The Water Line

Newsletter for the Lakes of Missouri Volunteer Program

Volume 4 Number 2 Spring 2000 1

TEST YOUR KNOWLEDGE! TAKE THE WATER QUIZ!

1) What percent of the earth's total water supply is available fresh water?
<1/2% 1-2% 2-5% 5-10% >10%

2) In what year was the first Earth Day held? 1960 1961 1965 1970

3) Which infamous Ohio river actually caught on fire in the 1960's?
Cleveland Erie Cuyahoga Sandusky

4) In what year was the Clean Water Act passed?
1965 1969 1972 1975

5) The watershed of the Mississippi River is quite large. How many states contain part of the Mississippi's watershed?
13 18 22 30 35

6) Approximately how many miles of permanent stream/river are located in Missouri?
5,000 11,000 22,000 28,000

7) Approximately how many acres of lake water are there in Missouri?
220,000 290,000 360,000 501,000

8) What percent of the total lake area in Missouri is threatened with eutrophication?
15% 25% 33% 40%

9) What percent of the public drinking water in Missouri comes from the Missouri River?
15% 26% 35% 53%

10) Fecal Coliform is a type of? Algae Fungi Bacteria Protozoa

11) At what temperature (°F) is water most dense?
32°F 39°F 45°F 60°F 100°F

12) What is the name of the top layer of a stratified lake?
upperlimnion upperaqueon epilimnion metalimnion

13) Zebra Mussels probably came to North America from where?
Serengeti Plains Norway Asia Eastern Europe

Answers on page 7.

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The Lakes of Missouri Volunteer Program is also supported by the University of Missouri.

Inside this issue....

Revisited:Zebras in Missouri? by, Dan Obrecht

(*We ran this article in the Winter 2000 newsletter,but wanted to rerun it for information for this year's sampling season. We have met with most of the volunteers and discussed the threat of zebra mussels with you. Please keep an alert eye and talk to your friends and neighbors about this serious problem.}*

In the last edition of the *Water Line* we announced that zebra mussels (*Dreissena polymorpha*) had been found in Missouri waters. So far the invaders have been found in the Mississippi River as well as the Missouri and Meramec rivers near their confluences with the Mississippi. Since the mussels first invaded the Great Lakes region, Missouri's resource agencies have wondered when the zebra mussel would make it into the state. That question has been answered. Now we are faced with new questions. Can they spread? How far will they spread? Can we control their spread?

BACKGROUND ON THE ZEBRA MUSSEL

The zebra mussel originally calls Eastern Europe its home. At some point in the 1700's it invaded Western Europe and became a nuisance there. Recently the little mussel made its way across the Atlantic to America. Theory is that a ship containing zebra mussels in its ballast water introduced the species when the ballast water was released in the Great Lakes Region. The transported mussel found the environment to their liking and decided to stay. And stay they did, with a vengeance. That was in the mid-1980's, the zebra mussel has since spread across the region, into the Hudson, Illinois, and Mississippi river systems.

LIFE HISTORY

Zebra mussels are relatively small, about thumb nail size, with lunkers measuring about 2 inches. They tend to be more angular in shape than the "average" freshwater mussel. Alternating dark and light stripes on the mussel's shell account for the common name. The zebra mussel is very prolific, females can produce 30,000 to 40,000 eggs a year. Eggs develop into a larval stage known as veligers and the veligers spend up to four weeks swimming freely in the water before maturing and settling down. At this time the zebra mussel is extremely small, about the size of a grain of sand. Using thread-like appendages, the zebra mussel attaches to substrate. Hard surfaces such as rocks, wood, cement, metal and other mussel shells are the preferred habitat, but aquatic plants and mud can be colonized if a hard substrate is not available.

POTENTIAL PROBLEMS

Because the zebra mussel is an exotic species, it has no natural enemy in our streams and lakes. Combine this with its ability to reproduce in large numbers and we have an invading species that can reach extreme densities. Detroit Edison on Lake Erie has reported zebra mussel densities of up to 700,000 per square meter (they often attach to each other, forming a layer up to one foot thick). A build up of zebra mussels can cause problems for hydro-power dams, locks in the big rivers, and drinking water intake pipes.

Even more troubling is the impact that zebra mussels could have on Missouri's water resources. The zebra mussel is a filter-feeder. It siphons water in, filters out the particles, and releases the water back into the environment. Plankton such as algae are removed from the water to feed the mussel. This isn't such a problem in itself as we have many filter-feeders occurring naturally in our rivers and lakes. But, zebra

CAUTION!!

