing it to make findings and propose a comprehensive and coordinated national coastal, ocean and Great Lakes policy to the President and Congress. The Commission presented over 200 policy recommendations in its final report.

The report had been long anticipated by those interested in coastal and Great Lakes issues. The last, previous comprehensive review of ocean, Great Lakes and coastal issues was the Stratton Commission report, completed over 35 years ago. Since that time, the nation's coasts have undergone dramatic increases in population growth, and corresponding changes in land development, and recreational and commercial uses.

Thanks to the leadership of the Great Lakes states, our region's interests are represented in the Commission's findings and recommendations. The Commission presented a set of draft findings to the nation's Governors and interested stakeholders in April of 2004. Governor Jennifer Granholm was one of 37 governors, five tribal leaders, and 800 interested stakeholders who provided detailed comments on the draft report. The Commission's final report reflects the consideration and inclusion of the comments received.

It would be difficult in an article of this size to describe all of the Commission's 200 plus recommendations. However, the Commission did identify four broad themes to guide the development and implementation of the recommended policies:

"The Commission presented over 200 policy recommendations in its final report."

1) Improved governance; 2) ecosystem based management; 3) use of scientific information in decision making; and 4) improved public education and stewardship.

To improve governance, the Commission proposed a new National Ocean Policy Framework to elevate ocean, coastal, and Great Lakes management to a higher level within the federal government. Under the direction of a cabinet-level Committee on Ocean Policy, the Administration could increase coordination between and within the many departments and agencies with coastal, ocean, and Great Lakes resource management responsibilities.

To move toward an ecosystem-based approach to resource management, the Commission recommended the creation of Regional Ocean/Great Lakes Councils. The Commission envisioned that the regions would encompass relatively large areas with similar ecosystem features. In response to the concerns expressed by Governor Granholm and others, the Commission amended the preliminary report to clarify that state and local needs should guide the Regional Councils, and Council priorities should complement state and local goals.

The recommendations to use science in improving management and policy decisions, and cultivating a broad public stewardship ethic would be achieved through increased funding for research and exploration, enhancing ocean and Great Lakes science infrastructure, and integrating data management. The cornerstone of the "science to management" recommendation is the national Integrated Ocean Observing System (IOOS) comprised of coordinated and connected regional observing systems linked to a global ocean observing system. Scientists and resource managers in the Great Lakes region have been active in developing a Great Lakes Observation System that would be a component of the IOOS.

Other major themes of the report include strengthening the link between coastal and watershed management, creating measurable water pollution reduction goals, particularly for nonpoint sources, and strategically focusing incentives, technical assistance, and other management tools to achieve the recommendations in the report.

The Commission's recommendations carry a hefty price tag, and the cost of implementing the proposed policies will challenge federal and state governments in a time

when financial resources are scarce. To pay for the new initiatives, the Commission suggested an Ocean Policy Trust Fund, capitalized with revenues from offshore oil and gas development and other new and emerging offshore uses.

The Commission delivered its final report to Congress and the President in September of 2004. On December 17, the President presented Congress with his U.S. Ocean Action Plan that sets forth the Administration's response to the Commission's recommendations. A copy of the U. S. Ocean Action Plan is available at http://ocean.ceq.gov.

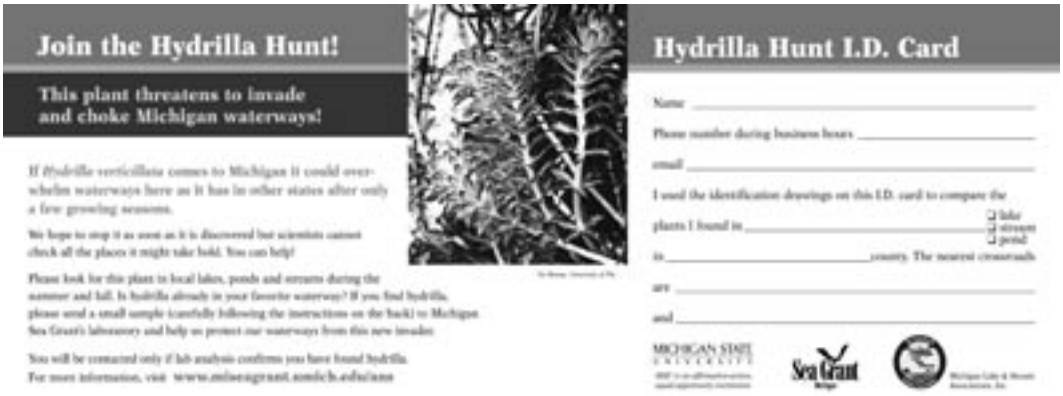
Cathie Cunningham Ballard is Chief of the Michigan Coastal Management Program, Environmental Science and Services Division, Michigan Department of Environmental Quality

