

Riffles & Pools

Office of Water Quality www.idem.IN.gov



A blue-green algae sign at an Indiana Department of Natural Resources owned and operated beach advises swimming beach users of current algal bloom risk levels occurring in the lake water.

Greetings Riverwatchers!

Recently, a September drive to Bloomington and back was eye-opening. The view of parched grass and dying young trees near my apartment building in Indy spoke of a hot August with downpours so hard that water ran off before assuaging thirsty soil.

Yet, the view through the White River Valley grew lush as I headed south. Some verdant, late-planted soybean fields gave the appearance of June to low-lying areas. Then, harvested cornfields and ripening oats along the ridge lines on my return drive north gave the feeling of late October. Red leaves peeking out of green hillsides hinted that change is ever coming. A scattering of dead trees standing amidst such liveliness was a reminder of the end of all life, while their passing grants the start of life to so many others.

This reminds me of a quote by L.R. Knost:

Life is amazing. And then it's awful. And then it's amazing again. And in between the amazing and awful it's ordinary and mundane and routine. Breathe in the amazing, hold on through the awful, and relax and exhale during the ordinary. That's just living heart-breaking, soul-healing, amazing, awful, ordinary life. And it's breathtakingly beautiful.

Keep enjoying your favorite creeks, streams, rivers, and lakes, which afford proper 2020 social distancing for you and your dear ones! We look forward to a fresh start soon!

— Carol Newhouse, Hoosier Riverwatch Coordinator

Autumn 2020

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MARK YOUR CALENDARS!

[Basic Workshop](#)

Oct. 3 – Fort Wayne

Hoosier Riverwatch is administered by



2020 Workshops Continue Despite a Unique Season

Photos of HRW Basic Workshop, et al. in Elkhart County



Instructor Krista Daniels makes creative use of a picnic table, bridge, and stream area to teach participants in accord with local and state COVID precaution guidelines.



Crane fly larvae, collected during training session, indicates good water quality at this site.



Too young for a workshop perhaps, but not to enjoy learning to become river savvy up on Pigeon Creek at Mongo.

Photo by Doug Newhouse



That's one way to take a sample. And it doesn't even muck up the water. 😊

Nice use of a paint palette for separating aquatic insects. Another take on the ice cube trays seen in other photos. Mayfly another indicator of good water quality.



Algae and Cyanobacteria in Indiana



Photo by Laura Crane

Blue-green algae, also known as cyanobacteria, are a group of photosynthetic bacteria found in lakes and slow-moving streams. Increased phosphorus and nitrogen (nutrients) from fertilizers, warm weather, and low turbulence cause them to 'bloom' in large numbers. Phosphorus is particularly important in fueling their growth.

When blue-green algae grow unchecked in lakes, they may interfere with recreation in and on the water. Some blue-green algal strains produce toxins, threatening human and animal health. In extremely rare instances, toxin-producing blue-green algae have resulted in the sickness or death of animals, including livestock and dogs.

When algal blooms die off, they sink to the bottom. The degradation of this organic matter consumes available oxygen in the water. This depletion of oxygen may be great enough to result in fish kills.

Some blue-green algae blooms can create an earthy or musty smell in lakes and reservoirs. In some cases, taste and odor from algal blooms can impair drinking water supplies that use a surface water source. Taste and odor compounds are not harmful and treated water is safe to drink. See the Centers for Disease Control and Prevention [Harmful Algal Bloom-Associated Illness website](#) regarding human health effects of blue-green algae.

Advisory signs, like the one shown in the cover page photo, work in much the same way as our familiar Smokey Bear fire hazard alert signs:



Blue Diamond (Low Risk): Don't drink the water. Shower after you swim.



Yellow Diamond (Advisory): Swimming and boating permitted. Avoid contact with algae. Avoid swallowing water while swimming. Take a bath or shower with warm soapy water after coming in contact with lake water. Do not use lake water for cooking or bathing. Do not allow your pets to swim or drink water where algae are present.