This past February a boat coming from the Mississippi River was to be launched into the Lake of the Ozarks. Fortunately an alert employee of the Illinois DNR spotted zebra mussels on the boat's hull and the boat was drydocked until the mussels died. Everyone has to be alert not only to check for adult mussels, but also the "sandpaper" feel the larvae leave on a boat.

mussels have the potential to reach extreme densities which can have a dramatic affect on the food web of a lake or river. Each adult zebra mussel can filter about a quart of water per day, multiply this by a million mussels and you end up with a lot of water being filtered. A small lake with a large zebra mussel population could literally have its volume filtered in a day or two. This would have a major impact on the ecosystem as food for the higher levels of the food web would be greatly reduced.

HOW THEY GET AROUND

Because zebra mussels have two life stages that differ from each other it isn't easy to sum up how they travel from one waterbody to another. Obviously the adults can move along with anything they have attached to, such as aquatic plants and boat hulls. The mussels and their larval stage can also be transplanted in bait buckets, live wells and bilges. But there is more! The cooling system on your outboard could harbor these little mussels. Your dip net could have veligers on it. The tennis shoes you used for wading could be besieged. Hard to believe? Divers were checked after being in infested waters and as many as 200 veligers were found on each of the diving suits! How do zebra mussels move from one waterbody to another? It seems that any item that comes in contact with infested water can be a potential source of contamination.

HOW TO AVOID SPREADING THE ZEBRA MUSSEL

The following steps should be taken to make sure you do not help the zebra mussel move from one water to another.

- Scrape off any mussels attached to your boat, outboard and trailer. Do not release them back into the water. Be aware! Small zebra mussels are the size of a grain of sand. If the hull of your boat feels rough, when it should feel smooth, you might have zebra mussels attached. A high pressure wash should help clean off the tiny mussels.

- Drain and rinse all bilges, live wells, bait buckets and engine compartments.

- Flush clean water through the cooling system of your motor, boat parts and accessories.

- Disinfect all live wells, bilges, anchors, bait buckets, boat trailers and nets with a salt solution (½ cup salt per gallon of hot water) followed by a rinse. - If you've been in waters that are known to contain zebra mussels, let your boat and equipment air dry for four or five days before heading out to a different waterbody.

- Do not transfer any aquatic plants, animals, or bottom materials from one water to another.

The zebra mussel has made its way to Missouri. What happens next will depend on everyone who uses Missouri's waters. Can the mussel spread? There is nothing to suggest that they can't. How far will they spread? In theory, it would only take a few careless boaters to spread the mussel across the state. Can we control their spread? Yes, but it will take educating everyone who recreates on Missouri lakes and streams about how to avoid transporting the mussels from one water to another.

WHAT ELSE CAN YOU DO?

One key to slowing down the spread of the zebra mussel is monitoring. If resource agencies can keep track of where the mussels have invaded, they can target educational efforts in order to reduce the chance of someone spreading the mussels to un-infested waters.

We are asking LMVP volunteers to do their part. When you go out to sample or you are out on the lake, visually check for zebra mussels. In lakes with relatively clear water and hard substrate (rocks, cement boat ramps, etc.) this just means looking into the water at the hard substrate. If your lake is murky or lacks the hard substrate the mussel prefers, you can use a brick with a rope attached to it (so you can retrieve it). Set the brick in 2-5 feet of water and check periodically. If need be, the LMVP will supply you with the latest high-tech zebra mussel sampling brick.

While LMVP volunteers will be monitoring Missouri's lakes for zebra mussels, the Stream Teams will be monitoring Missouri's streams. We have included a data sheet for you to fill out and send to Stream Team headquarters so we can have a central data base for zebra mussel monitoring efforts. If you do find

what you think are zebra mussels keep them, do not release them back into the water. They can be preserved in a jar with rubbing alcohol until properly identified by resource agency personnel. We also ask that you call the Missouri Dept. of Conservation regional offices at one of the following numbers if you do find zebra mussels in your lake. If we all do our part to avoid transporting the mussel and monitoring for infestations we can greatly reduce the risk of our waters being taken over by this exotic species.

Administrative Office
P.O. Box 180 (zip 65102)
2901 W. Truman Blvd.
Jefferson City MO 65109
573/751-4115
Fax: 573/751-4467

Northwest
701 N.E. College Dr.
St. Joseph MO 64507
816/271-3100
Fax: 816/271-3107

Northeast
2500 S. Halliburton
Kirksville MO 63501
816/785-2420
Fax: 816/785-2553

Kansas City
1401 N.W. Park Road
Blue Springs MO 64015
816/228-3766
Fax: 816/228-9243

Central
1907 Hillcrest Drive
Columbia MO 65201
573/884-6861
Fax: 573/882-9807

Southeast
2302 County Park Drive
Cape Girardeau MO 63701
573/290-5730
Fax: 573/290-5736
Fax: 660/885-503

Most adults are 1/2 - 1 inch in length. Note the dark stripes. The byssal threads are used by the mussel to attach itself to substrate.

