

Veterans Lake Field Trip Report

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and

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Introduction:

Our Limnology class from East Central University went on a field trip to Veterans Lake. The lake is an impoundment in the Chickasaw National Recreation Area in Sulphur, Oklahoma. Coordinates for the mid-lake sampling location are (N 34° 29.437'; W 96° 59.138') and the coordinates for the near-shore lake sampling location are (N 34° 29.460'; W 96° 59.008')

The intent was to introduce our class to research methods used to study lake ecosystems. The project assigned to us was to measure water quality and zooplankton population numbers.

Methods:

Secchi depth was recorded to the nearest 0.1 meters at the mid-lake location using a 20-cm diameter Secchi Disk. This was to enable interpretation of the data, as Secchi depth can indicate where the eutrophic zone ends.

To determine water quality, we collected three grab samples using a 2 L Van Dorn water sampler. Each grab was taken at a different depth: 1 meter, 4.5 meters, and 8 meters. Volume of each sample was split with ca. 500 mL for zooplankton analysis, 500 mL was placed in a LD polypropylene jar and put on ice for later determination of TDS, and the remaining volume was poured in bucket for the collection of water-quality field parameters: pH, specific conductance and water temperature. Conductivity was measured in the field to the nearest $\mu\text{S}/\text{cm}$ using an AquaShock® Hand-held conductivity meter. pH was then also measured in the field using an OakTon PD 450 Hand-held meter with probe. Total Dissolved Solids (TDS) was measured to the nearest mg/L for each water sample in the lab one week after sampling using an ExStik II® hand-held TDS meter. The samples were refrigerated at 4°C after collection and prior to TDS measurements.

To collect zooplankton to determine population densities, we used a 50 μm -mesh zooplankton tow net with a 50 μm plankton bucket attached for all zooplankton sampling. We collected three vertical zooplankton samples from the boat at the mid-lake location, and three from the near-shore location. The three near-shore samples were composited into the same container for analysis. We collected a horizontal tow sample from the mid-lake location to the near-shore location. The tow net was towed beside the boat at low speed, and at a depth of 0.1 meters. All zooplankton samples were placed in a 500 mL LD polypropylene sample jar, and a roughly equal volume of 70% isopropyl alcohol was added. Zooplankton samples were processed in the lab by disturbing each sample in an 8 cm plastic petridish. Because of the large number of zooplankton in the vertical and horizontal tow samples, a 0.5 mL subsample was removed from each petridish, and the zooplankton in this subsample were counted to identified to the taxonomic level of Order Cladocera (a.k.a., water fleas), Subclass Copepoda and Class Ostracoda. All taxa are within the Phylum Arthropoda and Subphylum Crustacea. A ca. 500 mL split of each water sample that was analyzed for TDS was checked for the occurrence of zooplankton taxa. None of the mesozooplankton taxa observed in the tow samples were found. However, the facultative phototroph, *Euglena* sp., and the multicellular phototrophic algae, *Volvox* sp. were observed.

Results:

Secchi depth was measured to be 3.1 meters.

Water temperature was a constant value of 25.3 degrees Celsius throughout all measurements.

