

From Shore to Shore

For Minnesota citizens promoting the health of our rivers & lakes

January - February 2008

#83

Calendar of Events

For the most current listing of Shoreland Education workshops, visit www.extension.umn.edu/shoreland.

→ Minnesota Green Expo

January 9-11 – Minneapolis Convention Center, Minneapolis, MN

www.minnesotagreenexpo.com

→ Remote Sensing Workshop

February 14, 10 a.m. - 3:00 p.m. - Little Falls

Learn to use remote sensing data to assess trends in water clarity, aquatic vegetation, and impervious cover.

Contact: : Barb Liukkonen, 612-625-9256, liukk001@umn.edu

www.seagrant.umn.edu/news/2008/01/04

→ Hazardous Algal Blooms Workshops

10 a.m. – 3 p.m., \$15

March 4 - Sauk Centre

March 5 - Mankato

March 6 - St. Paul

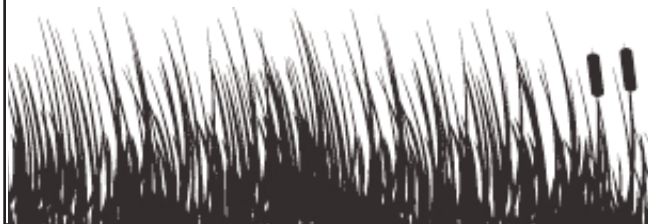
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www.seagrant.umn.edu/news/2008/01/03

→ Lake Home and Cabin Show

April 11-13 – Minneapolis Convention Center, Minneapolis, MN

www.lakehomeandcabinshow.com/



Citizens Monitoring Bacteria

Barb Liukkonen, Water Resources Center,
612-625-9256, liukk001@umn.edu

During the summer of 2007, 27 newly trained volunteers and five returning volunteers monitored 13 sites on seven lakes and 11 sites on six different streams for *E. coli* bacteria. They collected over 150 samples, contributing nearly 400 hours of time. When that time is valued at the national rate of \$18.77/hour, their contributions add up to over \$7,500!

2007 was the final year of a regional research project conducted by six Great Lakes states and funded through Cooperative State Research, Education, and Extension Service. The goal of the research was to assess how accurate home test kits are when used by volunteers. To evaluate accuracy, trained volunteers collected and split samples, sending half to a certified lab for analysis and testing the other half at home with the test kits. Minnesota volunteers used 3M Petrifilm™, and Coliscan® Easygel® in 2005-06. For more information on the test kits, protocols, and results, access: www.usawaterquality.org/volunteer/ecoli.

For the research study, nearly 100 volunteers across the six states collected 1,600 samples with paired lab and test kit analyses. We found that the test kit results compared fairly well with certified lab analysis, the kits are good tools for screening and for justifying additional monitoring, there was as much or sometimes more variability among the certified labs used in the project than between the volunteer results and lab data, and Easygel® and Petrifilm™, were essentially equal in performance when data from all states were combined. Two out of three volunteers preferred Petrifilm™, over Easygel®.

Although the regional research project was intended to evaluate the accuracy of the test kits, in Minnesota we also wanted volunteers to collect useful data. In 2005-2007, we received additional funding from the Legislative & Citizen Commission on Minnesota's *cont. on page 4*

Would You Like Your Lakes Shaken or Stirred?

Cindy Hagley, Minnesota Sea Grant, 218-726-8713, chagley@umn.edu



Hey everyone: In the lefthand photo above, that is me (middle) and my co-workers during one of the best jobs I've ever had. And the other photo is Lake Chelan in Washington state, just before we landed on it in our helicopter to collect water quality data and samples.

I was part of the National Surface Water Survey. We sampled lakes to find out how acid rain affected them. We collected only one sample from each lake – just one! Quick question: What time of year do you think we sampled to be able to best represent the natural characteristics of each lake?

If you get this newsletter, then you probably already know something about temperature stratification in lakes. Lakes in our part of the world have predictable temperature cycles that impact everything else about the lake. In the spring, immediately after ice break-up, the whole lake is fairly uniform temperature from top to bottom – very cold – and the density is also the same from top to bottom. Under these conditions, it takes very little wind energy to mix the lake completely. This is called spring “turnover.”