Zebra mussels may appear as a "build-up" on substrate, including native mussels.

East Central
Jct. I-44 & Hwy. 185 S.
P.O.Box 248
Sullivan MO 63080
573/468-3335

Southwest
2630 N. Mayfair
Springfield MO 65803
417/895-6880
Fax: 417/895-6910

St. Louis
2360 Highway D
St. Charles MO 63122
314/441-4554
Fax: 314/926-9125

Ozark
P.O. Box 138
618 Preacher Roe
West Plains MO 65775
417/256-7161
Fax: 417/256-0429

West Central
2010 S. 2nd Street
P.O.Box 368
Clinton MO 64735
660/885-6981

Freshwater Algae

by, Bruce Perkins

What are freshwater algae? They are, for the most part, microscopic green plants, though some form filaments or clumps which are visible without the aid of a microscope. While most are microscopic, during bloom conditions they can be seen simply because of the shear number of cells. Planktonic (free floating form) and periphytic (attached to a substrate) algae account for most of the nonbacterial primary productivity in most aquatic systems.

Algae are diverse in their form, color and habitat. The most common phyla (a taxonomic classification) are the Chlorophyta (green algae), Cyanophyta (blue-green algae), Chrysophyta (yellow-green / brown-green) and Bacillariophyta (golden-brown) which includes the diatoms. Algae are classified into these phyla based on their pigment composition, energy storage systems, cell wall composition and their general structure. All of these phyla are most commonly found in oceans, lakes and streams.

The **green algae** exist as single cells, colonial forms or filaments. Filaments can be floating or attached. Chlorophyll in green algae is contained in organelles called chloroplasts. The cells of green algae also have a nucleus. Attached green filaments can form large mats on the bottom of streams. Some of the more common green algae are *Cladophora* and *Spirogyra*.

The **blue-green algae** can be single cells, colonial forms or filaments. They are the most primitive of the algae and are sometimes classified as bacteria (cyanobacteria). They have no chloroplasts or nucleus. The chlorophyll pigments are distributed throughout the cell. Some of the blue-green algae have the ability to use atmospheric nitrogen and so do not need nitrate or ammonia sources to grow. Because of this blue-green algae can thrive in conditions where low nitrogen concentrations limit the growth of other algae. Attached blue-green filaments can also form large mats on the bottom of streams. Some common blue-green algae are *Anabena*, *Microcystis* and *Oscillatoria.*

The **yellow-green / brown-green algae** are single cells or colonial forms rarely forming filaments. They contain chloroplasts and a cell nucleus. Some common algae in this phylum are *Mallomonas* and *Dinobryon*.

Diatoms are generally filamentous or single celled. Their cell walls are made up of silicon compounds which are the main component of diatomaceous earth which is used in swimming pool filters, for insect control and in many other products. They also contain chloroplasts and a cell nucleus. Diatoms are often seen forming a golden brown color on the rocks in lakes and streams. Some common diatoms are *Asterionella* and *Melosira*.

Like terrestrial plants, algae require nutrients, water, CO^2 and sunlight to grow. Different species of algae are adapted to thrive in specific conditions. The varying nutrient, light, temperature, physical characteristics (mixing depth, currents, etc.) and predatory pressures in a waterbody determine which species of algae will dominate the algal community and at what concentrations. Because these factors change over time, both long term and annually, the composition and concentration of the algal community will vary.

To determine the biomass of algae we extract the chlorophyll pigments from algal cells. Because all algae have these pigments, the concentration of chlorophyll is correlated to the amount of algae in the sample. From this information we identify relationships between the average concentration of chlorophyll and the nutrient, light, and physical characteristics of their environment over a seasonal period. From this we can predict concentrations of chlorophyll (and therefore algae) that are likely to occur if there are certain changes in the nutrients, light or physical characteristics of a waterbody.

VOLUNTEERS MOVE TO MAINSTREAM!!

by Dan Obrecht

I attended the 6th National Volunteer Monitoring Conference in Austin, Texas during April 27-29, 2000. The conference was titled *Moving into the Mainstream*. The title reflects the direction that the U.S. Environmental Protection Agency would like to see volunteer programs move towards. A lot of the discussions (both in sessions and out) dealt with how to better manage the data that volunteers help generate, how to increase the credibility of volunteer data, and how to have more interaction among volunteer based monitoring programs. The goal is to have volunteer data available to those who want it and to have this data be of high enough quality that it can be used by states to not only monitor water quality but also identify polluted waters and be used in management.

