



# Large-scale Management of Starry stonewort (*Nitellopsis obtusa*) in a large Minnesota Lake

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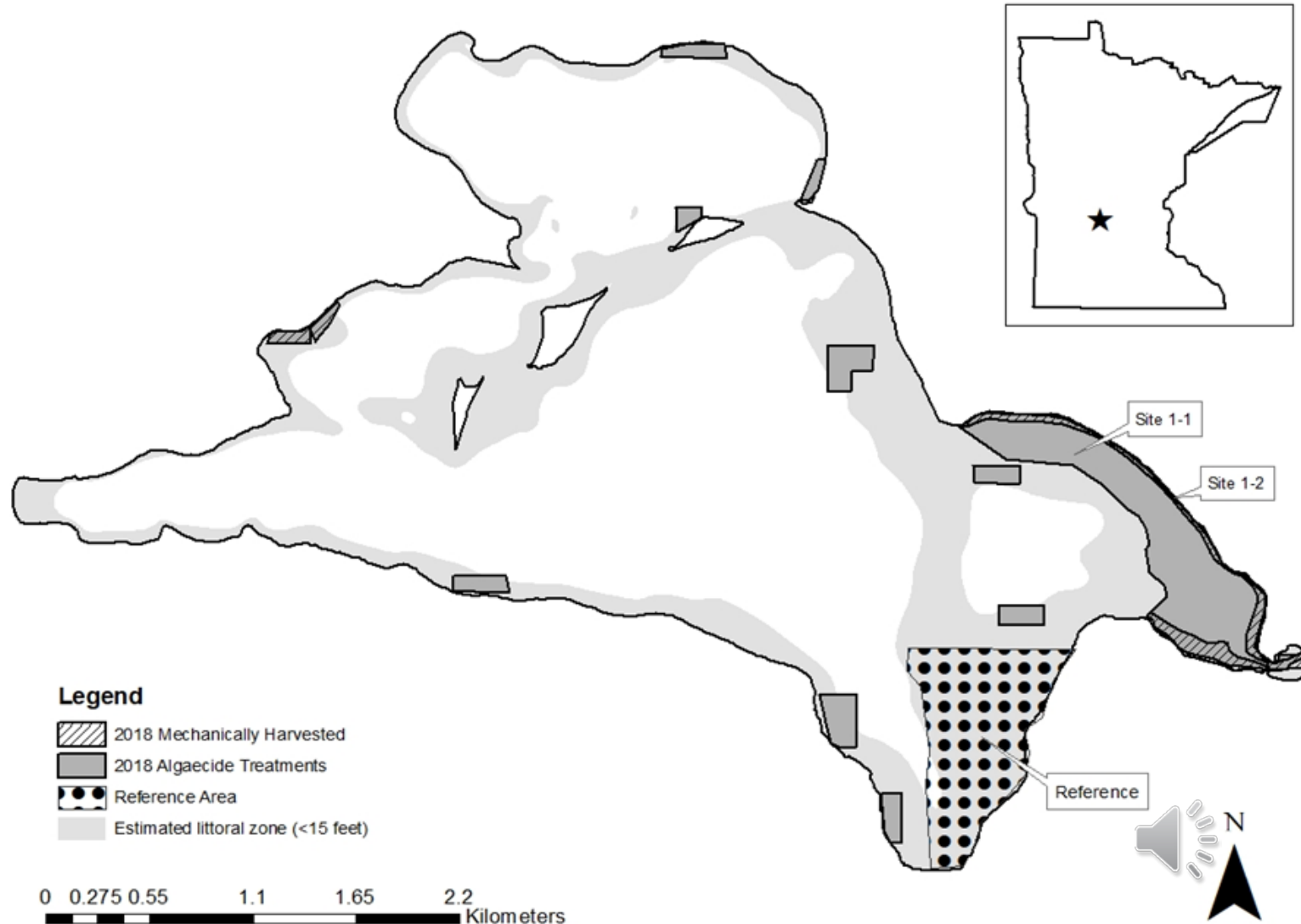


# Project Details

## Large- Scale Control Project

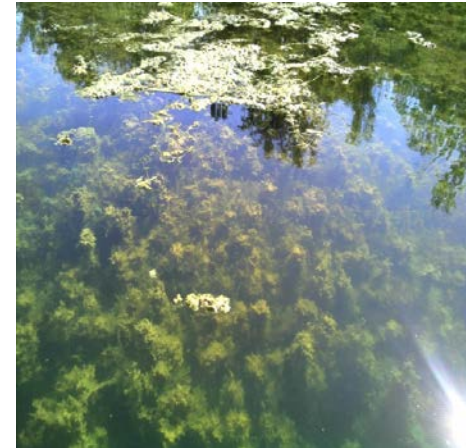
### Lake Koronis, Stearns Co

- 2,968 acre lake
- First MN listing: 18 Aug 2015
- Known extent: lake wide
- Management:
  - Mechanical harvesting
  - Copper treatments (2x)
    - 2018: 224 acres
    - 2019: 109 acres
    - 2020: 175 acres

