

Leesville Lake Water Quality Newsletter



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Blue-Green Algae Vs. Phytoplankton:

Background

Blue-green algae and phytoplankton are both common in eutrophic lakes and other nutrient-rich water bodies. Phytoplankton is beneficial to aquatic ecosystems, while blue-green algae are toxic in high concentrations. Although they are called “blue-green” algae, these organisms actually come in a wide variety of colors. Phytoplankton are microscopic organisms that play important roles in oxygen availability and food production in aquatic systems.

What's the Difference?

Blue-green algae are essentially a subset of phytoplankton. Blue-green algae contain chlorophyll A, which they use to convert CO₂, water, and sunlight to create sugars and oxygen, which they need for energy. Like blue-green algae, phytoplankton has chlorophyll A, but also contain additional forms of chlorophyll, including chlorophyll's B, C, and D. Different types of chlorophyll

can absorb different wavelengths of light, and organisms contain only the types which allow them to process available light the most efficiently.

Are they bacteria or plants?

Despite being able to conduct photosynthesis, blue-green algae are in fact a type of bacteria called *cyanobacteria*. Although they are prokaryotic (single-celled), blue-green algae are rather complex organisms that can regulate their position in the water column by using an organelle called a “heterocyst” to regulate the amount of nitrogen gas inside of them, therefore changing their buoyancy.

Importance of Phytoplankton

Like blue-green algae, phytoplankton are microscopic, single-celled organisms that turn light into sugars, which also produces oxygen in the process. Phytoplankton are responsible for more than

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Photo Courtesy of Frank Podrebarac

Algae, cont.

40 percent of the Earth's photosynthetic production, the process of which removes large amounts of carbon from the atmosphere, then deposit it into aquatic systems for later use.

Unlike blue-green algae, phytoplankton serve as a food source for zooplankton and many other types of small marine life, which in turn feed larger organisms such as fish, insects, and birds. Decreases in numbers of phytoplankton result in lower amounts of dissolved oxygen in the water, which can ultimately result in stresses to local fish and wildlife populations. See the "Parameter of the Month" for more about Blue-Green algae.

Additional Bacteria Monitoring

Two additional sites were sampled in June and tested for E. coli: Mile Marker 10 and the area underneath the powerlines that traverse the lake South of Toler Bridge. We are happy to report that both locations tested well below the safe levels for swimming and fishing.

However, swimming is still not recommended in the areas surrounding the Pigg River and the Toler Bridge, as both have elevated E. coli levels.



Leesville Lake Annual Picnic

This year, the Leesville Lake Beautification Day Volunteer Appreciation and Annual Meeting Picnic took place at Leesville Lake Marina Saturday, July 15th from 1-4 pm. Sherwood Zimmerman, President of Leesville Lake Association, was the master of ceremonies, and extended his thanks to everyone for their efforts this Beautification Day. He also pointed out that more debris than ever before had been collected. The Annual

Meeting included a review of proposed new Board members and a vote. The budget for the next fiscal year was also introduced, and changes from the current year were discussed. Approval was made by all who were in attendance. As always t-shirts from previous years and the current year were available. The artist of the t-shirt designs, Bob Rankin, also sold prints which... *Cont. Page 3*



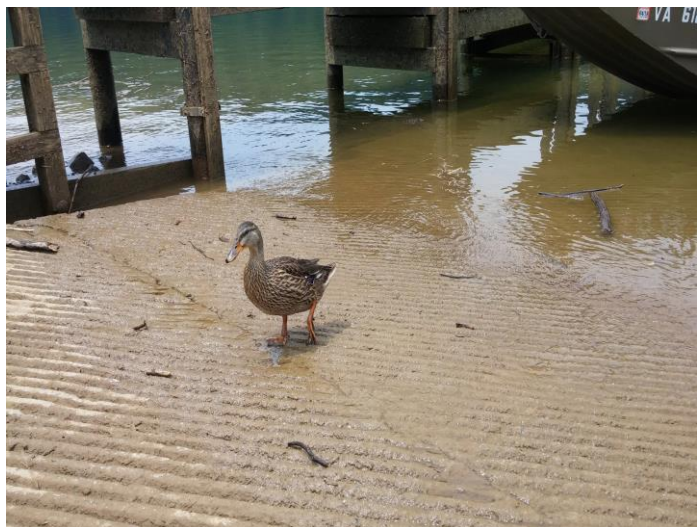
Debris Update

The debris cleanup barge operated by AEP has certainly been more active in July than in recent months, but logs and other debris remain a common sight along shorelines and throughout the lake, even on public boat launches (*left*). AEP reports they have removed approximately 400 tons of debris from Leesville Lake in 2017 alone.

