



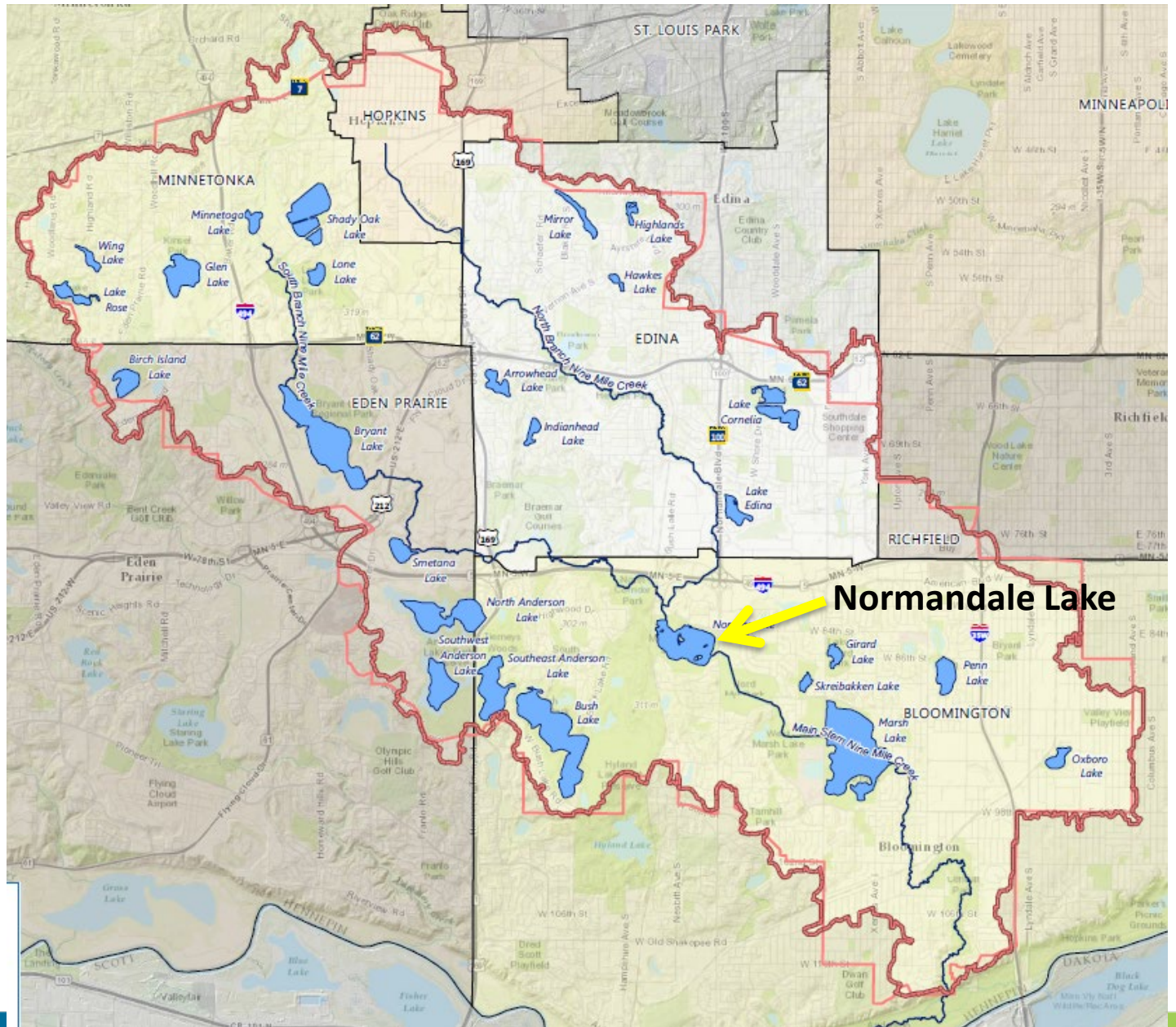
Normandale Outlet, Photo by Randy Wendel

# Normandale Lake Water Quality Improvement Project

Erica Sniegowski, Program & Project Manager, 9 Mile Creek Watershed  
Janna Kieffer, Senior Water Resources Engineer, Barr Engineering Co.







