Brookville Lake (2018)

Water Quality Takeaways

- Moderate potential for harmful algal blooms
- No exceedances of state water quality criteria

General Information and Water Quality

Brookville Lake (BVR) is located in Franklin and Union counties in Indiana. The dam was built by the Louisville District US Army Corps of Engineers (LRL) for the primary purpose of flood control and became operational in 1974. At summer pool, the surface area of BVR is 5,260 acres.

Water quality (WQ) in the tailwater is assessed by analyzing 2018 data for exceedances of WQ criteria established by the IN Department of Environmental Management (IDEM). No criteria were exceeded in the tailwater (2BVR10000; Figure 1). Also, BVR did not exceed the USEPA's recommended criteria for nutrients, which contribute to harmful algal blooms.

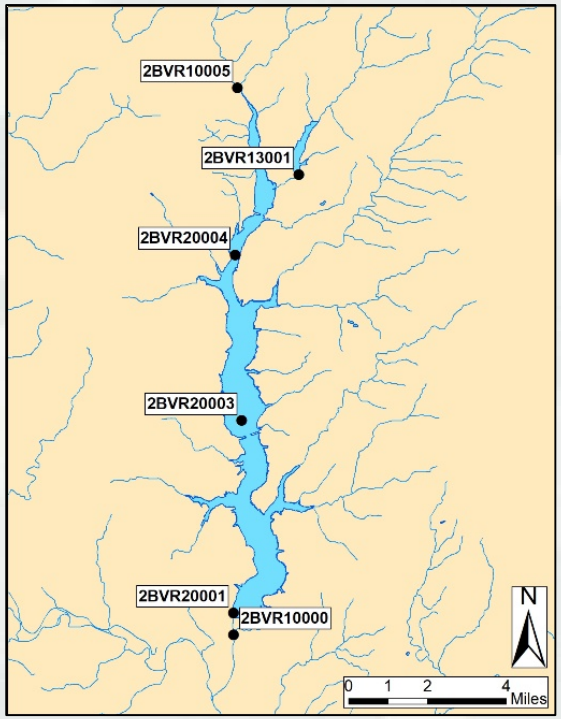

Figure 1. BVR sample sites in 2018 for field and chemical data.

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. WQ targets are established by each lake's Water Control Plan (WCP) and state criteria. Figure 2a shows a time series graph of the 2018 tailwater (2BVR10000; Figure 1) water temperature compared with the guide curve from the lake's WCP. BVR did not operate closely to 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). BVR met the state's criteria for dissolved oxygen in 2018.

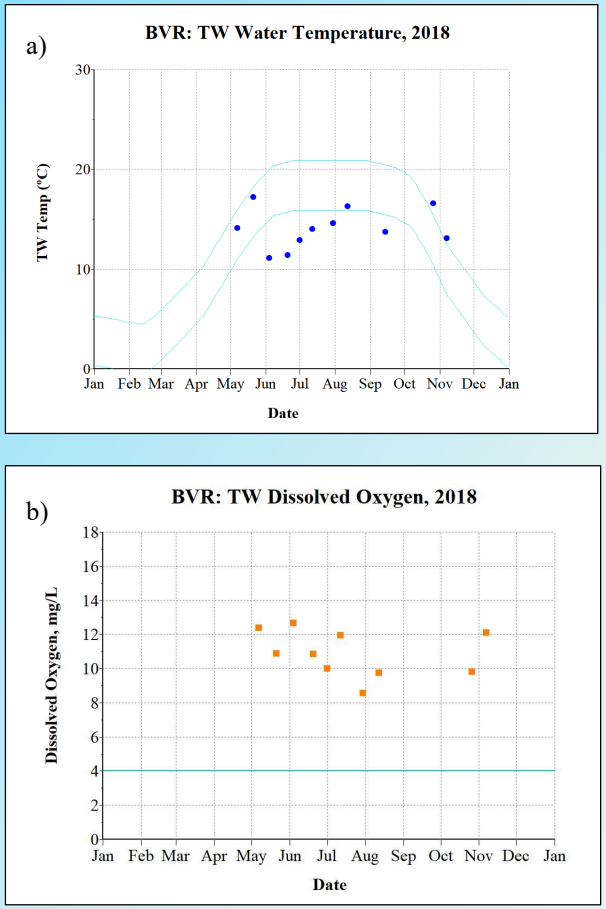

Figure 2. BVR time series data collected from the tailwater (2BVR10000; Figure 1) a) water temperature; and b) dissolved oxygen.