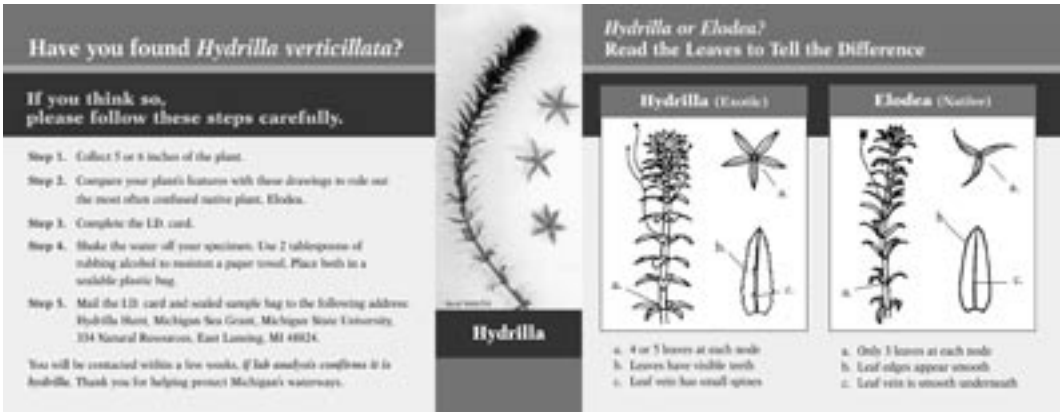
Hydrilla, One of the Worst of the Worst Aquatic Invasive Species

The possibility of the aquatic invasive plant hydrilla *(Hydrilla verticillata)* arriving in the Great Lakes is a specter we hope we don't have to deal with. Normally a warm-water plant species that has infested southern states, a northern variety has recently been found as far north as Maine. Hydrilla has been in both Florida and Southern California for 30 plus years, but it is not yet known to be in the Great Lakes basin. Florida and California reacted differently to the initial infestation. In Florida hydrilla was not initially recognized as different from the native plant elodea *(Elodea Canadensis)*. Once the seriousness of the problem was understood, maintenance management was initiated. However, the $5 million allocated was inadequate, so the plant continued to spread. Hydrilla is now found in over 40 percent of Florida's public waters and maintenance control costs are in excess of $17.5 million annually. In California, eradication was the approach adopted by the state. Today, only a few isolated populations of hydrilla exist and costs of management are far less than in Florida. Attempts are being made to eradicate those populations remaining. If

hydrilla ever gets established in Great Lakes waters, control and containment costs could be very high.

If hydrilla were to infest certain areas of the Great Lakes or inland waters, it would have profound effects on aquatic ecosystems, with the potential for being worse than Eurasian watermilfoil, another invader that is already here. Hydrilla can damage freshwater ecosystems both biologically and economically. It disrupts freshwater ecosystems through the aggressive and effective displacement of native vegetation, disrupts fisheries production and food-webs, alters nutrient cycles, and reduces or eliminates all recreational access/activities in infested systems. Due to the high costs associated with its control and eradication, responses to an infestation must be initiated as quickly as possible.





In 2004, Michigan's Office of the Great Lakes used hydrilla as the subject of a case study for developing a rapid response plan for invasions of new plant species. The state's Aquatic Nuisance Species Council established a Hydrilla Task Force that drafted the plan. It covers the 8 basic parts of rapid response, including communications, outreach, early detection, assessment, options, implementation, evaluation, and funding.

The early detection part of rapid response was immediately implemented through a broad public awareness campaign in Michigan. The Hydrilla Hunt consisted of distribution of thousands of information cards with contact information as well as many presentations on hydrilla and press releases throughout the state. In 2004, no hydrilla was found. Prevention is now a key action for protecting the Great Lakes from hydrilla. Keeping

boats and water recreation equipment clean is crucial, as is maintaining healthy water ecosystems. Ecosystems under stress may be more susceptible to invasive species such as hydrilla. Lakes receiving too much nutrient input from fertilizers or with shoreline/bottom disturbances can provide good habitat for invasive species. Therefore, a key preventative measure for reducing the possibility of invasions is to keep lake ecosystems healthy.

The Hydrilla Hunt card is shown. We are enlisting readers of this State of the Great Lakes report in the hunt. If you find what you think is hydrilla, follow the instructions on the card. You may be part of protecting the Great Lakes from one of the worst of the worst aquatic invasive species.

Underwater Great Lakes Treasures

The Hidden Landscapes Beneath the Great Lakes

By Charles F. Barker

Most of us think of the Great Lakes in terms of water, and rightly so, but have you ever wondered what is beneath all that water? You just might be surprised.