Orange Diamond (Caution): Follow all advisory level precautions. Children and those with compromised immune systems should not swim.



Red Diamond (Closed): Algae and toxin levels make beach currently unsafe for swimming.

It is sad to report that, as this newsletter was being prepped, a Reuters news report claims Botswana's rash of elephant deaths are due to cyanobacteria. Meanwhile, Zimbabwe's experience of similar die-offs appears to be caused by bacteria gathered while feeding. It remains unclear why elephants are the only species succumbing at this time.

State's Role in Keeping Recreational Health Hazards at Bay

1

IDEM's mission is to protect human health and the environment, managing Indiana's water quality.

2

IDEM samples blue-green algae and their toxins at selected swimming areas at some state parks, reservoirs, forests, and recreation areas. Sampling is done in advance of Memorial Day up to Labor Day.

3

DNR advises the public of blue-green algae threat levels via signs at swimming areas and the internet. IDEM, DNR, the Indiana State Department of Health, and the Indiana State Board of Animal Health cooperate to provide updates and information via www.algae.IN.gov.

4

IDEM manages water quality, including public drinking water supplies, by regulating point and certain nonpoint pollution sources, monitoring permit compliance, enforcing protective regulations, implementing various prevention programs, and providing funding and technical assistance to voluntary nonpoint source efforts at the local watershed level.



IDEM staff use the cyanotoxin automated assay system (CAAS) equipment to analyze microcystin, cylindrospermopsin, anatoxin-a, and saxitoxin in beach water samples.



Toward the end of the 2020 beach sampling season, and in an attempt to complete the entire northern route in a single day rather than two days, IDEM staff augmented their sampling efforts by employing the use of a floaty in order to stabilize and handle the sampling bucket without the need for a second set of hands. They discovered, after trying a handful of items rigged up by staff, this particular mermaid floaty was the best option for the size and weight of the stainless-steel sampling bucket. Clever. Nice find and good job!

Monitoring Cyanobacteria & Toxins at Indiana Beaches

An updated look at the 2019-2020 Cyanobacteria and Cyanotoxin Beach Monitoring Program. Written by IDEM staff member Charles Hostetter of the Watershed Assessment and Planning Branch.

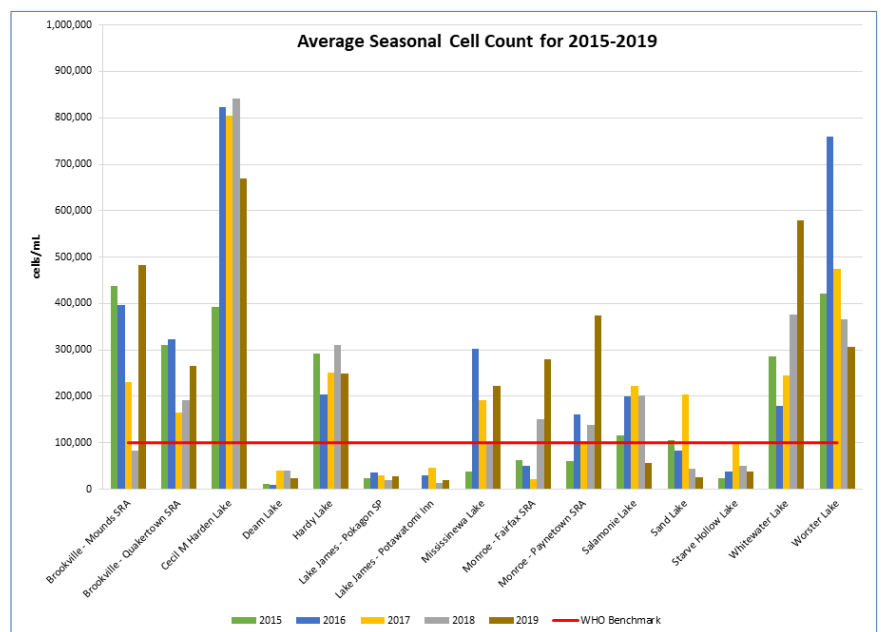


Early in 2019, the IDEM Office of Water Quality (OWQ) Watershed Assessment and Planning Branch purchased a cyanotoxin automated assay system (CAAS) in order to save time by freeing analysts from the burden of manual activities, such as dispensing samples and reagents or keeping track of process timers. The streamlining of this cyanotoxin process allows IDEM analysts to take on greater workloads, such as running ELISA (enzyme-linked immunosorbent assay) samples for the OWQ Drinking Water Branch Harmful Algal Bloom project, in addition to allowing time for other work functions.

