Using Phenological Data to Investigate Linkages Between Ecosystem Services

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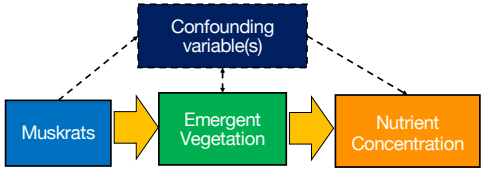
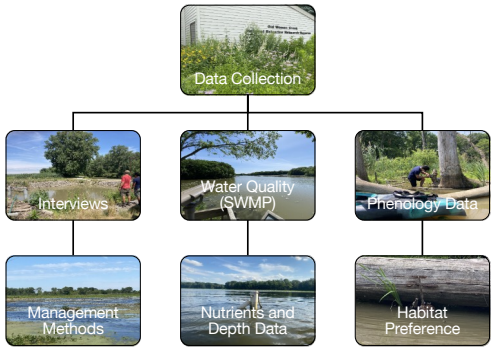
Introduction

- Wetlands absorb excess nutrients from water and improve water quality.
- Excess nutrients in the Great Lakes Region can lead to Harmful Algal Blooms (HABs).
- Muskrats (*Ondatra zibethicus)* are both indicator species and keystone species of wetlands.
- Muskrats manipulate the vegetation around them and thereby participate in the nutrient cycle.

Hypothesis



Methods



Scan the QR Code for the full description of the project and additonal information

Acknowledgements:
NOAA Hollings Scholar Program
OWC NERR – Emily Kuzmick
Interviewees at Winous Point and Ottawa NWR

Results

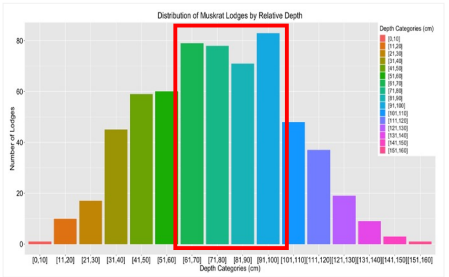


Figure 1: Distribution of muskrat lodges by relative depth.

Muskrats have a preference to build lodges at depths from 0.6 to 1.0 m in the OWC estuary. This depth range was used in isolating water quality monitoring data.

Vegetation composition in lodges located between 0.6 to 1.0 m was assessed; lodges were mainly made of cattails (> 65%), American lotus (5%) and *Phragmites spp.* (10%).

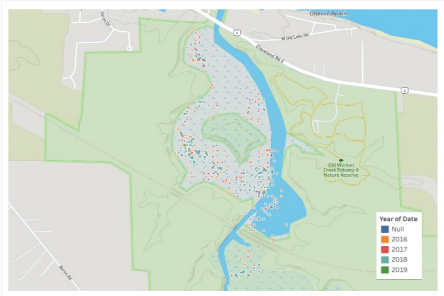


Figure 2: Distribution of muskrat lodges in the OWC estuary by year.

Phenological study of muskrat lodges provide data in areas where water quality sensors are non-existant. The data were used to complement water quality data from the System Wide Monitoring Program (SWMP).

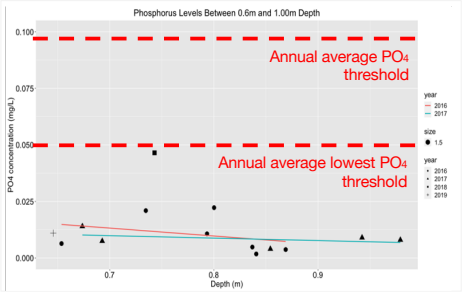


Figure 3: Phosphorus concentrations at water depths with the highest muskrat vegetation manipulation.

Average concentrations of phosphorus within the specific depth range at which muskrats prefer to build their lodges were plotted and compared with nutrient retention capacity thresholds of the OWC estuary, estimated in a previous NERRS Science Collaborative Project.

Discussion

- Native wetland vegetation and muskrat activity both depend on water depth and seem to be positively correlated.
- Observed areas in the estuary with high muskrat lodge density do not exceed nutrient retention thresholds.
- Phenology data can be used to address gaps in water quality monitoring protocol, HOWEVER:
  - **Links between phenological data and physiochemical properties are limited.**
- This study revealed a need for additional water quality sites incorporated into monitoring protocols to more accurately compare datasets and fully address management needs.

Additional Graphs