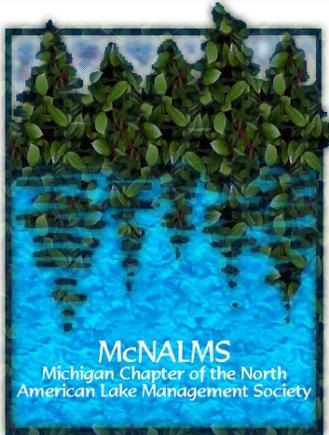


# LAKE EFFECT

April 2011



## Presidential Tidbits by Jo Latimore, Ph.D.

I am thinking about my first “Presidential Tidbits” column while I am in Cadillac, co-teaching a workshop called “Conflict, Collaboration, and Consensus in Natural Resources” hosted by Michigan State University Extension, MSU Department of Forestry, and MSU Department of Fisheries and Wildlife. This year’s participants include staff from the DNR, counties, USDA, MSU Extension, and the Michigan Natural Features Inventory, as well as graduate students from MSU. The goal is to help participants gain confidence and competence in helping groups and communities productively address contentious natural resource issues.

I am certainly learning more than I am teaching. Not only do my co-instructors have a wealth of experience and tools to share, each of the participants has contributed enormously through their own experiences—good and bad—in

dealing with sensitive, divisive, and critical natural resource problems. You might not be surprised to learn that a “hypothetical” problem that the participants tackled was identifying a mechanism for funding aquatic plant control in a recreational lake that was agreeable to all stakeholders. Even though many of the participants do not deal with inland lake management in their jobs, it was immediately apparent to all that this is a challenging—and very real—problem in natural resource management, and one that requires collaboration and consensus (agreement-building) among all the impacted parties. There are no easy answers, but we are more likely to reach the best possible solutions when we agree to become informed, listen to one another, and work together.

McNALMS has an important role to play in promoting effective solutions to lake management and protection problems in Michigan – including

communicating good science and techniques and providing forums for everyone involved (including lake associations, lake users, local decision makers, and regulatory agencies). We hope that our members will take advantage of opportunities like this “Conflict, Collaboration, and Consensus in Natural Resources” workshop hosted by our partners, and McNALMS’ own events, like our upcoming Fall Conference, September 22-23 at the Kettunen Center in Tustin. Topics will include planning for lake protection and recent innovations in aquatic plant management and lake science.

I appreciate the opportunity of serving as your President for 2011. Please let me know if there is anything you would like to see McNALMS pursue, or if you would like to become more involved with our Chapter.

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## Notes from the Executive Director by Howard Wandell

### New Warriors for the Lakes Battle

This year the State gave its employees the chance to retire or start paying more for benefits. Many in the Michigan Department of Natural Resources and Environment (MDNRE) who were eligible took the opportunity and retired. Over the last ten years the State agencies have experienced a significant exodus of employees in “early outs”. Consequently, a lot of institutional knowledge left the building.

In early January I spent an evening with many of these MDNRE employees at Trippers to celebrate their retirement. Looking around the room, the people there were the last of the staff I knew when I was working at the

MDNRE. For this old timer the next generation of natural resource managers has moved into the agency.

I think there are two very important positives about this situation. First, considerable experience has left the agencies but, a lot of fresh new ideas have moved in. Secondly, the institutional knowledge is not lost, it has just moved to another location.

We should take the occasion to get to know the new MDNRE (now split into the Dept. of Env. Quality and Dept. of Natural Resources) and identify ways we can support them. With the “bomb budget” being put in place, there should be many opportunities for us outside the agency to lend support. With

new partnerships like the Michigan Inland Lakes Partnership and the Michigan Natural Shoreline Partnership in place and working, the collaborative connections exist to bring together the NGOs and the State agencies to protect Michigan’s lakes. Hopefully, during these financially challenging times many individuals and organizations will get behind these partnership efforts.

Oh yes, these partnerships are also a place where old timers like me can exchange ideas and knowledge with the next generation of lake managers. It may not be the best of times, but I believe we have an opportunity to continue the battle to protect Michigan lakes, if we take it.

## ML&SA News and Views by Scott Brown, ML&SA Executive Director

By the time this edition of the McNALMS Newsletter hits e-mail in-boxes, we will be kicking off our 50<sup>th</sup> Annual Conference at Boyne Mountain Resort – our conference team has worked hard to deliver an excellent line up of distinguished presenters, workshops and events to this year's program. A hearty thanks to Jo Latimore and Howard Wandell for their substantive and unique contributions to our conference! We hope to see many of you in Boyne Falls on Friday, April 15<sup>th</sup> – your participation will help make our 50<sup>th</sup> Annual Conference a very special and memorable occasion!