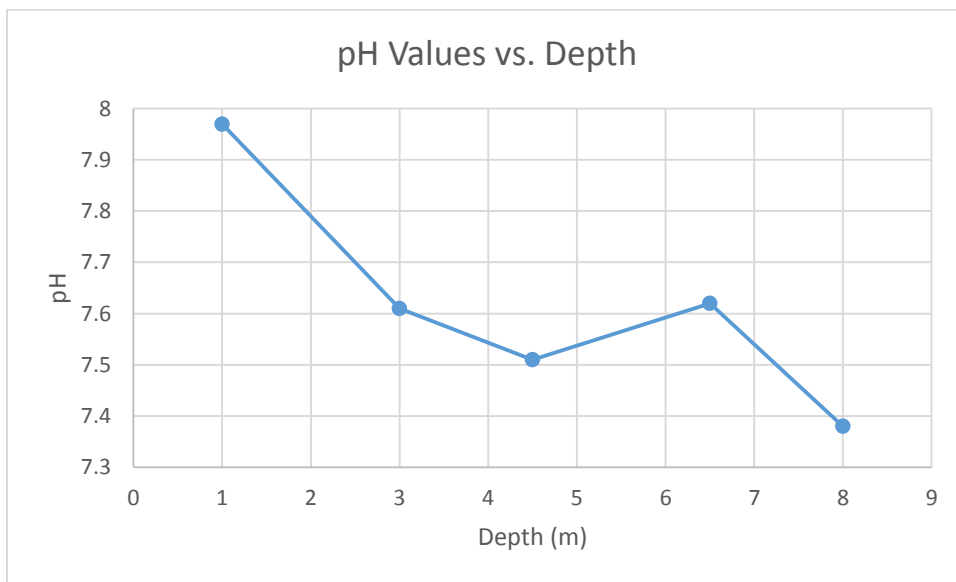


Figure 1: pH vs. depth in Veterans Lake.

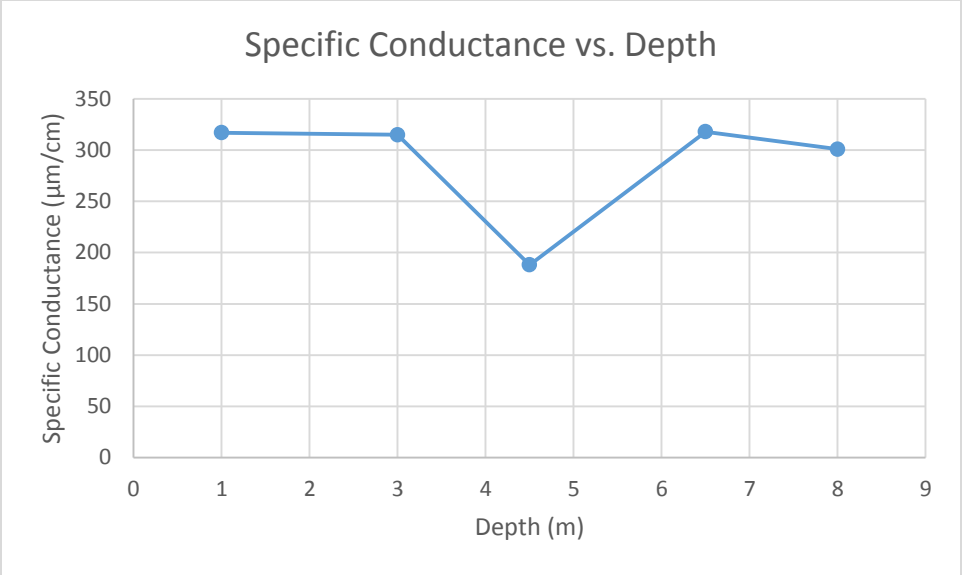


Figure 2: Specific conductance vs. depth in Veterans Lake.

