

Caesar Creek Lake (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

Caesar Creek Lake (CCK) is located in Warren, Clinton, and Greene counties in Ohio. The dam was built by the Louisville District US Army Corps of Engineers (LRL) for the primary purpose of flood control. At summer pool, the surface area is 2,830 acres.

Water quality (WQ) in the tailwater is assessed by analyzing 2018 data for exceedances of criteria established by the Ohio EPA. No criteria were exceeded in the tailwater (2CCK10000; Figure 1). However, CCK 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. CCK 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 (2CCK10000; Figure 1) water temperature compared with the guide curve from the lake's WCP. CCK operated relatively closely to the established temperature guide curve. Figure 2b shows a 2018 time series graph of the lake's tailwater dissolved oxygen data with the applicable state criteria (blue line). CCK met the state's criteria for dissolved oxygen.

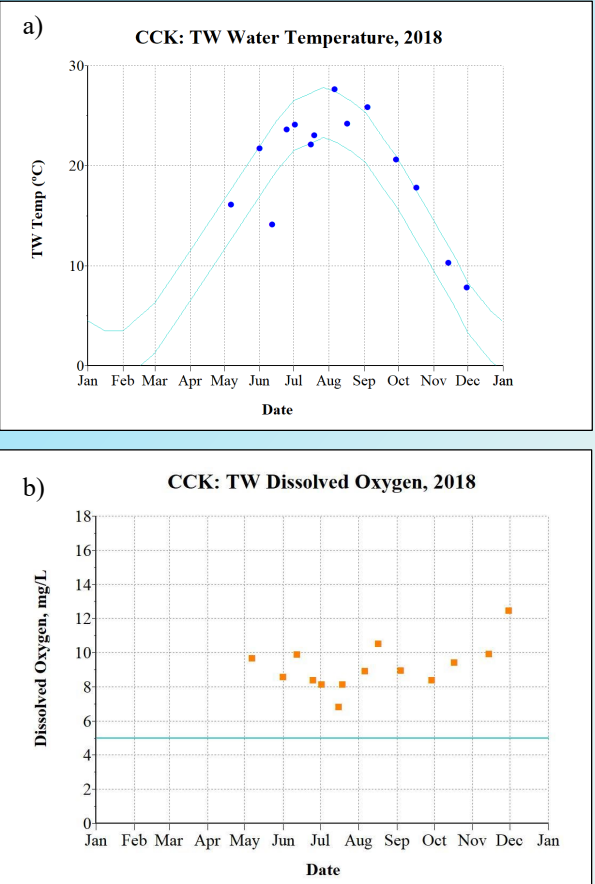


Figure 2. CCK time series data collected from the tailwater (2CCK10000; Figure 1): a) water temperature; and b) dissolved oxygen.



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Reservoir Conditions and Operations

Below (Figures 3a and b) are time series contour plots of CCK profile data collected at the damsite (2CCK20001; Figure 1) in 2018. The figures show the progression of temperature and dissolved oxygen availability in the lake throughout the year. The CCK temperature profile data collected in 2018 (Figure 3a) indicates that the reservoir contained the adequate cold water necessary to meet the established temperature guide curve, and it did (Figure 2a). While Figure 3b indicates that the reservoir may have dissolved oxygen limitations at times, actual data from the tailwater indicates adequate oxygenation.

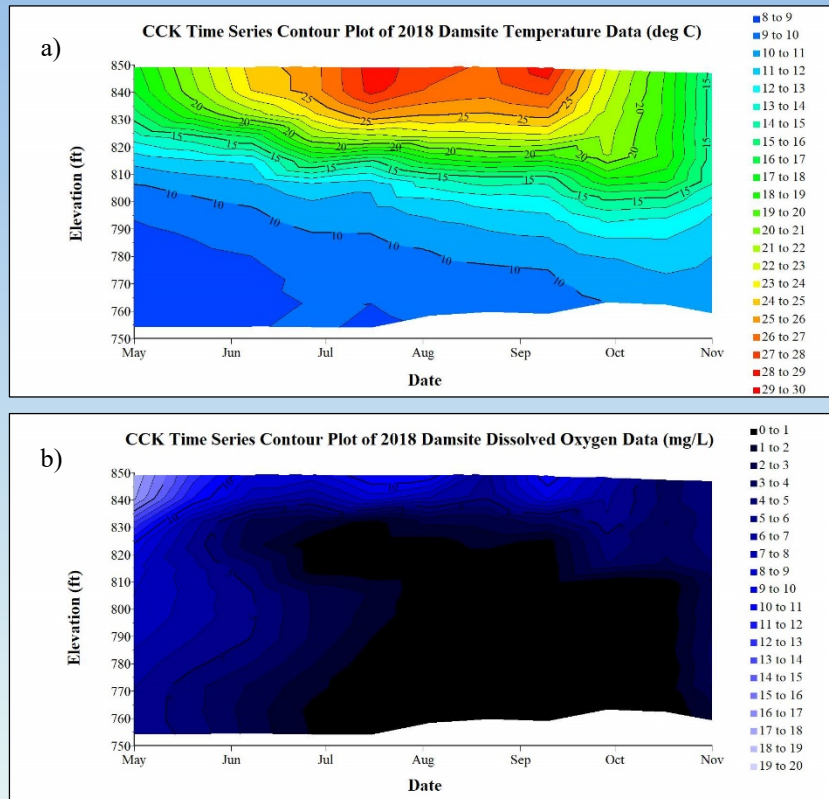


Figure 3. CCK time series data collected from the damsite (2CCK20001; Figure 1) during 2018: a) water temperature; and b) dissolved oxygen.

Reservoir Biological Conditions

Trophic State Index (TSI) was calculated using values from several analyses. The TSI values below were calculated for multiple sites with 2018 data. The results shown in Table 1 suggest that CCK is eutrophic (TSI score from 51-69). This means that CCK has a high concentration of nutrients, which can be detrimental to the lake in multiple ways.

Table 1. TSI scores and trophic states for samples collected at CCK.

Site	TSI Score	Trophic State
2CCK20001	60	Eutrophic
2CCK20002	61	Eutrophic
2CCK20003	61	Eutrophic
2CCK20004	60	Eutrophic
2CCK20007	60	Eutrophic
2CCK20008	63	Eutrophic
2CCK20009	66	Eutrophic
2CCK20015	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 overabundance of cyanobacteria.

2018 Phytoplankton Phyla by Density at 2CCK20001

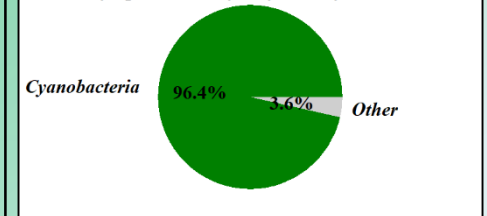


Figure 4. 2018 phytoplankton community at 2CCK20001.

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 CCK.

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. 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 recreational advisories. LRL supports the state agencies by reporting any visual HAB indicators and by communicating HAB potential to the visiting public.

