University of Waterloo

RESEARCH AT SUNFISH LAKE

Dear Sunfish Lake Cottagers,

We are a group of students and researchers at the University of Waterloo operating out of the Department of Geography under the supervision of Dr Claude Duguay. Our research is part of *Global Water Futures: Solutions to Water Threats in an Era of Global Change,* a multi-university program which focuses on water research throughout Canada.

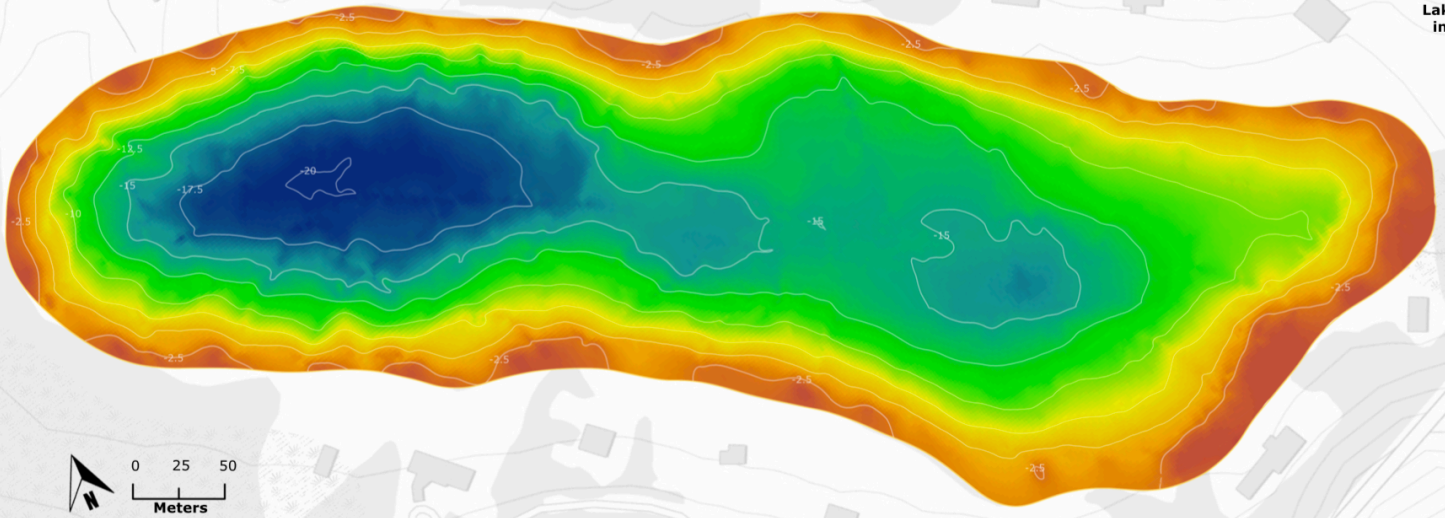
We are exploring the effect of climate change on small lake systems such as that of Sunfish Lake. To carry out this research we use a variety of tools and methods including unmanned aerial vehicles, thermal sensors deployed within the lake, as well as water sampling to measure key chemical parameters.

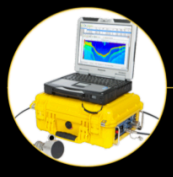
This pamphlet includes preliminary results from some of our research, as well as a bathymetric map of Sunfish Lake. We hope you enjoy it and would be happy to answer any questions you have.