Annual Picnic, cont.

he personally signs for all purchasers, making them truly one of a kind.

The water quality of Leesville Lake was also a topic of discussion, particularly the concerning levels of E. coli. As mentioned previously, the E. coli concentrations tend to be highest around the Pigg River and Toler Bridge, and decrease as you move away from these locations. Luckily, we have seen decreases in E. coli levels with measurements this month, and we expect this trend to continue. Water quality testing frequency has been increased by both the Water Quality Committee and Lynchburg College. Updates about the increased testing will be included in future newsletters.



Special thanks to Pat Kuhrtz and Frank Podrebarac for their help with this article!!!

Photo Courtesy of Frank Podrebarac

Parameter of The Month

Blue-Green Algae

For July's parameter of the month, we will be taking a closer look at blue-green algae, or as it is affectionately called by some: "pond scum". As mentioned in the front-page article, blue-green algae are typically green, but can really be a plethora of colors, including green, red, white, brown, and even purple. We also mentioned that B-G algae are a type of bacteria (*cyanobacteria*) rather than a "true algae", but there are some scientists that believe these complex organisms deserve a title more noble than "bacteria".



Image Credit: <http://www.npr.org/tags/485370156/blue-green-algae>

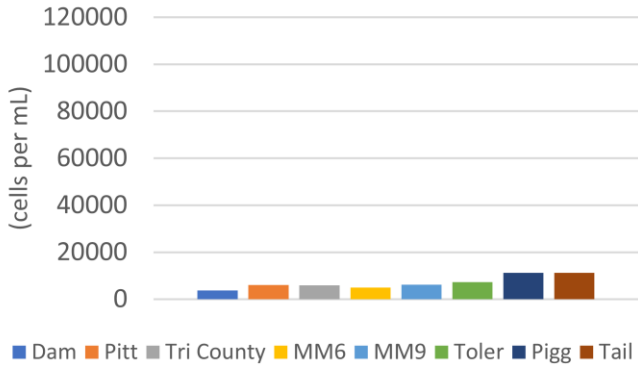
B-G algae are the only type of bacteria capable of both obtaining their energy through photosynthesis and producing oxygen. They are also capable of fixing nitrogen from the air without the symbiotic relationship necessary in many N-fixing plants, such as legumes. Due to the capability to fix nitrogen, they can use nitrogen gas regulate their temperature via their depth. If they need warmer temperatures, they can simply retain some of the nitrogen gas they would normally release, increasing their buoyancy and causing them to rise toward the water's surface.

However, if a water body has excess nutrients, especially phosphorous and nitrogen, it may result in a blue-green algal bloom (*above right*), which can be detrimental to water quality and the aquatic ecosystem. Too much B-G algae results in decreased light penetration to phytoplankton, discolored water, depletion of dissolved oxygen, and eventually toxin production. In fact, exposure to water sources containing moderate to high amounts of cyanobacteria can be toxic to many common pets and animals, such as dogs, cats, birds, and even some livestock.

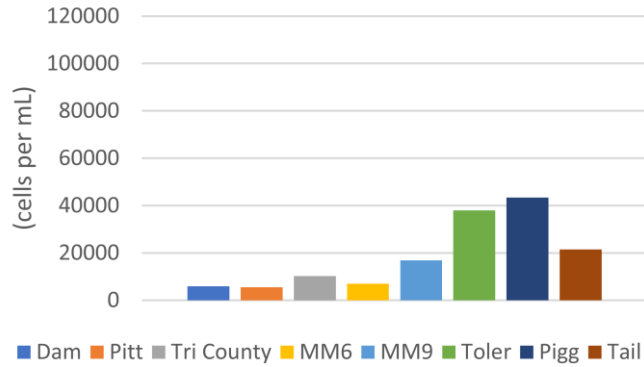
If B-G algal blooms persist, phytoplankton and other aquatic species will eventually succumb due to a lack of light and dissolved oxygen. When B-G algal blooms die off, the cells sink and begin to breakdown. The process of decomposition requires dissolved oxygen, levels of which have already been depleted by the process of the bloom. The process is called biological oxygen demand(BOD), and increases in BOD adversely affect fish and other aquatic life.