Later in the spring we will be publishing a new book written by our legal counsel and friend Cliff Bloom entitled *Buying and Selling Waterfront Property in Michigan* – an extensive work that will provide a detailed review of the laws, court cases and unique situations that those involved in buying or selling waterfront located property should be mindful of before entering this particularly risky corner of the Michigan real estate market. In today's tough Michigan economy, waterfront property is being bought and sold at an increasingly high rate - we would anticipate that our new book will be well received by the real estate and riparian communities.

We would like to publicly thank Dr. Niles Kevern for his valuable time and effort in reviewing and providing valuable suggestions for improving this unique publication



## Take Action to Reduce the Spread of Aquatic Invasive Species by Jo Latimore, Ph. D.

Michigan has nearly 39,000 square miles of Great Lakes waters and more than 11,000 inland lakes larger than five acres. It's natural that boating is one of the most popular recreational activities in the state, with nearly one million watercraft registered. Unfortunately, invasive non-native plants, fishes, and other organisms disrupt these precious ecosystems. They also interfere with the enjoyment associated with boating and damage recreational watercraft.

Volunteers can show boaters how to inspect their equipment, demonstrate cleaning techniques for boats and trailers, and by sharing educational information about invasive species. These volunteers can make a big difference in Michigan's efforts to pre-

vent the spread of aquatic invasive species from one body of water to another. Through the **Clean Boats, Clean Waters (CBCW)** program, volunteers organize and conduct a boater education program in their community. Adult and youth teams educate boaters about where they are most likely to find invasive species on their recreational watercraft.

Michigan's CBCW program was launched several years ago under the direction of Carol Swinehart, Communications Manager for Michigan Sea Grant. Thanks to a recent federal grant through the Great Lakes Restoration Initiative, CBCW has received funding for updates and expansion. Dr. Jo Latimore at Michigan State University has taken over as the Program Coordinator, and is interested in hearing from

lake communities that would like to initiate a CBCW program at their lake, as well as from existing programs that would like to expand. **Training and materials can be provided at no cost to the lake community.**

The first CBCW training opportunity of 2011 will be held as part of the Michigan Lake and Stream Associations' 50<sup>th</sup> Annual Conference on Saturday, April 16, at Boyne Mountain Resort.

If you would like to learn more about Clean Boats, Clean Waters, please visit the program website: <http://www.miseagrant.umich.edu/cbcw>, or contact Dr. Jo Latimore, CBCW Program Coordinator, at [latimor1@msu.edu](mailto:latimor1@msu.edu) or (517) 432-1491.

## New Law Limits the Use of Phosphorus Fertilizers on Lawns by Howard Wandell

The legislature passed and Governor Granholm signed Public Act 299 of 2010 into law. This new legislation limits the application of fertilizers containing phosphorus to lawns in Michigan. The new law will take effect on January 1, 2012.

In most Michigan soils phosphorus is in abundant supply and additional phosphorus is not needed to grow healthy lawns. The excess phosphorus can wash off the land with rain runoff or seep into the groundwater and migrate to the lake through the soil. Consequently in most situations in Michigan phosphorus fertilizer is an unnecessary cost and a potential water pollutant.

Michigan joins Florida, Wisconsin, Minnesota, Illinois and New York with similar legislation. The law does exempt agricultural applications of phosphorus

fertilizers and certain applications for maintaining golf courses.

A homeowner can still use fertilizers containing phosphorus if they have a soil test done documenting that the soil is deficient in phosphorus and that application of the nutrient is necessary. Additionally, phosphorus fertilizer can be applied if the home owner is establishing a new lawn and phosphorus will aid in germination.

The new law also limits the application of any fertilizer to turf less than 15 feet from surface water unless there is a 10 foot wide native vegetative buffer or the spreader has a guard that shields the application and is not applied less than 3 feet from the water.

The State's lake management community has been working for several years

to bring this law to reality. Enforcement of the law will be difficult, but as an educational tool hopefully people will understand the importance of keeping fertilizer particularly phosphorus fertilizer out of Michigan lakes.



