The Water Line

Newsletter for the Lakes of Missouri Volunteer Program

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NPS Pollution Part 3 - It's My Fault !?!

by, Dan Obrecht

This is the third article in a series on Non-Point Source (NPS) pollution. In the first article we identified NPS as pollution that comes from a diffuse source. It is estimated that NPS accounts for more than half of the pollution problems in our lakes and streams. The second article discussed urban influences; namely problems associated with decreased infiltration and increased runoff. In this article we will look at how each of us is part of the problem and what we can do to be part of the solution.

NOT IN MY BACK YARD!!!

Robert has a beautiful lawn. The grass is a vibrant green color (even in August), there are no dandelions, and the grass is immaculately trimmed. The back yard slopes down to the lake shore where the retaining wall protects the picture perfect lawn from the water. The question is: What protects the water from Robert's lawn?

Robert attributes the beauty of his lawn to the fertilizers he uses. The problem is he never bothered to have the nutrient levels in his soil checked so he doesn't know what the lawn actually needs. Most of the phosphorus he applies ends up in the lake because the soil in his yard has more than enough phosphorus. Robert also believes that if a little is good, then more is better. He applies 50% more fertilizer on his lawn than recommended. Instead of making his lawn greener, this extra fertilizer ends up making the lake greener. If Robert would only use the right type and amounts of fertilizer he could maintain a nice lawn, spend less money, and protect the lake.

The lack of dandelions and other undesirable

plants in Robert's yard is due to his use of herbicides and pesticides. Every Saturday morning, rain or shine, Robert makes the rounds, spraying chemicals to fight off the invading plants and bugs. The problem here is any pesticide and herbicide applied right before or during a rain has a better chance of ending up in the lake than staying in the yard. Again, wise use would save Robert money and protect the lake.

You won't find grass clippings in Robert's yard as his mower bags everything up. The best thing Robert could do would be composting the clippings, but he doesn't do that. Instead he dumps the clippings into the lake. After a little while all of the grass has sunk to the bottom or

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blown away from Robert's dock, he isn't sure which. He just knows it isn't his problem anymore. Wrong! The clippings decompose in the lake using up oxygen but also releasing nutrients, adding to the lake's problems.

With a little education and effort, Robert could still maintain a nice lawn without harming the lake.

THE GRASS IS ALWAYS GREENER OVER THE SEPTIC TANK

In the not to distant past people had outdoor plumbing. Many an outhouse sat overhanging the nearby stream. As long as the stream flowed everything would be washed downstream. We have come a long way from those days, or have we? Septic systems are used throughout the state. The problem is that often times people forget that these systems need to regular maintenance. A second problem is not all of Missouri is septic system friendly.

When a septic system is working properly the solids stay in the septic tank and go through decomposition. Liquids flow into the lateral lines where it enters the soil. Slow movement of the effluent through the soil allows for nutrients to be taken up by plant roots and provides time for bacteria to die. If the tank is not pumped out on a regular basis the tank can overfill and some of the solids can enter the lateral lines, causing problems by blocking the line. This can result in a dramatic decrease in the area in which the tank is draining. A smaller drainage area translates to the liquid (which contains the nutrients and bacteria) moving through the soil quicker and reaching the lake sooner than it should.

For some Missourians, maintaining their septic system may not be enough. Much of southern Missouri can be described as having very thin soils overlaying limestone with karst features. This situation is not septic system friendly! Thin soils translate to fast moving septic effluent. A situation made worse by the karst features. The underlying bedrock can have fissures that act as a conduits. In a worse case scenario the effluent coming from the septic's lateral line can end up moving through a fissure and into the lake in an extremely short time with little contact with the soil.

If you own a septic system make sure you have your tank pumped out on a regular basis. If you live in the southern part of the state consider using an alternative method of treatment and be supportive of projects that install central sewer collection and treatment in your area.

WHAT ELSE CAN YOU AND I DO TO REDUCE NPS POLLUTION?

-Dispose of household chemicals (paints, cleaners, oils, etc.) properly. Do not dump them into storm sewers or onto driveways.

- Maintain a vegetative buffer along streams and lakes. This will help slow runoff down which will allow for more infiltration of surface flow.

- Control erosion in your yard by planting ground cover and stabilizing erosion-prone areas.

