

C.J. Brown Dam & Reservoir (2018)

Water Quality Takeaways

- High potential for harmful algal blooms
- No exceedances of state water quality criteria
- Intensively surveyed in 2018

General Information and Water Quality

C.J. Brown Dam & Reservoir (CBR) is located in Clark County, Ohio. 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 September 1974. At summer pool, the surface area of CBR is 2,120 acres.

Water quality (WQ) in the tailwater is assessed by analyzing 2018 data for exceedances of WQ criteria established by Ohio EPA. No criteria were exceeded in the tailwater (2CBR10000; Figure 1). However, CBR exceeded the USEPA's recommended criteria for total phosphorus, total nitrogen, and turbidity. This is common among OH lakes but can contribute to harmful algal blooms.

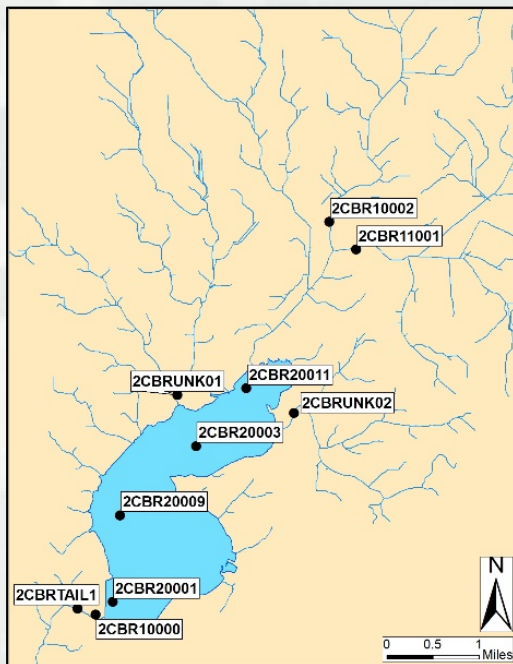


Figure 1. CBR sample sites in 2018.

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 (2CBR10000) water temperature compared with the guide curve from the lake's WCP. CBR did not closely follow the established temperature guide curve in 2018. Figure 2b shows a 2018 time series graph of the lake's tailwater DO data with the applicable state criteria (blue line). CBR met the state's criteria for dissolved oxygen.

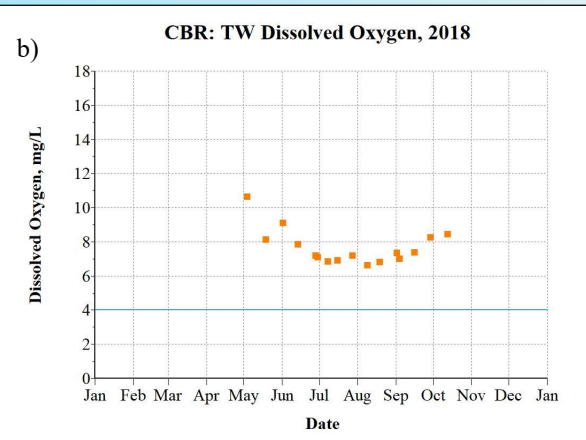
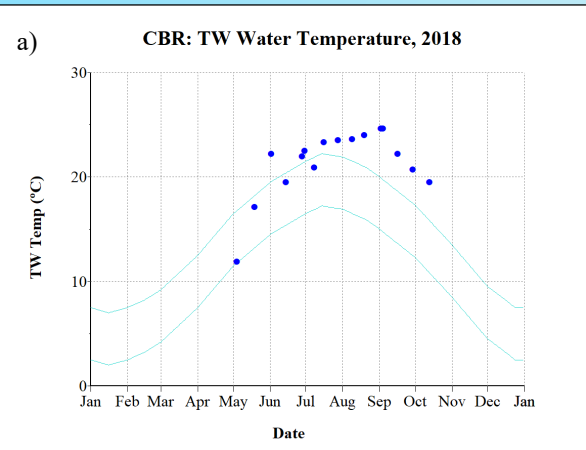


Figure 2. CBR time series data collected from the tailwater (2CBR10000; Figure 1): a) water temperature; and b) dissolved oxygen.