## The Role of DNR/DEQ in Lake Management Special Assessment Districts by Pam Tying

It's a new administration and the Department of Natural Resources and Environment has once again been split into two separate agencies, the Department of Natural Resources (DNR) and the Department of Environmental Quality (DEQ). DNR primarily has resource management responsibilities while the DEQ is the regulatory agency. Neither DNR nor DEQ has direct authority over lake management special assessment districts (SADs), but SADs often find themselves interacting with these agencies in the course of managing their lake. This interaction makes sense since the water in most lakes and the fish in them lie within the public trust. In addition, SADs and the state agencies have the same goal to protect our lakes while providing public and private use opportunities.

Until March 1, 2005, lake improvement boards included a representative of "the department," which at that time was the DEQ. In 2004, the state legislature amended the lake board act and removed DEQ from lake boards. However, two sections of the lake board act

were not rescinded and they state "[t]he department, upon request of the lake board, shall provide whatever technical data it has available and make recommendations in the interests of conservation," and "[w]henver a public inland lake is to be improved, the department may intervene for the protection and conservation of the natural resources of the state." Thus, while no longer a member, the lake board act still contemplates important functions for DEQ in lake management.

Aside from direct SAD administration, DEQ and DNR also interact with SADs through various permitting programs. Lake boards or township SADs that control nuisance aquatic plants with herbicides must first obtain a permit from DEQ; or, the commercial herbicide applicator who will be applying herbicides for the lake board or township must obtain the permit on behalf of the SAD. DEQ conducts an environmental review of the proposed treatment to ensure the type and amount of herbicides to be applied will be safe to aquatic communities and will be effective in controlling the targeted nuisance plants. During the permitting process, DNR is

given an opportunity to comment on the proposed treatment since it also has an interest in natural resources protection and management. Similarly, DEQ administers and DNR has input on permits issued under the Inland Lake and Streams Act and the Wetland Protection Act. If SADs engage in lake management activities such as drawdown, dredging, dam repair or other physical impacts to lakes or wetlands, then a permit is required. Alternatively, lake improvement boards or townships may request DEQ to inform them when any permit applications are submitted that impact the lake or watershed in which the SAD is located (or any other waterbody, for that matter). By doing so, lake boards and township boards can stay on top of proposed construction activities that may affect the lakes they manage.

No matter the name of the agency, lake boards and township special assessment districts have many opportunities to interact with DEQ and DNR to achieve the common goal of lake protection and management.

## The Quagga Mussel Quagmire by David Jude

Back in 1988, zebra mussels *Dreissena polymorpha* were discovered in the St. Clair River, which was around the time I found the first tubenose and round gobies in the same area. This suggests a strong linkage with the foreign freighters which were probably responsible for dumping them into the river with their ballast water discharge. Unfortunately this scourge continues. A recent paper notes zebra mussels were present earlier in Lake Erie (1986 – Carlton 2008), but went unreported. Zebra mussels spread rapidly throughout the Great Lakes, but were excluded from Lake Superior because of its low calcium concentrations (they are abundant in Duluth Superior Harbor). This non-indigenous species is unique among

our mollusk fauna because their eggs hatch into planktonic veligers, which can and continue to be transported long distances in boats, Great Lakes freighters, and by humans. Zebra mussels were restricted to near shore areas of the Great Lakes because of their requirement for hard substrate (they can also stick to macrophytes). Early on, I thought they would not do well on the southeastern shoreline of Lake Michigan, because of the expansive sandy sediments there, but they found a way to flourish. They stick to all types of hard material, including any wood, fingernail clams, or debris in the water, and they form fist-sized groups of mussels called druses that bind to each other using their extremely adhesive bysal

threads. Immediately we began to hear about the water clearing up wherever mussels were abundant and I had people tell me they “stocked” mussels in inland lakes to clear up the water. Obviously these people are NOT getting the message of how these mussels fundamentally transform aquatic ecosystems by filtering the algae and detritus from 1 L of water for each mussel per day.

*Con't on page 5*



## What is the Future of Trout Lakes? by Howard Wandell

In 2010 researchers Peter Jacobson, Heinz Stefan and Donald Pereira published a paper in the Canadian Journal of Fisheries and Aquatic Sciences (Vol. 67: 2002-2013) modeling the future for trout lakes under various productivity and climate conditions. The paper is titled *Coldwater fish oxythermal habitat in Minnesota lakes: influence of total phosphorus, July air temperature, and relative depth*.

