Water Column

Fall 2014
Vol. 26, No. 3

2014 Indiana Lake Survey

~ Melissa Clark

We conducted another survey of 80 lake during the 2014 summer. While we are still identifying and counting plankton samples, the bulk of the analysis is complete. Indiana lakes (including reservoirs) continue to be dominated by the eutrophic classification, which is characterized by low transparency 0.5 – 2 meter Secchi disk measurements, and high chlorophyll-a (7.3 – 56 ug/L) and total phosphorus (24 – 96 ug/L) concentrations. While the fish yield can be very high, eutrophic lakes can only support warm-water fisheries. Dense, and often nuisance, macrophytes crowd the lake making it difficult to swim or boat. With so much available nutrients to support primary productivity, if plants don't dominate these lakes, dense algal communites do, with the potential of harmful algal blooms and scums. Figure 1 illustrates that of the 80 lakes surveyed in 2014, 63% were eutrophic, followed by 31% in the mesotrophic category.

Table 1 (next page) lists the lakes surveyed this past summer and includes the Trophic State Index (TSI) based on Secchi disk values. A couple words of caution when looking up your lake: (1) plant-dominated lakes tend to have much deeper Secchi disk values but can still be characterized by high biological productivity, and (2) there is no "perfect" trophic state and it is often misconceived as indicating water quality. Lakes can have attributes that spread them across all categories. The TSI classification becomes a concern when you track trends toward less desirable characteristics and how that impacts how you use that lake resource. Swimmers and skiers may prefer the oligotrophic lake, but the anglers may prefer the higher yield and better fishing opporunties of the eutrophic lake.

Stay tuned for the full 2014 results. They will be posted to the Indiana CLP website as soon as the plankton analysis has been completed.

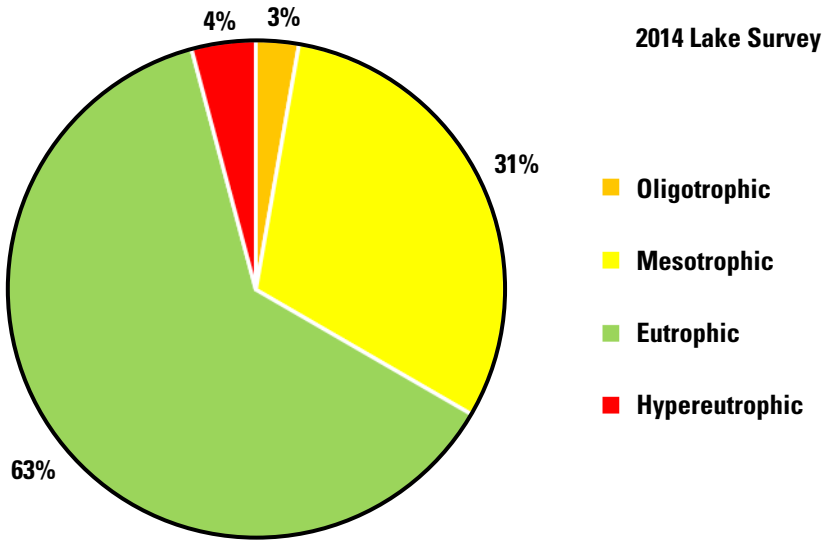


Figure 1. Carlson Trophic State Index classification for the 2014 Indiana CLP survey.

Table 1. 2014 Indiana Clean Lakes Program surveyed lakes. Trophic State Index (TSI) values are scored based on Secchi disk and color coded: Oligotrophic (green), mesotrophic (yellow), eutrophic (orange), hypereutrophic (red).

