



# Habitat Restoration Effectiveness

## St. Louis River AOC

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AOC Conference | Cleveland, OH

Thursday, Session C-2, 12 September 2019



[https://www.pca.state.mn.us/water/  
st-louis-river-area-concern](https://www.pca.state.mn.us/water/st-louis-river-area-concern)



Courtesy Jeff Williams

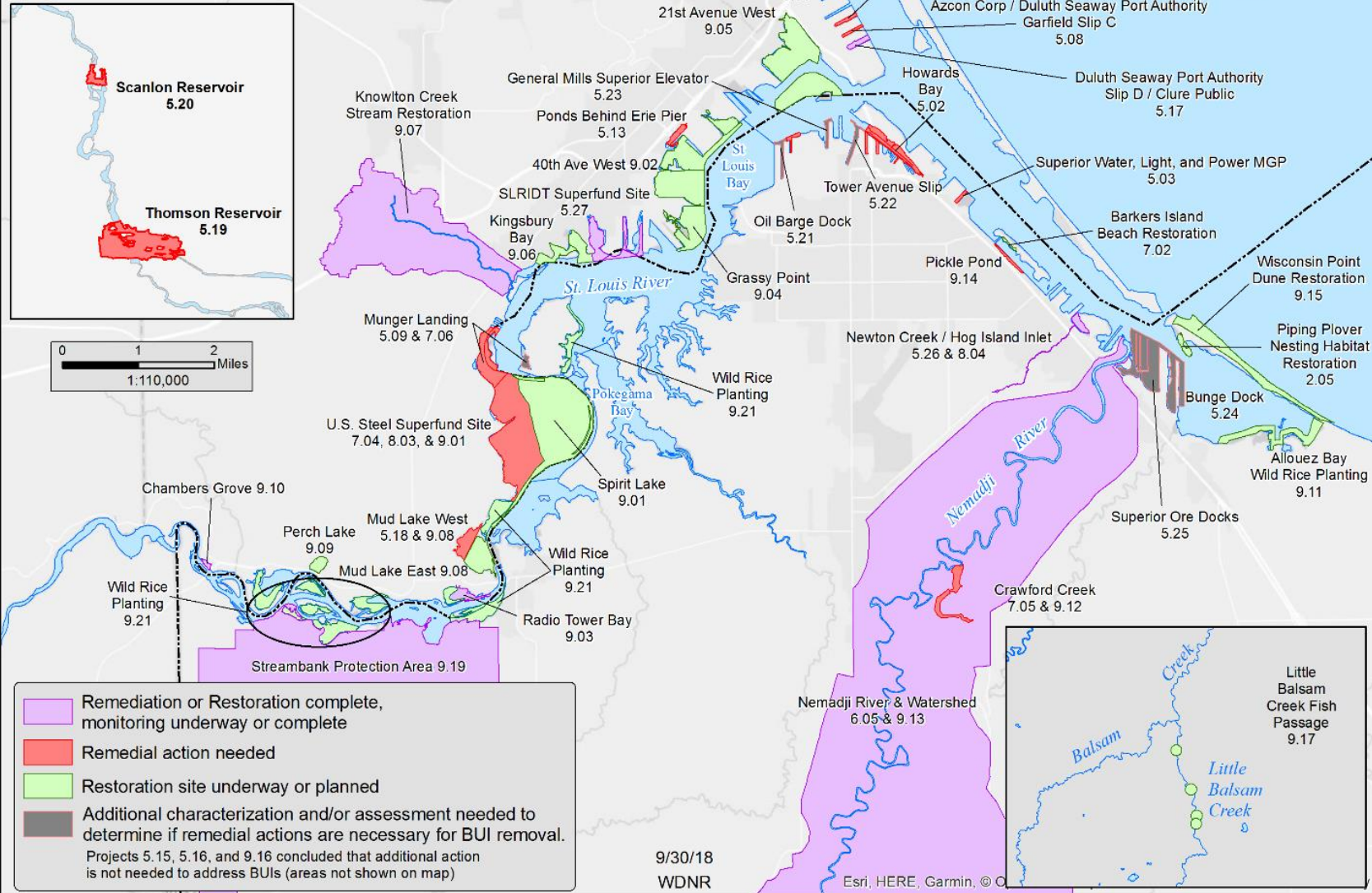
# Take Home Message

*fundamentals*

1. science-based
2. partnerships
3. “.....within reason.....”



# St. Louis River Area of Concern Remediation and Restoration Sites



# Before and After

*defining restoration effectiveness*

1. Measure existing condition
2. Establish targets  
*(compare alternatives)*
3. Monitor Progress  
(benefits/cost ratio)

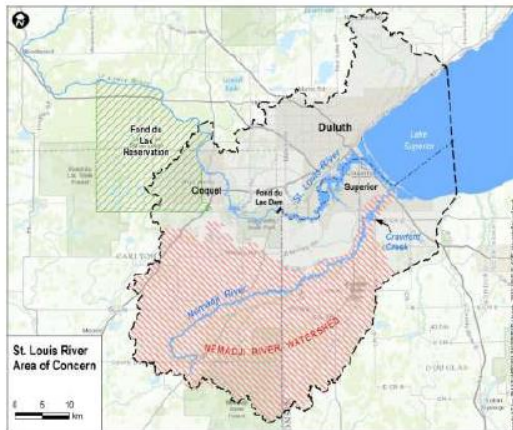


# Minnesota Guidance

## Data Collection and Design-basis Approach

### St. Louis River Area of Concern Quality Assurance Program Plan for Minnesota Based Projects

January 2015



### Appendix 1

#### Managing In-Water Placement of Dredge Material for Habitat Restoration Sites in the St. Louis River Area of Concern

Minnesota Pollution Control Agency



### Appendix 2:

#### A Biological, Chemical and Physical Approach to Aquatic Habitat Restoration Decisions in the St. Louis River Area of Concern