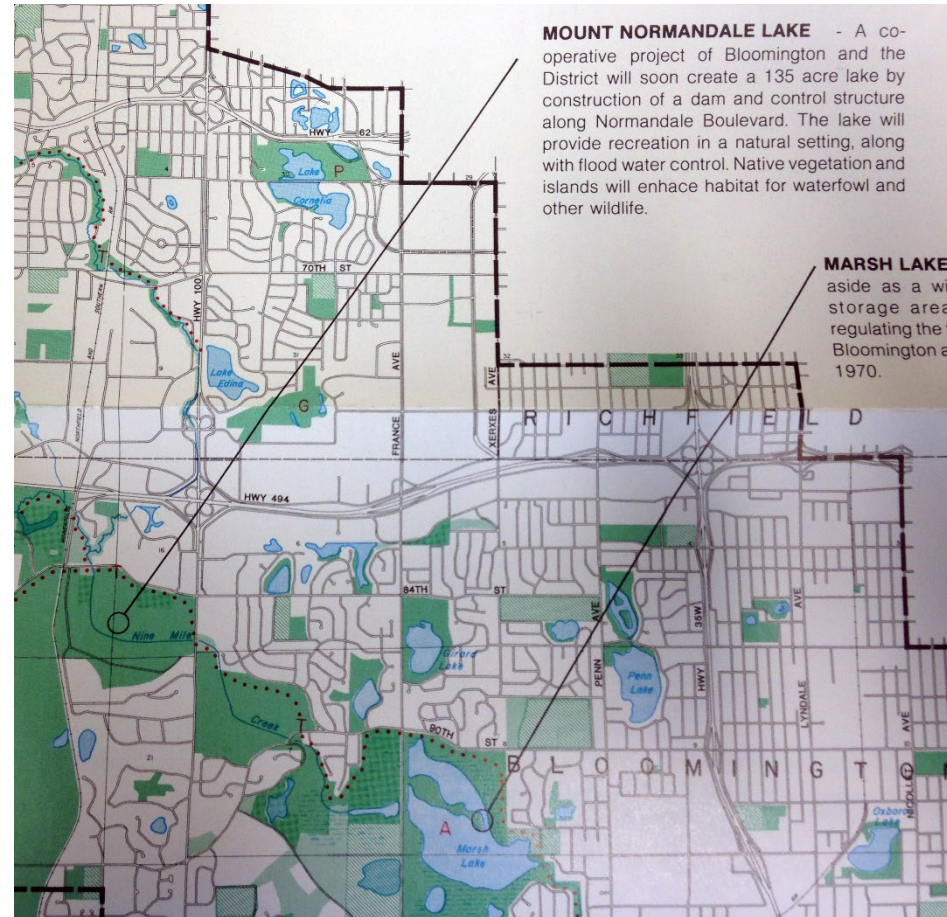


# Normandale Lake

Created in late-1970s for flood control

116 acres in size

3-foot average depth



**MOUNT NORMANDALE LAKE** - A cooperative project of Bloomington and the District will soon create a 135 acre lake by construction of a dam and control structure along Normandale Boulevard. The lake will provide recreation in a natural setting, along with flood water control. Native vegetation and islands will enhance habitat for waterfowl and other wildlife.