Lake Name	County	TSI(SD)
Atwood	Lagrange	47
Banning	Kosciusko	55
Bartley	Noble	54
Bass	Sullivan	46
Bear Creek	Brown	43
Beaver Creek Res.	Dubois	62
Big Barbee	Kosciusko	60
Brokesha	Lagrange	46
Cedarville Reservoir	Allen	83
Center	Kosciusko	45
Chrisney	Spencer	53
Dale Reservoir	Spencer	73
Dallas	Lagrange	55
Dock	Noble	60
Everett	Allen	63
Flat	Marshall	53
Fox	Steuben	45
Frank	Greene	42
Freeman	Carroll	60
Fry (Upper)	Sullivan	57
George	Steuben	43
Golden	Steuben	65
Goose (Dugger)	Sullivan	34
Green Valley	Vigo	67
Grouse Ridge	Bartholomew	43
Hackberry	Sullivan	54
Hemlock	Greene	56
Hunter	Elkhart	44
Hurshtown impoundment	Allen	60
Impoundment 26	Sullivan	67
Impoundment No. 29	Sullivan	37
Jackson	Greene	50
Kickapoo	Sullivan	55
Knightstown (Big Blue #7)	Henry	59
Knob	Jackson	47

Lake Name	County	TSI(SD)
Lukens	Wabash	53
Manitou	Fulton	60
Manlove	Fayette	61
Miller (Chain-O)	Noble	56
Moss	Noble	49
North Little	Kosciusko	55
North Twin	LaGrange	49
Ontario Mill Pond	LaGrange	57
Pigeon	Steuben	52
Pine	LaPorte	44
Prides Creek	Pike	47
Pump	Sullivan	50
Redbud	Sullivan	44
Ridinger	Kosciusko	65
Robinson	Whitley	65
Rothenberger	Kosciusko	47
Salinda	Washington	73
Scales	Warrick	55
Smalley	Noble	64
Snow	Steuben	53
Stone	LaPorte	42
Story (Lower)	Dekalb	47
Sylvan	Noble	70
T Lake	Sullivan	43
Tamarack (Rome City)	Noble	57
Tree	Sullivan	51
Troy Cedar	Whitley	67
Turtle	Sullivan	45
Wall	LaGrange	41
Walnut	Sullivan	55
Webster	Kosciusko	59
Westler	Lagrange	62
Kreighbaum	Marshall	50
Lake Lincoln	Spencer	50
Little Chapman	Kosciusko	60
Little Knapp	Noble	54

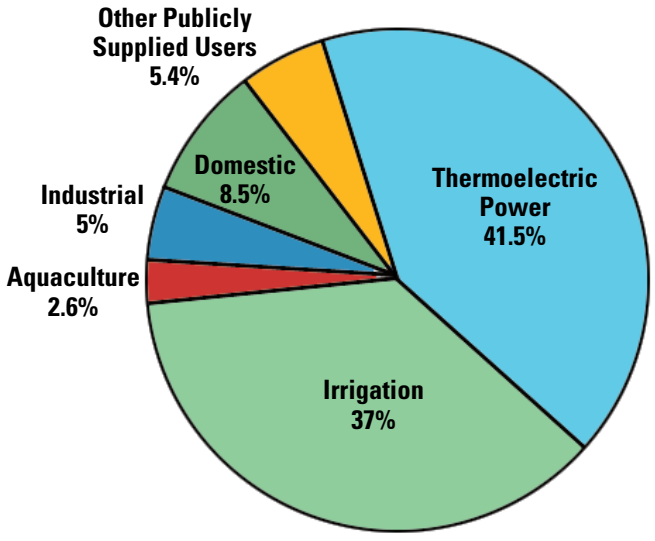
Water Conservation: The Crux of Our Future

~ Bridget Borrowdale

Water quality and quantity issues are appearing in the news more and more frequently. We hear about water becoming unsuitable for drinking from algal blooms, droughts becoming more widespread and longer in duration, and all of the conflicts that arise with water scarcity which already afflict many parts of the world. The news generally covers how water shortages compromise a community's ability to prosper by highlighting the common themes we see in water scarce areas: protests, failed crops, dying livestock, debilitating pollution, poverty, and forced migrations. But the news seems to give little attention to water consumption patterns and inefficiencies that perpetuate water scarcity and more importantly, what we can do about it. A good first step is realizing how much water we use and waste in our daily lives, which is what I'm here to write about. I'm pretty sure the information that follows will astound you, but it will also hopefully inspire you to curb the amount of water you use.