Defining Aquatic Ecosystem Restoration Targets by Evaluating Site  
Conditions

Minnesota Pollution Control Agency





# St. Louis River Estuary Data

- **Sediment Chemistry**

pore water toxicity,  
bioassays, biochemistry

- **Water Chemistry**

- **Benthic macroinvertebrates**

- **Aquatic vegetation**

Each with > 2,000 stations

- **Physical Measures**

a. Hydrologic connectivity

b. Riparian/littoral connectivity

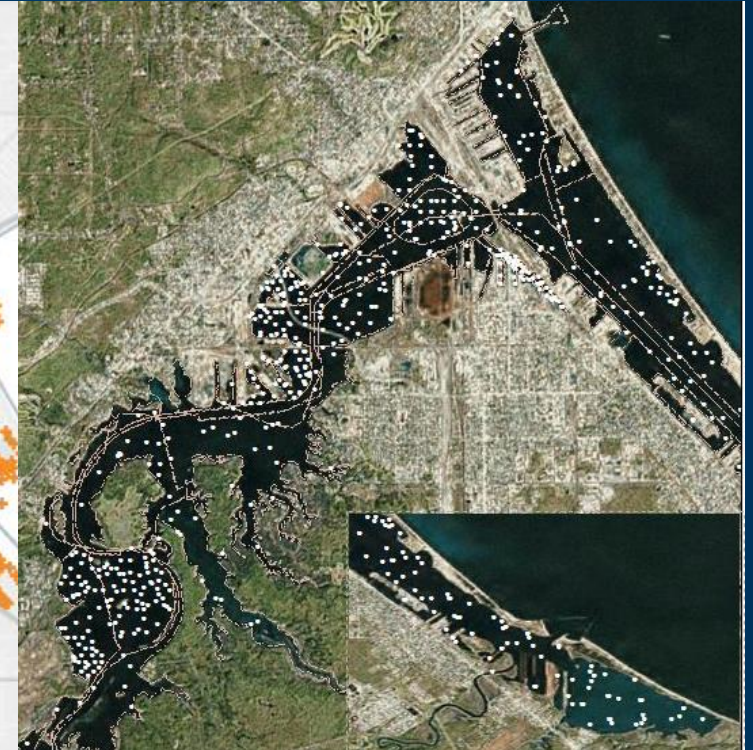
c. Habitat morphology

d. Bathymetry/REI

e. Substrate quality

f. Larval fish/macrophytes

g. ESM output



1

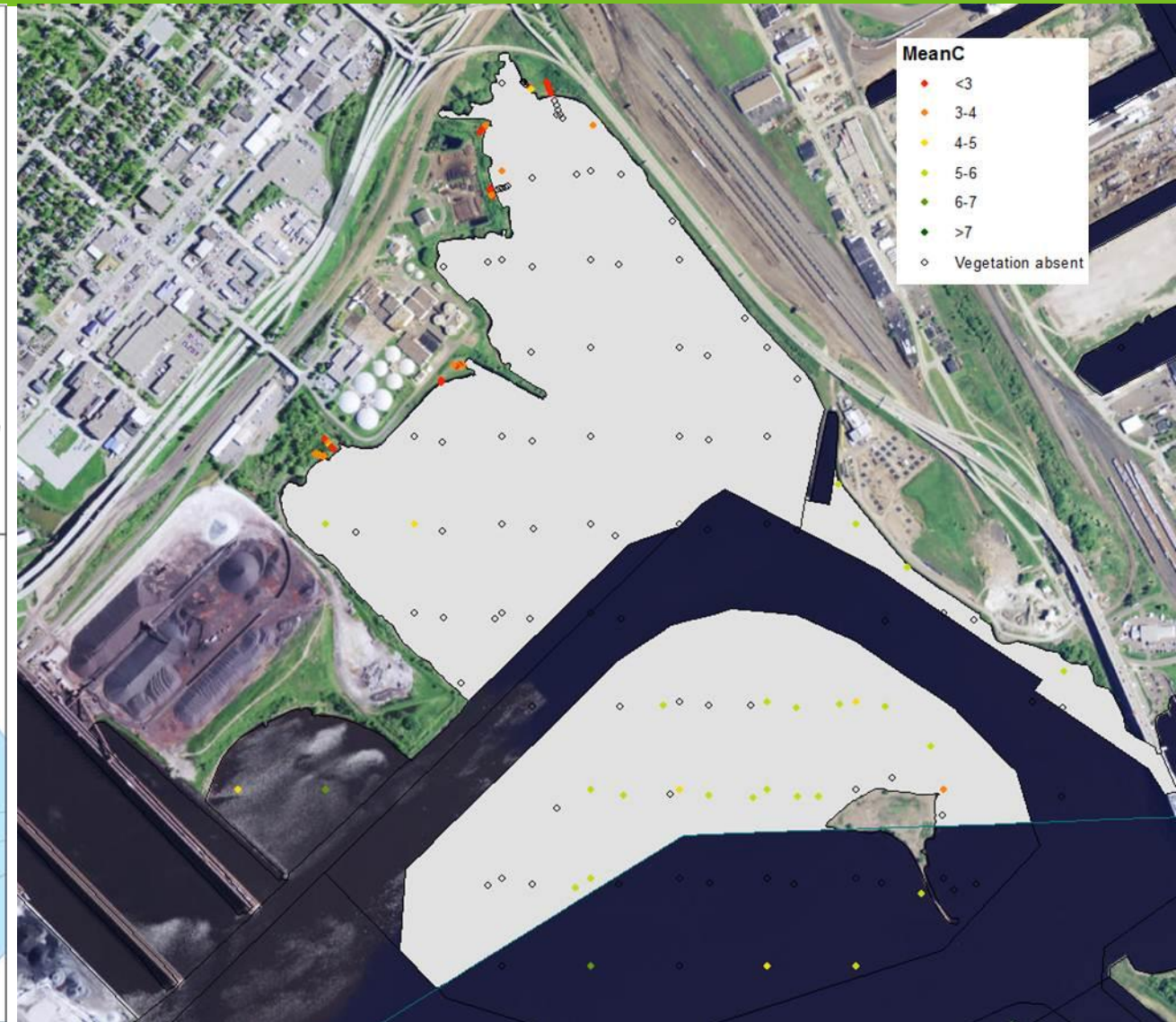
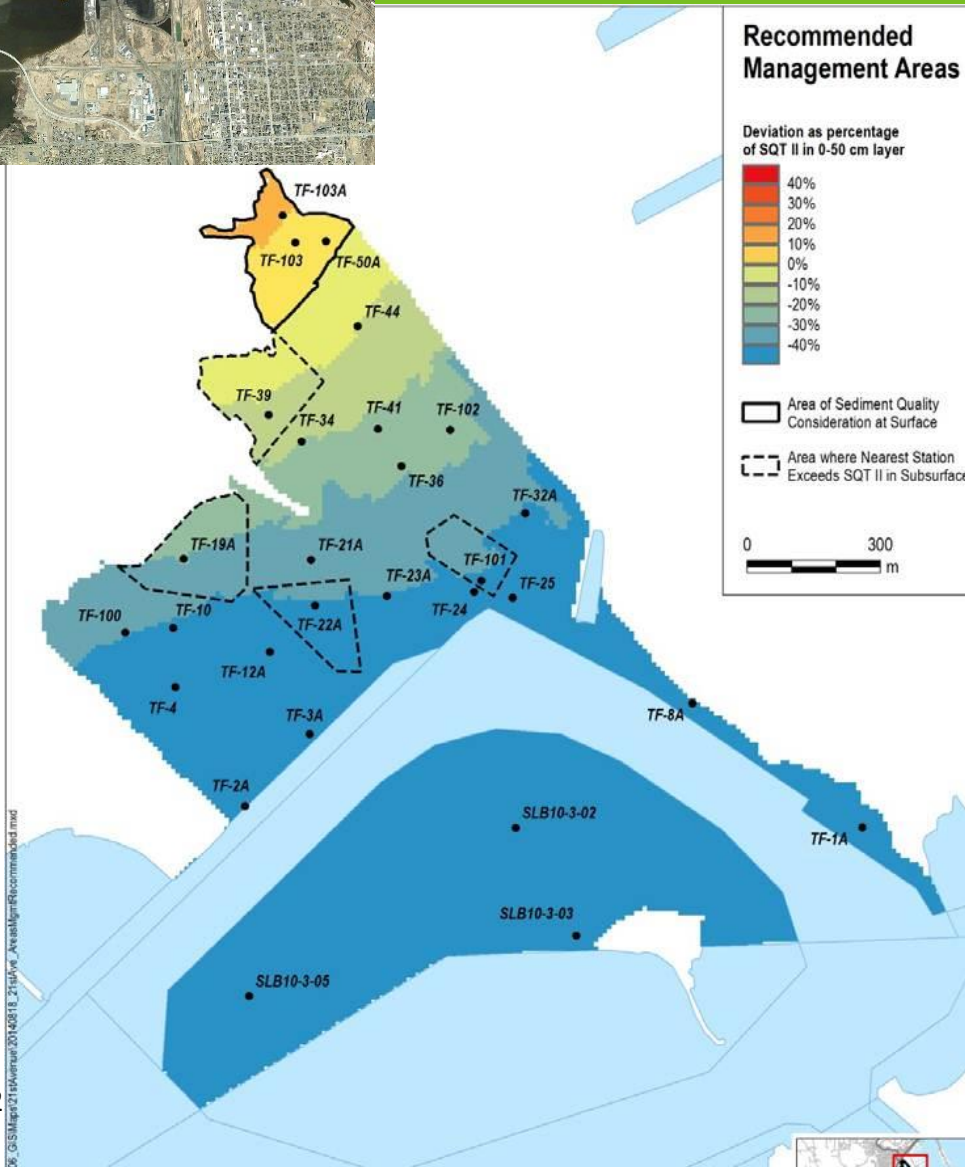
Assess  
Current  
Condition