- Aim down-spouts into the yard and not down the driveway (more infiltration).

- Limit the impermeable surfaces around your house.

-Become involved in local decision making and the education of your neighbors.

- Keep pet waste out of streams and lakes by making sure that Fido isn't going potty right next to the water's edge (vegetative buffer will help here).

Non-Point Source Pollution is a major cause of water quality problems in our streams and lakes. We all contribute to the problem and with a little knowledge and effort, we can reduce our impacts. Together we can make a difference!

TEST YOUR KNOWLEDGE!!

Although I think this quiz has some pretty bizarre, off the wall choices (!), I still enjoyed taking it and hope you will too. I took some of the questions from a quiz found this on a web site www.stormwatercenter.net. I would recommend you check out. Fran

1. A water shed is generally defined as:
A. A building that stores water
B. All the land area that drains to a given point in a water body
C. All the water area that drains to a given point in a landform
D. A moment in time when you cross into new area

2. Stream order is a technique to:
A. classify different streams based on their relative location in the drainage network
B. Stop stream disturbance b issuing a regulatory permit
C. Prevent flow from running downhill

3. When a first order stream flows into another first order stream, the resulting order is:
A. first order
B. second order
C. third order
D. back ordered
E. Fluvial-3

4. First and second order streams comprise what percent of the total stream and river mileage of the United States?
A. 10%
B. 48%
C. 67%
D. 100%

5. How much land in a watershed is taken up by a stream buffer network that extends a distance of 100 feet from either side of the stream?
A. 15%
B. 25%
C. 5%

6. Recent watershed research has discovered that urban stream quality begins to sharply decline once impervious cover in a watershed exceeds:
A. 45%
B. 10%
C. 75%
D. 125%
E. 3,141%

7. How much more stormwater runoff is produced by a one acre parking lot compared to a one acre meadow?
A. 6%
B. 78%
C. No difference
D. 100%
E. 1600%

8. How many Americans can correctly identify that stormwater runoff is a common source of pollution of stream, rivers, and oceans?
A. 3%
B. 22%
C. 30%
D. Every red-blooded Amerioca understand this concept

9. A single quart of motor oil dumped down a storm sewer creates an oil slick of what size?
A. no slick, sinks to bottom
B. No slick, oil travels from storm sewer to treatment plant
C. 160 square feet
D. 2 acres

10. What percentage of the urban population of the United States relies on groundwater for its drinking water?
A. 4.8%
B. 22%
C. 30%
D. 90%

11. What percentage of Americans rely on septic systems to dispose of their wastewater?
A. 16%
B. 21%
C. 37%

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D. 78%

12. What percentage of Americans that own a septic system do not know where it is located on their property?
A. 100%
B. 12%
C. 2%
D. 0%
E. 67%

13. How many fecal coliform bacteria are produced by an average size dog dropping?
A. 49
B. 1200
C. 3 billion
D. 100,000
E. Trick question, dogs only produce fecal streptococci bacteria

14. According to the EPA, water pollution prompted closings or swimming advisories at how many beaches around the country in 1996?
A. three in New Jersy and one in Florida
B. 1000
C. 2500
D. None
E. 216

15. Which of the following comprises the greatest percentage of impervious cover in suburban areas?
A. rooftops
B. Lawns
C. Roads, parking lots and driveways
D. Vacant lots

16. On average, how much land is converted to urban land use in the United States each year?
A. 500,000 acres
B. Over one million acres
C. No net loss
D. 10 acres
E. 49,000 strip mall equivalents

17. According to the EPA, what percentage of river pollution is caused by urban stormwater runoff is the nation?
A. virtually non, industrial pollution is the major cause
B. Virtually none, trees cause pollution
C. 21%
D. 99%
E. 11%

18. The residential zoning category that produces the amount of impervious cover at which stream quality begin to decline is:
A. ten acre lots
B. One acre lots
C. 1/2 acre lots
D. Townhouses
E. Apartment buildings

19. How many pounds of active pesticide ingredients our applied to lawns in our country each year?
A. 18 million
B. 0.2 million
C. No one uses pesticides since *Silent Spring* was written
D. 54 million
E. 70 million

20. How many pounds of grass trimmings are generated by the average suburban lawn each year?
A. 1500 pounds
B. None, the rabbits eat it all
C. 6 pounds, eight ounces
D. 2100 long tons

Answers:
1.B
2.A
3.B
4.C
5.C
6.B
7.E
8.B
9.D
10.C
11.D
12.B
13. C
14.C
15.C
16.B
17.C
18.B
19.D.
20.A

Crystal Clear- The Clear Water Phase

by, Fran Pope

Secchi readings reported over 440 inches, water so clear one can see 20 feet to the bottom. These are the reports this spring from volunteers on Table Rock Lake. Just what is going on? This is a clear water phase.