The Indiana Department of Natural Resources (DNR) issues advisories at public beaches when IDEM cyanobacteria cell count results are greater than the 100,000 cells/mL threshold established by the World Health Organization. The picture on the cover page of this newsletter edition shows a cyanobacteria (or blue-green algae) sign with risk level diamonds at a DNR beach. Although the diamond shown is blue, indicating low risk, it is common to see yellow diamonds indicating high cyanobacteria cell counts in the warmer months of July and August.

The bar chart to the right shows average seasonal cell counts for all beaches sampled by IDEM from 2015 to 2019. Results almost always increase due to warmer temperatures occurring from late May until sampling stops just before Labor Day weekend.

In 2019, DNR only issued two toxin advisories (orange caution diamond) based on IDEM monitoring results. These were for total microcystin at Salamonie Lake/Lost Bridge West State Recreational Area (SRA) and Mississinewa Lake/Miami SRA beaches. Thankfully, the microcystin concentration levels never exceeded the 20 ug/L closure threshold and the beaches remained open with appropriate precautions.



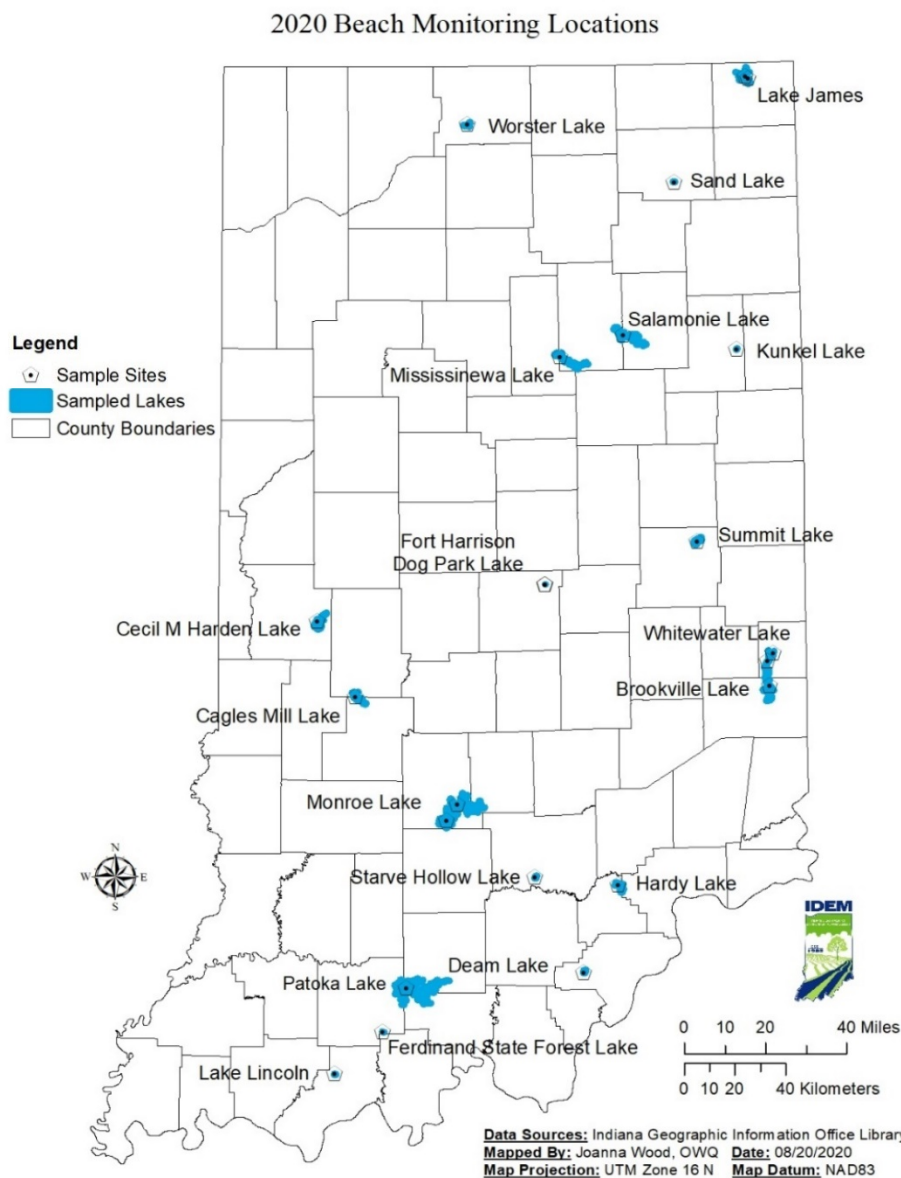
The table below shows the four toxins analyzed by IDEM for the beach monitoring program, along with recreational advisory and beach closure levels.