The researchers developed an empirical model to describe the influence of lake productivity, climate and morphometry on the temperature and dissolved oxygen levels of lakes populated by four cold water fish species. The four fish species involved were lake trout, lake whitefish, burbot, and cisco. Lake trout are the most sensitive to temperature/dissolved oxygen levels and cisco are the least sensitive,

with lake whitefish and burbot having intermediate sensitivity.

It is well known that a lake's oxygen/temperature profiles can be significantly affected by lake depth, total phosphorus, and air temperature. A lake's depth delimits the reservoir of dissolved oxygen in the hypolimnion at the end of spring overturn and available through the summer months. Total phosphorus drives productivity, with increasing organic matter in the hypolimnion to be decomposed by bacteria with the reduction of dissolved oxygen. Higher air temperatures prolong the severity and duration of stratification and the potential for oxygen depletion.

The researcher's model projects that the scenarios of: 1) climate warming of +4 degrees Centigrade, which some climatologist predict by the end of this century, and 2) doubling of

total phosphorus, would both have significant impacts upon cold water lakes in Minnesota. However, when the two scenarios are combined the impacts upon temperature/dissolved oxygen levels is devastating. Of the four fish species evaluated, cisco would hold on in some lakes, but lake whitefish and burbot would be greatly reduced and lake trout would virtually disappear from Minnesota waters.

Since climate warming may not be manageable, the researches emphasize the importance of controlling phosphorus loading to lakes and the resulting eutrophication. They conclude, “Protecting deep, unproductive lakes from eutrophication will be a necessary management strategy to ensure that coldwater fish persist in at least some Minnesota lakes after climate warming.”

## Michigan State University Dept of Fisheries & Wildlife 6th Annual Graduate Student Organization Research Symposium—Summary of presentations about inland lake research By Dr. Kendra Spence Cheruvelil

On February 25, 2011, the graduate students in the Department of Fisheries and Wildlife at Michigan State University had their 6<sup>th</sup> Annual Graduate Student Organization Research Symposium. This year, 20 master and doctoral students gave oral presentations and four gave poster presentations throughout the day. As always, students shared their research about a diverse set of ecosystems and organisms, including humans. For a complete list of presentations, and abstracts about each, please go to: <http://fw.msu.edu/gsosymp/2011presentations.pdf>. This year, the plenary speaker who closed the session was Dr Margaret Wild, Chief Wildlife Veterinarian and Wildlife Health Program Leader for the National Park Service, who spoke about the role of wildlife in *One Health*. Following her talk, there was a social and the presentation of awards.

For this research review, I will summarize the two inland lake oral presentations at the Symposium. First, Jeff White, advised by Dr Ace Sarnelle, talked about his research examining what influences whether zebra mus-

sels will consume toxic, bloom-forming *Microcystis* algae. He conducted lab experiments to determine whether *Microcystis* genetic variation (using five genetically unique but coexisting *Microcystis* strains that differ in toxicity) or colony size variation influenced zebra mussel consumption. His results showed that within one *Microcystis* strain, colonies smaller than 80 micrometers were consumed by zebra mussels, whereas those larger than 80 micrometers were not. He also found that coexisting strains of *Microcystis*, in the absence of colony size variation, differ in their vulnerability to zebra mussel grazing, which wasn't related to toxicity. Jeff's results may explain why in some freshwater systems with zebra mussels *Microcystis* blooms have appeared, whereas in others *Microcystis* has decreased following zebra mussel invasion. Jeff won best retrospective student oral presentation – congrats!

Second, Jan-Michael Hessenauer, advised by Dr Mary Bremigan, talked about his research examining the effects of spring catch-and-immediate release fishing on black bass nest success in Warner Lake (Barry County, MI). In southern Michigan, black bass

nest during May and June, during the catch-and-immediate release fishing season. During this time period, nest-guarding males are vulnerable to negative effects of angling, and those negative effects might impact young-of-year bass survival to the next season (recruitment). Jan monitored bass nests and used genetic techniques during spring 2009 and 2010 and conducted an angling experiment during spring 2010 to track nests through time and determine the contribution of individual nests to young-of-year recruitment as a function of nest and habitat features, nest-specific angling levels, and characteristics of the guarding male. Jan found that although nest numbers were consistent between years, unfished nests produced four times more young-of-year surviving to late summer than nests that received experimental angling. Therefore, the spring the catch-and-immediate release fishing season may negatively affect bass abundance and recruitment.