The clear water phase is governed primarily by interactions within the aquatic food web. As spring rains and lake turnover bring nutrients into the warming waters of the photic zone (where sunlight can penetrate for photosynthesis), algal populations increase. These algae then become an abundant food source for the zooplankton. Zooplankton, such as *Daphnia* (see the article, Lake Invaders, in the January 1999 issue of *The Water Line)*, copepods and rotifers, are microscopic animals in the water column. An increase in food supply (algae) allows zooplankton populations to increase. The algae population will continue to grow until it has supplied a substantial food base for the zooplankton. The clear water phase coincides with the time when the zooplankton feeding rates surpass the algae growth rates.

Why doesn't the clear water phase last all summer? When the zooplankton decrease their food supply by consuming the majority of the algal population, the zooplankton growth rate will decrease. Then the algal population will again increase. One would assume that the cycle of zooplankton population increase would repeat. But at this time in the year, fish begin to grow and the zooplankton are controlled by fish predation. Also different types of algae that are not appealing to zooplankton begin to grow. Some algae are too large to be eaten, some taste bad and some produce toxins.

As we know, lakes and reservoirs are complex ecosystems with many factors affecting water clarity and water quality. Studies have shown that the main factors that can influence a clear water phase are: 1) zooplankton grazing on algae population, 2) the amount of external phosphorus entering the lake, 3) how quickly inorganic suspended solids settle out of the water column, 4) the internal phosphorus loading that can occur from the lake's bottom sediment and 5) the stability of the stratification layers. The beautiful, clear water we are seeing at Table Rock Lake is the result of optimum conditions creating a spectacular clear water phase.

Although this all makes perfectly good sense, why aren't Table Rock Lake's Secchi readings always over twenty feet. Again, reservoirs are complex systems with many factors affecting water clarity. All of the factors must come together in perfect harmony to have a clear water phase like the one we are witnessing in Table Rock Lake. Differences in the make up of the algal and zooplankton communities from one year to the next can influence the intensity of the clear water phase. Nutrient availability, both from external and internal sources, also plays a role by determining the initial algal biomass the lake will have.

This just briefly describes a very complex aquatic system. It will be very interesting to see how long this phase lasts and what kind of continued Secchi readings we will see this summer. We will look to our volunteers to keep us posted and will report on the findings in the fall 2001 newsletter. If you are interested in learning more about this, I would be happy to send you the article *Summer Water Clarity Responses to Phosphorus, Daphnia grazing, and Internal Mixing in Lake Mendota*, *Limnology and Oceanography volume 44, 1999 pp137-146*.

Secchi Dip-In

The summer of 2001 marks the eighth year of the Great North American Secchi Dip-In. The Dip-In is an international effort in which volunteers produce a "snapshot" of the transparency of water in the United States and Canada. Sponsored by the North American Lake Management Society and the United States Environmental Protection Agency, the Dip-In is directed by Kent State University biologists, Dr. Robert Carlson and Professor David Waller, and KSU geographer, Dr. Jay Lee.

During the period from **June 1 until July 15, 2001** more than 2,500 volunteers from volunteer monitoring programs in the United States and Canada will measure transparency in their favorite lake, reservoir, river, or estuary. They use an instrument called a "Secchi disk," a flat, horizontal, black and white disk that is lowered from a rope into the water until it disappears. The disk itself is named after the Jesuit priest, Pietro Angelo Secchi, who used the disk more than 150 years ago. The depth the disk disappears is a measure of the transparency of the water. Transparency is affected by the color of the water and by particles of silt or clay or small plants called algae, and therefore is a measure of some forms of pollution.

Carlson said that he wanted to find a way to produce a scientific picture of the water quality of the world's lakes. Such a project could only be done using the thousands of volunteers who routinely measure transparency in local volunteer programs. The Dip-In is really a chance for volunteers to think and contribute globally by taking a measurement in their local environment.