**MARSH LAKE** aside as a will storage area regulating the f Bloomington a 1970.

1976 District map, notes location of future Normandale Lake





# Normandale Lake Issues (2017 analysis)

High levels of phosphorus

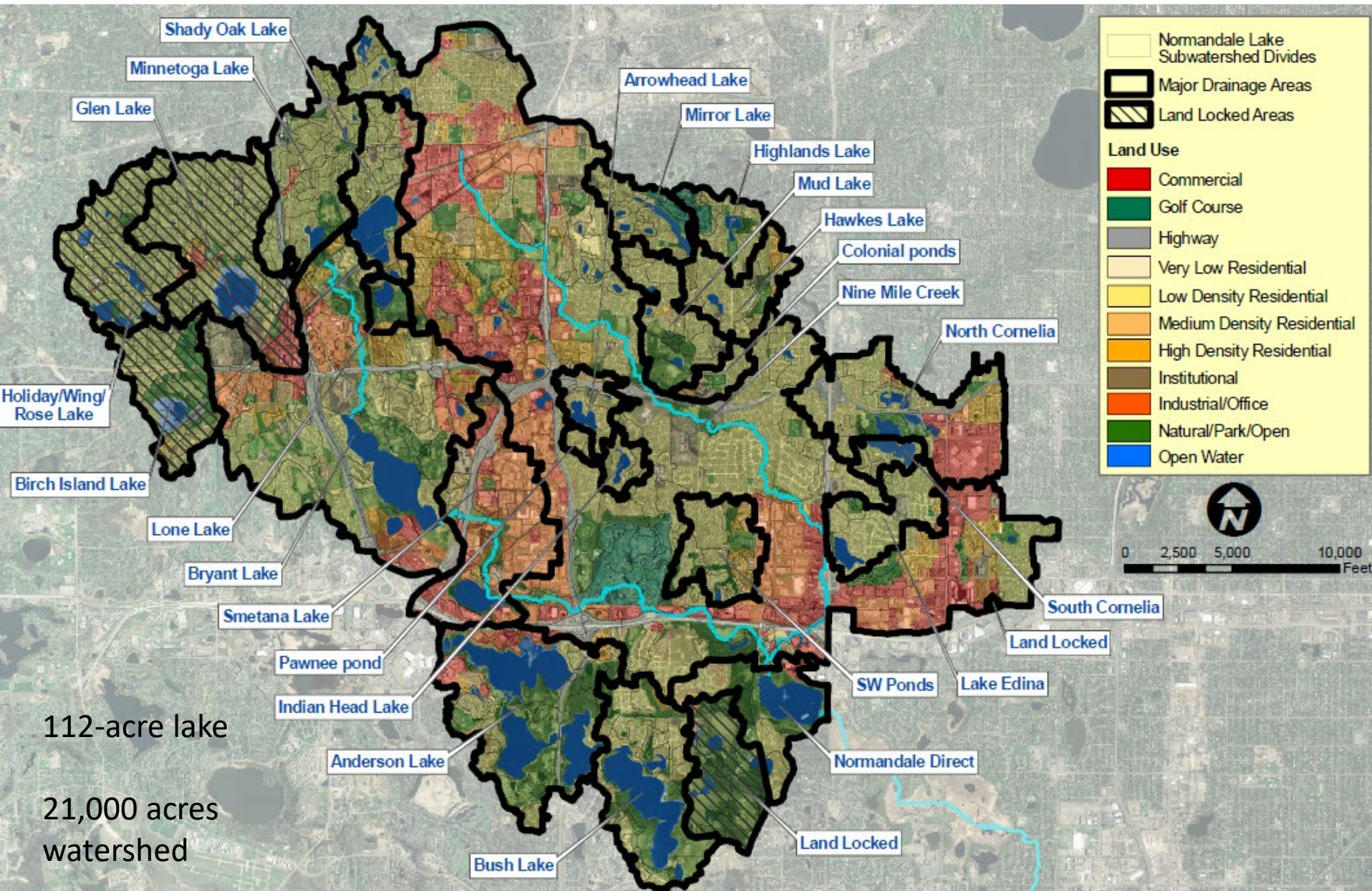
- “internal” sources (e.g., curly-leaf pondweed, lake sediment)
- watershed