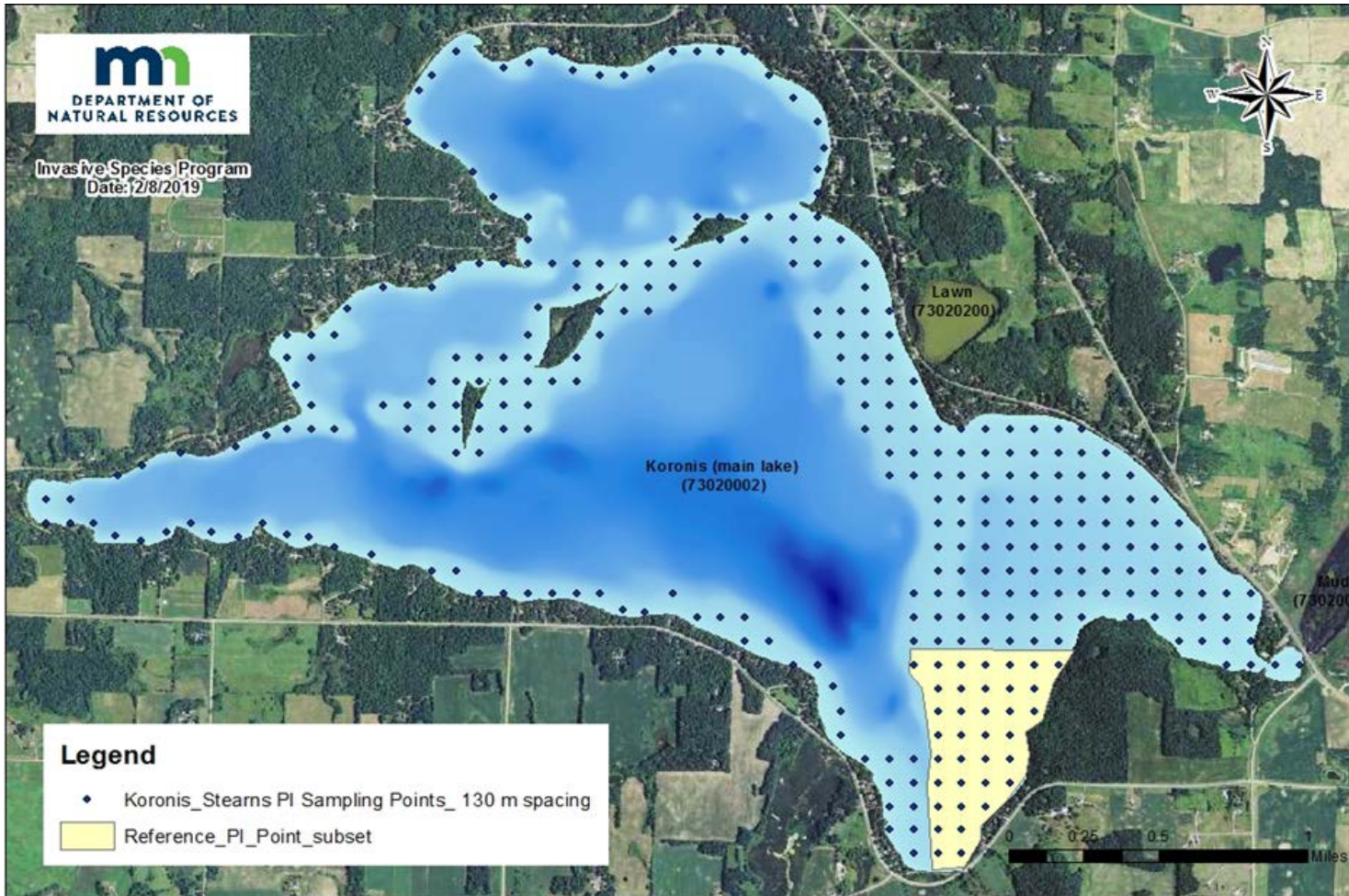


## **We examined the effects of management by assessing:**

- 1) Changes in starry stonewort and native aquatic plant frequency
- 2) Changes in biomass over a single growing season
- 3) Impacts to bulbils following copper treatments
- 4) Impacts to macroinvertebrate communities following copper treatments.
- 5) Copper monitoring



# Lake Koronis Point-intercept Map

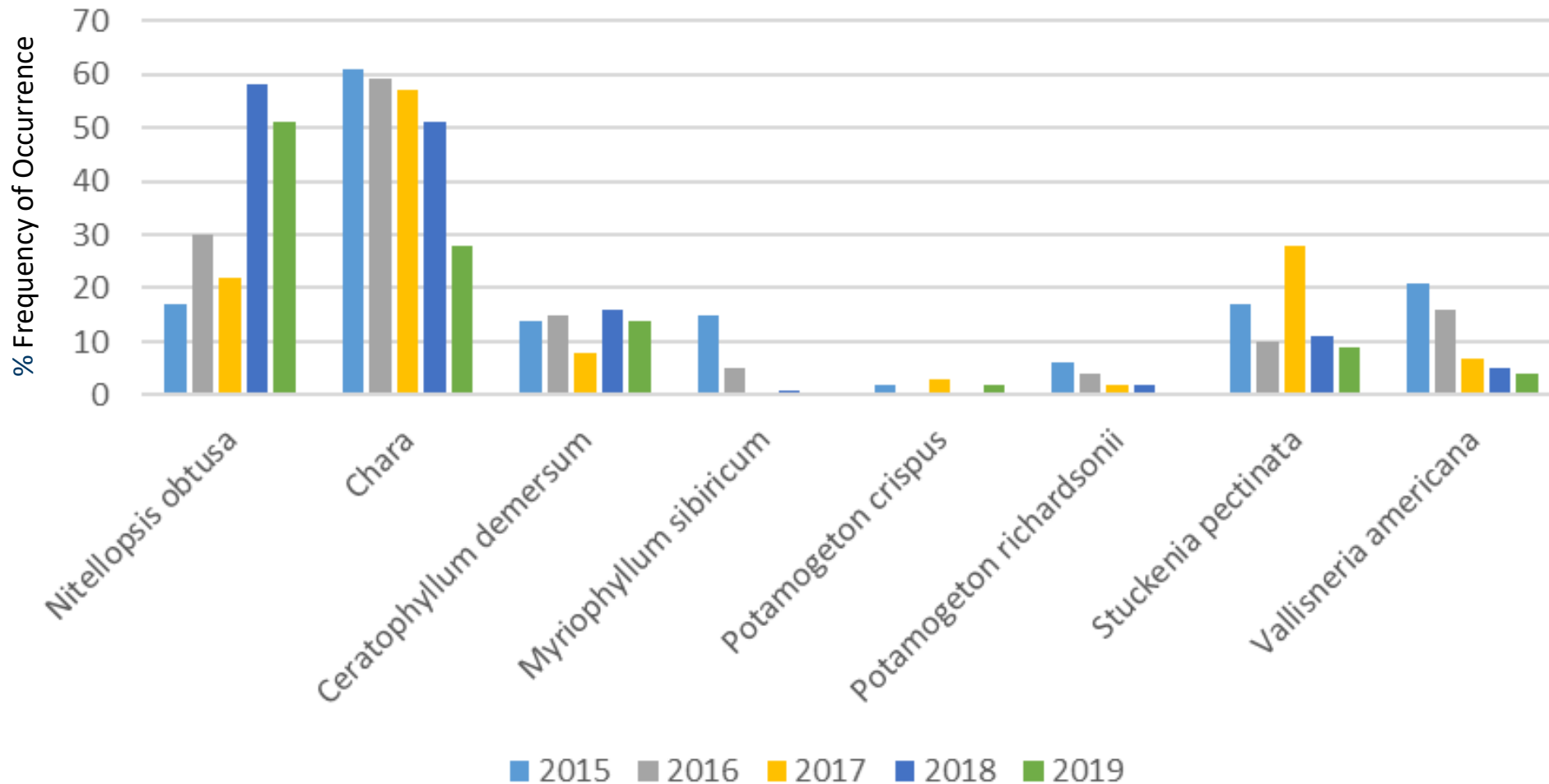


Point intercept Survey Map with Reference Plot  
Lake Koronis, Stearns County (DOW 73020002)



