

## Introduction

- Beavers (*Castor Fiber*) are known to modify river flow networks, which significantly affect hydrological properties
- This study investigates the impact of beaver activity on the transport and flux of nutrients/carbon in inland arctic waters. We hypothesize there will be a statistically significant impact by beaver activity levels, ranging from high to low, on nutrients and carbon dynamics within aquatic ecosystems.

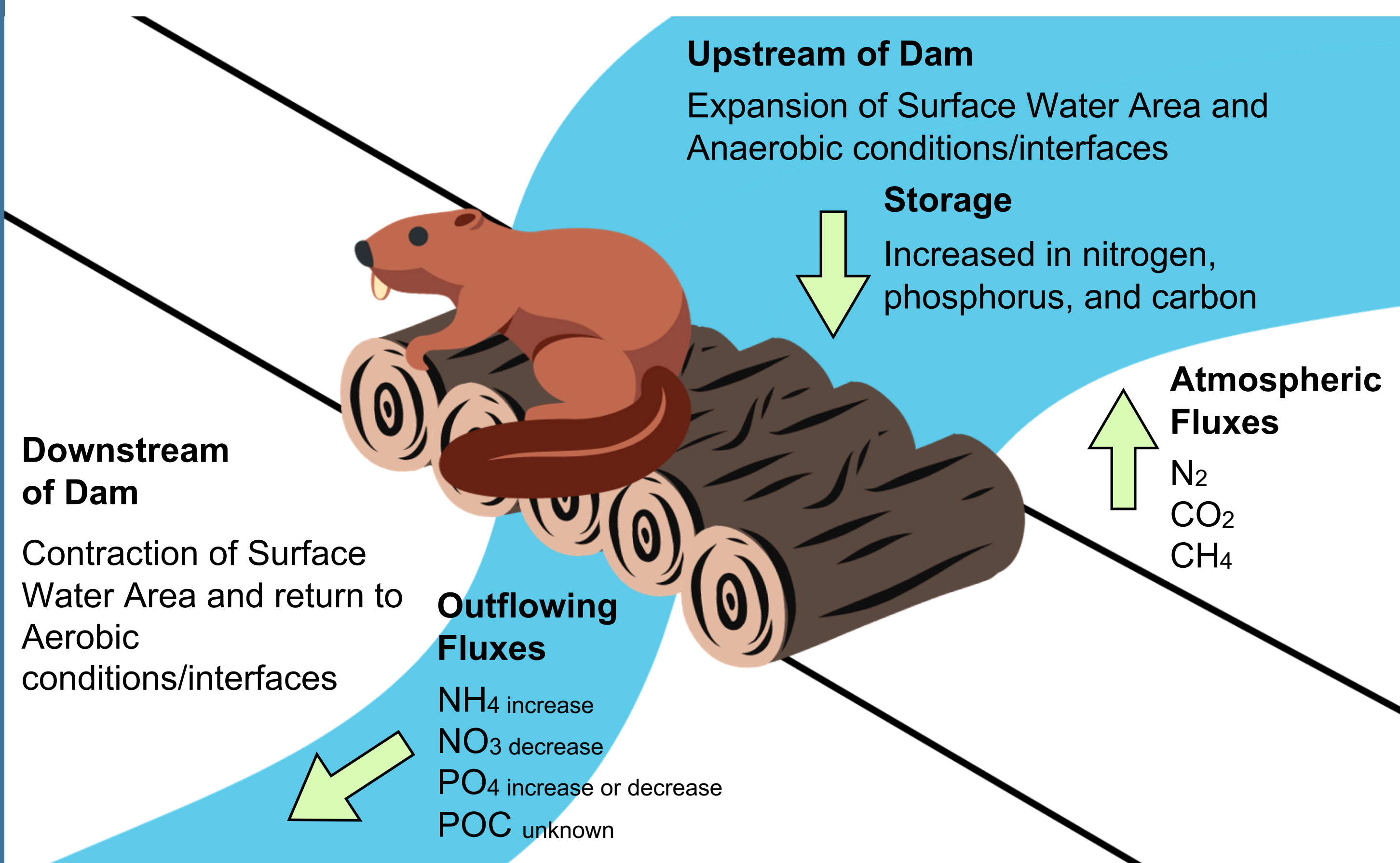


Figure 1: . Conceptual model of changing biogeochemical conditions, pathways and fluxes potentially induced by beaver dams, from upstream to downstream

## Methods And Analysis

- 21 sites were sampled. Sampling sites included beaver impacted water (Beaver Pond (n = 6), Stream after BP (n = 8), Stream after DL (n = 3), Stream after LK (n = 2), Lakes (n = 2).
- At each location we measured pH, dissolved oxygen (DO), and temperature. We also analyzed water for Non-Purgeable Organic Carbon (NPOC), and other nutrients.
- Four sites were selected to measure ebullition and seven sites for CO<sub>2</sub> and CH<sub>4</sub> diffusion rates.