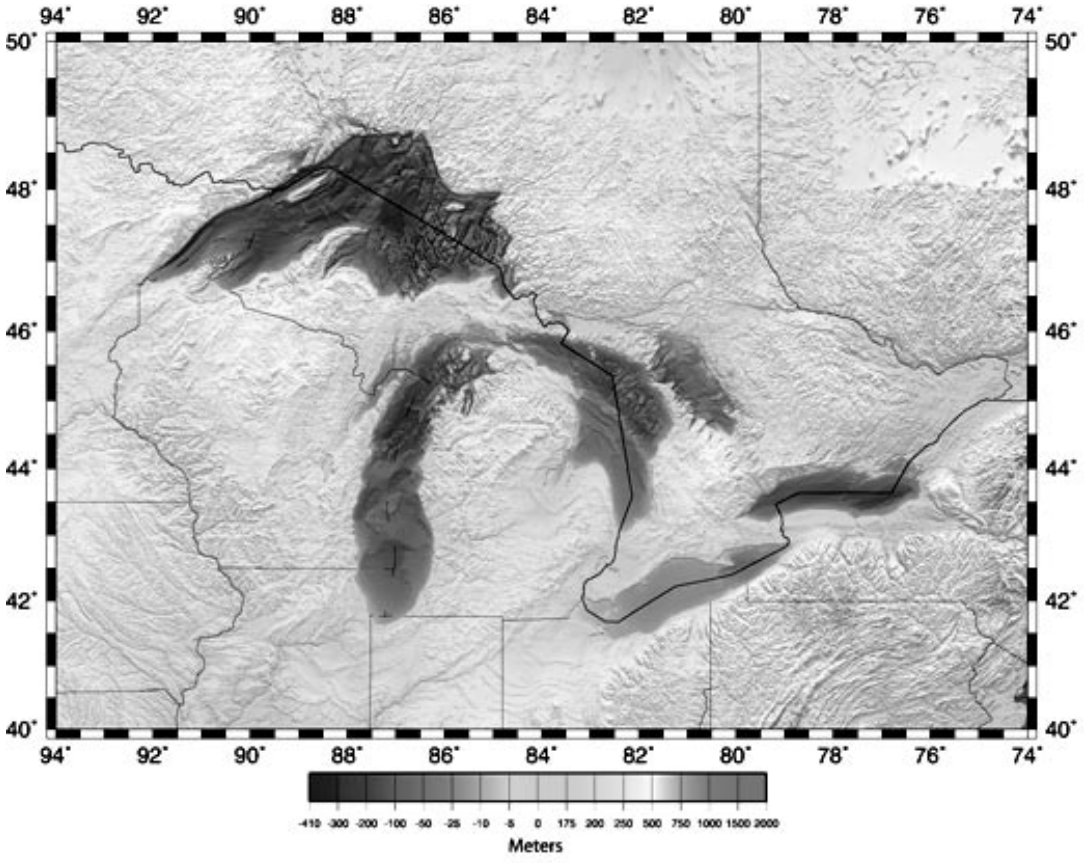
With most of the attention in the Great Lakes focused on water quality, invasive species, and the controversy over water withdrawals, the floors of the Great Lakes remain shrouded in mystery – if they are given much thought at all.

But new maps of the lake floors produced by the National Oceanic and Atmospheric Adminsitration/National Geophysical Data Center World Data Center for Marine Geology and Geophysics in Boulder, Colorado, comprising the work of many people and many organizations, have revealed amazing features at the bottom of the lakes. These submerged landscapes are revealed in amazing detail, and some features seen for the first time.

The State of Michigan and the surrounding landscapes of the Great Lakes basin are ultimately defined by the underlying geology. The rock formations that are more resistant to erosion than others protrude as landforms such as the Door Peninsula, the Georgian Islands, and the cliffs forming Niagara Falls. In fact, these are all part of the same resistant bowl-shaped formation. Given that, it is not so surprising to find that this same principle defines some rather prominent if not spectacular landforms under the Lakes.

For instance, in the middle of Lake Huron, long tall ridges of rock run from Alpena, Michigan to Amberley, Ontario--appropriately named the Alpena-Amberley Ridge. Again, this is the submerged version of the expression of the

edge of a bowl-shaped resistant rock formation. In some places along its approximately one hundred-mile length, the ridge has an elevation drop of 400 feet or so from crest to deepest point. During lower Lake levels in the past, and likely again at some point in the distant future, this ridge would form a chain of Islands – much like the Florida Keys in appearance, yet in the middle of Lake Huron (sans palm trees).