Some of the sessions I took part in included: Rousing Report and Powerful Presentations, Introduction to Data Management, Data Management in Action, An Introduction to the Clean Water Act and TMDL's (Total Maximum Daily Loads), Organizing a Regional Monitoring Day, and Measuring Bacterial Contamination. I also attended a session for State Coordinators. This session allowed me to meet other volunteer program coordinators from across the country and hear what obstacles they have to overcome.

All in all it was good conference. I came back knowing more than when I left and look

North American Lakes Management Society (NALMS) Conference -

by Fran Pope

While Dan was in Austin at the Volunteer Conference, I was in Chicago for the 13th annual conference of NALMS. It was very informative with discussions and lectures covering topics such as shoreline restoration projects and the need to protect and reestablish the riparian corridor on streams and lakes, watershed management group development, swimming safety as related to fecal coliform contamination, nutrient criteria development and lake program funding - just to name a few. Attending this conference gave me an opportunity to talk with EPA officials, activists in clean lake program lobbying efforts, private consultants and researchers in the lake management field.

This conference always reaffirms the fact that the work you, the volunteers, do by collecting water quality data on Missouri's lakes is important. Not only are you monitoring the lakes you live near, but you are also contributing to the national knowledge base of our waters. You are educating yourself on these water quality issues so that you can become spokespersons and leaders within your community to educate your friends and family members about our water resources. One issue that was continuously raised and discussed was that of non-point source pollution. The key message of the discussion was *that everyone has to be vigilant in their own personal efforts to control non-point source pollution.* This is where public education and awareness plays such an important role - and you can be the voice of knowledge within your circle.

Look for articles in upcoming newsletters sharing information we learned at these conferences - riparian corridors, fecal coliform contamination, etc.!

~A Personal Note~

We would like to extend our warmest thank you and best wishes to Bruce Perkins. Bruce managed the limnology lab here at UMC for 15 years. He was a valuable resource for our program and his expertise and knowledge will be missed. We wish him great success with his private consulting firm, Perkins Limnological Consulting Laboratory, LLC in Grain Valley, MO.

Sincerely,
Fran & Dan

ANSWERS to Quiz from Page 1 -

1) < ½ % - The majority of the earth's water is seawater, about 97%. And a large portion of freshwater is locked into icecaps and glaciers.

2) Earth Day just celebrated its 30th anniversary meaning the first one was in 1961.

3) It was the Cuyahoga River that caught on fire. In 1969 the river was heavily polluted and sparks from a passing train ignited a fire in the river.

4) The Clean Water Act was passed in 1972, the same year as the Endangered Species Act.

5) The Mississippi River watershed stretches east to west from New York to Montana, from Louisiana to Minnesota. Altogether there are 30 states that fall totally or partially within this watershed (plus two Canadian Provinces, Alberta and Saskatchewan.

6) According to the Missouri Department of Natural Resources, there are approximately 22,000 miles of permanent flowing streams and rivers in Missouri (21,978 miles to be exact).

7) Again, according to Missouri Department of Natural Resources, the total amount of lake surface area in the state is about 290,000 acres (292,204 acres).

8) The MoDNR reported that the percent of lake area in Missouri threatened with eutrophication is 40%.

9) A full 35% of the public drinking water in the state comes from the Missouri River. The Mississippi and Meramec rivers make up another 5% and the rest is from groundwater or other surface waters such as reservoirs.

10) Fecal Coliform are a bacteria found in the guts of warm blooded animals. Their presence in a water could indicate fecal contamination and the possible presence of more dangerous pathogens.

11) Water is the most dense at 39°F (4°C).

12) The top layer of a stratified lake is the epilimnion. The middle layer is the metalimnion and the bottom layer is the hypolimnion.

13) Zebra Mussels probably came to North America from Eastern Europe.

Welcome to New Volunteers!

We are happy to welcome all of the new volunteers into the program. We have new volunteers on Table Rock Lake, Truman Lake, Smithville Lake, Lake Winnebago, Longview Lake, Lake of the Ozarks, Creve Coeur Lake and Buteo Lake! Thank you to all of these new volunteers and a special thank you to all of our returning volunteers. Please do not hesitate to call or email us with any questions, comments and concerns. I look forward to seeing you this summer.

Fran