

## Phosphorus – Management and Controls

We've reported on phosphorus (P) and its role in lake eutrophication previously in the *Water Column*. Phosphorus is one of several nutrients important for plant growth. Phosphorus is found in every living cell as part of each cell's DNA. In plants, it also plays a vital role in capturing light during photosynthesis, helping with seed germination, and helping plants use water efficiently. Too much phosphorus can promote excessive growth of plants – especially in lakes and rivers.

Much attention has been given this spring and summer to examining how Indiana can reduce the overuse of phosphorus on residential lawns. In June, the Indiana Lakes Management Work Group discussed this issue and heard from John Goss of the Indiana Wildlife Federation (IWF). The IWF (<http://www.indianawildlife.org/phosphorus.htm>) has been working with various groups to encourage the voluntary reduction of P in lawn fertilizers. New information that we learned at this meeting included:

- The Scotts Fertilizer Company has about 60 percent of the residential market and they are changing to almost totally P-free fertilizers, as well as having joined the Alliance for the Great Lakes.
- The TruGreen Company has gone P-free in their products.
- The state chemist's office at Purdue University is incorporating education about P in lawn fertilizers in the certification and education program for pesticide and lawn fertilizer applicators.



Make certain that the middle number on any lawn fertilizer you buy is "0." This 23-0-23 formula has 23 parts nitrogen, 0 parts phosphorus, and 23 parts potassium. Photo by Robert Kirschner.

Research in Wisconsin, reported by the Wisconsin Association of Lakes (WAL), concluded that Wisconsin lawns and soils already contain adequate – and often excessive – amounts of phosphorus. It takes 20 parts per million (ppm) of soil phosphorus to grow healthy turf. Agricultural soils in every Wisconsin county have at least 20 ppm of soil phosphorus; the average concentration is 53 ppm. Some counties have significantly higher concentrations, the highest being 160 ppm. Some estimate phosphorus levels in residential Wisconsin lawns have up to twice the amount of phosphorus (105 ppm) than the average farm field.

Plants don't absorb more phosphorus than they can use so excess can run off the soil into water.

**While it takes 20 parts per million of soil phosphorus to grow healthy turf, 25 parts per billion (a quantity 1000 times smaller) can promote excessive algae growth in lakes.**

Reduction of P in lawn fertilizers has been achieved largely through regulation in other states. Minnesota was the first state to restrict phosphorus in lawn fertilizers in 2005, following a prohibition in the Twin Cities metro area in 2004. Laws such as these put pressure on the fertilizer industry to comply. The Indiana Legislature has been asked to craft legislation that would restrict phosphorus in lawn fertilizers.

*Clear Choices for Clean Water* is a new campaign in Indiana designed to increase awareness about lawn care and its impact on streams and lakes. In addition to providing information about green lawn care, the organization seeks to organize and empower citizens to be more effective environmental stewards. For more information: [www.clearchoicescleanwater.org](http://www.clearchoicescleanwater.org).

It is estimated that 35,000 tons of fertilizer are applied on U.S. lawns annually. This is just 0.2

percent of the amount of fertilizer applied to U.S. agricultural land. So if we want to reduce the amount of nutrients entering our waterways, we must continue to work to reduce agricultural nutrient losses.

### **Nutrient Management on Agricultural Lands**

Agriculture has made progress in recent years. According to the USDA Economic Research Service, phosphate (as P<sub>2</sub>O<sub>5</sub>) applied to ag lands rose steadily throughout the 1960s and '70s, peaking at 5,630,000 tons in 1977. Since that time, agricultural phosphorus use has steadily declined to 4,247,000 tons used in 2008.

Farmers are discovering that less phosphorus can be used to produce high yields of corn. The amount of phosphorus applied to produce one bushel of corn has dropped from 0.75 lbs. in 1980 to 0.48 lbs. in 1990, to 0.35 lbs. in 2005. Modern agricultural Best Management Practices work to: (a) match the amount and type of fertilizer to the crop needs, (b) make nutrients available when the crop needs them, and (c) keep nutrients where crops can use them.

Having a "green" lawn isn't as difficult as you might think and you can do so while protecting the environment.

### **Lisen Cummings, editor of *Sustainable Environments*, lists these suggestions for having a "green" lawn, while protecting the environment:**

