Introduction

• There are local concerns about fish resilience in the Yukon-Kuskokwim Delta (YK Delta) and Yup'ik subsistence fishing related to the increase in fire frequency and severity due to climate change.
• Increases in fire frequency and magnitude impacts biogeochemistry throughout the tundra, especially within aquatic ecosystems.
• Our goal was to assess those ecosystem changes using chlorophyll-a (chl-a) concentration
• We hypothesized differences in chlorophyll a concentrations across burn histories of lakes in the YK Delta

Study Area

Yup’ik Territory, Yukon-Kuskokwim Delta, Alaska

Methods

• Sampled 22 lakes each in unburned area (n=8), 1972 burned area (n=7), and 2015 burned area (n=7)
• Water samples collected for analysis of nitrate, ammonium, phosphate, and dissolved organic carbon (DOC) concentrations
• Tested chl-a in field using Turner Design Fluorometer

Results

Figure 1. Estimates of chl-a sampled in 2022, from lakes across different burn histories including areas that burned in 2015, 1972 and an unburned area.

Figure 2. Dissolved Oxygen (mg/L) sampled in 2022, from lakes across different burn histories. Lakes from the 2015 burn had higher average DO than lakes in the 1972 burn or the unburned areas. (p-value = 0.03567).

Figure 3. Ammonium - NH4-N (ug/L) sampled in 2022, from lakes across different burn histories. B: Chl-a (ug/L) and NH4-N concentrations of lakes in the Kuskokwim Delta, Alaska

Figure 4. Nitrates - NO3-N (ug/L) sampled in 2022, from lakes across different burn histories. B: Chl-a (ug/L) and NO3-N concentrations of lakes in the Kuskokwim Delta, Alaska

Figure 5. Phosphate PO4-P (ug/L) sampled in 2022, from lakes across different burn histories. B: Chl-a (ug/L) and PO4-P concentrations of lakes in the Kuskokwim Delta, Alaska

Figure 6. Specific Conductivity sampled in 2022, from lakes across different burn histories. B: Temperature sampled in 2022, from lakes across different burn histories. C: pH sampled in 2022, from lakes across different burn histories

Results continued

Figure 7. Dissolved Organic Carbon (DOC) sampled in 2022, from lakes across different burn histories. B: Chl-a (ug/L) and DOC concentrations of lakes in the Yukon-Kuskokwim Delta, Alaska

Discussion

• Results suggest that chl-a, over time returns to pre-burn concentrations. In 2019, we saw significantly higher chl-a concentrations in lakes in 2015 burned area. (Figure 1)
• There was significantly higher concentrations of DO in lakes in 2015 burned areas than 1972 burn or unburned areas suggesting increased presence of photosynthetic organisms. (Figure 2 A)
• In 2019, chl-a appeared limited by phosphate concentrations. This year, there is a slightly positive relationship between chl-a and ammonium, nitrates, and phosphates. (Figures 3B, 4B, 5B)

Conclusion/Future Work

• Future research will investigate other potential environmental factors of importance (ie. Lake depth, weather, light accessibility)
• More research needed on patterns of phytoplankton nutrient limitations
• Species composition of lakes should be evaluated in future

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