Issue 1 June 30, 2016

Leesville Lake Water Quality Newsletter

Photograph of Tri-County Marina. One of the two marinas Leesville Lake has.

All photographs by Jade Woll

Inside This Issue

The History of Leesville Lake

Leesville Lake, also known as a Blue Jewel near the Blue Ridge, is a seventeen-mile long lake that is surrounded by one hundred miles of lush wooded shorelines. This lake is different from its neighbor Smith Mountain Lake, having minimal development along the shoreline, creating a quite and serene environment for the community.

This unique oasis was built in the early 1960's as a solution to the reoccurring flooding of the Roanoke River. In order to solve this flooding crisis, the US Army Corps of Engineers conducted a survey in 1927 that determined where flood control, irrigation, and hydropower projects would be most efficient.

Initially it was extremely difficult to receive funding for the flooding issue, but after a flood hit towns off of the Roanoke River in 1940, devastating the communities, the US Army Corps of Engineers pushed forth again for funding. Finally funding was given, and there were 8 flat reservoir sites that would be constructed to help the flood epidemic.

Leesville Lake is a part of the Leesville Smith Mountain Pumped Storage Project, which began construction in the early 1950's and was completed in 1966 by AEP.

Continue to bottom left of pg. 3

Fun Fact!

One wind turbine can generate about 2 megawatts, which generates electricity for about **400 homes**. The installed capacity for the Leesville Smith Mountain Project is 635 megawatts, aka electricity for **127,000 homes**.

Sampling Sites

Leesville Dam

This site provides data on the lacustrine portion of the lake. The data can be compared to the transition section (MM6) and the riverine section (Toler Bridge).

Leesville Lake Marina

Formerly Pitt Stop Marina, this site receives water from Old Woman's Creek enters the lake near the marina, which could increase the flow of bacteria into the site due to the water coming from the runoff into Old Woman's Creek.

Tri-county Marina

This site has a swimming area, which is why bacteria levels are tested for water safety. Possible causes for increased bacteria levels at this site could be failed septic systems from older homes along the lake.

Mile Marker 6

Also known as MM6, this site is a transition zone from the riverine portion of the lake to the lacustrine portion of the lake. It also provides information on changes in water quality from Toler Bridge to MM6.

*Site description provided by Mike Lobue

Leesville Lake Water Quality Monitoring

In 2007 Leesville Lake Association started the water quality-monitoring program. Mike Lobue, one of the 3 people who started the program, said that initially association volunteers would collect data and test for *E. coli* using tools provided by the Virginia Department of Environment Quality.

Eventually the Appalachian Power Company began funding the project in 2010, allowing the Association to partner with Lynchburg College. This new partnership "allowed us to greatly expand the program to include more water quality data and analysis", says Lobue.

The fiscal year objectives, according to the Leesville Lake Association website, are to annually submit water quality plans to APC, train program volunteers, obtain data and samples according to plan schedule, submit water quality data to the Virginia Department of Environment Quality, and prepare and submit a water quality report to Appalachian, Leesville Lake Association members, and other sources.

Tony Capuco, a 3-year member of the water quality project, believes it is essential to continuously monitor water quality so that sufficient data can be obtained to identify trends and statistically meaningful changes in the water quality of the lake.

Capturing monthly data allows members of the community to be aware of the possible changes that could be necessary to avoid for safety concerns.

Additionally, with this project members have seen a

change in activities that could have been detrimental to the lakes health. Dave Waterman, a new member to the project, has already become more aware of how detailed some of the issues and best practices are.

Both Lobue and Capuco explained how the association has been promoting behaviors that promote for better water quality.

The ability for community members to assist on the monitoring allows them to gain a greater understanding of what is going on in the lake.

Lobue says he now has a better understanding of the relationship between nutrients and water quality, the importance of bacteria monitoring and the relationship between a healthy fishery and good water quality.

Dr. Thomas Shahady, from Lynchburg College, emphasized the importance of creating a long-term data set documenting the water quality of Leesville and its relationship with Smith Mt.

History of Leesville Lake Continued from pg. 1: The Storage Pump Project was the first Appalachian project to utilize the pumped storage concept. This concept utilizes water from both lakes by pushing water from the upper lake (Smith Mountain Lake) through turbines, into the lower lake (Leesville Lake), creating almost a washer machine effect. Power is generated by passing water through the turbines, which causes the Smith Mountain Lake level to fluctuate up to 2 feet while the Leesville Lake becomes full. Once the lake is full power cannot be produced until some of the water is pumped back into Smith Mountain Lake, which creates this washer machine cycle. The hydroelectric system helps power the sister lakes communities, as well as created a solution to the continuous flooding of the Roanoke River.

Sampling Sites

Mile Mark 9

Also known as MM9, this site provides data on bacteria settling from Toler Bridge. It also shows the reduction of bacteria when compared to the higher levels at Toler Bridge.