Great Lakes topography/bathymetry map courtesy of NOAA/Great Lakes Environmental Research Laboratories; Canadian Hydrographic Services, Nautical Charting Division; and the Cooperative Institute for Research in Environmental Sciences, University of Colorado

Beneath Lake Michigan, the underlying rocks again create a bizarre landscape. In the north, the deepest part of the lake, the soluble limestone dissolved away in places leaving elongate pock-marked submerged caverns, as overlying rocks were scrapped away by the erosive power of the glaciers. To the south, a high point in the middle of the Lake was likely an island during periods when lake levels were much lower.

Add to these features the possibility of something quite literally out of this world – some suspect a possible impact crater at the eastern edge of Lake Ontario. With these new maps, we can begin to appreciate the Great Lakes not only for the water we see, but the fascinating Lake floors that lie beneath.

Where to Purchase maps of the Great Lakes floors

Maps showing the amazing features on the floors of the Great Lakes (some in 3-D) may be purchased from the NOAA/National Geophysical Data Center World Data Center for Marine Geology and Geophysics in Boulder, Colorado. Maps can be purchased from their web site at: http://www.ngdc.noaa.gov/mgg/bathymetry/relief.html (or search under Great Lakes Bathymetry)

Charles Ferguson Barker is a geologist with the environmental consulting firm Hands & Associates, Inc., in downtown Detroit, and is a part-time faculty member of the Geology Department at Wayne State University.

Great Lakes Underwater Exploration with the Research Vessel *Pride of Michigan*

by Luke Clyburn

The future welfare of the Great Lakes will be in the hands of future leaders – our youth of today.

In 2002, we established the Noble Odyssey Foundation (a non-profit 501c3 organization) to enhance an already successful maritime training program for future leaders. For over twenty-five years hundreds of young boys and girls in our Great Lakes Division of the U.S. Naval Sea Cadet Corps have carried out seagoing missions in support of Great Lakes research projects.

Congress created the U.S. Naval Sea Cadet Corps in 1963 to develop a maritime interest in American youth. When we formed the Great Lakes Division of Sea Cadets in 1973 we believed that the best way to develop this maritime interest was to actually take young people to sea, and have them perform real-world missions. In 1977, the dream became a reality with our acquisition of a 75-foot Navy Yard Patrol boat. We named this boat the *Noble Od-*

yssey, and the whole Great Lakes became our training ground.

Pride of Michigan

From the beginning we wanted to involve the cadets in professional projects where they could apply their training realistically. We needed to develop project ideas that would be largely self-funding and also create real interest among our cadets, volunteers and donors. So, we began to support scientific research programs that required using the *"Noble Odyssey"* to transport equipment and researchers to Great Lakes sites. With adult supervision, the cadets manned the ship and provided hands-on help with research tasks in the field. This approach has been very successful. The following are some examples of our research projects to date.

From 1980 to 1989, we supported research projects on island ecology in the Great Lakes. It involved researchers from several academic institutions. For seven summers we transported a botanist and a herpetologist and their associates to several islands. With cadet help, the botanist gathered and preserved rare and endangered species of Michigan flora. As cadets worked closely with the botanist, they learned about the scientific value of these studies. They also worked with the herpetologist to collect island garter snakes for comparative DNA studies. They later learned what these studies revealed about genetic links between island and mainland snake populations in ancient times during lower lake levels.

In 1982, the *Noble Odyssey* was used as a platform for filming an underwater shipwreck on the north shore of Isle Royal in Lake Superior. We produced a documentary film "Angels of the Sea," which told about the sinking of the steamship, *Emperor.* The performance of our divers and cadet crew under difficult conditions was outstanding. The film was aired on the Public Broadcasting Service around the Great Lakes region, and the growing capabilities of our operation became better known.

In 1989 we replaced the *Noble Odyssey* with a similar but newer ship, the *Pride of Michigan*. It is a slightly larger vessel, which has allowed us to expand the scope of our training and research programs.

A diver investigates an underwater ridge of limestone

For many years our cadet SCUBA team has worked with scientists from Oakland University on the collection of zebra mussel data from Lake St Clair. Cadet divers have collected native clams from the lake bottom that researchers used to determine the ecological effects of zebra mussels. Zebra mussel larvae were also sampled at various sites while transiting Lakes Huron and Michigan. The results aided in studies of the migration of this invader. Along the way the cadets also made many dives on shipwrecks to collect data on the spread of zebra mussels. This and other work resulted in a documentary film, "Fresh Water Invaders."

During the 1990s our research projects continued to involve underwater research. We investigated an ancient drowned forest some 40 feet under water, two miles off Lexington, Michigan. For more than ten years scientists and our cadet divers have studied this site. They have set up search grids, located and documented logs and rooted tree stumps on the bottom, and collected research samples. Within this grid, 13 rooted stumps were found, well preserved. Carbon dating established that all of the wood samples were over 7,000 years old, and proved that Lake Huron water levels were much lower at that time. Another documentary film was prepared: "Drowned Forests of Lake Huron."