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Reservoir Conditions and Operations

Below (Figures 3a and b) are time series contour plots of BVR profile data collected at the damsite (2BVR20001; Figure 1) in 2018. The figures show the progression of temperature and dissolved oxygen availability in the lake throughout the year. The BVR temperature profile data collected in 2018 (Figure 3a) indicates that the reservoir contained adequate water temperatures necessary to meet the established temperature guide curve shown in Figure 2a. While Figure 3b indicates that the reservoir may have dissolved oxygen limitations in the summer, actual data from the tailwater indicates that it is adequately oxygenated.

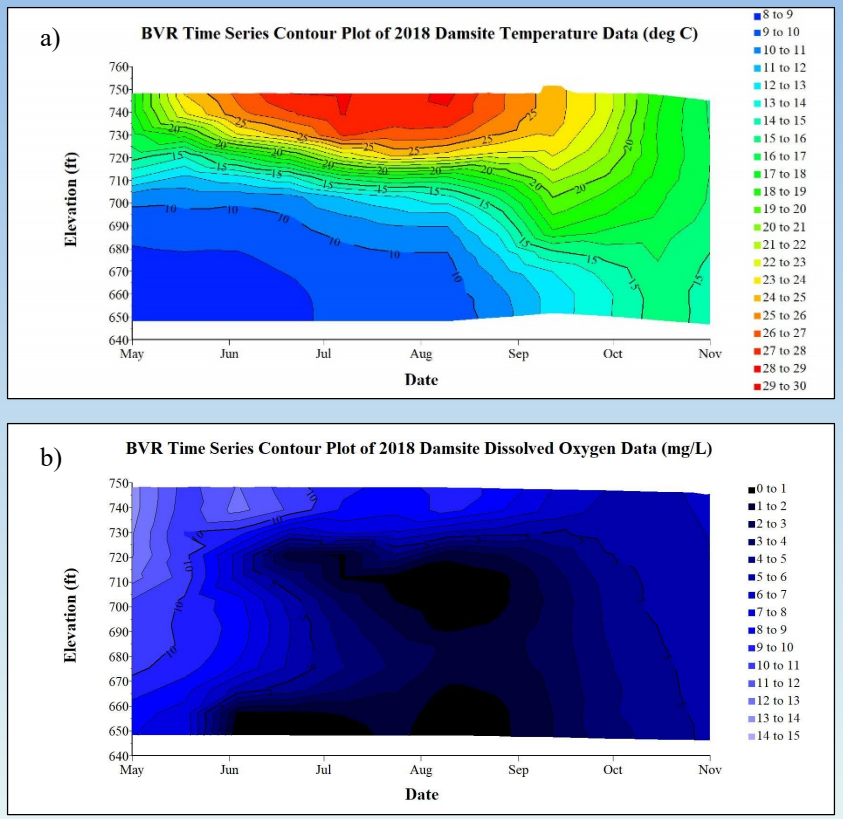

Figure 3. BVR time series data collected from the damsite (2BVR20001; Figure 1) during 2018: a) water temperature; and b) dissolved oxygen.

Reservoir Biological Conditions

The Trophic State Index (TSI) was calculated using the data from the Secchi Depth, Chlorophyll-a, and Total Phosphorus analyses. The TSI values below were calculated for multiple sites with the 2018 data. The results shown in Table 1 suggest that BVR is eutrophic (TSI score from 51-69). This means that BVR 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 BVR in 2018.

Site	TSI Score	Trophic State
2BVR20001	52	Eutrophic
2BVR20003	55	Eutrophic
2BVR20004	68	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.

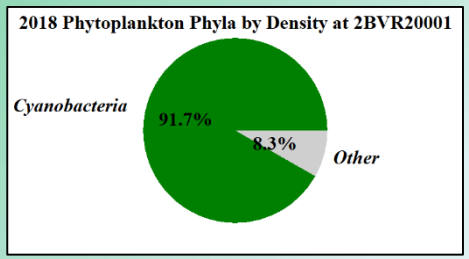

Figure 4. 2018 phytoplankton community at 2BVR20001.

Figure 4 illustrates the abundance of cyanobacteria relative to the other types of phytoplankton collected. 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 BVR.

Harmful Algal Blooms (HABs) in IN are addressed by the IN Department of Natural Resources (IDNR) and the IN Department of Environmental Management (IDEM) in the IDNR HAB Response Standard Operating Procedure. The LRL WQ Program supports the state agencies efforts by reporting visual HAB indicators via the IN State Department of Health Algal Bloom Notification Form.