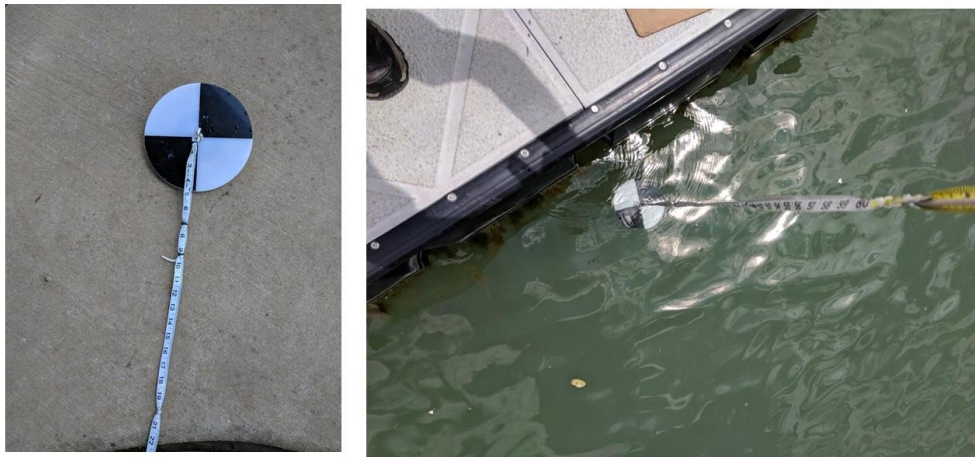


The Watershed Association of the Tellico Reservoir (WATeR) was formed to protect and preserve the environment around the Tellico watershed. As a part of this mission, one of the committees of WATeR, the Water Quality Improvement Committee (WQIC) has undertaken several studies to look at the clarity of the Tellico Reservoir due to concerns about the possible increase in greening of the lake. Greening, resulting from growth of algae, is affected by runoff from agricultural and residential pollution. These concerns have arisen from the increase in development in the area around the watershed, resulting in the greater use of fertilizers that run off into the reservoir.

In 2018 the WQIC began a program to monitor the clarity of the water in the Tellico Reservoir. The clarity of water depends upon materials dissolved or suspended in the water, such as sediment, tannins from bark or plant tissue, and phytoplankton, which are microscopic plants that grow in the water. Clarity is an indicator of the overall health of the lake. Water clarity can be measured fairly easily and gives an indication of the present quality of the water in the Tellico Reservoir. It can also be used to track changes over time.

The clarity is measured using a tool called a Secchi disc, which is an 8 inch circular disc painted black and white in a checkerboard pattern. Clarity is measured as the depth the Secchi disc disappears when submerged into the water. This is referred to as Secchi depth. Generally, the Secchi depth is half the distance of the penetration of visible light.

