Wildfires and Lake Characteristics May Influence Zooplankton Communities in the Yukon-Kuskokwim Delta, Alaska Madeline R. Frey^{*1}, Nigel Golden², Emily Bristol³, Ellen G. Bradley², Sue Natali² *mfrey@disl.org;; ¹Dauphin Island Sea Lab, ²Woodwell Climate Research Center, ³University of Texas at Austin

Introduction

- Zooplankton are small heterotrophs in the water column that play a large role in nutrient cycling in aquatic food webs.
- Zooplankton are vulnerable to changes in water quality linked to disturbances fueled by climate change (such as wildfire and permafrost thaw).
- The Yukon-Kuskokwim delta has experienced several wildfires, placing historically burned and unburned areas into close proximity.
- Here, we explore zooplankton community composition in lakes in a moss and lichen-dominated permafrost tundra and examine their relationship to disturbance history and lake biogeochemistry.

Methods

- 5-meter horizontal zooplankton tows using a $10 \ \mu m \ net. \ (n = 2-3 \ per)$ lake)
- water sample was taken • 1 at each lake and analyzed for nutrients, organic matter, and chlorophyll.
- Measured water temperature, oxygen, pH, etc. with a YSI at each location.
- Zooplankton were preserved in ethanol and identified as closely as possible using dissecting microscope in the field.
- Analyses performed using the vegan package in RStudio.

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Results





NMDS- Species Composition



NMDS1

Interesting result: samples from South lakes are similar to other lakes despite being outliers in pH and chlorophyll concentrations. Clearly, fire history is not the only important factor structuring aquatic communities.

category

Plankton abundance varies widely between and within lakes.



Unburned lakes have higher diversity while 2015 burn and southern lakes have lower diversity as measured by Shannon-Weiner Index Values (0-1). Letters represent significance from a Tukey Honest Significant Difference Analysis.



In Non-metric Dimensional Scaling (NMDS) points that are closer together represent samples that are similar in species composition. Here, the unburned and 2015 burn areas are more similar to each other.



Discussion

Future Work



• Food availability and predators may both affect zooplankton populations. Further research is needed to determine the relative importance of these mechanisms in YK Delta zooplankton diversity.

• Poor taxonomic resolution (i.e. Copepoda) may be obscuring community differences. Future quantification of zooplankton body size and biomass will further our ability to understand community drivers.

• As disturbances due to wildfire and permafrost thaw are projected to increase in frequency, understanding tundra lake biodiversity and functioning will be key to predicting impacts and recovery.

• Further analysis to understand relationships between environmental variation and community structure (PCA, etc.) Reexamine specimens to resolve identifications and measure body size. • Monitor lakes to understand how productivity trends relate to zooplankton communities.