Mississinewa Lake (2018)

Water Quality Takeaways

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

General Information

Mississinewa Lake (MSR) is located in Wabash, Miami, and Grant counties in Indiana. 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 October 1967. At summer pool, the surface area of MSR is 3,180 acres.

Water quality (WQ) in the tailwater is assessed by analyzing 2018 data for exceedances of WQ criteria established by the IN Department of Environmental Management (IDEM). No criteria were exceeded in the tailwater (2MSR10000; Figure 1). However, MSR exceeded the USEPA's recommended criteria for total phosphorus and turbidity. This is common among IN lakes but can contribute to harmful algal blooms.

Figure 1. MSR 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 established by each lake's Water Control Plan (WCP) and state criteria. Figure 2a shows a time series graph of the 2018 tailwater (2MSR10000; Figure 1) water temperature compared with the guide curve from the lake's WCP. In 2018, MSR operated 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). MSR met established state criteria for dissolved oxygen.

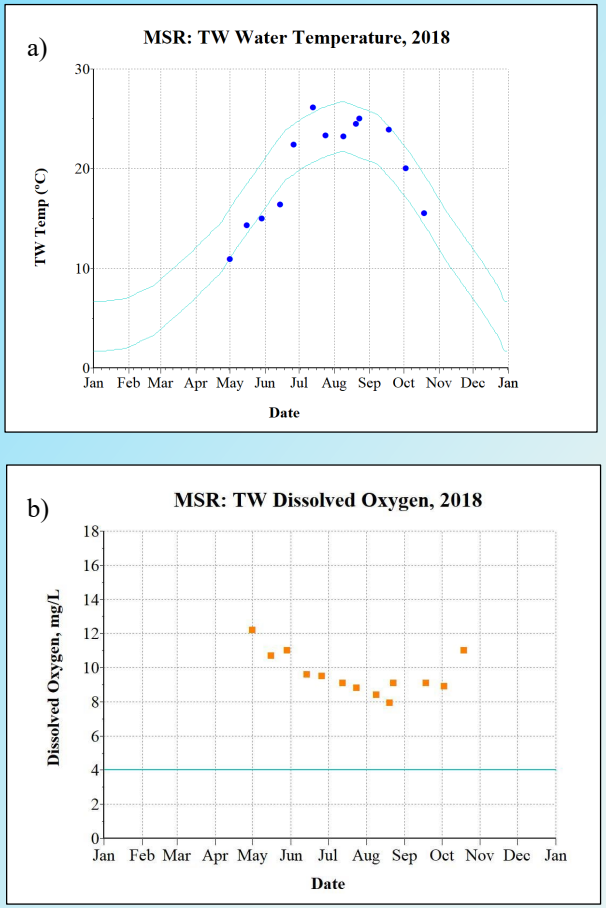

Figure 2. MSR time series data collected from the tailwater (2MSR10000; Figure 1): a) water temperature; and b) dissolved oxygen.

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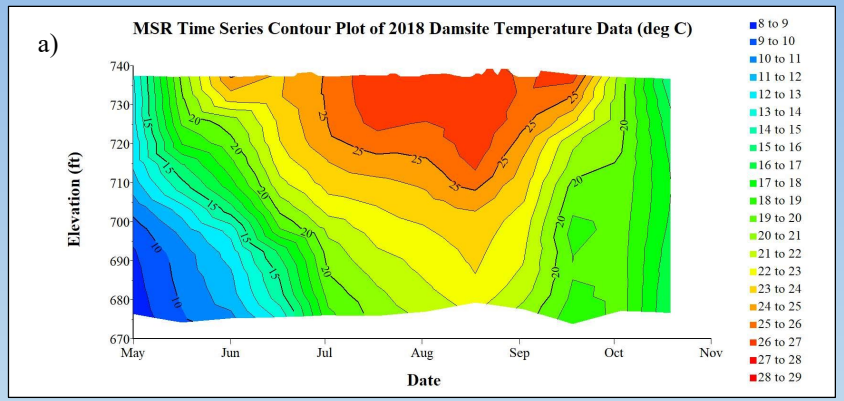
Reservoir Conditions and Operations

Below (Figure 3a and b) are time series contour plots of MSR profile data collected at the damsite (2MSR20001; Figure 1) in 2018. The figures show the progression of temperature and dissolved oxygen availability throughout the year. MSR temperature profile data collected in 2018 (Figure 3a) indicates that the reservoir could be successfully operated to meet its temperature guide curve, which it did (Figure 2a). Additionally, Figure 3b indicates that the reservoir possesses adequately oxygenated water to meet state criteria.



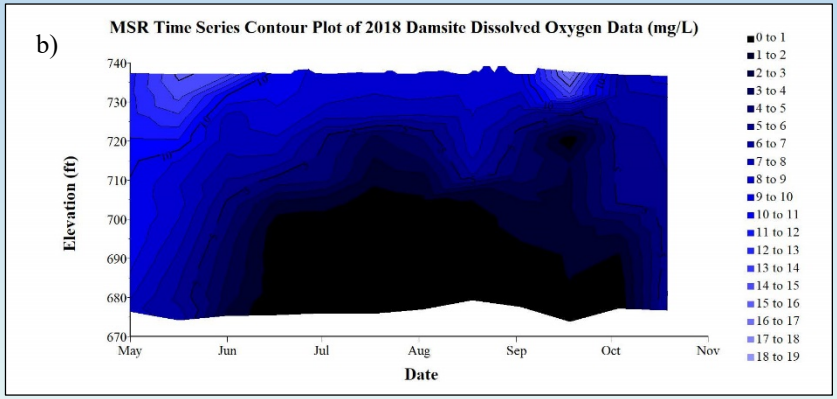


Figure 3. MSR time series data collected from the damsite (2MSR20001; Figure 1) during 2018: a) water temperature; and b) dissolved oxygen.

Reservoir Biological Conditions

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

Site	TSI Score	Trophic State
2MSR20001	62	Eutrophic
2MSR20002	67	Eutrophic
2MSR20003	76	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.

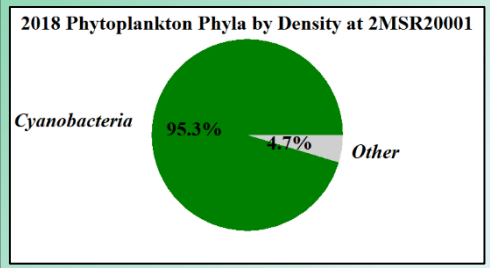


Figure 4. 2018 phytoplankton community at 2MSR20001.

Figure 4 illustrates the abundance of cyanobacteria relative to the other types of phytoplankton collected in 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 MSR.

Harmful Algal Blooms (HABs) in IN are addressed by the IN Department of Natural Resources (IDNR) and the IN Department of Environmental Management (IDEM) in the IDNR HAB Response Standard Operating Procedure. The LRL WQ Program supports the state agencies efforts by reporting visual HAB indicators via the IN State Department of Health Algal Bloom Notification Form.