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## Results

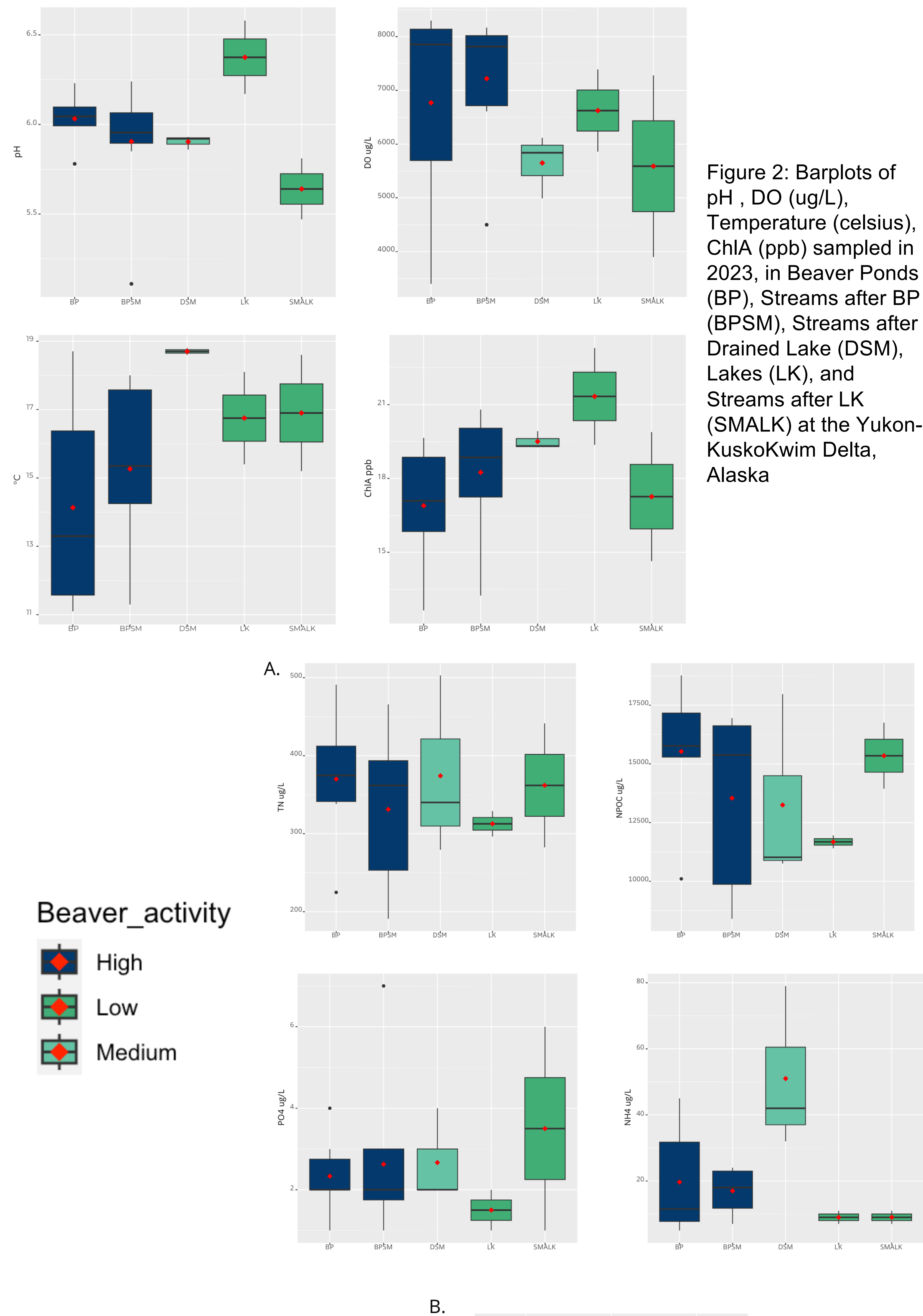


Figure 3: A.) Barplots of TN (ug/L), NPOC (ug/L), PO<sub>4</sub> (ug/L), NH<sub>4</sub> (ug/L) concentrations sampled in 2023, in Beaver Ponds (BP), Streams after BP (BPSM), Streams after Drained Lake (DSM), Lakes (LK), and Streams after LK (SMALK) at the Yukon-Kuskokwim Delta, Alaska. B.) Bar graph of NH<sub>4</sub> (ug/L) concentration in all the the sample sites within the category DSM.

## Results and Discussion

### Multivariate Analysis:

- MANOVA indicated a marginally significant overall effect (Pillai's trace = 1.3903, F(20, 60) = 1.5983, p = 0.08336).

### Univariate ANOVA:

- No significant differences among groups for NPOC, TN, PO<sub>4</sub>, and SiO<sub>2</sub> (p > 0.05).
- NH<sub>4</sub> exhibited a significant difference among groups (F(4, 16) = 4.5145, p = 0.01244).