Finally, in 2004, the Noble Odyssey Foundation, with funding from Michigan's Coastal Management Division, Cranbrook Institute of Science, and Inter-Seas Exploration, began an underwater geological and archeological survey across the mouth of Grand Traverse Bay. On the adjacent shore, near the village of Norwood, are ancient chert mines where Native Americans made tools and left evidence of their work dating to some 10,000 years ago. Teams of cadets aboard the *Pride of Michigan* made more than 300 dives, exploring an underwater ridge of limestone for possible quarry sites formerly above water. Weather-

eroded stones were found on the bottom proving that the area was above water levels in earlier times. We also found an ancient drowned river channel cutting through this land bridge; a location where Native fishing camps may have existed during the low water period. This is an area that begs for future research. A film "The Norwood Project" was produced, documenting this expedition. It will be used to help develop public interest in Great Lakes science and history.

Each year with our ship and crew of Sea Cadets and volunteer professionals, we undertake some kind of research project on the Great Lakes. Every year new discoveries are made, creating many new questions about science and history under the waves. Working directly with scientists has greatly stimulated the cadets' interest in developing their own careers in science, technology, and maritime professions. Just as important, they have developed responsible habits and leadership skills that are exceptional among their peers. Over the years many of our former cadets have moved on to leadership positions in science, industry, and politics around the Great Lakes Region. The benefits of their unique experience as Sea Cadets will remain with them all their lives.

Luke Clyburn is Lieutenant Commander of the Great Lakes Division, U.S. Naval Sea Cadet Corps, and Captain of the vessels "Noble Odyssey" and "Pride of Michigan."

Protecting Michigan's Historic Shipwrecks

by John R. Halsey

European explorers of the 1600s used the Great Lakes-St. Lawrence system to access the heart of the North American continent. They modified Old World vessel types and created new ones that were responsive to the unfamiliar conditions of the Great Lakes: ocean-sized bodies of fresh water, but without tides, where violent storms built up on short notice, filled with uncharted hazards. Merchants and shipbuilders experimented

A composite mosaic of images of the shipwreck "E.B. Allen"

throughout the eighteenth and nineteenth centuries trying to develop ships with the optimum combinations of wood, iron, steel, sail, steam and crews. Many of these experiments were unsuccessful or unlucky. Today Michigan's Great Lakes bottomlands hold a magnificent collection of shipwrecks documenting virtually every major advance or misstep in Great Lakes nautical engineering. Within Michigan Great Lakes boundaries there are at least 1,500 recorded shipwrecks.

In cold, fresh, shipworm-free waters, Great Lakes scuba divers of the 1960s and 1970s could swim over virtually intact shipwrecks. Cargoes of grain, copper, iron ore, limestone and cement, as well as mixed products ranging from hand lotion to Scotch whisky still sat in the holds. But as scuba diving became more popular after World War II, long-lost vessels and their cargoes became accessible to the layman and it was not long before wrecks, especially those made of wood, were being torn apart for nautical memorabilia and shipwreck furniture.

A state-mandated system of Great Lakes bottomland preserves was the first serious effort to protect shipwrecks from unlawful salvage/vandalism/souveniring. A 1980 act made unpermitted removal of artifacts a misdemeanor. This was not much of a deterrent, but it was something. And it was unique among all Great Lakes states.

The most recent stage in the Michigan experience of shipwreck preservation was the creation in October 2000 of Thunder Bay National Marine Sanctuary and Underwater Preserve, the thirteenth in the National Oceanic and Atmospheric Administration's (NOAA) network of sanctuaries that extends from Massachusetts to American Samoa. Thunder Bay is only the second devoted to cultural resources (the other being the Monitor sanctuary), the first sanctuary in fresh water, and the only sanctuary jointly managed between a state and NOAA.

NOAA brings the funding that can finally make a full-blown shipwreck sanctuary a reality: adequate staffing, enforcement, research technology, publicity, and connections to other powerful federal agencies such as the U. S. Coast Guard and major private organizations like the National Geographic Society and Robert Ballard's Institute for Exploration. The state brings the expertise of the Michigan Historical Center in archaeology, historic preservation, museum exhibits, and archival techniques. The Department of History, Arts and Libraries, parent agency of the Michigan Historical Center, brings the resources of the Library of Michigan and the Michigan Film Board. Conservation officers from the Michigan Department of Natural Resources will continue their sparkling tradition of successful enforcement and prosecution. Other potential enforcement partners range from the Alpena County Sheriff Department to the United States Coast Guard. NOAA's participation has leveraged state funding, and after a quarter of a century, Michigan has a real maritime archaeologist, stationed at Alpena, and a key member of the Sanctuary team.