### Secchi Disk used to measure water clarity in lakes



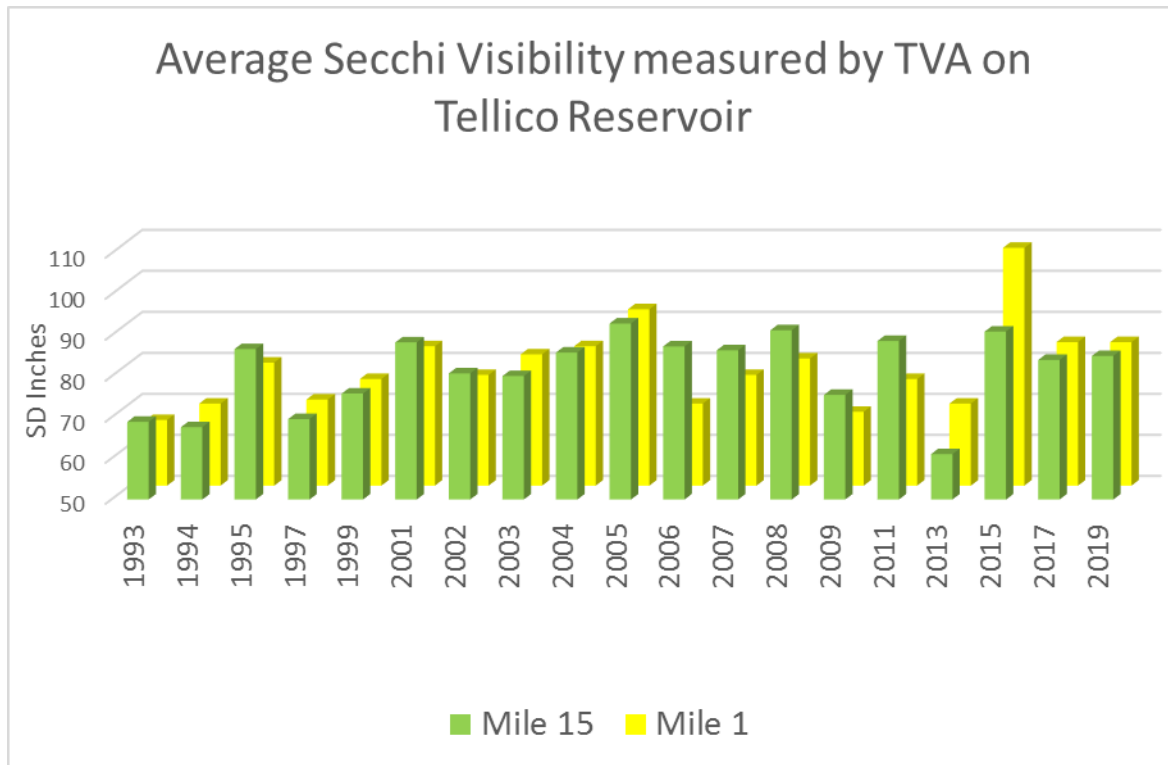
Volunteers with the WQIC measured Secchi depth at several locations on the Tellico Reservoir. Secchi depth ranged from a low of 9 inches, due to muddy water, to a high of 103 inches. The yearly average Secchi depth measured at the Tellico Village Yacht Club courtesy pier was

- 58 inches in 2018,
- 56 inches in 2019,
- 64 inches in 2020.

In 2020, clarity was also measured at the Toqua Boat Ramp, Ft Loudon State Park, and Morganton Boat Ramp (on Baker Creek). The Secchi depth averages for these sites were:

- Toqua Boat Ramp 73 inches
- Ft Loudon (at Kayak launch Pier) 75 inches
- Morganton Boat Ramp 37 inches

The Tennessee Valley Authority (TVA) also does water clarity studies. They collect information on water quality of the Tellico Reservoir at Mile 1 and Mile 15 every other year and have been doing so since 1993. The TVA also use a Secchi disc to measure water clarity. The yearly average Secchi disk visibility at Mile 15 ranged from a low of 61 inches to a high of 93, while at Mile 1 the range was 58 to 108 inches.



In a related study, the WQIC also looked at the trophic state of Tellico Reservoir. The Trophic State Index (TSI) is a classification system designed to rate water bodies based on the amount of biological growth they produce. Nutrients such as nitrogen and phosphorus together with factors such as temperature and light affect the abundance of algae or biological growth. The TSI of a water body is rated on a scale from zero to one hundred.

Bodies of water are classified according to their productivity or growth. Low productivity waters are oligotrophic and generally are very clear, whereas waters with high biological growth are eutrophic and can be turbid and green in color. Mesotrophic waters are in between. Carlson's Trophic State Index (TSI) is a phytoplankton-based index that uses either Secchi Disk visibility, concentrations of chlorophyll, amount of phosphorus, or nitrogen concentration to establish a numerical value of the trophic classification of a lake or reservoir.