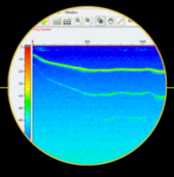
Best,
UW Sunfish Researchers
https://uwaterloo.ca/duguay-research-group

UAV composite image October 25th, 2018

SUNFISH LAKE BATHYMETRY





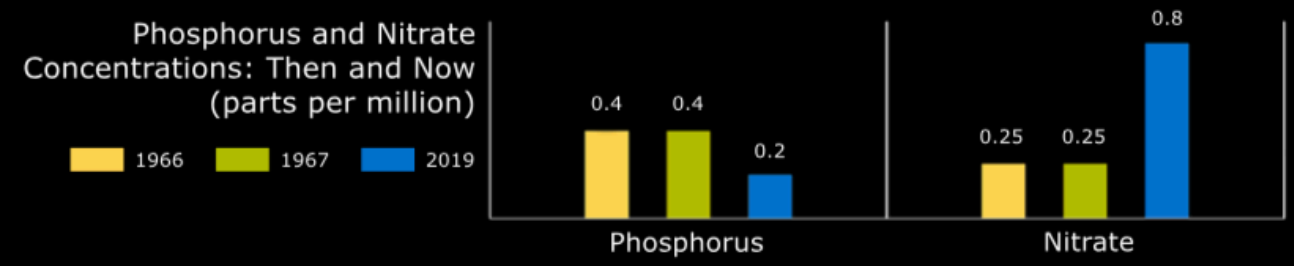


The map above shows depth throughout Sunfish Lake, also known as bathymetry. This bathymetry data has been collected with an echo sounder, a device that uses sound waves to determine depth based on the amount of time it takes for a sound pulse to travel to the lake bed and back (left and center images). You may be familiar with this technique as many anglers use echo sounding to look for fish! This device was mounted onto a small boat to collect nearly 13,000 depth measurements all over Sunfish Lake (right image).

The lines seen within the map are called isobaths and are similar to contours. They connect places in the lake with equal depth to show depth at various locations, as well as the slope of the lake bed.

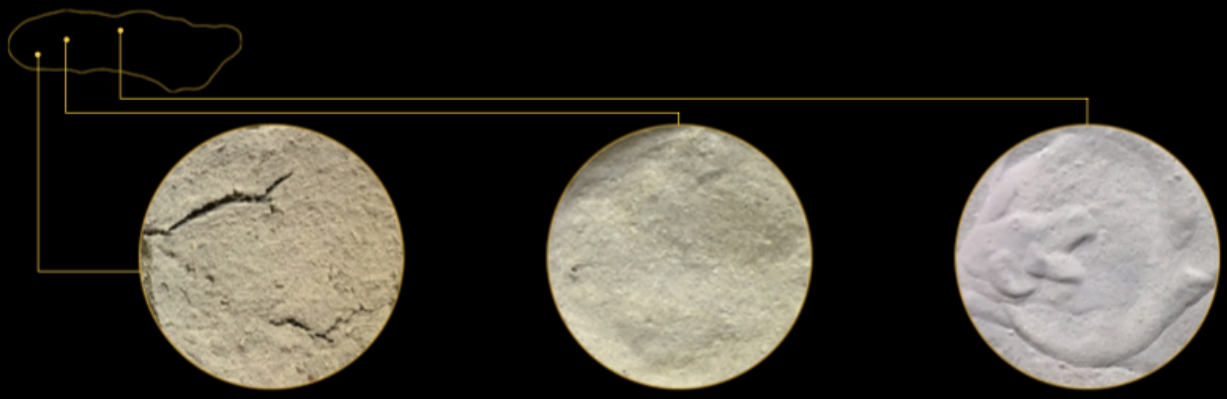
CHEMISTRY

Nitrate and phosphorus are two essential nutrients contributing to algae growth in lakes, and measuring their concentration can inform on future algae bloom potential. Below, preliminary measurements of the current concentration of these nutrients is shown compared to concentrations reported half a century ago. Phosphorus measurements were taken at 15 meters below the lake surface, whereas nitrate is reported from the maximum observed value in the water column.



SEDIMENTS

Lakebed sediments act as storage for nutrients like nitrogen and phosphorus. We plan to measure the amount of many nutrients in the sediments, and look at how this has changed over the past 50 years. The dried sediment samples pictured below show varying compositions found at three lake locations.



TEMPERATURE

The graph below shows how water temperature in Sunfish Lake has changed from August 2018 to present. This temperature data was collected by a line of thermal sensors attached to a buoy anchored at the deepest part of the lake.