The windlass of the shipwreck "E.B. Allen"

The sanctuary has made significant strides in its shipwreck preservation efforts. In 2001, the Institute for Exploration (IFE) conducted a comprehensive side-scan sonar inventory of the sanctuary, covering 342 square miles of Lake Huron bottomland. In 2002, IFE returned for two weeks to conduct a follow-up visual survey of known shipwrecks, newly located shipwrecks, and other significant targets. The team used a high-definition video camera mounted on a remotely-operated vehicle to collect the underwater footage. Both the inventory and video footage provide sanctuary staff with important tools and information with which to manage and interpret the collection of shipwrecks.

It is too soon to declare the Thunder Bay sanctuary an unmitigated success, but we now have more committed partners and community support in the Alpena area grows daily. Shipwrecks captivate the public and provide an unparalleled opportunity for the elementary and secondary school teaching of such topics as history, economics, and ecology (fish love shipwrecks too!) as well as archaeology. We have also learned that sometimes it also takes incremental efforts and perseverance over a quarter of a century to make something good happen.

John R. Halsey, State Archaeologist with the Michigan Historical Center, Michigan Department of History, Arts and Libraries, has been involved with shipwreck preservation efforts in Michigan since 1976. He is the State of Michigan's representative on the Joint Management Committee for the Thunder Bay National Marine Sanctuary and Underwater Preserve.

Michigan will be a Premier Maritime Heritage Destination

by Dr. William Anderson and Sandra Clark

Michigan is rich in maritime history. With our unique physical location in the heart of the Great Lakes, we have an amazing array of cultural, natural and historical resources. It is difficult to think of a stronger example of a complimentary relationship between natural and cultural resources.

You can discover Michigan's maritime heritage in more than 120 lighthouses, ore docks, piers, breakwaters, river and harbor walkways, sailing clubs, and communities and industries built on the water. There are hotels and resort towns, more than a dozen maritime-related National Landmarks, two National Lakeshores and two National Parks, dozens of state parks and National Register-listed sites. Michigan has 11 underwater preserves, the nation's only fresh water National Marine Sanctuary, and of course, the lakes themselves and their stories of lighthouse keepers,

Native Americans, fur traders, missionaries, settlers, iron and copper miners, lumberjacks, sailors and travelers.

This endeavor is about preserving and rediscovering our history and sharing a rich story and experience with residents and visitors. There is a growing concentration and value being placed on maritime heritage in Michigan. Nothing illustrates that more strongly than the incredible passion and dedication to lighthouse preservation in our state. The development of the National Marine Sanctuary at Thunder Bay in Alpena and the construction of Friends Good Will, a replica of the War of 1812 three masted schooner by the Michigan Maritime Museum in South Haven are among numerous projects underway.

This endeavor is about preserving and rediscovering our history and sharing a rich story and experience with residents and visitors.

It is time for Michigan to capitalize on these exceptional resources and stake its claim to being the center of Great Lakes maritime heritage. As documented by the Travel Industry Association of America, cultural tourists want experiences that have historical significance. When travelers think of the American Revolution, they think of Boston. If we do our job well, when they think of great ships loaded with lumber that built the Midwest, or the iron and copper that helped win the Civil War and built the auto industry, they will think of Michigan. When they think of courageous sailors or selfless rescues at sea, they will see Michigan beaches, lighthouses and coastal towns.

To seize this opportunity we are creating a Michigan Maritime Heritage Destination that pulls together our top attractions and stories. Through collaboration we will generate the critical mass necessary to create maritime heritage destinations. Two of these regional destinations have been organized and several others are being developed. By working in partnership we have gained access to the marketing resources of Travel Michigan. Through alliance and cooperation, we are gaining a commitment to the benefit of cross selling our combined maritime heritage product and creating win-win relationships. The Michigan Maritime Heritage Destination will encourage prospective customers to customize their travel plans by selecting what they want to experience and making Michigan their destination.

Fort Gratiot Lighthouse at Port Huron is Michigan's oldest lighthouse

A well-defined and marketed Michigan Maritime Heritage Destination plan will result in many positives: a national identity, more visitors, greater revenues, more word-of-mouth business that spreads further each year, and a broader recognition of Michigan's wealth of maritime attributes.

Dr. William Anderson is Director of the Michigan Department of History, Arts and Libraries.

Ms. Sandra Clark is Director and State Historian of the Michigan Historical Center.

Aquatic Nuisance Species Education and Information Grants Program: Encouraging Local Initiatives

by Jill Ryan

Michigan's vital waters, from our four majestic Great Lakes to our bountiful inland lakes and rivers, continue to be under assault from aquatic nuisance species such as zebra mussels, sea lamprey and purple loosestrife. Aquatic nuisance species (ANS) are waterborne, non-native organisms that threaten the diversity or abundance of native plants and animals, or the ecological stability of impacted waters, or threaten a commercial, agricultural, aquacultural, or recreational activity that depends on waters of the state. A collaborative grants program has been providing small financial awards for the past two years to foster implementation of Michigan's Aquatic Nuisance Species State Management plan recommendations on information and education. Through this program, we have seen innovative new approaches to spreading the word about preventing the spread of these invaders.

