

Big Hawk Lake Benthic Biomonitoring Assessment

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Background Information

Benthic macroinvertebrates are useful bioindicators of aquatic ecosystem condition indicative of both environmental stressors and effects. They are widespread, sedentary, long-lived, and easy to sample, making them ideal for assessing water and sediment chemistry. The presence of or absence of benthos serves as a measure of their tolerance to water conditions. Long-term monitoring over many years can reveal environmental health deterioration or improvement which can help in decisions surrounding policy, development, and pollution.

Purpose

This study is focused on evaluating the ecological health of Big Hawk Lake in Haliburton, Ontario, through the bioassessment of benthic macroinvertebrates. Conducted in collaboration with the host organization Halls and Hawks Lakes Property Owners Association (HHLPOA) and U-LINKS Centre for Community Based Research, this project addresses the need for continuous monitoring to combat ongoing challenges such as increased algae growth, acidification, invasive species, and other environmental stressors. The results aim to equip HHLPOA with valuable insights, fostering informed decisions for the lake's sustained health in the long-term.

Methodology

Field Work:

- Kick and sweep method at three sites (two replicates each)
- 3 mins sample collection at 1m depth and/or 10m distance
- Samples were sieved, collected in jars, and labelled

Lab Work:

- Samples preserved with 70% ethanol
- Invertebrates were studied under microscopes, identified, and tallied

Results

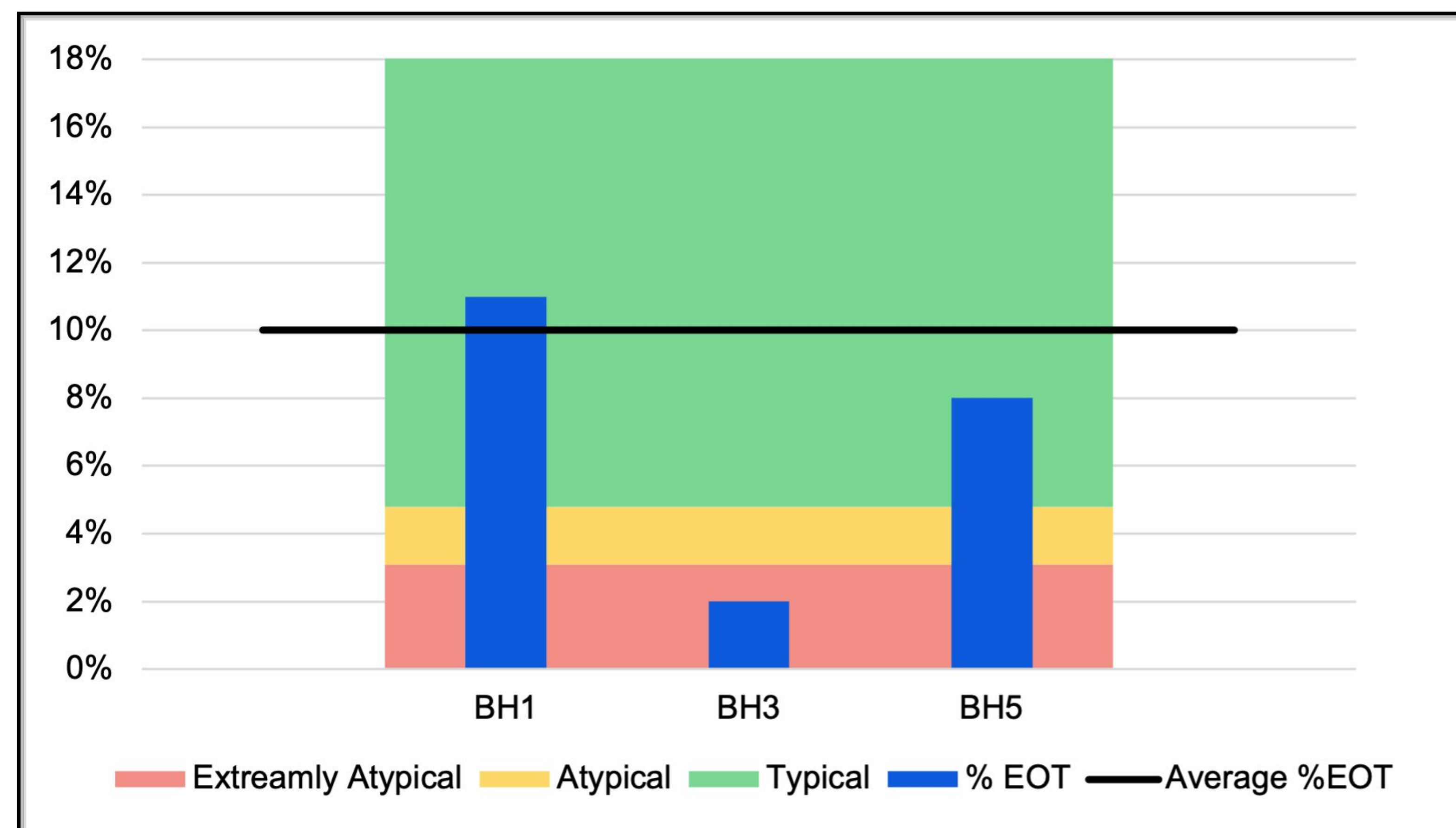


Figure 1. Average percentage of Ephemeroptera, Odonata, and Trichoptera (% EOT) found at each sample site against regionally typical, atypical, and extremely atypical percent ranges, as well as the average regional % EOT

