

# From Shore to Shore

A publication of the University of Minnesota Extension  
Water Resources Team

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[www.shorelandmanagement.org](http://www.shorelandmanagement.org)

## Shared Waters/Shared Responsibility

A forum titled Shared Waters/Shared Responsibility: Working Across Borders to Protect and Restore Lake Winnipeg and the Red River Basin was recently held in Minneapolis. Hosted by the Consulate General of Canada, University of Minnesota, Freshwater Society, Environment Canada, and the Province of Manitoba, the mid-December forum was designed to address water quality, quantity and timing issues in the basin. The event was planned with scientists, researchers, teachers, students, policy makers, and officials in mind but was also open to the public.

Regarding degraded water quality, media attention has focused on how land uses within the Mississippi River watershed create hypoxia (also known as Dead Zones) in the Gulf of Mexico. Comparatively little attention, however, has been given to the impacts that land uses within the Red River of the North Basin have on Lake Winnipeg.

## Asking You, Our Readers ...

What is a newsletter without its readers? When we are creating the From Shore to Shore newsletter, we think of you every step of the way: what topics to cover, what format to use, how often to send them out, how to best reach you, etc. We love to get feedback from you so we can improve the newsletter. We have not surveyed our readers in about five years and think it's about time ... so we have created a short survey to get your opinions and comments. To take the survey online, please visit [https://www.surveymonkey.com/s/Shore\\_to\\_Shore](https://www.surveymonkey.com/s/Shore_to_Shore) and tell us

Lake Winnipeg's 380,000 square mile watershed (for comparison, Minnesota is about 87,000 square miles) includes parts of four Canadian provinces and four states, creating a complex combination of regulations, land uses, funding sources and priorities from two countries, eight provinces/states and a multitude of local units of government. Large-scale issues such as the water resources of Red River of the North and Lake Winnipeg are not often addressed in a holistic way because of the multiple participants and factors involved. But, thanks to the organizers and participants at this forum, these issues will continue to be tackled in ways that will lead to positive changes throughout the watershed by acknowledging that our shared waters do indeed bind us with shared responsibilities. More information about the forum can be found here: (<http://events.r20.constantcontact.com/register/event?oeidk=a07e6m1kxyve536c878&llr=6k8h8veab>). ■

what you think. If you are still one of the subscribers who receive the newsletter through the mail, you have the option of completing either the hard copy of the survey included with this newsletter or the online survey.

We hope you will take the time to tell us how we can make the newsletter better for you, our readers. ■

## Calendar of Events

For the most current calendar items and more details, visit [www.extension.umn.edu/environment/water/calendar/](http://www.extension.umn.edu/environment/water/calendar/).

### NEMO Workshops

January 30 -- Red Wing

February 6 -- Lindstrom

February 7 -- Chisago City

February 11 -- Center City

Contact: John Bilotta, [bilot002@umn.edu](mailto:bilot002@umn.edu), 612-986-1630

### Stormwater U -- Lessons Learned: Repeating Successes in Stormwater BMPs

Date: February 14, 2013

Location: Eagan, MN

Contact: Shane Missaghi, [miss0035@umn.edu](mailto:miss0035@umn.edu), 952-221-1333

## Inside...

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③ Minnesota Agriculture Moves to Address Water Quality Issues

## Educators Learn From Experts at the “Science Institute” Series

Marte Kitson, Minnesota Sea Grant, 218-726-8305, mkitson@d.umn.edu

“Fascinating!” was one teacher’s response at the conclusion of Chris Kleist’s talk about stormwater management and flood effects. “Who knew Duluth has 16 trout streams and 431 miles of stormwater pipe?” Kleist is a project coordinator for the city of Duluth.

Learning about the community, in part, is what the *Science Institute for Educators* program is about. The Duluth-based program was founded by the Great Lakes Aquarium, Minnesota Department of Natural Resources (MNDNR) MinnAqua Program and Fulbright Canada in 2011. The *Science Institute* provides an outlet for scientists, managers, and other experts in the Duluth area to share their work. It also enhances participants’ understanding of regional and local environmental topics, and strengthens their abilities to meet learning criteria with a local focus. These well-attended two-hour monthly workshops address a topic relevant to Lake Superior or its watershed. Participants are introduced to terms, activities, and a Minnesota State Academic Standards-based lesson plan. Then, the floor is turned over to the presenting expert.