- Mow your grass at a height of three inches. This will give your grass more leaf surface to take in more sunlight, develop deeper roots, prevent weeds, retain soil moisture, and be more drought and insect tolerant. Never cut more than a third of the grass length.
- Allowing grass clippings to decompose naturally on your lawn reduces the need for chemical pesticides and/or fertilizers. This will save you money and time. It is estimated that 20 to 40 percent of landfill space is taken up with yard waste. If you still wish to bag your clippings, ask your local government if they have a compost drop-site.
- If you would like to improve your soil, use organic matter like compost, manure, or grass clippings. If your soil is compacted or clay you can aerate it before adding organic amendments.
- Reduce your mowing and maintenance by replacing grass with native plants or a vegetable garden. Native ground covers are a great low-maintenance option. If you have a green thumb, plant attractive perennials that will increase your property value. You could plant a theme garden for butterflies, hummingbirds, birds, or any type of wildlife you prefer. Meadows of wildflowers and grasses are attractive and bring a variety of beneficial wildlife. Using plants that are native to your area requires less maintenance, pesticides, herbicides, and insecticides.
- If you live in the woods, you know how difficult it is to grow a lush lawn. A moss garden/lawn is a great option, and feels even better under foot. You can buy or harvest moss, soak it in yogurt or beer (for the yeast) and spread it on loose soil. Soon, you will have a green carpet of soft moss. In the fall, lay down netting for easy leaf removal.
- For areas near your house, hook up a rain barrel to your down spout to use for irrigation. This will cut down on your water bill and reduce stormwater runoff.

## Ohio Lake Suffers from Massive Algae Bloom

Grand Lake St. Marys is Ohio's largest inland lake at 12,700 acres. Since May of this summer, the lake has suffered from massive algae blooms of several different species, including *aphanizomenon* and *planktothrix*. Both species are common in Indiana lakes but these algae do not always produce toxins. Unfortunately for Grand Lake St. Marys, toxin are being produced in the lake.

Water samples taken by Ohio EPA at the three state park beaches on July 12 and analyzed by the Celina Water Department indicate microcystin levels have reached very high levels of at least 2,000 parts per billion at East Beach, West Beach, and Campground Beach. Microcystin levels remain higher than the 20 ppb considered by the World Health Organization to be safe for human recreation.

In addition, another more potent algal toxin, anatoxin-a, has also been detected in the lake at concentrations up to 4 ppb. Anatoxin-a is a neurotoxin.

Because of high levels of anatoxin-a, the Ohio EPA, Ohio Department of Natural Resources,



*A thick algal scum covers Grand Lake St. Marys.*

and Ohio Department of Health are maintaining the advisory level at the lake to ensure public health. Microcystin levels fluctuate. At this time, the state recommends people do not contact the water, do not allow pets to contact the water, and do not take boats onto the lake. Additionally, Ohio EPA still urges people not to eat fish caught in Grand Lake St. Marys due to the uncertainty of the buildup of microcystin toxins in fish tissue.

Straddling the Augulaize-Mercer County line between St. Marys and

Celina, the lake was constructed in the mid-1800s to store water for the Miami-Erie Canal. In 1949, Grand Lake St. Marys was among the first state parks established in Ohio. Today, it is a popular recreation lake for boating, personal watercraft, fishing, and swimming. It also is the drinking water supply for the city of Celina. The Ohio Department of Natural Resources maintains a campground, three public beaches, and several picnic areas in a state park along the lake.

Over the years, the lake has become increasingly enriched by phosphates and nitrates from a number of man-made and natural sources. These nutrients have contributed to the decline of the lake's water quality. Ohio EPA and various state and local partners have been working within the lake's watershed for many years to achieve improvements along streams that feed the lake, which in turn will improve water quality in the lake.



*A personal watercraft creates a green wake.*

**Have you checked out the Indiana Clean Lakes Program Web page lately? Take a look at <http://www.indiana.edu/~clp/> and see what's new and happening with the program and with Indiana lakes!**

## WATER COLUMN

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## Effects of Urbanization on Stream Ecosystems

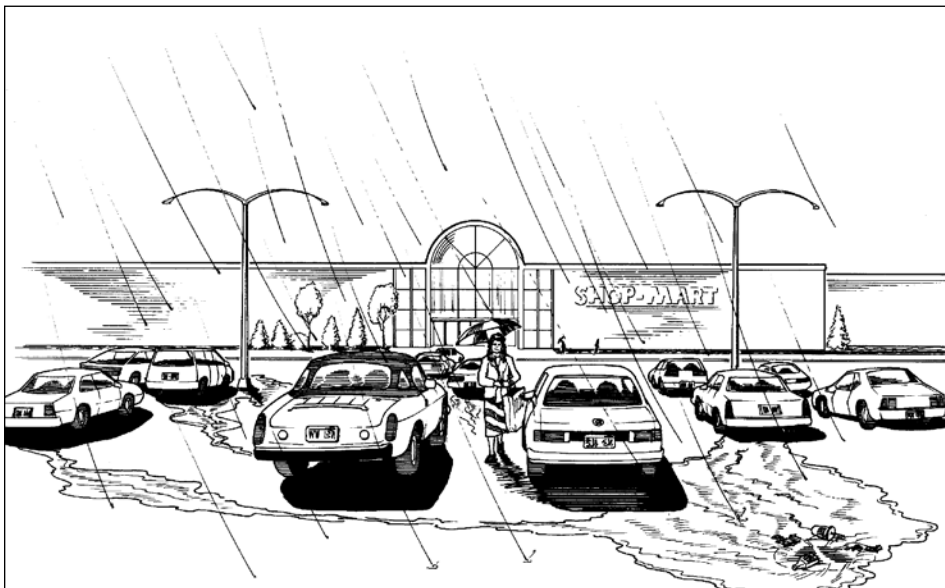
A new report from the U.S. Geological Survey (USGS) explains the effects of urban development on stream ecosystem health. Surprisingly, aquatic insect communities show little, if any, initial resistance to low levels of urban development that were previously thought to be protective of aquatic life. The study showed, for example, that by the time a watershed reaches about 10

percent impervious cover in urban areas, aquatic insect communities are degraded by as much as 33 percent in comparison to aquatic insect communities in forested watersheds.