Normandale Lake, 2012



# Normandale Lake watershed





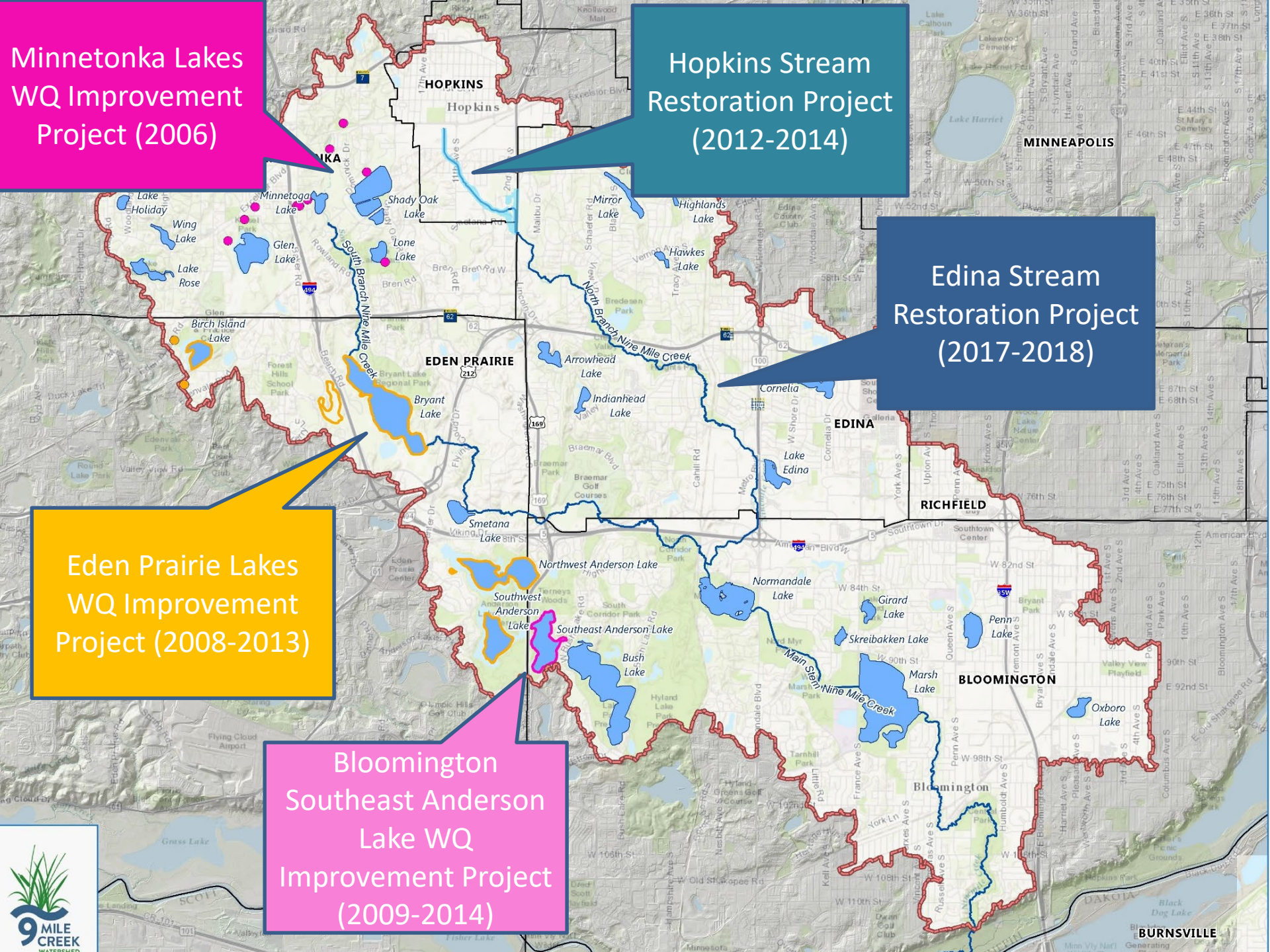
Minnetonka Lakes  
WQ Improvement  
Project (2006)

Hopkins Stream  
Restoration Project  
(2012-2014)

Edina Stream  
Restoration Project  
(2017-2018)

Eden Prairie Lakes  
WQ Improvement  
Project (2008-2013)

Bloomington  
Southeast Anderson  
Lake WQ  
Improvement Project  
(2009-2014)







