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Spatial and Temporal Variability of Water Quality Parameters in Cedar Lake (Cedarville, Ohio)

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Research & Scholarship SYMPOSIUM

Spatial and Temporal Variability of Water Quality Parameters in Cedar Lake (Cedarville, Ohio)

Cedar Lake is a man-made lake that is central to Cedarville University's campus. This focal point of the campus is a source of aesthetic appeal and beauty of Cedarville University. The lake ranges in depth from 0.6-3.7m, is 140m by 150m across, an approximate volume of 40,000 m³ and demonstrates normal capabilities to support fish and other life. There is, however, some concern over Cedar Lake's level of productivity, as undesirable algae blooms are common during warmer months. In October and November 2016, we began to assess the spatial and temporal variability of water chemistry by measuring temperature (°C), dissolved oxygen (DO), ammonium (NH₄⁺), nitrate (NO₃⁻), conductivity, and total dissolved solids. We recorded GPS coordinates of each sample location. We predicted that temperature and DO would be greatest at the surface (due to heating and mixing) and NH₄⁺/NO₃⁻ near the shore (due to runoff).

We measured the following parameter ranges: temperature of 10.4 - 12.5 (°C), DO = 8.03 - 10.01 mg/L, NH₄⁺ 0.56 - 0.84 (mg/L), NO₃⁻ = 0.18 - 0.41 (mg/L), conductivity = 250.4 - 277.6 (mS/cm), and TDS 162.76 - 180.44 (g/L). We found that DO was significantly different ($p < 0.05$) for both sampling date (October/November) and location (shallow/deep). Using spatial interpolation techniques in ArcGIS we were able to provide supporting evidence for our hypothesis where NH₄⁺/NO₃⁻ levels were greater near the lake's edge. We also noted a spatial trend in surface DO as it declined from highest values in the northeastern portion of the lake to the lowest values near the outlet.