The *Science Institute*, which is held at the Great Lakes Aquarium in Duluth, runs concurrently with the school year. For 2012-2013 Minnesota’s Lake Superior Coastal Program funded *Increasing Great Lakes Literacy among Educators*, a project lead by Minnesota Sea Grant, which builds upon existing lessons and activities, and extends the *Science Institute for Educators* further up the Lake Superior shore through workshops offered at the Wolf Ridge Environmental Learning Center (ELC). Project partners include Minnesota Sea Grant, the Great Lakes Aquarium, MNDNR MinnAqua Program, and



Marte Kitson, University of Minnesota Sea Grant Program

*Participants in the Science Institute at Wolf Ridge learn about the effects of water flow on sediment deposition.*

Wolf Ridge ELC. They have been planning the *Science Institute for Educators* for the 2012-2013 school year since November 2011. The funding also supports the production of kits, which include the lesson plan and supplemental materials for the activities. The kits are available for checkout from the Great Lakes Aquarium.

“This is a great opportunity for our more remote educators to participate in a workshop series that may otherwise be inaccessible to them,” said Pete Gravett, education director at Wolf Ridge. “Our resident naturalists as well as teachers from Silver Bay and Birch Grove are taking advantage of the program.”

The area experts are also jazzed about the opportunity to talk to teachers. “It is always energizing to present information on what I work with pro-

fessionally to interested groups,” said John Lindgren, fisheries manager with the MNDNR. “I think it is great that you are offering opportunities for educators to learn and incorporate science-based lesson plans into their teaching. The activities are very creative and support the topic well.”

Since its inception in 2011, a core group of 20 educators have participated in over a dozen workshops that focus on Lake Superior and its surrounding watershed.

“I will use all this stuff next month in my classes,” a teacher said after Kleist’s presentation. Is there a better testimonial?

For more information about the *Science Institute for Educators* program, see: [www.seagrants.umn.edu/news/2012/10/05](http://www.seagrants.umn.edu/news/2012/10/05). ■

# Minnesota Agriculture Moves to Address Water Quality Issues

Brad Carlson, Extension Educator, 507-389-6745, bcarlson@umn.edu

For the majority of the state (other than the Arrowhead Region), agriculture is the predominant land use. Because of this, Minnesota farmers are getting used to the fact that their management practices are under the microscope with respect to how they affect the environment. A recent survey conducted by University of Minnesota Extension shows that two thirds of farmers acknowledge water quality issues related to agriculture.

If you look at Chapter 7050 of Minnesota's Pollution Control rules you will find a long list of potential contaminants of surface water. The specific impairments that relate to agriculture include phosphorus, sediment, turbidity (which frequently goes hand in hand with sediment), and a number of pesticides.

It is common to hear people use a blanket statement that water quality is affected by "runoff of fertilizers and pesticides." In fact, documented water quality impairments related to pesticides are rare and localized. Most of the pesticides listed in 7050 are products that have been banned since the early 1970s. Most recently there have been two pesticides in wide use (acetochlor and chlorpyrifos) that have caused stream impairment (and this is isolated to three small watersheds).

A much larger concern is phosphorus (P), which is an essential nutrient for plant and animal growth. As such, it is a necessary fertilizer addition for most field crops. The problem is that when phosphorus gets into surface water it leads to unwanted algae and plant growth (eutrophication). Phosphorus has a complex chemistry, and the chemical form present in soil changes based on pH. Because of this, P adsorbs tightly to soil particles and does not leach. Phosphorus issues typically arise due to the overland flow of water (surface runoff), which either dissolves phosphorus into solution (dissolved P)



*Internal cycling of phosphorus can cause water quality problems for decades after most problems within the watershed have been addressed.*

or washes soil containing phosphorus compounds and organic matter directly into the surface water (particulate P).