# Summary of PI Surveys (2015- 2019)

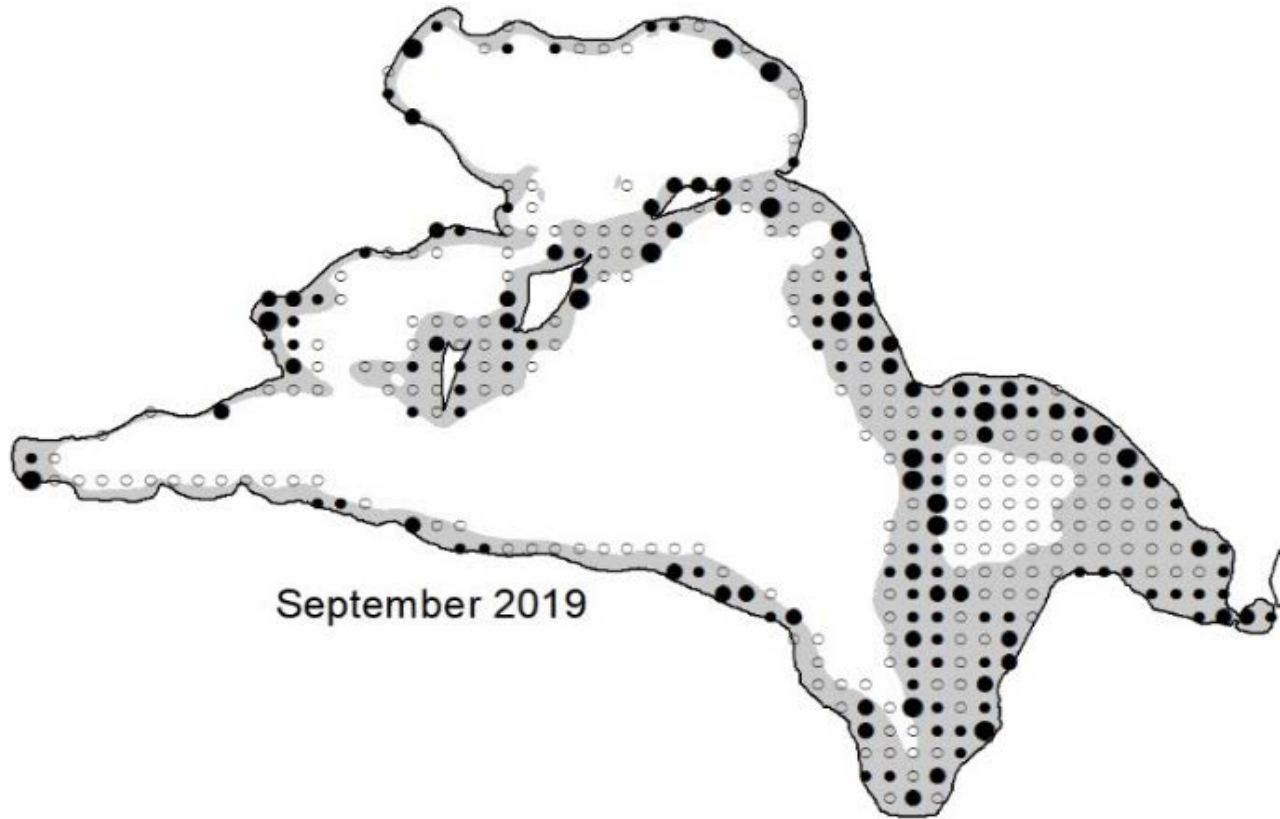
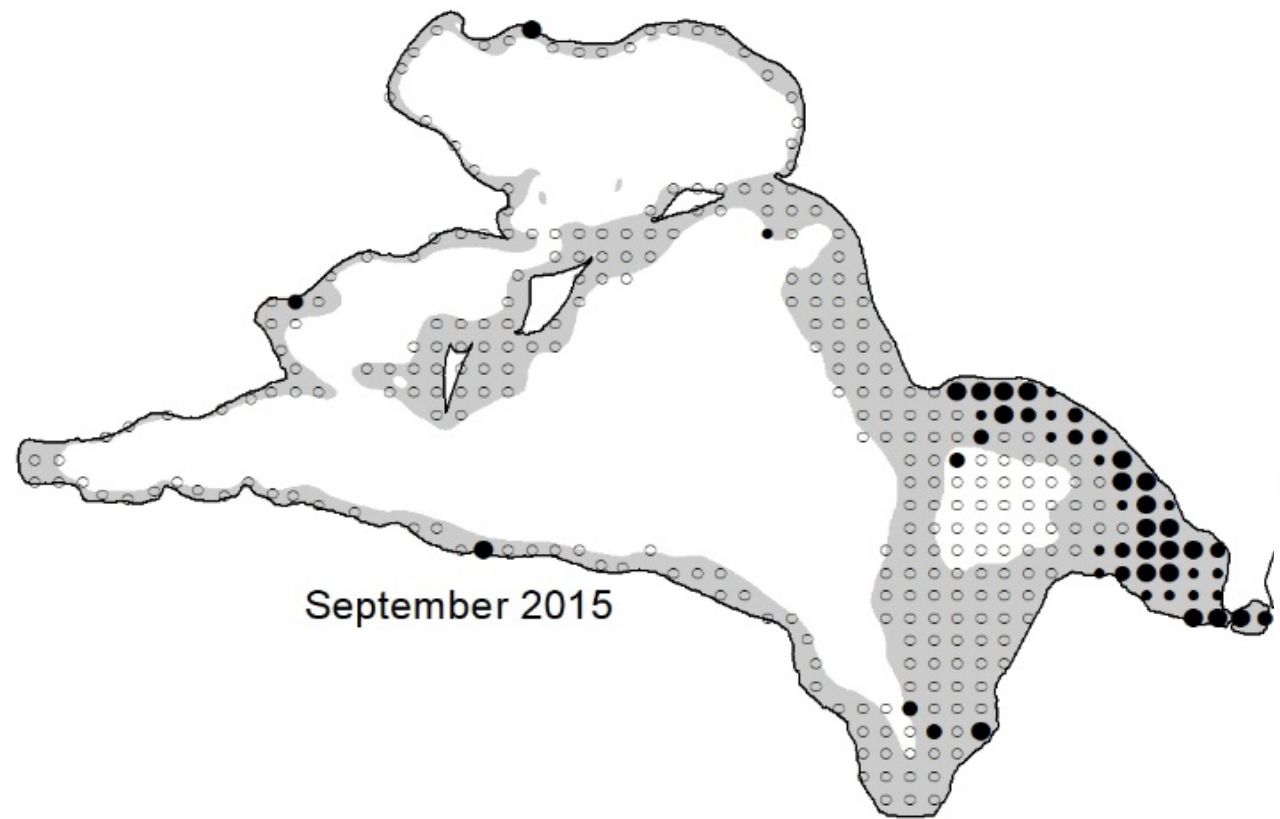
## Koronis Percent Frequency of Occurrence 2015- 2019