# Normandale Lake Issues (2017 analysis)

High levels of phosphorus

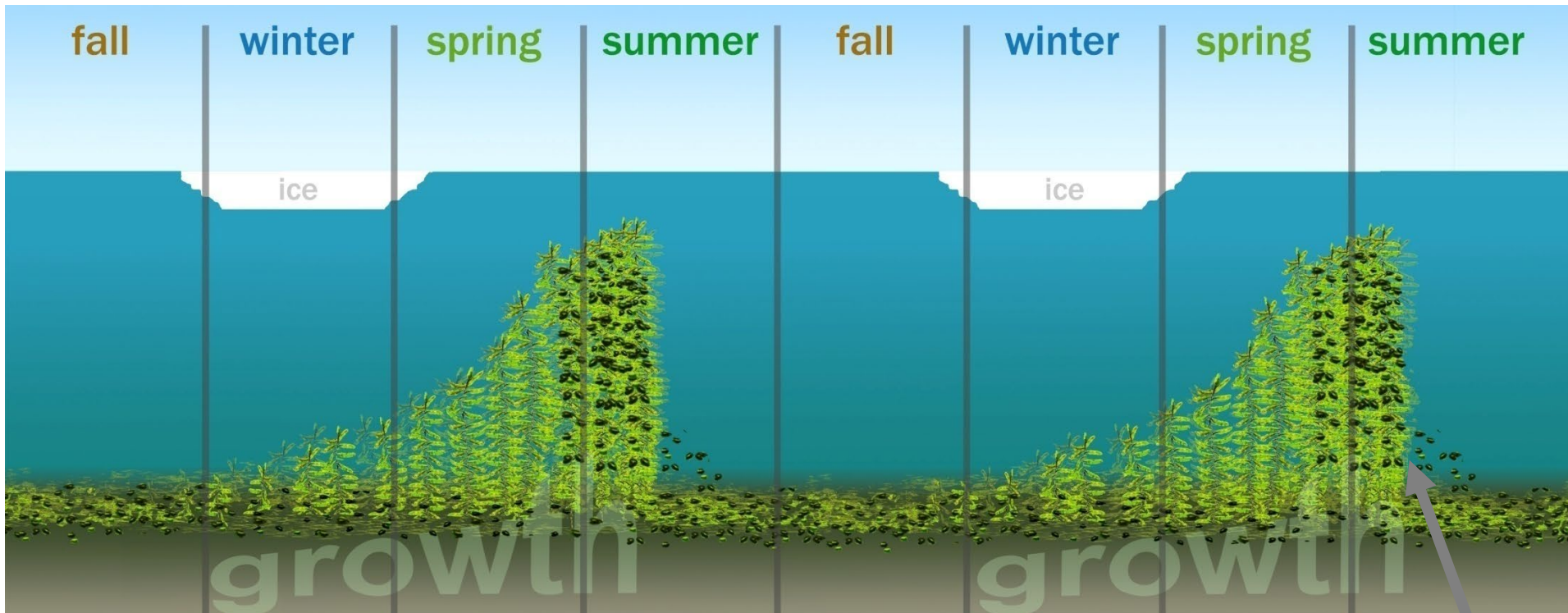
Abundant aquatic plants (including curly-leaf pondweed) that play a large role in ecology and nutrient cycling