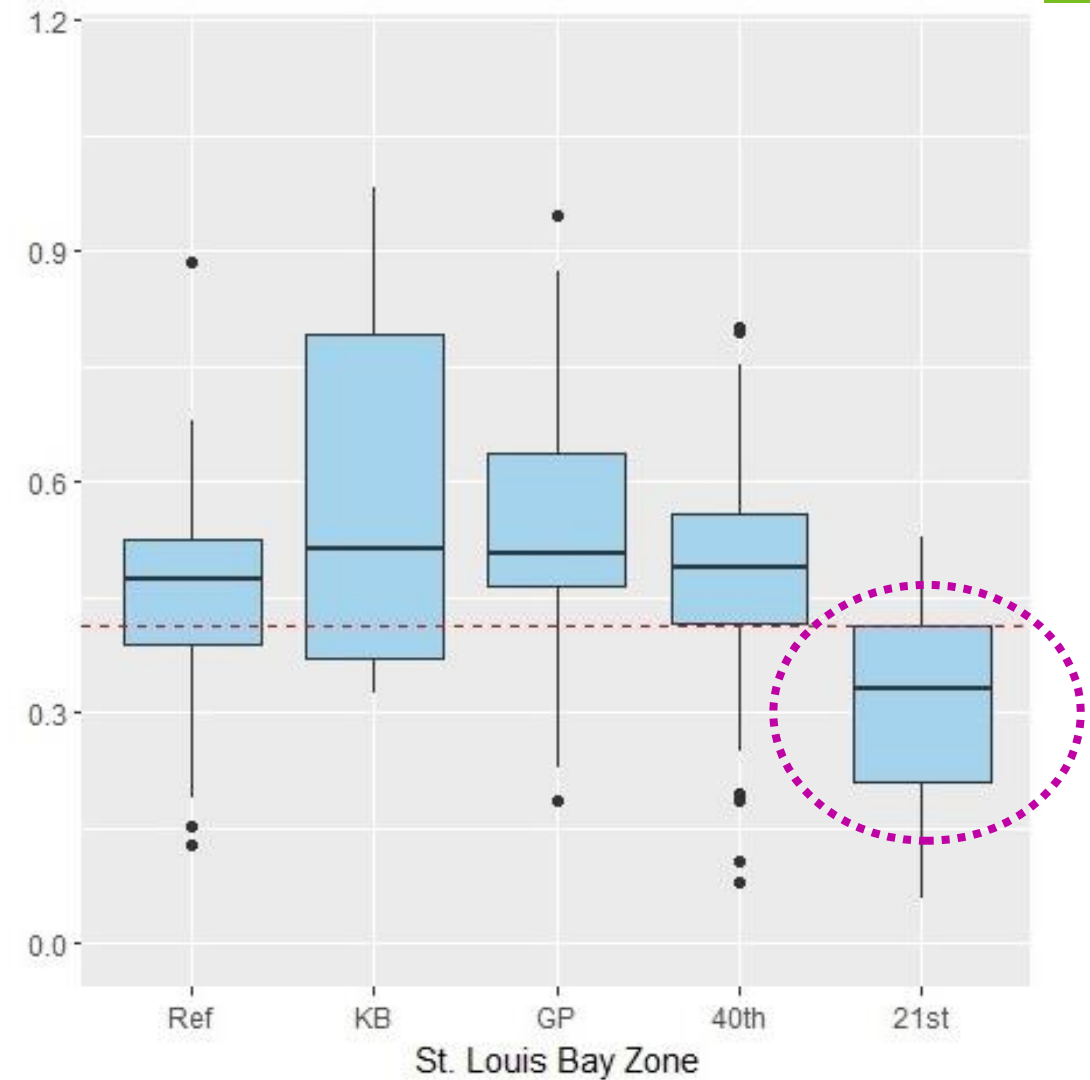
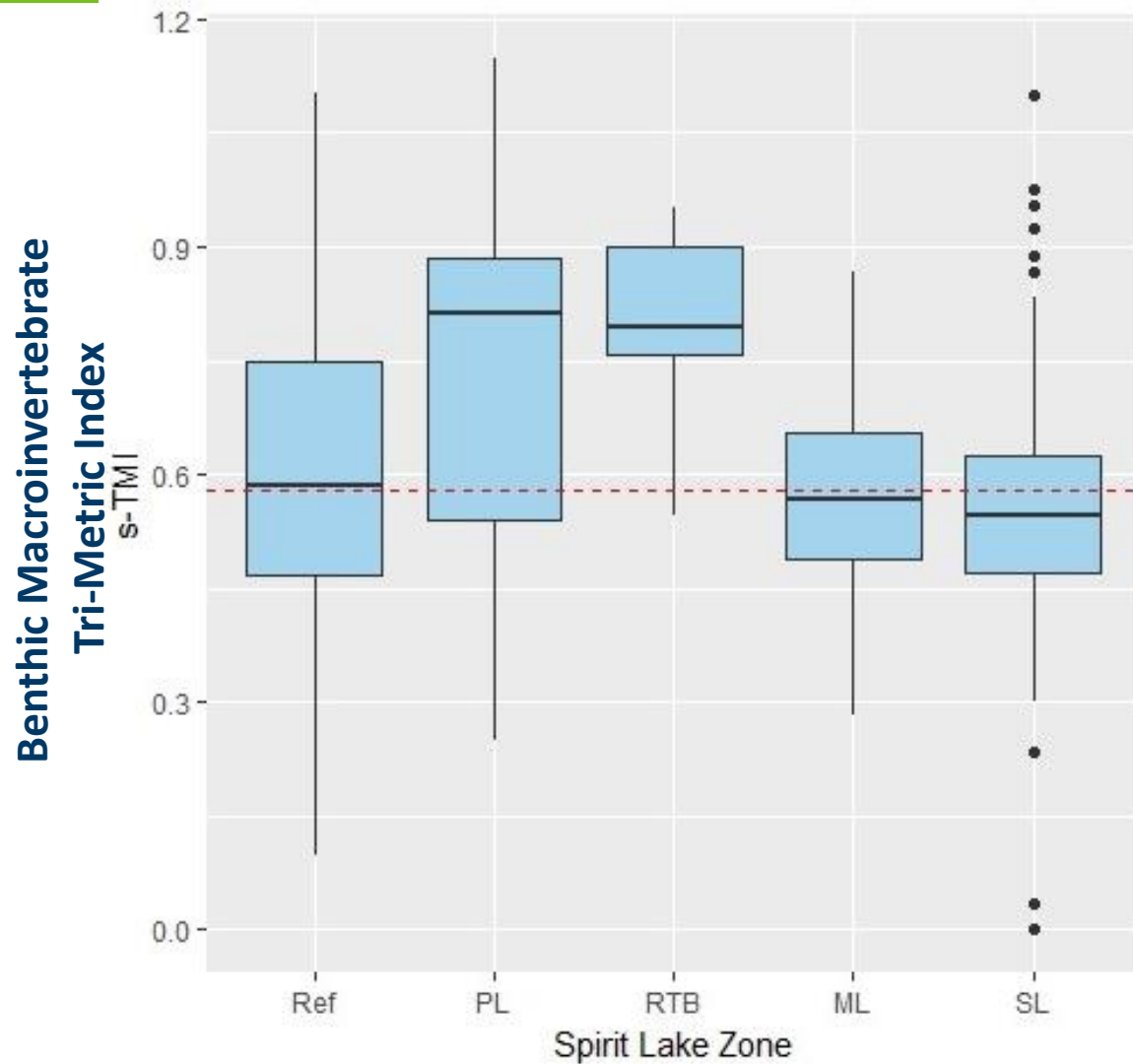