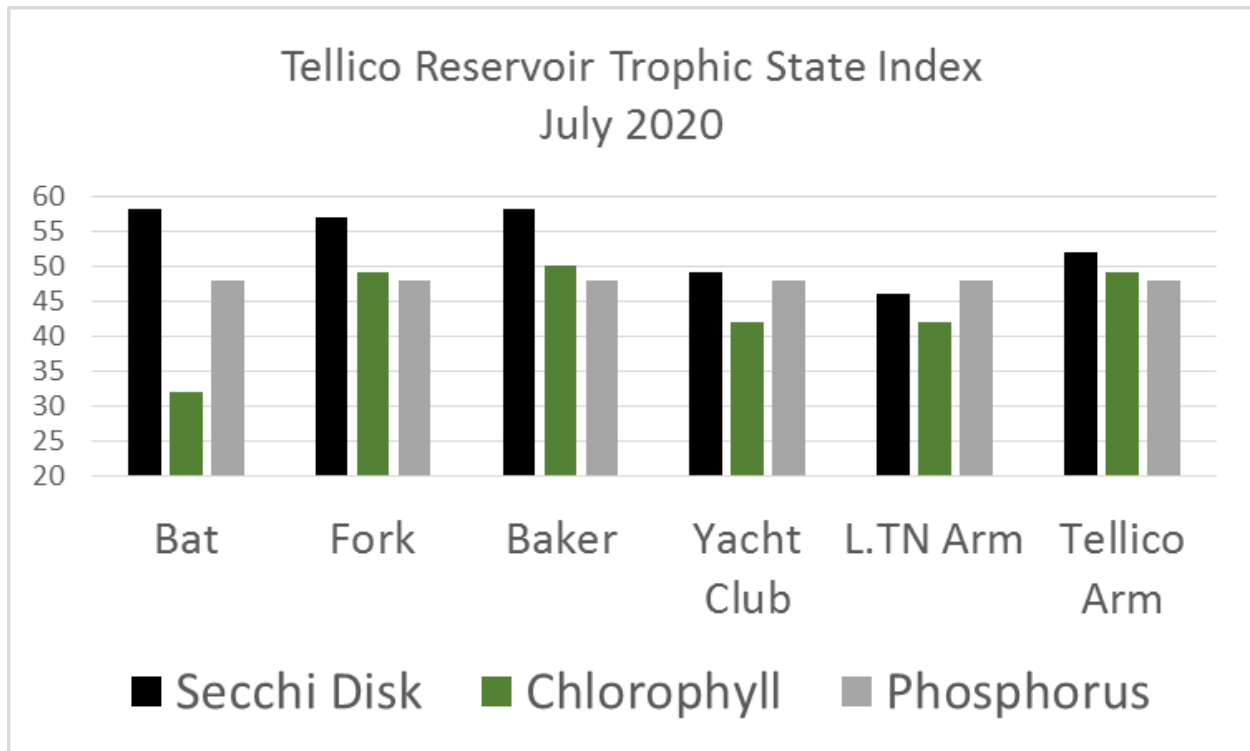
The chart below shows a range in TSI associated with levels of variables used to determine TSI.

	ug/l	ug/l	inches	
<b>TSI</b>	<b>Chl</b>	<b>P</b>	<b>SD</b>	<b>Trophic Class</b>
< 30—40	0—2.6	0—12	157 +	Oligotrophic
40—50	2.6—20	12—24	79-157	Mesotrophic
50—70	20—56	24—96	20 - 79	Eutrophic
70—100+	56—155+	96—384+	<20	Hypereutrophic

WQIC collected data for trophic determination at three sites in the main stem of the reservoir; mid-lake at the Tellico Village Yacht, an up-lake sites on the Little Tennessee River arm and one on the Tellico River arm. Data was also collected in three of the reservoir embayments; Bat Creek, Baker Creek and Fork Creek. Embayments are shallow areas at the lake shoreline where small streams enter the lake.

Based on levels of chlorophyll, which is the best means to compute TSI, Tellico Reservoir, as a whole, has an average TSI score of 46: That would define the reservoir as being mesotrophic. The three embayments had an average TSI score (49.5) which is borderline between mesotrophic and slightly eutrophic. The TSI values computed from Secchi disk measurements were generally higher than TSI values derived from chlorophyll data. Chlorophyll is a green pigment, present in all green plants, including algae, responsible for the absorption of light to provide energy for photosynthesis.

These results indicate that the shallow areas feeding into the Tellico Reservoir have more growth or sediment present and need to be followed to determine their influence on the water quality of the reservoir as a whole.



WQIC also had the composition of the phytoplankton community assessed as part of the study. Seventy-six species of phytoplankton were identified. Diatoms or blue-green algae were the dominant phytoplankton species in all of the sites, except in the Little Tennessee River arm of the upper lake where green algae were most numerous. Diatoms are species of algae that are encased in a glass (silica) sphere.

For more information on these two studies, the complete technical reports concerning the water quality of Tellico Reservoir can be found on WATeR's website [tellicowater.org](http://tellicowater.org). The two reports are: **Tellico Reservoir Water Clarity Monitoring Program: 2018-2020** and **The Trophic State of Tellico Reservoir in 2020**).

Lucas Reports revised Christine Stevens