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## Periphyton Community Dynamics as an Indicator of Water Quality

CHANTLER, C., BENALLICK, J., SINCLAIR, C. & KANAVILLIL, N.

Lakehead University, Orillia Campus, Orillia, Ontario, Canada

Periphyton respond rapidly to changes in environmental factors. As a result, periphyton are used as water quality indicators. Periphyton samples growing on small rock surfaces in the littoral zone were collected in replicates from thirty sampling areas in Central Ontario including: the Trent-Severn Waterway north of Lake Couchiching; Lake Simcoe; Bass Lake; Lake St. John; and the Holland River. The water parameters monitored at these sites include: pH; dissolved oxygen; temperature; conductivity; chlorophyll-*a*; total suspended solids/biomass; and nutrients (total phosphorus and total nitrate). Periphyton samples extracted by using sterile toothbrushes from the rock surfaces were studied for their density, biomass, microalgal species composition, species diversity, and bio-volume. Overall, more than 80 different species of microalgae were found. The dominant species found were *Cymbella sp.*, *Diatoma sp.*, *Navicula sp.*, and *Synedra sp.* Of these dominant species, *Navicula sp.* was the only species found in all samples that were counted. The presence of *Oscillatoria sp.* and *Achnantheidium sp.*, found at the outflow of Orillia's wastewater treatment facility well, reflected the high concentrations of nitrate, high conductivity in the flowing waters. Similarly, the presence of *Anabaena sp.* at Lake St. John well reflected high nutrient availability and chlorophyll *a* concentrations within the lake. Significant variation was observed in species composition between sampling locations. Species richness varies from 4 to 37, and Shannon's Diversity Index range from 0.17 to 1.02. Site 1, Line 14 in Oro-Medonte, had the lowest species richness whereas site 17, Harbour Park Crescent, had the highest species richness. Site 1 also yielded the lowest species diversity, while site 25, Centennial Park in Washago, had the highest species diversity. Overall, the significant variation in species composition, richness, and diversity will help in designing a periphyton-based water quality index for this region.