# Pre-construction Environmental Assessment





# Pre-construction Environmental Assessment





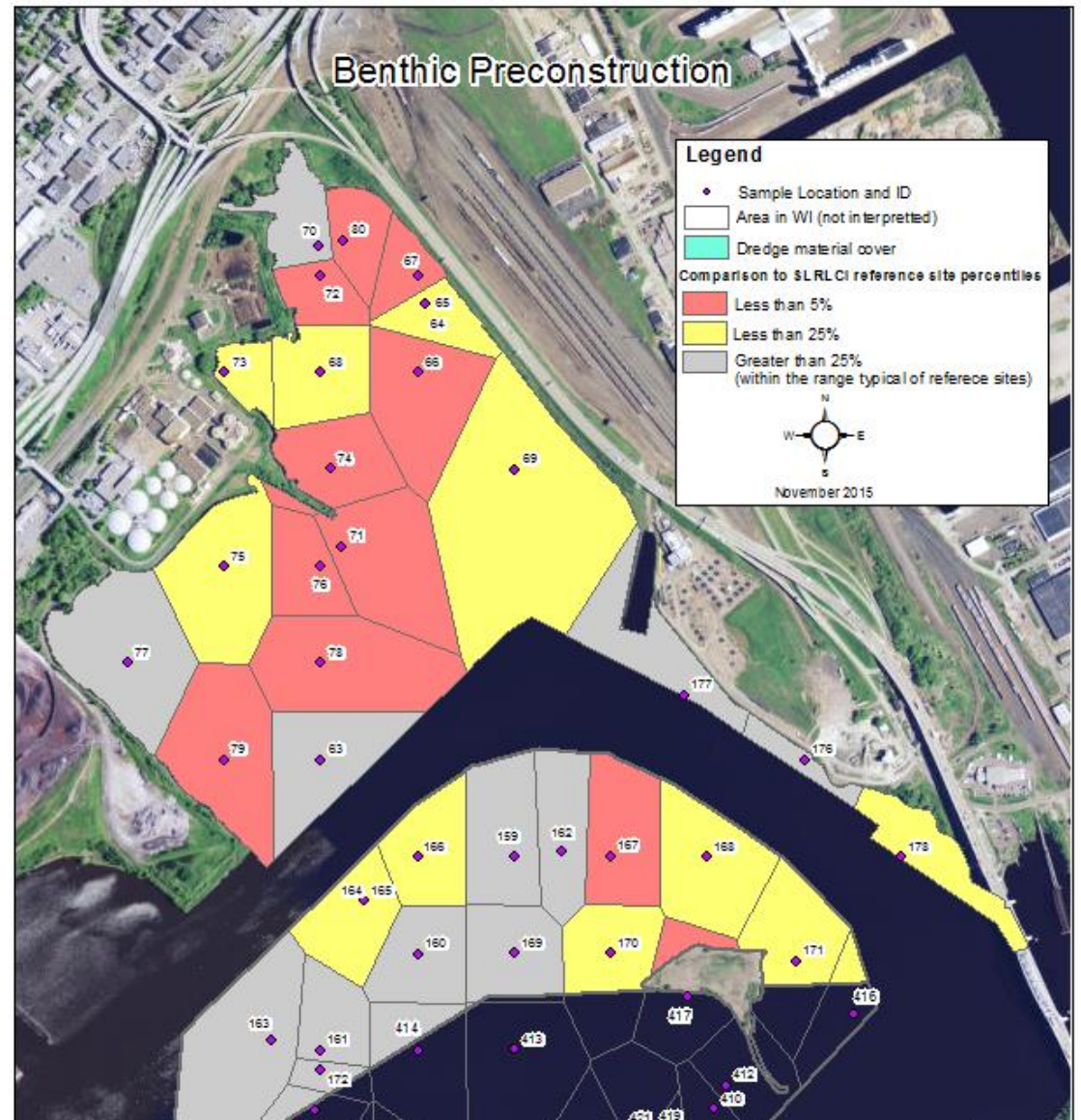
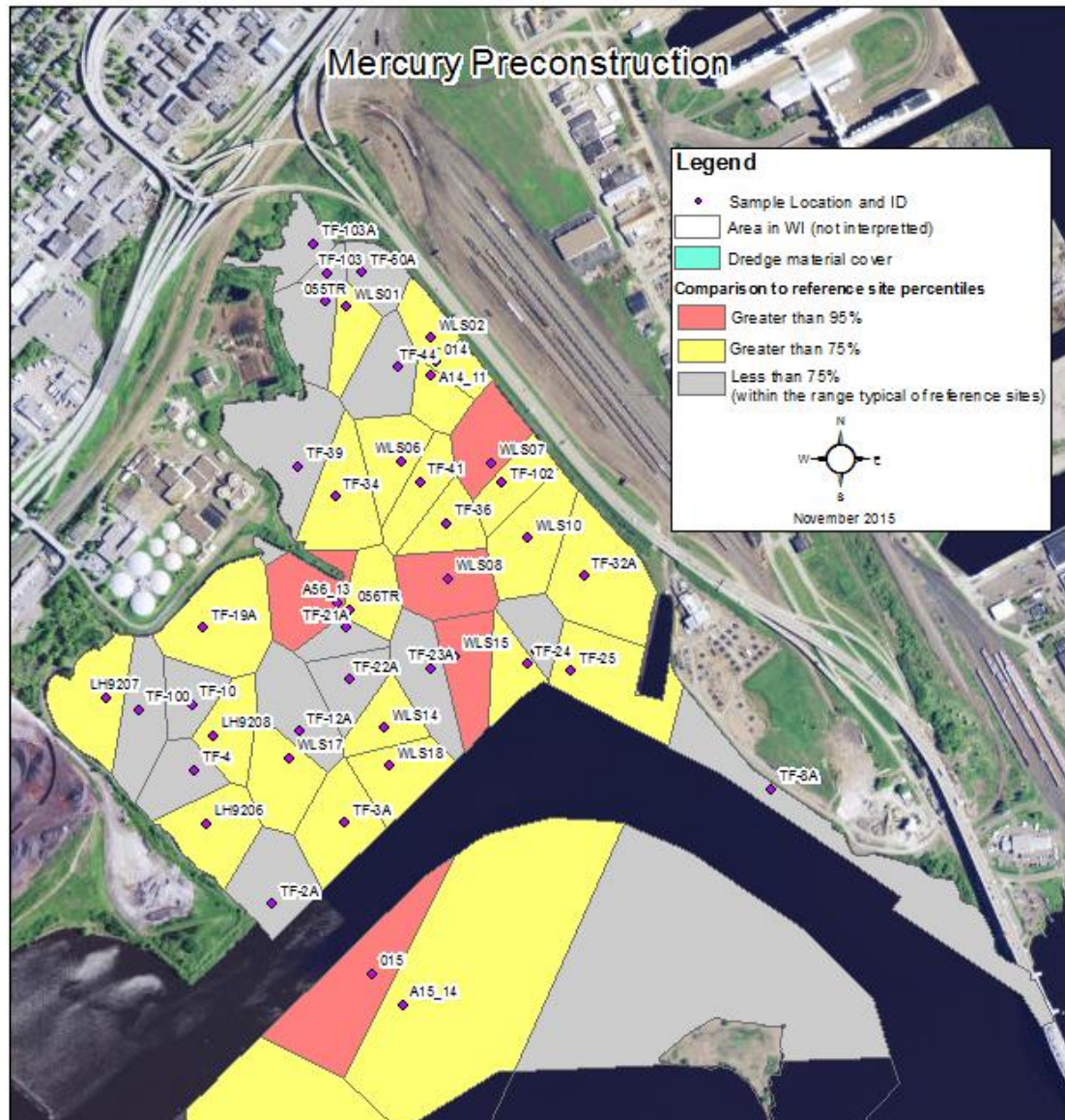
2