Toler Bridge

This site is downstream of the confluence of the Pigg River and the water from Smith Mountain Lake. This site provides data after Pigg River water is diluted with Smith Mountain Lake water when the water is flowing downriver. This site provides data on the riverine portion of the lake.

Pigg River

This site provides data on quantity of bacteria and nutrients entering the lake from the river. Historically there have been high levels of both nutrients and bacteria at this site.

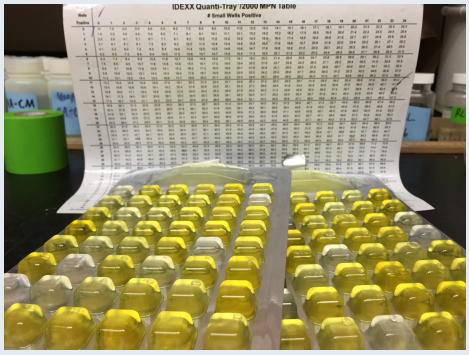
* Site description provided by Mike Lobue

Parameter of the Month

E. coli

In the world of water quality there are specific parameters tested to determine the overall health of Leesville Lake. In each newsletter, we will highlight a specific parameter that we use for evaluating water quality. For this months newsletter we will dive into the life of *E. coli*, spreading awareness and possibly squashing some widely spread rumors and hopefully clearing its name once and for all!

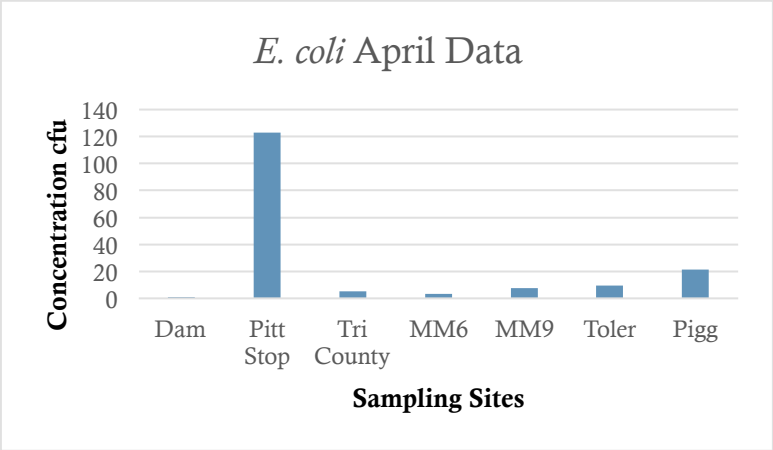
The website for the Center for Disease Control and Prevention explains that *E. coli*, also known as *Escherichia coli*, is a bacteria that normally lives in the intestines of people and animals. According to the website most *E. coli* or coliform bacteria are harmless, which if you are like me shatters all your previous beliefs about the so-called truth of the dangers of *E. coli*. I admit, I quickly hopped onto the "I hate *E. coli*" bandwagon from all those crazy stories about outbreaks and stories about new limbs and deformities, okay maybe the limbs and deformities I made up but the media still makes it seem like it is a scary *E. coli* infested world out there! But don't get me wrong, there are cases where *E. coli* can cause some unwanted stomach illnesses such as the infamous diarrhea, which is why it is essential to collect *E. coli* data in bodies of water especially those that are of recreational use. Because of the potential increase of bacteria due to runoff from farms, spillage of septic tanks, and other sources that can increase the level of bacteria in the lake it is important to test monthly for *E. coli* levels. . Being aware of *E. coli* levels allows communities, like Leesville Lake, to become more aware of water safety and avoid swimming in areas with high bacteria count.