Monthly Water Quality Report

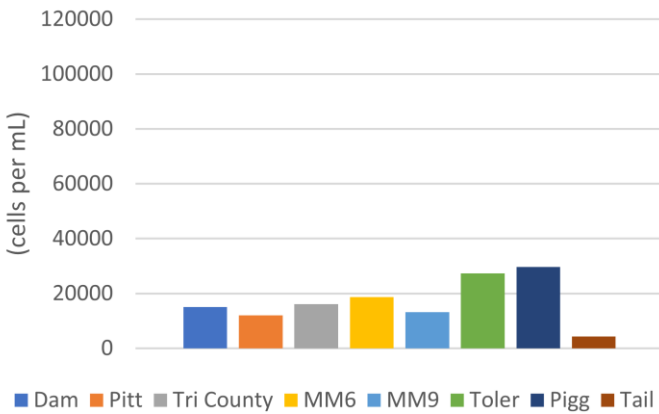
Blue-Green Algae - July 2017



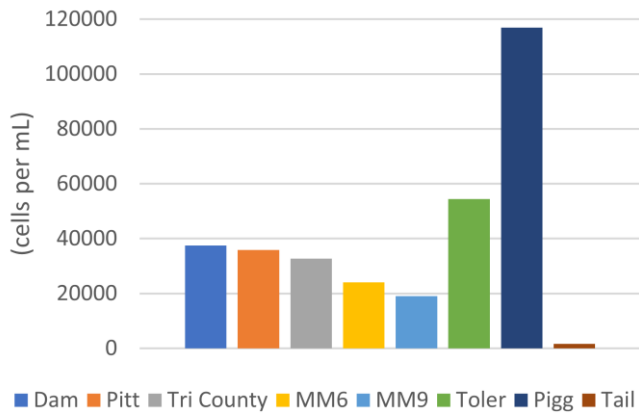
Blue Green Algae - June 2017



Blue-Green Algae - May 2017



Blue-Green Algae - April 2017



As July comes to an end, we see the lowest concentrations of blue-green algae throughout the lake so far this year, with the exception of the tail waters, which are only slightly higher than in previous months. Since Lynchburg College began collecting data on Leesville Lake, September has had the highest concentrations of any month, while the lowest concentrations tend to occur during the cooler times of year when metabolic rates are slow.

July also marks the lowest E. coli concentrations on average throughout all of Leesville Lake. This is a wonderful news for residents, boaters, fisherman, and anyone else who enjoys spending time on the Blue Jewel. We expect E. coli numbers to continue decreasing until around September or October when the lake turns over from the cooler weather. In July, conductivity was higher than in June or May, and about the same as in April. This could be for several reasons, including increases in sediment, faulty-septic system runoff, and other inorganic pollutants making their way into Leesville Lake or its tributaries. However, the slightly elevated conductivity levels are nothing to be alarmed about, as it is typical for this time of year.

Water Quality Research Members



Dr. Thomas Shahady has been conducting water quality research at Leesville Lake since 2006. He is an Environmental Science professor at

Lynchburg College, and teaches a variety of freshwater ecology courses. He received his BS in Biology at Guilford College, MSP.H. in Environmental Biology at UNC School of Public Health, and PhD in Zoology at North Carolina State University. He has had experience with the EPA and North Carolina Departments of Environmental and Natural Resources. His research interests are in aquatic ecology, lake management, and environmental compliance.

Email: shahady_t@lynchburg.edu

C.T. Boaz is a new member to the Water Quality Project. He is a senior at Lynchburg College, majoring in Environmental Studies with a minor in Environmental Science; with a focus on water quality.



Some of his interests include hiking, fishing, gardening, and woodworking. His plan is to intern for Dr. Shahady during the Summer and continue water quality research with him throughout the 2017-2018 school year. He will be managing the water quality newsletter for the Summer, hoping to bring some basic understanding of what the research purpose is, and discussing the monthly findings. Please feel free to email him with any questions, concerns, or suggestions!

Email: Boaz_c@lynchburg.edu



Anthony Capuco, aka Tony, has lived at Leesville Lake for 3 years. After receiving his BA in Biology from Hobart College, he went forward to pursue a PhD in Mammalian Physiology from Cornell University. He then had a 30-year career as a research scientist with the USDA- Agricultural Research Service as a lactation and cell biologist. He has been a member of the water quality committee for 3 years. Tony likes spending time woodworking, swimming, golfing, and time with family and friends.

Dave Waterman is a new member to both Leesville Lake, moving here a little over a year ago, and the water quality project. Before joining the Leesville Lake community Dave received his BS in Economics at Northeastern University, which led to his career working for an electric company called National Grid. He recently began engaging in the water quality project volunteering with the TLAC Environmental Committee. During his off time, he is a voracious reader, enjoys swimming and boating, and daily walks and hikes.



Mike Gooden is a new member of the Leesville Lake Water Quality Committee. Before settling into the cabin his wife, Margy, and himself built in 2010, he received his Bachelor's degree in Chemistry of the University of Maryland at Baltimore County. He then worked at the National Institute of Standards and Technology from July 2007 to June 2016, acting as a liaison between the technical staff and the contracting office to generate contacts that met mission requirements. During his time off he enjoys hiking, running, kayaking, photography, reading, and helping others.