

West Fork Lake (2018)

Water Quality Takeaways

- High potential for harmful algal blooms
- No exceedances of state water quality criteria
- Does not possess selective withdrawal capabilities

General Information and Water Quality

West Fork Lake (WFR) is located in the metropolitan Cincinnati area in Hamilton County, Ohio. The dam was built by the Louisville District of the US Army Corps of Engineers (LRL) for the primary purpose of flood control and became operational in December 1952. At summer pool, the surface area of WFR is 183 acres.

Water quality (WQ) in the tailwater is assessed by analyzing 2018 data for exceedances of WQ criteria established by the Ohio Environmental Protection Agency (OH EPA). No criteria were exceeded in the tailwater (2WFR10000; Figure 1). However, WFR did exceed the USEPA's recommended criteria for total phosphorus and turbidity. This is common among OH lakes but can contribute to harmful algal blooms.

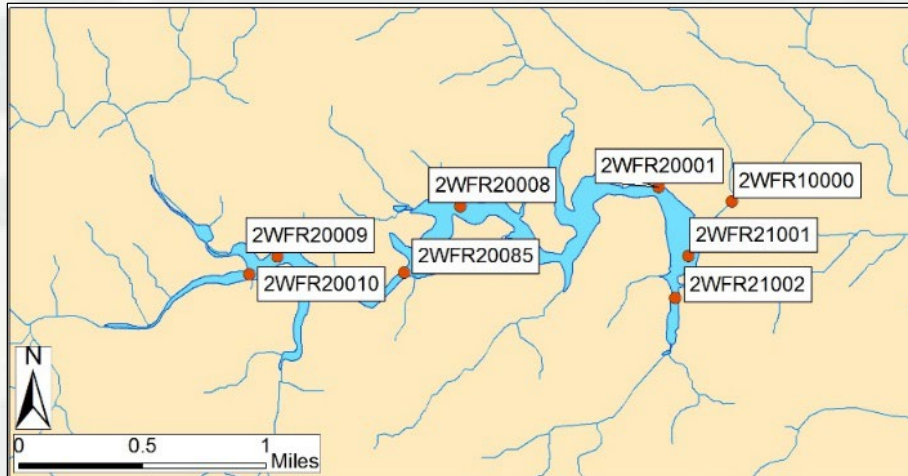


Figure 1. WFR sample sites in 2018 for field and chemical data.

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 water temperature at WFR. WFR operated relatively 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). WFR met established state criteria for temperature and DO.

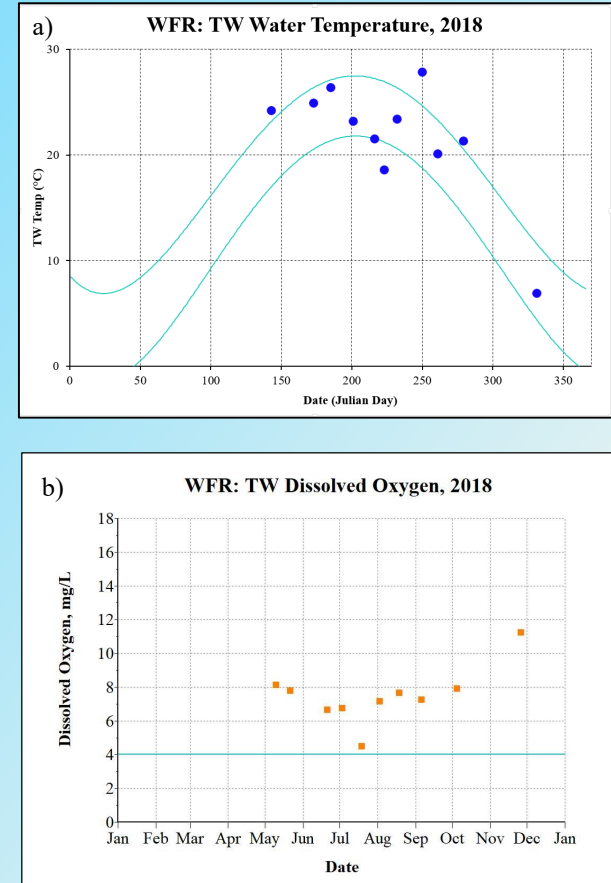


Figure 2. WFR time series data collected from the tailwater (2WFR10000; Figure 1): a) water temperature; and b) dissolved oxygen.

