

Leesville Lake Water Quality Newsletter



Photograph of Leesville Lake Dam, one of the two Hydroelectric Pump Storage units.

Photographs by Jade Woll and Leesville Lake Association.

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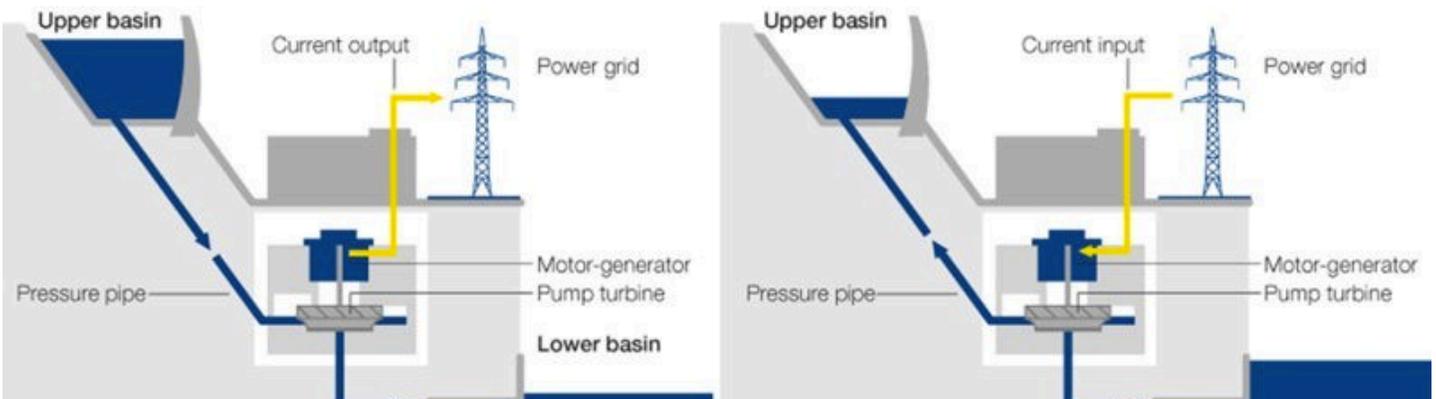
Hydroelectric Pump Storage Systems

Hydroelectric dams have become one of the leading resources of renewable energy in the United States. Leesville Lake and Smith Mountain Lake are man made lakes, created for the hydroelectric pump storage system project created by AEP. The Smith Mountain Lake operations focus on water management levels, generating electricity, and pumping water back into storage.

The way this system works is through a pump storage operation. The process starts in Smith Mountain Lake, where water flows into the reservoir that is held back by the dam. Once Smith Mountain Lake reaches full pond, which is 795ft above sea level, it no longer lets water accumulate in the reservoir. Once power is demanded the generator units start, which allows water to flow down through the turbines generating electricity.

Water will then flow into Leesville Lake, which reaches full pond at 613ft above sea level. On the days when there is greatest demand for electricity, Leesville Lake rises while Smith Mountain Lake falls. Additionally, there are generators at Leesville Lake dam, which allow some water to flow into the turbines every hour to generate electricity, as well as maintain minimum water flow downstream to Stanton River.

Continue to bottom left of pg. 3



Input of excess nutrients into lakes...

Sewage Treatment Plants

Direct input of effluent water.

Household Detergents

Although phosphate levels have been lowered in detergents, there are still small amounts that can go into water.

Septic Systems

Overflow and breakage of septic systems can cause a direct input of human waste.

Sediment

Excessive erosion from construction sites, which can have nutrients attached to sediment, can runoff into water.

Animal Manure

Animal Manure is one of the highest levels of nutrient input, more than 4 billion lbs. go into bodies of water.

Commercial Fertilizers

4 billion lbs of phosphorous comes from commercial fertilizer, which can absorb into the soil and groundwater. Due to runoff this can go directly into the water.

*Information provided by Water Encyclopedia



Leesville Lake Annual Picnic

Leesville Lake Association holds an annual picnic for the lakes community. The 2016 picnic was held July 16th, to recognize those who participated in the Leesville Lake Beautification Day, as well as to have the members of the lake gather and have a day full of food and company.

This picnic had a solid turnout of about 80 members, including the Campbell County Supervisor, Stan Goldsmith. Tony Capuco, the newly inducted chairman of the water quality committee, says, "Despite the threat of rain, we were fortunate to encounter only a sprinkle lasting about two minutes" not impacting the picnic festivities.

Brain Miller catered the picnic, providing Leesville Lake members with a delicious barbecue meal.

Additionally lake members chipped in and provided a variety of desserts for the picnic.

During the picnic a general business meeting of the Association was conducted. New board members were elected, congratulations to the newly elected members Margy Nolan, Frank Podrebarac, and Dannie Smith.

