

Salamonie Lake (2018)

Water Quality Takeaways

- High potential for harmful algal blooms
- No exceedances of state water quality criteria

General Information and Water Quality

Salamonie Lake (SRR) 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 of SRR is 2,665 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 (2SRR10000; Figure 1). However, SRR did exceed the USEPA's recommended criteria for total phosphorus, total nitrogen, and turbidity. This is common among IN lakes but can contribute to harmful algal blooms.

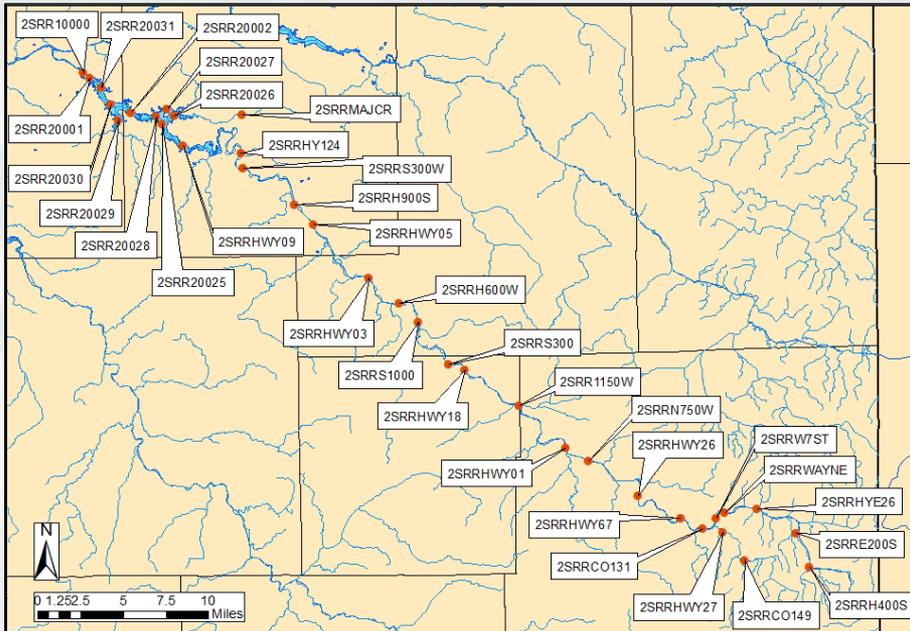


Figure 1. SRR sample sites in 2018 for field and chemical data.

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 that are established by each lake's Water Control Plan (WCP) and state criteria. Figure 2a shows a time series graph of the 2018 tailwater temperature compared with the guide curve from the lake's WCP. SRR 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). The tailwater met established water quality criteria for DO.

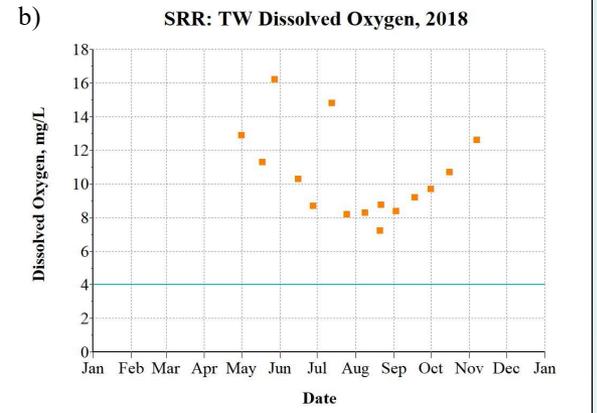
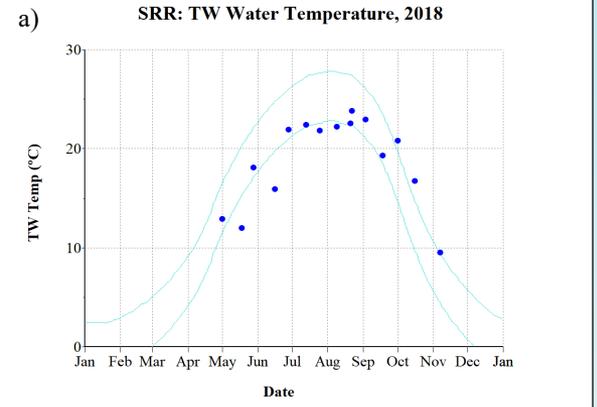


Figure 2. SRR time series data collected from the tailwater (2SRR10000; Figure 1): a) water temperature; and b) dissolved oxygen.