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Reservoir Conditions and Operations

Below (Figures 3a and b) are time series contour plots of WFR profile data collected at the dams site (2WFR20001; Figure 1) in 2018. The figures show the progression of temperature and dissolved oxygen availability in the lake throughout the year. Figure 3a shows that the lake was thermally stratified from approximately June through October. Figure 3b indicates that the reservoir is adequately oxygenated.

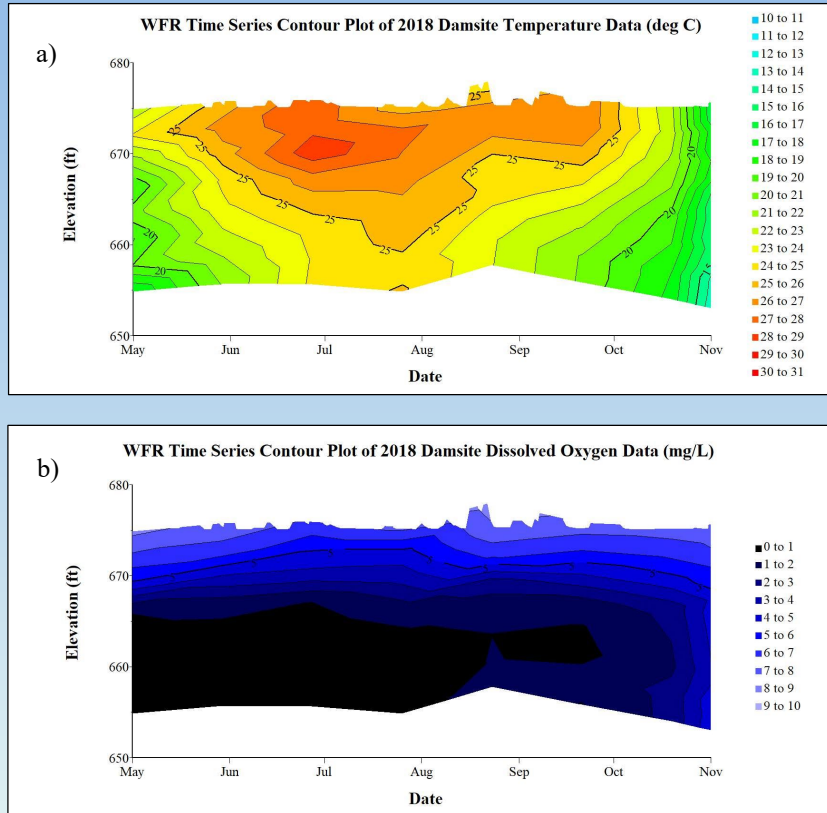


Figure 3. WFR time series data collected from the dams site (2WFR20001; Figure 1) in 2018: a) water temperature; and b) dissolved oxygen.

Reservoir Biological Conditions

Trophic State Index (TSI) was calculated using Secchi Depth data. The results shown in Table 1 suggest that WFR is at a minimum eutrophic (TSI score from 51-69). This means that WFR 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 WFR.

Site	TSI Score	Trophic State
2WFR20001	65	Eutrophic
2WFR20008	67	Eutrophic
2WFR20009	80	Hyper-eutrophic
2WFR20010	80	Hyper-eutrophic
2WFR21001	73	Hyper-eutrophic
2WFR21002	74	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.

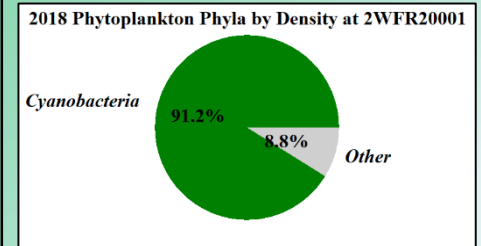


Figure 4. 2018 phytoplankton community at 2WFR20001.

Figure 4 illustrates the abundance of cyanobacteria relative to the other types of phytoplankton collected from the dams site 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 WFR.

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. LRL supports the state agencies by reporting any visual HAB indicators and by participating in a Sign Posting & Communication Plan to communicate HAB potential to the visiting public.