Each of the Lake Association committee chairs provided the community with reports pertaining to their work. Additionally this years Beautification Day was one for the books, removing a record amount of debris from Leesville Lake.

Mike Lobue, who was one of the founders of the water quality committee, stepped down as chairman this past month. "He was a guiding

force since its inception in 2007” said Tony Capuco.

The annual picnic is one of the many community-gathering opportunities for Leesville Lake members. It provided a venue for the

introduction of new members and spirited discussions about stewardship of the beautiful Leesville Lake.

For more information on the picnic or other community gatherings, visit the Leesville



Hydroelectric Pump Storage Systems continued from pg. 1:

During the night, when power demands are lower, the pumping is reversed and water is pumped back to Smith Mountain Lake. This is an ongoing cycle that allows Leesville Lake and Smith Mountain Lake to pump the water back and forth for electricity. Although there are several benefits to Hydroelectric Pump Storage systems, there can be environmental impacts to the local wildlife and fauna. Due to this system pumping water back and forth between the two reservoirs, spreading of species can be increased. Meaning that the pump system can bring species from Leesville Lake to Smith Mountain Lake. This is referring to organisms like phytoplankton, bacteria, etc. all of which are capable of not being killed while going up the turbines. This is an issue because the introduction of species from the different reservoirs can lead to a reduction or extinction of specific flora and fauna that are native to those reservoirs. Additional impacts are constant fluctuation of water within a shorter period of time, quicker rather than gradual fluctuation of water levels, landscape changing due to shoreline erosion caused by water levels changing, and lower visibility due to constant input and output of water near the reservoirs. Although there are environmental impacts Leesville Lake Association has taken the correct approach, covering a variety of environmental issues such as: debris, aquatic invasive vegetation, water safety and education, water quality, and many more. To read more about the Lake Associations role in keeping the lake clean and environmentally friendly, visit the Leesville Lake Association website to learn more about each committee and what their role is.

Diagram from pg. 1 provided by Hydro Equipment Association

Fertilizer

1-2-3

1= Nitrate
2= Phosphorous
3= Potassium

And how to avoid it!

Use no-phosphorous fertilizers

Look for fertilizers with no phosphorous. Look at the above diagram to show you what to look for!

Sweep it up!

Sweep up any excess grass, fertilizer, or sediment to avoid excess runoff into the lake.

Solid riparian buffer!

Strong riparian buffers, full of trees and vegetation help to absorb and filter runoff.

Keep livestock away!

Be sure not to allow livestock to defecate directly into water, and create holding ponds to collect manure runoff.

Use no-phosphorous detergents

Keep an eye out for cleaning products with lower nutrient levels. This can help prevent direct input of nutrients into the water.

*Information provided by Minnesota Pollution Control Agency

Parameter of the Month

Total Phosphorous

For July's parameter of the month, we have decided to dive deep into the life of Phosphorous. Phosphorous is one of the most common nutrients looked at when determining the health of Leesville Lake. The Water Encyclopedia explains how nutrients are "critical to the development of plant and animal life", because they are essential for algae growth, which is the base of the food web in this ecosystem.

When measuring this parameter we look at the total phosphorous levels, for those who are a little closer with total phosphorous feel free to call it TP, it will not be offended! It is essential to look at the TP levels because it is a critical nutrient, often in short supply, for both aquatic animals and plants. TP measures all forms of phosphorous, allowing us to have a better understanding of the overall levels of phosphorous found in Leesville Lake.

Although TP may not have the well-known bad rep as our previous contestant, *E. coli*, it can have some serious effects on a lakes health. When there is an abundance of nutrient levels it can cause Eutrophication. This occurs when there is an increase of chemical nutrients within the environment.

The life of eutrophication goes a little like this... There is a big storm that creates a huge amount of runoff of sediment and waste from the local farm. This sediment has pesticides and fertilizers absorbed into it that are eventually released into the lake. Now that the lake is filled with additional nutrients, it begins to have a severe impact because these nutrients continue to buildup. This increase of nutrients causes the plants and animals to have a feast! Imagine Thanksgiving, but each organism has a Thanksgiving all to itself. This causes a drastic increase in both algae as well as aquatic animals.

There will be noticeable differences in the water when eutrophication occurs. Thick mats of algae begin to appear; there can be scum and foam on the surface, bad odors and taste problems in the water, and death and disease of aquatic life. Additionally there are unseen effects, such as the reduction of dissolved oxygen, which directly affects the aquatic life resulting in deaths.

