



Algae Monitoring of the Tellico Reservoir

Summary May 2023

Thanks to a grant from the TVA a collaboration between WATeR (Watershed Association of the Tellico Reservoir) and the University of Tennessee at Knoxville (UTK) was initiated in 2022 to conduct a multi-year study of the phytoplankton (algae) within the reservoir. The grant was procured by Dr. Forbes Walker of the UTK Institute of Agriculture (UTIA) and Dr. William Waldrop of WATeR, with Dr. Steven Wilhelm of the UTK Department of Microbiology as the supervisor of the research. Dr. Wilhelm has studied algae in Lake Erie over many years and also has participated in algal studies in China and in the Atlantic ocean.

This program is a proactive effort to prevent the occurrence of algal blooms such as those caused by a class of blue-green algae (cyanobacteria). Blue-green blooms can get extensive. Algal blooms can be unsightly and can have a very unpleasant odor. Should there be algae blooms it is highly likely that the valuation of the residential property would decline resulting in more wide-spread negative economic repercussions. Once the types and relative amounts of the different types of algae, and the outside forces that influence their growth are determined, only then can remedial action be taken to control algal growth.

WATeR initiated sampling of the algae in Tellico Reservoir in 2020 as several longtime members of WATeR believed the reservoir water was much greener than it had been in the past.

In the summer of 2022 WATeR assisted the Microbiology Department in surveying the phytoplankton of Tellico Reservoir. The objectives were to see what specific organisms comprised the phytoplankton, compare phytoplankton with information collected in 2020 (by WATeR) and between areas of the reservoir; and to try to identify environmental circumstances that would help in understanding how to manage the phytoplankton.

Studying the algae in the reservoir is the Master's thesis of David Niknejad, a graduate student in the microbiology department, with the help of a post-doc, Dr. Robbie Martin. David is collecting water samples and analyzing them for the types and amounts of algae and their nutrient sources



(nitrogen, ammonia and phosphorus). Other data is being collected to better understand the relationship between the algae and their effects on the quality of the water, such as: water clarity, pH, dissolved oxygen, conductivity, temperature and the total amount of chlorophyll.

Through the Water Quality Improvement Committee (WQIC) WATeR is providing logistical support to access the sampling sites. WATeR also provides connections within the lake community. WQIC recommended the six sampling sites primarily based on the past water quality studies conducted by WATeR, and others. The WATeR pontoon boat provides access to these sites and volunteers shuttle the UTK personnel, pilot the boat and assist in the collection of other data such as water depth, pool height, wind direction and velocity, water appearance, barometric pressure and the site's GPS coordinates.

In 2022 the six sampling sites were sampled 7 times between June 27 and November 1. Within the microbiology lab, David used an automated particle analyzer to measure the size, shape and relative amounts of the material (algae and detritus) in the sample. Nutrients were measured with the cooperation of a specialty analytical laboratory at the Ohio State University. DNA sequencing was performed to broadly determine the different types of phytoplankton—green algae, blue-green algae (cyanobacteria), diatoms etc. During 2023, laboratory analyses will result in more precise identification of the species of algae. All the data is maintained and analyzed by UTK.

In 2022, there was a diverse assemblage of phytoplankton with several genera of algae, blue-green algae (cyanobacteria) and diatoms in the Tellico Reservoir. A diverse assemblage is good. There appeared to be some changes in the phytoplankton from that in 2020, but further review of the 2022 information is needed, and is on-going. The abundance of the phytoplankton was found to be highest in a shallow cove not directly connected to the main channel, and in an upstream area of one of the creeks entering the reservoir. The lowest abundance was found in the southern arm of the reservoir.

The analysis of the 2022 data also indicates that although there are algal species of concern, they are in relatively small quantities. The Tellico Reservoir can be classified as "healthy" based on the distribution of diverse types of cells, none of which are in large amounts, and the presence of



rotifers. There are greater changes in the data over time (months) as compared with changes over the six locations.

Sampling of 6 sites will continue in 2023 with 10 sampling runs between April 20 and October 26. The same parameters will be measured and comparisons will be made between sample locations, dates and the data collected in 2022. Nine WATeR volunteers are supporting this very important research project.