# Curly-leaf Pondweed

Non-native, invasive plant; Unusual growth cycle



**Winter:**  
Plants continue growing under ice

**Late-spring/early-summer:**  
Plants die back and form turions

**Summer:**  
Turions remain dormant

**Fall:**  
Turions germinate

**Winter:**  
New plants sprout from turions



Curly-leaf Turion



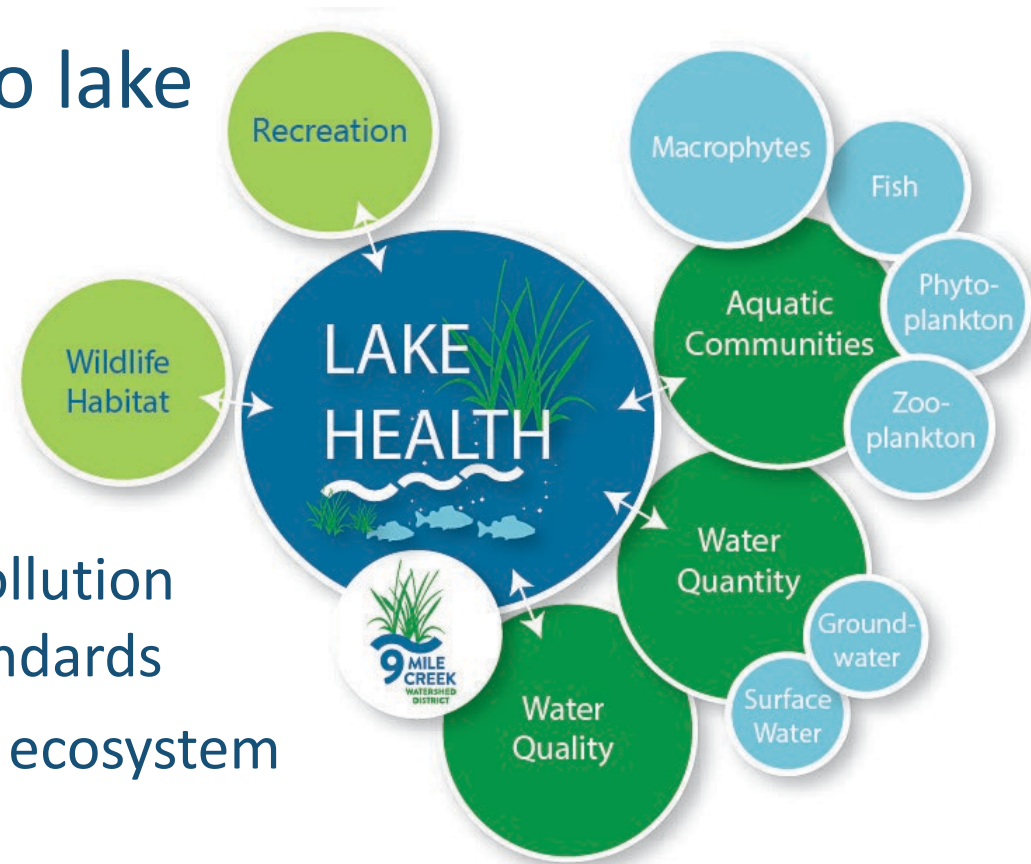


# Lake Management Objectives

Holistic approach to lake management

Manage to:

- meet Minnesota Pollution Control Agency standards
- achieve a balanced ecosystem







# Project Overview

LAKE DRAWDOWN



ALUM TREATMENT



HERBICIDE TREATMENT



Management Practice	Timing	Approximate Cost
Lake Drawdown	Fall 2018	\$400,000
Alum Treatment	Spring 2019	\$125,000
Herbicide Treatment (2-5 Years)	Spring 2020	\$100,000 per year





# Desired Project Outcomes

Reduce internal phosphorus loading

Improve native aquatic plant community







# Drawdown

Completed: August 2018-March 2019

Drained the lake to manage curly-leaf pondweed by freezing turions







# Drawdown

Initiated using pumps and existing 18" bypass pipe







# Drawdown

Installed permanent bypass pipe (36")  
-completed early November 2018





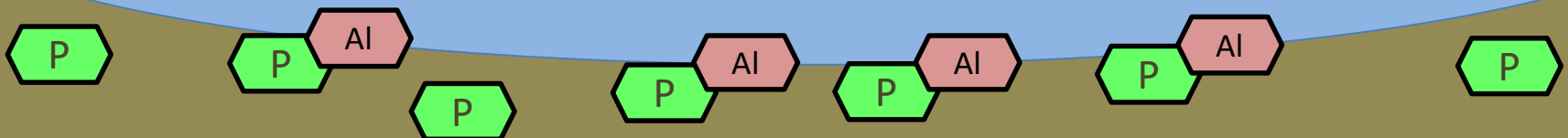
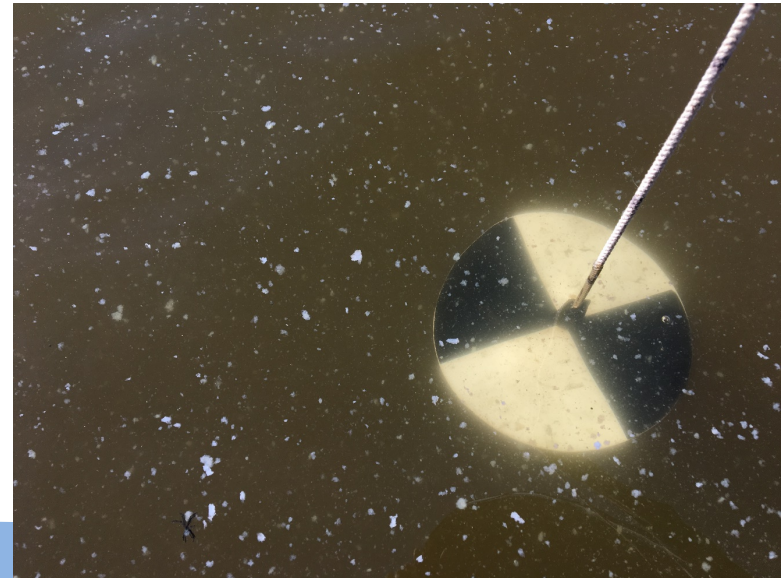
# Alum Treatment