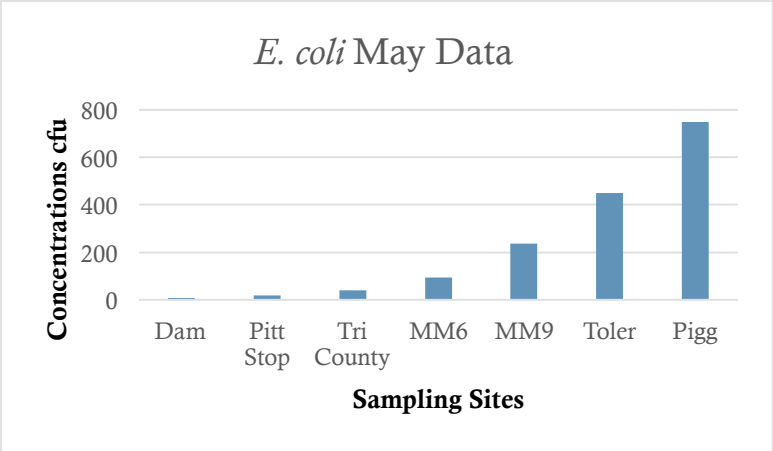


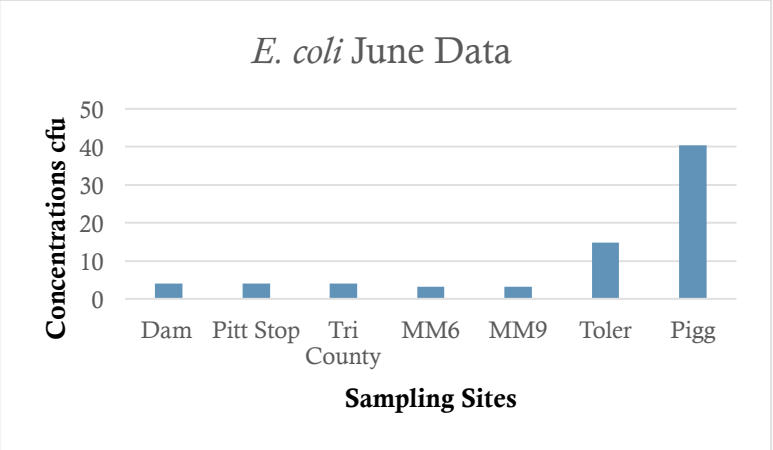
The sampling method for *E. coli* is one of the more simple ones. We collect samples in sterile 125 ml polypropylene bottles, and proceed by mixing a Colilert media packet into each sample. Next step is placing these samples into a Quanti-Tray, which are then sealed and incubated. Final step is counting the total number of wells that are fluorescent, indicating the presence of *E. coli*. This information is entered into a chart, giving the final concentration of *E. coli* for that sample. When a sample exceeds a concentration of 235 cfu per 100 mL of water it becomes matter of concern. Although *E. coli* has received a bad rep over the years, it is important to remember that it takes a large dosage of *E. coli* to have a really harmful effect. If you continue to avoid drinking the lake water, not swimming in muddy areas like the Pigg River, which often contains the highest *E. coli* levels, being aware and attentive to warnings of *E. coli* levels, you will be able to avoid a very unwanted stomach bug.

For more information: http://www.cdc.gov/ecoli/general/index.html

Monthly Water Quality Report







This section will have a monthly report about the lakes water quality during the previous month and a graph or figure showing results. The report this month will focus on *E. coli* levels and trends throughout April, May and June sampling.

Looking at the *E. coli* levels in April, we can see the trends for both the lake during this time of year as well as for the different stations. Leesville Marina (Pitt Stop) had the highest observed values of *E. coli*. These values could possibly be associated with Old Women's Creek, due to an increase in runoff from the stream. As expected, trends show an increase of *E. coli* levels as you move up the reservoir towards Pigg River. This sample may reflect the hydrology of the lake during periods when the Smith Mountain Lake dam pushes water back into Leesville Lake lowering the levels of bacteria, generally inputted from Pigg River.

Moving forward to May data, *E. coli* levels were exceptionally high. This again is expected due to the heavy rainfall we received during this month. Due to the increases rainfall, runoff of nutrients and bacteria are expected to increase. There were very high levels of *E. coli* in the upper lake section, gradually increasing the closer we moved toward Pigg River. Sites MM9 through Pigg River were in violation of the 235 cfu per 100 mL of water.

Although May *E. coli* levels were high, bacteria levels fluctuate quickly especially in times of heavy rainfall. As you can see in the June *E. coli* data there was no high bacteria levels throughout the lake. Thus- two trends are noted in Leesville Lake. High *E. coli* levels enter from the Pigg River but reduce rather quickly in the lake. And secondly, this trend is evident even during heavy rains but if the rains are significant enough the lake shows very high levels of *E. coli* throughout. We will add a small monthly report of *E. coli* levels in each newsletter, for monthly updates.

Water Quality Research Members

Dr. Thomas Shahady has been conducting water quality research at Leesville Lake since 2006. He is a 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.

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Jade Woll is a new member to the Water Quality Project. She is a recent graduate of Lynchburg College, with a BS in Environmental Science and a minor in Photography. Her plan is to continue working for Dr. Shahady this summer, move to Pensacola, FL. for a forestry conservation program on the Naval Base, and pursue a graduate degree the following year. She will be managing the water quality newsletter for the summer, hoping to bring some basic understanding of what the research purpose is, and what the monthly findings are. Feel free to email her with any questions or suggestions!

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Mike Lobue has lived at Leesville Lake for 16 years. Prior to this Mike received his Professional Degree in Chemical and Petroleum Refining Engineering from the Colorado School of Mines and worked for a major oil company for over 30 years. He is one of the 3 people who started the water quality program back in 2007. Mike continues to help with monthly sampling with other lake volunteers. When he is not helping save the water Mike enjoys boating, fishing, golf, and clay target shooting.

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.