Registration for this annual all-day event is free and it is held on the MSU campus – please feel free to join us next year, and check <http://fw.msu.edu/gsosymp/> for updates.

### Quagga (con't from page 4)

Algae (actually the chlorophyll molecule) is the miracle that transforms sunlight and carbon dioxide to carbohydrates. In the Great Lakes food web, two, what I like to call aquatic cows that eat that grass, are zooplankton and the benthic amphipod *Diporeia*. Even though zebra mussels were confined to the nearshore zone in harbors and out to 20 m where it was sandy or rocky, *Diporeia* and zooplankton began to show signs of decline. The closely related quagga mussel *D. bugensis rostriformis*, which has two phenotypes, an epilimnetic form and a hypolimnetic form, was found in Lake Michigan around 2001, and they quickly dominated the zebra mussel population and then expanded the range of the dreissenids across the entire lake. We now commonly can catch up to 300 pounds of quagga mussels in a 10-min trawl with a 16-ft wide otter trawl out to 300 ft of water. Now there are some 900 trillion quagga mussels in the lake and it is estimated that all the water in Lake Michigan, can under certain conditions, be filtered by mussels in 9 to 12 days.

Quagga mussels have thinner shells, put more energy into reproduction, can subsist on soft substrate, have a longer siphon, can spawn at lower temperatures, and have a higher assimilation efficiency than zebra mussels. In general dreissenids perform six new functions in the Great Lakes: 1.) Shift energy from the pelagic to the benthic zone promoting high water clarity, which promotes aquatic plants, benthic algae (e.g., *Cladophora*), and drives fish such as walleye and alewives deeper, 2.) Act as facilitators for additional exotic species, like the round goby, 3.) Promote uptake of contaminants in fish and waterfowl, 4.) Provide new substrates that act like extensive reefs, where benthos, periphyton, and fish can spawn and reside, 5.) Attach to substrates, thereby clogging intakes and killing native mussels, and 6.) Excrete large volumes of nutrients and pseudofeces, which can fuel *Cladophora* blooms (Ozersky et al. 2009) and supply food for benthos. Ozersky found in a portion of Lake Ontario shoreline, that mussels provided more recycled, bioavailable P to the near shore, than local watercourses and WWTPs. *Con't on page 6*

**Quagga (con't from page 5)**

As a result of their filtering activities, which are maximal during isothermal conditions (Kerfoot et al. 2010), Lake Huron has seen dramatic changes to its ecosystem, such that its water quality and biological template more resemble Lake Superior than it does its former, more enriched state. There has been an increase in silica resulting from the removal of diatoms from the spring bloom, since there are so few diatoms, that require silica to make their shells, that not all the phosphorus or silica are used as they used to be in the spring. The spring bloom is non-existent and secchi disc readings in Lake Michigan are deeper than what is found in Lake Superior; some up to 33 m have been measured in the lake. Chlorophyll a in lakes Michigan and Huron are equal to or lower than those found in Lake Superior. As a result of the removal of algae we are observing a trophic cascade in Lake Huron; *Diporeia*, critical food for many species of fish, have declined from around 8,000/m<sup>2</sup> down to ca. 10/m<sup>2</sup>. Zooplankton, critical food for larval fishes and planktivores, has declined precipitously and *Daphnia* have disappeared from the lake. As a result prey fish populations have declined to very low levels, alewives have disappeared from Lake Huron, and the USGS reported the lowest biomass of prey fish in Lake Michigan since 1973. With no alewives, the salmon fishery in Lake Huron is a thing of the past. Another result of the loss of alewives, which are planktivores and eat the larval form of native fishes, has been the spectacular increase in walleyes in Saginaw Bay, emerald shiners have resurged in Lake Huron, and native lake herring and lake trout survival has improved in the lake.

Reduction in zooplankton densities, especially the smaller forms (e.g., rotifers) has implications for survival of larval fish of important species such as yellow perch. In addition, as some of the Great Lakes become more oligotrophic, we have seen a shift from *Daphnia* and some copepods to more *Limnocalanus*, which is a large species that resides in the hypolimnion. This may actually favor our native fish species, such as bloater and lake whitefish, which are much longer when newly hatched and can eat *Limnocalanus*, while species such as the exotic alewife have too small gape widths to eat them, when small.