Completed: May 2019

Reduce release of phosphorus from lake sediment

Alum forms floc that sinks to lake bottom

May be repeated in 5-10 years







# Measuring Success: Visual Aesthetics



June 28, 2016 (before project)



July 12, 2012 (before project)



June 28, 2019 (after project)

Photos by Mike Berndt



July 15, 2019 (after project)

Photos by City of Bloomington



# Measuring project success

## Water quality improvement?

- Total phosphorus
- Water clarity

## Health of aquatic plant community?

- Aquatic plant species richness
- Quality of the Plant Community Per Floristic Quality Index (FQI)

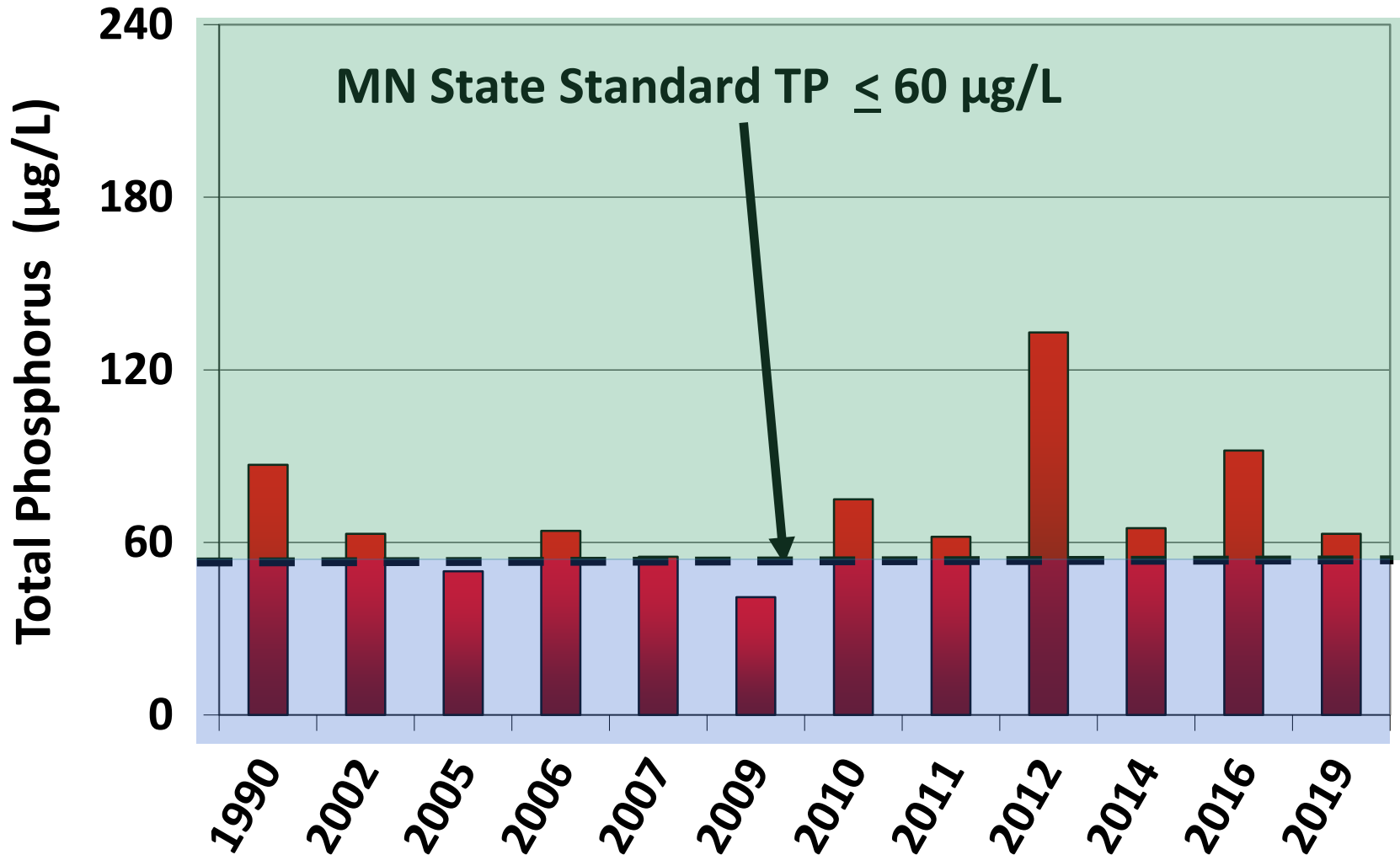
## Curlyleaf pondweed (CLP) reduction?

