

Taylorsville Lake (2018)

Water Quality Takeaways

- High potential for harmful algal blooms
- No exceedances of state water quality criteria
- Successfully operated closely to the established temperature guide curve in 2018

General Information and Water Quality

Taylorsville Lake (TAR) is located in Spencer, Nelson, and Anderson counties in Kentucky. The dam was built by the Louisville District of the US Army Corps of Engineers (LRL) for the primary purpose of flood control and was placed in operation in January 1983. At summer pool, surface area is 3,050 acres.

Water quality (WQ) in the tailwater is assessed by analyzing 2018 data for exceedances of WQ criteria established by the KY Division of Water (KDOW). No criteria were exceeded in the tailwater (2TAR10000; Figure 1). However, TAR exceeded the USEPA's recommended criteria for total phosphorus, total nitrogen, and turbidity. This is common among KY lakes but can contribute to harmful algal blooms.

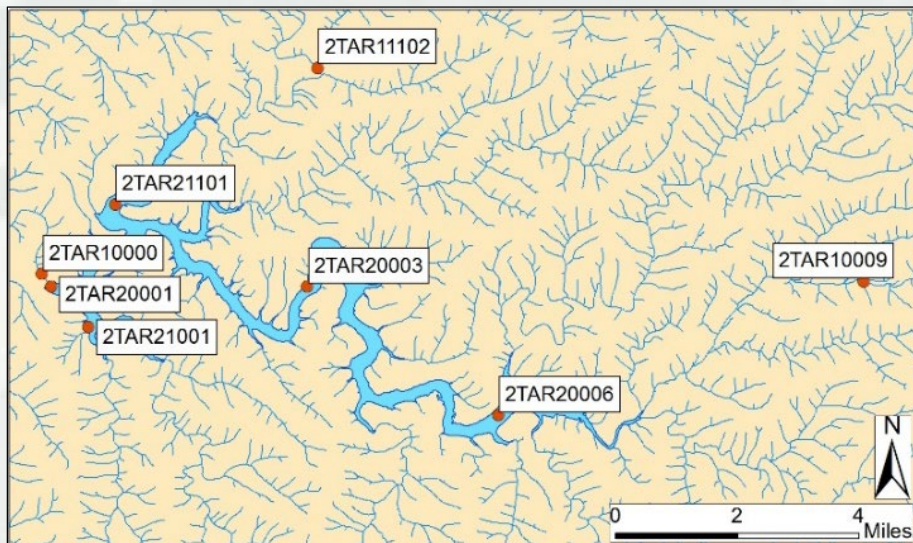


Figure 1. TAR sample sites in 2018 for field and chemical data.

Tailwater Conditions

Temperature and dissolved oxygen (DO) profile data are regularly collected from LRL lakes and tailwaters. This data informs water control engineers on how to best use existing selective withdrawal capabilities to meet downstream WQ targets established by each lake's Water Control Plan (WCP) and state criteria. Figure 2a shows a time series graph of the 2018 tailwater (2TAR10000, Figure 1) water temperature compared with the guide curve from the lake's WCP. In 2018, TAR closely followed the established temperature guide curve. Figure 2b shows a 2018 time series graph of the lake's tailwater DO data with the applicable state criteria (blue line). TAR met state criteria for dissolved oxygen.

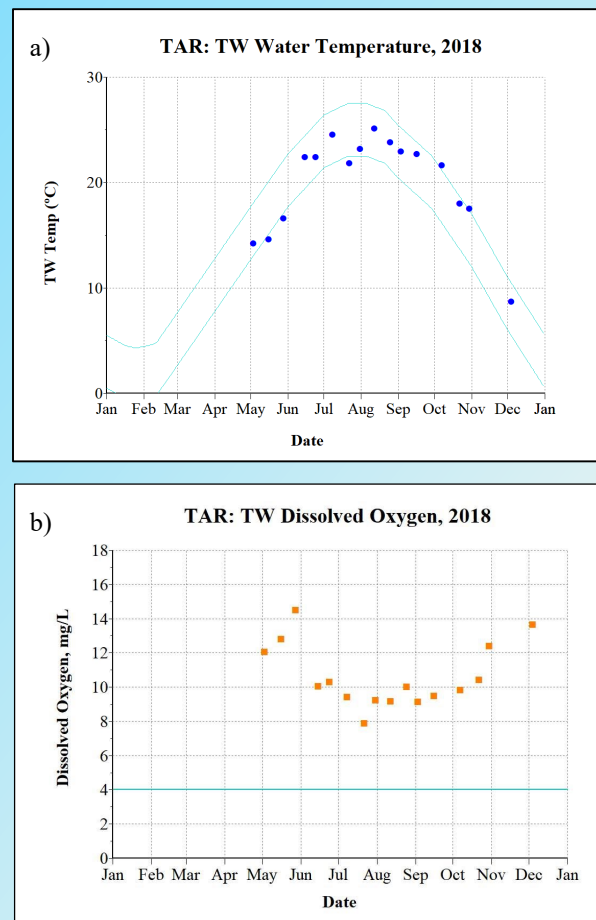


Figure 2. TAR time series data collected from the tailwater (2TAR10000; Figure 1): a) water temperature; and b) dissolved oxygen.