TP is not toxic to humans in moderate concentrations, but it can cause certain species of algae (Blue-green algae) to become more abundant. Blue-green algae can produce toxins that harm the nervous system and liver of both animals and humans. Additionally it can lower the fish population in the lake, which affects many of the recreational activities of the Leesville Lake community. If you follow some basic practices, nutrient increase can be avoided. The side panels of this newsletter explain ways TP can get into your waters, as well as practices to help avoid the increase of nutrient levels in Leesville Lake.

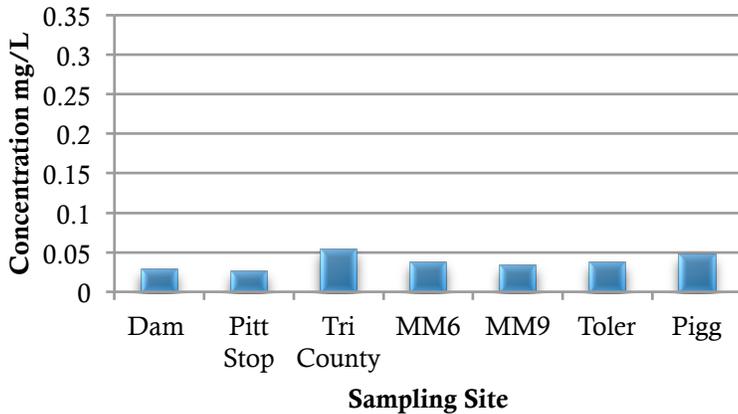


Image provided by Soil-Net photo and image library

For more information: <http://www.waterencyclopedia.com/Mi-Oc/Nutrients-in-Lakes-and-Streams.html#ixzz4EleFI8l4>

Monthly Water Quality Report

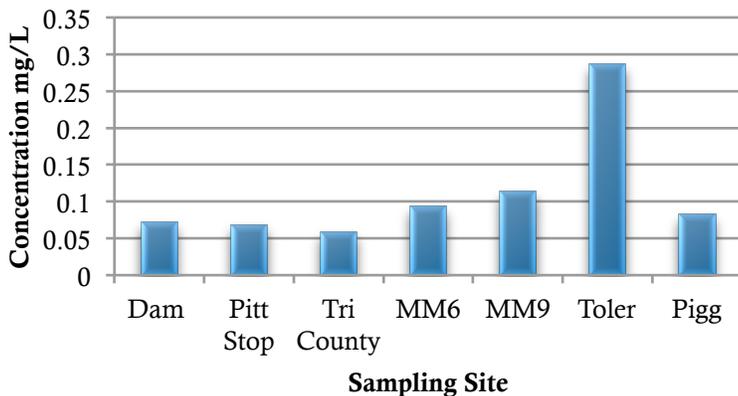
Total Phosphorous April Data



This month's water quality report is focusing on Total Phosphorous levels during the months of April and May. Due to extensive analysis for this parameter we are unable to put up reports from June and July because we still must run the analysis as well as sample (sampling is conducted at the end of each month).

Healthy levels of total phosphorous are between 0.03-.05 mg/L. Once levels begin to go above 0.05 mg/L the chances of eutrophication increase. During April TP levels were mostly in the range of natural TP levels. Tri County had the highest TP levels, while most other sites were well below 0.05 mg/L.

Total Phosphorous May Data



When comparing the April data to May you can see an increase in TP levels at each site. When moving closer to Pigg River sites such as MM6, MM9, Toler and Pigg have a drastic increase when compared to April's data.

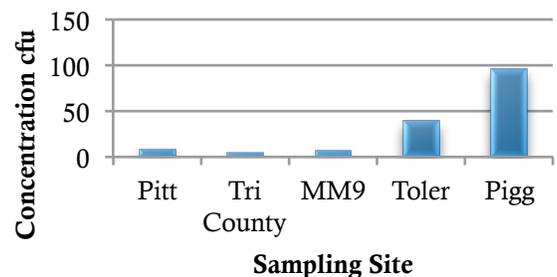
There is an increase of TP levels at Toler, which could be due to rains pushing nutrients into Leesville Lake from Pigg River. Pigg is known to have

higher nutrient levels, which affects the downstream sampling sites as seen in the May data. All sites preceded the healthy amount of TP levels, but MM6, MM9, and Toler showed to have the highest levels of TP. Toler's exceedingly high level of TP is somewhat of a concern, but TP levels can fluctuate easily when large storm events occur and increase runoff into the lake.

Overall April data shows Leesville Lake had the expected TP levels, while May had an increase of TP at each site. Again, this could be due to storm events that led to a sudden increase of input from local areas, which can have an influence on the nutrient levels in the lake.

July *E. coli* Levels: July *E. coli* levels are not of concern, none going above the 235 cfu per 100 mL of water.

E. coli Levels 7-19-16



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.

Email: shahady_t@lynchburg.edu

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!

Email: woll_j@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.