Exposure Reference Values (in ug/L) per Activity and Sampled Toxin	Microcystin	Cylindrospermopsin	Anatoxin-a	Saxitoxin
Human Recreation Advisory	8	15	80	0.8
Human Recreation Prohibited	20	20	300	3
Dog Recreation Prohibited	0.8	1.0	Any detection	Any detection

Continued

Monitoring Cyanobacteria & Toxins at Indiana Beaches (cont.)

Five properties were added to the monitoring program in 2020 to account for all the public beaches managed by DNR. These properties included Cagles Mill SRA, Summit Lake State Park (SP), Lincoln SP, Patoka Reservoir, and Ferdinand State Forest. See the map below of all beaches/properties monitored as part of this program. Please note that Lake James at Pokagon SP, Brookville, and Monroe Reservoirs each have two beach locations that are sampled.

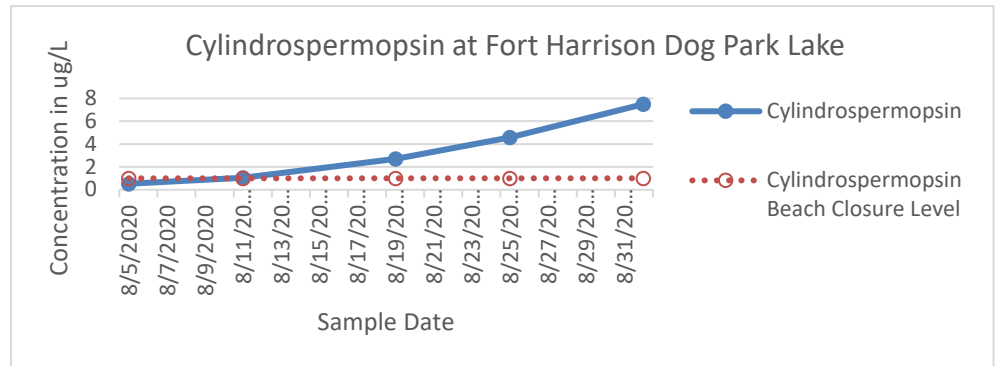


In 2020, it was necessary to close the “beach” at the Fort Harrison SP dog park lake due to the presence of the cyanotoxin cylindrospermopsin, which has been found to be toxic to liver and kidney tissue. While the aquatic recreational advisory from U.S. EPA for cylindrospermopsin is set at 15 ppb for humans; dogs are smaller and often ingest the water they swim in, either directly or by licking their fur. Therefore, the closure level for the dog park lake is set much lower at only 1 ppb cylindrospermopsin in order to adequately protect our canine companions.

Continued

Monitoring Cyanobacteria & Toxins at Indiana Beaches (cont.)