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Reservoir Conditions and Operations

Below (Figures 3a and b) are time series contour plots of TAR profile data collected at the damsite (2TAR20001; Figure 1) in 2018. The figures show the progression of temperature and dissolved oxygen availability in the lake throughout the year. TAR temperature profile data collected in 2018 (Figure 3a) indicates that the reservoir could be successfully operated to meet its temperature guide curve, and it was (Figure 2a). While Figure 3b indicates that the reservoir may have dissolved oxygen limitations, actual data from the tailwater indicates the tailwater is adequately oxygenated.

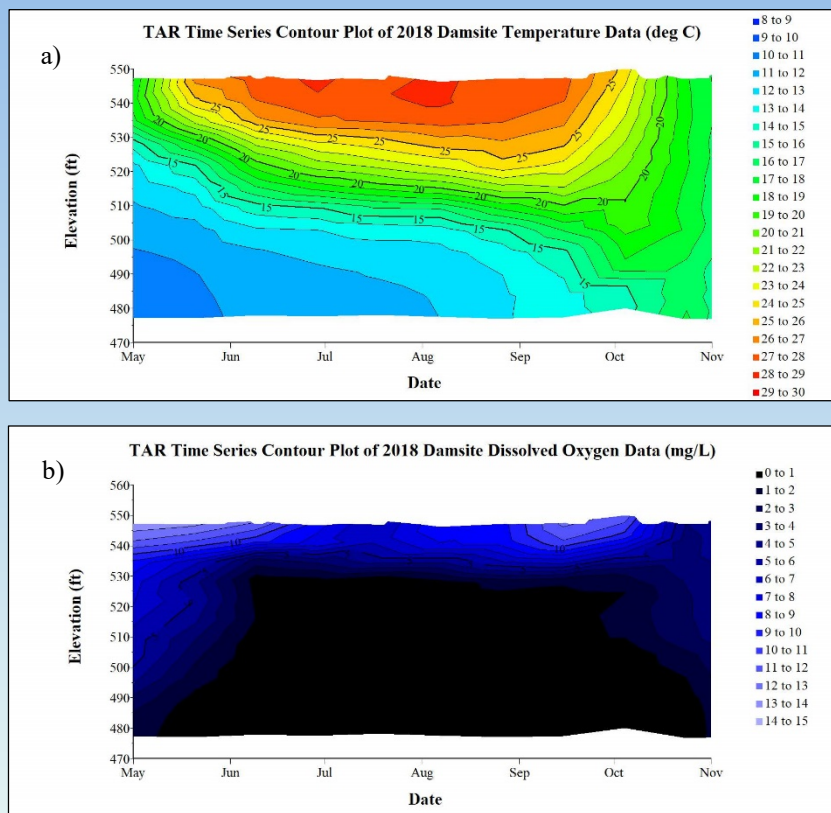


Figure 3. TAR time series data collected from the damsite (2TAR20001; Figure 1) during 2018: a) water temperature; and b) dissolved oxygen.

Reservoir Biological Conditions

Trophic State Index (TSI) was calculated using the data from the Secchi Depth, Chlorophyll-a, and Total Phosphorus analyses. The results shown in Table 1 suggest that TAR is at a minimum eutrophic (TSI score from 51-69). This means that TAR has a high concentration of nutrients, which can be detrimental to life in the lake in multiple ways.

Table 1. TSI scores and trophic states for samples collected at TAR in 2018.

Site	TSI Score	Trophic State
2TAR20001	64	Eutrophic
2TAR20003	66	Eutrophic
2TAR20006	76	Hyper-eutrophic
2TAR21001	64	Eutrophic
2TAR21101	63	Eutrophic

Phytoplankton (algae and cyanobacteria) and green plants are the base of the food chain in aquatic ecosystems. Phytoplankton also have a large impact on humans via harmful algal blooms (HABs) which are caused by an over-abundance of cyanobacteria.

2018 Phytoplankton Phyla by Density at 2TAR20001

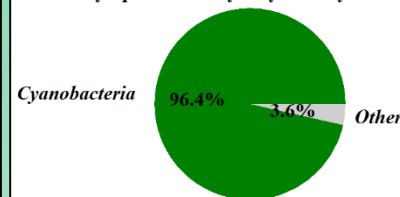


Figure 4. 2018 phytoplankton community at 2TAR20001.

Figure 4 illustrates the abundance of cyanobacteria relative to the other types of phytoplankton collected from the damsite in summer 2018. The chart shows that cyanobacteria dominated the phytoplankton community in density (cells/L). These results indicate that HABs have the potential to be problematic at TAR.

Harmful Algal Blooms (HABs) in KY are addressed by the KDOW as they are the lead agency for HAB response. The KDOW has adopted HAB toxin sampling for posting public recreational advisories/cautions. The LRL WQ Program supports KDOW's efforts to implement a statewide HAB response plan. LRL assists the KDOW with implementation by reporting visual HAB indicators and collecting HAB toxin samples at locations as specified by the KDOW.