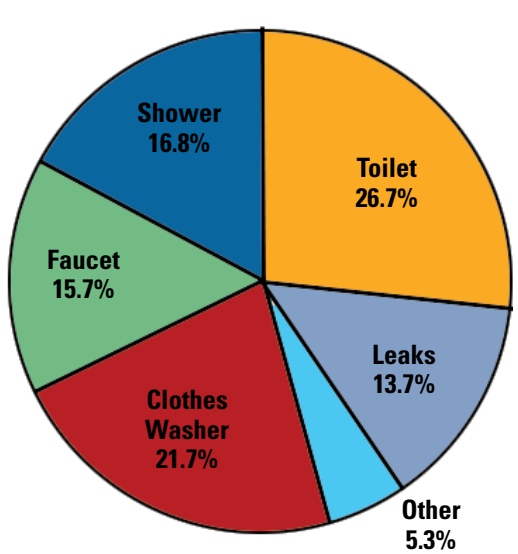
We are very fortunate to live in a geographical area where melted glaciers from the past have provided us with plenty of freshwater. Growing up, I never gave much thought about the Earth's finite water supply. As most Americans do, I simply turned the faucet on when I needed water without thinking about what happened once the water went down the drain. Having access to clean, inexpensive water is something that most Americans take for granted. Unfortunately, this attitude has created a society that is extremely careless and wasteful with water usage. This might seem acceptable in the present, but it is predicted that by the year 2025, 1.8 billion people will live in regions plagued by water scarcity due to population growth, increased water demands, and climate change. That makes two-thirds of the global population living in water scarce areas. The precise nature of a water crisis varies in intensity and location, but the stress will be shared among both rich and poor countries. Water issues will not go away on their own and will only worsen with time unless we respond as a global community.

As America's population doubled over the past 50 years, water usage tripled. The average American uses somewhere between 80-100 gallons per day and the average American family of four uses 363 gallons of water each day. These numbers are more meaningful knowing that the average African family of four uses about five gallons per day. As a nation we use about 319 trillion gallons annually! Figure 1 illustrates where all of that water is being used.



Livestock and Mining combined use approximately 1% of total use and are not included.

Data come from U.S. Geological Service Circular 1344: Estimated Use of Water in the United States in 2005 by Joan F. Kenny, Nancy L. Barber, Susan S. Hutson, Kristin S. Linsey, John K. Lovelace, and Molly A. Maupin, available at http://pubs.usgs.gove/circ/1344/



Source: American Water Works Association Research Foundation, "Residential End Uses of Water," 1999.

Figure 1. (a) National freshwater usage by category, with the average personal domestic use (b).

Some of these water withdrawals are unavoidable and essential for life, but that does not mean it is done in a conservative fashion. On the other hand, some irrigation uses are far from essential, such as the 2.5 billion gallons of water used to water golf courses each day. The impact of a broken or leaking pipe may seem trivial when you envision it being wasted by the drop, but all of those drops amount to 1.7 trillion gallons lost each year in the U.S. One way you and your family can make a difference is by being more prudent with water consumption when it comes to domestic usages. Many Americans cherish long showers, but even a ten-minute shower uses about 40 gallons, which the same amount as a bath. We could save an incredible amount of water by adopting a habit that most cultures employ: "navy showers." This is a shower practice where you get wet, then turn off the faucet while you lather up, shave, etc., and run the water again to rinse off. A person who showers this way conserves 14,800 gallons per year… talk about making a positive impact!

Many people in the world survive on 3 (or fewer) gallons of water per day, which is the same amount of water we use every time we flush a toilet that predates 1994. Toilets manufactured after 1994 comply with the federal standard of 1.6 gallons per flush, but better yet, the U.S. EPA's WaterSense approved toilets use 1.28 gallons per flush. An average family can reduce the water consumed by toilets by 20-60% by making the switch to WaterSense approved toilets, saving 13,000 gallons of water and $110 on bills annually – $2,100 would be saved on water bills over the lifetime of the toilets. Replacing every toilet in America with efficient models would save us 520 billion gallons each year, which is the same amount of water that flows over Niagra Falls in approximately 12 days.