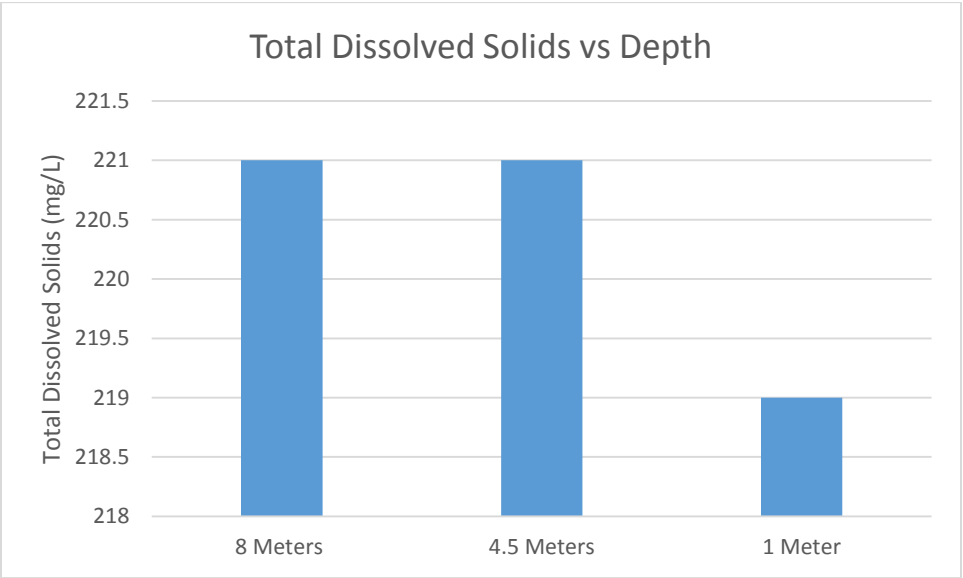


Figure 3: Total dissolved solids vs depth in Veterans Lake.

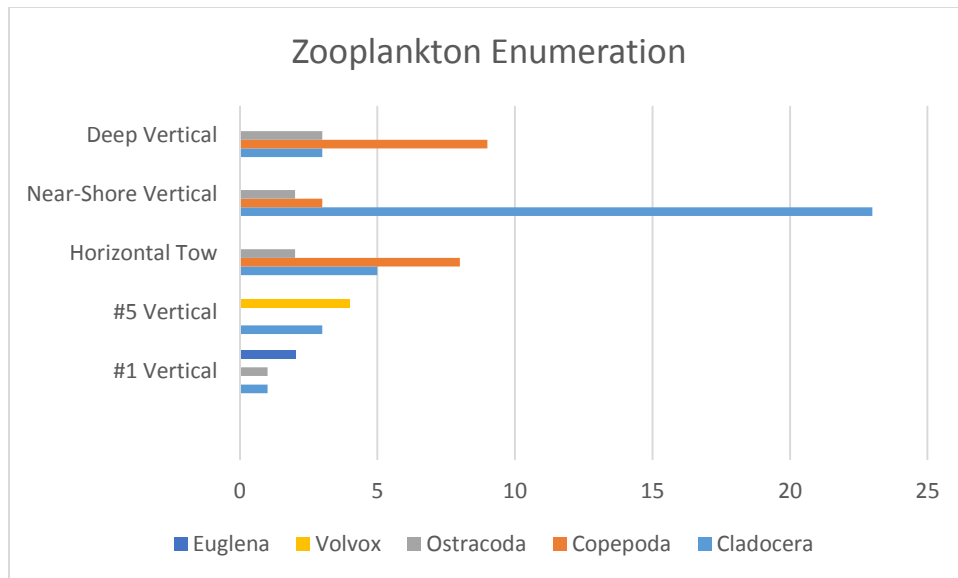


Figure 4: Zooplankton enumeration by depth and taxa.

Conclusions:

Water temperatures were constant throughout all measurements. This could indicate that the lake was in a turnover period.

The data shows that pH levels drop with depth. This is expected, as with less photosynthesis happening at lower depths there should be more carbon dioxide. This carbon dioxide would be in the form of carbonic acid, meaning that less photosynthesis is correlated with lower pH.

The specific conductance measurements vary mostly at only one point. This could be from faulty data collection, or it could be from wind mixing action. I predict that a second sample from the same area would give a different result for that one data point.

The total dissolved solids shows data that I would expect to find in the middle of a lake. The solids would likely settle down farther in the water column due to their high density. This explains the relative lack of dissolved solids in the eutrophic zone.

Zooplankton enumeration shows that more zooplankton overall occur in the near-shore region. This is to be expected, as littoral regions tend to have high species numbers (and also because the sample was a composite of several trials). The photosynthetic *Volvox* only appears in the higher regions of the euphotic zone to facilitate its need for UV radiation. Euglenas are only seen in the 8 meter deep sample, as they favor the deeper areas of the euphotic zone. Cladocerans, Copepods, and Ostracods all are most prevalent in the higher regions of the euphotic zone. I am surprised to see that we did not collect any Copepods or Ostracods in our #5 vertical, as we collected them in both more shallow and deeper depths. When sampling the deeper profiles, the tow net that we used should have also taken up zooplankton from the higher profiles. This is because there is no way to close the net underwater. Therefore I am obliged to think that if we sampled the #5 vertical again we would likely find Copepods and Ostracods.