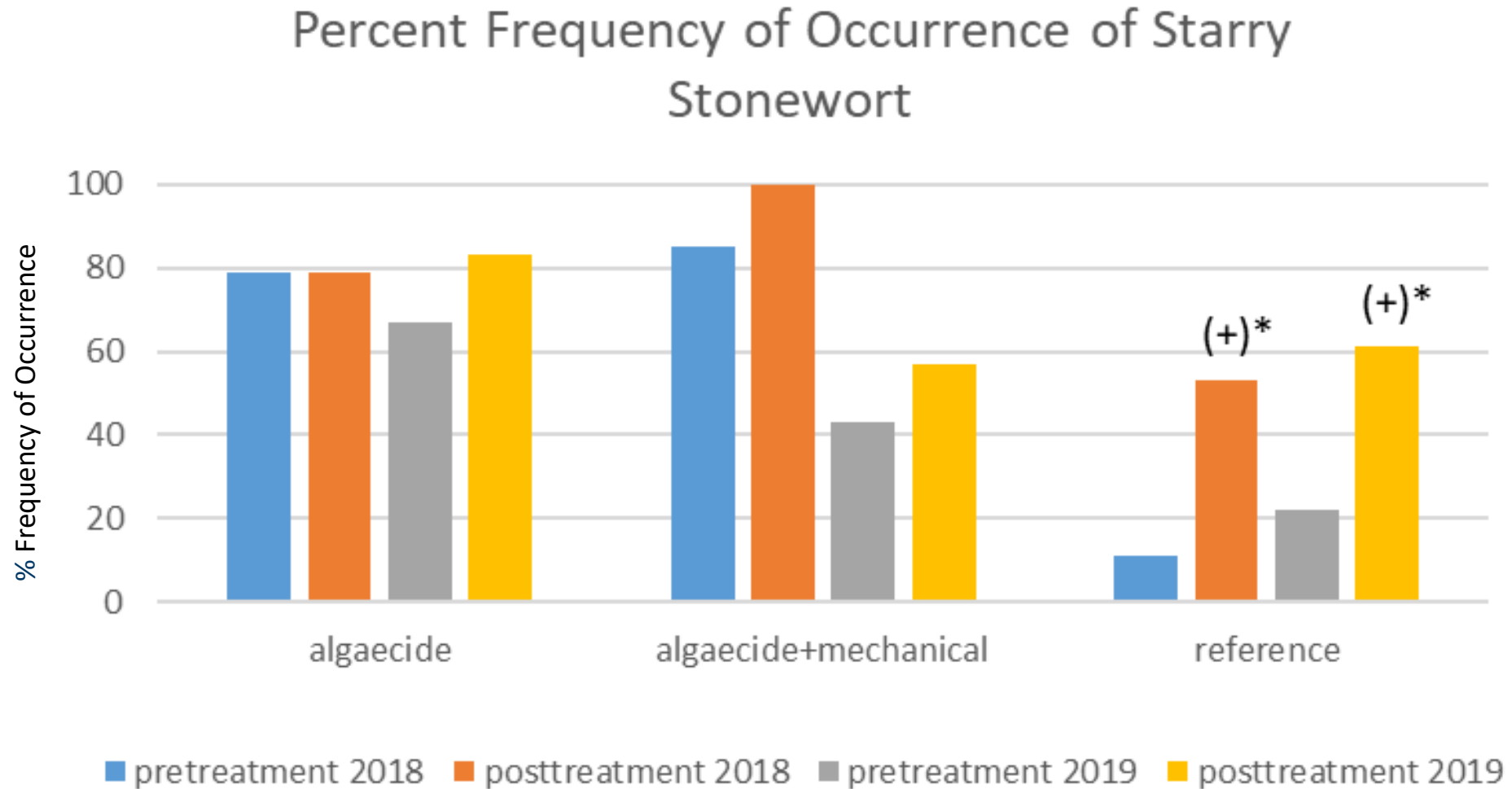
PI surveys conducted by MN DNR (Jurek, Hauck Jacobs, Millaway, Riihiluoma, Perleberg and Simon (2015,2016, 2017, 2018, 2019) and Blue Water Science, McComas (2018, 2019 and 2020)



