

West Fork Lake (WFR) Water Quality Summary

Summary of 2020 Water Quality Results

West Fork Lake had no exceedances of OH's water quality criteria at the tailwater (WFR10000). Total phosphorus at all sample locations exceeded the USEPA nutrient criteria, and total nitrogen exceeded the USEPA nutrient criteria in two out of five samples. The mean TSI categories for all three indices classified the lake as eutrophic or hypereutrophic, indicating a very high level of biological activity. Finally, our sampling showed no samples had cyanobacteria cell counts over 100,000 cells/mL at the time of sampling. The elevated nutrient levels and hypereutrophic TSI classification indicate there is a high potential for HAB development in the lake.

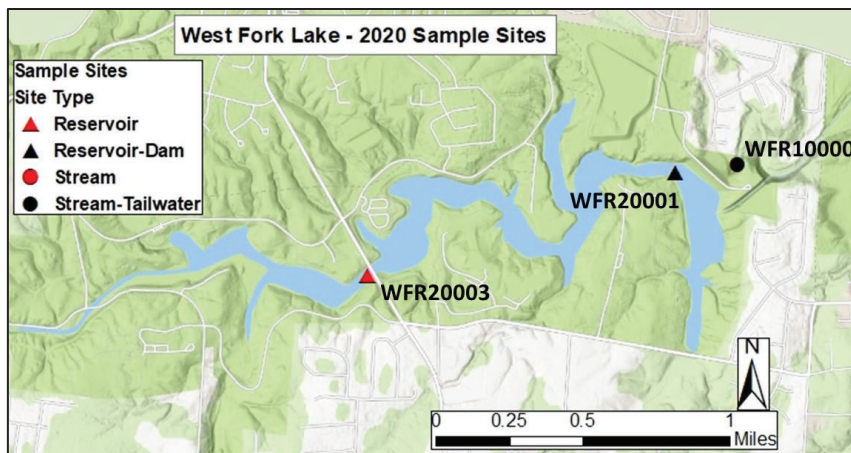


Figure 1. Water quality sampling locations for West Fork Lake in 2020.

2020 Activities

In 2020, one sampling event was conducted at West Fork Lake. Field data and chemical samples were collected at three sites (Figure 1). Chlorophyll and phytoplankton were collected at two sites, and zooplankton samples were collected at the damsite (WFR20001).

Additionally, temperature and dissolved oxygen (DO) profiles were collected by the project staff at the damsite and tailwater approximately every two weeks from early May through early October.

Exceedances of OH State Water Quality Criteria

There were no exceedances of Ohio state WQ criteria in 2020.

Tailwater Temperature and DO Conditions

Tailwater data was compared to OH state water quality criteria for temperature (Figure 2a). Tailwater temperature did not exceed the state criteria for temperature at any time. West Fork Lake has virtually no selective withdrawal