As spring progresses, the sun warms the surface of the water and the wind mixes the warmed surface layer with the colder water underneath. As the surface waters warm, they become less dense. Soon, the upper water becomes too warm and buoyant for the wind to be able to mix the surface waters with the colder, denser waters below. At this point, the lake begins to “stratify,” or form distinct layers based on temperature and density differences. By mid-summer, stratification is well-established. Imagine trying to push a rubber ball filled with air to the bottom of a swimming pool and you'll understand what the wind encounters.

Deep lakes generally stratify into three identifiable layers. The upper, warm layer (epilimnion) is usually well-mixed and has the most biological activity. In the middle layer (metalimnion), the temperature declines rapidly with depth (the thermocline). The cold and often dark bottom



layer (hypolimnion) is isolated from the surface waters by the metalimnion, effectively sealing it off from the surface waters during mid-summer.

So why does this matter to the animals and plants that live in the lake? Think of a cold-water fish species, like trout. The isolated bottom water is cold, dark, and often does not contain much oxygen by the end of the summer, making it unsuitable trout habitat. The surface water can reach high temperatures by mid-summer, so even though it can contain lots of oxygen, it is too warm for trout. Consequently, they are limited to the metalimnion. When fall comes and lakes begin to lose heat, the process reverses itself. The surface water cools and becomes less buoyant, so it begins to settle and mix with the cooler water underneath, until the lake eventually mixes again from top to bottom. This is called fall turnover.

As fall turns to winter, another characteristic of water comes into play. Even though cold water is heavier than warm, once the water turns to ice it floats! As most substances go from a liquid to a solid, the molecules become more tightly packed, making the solid denser than the liquid form. Water is unusual. When it turns to ice, the crystals lock together neatly in a rigid structure that is LESS dense than liquid water. If this were not true, ice would sink and lakes would freeze from the bottom up!

So what time of year did we sample lakes for the National Surface Water Survey? Since we were only collecting one water sample, we wanted to collect it when the lake was as uniform as possible. If you answered spring or fall turnover, you are on the right track, but there is a catch. Many lakes don't turn over fully in the spring. If the weather is warm and the winds are light, lakes can begin to stratify almost immediately when the ice leaves. It turns out that fall is a better choice, so we sampled during fall turnover, when the lakes were well-“stirred,” not shaken.

For more information about lake stratification, go to Water on the Web: www.waterontheweb.org. ■

2007 Lake-Friendly Development Awards

Philip Hunsicker, 1000 Friends of Minnesota, 218-824-5095, phunsicker@1000fom.org



Recipients of the 2007 Lake-Friendly Development Awards.

Over 50 people attended the 5th annual Brainerd Lakes Area Lake-Friendly Development Award Ceremony, held on October 18.

Two projects, both in Crow Wing County, were awarded **Lakescaping Awards** for creating natural shoreland landscapes. Dick and Jan Boumeester on Shirt Lake restored approximately 50 feet of lakeshore with native plants. Pete and Nancy Jones on Clamshell Lake replaced approximately 500 feet of an iron retaining wall with a buffer designed and installed by Terrain Solutions and Lakeside Lawn and Landscape.

The **Lake-Friendly Construction Award** went to Scott Pederson for Nordenstua on Sibley, in Crow Wing County. This 14-acre development incorporates conservation design principles. It enabled preservation of old growth Norway pines, retained 80 percent of the property as open space, and left over 300 feet of shoreline along Sibley Lake undisturbed. Dwellings on the site will be cottages with a distinctly Scandinavian design, featuring green rooftops and garages almost hidden from view.

The new **Lake Stewardship Award** went to Judith and Michael Herman, owners of 2,600 feet of shoreline on Mitchell Lake in Crow Wing County, who left a well-wooded buffer intact. Access to a small boat dock is by a narrow path through trees. Set back, the house is hardly visible from the lake.

Two projects received **Lake-Friendly Protection Awards**, which recognize an organization or a local unit of government that has created an ordinance, regulatory code, or other initiative to preserve lake or river systems. The Leech Lake Area Watershed Foundation in Cass County was honored for their promotion of sustainable committees in partnership with Ponto, Leech, and Woman lake associations, and for assisting in the formation of sustainable committees on Web, Thunder, Wabedo, and Mule lakes.

The second winner in this category was the Morrison County Public Works Department for the realignment of County State Aid Highway 3 around Bernhart Lake. The road was re-routed north of the lake and the old roadbed that bisected the lake was removed.

