CREATING A NUTRIENT MAP OF UPPER EMPIRE LAKE

Madison Davis, Tyrone Stagner, Quinn Simard, and Dr. Mike Springer
Oregon NASA Space Grant Student Symposium, November 15th, 2019
Eutrophication can have a negative and lasting impact on the environment. Measuring the concentrations of dissolved species and creating a nutrient map of a body of water can help to determine if the area is eutrophic. This project describes the creation of a nutrient map around the perimeter of Upper Empire Lake.
1. **November-December**: Used library databases to find literature from peer-reviewed journals
2. **January**: Identified sample sites around the perimeter of the lake
3. **January-March**: Began taking field measurements using digital probes and water samples for the Atomic Absorption Spectrometer (AAS)
4. **May**: Flew unmanned aerial vehicle over lake
5. **May**: Analyzed water samples with the AAS
6. **May**: Interpreted field measurements
7. **May**: Geotagged sampling sites and created nutrient map
SAMPLING METHODS

- Multiple samples were taken at each sampling site
- Sample containers remained closed until container reached a depth of approx. 10cm
- Digital probes were calibrated each time samples were recorded.
• Water samples were tested to determine chromium and lead concentrations
• Light is shot through atomized sample, particles of a specific will reabsorb light at those frequencies
• Upper Empire lake is fairly homogeneous
• Inconsistencies with pH lead to a hypothesis that slow moving water and decomposing organic material is responsible for a lower pH
• Nitrate, ammonium, and phosphate are primary nutrients in an ecosystem and are, thus, generally limited due to organism use
ATOMIC ABSORPTION SPECTROMETER
RESULTS

• No chromium or lead in Upper Empire Lake
• Graphite furnace measurements can measure concentrations of certain species down to several parts per billion
• Chromium is an essential micronutrient found in aqueous environments
UNMANNED AERIAL VEHICLE RESULTS

- Proposed to create a GPS-tagged map of Upper Empire Lake
- Recruited an employee of the college who had their drone pilot's license to fly the drone over the lake
- Complications with the memory card resulted in lost data
FUTURE DIRECTIONS

- More testing for nutrient levels to pinpoint polluted runoff
- Test what metals are found in the lake and their oxidation states
REFERENCES


