William H. Harsha Lake (2018)

Water Quality Takeaways

- High potential for harmful algal blooms
- No exceedances of state water quality criteria
- Operated rather closely to the established temperature guide curve

General Information and Water Quality

William H. Harsha Lake (EFR) is located in Clermont 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 May 1978. At summer pool, the surface area of EFR is 2,160 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 (Ohio EPA). No criteria were exceeded in the tailwater (2EFR10000; Figure 1). However, EFR 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.

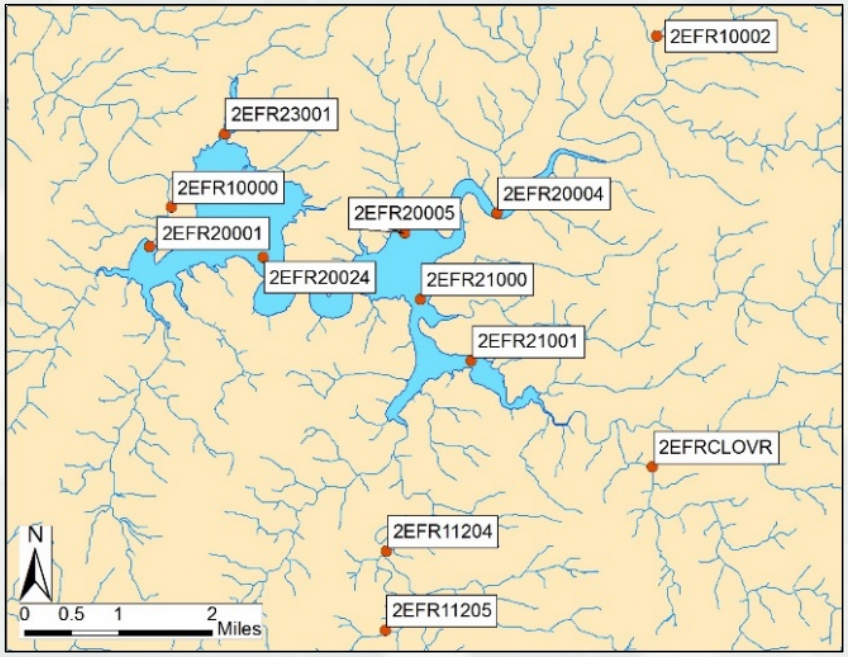

Figure 1. EFR sample sites in 2018 for field and chemical data.

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 water quality 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 (2EFR10000; Figure 1) water temperature compared with the guide curve from the lake's WCP. With a few isolated exceptions, EFR operated relatively closely to 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). EFR met the state's criteria for dissolved oxygen.

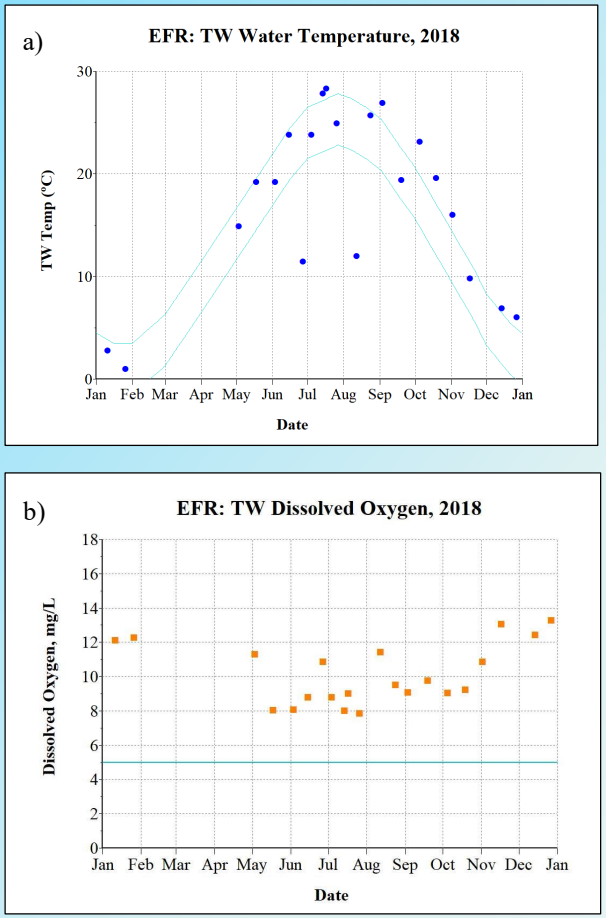

Figure 2. EFR time series data collected from the tailwater (2EFR10000; Figure 1): a) water temperature; and b) dissolved oxygen.