The Lake-Friendly Development Awards proved once again that not all development is bad. When development respects the environmental integrity of the building site, we are all enriched with aesthetically pleasing designs, healthier lakes and rivers, and the satisfaction that we are building sustainable communities one project at a time. The awards are co-sponsored by 1000 Friends of Minnesota, Brainerd Lakes Area Audubon Society, Minnesota Waters, Crow Wing County Lakes and Rivers Alliance, Minnesota Department of Natural Resources, Minnesota Chapter of the American Fisheries Society, The Nature Conservancy, and A.W. Research Laboratories. ■

Citizens Monitoring Bacteria *cont. from page 1*

Barb Liukkonen, Water Resources Center, 612-625-9256, liukk001@umn.edu

Resources. Many committed volunteers collected samples weekly, so we could determine whether the lakes and streams met state bacteria standards. The standard requires five samples collected within a 30-day period.

Only eight of the samples exceeded the one-time state standard for *E. coli* of 1,260 colony forming units (cfu), including samples collected from the Root River following the August floods. Volunteers collected five samples within 30 days for six lakes and five streams (at multiple sites). Two sites on the Root River and one site on Bear Creek and the Moose Horn River exceeded the *E. coli* 30-day standard of 126 cfu. Grindstone Lake exceeded the 30-day standard for all of August, but not during May and June. Most volunteers were pleased to find that the sites they monitored had very low bacteria counts and do not present a human health risk for recreational use.

Two volunteers investigated whether bacteria were surviving or thriving in bottom sediments by collecting a sample following protocols and then stirring up bottom sediments and collecting a second sample. Values from six paired samples showed virtually no difference between the regular sample and one following sediment disruption.

At Lake Hallett in St. Peter, the lake association was concerned about a pipe inlet that was leaking. It was supposed to run only during high-water overflow from an upstream detention pond near the city wastewater treatment plant. The plant had a spill in March 2006, and the water trickling out of the pipe was very high in *E. coli* bacteria (2,420; 387; 2,420; 517 cfu). A concerned citizen spoke with city officials and the health department about the elevated bacteria levels and potential health risks for youths who swim at the beach near the outfall. The city repaired the leaking storm sewer pipe on September 6, and as of September 13, it is no longer running into Lake Hallett. This is a great example of citizens collecting data and working with their local unit of government to make the changes needed to protect surface water resources and public health.

In end-of-the-year surveys, volunteers reported that they shared their monitoring results with neighbors, friends,

and visitors; lake association leaders; elected officials; and local natural resource managers. Data will be entered into the STORET national water quality database for use in assessing impaired waters. ■

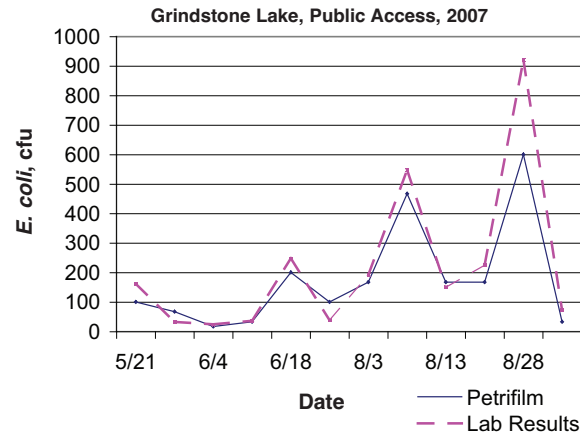


Figure 1. This graph shows spikes in *E. coli* levels following rainfall events. Note how well the test kit results (Petrifilm™) match the certified lab analysis.

How "Environmentally Friendly" Are You?

Answer the following yes/no questions to find out. These are choices each of us can make that will lead to a positive impact on our environment. The more "yes" responses you have for 2008, the more 'environmentally friendly' you are!

	Pre-2008	In 2008
Do you recycle your household waste?		
Do you use compact fluorescent bulbs throughout your home?		
Do you plant native vegetation in your yard?		
Do you save rain water for future use?		
Do you compost your yard waste?		
Do you support local farmers by purchasing locally produced goods?		
Do you own a hybrid vehicle?		
Do you use organic fertilizer or no fertilizer at all?		

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www.shorelandmanagement.org



From Shore to Shore is made possible by Minnesota Sea Grant, in cooperation with the University of Minnesota Water Resources Center and University of Minnesota Extension.

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