# Starry stonewort expansion

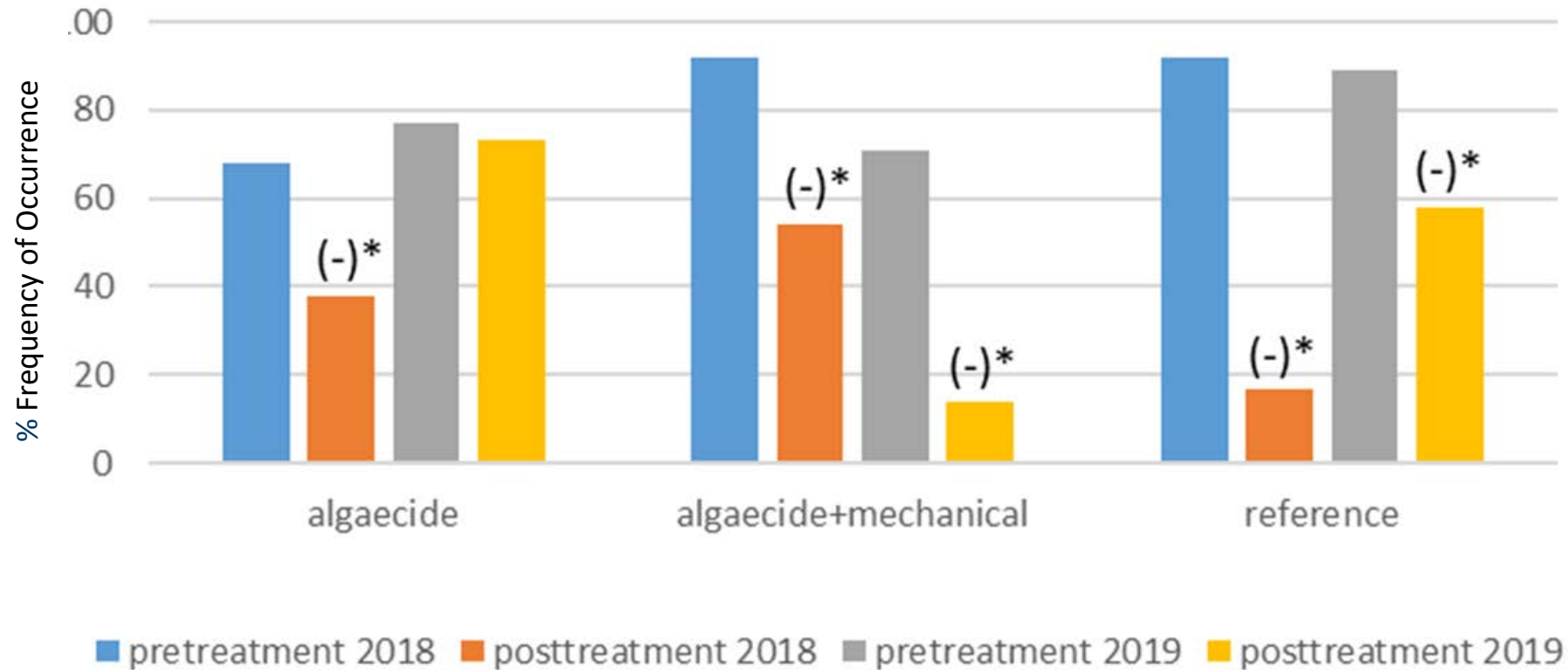


# Management plots



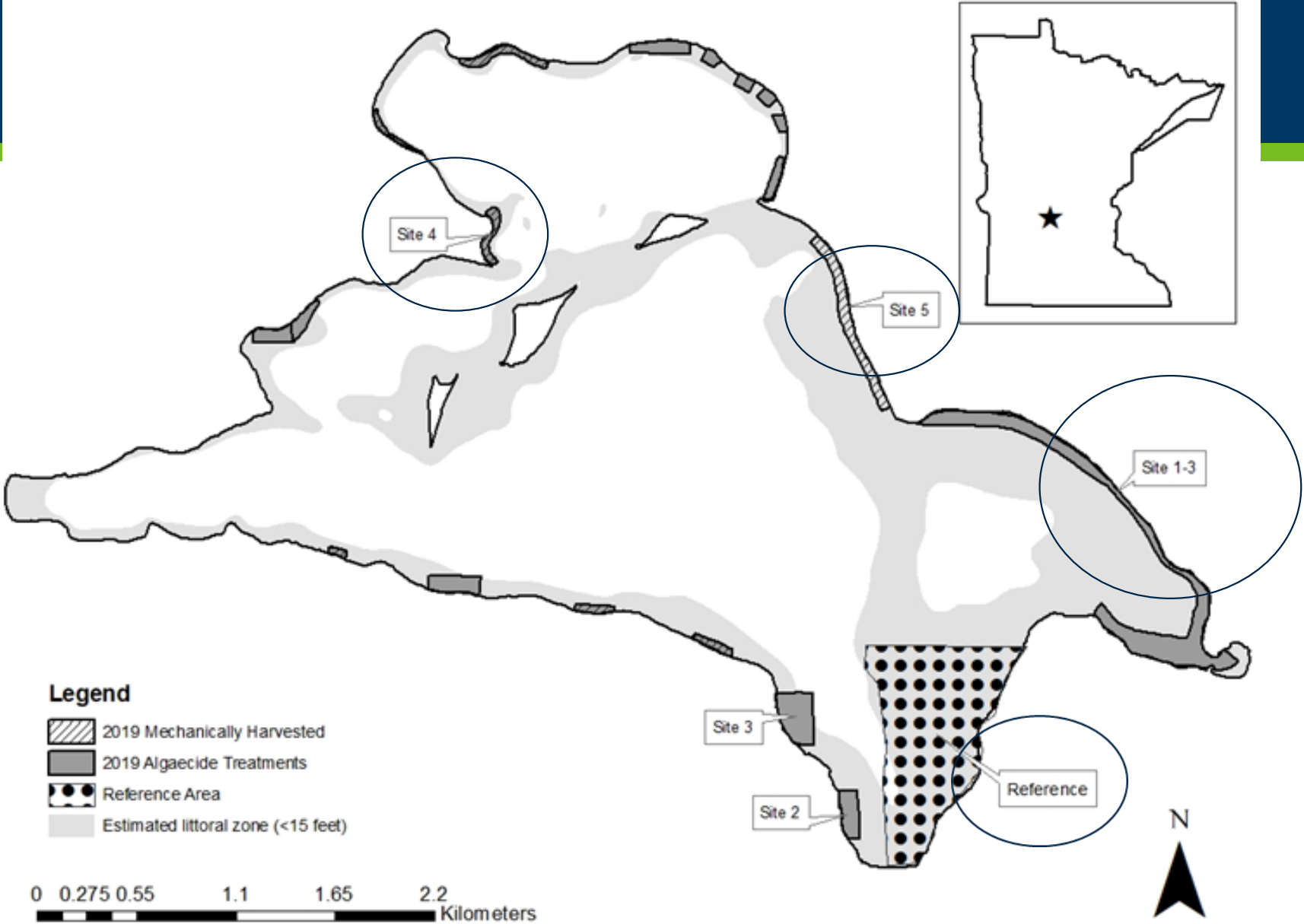
# Koronis Management Plots

## Percent Frequency of Occurrence of Native Aquatic Plants

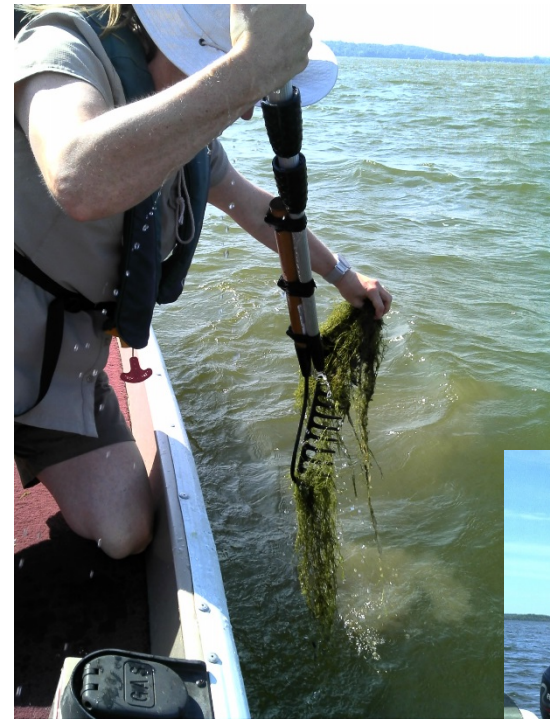




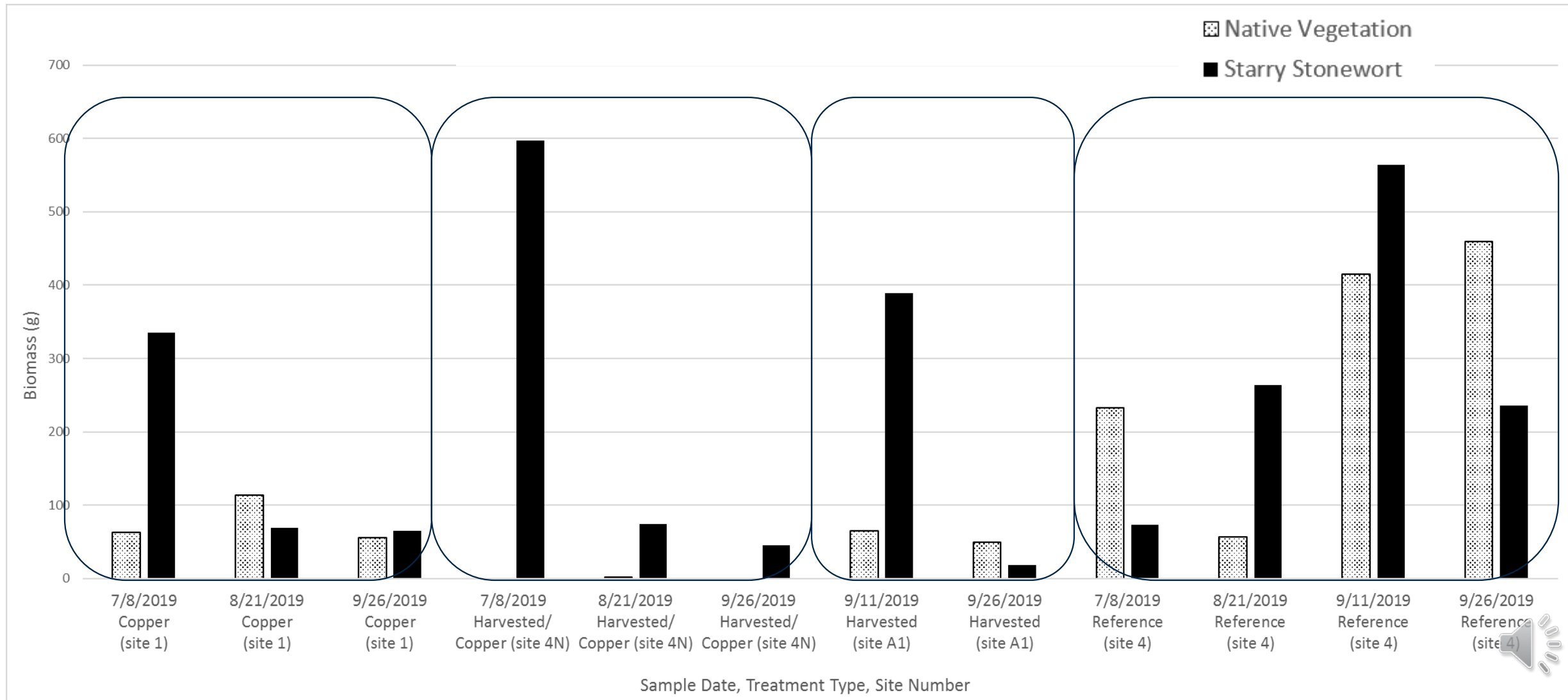
# Biomass Map



# Biomass Sampling



# Biomass Reductions in Management Plots



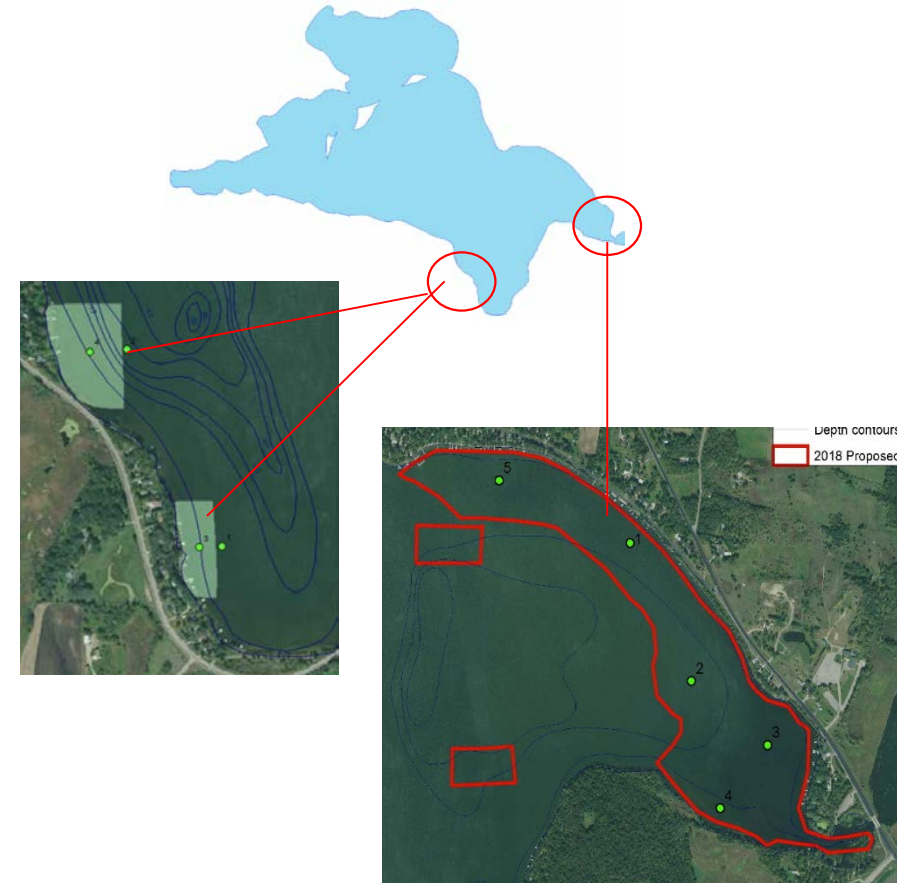
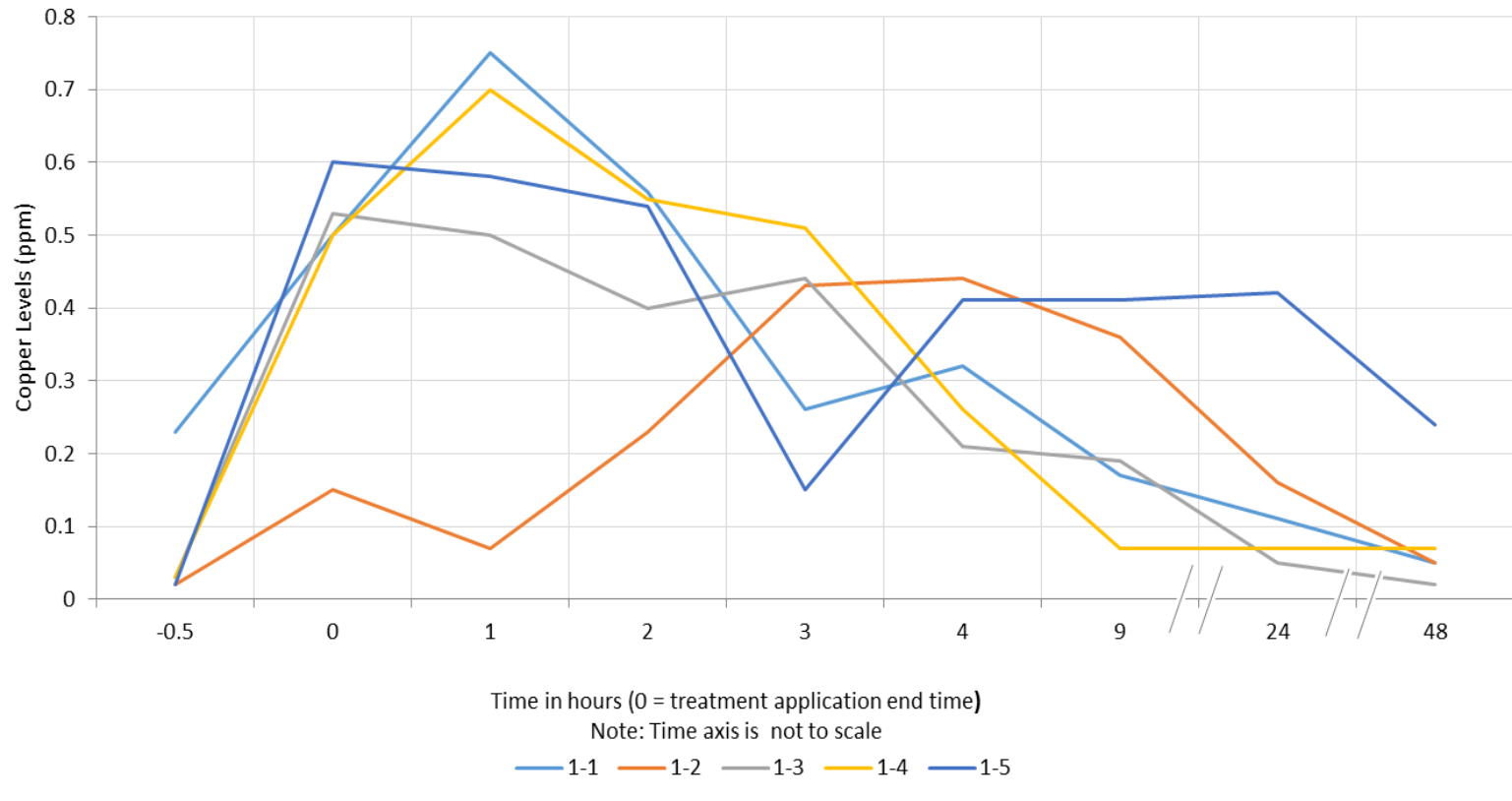
# Biomass Results

Management	Mean Biomass (g/m <sup>2</sup> )			Percent Change	
	Pretreatment	1 <sup>st</sup> Treatment	2 <sup>nd</sup> Treatment	1 <sup>st</sup> Treatment	2 <sup>nd</sup> Treatment
Algaecide	944 (+/- 785)	176 (+/- 286)*	147 (+/-296)*	-81%	-84%
Algaecide+ Mechanical	1680 (+/- 872)	190 (+/- 187)*	91 (+/- 220)*	-89%	-94%
Reference	165 (+/-232)	635 (+/- 1303)	236 (+/-599)	285%	43%



# Copper monitoring

Lake Koronis, Stearns, July 5/6/9, 2018  
Copper levels in parts per million (ppm)