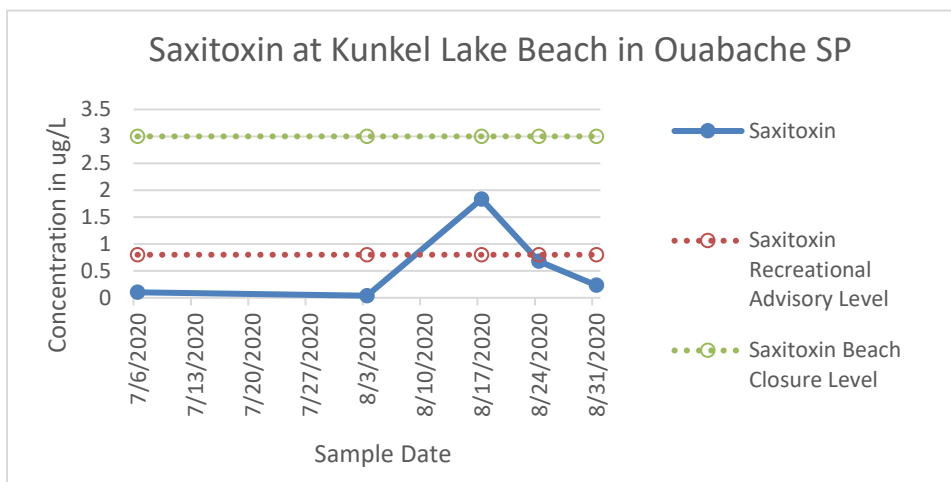
Despite having low cyanobacteria cell counts from prior dog park lake grab samples in July, cylindrospermopsin and other toxins were analyzed in early August, and cylindrospermopsin had a concentration of 0.5 ppb. The next week's sample had a result over 1.0 ppb and steadily climbed over the month, as shown on the graph to the right.



Still, the cyanobacteria cell counts themselves from the dog park lake remained low despite the rise in toxin levels. IDEM staff, therefore, did a periphyton scrape from mucky rocks found in the water at this beach. From those scrapings, the cylindrospermopsin toxin producers, *Lyngbya* (stalk of flattened cells) and *Anabaena* (faint shape that looks like strings of beads), pictured below, were identified under the microscope.



The only other beach where a toxin advisory was issued in 2020 was Kunkel Lake at Ouabache State Park. The advisory was issued due to elevated saxitoxin levels. Saxitoxin, a potent neurotoxin, was first analyzed by IDEM in 2018. It is usually most harmful to humans through the consumption of contaminated shellfish. A result of 1.8 ppb just two weeks after a nonreportable saxitoxin result raised immediate concerns at Kunkel Lake since the level established for beach closure is 3.0 ppb. Fortunately, saxitoxin is not as persistent in the environment as cylindrospermopsin. The levels at Kunkel Lake soon subsided and the advisory was lifted, as illustrated by the data in the graph below.



For additional photos and information (and ways to help prevent algal blooms), please see these previous editions of [Riffles & Pools](#):

Jan/Feb 2013 p2 (nutrient pollution), Nov/Dec 2013 p5 (pet waste), Mar/Apr 2014 p3 (USGS WaterAlert service), Sep/Oct 2014 p5 (blue-green algae), Jul/Aug 2015 p2 (harmful algal blooms), Autumn 2018 p4 (what IDEM does), Winter 2018 pp4-5 (lake vs. stream sampling, including cyanos).

Citizen Roles in Avoiding/Reducing Recreational Health Hazards

If you are recreating in a lake or other waterbody, do not ingest the water. Avoid contact with visible algae or algal scums, and shower or bathe with warm, soapy water when you are finished.

Algal toxins can cause skin irritation, gastrointestinal upset if swallowed, allergic reactions, and/or respiratory problems if inhaled. If you think you are ill from contact, contact your doctor for assistance and to [report a human illness](#).

DNR advises the public of the blue-green algae threat through signs at the swimming areas and on the DNR website for the properties being sampled. The [Indiana State Parks Advisories and Closings](#) page has the full list of these facilities. Heed posted advisory signs. Some exotic species of toxin-producing algae are not so easily seen without the aid of a high definition microscope.

