

Cecil M. Harden Lake (2017)

Cecil M. Harden Lake (CHL) is located in Parke and Putnam counties in Indiana (IN). The dam was built by the Louisville District of the US Army Corps of Engineers (LRL) for the primary purpose of flood control and became operational in July 1960. The dam site is located at river mile 33 of Big Raccoon Creek. The drainage area above the dam is 216 square miles, and at summer pool, the surface area of CHL is 2,110 acres. Note: The term “lake” is substituted for the technically correct “reservoir” throughout this document for consistency.

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 agencies sample and post appropriate recreational advisories for select lakes May through September of each year. 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. LRL also supports the state agencies in HAB response by communicating HAB-related recreational advisories to the public.

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 CHL in May, July, and September 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 CHL during each sampling event. The relative abundance percentage was calculated using the density of phytoplankton species from all sample sites, at all depths during each event. **Chroococcus microscopicus** was the dominant species in May while **Planktolyngbya** was the dominant genera in July and September. Both dominant taxa are genera of cyanobacteria.

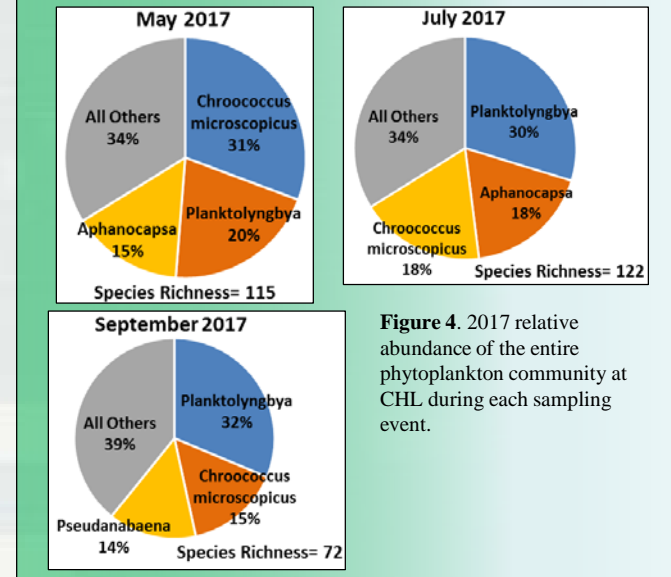


Figure 4. 2017 relative abundance of the entire phytoplankton community at CHL during each sampling event.

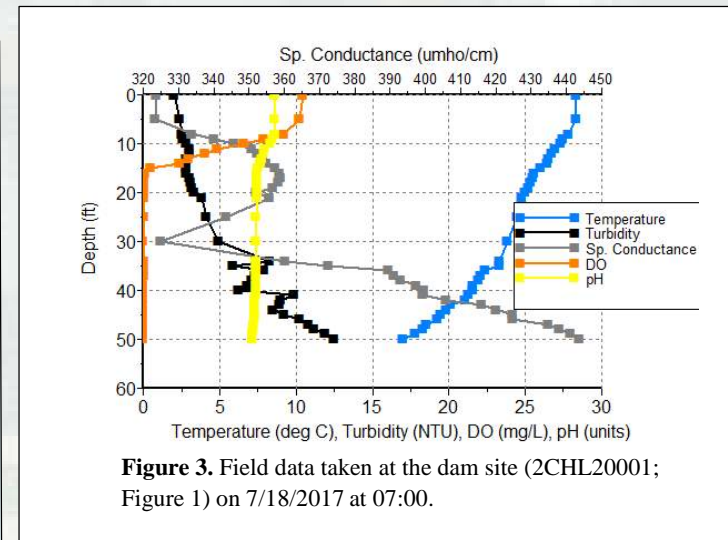


Figure 3. Field data taken at the dam site (2CHL20001; Figure 1) on 7/18/2017 at 07:00.

Zooplankton are microscopic animals that live in the water and are a part of the food chain. The LRL WQ Program sampled zooplankton at the dam site (2CHL20001; Figure 1) three times using a Wisconsin net pull of 20 vertical feet. Figure 5 illustrates the abundance for the zooplankton community and species richness at CHL during each sampling event. Species richness is an indicator of community health, with greater community health as species richness increases. Dominant taxa included *Daphnia* sp., *Daphnia parvula*, *Asplanchna priodonta*, sub-adult Calanoida, and sub-adult Cyclopoida.