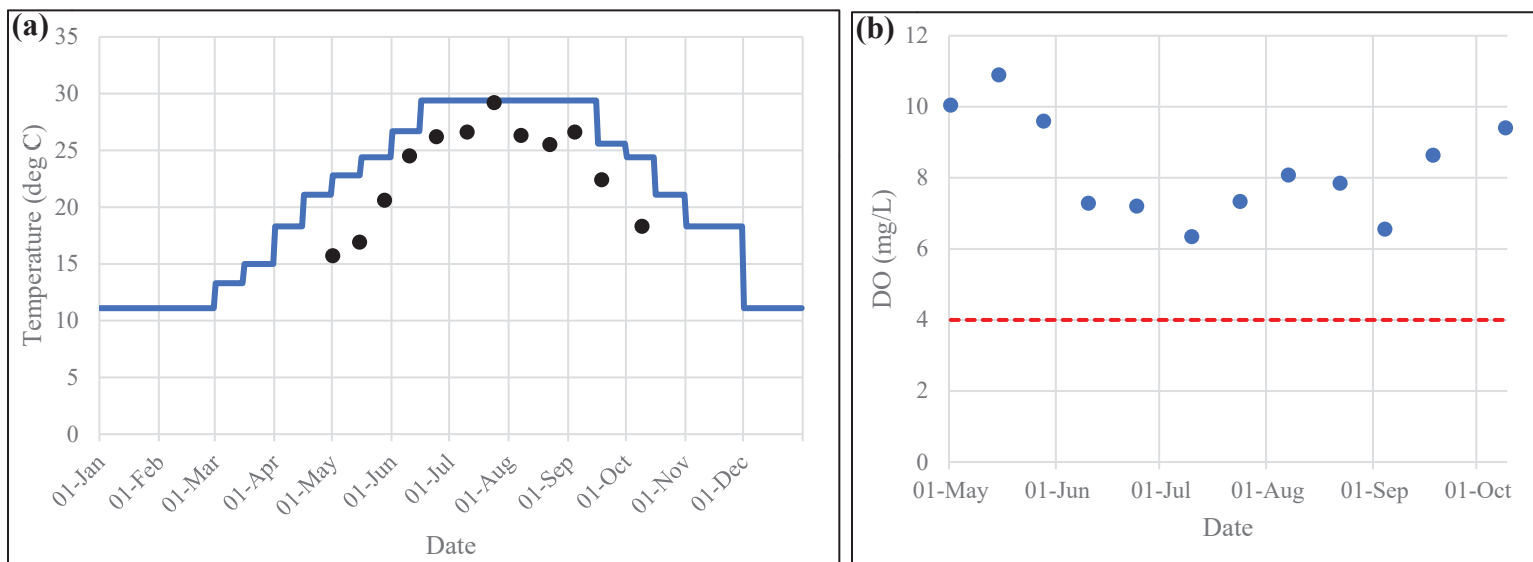


Figure 2. West Fork Lake tailwater temperature and DO data. (a) Tailwater temperature data collected by project staff in 2020 is represented by the black dots, and the blue line represents the OH water quality criteria for temperature. (b) Tailwater dissolved oxygen (DO) data collected in 2020 is represented by the blue dots. The OH water quality criteria for DO is represented by the dashed red line.

capabilities which severely limits the ability to operate for temperatures downstream. Tailwater dissolved oxygen levels did not exceed state criteria at any time throughout the year (Figure 2b).

Nutrient Analyses

Nutrient data, including total nitrogen (TN) and total phosphorus (TP) data, were collected at all sample sites in 2020. The 2020 TP and TN values were compared to historical data from 2012 through 2019 (Figure 3). The TP and TN values at each site were compared to their respective USEPA recommended criteria. Nutrient levels are an area of concern because elevated nutrients can lead to high biological activity, especially with respect to HABs.

Total Phosphorus

2020 TP values were above the historical medians and near the top or above historical distributions at all sites. Also, 2020 TP levels at all sample sites were above the USEPA recommended nutrient criteria for the respective locations.

Total Nitrogen

2020 TN values were below the historical medians at all sites and were near the bottom or below the historical distribution for each site. Also, 2020 TN levels in two samples were above the USEPA recommended nutrient criteria for the respective locations.

Cyanobacteria Data, HABs, and Trophic State Index

Cyanobacteria Data

Five phytoplankton samples were collected at various depths from two sites. Total cyanobacteria cell counts did not exceed 100,000 cells/mL (guideline value for moderate health risk from the World Health Organization's Guidelines for Safe Recreational Water Environments [2003]) in any samples collected. These results indicate West Fork Lake did not have cell count levels potentially indicative of a HAB at the time of sampling.