### Post-hoc Tests (NH<sub>4</sub>):

- Significant differences observed: DSM vs. BP (p = 0.0368), DSM vs. BPSM (p = 0.0158), LK vs. DSM (p = 0.02896), SMALK vs. DSM (p = 0.02896)

### Interpretation of Results

- MANOVA suggests subtle nutrient concentration variation between chosen categories.
- Owing to potential sample size effects, further investigation with a larger sample size is recommended for a comprehensive understanding of nutrient dynamics.
- NH<sub>4</sub> significance may be attributed to the presence of a drained lake, influencing concentration changes within the network (see Fig 3B).

## Future Work

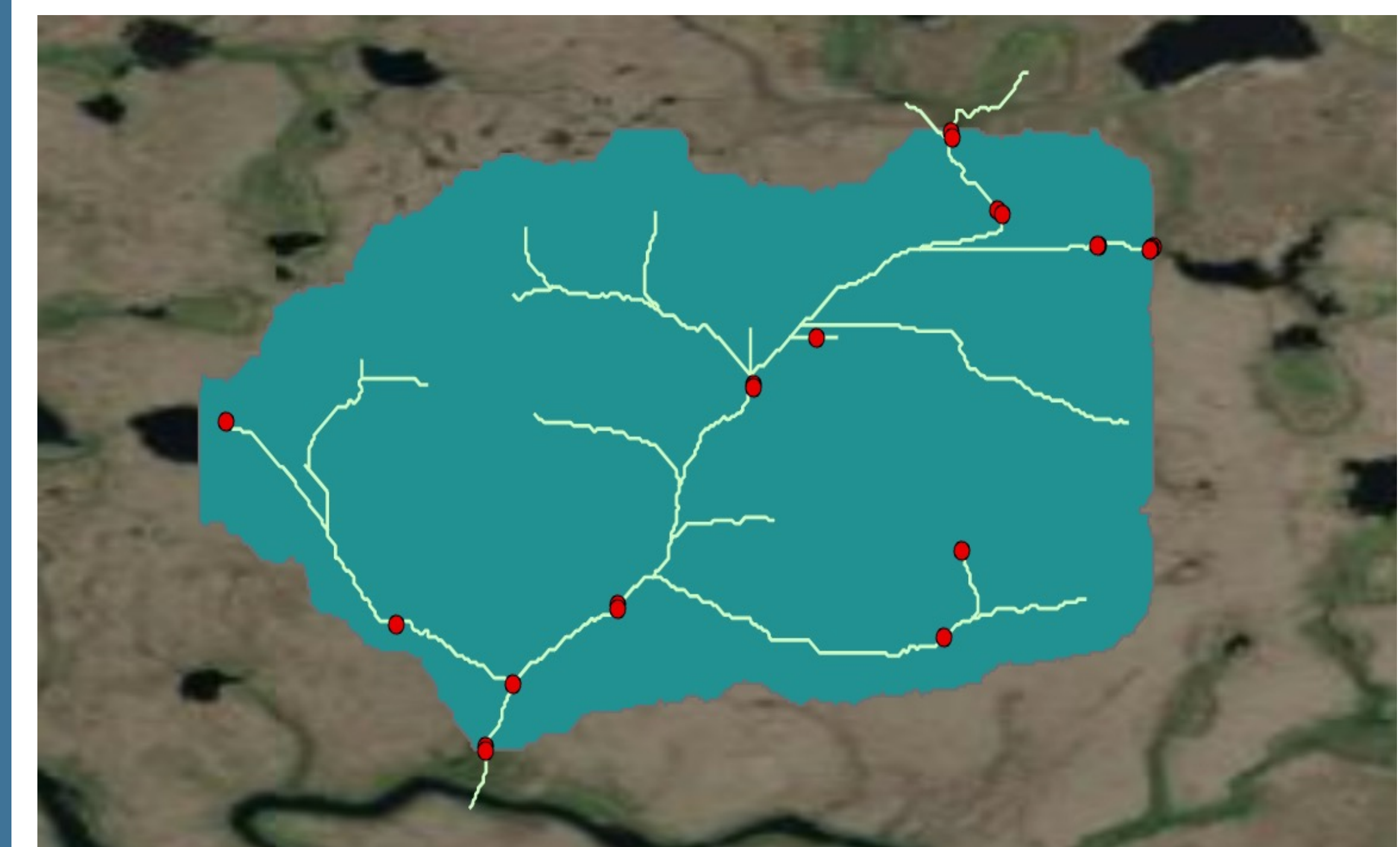


Figure 4: ARCGIS Pro Stream Network Analysis - current progress includes the establishment of the stream network, extraction of key parameters such as length and stream order, as well as the delineation of the watershed with the corresponding extraction of its area. (m<sup>2</sup>)