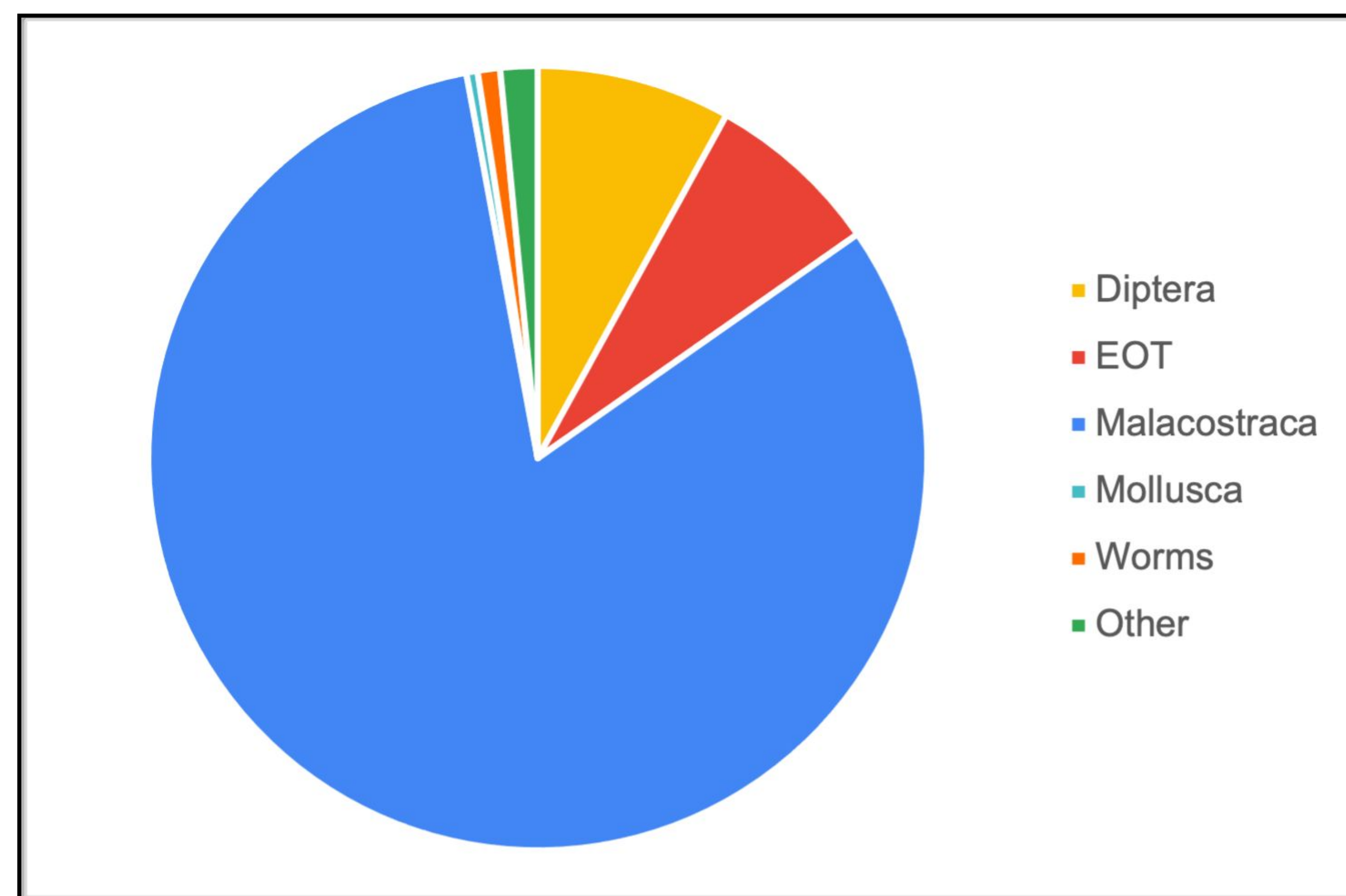


Figure 2. A pie chart of combined count data from all six replicates of six key macroinvertebrate groups. Diptera consists of midges, deer flies, mosquitos, no-see-ums, crane flies, black flies, and other flies (Diptera). EOT consists of mayflies (Ephemeroptera), dragonflies and damselflies (Odonata), and Caddisflies (Trichoptera). Malacostraca consists of sowbugs, scuds, and crayfish. Mollusca consists of clams, mussels, and snails. Worms consist of flatworms, roundworms, and earthworms. The other group consists of hydras, leeches, mites, stoneflies, true bugs, alderflies, moths, and beetles.

Biotic Indices

• **Modified Hilsenhoff Family Biotic Index (HBI) = 5.96**

- Indicates a water quality rating of fair (significant organic pollution in the lake), and a community with an average tolerance of poor water quality,
- **%Ephemeroptera, Odonata, Trichoptera = 7%**
- These invertebrates are sensitive to the disturbances and pollutants often seen in lakes
- This value is considered typical in the Haliburton region and is just below the average %EOT though site three was atypical at 2% (Fig. 1)

• **Simpson's Index = 0.66**

- The probability that any two individuals will belong to the same group – value is slightly above average on a scale from 0 (no diversity) to 1 (infinite diversity), indicating good-fair water quality

Recommendations

The 2023 data was compared to previous years data for the same sites. The only noticeable change in the results over time was observed at site 3, with average %EOT steadily declining since 2020. We recommend continuing to gather annual samples from these sites to establish long-term data and trends for the lake. This will allow trends in the data, like improvements or declines in lake health to become more apparent.

To ensure that the health of the lake is maintained, we also recommend continual mitigation measures to reduce the threat of invasives, including draining boat live wells, removing any living organisms from the bottom of the boat, never dumping bait, using local bait, and properly sanitizing the boat between uses in different lakes. Regular testing of water quality and chemistry, as well as benthic sampling, in areas under construction is also recommended. These measures will provide data on the impact of development and assess its influence on bacteria levels, water acidification, and overall water quality.