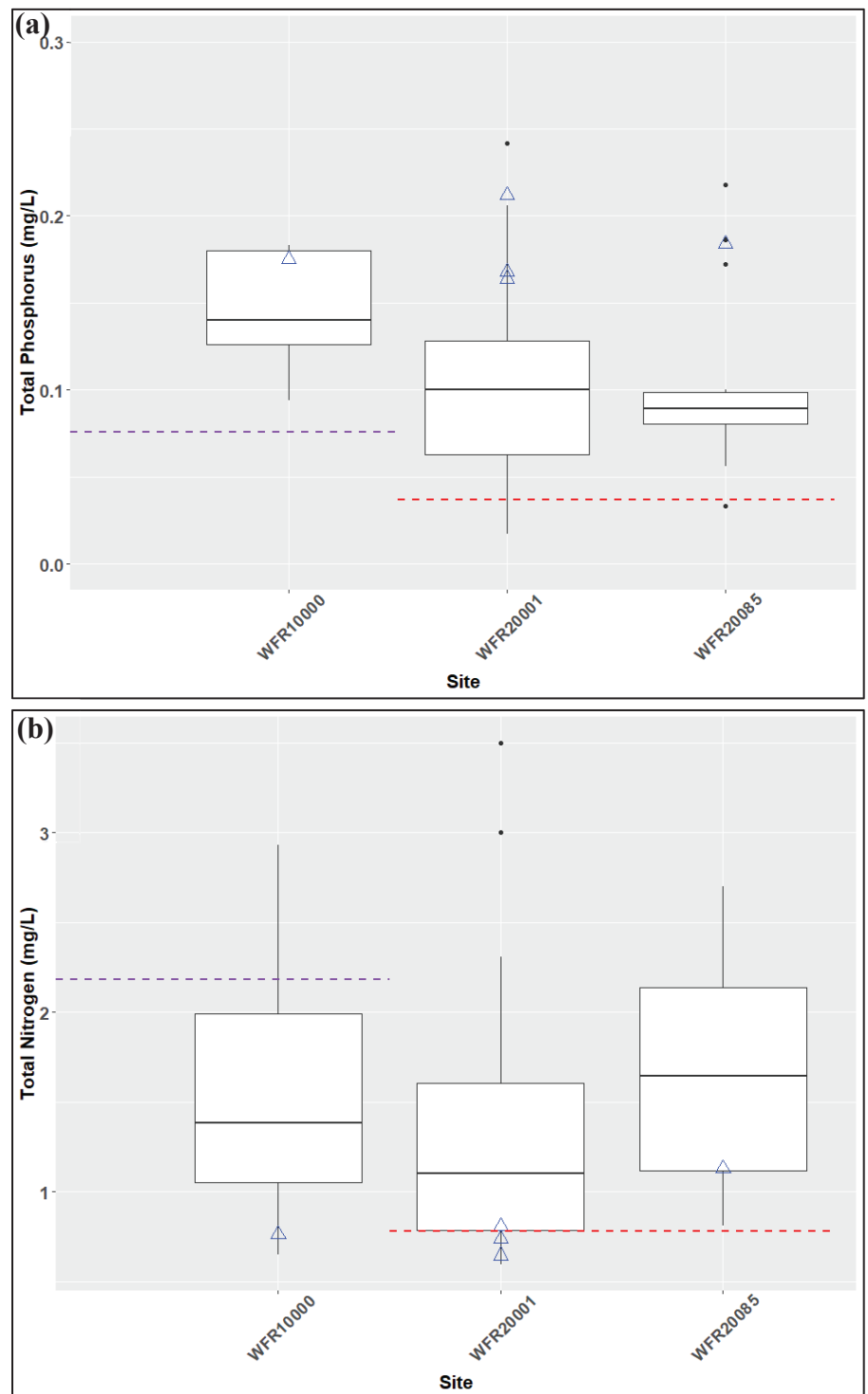


Figure 3. Comparison of West Fork Lake 2020 nutrient data to historical samples and nutrient criteria. Boxplots represent data collected in 2012-2019 and blue triangles represent 2020 data. Purple and red dotted lines represent USEPA recommended nutrient criteria for streams and reservoirs, respectively. (a) Comparison of total phosphorus data. Four outliers (values range from 0.359 to 0.538 mg/L) were excluded to make plot easier to interpret. (b) Comparison of total nitrogen data.

Harmful Algal Bloom (HAB) Response

Ohio EPA is the lead agency for HAB response in Ohio, and Great Parks of Hamilton County (GPHC) manages recreation at West Fork Lake. Ohio EPA/GPHC did not issue any advisories for HABs at West Fork Lake in 2020.

TSI

The trophic state indices for Secchi depth [TSI(SD)], chlorophyll-*a* [TSI(CHL)], and total phosphorus [TSI(TP)] were calculated for two reservoir sites at West Fork Lake (Table 1). The mean categories of the three indices ranged from eutrophic to hypereutrophic, indicating a high to very high level of biological activity.

Table 1. Summary of calculated trophic state indices at West Fork Lake.

	Mean Score (range)	Mean Category (Range)
TSI(SD)	69 (65-73)	Hypereutrophic (Eutrophic-Hypereutrophic)
TSI(CHL)	61 (56-65)	Eutrophic
TSI(TP)	79 (78-79)	Hypereutrophic