There are other unanticipated consequences of the invasive quagga mussels as well. This process of transferring energy from the pelagic zone to the benthic zone has led to many changes in the way food webs now function in the Great Lakes. Mussels have created optimal environments for *Cladophora* growth on rocky substrates by improving light penetration to the bottom. The *Cladophora* (and other algae: *Lyngba* in Lake Erie) is broken off the rocks during storms and accumulates in huge thick bands along the shoreline (some of you may have experienced this in Lake Erie, Sleeping Bear Dunes, etc.). Anoxia develops in these mats, leading to optimal conditions for the development of Type E botulism, which is then filtered by mussels, eaten by round gobies, and then stricken round gobies are eaten by many bird and piscine predators, leading to the death of many of our iconic species, such as the loon and lake sturgeon.

Dreissenids also have been implicated in more blue-green algal blooms in infected lakes. They eat favored algae, such as diatoms, leaving the undesirable algae to flourish. *Microcystis* is an alga favored by this new process in lakes. It produces a toxin called microcystin and has caused taste and odor problems in water treatment plants.

Dreissenids are also part of a new, non-indigenous food web that in contaminated areas of the Great Lakes results in bioaccumulation of toxic substances, especially PCBs. Mussels because of their large filtering capacity accumulate large concentrations of toxic materials, which are passed onto round gobies that feed almost exclusively on mussels, when they reach about 50 mm. Top predators, such as smallmouth bass and walleyes, then consume round gobies and become contaminated with these substances. Because dreissenids filter so much water of detritus and algae, they foster uptake of more contaminants than would occur in food webs composed of native species.

The dreissenids are just another in a long list of invasive species that have entered and flourished in the Great Lakes. They represent a kind of ecoterrorism, since they are imported from another country, disrupt our ecosystems, often killing native species, and cause billions of dollars worth of damage to the economy, by destroying or degrading the services (especially fishes) provided by our aquatic food webs, by costing industry large sums to thwart their effects, and despoiling our beaches esthetically and tainting public health. More needs to be done with ballast water protocols to prevent the next assault, perhaps the discovery of cholera, from happening in the Great Lakes. *Con't on page 8*

## Calendar of Events

### July 13-15

Michigan Association of County Drain Commissioners annual summer conference at Crystal Mountain, Thompsonville, MI

### July 23

Michigan Trout Unlimited summer meeting, Ralph A MacMullan Center, Roscommon, MI

### July 24-27

Aquatic Plant Management Society 51st annual meeting, Baltimore, MD

### Sept 23

Michigan Chapter North American Lake Management Society annual conference at Kettunen Center, Tustin, MI. Information soon to be posted on the website [www.mcnalms.org](http://www.mcnalms.org).



### Oct. 26-28, 2011

#### 31st International Symposium Of The North American Lake Management Society

Spokane is pleased to be hosting NALMS in 2011! With 76 lakes in a 50-mile radius, Spokane boasts a wealth of opportunities for North American Lake Management Society participants to discuss lake management issues as well as have some fun! When you're making plans to attend the convention, set aside some extra time to play.

There are so many fun things to do in and around Spokane. Swim. Hike. Climb. Grab a bike and set out on one of our wonderful trails. You'll see why we say we're Near nature. Near perfect.

Whether you're 5 or 95, we've got great activities for kids of all ages!

### MCNALMS to Host Fall Conference by Dave Foley

This fall MCNALMS will present its third annual conference on September 22 and 23. Under the title of "New Trends in Lake Research and Aquatic Plant Management," the conference will begin Thursday. An optional pre-conference workshop is scheduled beginning at 12:30 at the Kettunen Center on Center Lake near the village of Tustin. Afterwards the group will head south fifteen miles for a tour of Lake Cadillac which is the site for the Natural Shoreline Bioengineering Project. After the tour, all will return to the Kettunen Center where pizza will be served at a reception and social hour.

The main conference begins at 9:30 Friday with morning sessions followed by lunch and two concurrent sessions in the afternoon wrapping up at 4:00. Details concerning topics and presenters will be in the MCNALMS summer newsletter. Those interested in showing exhibits should contact Mike Solomon [draincom@wexfodcounty.org](mailto:draincom@wexfodcounty.org).

Information about conference specifics and registration will be available at [www.mcnalms.org](http://www.mcnalms.org)

**Quagga (con't from page 6)****Additional Reading**

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- Ozersky, T., S. Malkin, D. Barton, and R. Hecky. 2009. Dreissenid phosphorus excretion can sustain *C. glomerata* growth along a portion of Lake Ontario shoreline. *J. Great Lakes Res.* 35:321-328.

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