Veterinarians recommend not allowing pets and livestock to drink or swim in waters visibly impacted by algae. If in doubt, KEEP YOUR ANIMALS OUT. Dogs are particularly susceptible to blue-green algae poisoning due to their small size and habits of lapping at water and licking their fur. If you think your animal is ill from contact, this is an emergency; call your veterinarian immediately! Details on what symptoms to track are provided on the Indiana State Board of Animal Health [Blue-Green Algae](#) site.

Field crews often access sampling locations from the public right of way at the nearest bridge. However, many sample sites are located a long distance from a bridge access, which may require field crews to contact landowners or property managers to request permission to access streams via private property. Between January and April, IDEM field crews will travel to potential summer sampling sites to determine their accessibility. Only with the help of landowners and property managers granting their permission can Indiana's rivers and streams be effectively assessed.

There are a number of actions every citizen can take to reduce the influx of nutrients into the watershed and improve overall water quality:

- Do not over fertilize. Check soil nutrient levels prior to applying fertilizer to ensure correct application. Soil test kits can be purchased from some local hardware stores and online.
- If applying fertilizer, use phosphorus-free lawn fertilizers. Lawn-fertilizer packaging is labeled with three numbers for nutrient content. Look for a zero as the middle number (phosphorus content) to indicate phosphorus-free fertilizer.
- Do not fertilize up to the edge of a waterway. Check with your local government for any specific setback requirements.
- Do not dispose of grass clippings or leaves in or near a waterway. [Properly manage](#) yard debris instead.
- To prevent nitrogen input from human waste, have your septic system inspected and the tank pumped out at least every two years.

More Resources for Cyanobacteria and Related Topics

View the IDEM [Blue-Green Algae video](#) about algal sampling.

Between Memorial Day and Labor Day weekends, follow IDEM's [weekly algal sampling counts](#) and view result summaries on the [Indiana Reservoir and Lake Sampling Update](#) page.

In addition to algal sampling at beaches, from June to August the [Lilly Center at Grace College](#) collects water samples from open water on Kosciusko County's twelve all-sport lakes and Center and Pike lakes, along with the public swimming beaches at Center, Pike, Syracuse, Waubee, Webster, and Winona lakes. Samples are processed and analyzed for microcystin, a blue-green algae toxin relevant in the county. Toxin results are updated on the Center's website every week during the summer.

For more on blue-green algae, explore the resources available from IDEM and partner agencies through the [About Blue-Green Algae](#) frequently asked questions and the Blue-Green Algae fact sheet (available on the [IDEM Fact Sheets](#) page).

Recreation-specific safety tips are included on the blue-green algae information sheet (available on the DNR [Blue Green Algae Blooms](#) page).

To learn the difference between non-threatening plants and harmful algae blooms, view the photos on the How to Identify Harmful Algal Blooms fact sheet (available on the Indiana State Department of Health [Harmful Algal Blooms](#) page).

For assistance in identifying and addressing algal issues on private waterbodies, consult the IDEM Blue-Green Algae Sampling Services document (available on the IDEM [Additional Resources](#) page).

Find current [lake information and monitoring data](#) collected by staff and students of Indiana University O'Neill School of Public and Environmental Affairs, as well as Indiana lake volunteer monitors, online.

Become informed about [exotic toxin-producing blue-green algae](#) that are now found in Indiana waters.

Can we eat fish from water containing blue-green algae? Some blue-green algal toxins can accumulate in the tissues of fish. Recent studies in Ohio have determined that the flesh of fish is safe to consume. The World Health Organization advises that if you eat fish taken from water where a blue-green algae bloom is present, eat them in moderation and avoid eating the guts, where accumulation of toxins may be greatest. Do not cut into organs when filleting and rinse the fillets with clean water to remove any liquids from the guts or organs before freezing or cooking.