Eight unique projects to provide information and education about the threats, effects and spread of ANS were carried out in 2004 with assistance from the grant funds. The grants were made through the Aquatic Nuisance Species Education and Information Grants Program, administered by the Great Lakes Aquatic Habitat Network and Fund, a project of the Tip of the Mitt Watershed Council.

Through these creative grant projects ranging from television public service announcements (PSA) to boater education programs to media professional education seminars, literally hundreds of thousands of citizens in Michigan have learned more about the threats of ANS and methods

Eurasion water milfoil on a boat propeller

for preventing their spread. The following short stories give a flavor for the types of projects that were active in 2004.

Inland Seas Education Association (ISEA) was awarded $2,450 for the project, ANS Field Course for Michigan Media Professionals. Media Day on the Bay was a full-day program designed to teach Michigan media professionals (television, radio, newspapers) about ANS in the Great Lakes and to prepare them to effectively report on ANS issues. Because of the important role of media professionals as information providers, the ultimate goal of Media Day on the Bay was to prepare participants to effectively evaluate information on ANS and to describe practical ways that citizens throughout the Great Lakes region can help prevent the introduction and spread of ANS. Participants, including representatives from the Associated Press, a television station, a radio station, four city newspapers and a college newspaper, have created high-quality articles and news segments about ANS in the Great Lakes following the program.

Glen Lake Association was awarded $2,500 for the project, Glen Lake Powerwash and Education Program to Prevent Nuisance Species Infestation. Through this project the group successfully contacted approximately 1,500 boaters prior to launching into Glen Lake. They provided ANS informational brochures and power washed nearly all of the boats in order to prevent the introduction of ANS into the lake. The project is an important part of the overall goals of the group in maintaining the health of this beautiful lake.

Michigan United Conservation Clubs received an award of $2,272 for their project Educating Recreational Boaters to Prevent the Spread of Aquatic Nuisance Species. The project produced, distributed and aired on Michigan Out-of-Doors a television PSA and a four minute television segment on the prevention of the spread of ANS. The pieces debuted during ANS Prevention Week in June on 18 different Great Lakes' television stations. The PSA was distributed to all Michigan public television stations for use along with an educational packet. Because 85 percent of the viewers of Michigan Out-of-Doors are anglers and over 70 percent are recreational boaters, it provided an ideal outlet for dissemination of this educational information.

These projects highlight the outstanding work that has been accomplished through the grants program to educate citizens about the impact of ANS to our water resources and the importance of preventing the spread of these species. While a comprehensive system for preventing the introduction of these destructive species has not yet been developed, this program helps to bring awareness to those living in this water rich area about how our personal behavior can have a real impact on our local environment.

Media Day on the Bay

Funding for the program was made available by the Michigan Office of the Great Lakes, through a grant from U.S. Fish and Wildlife Service.

Jill Ryan is the Director of the Great Lakes Aquatic Habitat Network and Fund.

Partnering for Water Quality

by Marsha Smith

Living alongside 20 percent of the world's supply and 90 percent of all freshwater in the United States, water is key to our quality of life.

In the Grand Traverse region alone, it's the foundation for an annual half-billion dollar recreation and tourism economy.

That's why in February of 2004, Rotary Charities made one of its largest gifts ever in the form of a $1 million grant to Northwestern Michigan College's (NMC's) Great Lakes Water Studies Institute (GLWSI). The grant was also made in view of Rotary's centennial year, and Rotary International's identification of freshwater as a fundamental worldwide concern.

In Charities' view, this gesture reflected our commitment to the stewardship of this important resource, as well as our

Rotarians working to improve water quality

strategy of involvement and service in linking Rotarians, community leaders and volunteers to the resource. Certainly not every Rotary Club can catalyze a cause like this with a million dollar gift. But, every club has the potential to involve its members in partnership with community organizations to protect their regional natural resources and fresh water supply.

Indeed, since that grant, the benchmarks spelled out by Rotary are well on their way to being realized, melding with GLWSI's missions of curriculum, collaboration and convening. They include:

- Seeking additional seed funding for GLWSI's significant water research;
- The creation of new student internships focusing on water resources;
- Development of new partnership programs to help achieve regional goals for water management;
- Introduction of new water resource education programs at NMC;
- The establishment of a long-term funding vehicle to ensure the sustainability of the GLWSI.

By any measure, over the past year GLWSI staff, working with Rotary and the region's schools, nonprofits and private/governmental environmental organizations, have taken giant steps in realizing Charities' charge of promoting and enhancing the stewardship of the Great Lakes.