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Reservoir Conditions and Operations

Below (Figures 3a and b) are time series contour plots of CBR profile data collected at the damsite (2CBR20001; Figure 1) in 2018. The figures show the progression of temperature and dissolved oxygen availability in the lake throughout the year. Figure 3a indicates that the lake was thermally stratified from approximately June through September. Figure 3b indicates that the reservoir is adequately oxygenated to meet downstream water quality criteria for dissolved oxygen.

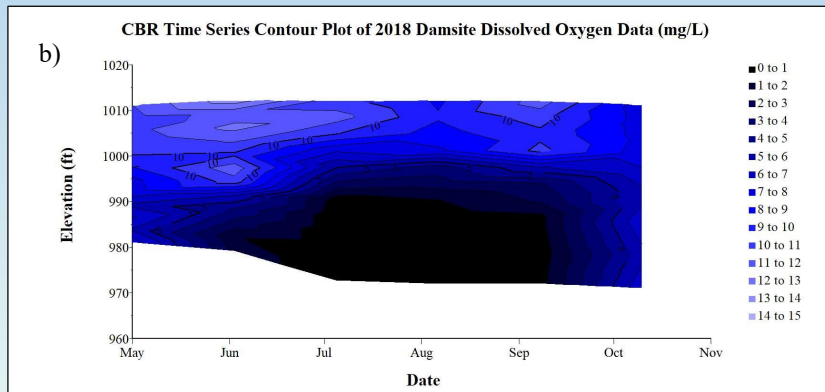
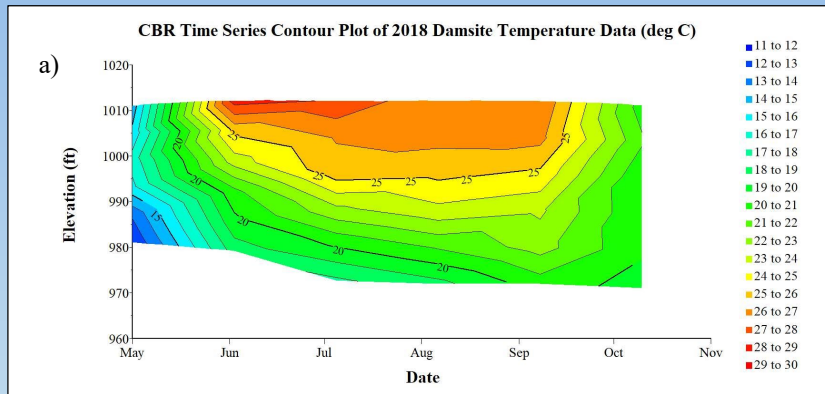


Figure 3. CBR time series data collected from the damsite (2CBR20001; Figure 1) in 2018: a) water temperature; and b) dissolved oxygen.

Reservoir Biological Conditions

Trophic State Index (TSI) was calculated using 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 CBR is at a minimum eutrophic (TSI score from 51-69). This means that CBR 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 CBR in 2018.

Site	TSI Score	Trophic State
2CBR20001	67	Eutrophic
2CBR20003	69	Eutrophic
2CBR20009	68	Eutrophic
2CBR20011	71	Hyper-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 2CBR20001

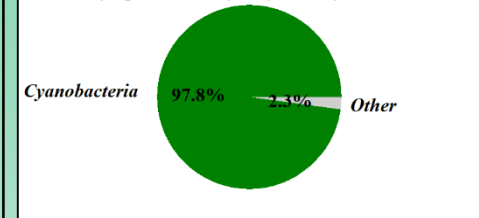


Figure 4. 2018 phytoplankton community at 2CBR20001.

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 CBR.

Harmful Algal Blooms (HABs) in OH are addressed by the OH Department of Natural Resources (ODNR) as they are the lead agency for HAB response in the state. The ODNR works with the Ohio EPA and OH Department of Health to sample for cyanobacteria and cyanotoxins at designated swimming beaches and to post any required recreational advisories.