# Macroinvertebrate and Bulbil Sampling

**Objective:** Sample aquatic invertebrates and bulbils to examine possible impacts of copper treatments to biota

## **Methods:**

### Sampling sites:

22 sites in treated area

12 sites in reference area

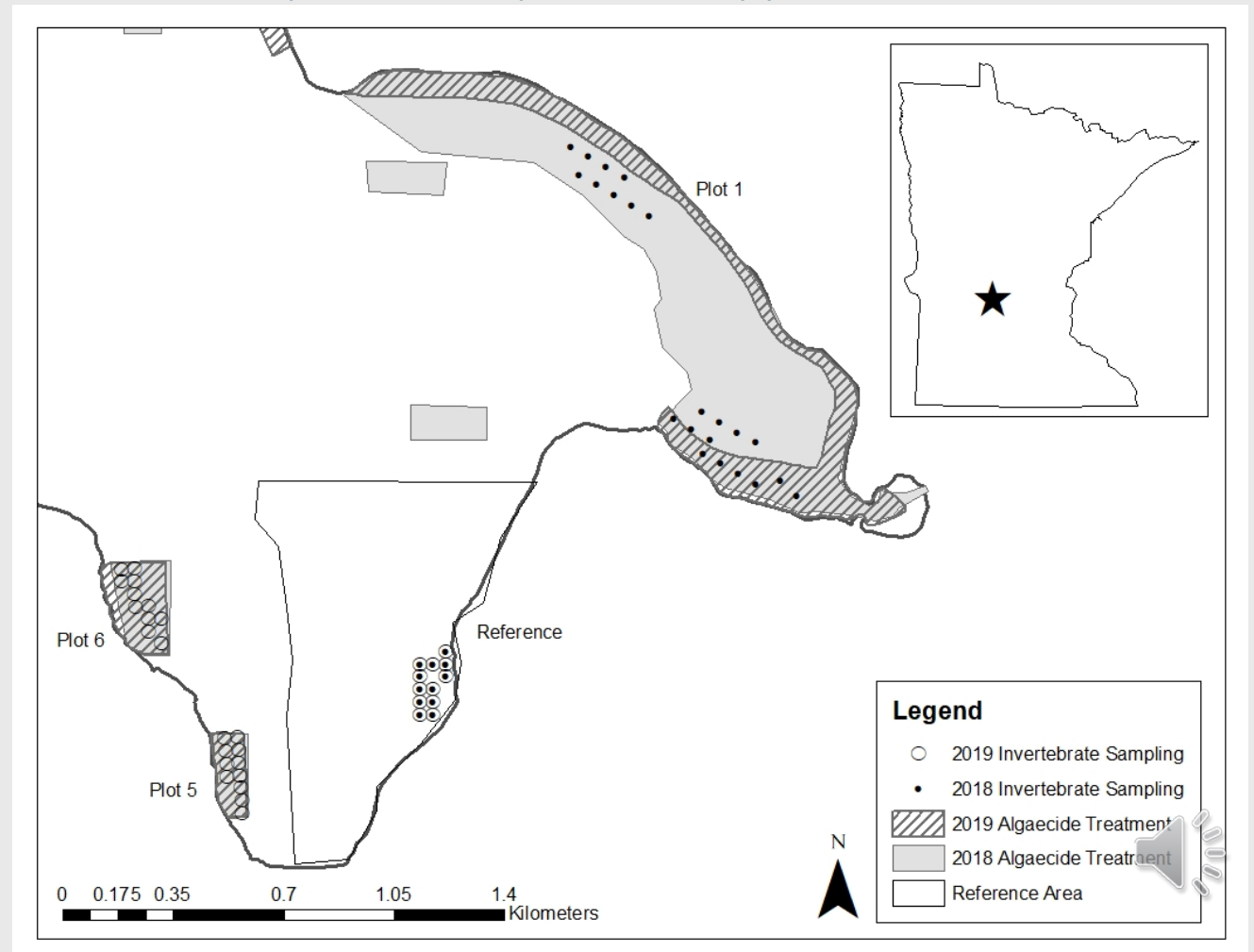
### Sampling interval:

Sample within 7- 10 days of copper application

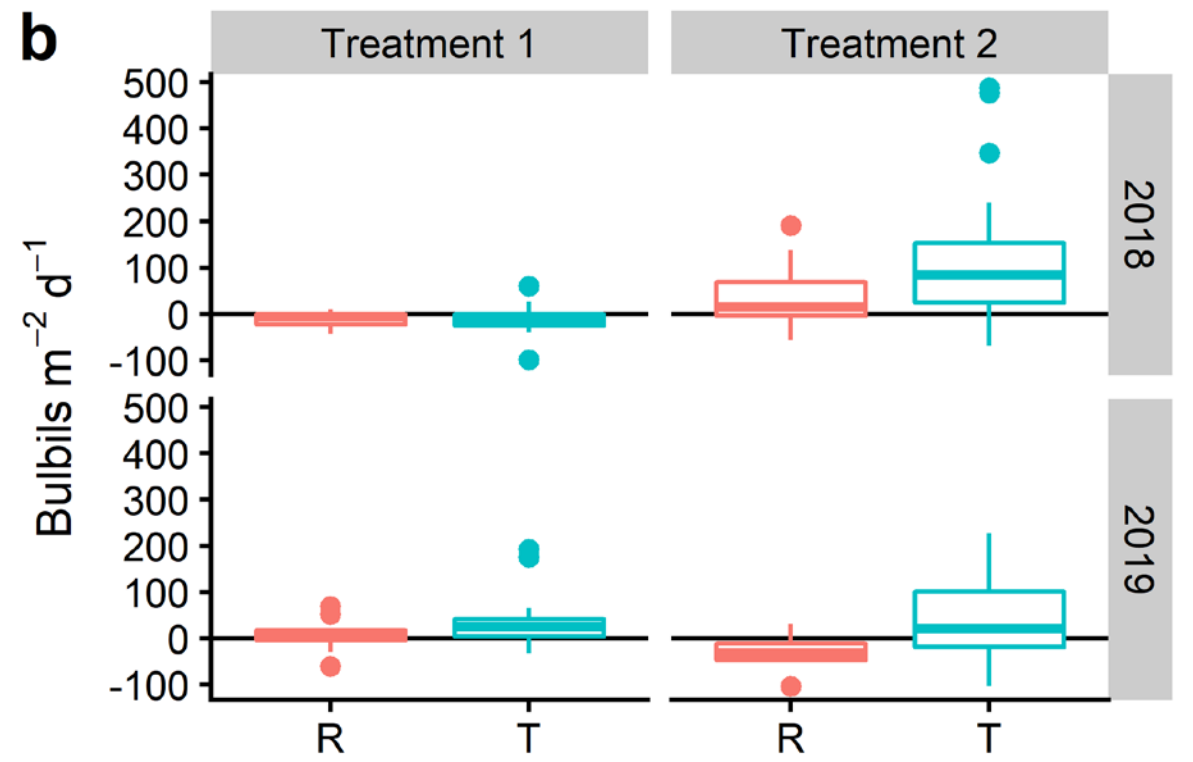
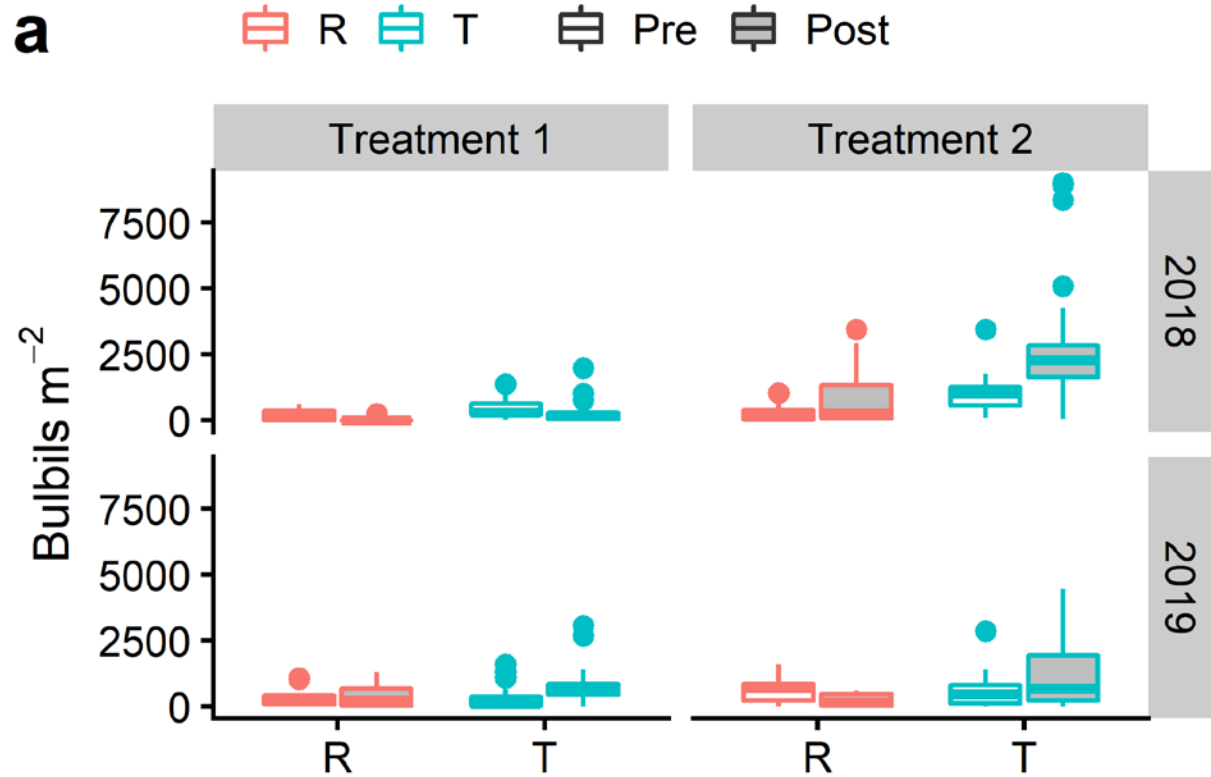
### Analysis (pre/post treatments):