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Reservoir Conditions and Operations

Below (Figures 3a and b) are time series contour plots of SRR profile data collected at the dams site (2SRR20001; 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 May through October. Figure 3b indicates that while the reservoir could have oxygen limitations in the fall, the lake is adequately oxygenated most of the time.

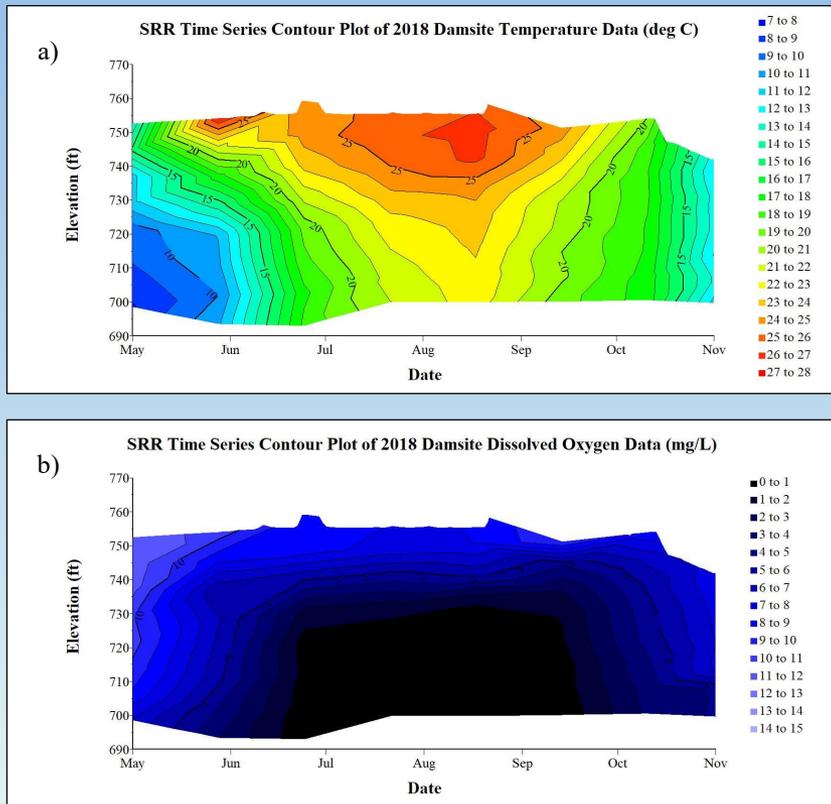


Figure 3. SRR time series data collected from the dams site (2SRR20001; Figure 1) in 2018: a) water temperature; and b) dissolved oxygen.

Reservoir Biological Conditions

Trophic State Index (TSI) was calculated using values from Secchi Depth, Chlorophyll-a, and Total Phosphorus analyses. The TSI values below were calculated for multiple sites with 2018 data. The results shown in Table 1 suggest that SRR is at a minimum eutrophic (TSI score from 51-69). This means that SRR 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 SRR in 2018.

Site	TSI Score	Trophic State
2SRR20001	68	Eutrophic
2SRR20002	72	Hypereutrophic
2SRR20025	72	Hypereutrophic
2SRR20026	72	Hypereutrophic
2SRR20027	71	Hypereutrophic
2SRR20029	70	Hypereutrophic
2SRR20030	69	Eutrophic
2SRR20031	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.

2018 Phytoplankton Phyla by Density at 2SRR20001

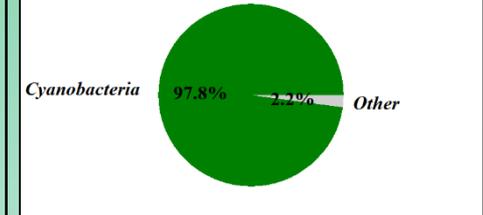


Figure 4. 2018 phytoplankton community at 2SRR20001.

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 SRR.

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.