While these are the more obvious ways in which Americans use water in their daily lives, there is an astounding amount of unseen water usage that goes into nearly everything we consume. "Virtual water" is the term used to describe the water we consume indirectly, which accounts for all of the water required throughout various steps in production processes for the food, beverages, and goods we consume. Approximately 95% of our water footprint is from virtual water (Figure 2).

Those jeans that you're wearing took 2,900 gallons of water to create – that is enough water to supply one person with 8 glasses of water per day for 15 years! Producing the amount steel needed to make one car requires 80,000 gallons of water and even more shockingly, the amount of water used to build 8 cars is enough to fill an Olympic-sized swimming pool!

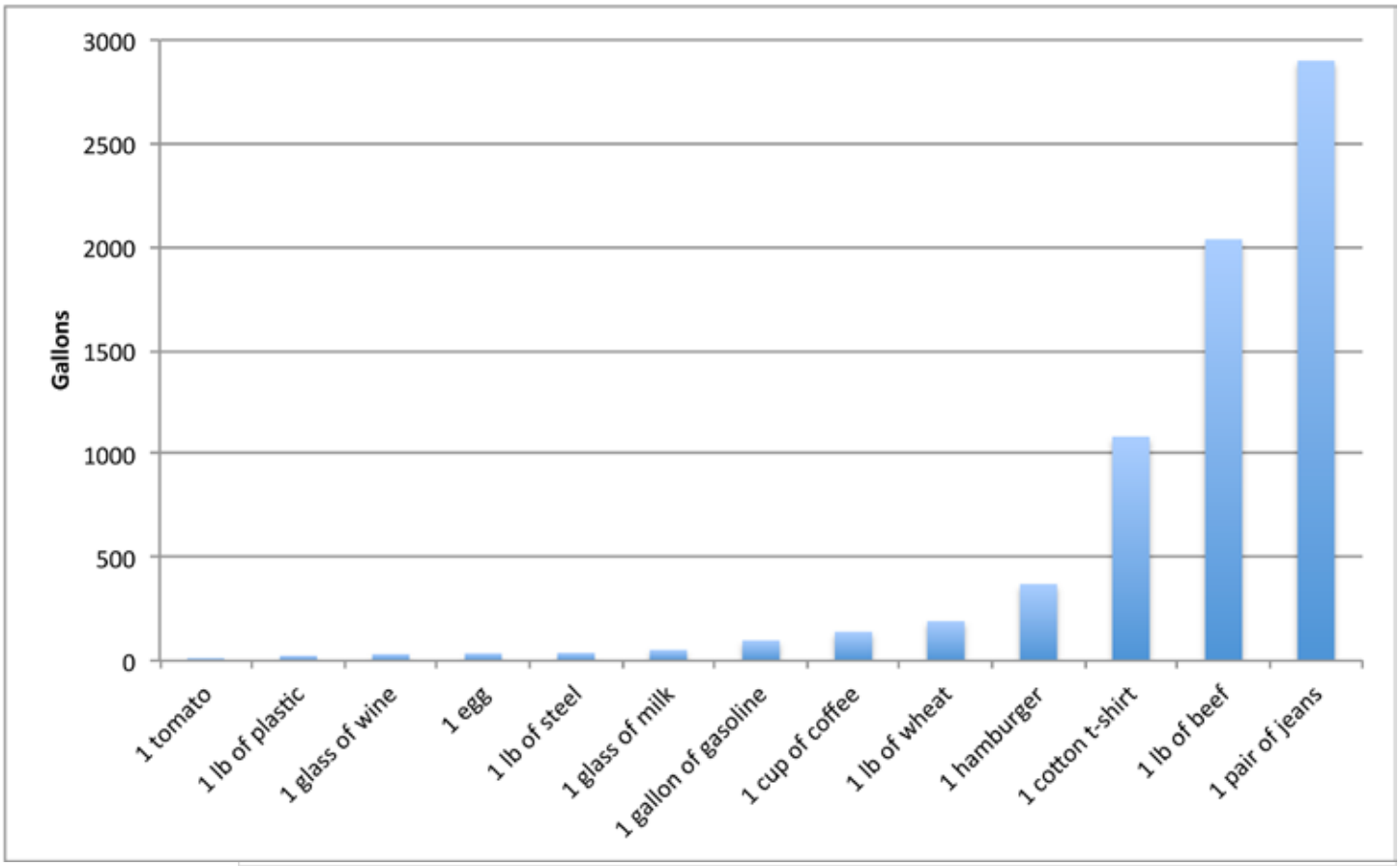


Figure 2. "Virtual water" usage examples.

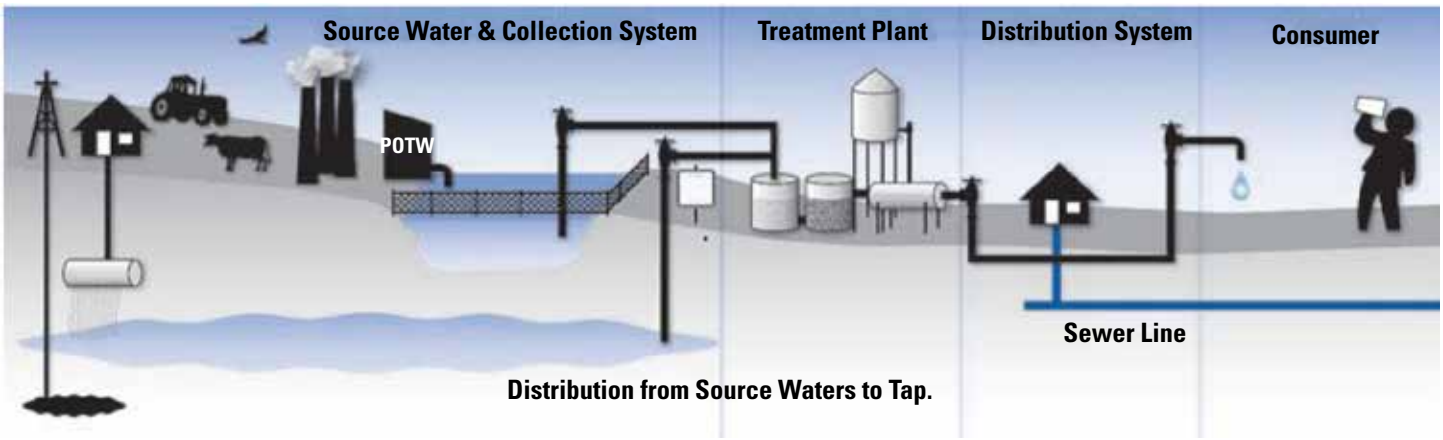
On top of this, American consumers aren't always doing their part in requiring fewer of these items to be produced. For example, in 2008 we threw away 34.48 million tons of paper and 27.93 million tons of plastic, both of which are water intensive materials that can be reused and recycled. Each of us can save 3.5 gallons of water just by recycling the daily newspaper!

You might be thinking, "If water is constantly being cleaned and recycled through the Earth's water cycle, why do *we* need to conserve it?" Even though water is always returned to Earth through the water cycle, it is not always returned to the same location or in the same quality and quantity. This can create a situation known as "peak water." This is when people are using our planet's fresh water faster than it can be naturally replenished, which makes our water supply vulnerable to reaching low levels. As populations continue to grow exponentially, the stress on water supplies will magnify, making conservative water usage a lifestyle that will become more and more important.

Water consumption and energy are inextricably linked. It takes a lot of time and energy to treat wastewater and to transport water to and from the treatment plant. The energy consumed throughout the treatment process accounts for 35% of typical U.S. municipal energy budgets, emitting 45 million tons of greenhouse gases annually. Letting your faucet run for five minutes uses about the same energy as letting a 60 watt light bulb run for 22 hours. So by sending less water down the drain you lessen the burden placed on treatment facilities, which saves you and your local government money and provides your community with a larger water supply and cleaner air! If the U.S. could achieve a 10% reduction in energy usage for treating water (and we can!), the nation would save $400 million and 5 billion kWh's annually.