The USGS determined the magnitude and pattern of the physical, chemical, and biological response of streams to increasing urbanization and how these responses vary throughout nine metropolitan areas: Portland, OR; Salt Lake City, UT; Birmingham, AL; Atlanta, GA; Raleigh, NC; Boston, MA; Denver, CO; Dallas, TX; and Milwaukee, WI. Comparisons among the nine metropolitan areas show that not all urban streams respond in a similar way. Land cover prior to urbanization can affect how aquatic insects and fish respond to urban development and is important to consider in setting realistic stream restoration goals in urban areas.

Learn more about how stream ecosystems respond to urban development from USGS reports and video podcasts on the USGS Website: <http://water.usgs.gov/nawqa/urban/>.

Source: EPA Watershed News



*Impervious surfaces in urban areas (roofs, parking lots, roads, etc.) collect rainwater and cause it to run off the land quickly. This carries urban pollutants into streams and increases stream water speed, to the disadvantage of stream organisms.*

## Healthy Lakeshores Through Better Shoreline Stewardship

The U.S. EPA recently held a Webcast seminar where participants could learn about improving lakeshore habitat through better shoreline stewardship. EPA's first-ever assessment of the ecological condition of the nation's lakes, the National Lakes Assessment, identified poor lakeshore habitat and high levels of nutrients as leading stressors affecting the biological health of lakes. In this Webcast, experts from Minnesota, Wisconsin, and Maine shared innovative local and statewide lakeshore protection initiatives, touching on both voluntary and regulatory measures.

An archived version of the Webcast is available on the following Website by scrolling down to "Lakes": <http://www.epa.gov/owow/watershed/wacademy/webcasts/archives.html>.

## Explore a Shore

Summer is drawing to a close, but there is still time to enjoy. Indiana's beautiful lakes and local beaches can offer more than just sunbathing for the lake explorer. The National Wildlife Federation offers these suggestions for youngsters:

- 1. Seek treasure.** Waves toss up all kinds of interesting things: interesting shells, polished pebbles, smooth beach glass, driftwood. Enjoy them – then leave them for others to enjoy, too.
- 2. Listen to the music.** The water, the waves, the wind, the birds ... together they make a wonderful, peaceful sound.
- 3. Get your feet wet.** Take off your shoes, wiggle those bare toes, and wade right in. (But



Beach at South Twin Lake, IN.

check with an adult first to be sure it's safe.)

4. **Look for creatures.** Watch birds swoop and dive. Look for fish, water bugs, frogs, crayfish, and other animals along the shore and in shallow water.
5. **Follow the footprints.** Look for animal tracks left in sand or mud. How many creatures have come this way?
6. **Skip stones.** How many times can you make a flat rock hop across the water?
7. **Float a boat.** Make tiny rafts from leaves or sticks and send them down a stream.
8. **Sculpt sand.** At a sandy beach, make sand castles – or a whole sand village!
9. **Run a race.** A wide, windy beach is the perfect place to run as fast as you can. When you need a rest, race to a good spot for a picnic lunch!

## Meetings

### Watershed Management Conference

**August 23-27, 2010. Madison, Wisconsin.** The American Society of Civil Engineers' Environmental & Water Resources Institute (EWRI) is sponsoring the 2010 Watershed Management Conference: *Innovations in Watershed Management Under Land Use and Climate Change*. The conference will highlight innovative approaches for managing water resources under climate and land use change. Relevant topics include hydrologic measurement and modeling, integrated and/or adaptive water management, aquatic ecosystem restoration, risk-based design, and the use of regional predictions of climate change.

## NALMS 30th International Symposium

**November 3-5, 2010.**

**Oklahoma City, Oklahoma.** We invite you to visit Oklahoma City for the NALMS 30th International Symposium, *The Water Cycle: Managing the Challenges in Water Resources*, hosted by the Oklahoma Clean Lakes and Watersheds Association. Oklahoma City is a wonderful place to be in the fall with beautiful foliage, gorgeous lakes, and amazing weather. You will find entertainment galore in Bricktown, the heart of Oklahoma City's Downtown, as well as wonderful restaurants sure to whet your appetite. Let our Southern charm, charm you!

Don't miss the opportunity to network with some of the most knowledgeable leaders in watershed information and technology. The conference will consist of panels and discussions full of new and exciting data focused on guaranteeing the beauty, safety, and cleanliness of Earth's most precious natural resource.



## Perspectives

Water links us to our neighbor in a way more profound and complex than any other.

~ John Thorson



## **WATER COLUMN**

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