The previous Dip-In's have provided valuable information about water quality. The maps made each year have shown considerable regional differences in transparency. Lakes in the northern parts of the United States and in Canada typically have the clearest lakes, while lakes in agricultural regions of the Midwest have some of the smallest transparencies. Transparencies found during the Dip-In range from one inch to more than 65 feet. Almost 700 sites have been monitored during the Dip-In for four or more years, and, as data accumulates, it may be possible to see if the transparency of lakes in the country is changing over time.

Equally valuable has been the information gleaned on the volunteer's perception of water quality. The Dip-In has found that opinions of water quality vary considerably from region to region. A person in Minnesota, Maine or Canada, for example, may think that a lake is degraded if the transparency is six feet while in other states, a lake with a transparency of only a foot may be considered beautiful. Carlson suggests that these regional differences mean that people become accustomed to the quality that they see every day. Most sobering may be the possibility that everyone grows up thinking that their environment is normal. Small changes in water quality may go unnoticed. Fortunately, there are volunteer monitors who record these changes in water quality year after year. Without their observations, our environment might change unnoticed.

The volunteers have also changed our perception of what is considered to be a water quality problem. Typically, those who study lakes think of problems as algal scums and weeds. Although the volunteers think these biological nuisances are important, a group of human-related problems are also being found. Volunteers report that noise, boat congestion, rude boaters, and trash are also important water quality problems. In some states personal watercraft now equal or surpass algae and weeds as the chief perceived water quality problem. The volunteers' perceptions may not reflect the attitudes of all users of our waters, but they do remind us that aesthetics and human interactions are an important part of our environmental consciousness.

More information on the Great American Secchi Dip-In, including participating programs and state-by-state results for past Dip-Ins, is available on the World Wide Web at: http://dipin.kent.edu/

LMVP EXPANDS!

The LMVP is very happy about new additions to the program. One very exciting addition is a new staff member, Tony Thorpe. Tony is completing a Master of Science in the Department of Fisheries and Wildlife. He is also currently designing a web site for the LMVP. Tony will be an excellent new addition to the Lakes of Missouri Volunteer Program and we welcome him.

We have added new lakes and volunteers to the program. Two new lakes in the Jefferson City area, Binder Lake and Ben Branch Lake will be sampled this summer. We have also added a new site on Lake of the Ozarks in the Grand Glaize arm. Stockton Lake, northwest of Springfield is another new lake in the program. Two new volunteers are sampling Blue Springs Lake and Lake Jacomo in the Kansas City area and a new volunteer is on Smithville Lake just north of Kansas City. Thank you to our new volunteers and please contact us if you know anyone interested in participating in the program

LMVP Goes to Earth Day

by, Dan Obrecht

The Lakes of Missouri Volunteer Program was active this past April 22nd. The program had a table set up at the St. Louis Earth Day gathering in Forest Park. The table consisted of microscopes and a gold-fish bowl full of zooplankton. The bowl full of tiny creatures swimming around really drew people's attention. The chance to look at the zooplankton under the microscopes made them even more enthusiastic (especially the kids). Our goal was to introduce people to the concept of aquatic ecology in hopes of sparking interest in aquatic sciences and promoting discussion about water quality. To that end I think we were quite successful. We had people in front of the table consistently for six hours. We are estimating between 600 and 1000 people stopped to talk about lakes and water quality.

Phosphorus Removal

In response to the degradation of water quality in the James River and Table Rock Lake, a mandate was passed that sewage treatment plants in the Table Rock watershed need to reduce phosphorus in their effluent. Larger treatment plants were given four years to update plant facilities to accommodate the added treatment. The city of Springfield's Southwest Wastewater Treatment Facility has completed construction and is in the process of testing the new equipment. This means the Springfield plant will be removing phosphorus from its effluent two and a half years ahead of schedule!! This is the largest treatment plant in the Missouri portion of Table Rock Lake's watershed. The additional treatment will reduce the amount of phosphorus discharged into the watershed by 700 pounds per day!! Congratulations to Springfield for moving quickly to help solve water quality problems.

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Region VII, US Environmental Protection Agency, through the Missouri Department of Natural Resources, has provided partial funding for this project under Section 319 of the Clean Water Act.

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