Compare abundances and densities

Compare taxa composition



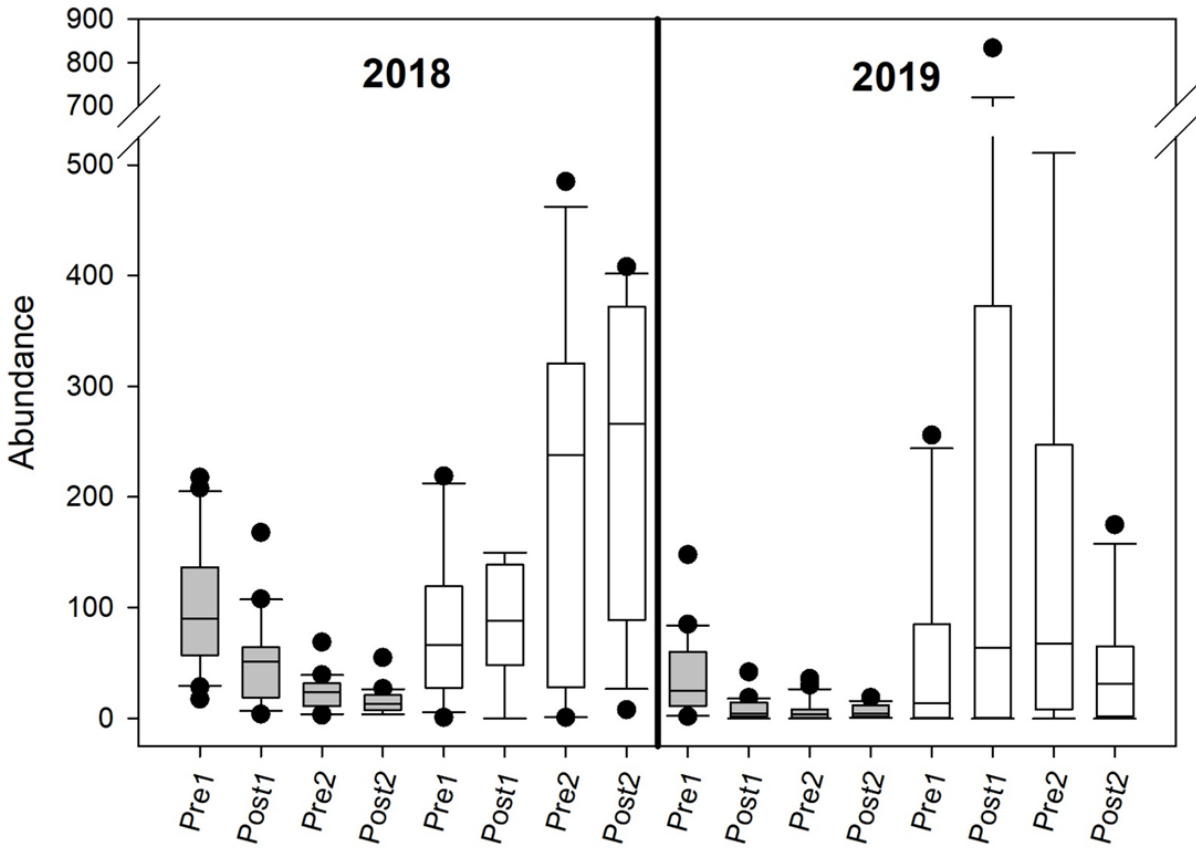
# Bulbils



R= reference, T= algaecide



# Macroinvertebrate Sampling



Mollusca abundance in pre- and post-treatments for treatment and reference sites over two copper treatments in Lake Koronis, 2018 and 2019. Shaded boxes are treatment samples, open bars are reference samples.

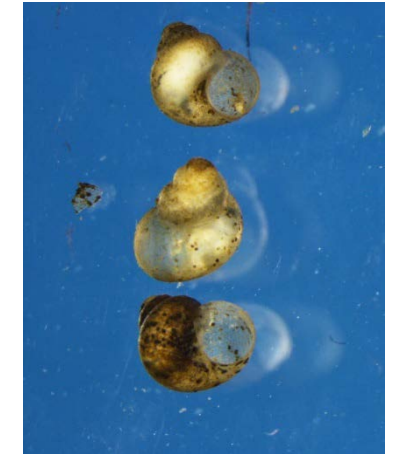


Photo credit: Gary Montz (MN DNR)



## Large- scale management

- Significant reductions in biomass
- Lake wide starry stonewort expansion (frequency)
- Decreases in native aquatic plants, especially macroalgae
- Impacts to macroinvertebrates following copper treatments
- Treatments did not have any detectable effects on bulbil densities



# Take Home Message

- Early detection is a vital part of a rapid response plan
- Large infestations are difficult
- Ideally, if management could effectively reduce or impact bulbil viability and quantity, it may be possible to reduce the spread or occurrence of starry stonewort.



# Thank You!

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