Less water going down the drain also means that there is more water available in streams, rivers, and lakes. Therefore, using less water preserves habitat available to fish and other animals while also improving the quality of your drinking water supply and other water bodies. This is because when water levels are low, pollutants are more concentrated and harmful. If your local water bodies were to reach low levels, not only would habitat degradation occur, but additional dams and reservoirs could be necessary to make sure your town has enough water.

Much of what I've talked about may not directly impact you now, but it could in the future. Making small adjustments to your daily routines now would make a big impact when it comes to water conservation. A community shift to less wasteful water use could lessen the likelihood that your region experiences water scarcity in the future. So spread the word and start saving!



Distribution from Source Waters to Tap.

December 16 Marked 40th Anniversary of Safe Drinking Water Act (SWDA)

The Act was passed to protect public health by regulating the nation's public drinking water supply. We have made great progress over the past 40 years, but many challenges remain. EPA is committed to working with states, tribes, water sector partners and the public to meet the challenges ahead and protect public health.

The SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells (SDWA does not regulate private wells that serve fewer than 25 individuals.)

Originally, SDWA focused primarily on treatment as the means of providing safe drinking water at the tap. The 1996 amendments greatly enhanced the existing law by recognizing source water protection as important components of safe drinking water.

Focusing on lakes and reservoirs, which provide a substantial amount of Indiana drinking water, there are many best management practices we can focus on to protect this source water. A few activities that are more likely to occur among most lake properties are:

For more information: **www.epa.gov/safewater.**

With the new year around the corner and many of you working out those New Year Resolutions, please keep your lake in mind and how each step contributes to your lake stewardship!

Category, Activity, or Threat	Impacts, Implications, or Risk	Possible BMPs Available
Septic Systems	Improper siting, maintenance and use may contaminate both surface and ground water by percolation or runoff. Bacteria, protozoa, and viruses present in sanitary wastewater can cause gastrointestinal illness, cholera, hepatitis A and typhoid if consumed.	• Establish proper siting criteria • Specify appropriate design and construction criteria • Establish operation and maintenance protocol ("Septic System Ground Water Protection" EPA, July 1986 GPO 1991-517-003-28046) • Analyze assimilative capacity of soils and receiving water to determine appropriate density of septic system units. • Consider connecting to a public water system
Lawn & Garden Fertilizer	Field leaching or runoff into surface and ground water. Nitrogen leaching into drinking water supplies at levels above MCLs may cause "blue baby syndrome" in infants under 6 months —life-threatening without immediate medical attention. Symptoms are shortness of breath and blue skin color. Phosphorus may affect taste and odor of drinking water and may require treatment.	• Eliminate excess uses • Ensure proper application • Select appropriate fertilizer • Avoid application near wells used for drinking water, agricultural drainage wells; surface waters • Plant native plants and grasses requiring less fertilizer and water
Pet Waste	Watershed runoff or direct contact can introduce wastes into drinking water supplies. Cryptosporidium; Giardia lamblia, Salmonella, and E. coli pose the greatest threats	• Pick up after pets
Storm Water Runoff – Rain or snow runoff carrying sediments and contaminants into surface or ground waters – Pathways include excess volume runoff from settling ponds, municipal storm drains, parking lots, truckstops, gas stations, airports (fuel and deicing fluids) and road chemical Storage – Sediment and contaminants carried to surface and ground waters via infiltration through soil of drainage to subsurface wells or septic systems.	Possible contaminants include gasoline, oil, automotive fluids, sediment, pesticides, nutrients, animal wastes, and hazardous wastes. Nationally, 77 of 127 priority pollutants have been detected in urban runoff. Potential health effects from these contaminants include gastrointestinal illness, reproductive and developmental effects and increased cancer risk.	Basic pollution prevention practices such as erosion control and sedimentation control measures; land use controls; grassed swales; buffer strips; filter strips; storm water capture and retainment ponds, and constructed wetlands.