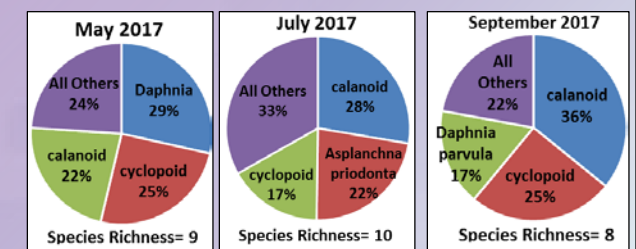


Figure 5. 2017 abundance of the zooplankton community at CHL.

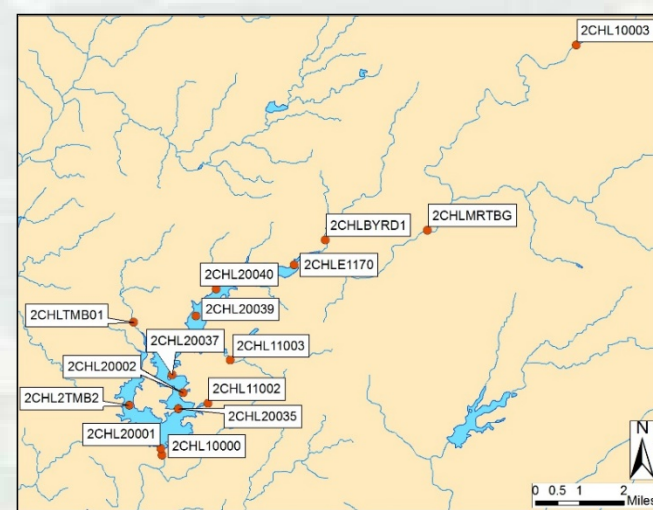


Figure 1. CHL sample sites in 2017 for field and chemical data.

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 2a shows a time series graph of the 2017 tailwater water temperature compared with the guide curve from the lake’s WCP. Figure 2b shows a 2017 time series graph of the lake’s tailwater dissolved oxygen data with the applicable state criteria (blue line).

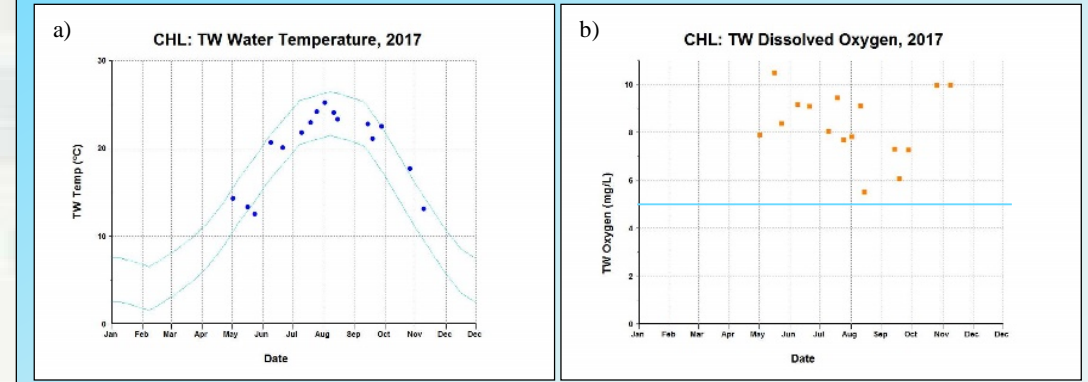


Figure 2. CHL time series data collected from the tailwater (2CHL10000; Figure 1): a) water temperature; and b) dissolved oxygen .

WQ in the Tailwater is assessed by analyzing exceedances of WQ criteria established by the IN Department of Environmental Management (IDEM). **No criteria were exceeded in the tailwater (2CHL10000; Figure 1). However, CHL exceeded the USEPA’s recommended criteria for total phosphorus (Criteria: 36.56 ug/L; Measurements: 95.0 and 191.0 ug/L), total nitrogen (Criteria: 0.69 mg/L; Measurements: 1.25, 2.85, and 4.05 mg/L) and turbidity (Criteria: 5.7 FTU; Measurement: 6.5 and 14.1 NTU). All exceedances have been reported to IDEM.**