

Carr Creek Lake (2017)

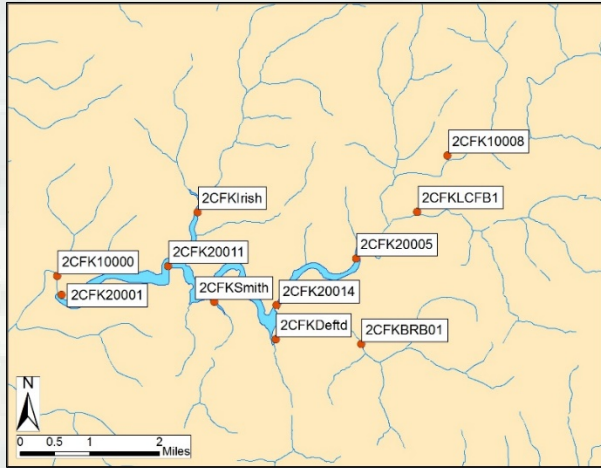


Figure 1. CFK sample sites in 2017 for field and chemical data.

Carr Creek Lake (CFK) is located in Knott County, Kentucky (KY). The dam was built and is operated by the Louisville District of the US Army Corps of Engineers (LRL). The primary purpose of the lake is flood control and secondarily water supply. The dam site is located at river mile 8.8 of Carr Fork and the surface area of CFK is 710 acres. Note: The term “lake” is substituted for the technically correct “reservoir” throughout this document for consistency.

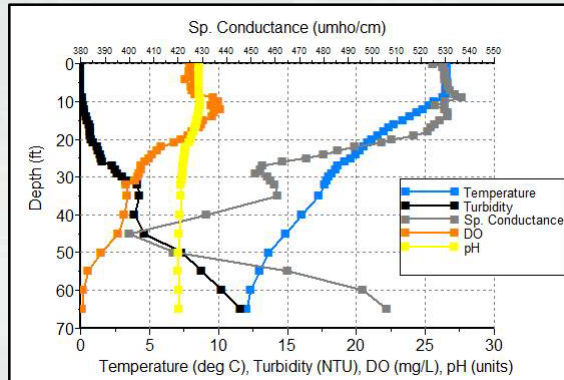


Figure 2. Field data taken at the dam site (2CFK20001; Figure 1) on 6/21/2017 at 07:00.

Harmful Algal Blooms (HABs) in KY are addressed by the KDOW as they are the lead agency for HAB response in the state. The KDOW has adopted HAB toxin sampling for posting public recreational advisories/cautions. The LRL WQ Program coordinates with, complies with, and supports the state agency’s efforts to implement a statewide HAB response plan. LRL assists the KDOW with implementation by reporting visual HAB indicators and collecting HAB toxin samples at locations as specified by the KDOW.

Phytoplankton (Algae) and green plants are the base of the food chain in aquatic food webs and convert nutrients and CO₂ through photosynthesis into biomass for all aquatic life. The LRL WQ Program sampled the phytoplankton community at CFK in June 2017. The distribution and identification of phytoplankton is measured throughout the water column at depths of 0,5,10, and 20 feet at multiple locations across the lake body.

Figure 4 illustrates the relative abundance and species richness for the entire phytoplankton community at CFK. The relative abundance percentage was calculated using the density of phytoplankton species from all sample sites, at all depths. *Chroococcus microscopicus*, a species of cyanobacteria, was the dominant species found at CFK during the June sampling event. While HABs have not previously been a reported WQ issue at CFK, the results from the phytoplankton sampling indicate that HABs have the potential to become problematic at CFK.