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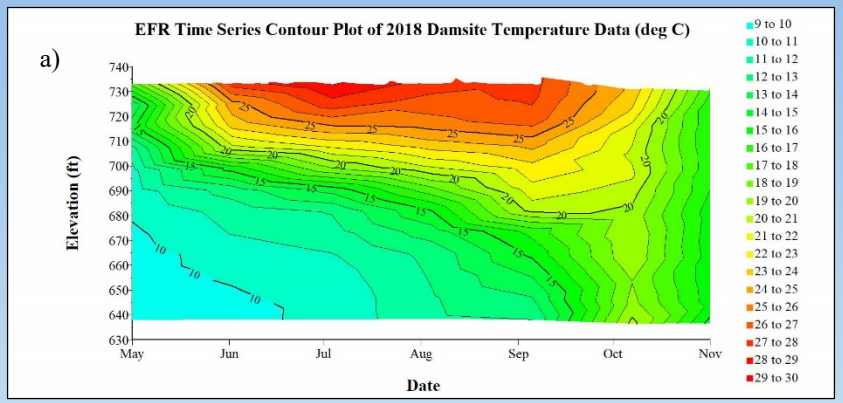
Reservoir Conditions and Operations

Below (Figures 3a and b) are time series contour plots of EFR profile data collected at the damsite (2EFR20001; Figure 1) in 2018. The figures show the progression of temperature and dissolved oxygen availability in the lake throughout the year. The EFR 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, as shown in Figure 2a. While Figure 3b indicates that the reservoir has severe dissolved oxygen limitations in the summer and fall, actual data from the tailwater indicates that it is adequately oxygenated.



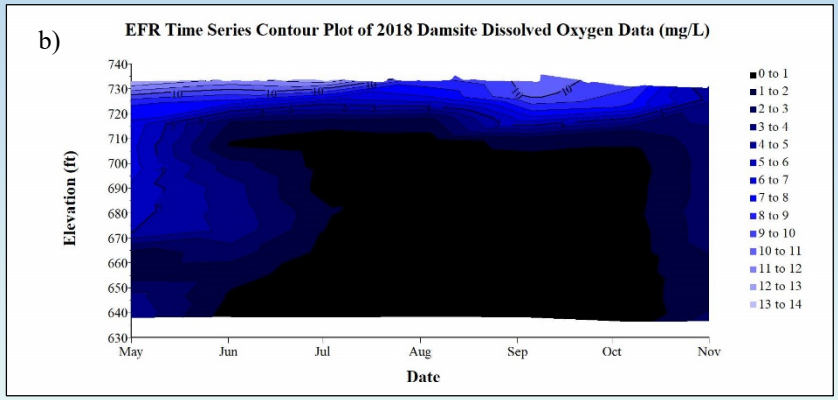


Figure 3. EFR time series data collected from the damsite (2EFR20001; Figure 1) in 2018: a) water temperature; and b) dissolved oxygen.

Reservoir Biological Conditions

Trophic State Index (TSI) was calculated using values from several analyses. The results shown in Table 1 suggest that EFR is at a minimum eutrophic (TSI score from 51-69). This means that EFR 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 EFR.

Site	TSI Score	Trophic State
2EFR20001	69	Eutrophic
2EFR20004	76	Hyper-eutrophic
2EFR20005	72	Hyper-eutrophic
2EFR20024	68	Eutrophic
2EFR21000	71	Hyper-eutrophic
2EFR21001	70	Hyper-eutrophic
2EFR23001	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.

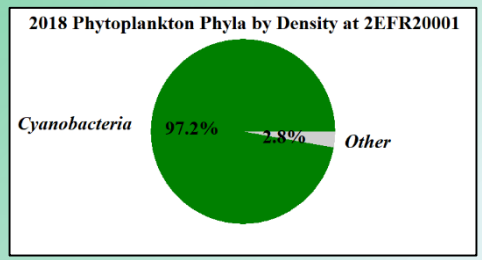


Figure 4. 2018 phytoplankton community at 2EFR20001.

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 EFR.

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.