For instance, a smaller Rotary Charities' grant of $50,000 last year has created the Great Lakes Non-Profit Institute (GLNPI), designed to forge a non-traditional and innovative partnership with Northwestern Michigan College. Its goal is to support the sustainability and capacity of regional nonprofits that contribute to the current and future quality of life.

A snapshot of other progress over the past year in this alliance for Great Lakes stewardship looks something like this….

LEARNING:

The first GLWSI course, Watershed Science, has been developed and is offered as part of the curriculum at NMC.

Volunteers work to stabilize the banks of Kid's Creek

"RIPPLE," an acronym for Research, Inquiry and Public Partnerships for Local Education, has been established. It involves a four-day summer institute for K-12 teachers, students, representatives of water resource agencies and community leaders. Four follow-up sessions are held during the subsequent school years. Teachers develop instructional units and related community projects for middle and high school students, and using fresh water as a theme. In February of 2005, the DTE Energy Foundation recognized the program with a grant that will support the statewide development of the program in "DTE's Freshwater Science Education Institute for Teachers," under which GLWSI will become a statewide hub for teacher development in support of education about the Great Lakes and its watersheds.

In a related initiative, GLWSI is taking the lead in developing new concepts for creating and funding "place-based" education to support water resources pedagogy. This project will evaluate how teacher/student learning is affected from exposure to "real world" water issues and projects involving nonprofit watershed organizations.

A pilot initiative in partnership with the Northwest Michigan Council of Governments and Traverse City Area Public Schools (Sci-Ma-Tech Program) assesses high school student interests and priorities involving fresh water.

GLWSI has developed and distributed to 44,000 regional households a tabloid on its summer environmental education programs.

This year, GLWSI will engage its college and university partners to develop a five year plan for infusing freshwater themes across curricula, so that students can use our unrivaled water resources as a learning lab for the hard sciences, and also for courses covering the arts, social and political science, and others.

PARTNERING:

With leadership from Rotary and GLWSI, a community-driven initiative to enhance the Traverse City West Bay shoreline is being mounted. A master plan reflecting the insights of varied interests is presently being drafted. The project reflects Rotary's charge of forming new partnerships and alliances that focus on water.

Surveys of Rotarians and partner non-profit organizations have been completed in an effort to match over 400 Rotarians with community service projects that support regional water quality projects.

GLWSI is collaborating with varied regional groups and agencies to address area water issues, write grant applications and form partnerships to host events like a statewide wetlands conference. Partnering organizations include many in the Grand Traverse region and also the U.S. Environmental Protection Agency (U.S. EPA), Michigan Departments of Natural Resources (DNR) and Environmental Quality (DEQ), Traverse City Rotary Clubs, and Tip of the Mitt Watershed Council.

CONVENING:

The national meeting of the Coastal States Organization, representing over 30 states, was hosted at GLWSI last fall.

The National Oceanic and Atmospheric Administration spill response staff held its national meeting here last year. Its primary purpose was to learn about the unique physical characteristics of the Great Lakes, information that would be useful in the event of a major spill. Traverse City Rotarians participated in both events and discussed their freshwater-focused partnership with GLWSI.

The statewide wetlands conference, which last year marked the 25th anniversary of the Wetland Protection Act, was held on the Great Lakes Campus. It was co-sponsored by the Michigan DNR and DEQ, along with the U.S. EPA, Tip of the Mitt Watershed Council and the GLWSI.

GLWSI hosted David Ulrich, Executive Director of the Great Lakes Cities Initiative, to discuss the first-ever opportunity for community voices to be heard in Great Lakes policy making.

That's a commitment we take very seriously. And we are dedicated to helping Michigan lead the way.

ABOUT ROTARY CHARITIES

Since its inception in the mid-70s, Rotary Charities of Traverse City has distributed over $32 million in the form of over 560 grants to organizations and non-profits in Grand Traverse, Leelanau, Benzie, Kalkaska and Antrim counties.

The public foundation was formed following the discovery in July of 1976 of valuable oil and natural gas reserves on property owned by the Traverse City Rotary Club. Its purpose over the years has been to distribute interest income generated from the oil and gas royalties to organizations throughout the five county region of Northwest Michigan.

Marsha Smith is Executive Director of the Rotary Charities of Traverse City.

The Office of the Great Lakes would like to say thanks to a friend of the Great Lakes, Dr. Frank D'Itri. Frank retired in 2004 as the Associate Director of the Michigan State University Institute of Water Research. Frank worked on Great Lakes issues for many years and represented Michigan as a Commissioner on the Great Lakes Commission. Frank was also one of the initial members of the Technical Advisory Board for the Michigan Great Lakes Protection Fund.

Thank you Frank

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