Incorporate  
metrics, prioritize  
locations

alternatives  
analysis

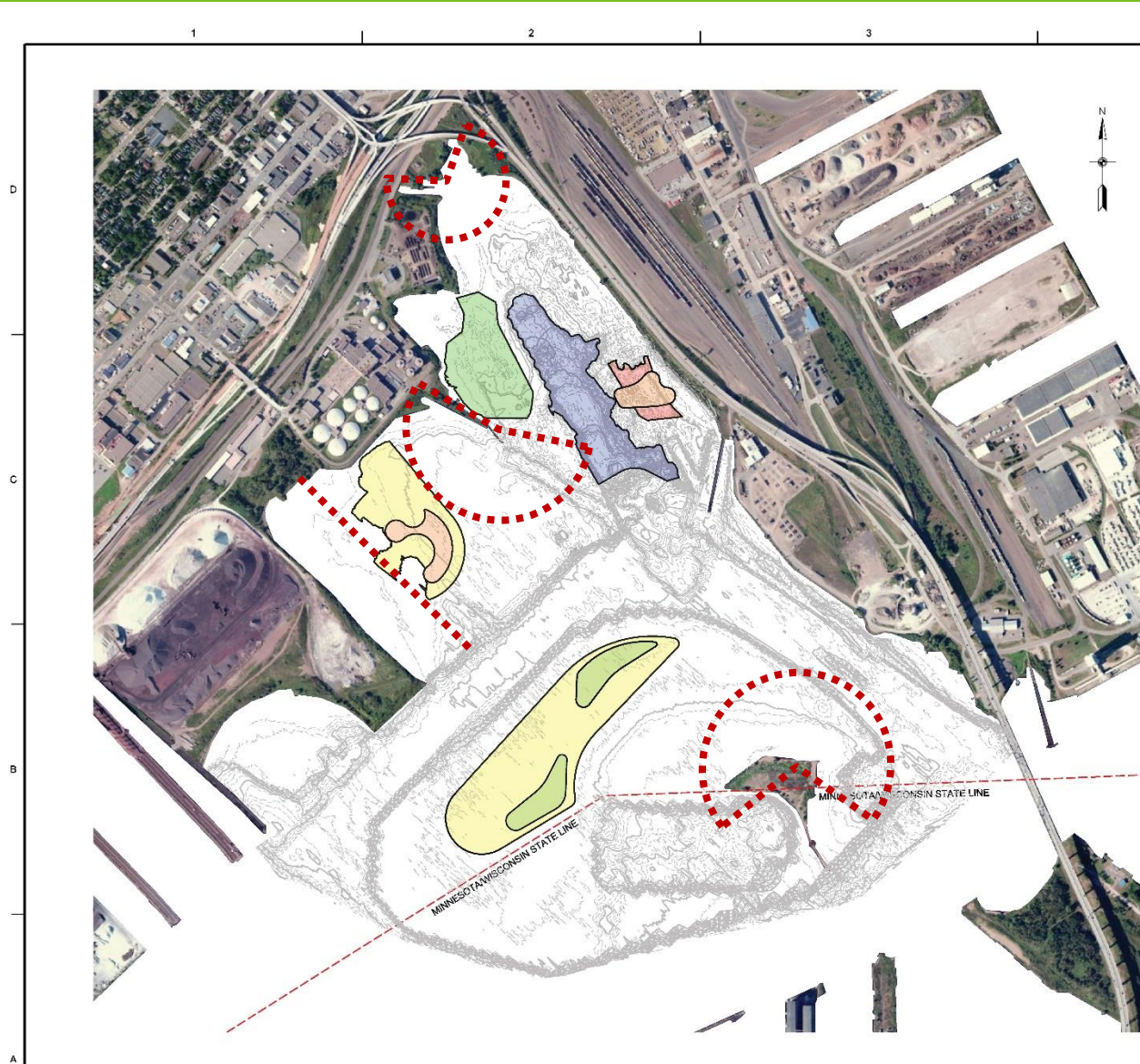


# Surface-area Weighted Average of Condition

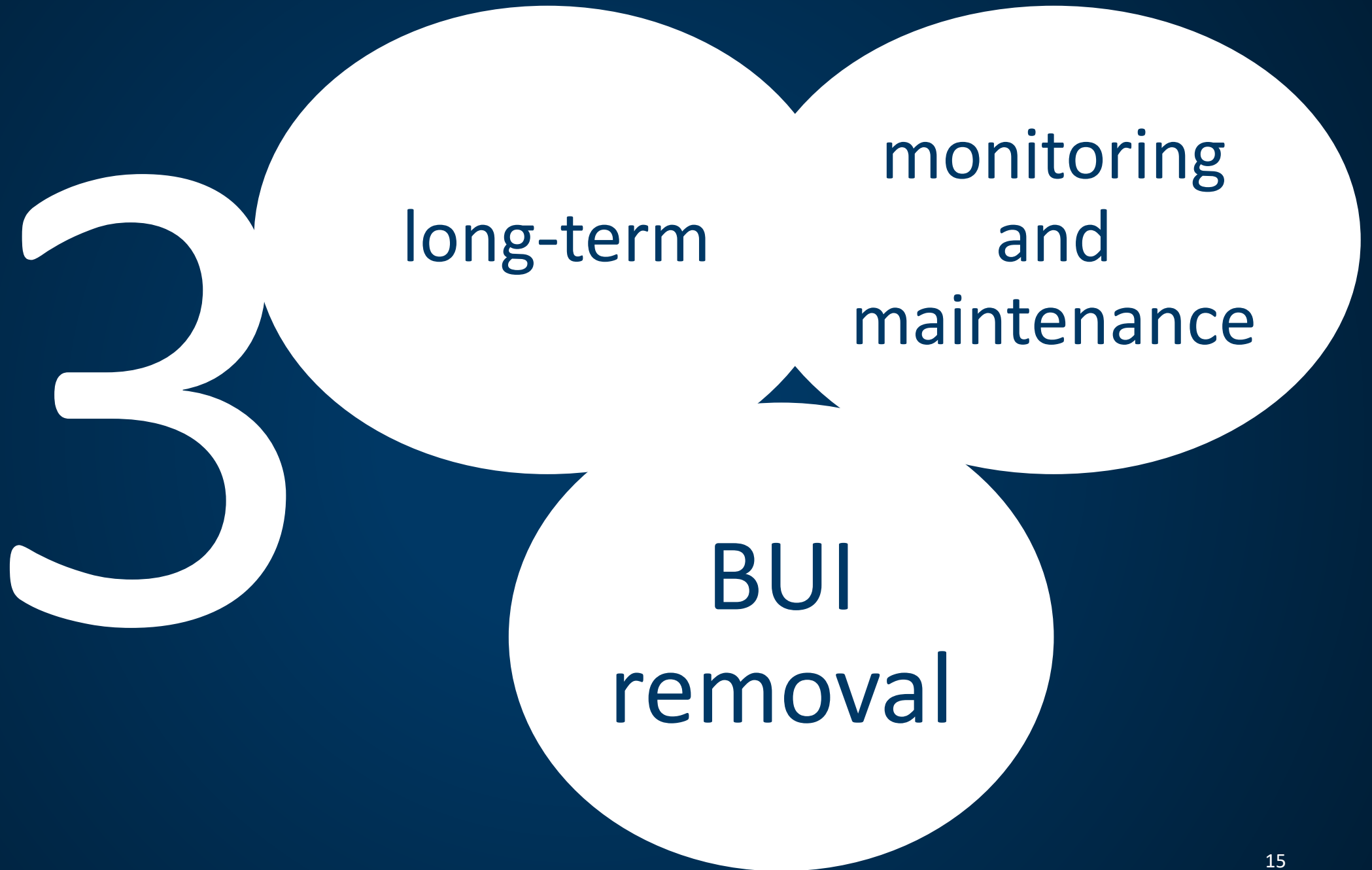




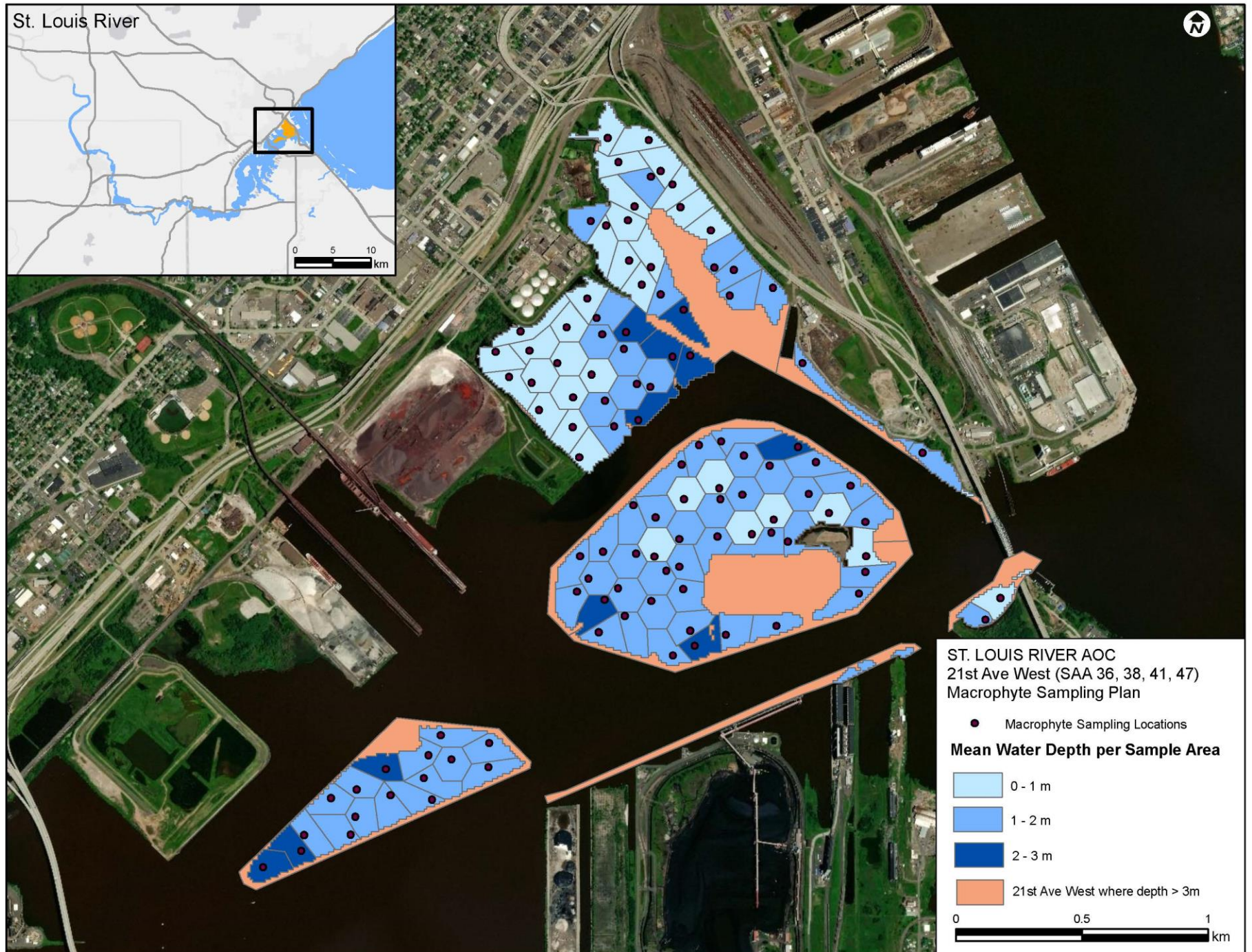
# Preferred Alternative and Construction Results







# Post- construction depth-adjusted SWAc sampling plan





# St. Louis River AOC..... Summary

restoration effectiveness (project performance)

- Site-level assessments (physical habitat, sediment chemistry, biological metrics)
- Partnerships
- Before and after collections compared to an established target



# Thank you again!



**MINNESOTA POLLUTION  
CONTROL AGENCY**

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