Volunteer Corner

~Sarah Powers

The volunteer data is coming together nicely from this past summer. You can look for the yearly reports to arrive in your mailbox after the first of the year. Last year we updated our reporting method and it will greatly increase our turnaround time on reports. If you have not yet sent back your annual survey please do so as soon as possible. Volunteer surveys help us track volunteer needs and make modifications to the program. It only takes a few short minutes of your time and is extremely valuable to our work.

We have had a substantial number of volunteers retire in the past few years and are continually looking for new individuals to monitor lakes and become a Citizen Scientist for the Indiana Clean Lakes Program. If you know of a lake that is not monitored or an enthusiastic individual who might be interested in monitoring please let us know. The continued support of the volunteer monitoring helps maintain long term seasonal data on the lakes you love.

We would like to invite you to join us the Indiana Lakes Management Society Annual Conference, March 5th and 6th. We will be able to train new volunteers as well as offer refreshers to existing volunteers. We would also like to invite anyone who would be interested in meeting with us to attend the conference and learn more about lakes. This is a great time to meet with lake enthusiasts from all over the state and learn about lake case studies, challenges, and solutions. Melissa Clark and I, as well as other Indiana Clean Lakes Program staff will be there to answer any question you may have. The conference will be held at Oakwood Resort on Lake Wawassee and offer a unique opportunity to meet with volunteers right on the lake. We hope to see you there!

Perspectives

"Autumn is a second spring, when every leaf is a flower."

~ Albert Camus

WATER COLUMN
Published quarterly by the Indiana Clean Lakes Program as a medium for open exchange of information regarding lake and watershed management in Indiana.

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CLEAN LAKES PROGRAM

Save the date!

The 27th Annual Indiana Lakes Management Conference

ILMS "Dedicated to our Lakes"

Thursday and Friday,

March 5th and 6th , 2015

OAKWOOD LAKE WAWASEE LAKEFRONT DINING & HOTEL

Oakwood Resort Syracuse, Indiana

Look for more information coming soon online at

www.indianalakes.org!

We are looking for presentations covering any of the following topics:

- Water Quality
- Fish
- Drawdown Logistics and Effects
- Increasing Community Involvement
- Grants and Fundraising
- Nuisance Flora and Fauna
- Partnerships
- Legislation

You can find more details here!
The deadline to submit an abstract is **Friday, November 7, 2014!**

Aquatic Invasive Monitoring Plant Highlight

This will be the tenth plant in the plant highlight series. We will be featuring one aquatic plant in each Water Column issue. We will feature both native and invasive plants to improve our plant identification skills.

Flowering rush (*Butomus umbellatus*) – INVASIVE

This will be the tenth plant in the plant highlight series. We will be featuring one aquatic plant in each *Water Column* issue. We will feature both native and invasive plants to improve our plant identification skills. Flowering-rush is an aquatic plant which grows along lakeshores and other slow-moving rivers in water 9 feet or less. The flowering-rush was initially brought to the United States and Canada as an ornamental but has since spread through the Eastern United States. Flowing-rush can grow up to 5 feet tall and blooms from June to August with three large bright pink petals.

You can find more information about our Invasive Plant Monitoring Program and the Flowering Rush on the Clean Lakes Program website at **www.indiana.edu/~clp**. We will be updating the Invasive Plant Monitoring page to include links to several resources and tips on identification guides.

Identification tips:

- Leaves are thin, straight, sword-shaped, triangular in cross-section, and up to 40 inches long (true rushes have round stems)
- Flowers grow on tall, cylindrical stalks in round-topped umbrella-like clusters of 20-50 flowers
- Flowers have three large pink petals (the three sepals under the petals are also pink and look like small petals)
- In deeper water, the plant grows submerged with floating leaves
- Resembles bulrushes and true rushes when not in flower
- Bulbils (little bulb-like plant sprouts) may be present at the base of flower stalks and at the roots
- Rhizomes are fleshy and grow trailing along the ground