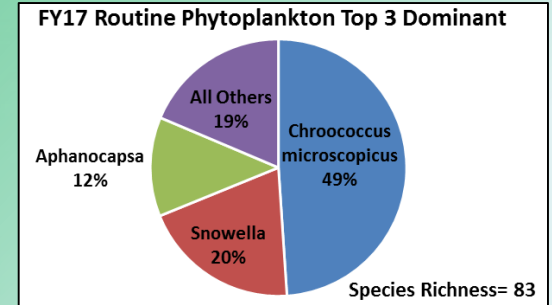


Figure 4. 2017 relative abundance of the entire phytoplankton community at CFK.

Temperature and dissolved oxygen (DO) profile data are regularly collected from LRL lakes. This data informs water control engineers on how to best use existing selective withdrawal capabilities to meet downstream water quality (WQ) targets established by each lake’s Water Control Plan (WCP) and state criteria. Figure 3a shows a time series graph of the 2017 tailwater water temperature compared with the guide curve from the lake’s WCP. Figure 3b shows a 2017 time series graph of the lake’s tailwater dissolved oxygen data with the applicable state criteria (blue line).

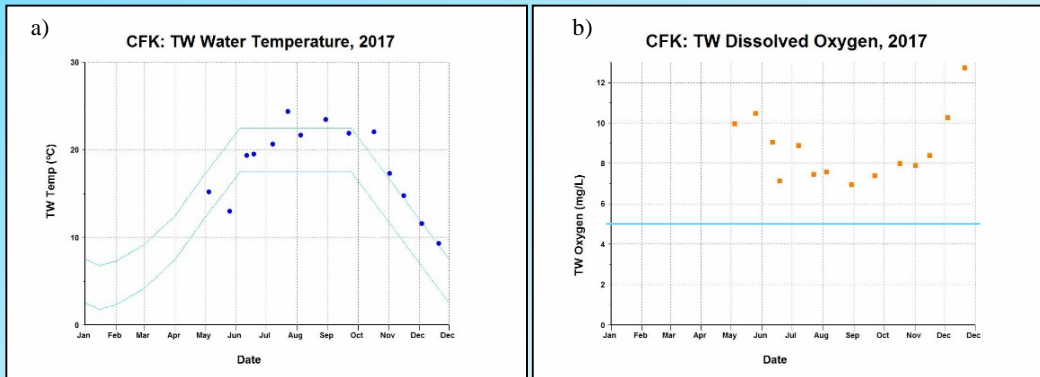


Figure 3. CFK time series data collected from the tailwater (2CFK10000; Figure 1) a) water temperature; and b) dissolved oxygen.

WQ in the Tailwater is assessed by analyzing exceedances of WQ criteria established by the KY Division of Water (KDOW). **No criteria were exceeded in the tailwater (2CFK10000; Figure 1). However, KY exceeded the USEPA’s recommended criteria for total phosphorus (Criteria: 10.0 ug/L; Measurement: 11.0 ug/L) and total nitrogen (Criteria: 0.31 mg/L; Measurement: 0.88 mg/L). All exceedances have been reported to KDOW.**

Zooplankton are microscopic animals that live in the water column and are an important part of the food chain. The LRL WQ Program sampled the zooplankton community at the dam site (2CFK20001; Figure 1) using a Wisconsin net pull of 20 vertical feet. Figure 5 illustrates the relative abundance for the zooplankton community and species richness at CFK. Species richness is an indicator of community health, with greater community health as species richness increases. The top 3 dominant zooplankton were *Diaphanosoma brachyurum*, sub-adult Cyclopoida, and *Mesocyclops edax*.

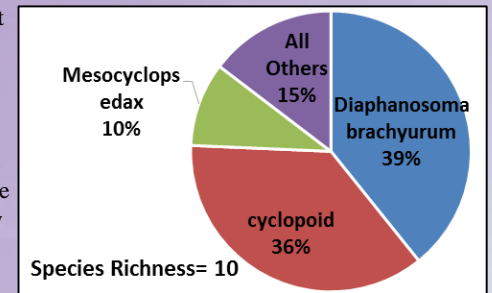


Figure 5. 2017 relative abundance of the zooplankton community at CFK.