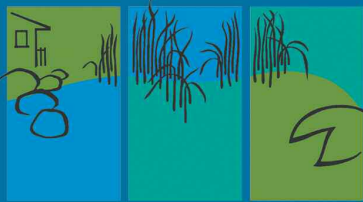
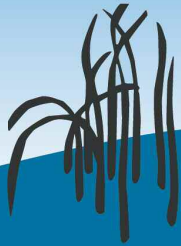
A wide array of conservation options is available for farmers to use to prevent P from entering surface waters. Some of these options include manure and nutrient management plans, buffer strips, eliminating open tile intakes, and anything that controls soil erosion or sediment delivery to surface waters. Phosphorus impairment in lakes, however, is a particularly problematic issue because once high levels of P are trapped in lake sediment, water quality can continue to be poor despite completely eliminating additional inputs. This process is called internal cycling and is often exacerbated by the presence and actions of rough fish, particularly carp, which stir up sediment making P available for algae. It is important to determine the role of internal cycling when addressing individual lakes, as close examination of the watershed may show that farmers have already have done most things neces-

sary to eliminate P delivery. In this case, expending resources on additional practices on the landscape may produce little or no improvement in lake water quality.

One nutrient that you will not currently find on the 7050 list of impairments is nitrate. The issue of nitrate in surface waters has come to prominence because of its relationship to hypoxia in the Gulf of Mexico. Nitrate has long been considered to be a potential contaminant to drinking water because of health risks to mammals (particularly human infants). As it is not a primary cause of freshwater eutrophication, it has not traditionally been considered a surface water contaminant in Minnesota. Nitrate is present in the soil due to microbial action, and originates from a number of sources including soil organic matter and nitrogen-containing fertilizers. Nitrogen (N) is prevalent in the environment and nitrogen gas (N<sub>2</sub>) is the primary component of our atmosphere. →④

## Contact

Karen Terry  
University of Minnesota Extension  
*From Shore to Shore* Editor  
320-589-1711  
kterry@umn.edu



## From Shore to Shore

[www.shorelandmanagement.org](http://www.shorelandmanagement.org)

*A publication of the Water Resources Team, dedicated to educating Minnesota citizens about shoreland management to improve water quality, habitat, and aesthetics of our lakes and rivers.*

*From Shore to Shore* is available in hard copy and electronic formats. Archived issues are available online at [www.shorelandmanagement.org](http://www.shorelandmanagement.org)

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## ← Minnesota Agriculture Moves to Address Water Quality



*Constructing pads for structures to prevent manure from running off site.*

The exact form of N present at any time is determined by the nitrogen cycle (see University of Minnesota Extension publication WW-03770, *Understanding Nitrogen in Soils*, 1994; [www.extension.umn.edu/distribution/cropsystems/dc3770.html](http://www.extension.umn.edu/distribution/cropsystems/dc3770.html)). Because nitrate in water has only recently received attention, practices and techniques to mitigate its presence in surface waters are still emerging and are in varying states of research and/or acceptance. Minnesota is currently in the process of developing a standard for nitrates in surface water, as well as a management strategy to address the problem.

Farmers have traditionally been a receptive audience with respect to adopting better conservation practices. History shows that there have been many major successes, particularly with respect to controlling soil erosion. A challenge in working with agriculture to address nonpoint-source pollution as a whole is that each county has hundreds of farms, and individual landowners with agricultural land number in the thousands. Each farm can be thought of as a small business, with unique economics, history and culture and thus, solutions to problems typically need to be customized for an individual operation.

The portfolio of conservation practices to address environmental issues is quite large. Most of these practices are well researched as to their effectiveness and cost. What is currently lacking is a broader plan with respect to what is necessary to achieve various local and state water quality goals. Small plot research as traditionally conducted by agricultural researchers and Extension provides some of this informa-

tion, but it is often difficult to extrapolate over the broader landscape due to varying topography, hydrology, conservation history, and impact potential to surface waters.

Farmers have a wide array of conservation practices at their disposal. Many of the easiest and most economical "fixes" have already been addressed. Therefore, future projects are likely to be more complex and expensive.

Recently, farm groups in Minnesota have combined to form the Minnesota Agricultural Water Resources Center ([mawrc.com](http://mawrc.com)). This group is funding a number of "Discovery Farms" around the state. The objective of these is to closely monitor the environmental impacts of agriculture. The farms are chosen based on the ability to measure and analyze runoff and drainage water, to study the impacts of the standard practices used by the operators. Obtaining this information will enable individual farmers and landowners to develop strategies to reduce their impact on the environment.

In the future you will hear more about farmer-led councils that will be working on local water quality issues. These groups will be examining what is learned from the Discovery Farms, establishing goals and working to fit appropriate conservation practices into the landscape to achieve these goals. Addressing environmental issues is ever-changing and evolving; the formation of the farmer-led councils promises to engage farmers in the quest for acceptable solutions to fill gaps in strategies for maintaining safe water supplies. ■