Is our public drinking water safe? Yes. Water treatment processes remove any toxins from blue-green algae. Do not use lake water for cooking or bathing.

We all can prevent soil and organic matter from washing into waterways and carrying excess nutrients into storm drains. There are many ways to [reduce or stop nonpoint source pollution](#).

We can also limit the use of aquatic weed control. These chemicals can have unintended consequences for algae development and the potential release of toxins and, therefore, are not recommended.

Look for local watershed initiatives in your area using the IDEM [Watershed Groups Finder](#) and join in!

Mark Your Calendars

2020 Training Workshop Schedule

A Hoosier Riverwatch Basic Training workshop introduces you to hands-on water quality monitoring methods. You will learn about aquatic habitat, chemical, and biological assessment techniques. Sessions are held in- and out-of-doors. All interested persons, age 18 and over, are welcome to attend. Once trained, certified educators are qualified to teach these methods and topics to their students.

Workshops are free of charge. But it is important to register in advance using the contact given for the workshop you are interested in. Training does come at a cost to the program, however, as well as to the host and/or instructor. So, please, contact your instructor or host if you will *not* be able to attend the workshop that you have signed up for.

Please remember that volunteers and instructors must abide by [federal](#), [state](#), and local protocols for social distancing, hand washing, and face masks, as appropriate, at the time of their training.

Saturday, October 3

Fort Wayne, IN – Metea Park Nature Center (9:00 AM – 5:00 PM).
Instructor will be Sharon Partridge. Contact Sharon at ssp2655@gmail.com or 260-755-8111 to register.

Note that Sharon is planning an Advanced E. coli workshop shortly thereafter in the Fort Wayne area. Let her know if you might be interested as space will be limited.



An Asian clam ([Corbicula](#) sp.) die-off was reported on the White River from 72nd Street to Broad Ripple Park in Indianapolis in mid-July. Brant Fisher of DNR confirmed that these species of exotic bivalves are prone to dying by the tens of thousands during extremely high temperature/low oxygen days.

When they die on the river bottom, they pop open and their bodies float to the surface. Low oxygen can result from hot daytime temps, biochemical oxygen demand of substances in the river, low river flow, and/or the natural respiration process of aquatic plants during the nighttime hours.



Photos of dead [Corbicula](#) used by permission of Susan Reed.

Photo of live [Corbicula](#) by Yaca2671 – Own work, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=2215152>





**Indiana Department of
Environmental Management**
Office of Water Quality
*Watershed Assessment
and Planning Branch*

Mailing Address:
Shadeland Office
100 North Senate Avenue
Indianapolis, IN 46204-2251

Office Location:
Western Select Building
2525 North Shadeland Ave.
Indianapolis, IN 46219

Phone:
(317) 308-3392
(800) 451-6027 (toll free in Indiana)

Email:
riverwatch@idem.IN.gov

Hoosier Riverwatch Program:
www.idem.IN.gov/riverwatch

Hoosier Riverwatch Database:
www.hoosierriverwatch.com



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When life feels too big to handle, go outside. Everything looks smaller when you're standing under the sky.

– L.R. Knost

IDEM Office of Water Quality Mission

The Office of Water Quality's mission is to monitor, protect, and improve Indiana's water quality to ensure its continued use as a drinking water source, habitat for wildlife, recreational resource, and economic asset.

The office achieves this by developing rules, guidance, policies, and procedures; assessing surface and groundwater quality; regulating and monitoring drinking water supplies and wastewater facilities; protecting watersheds and wetlands; and providing outreach and assistance to the regulated community and the public while supporting environmentally-responsible economic development.

Hoosier Riverwatch Mission

The mission of Hoosier Riverwatch is to involve the citizens of Indiana in becoming active stewards of Indiana's water resources through watershed education, water monitoring, and cleanup activities. [Hoosier Riverwatch](http://www.hoosierriverwatch.com) is a water quality monitoring initiative sponsored by the Indiana Department of Environmental Management's *Office of Water Quality*.



Fall Creek in Fall Creek Gorge Nature Preserve,
Warren County, Indiana