- Aquatic plant frequency and biomass monitoring
- CLP turion monitoring



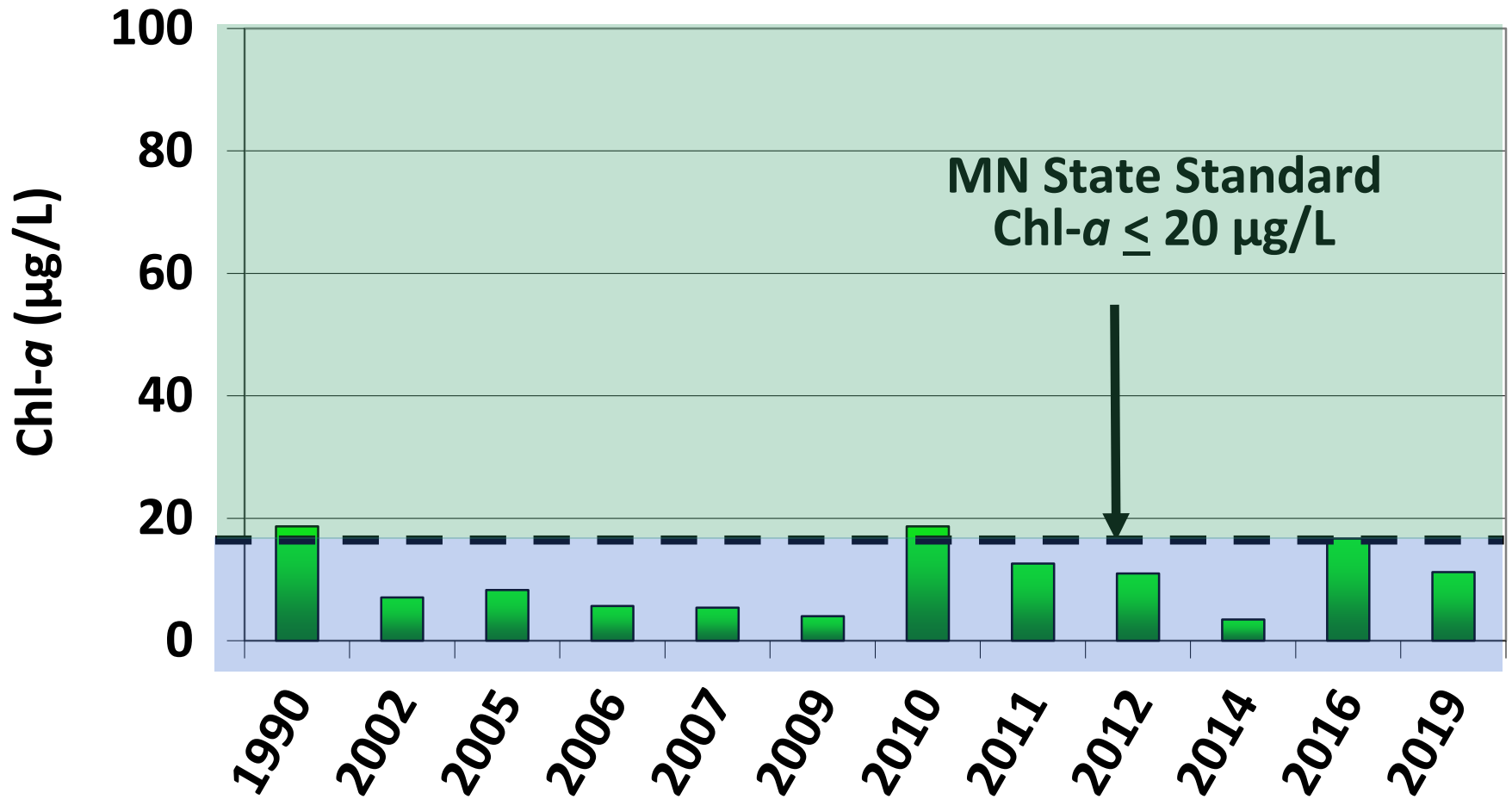


# Normandale Lake Water Quality



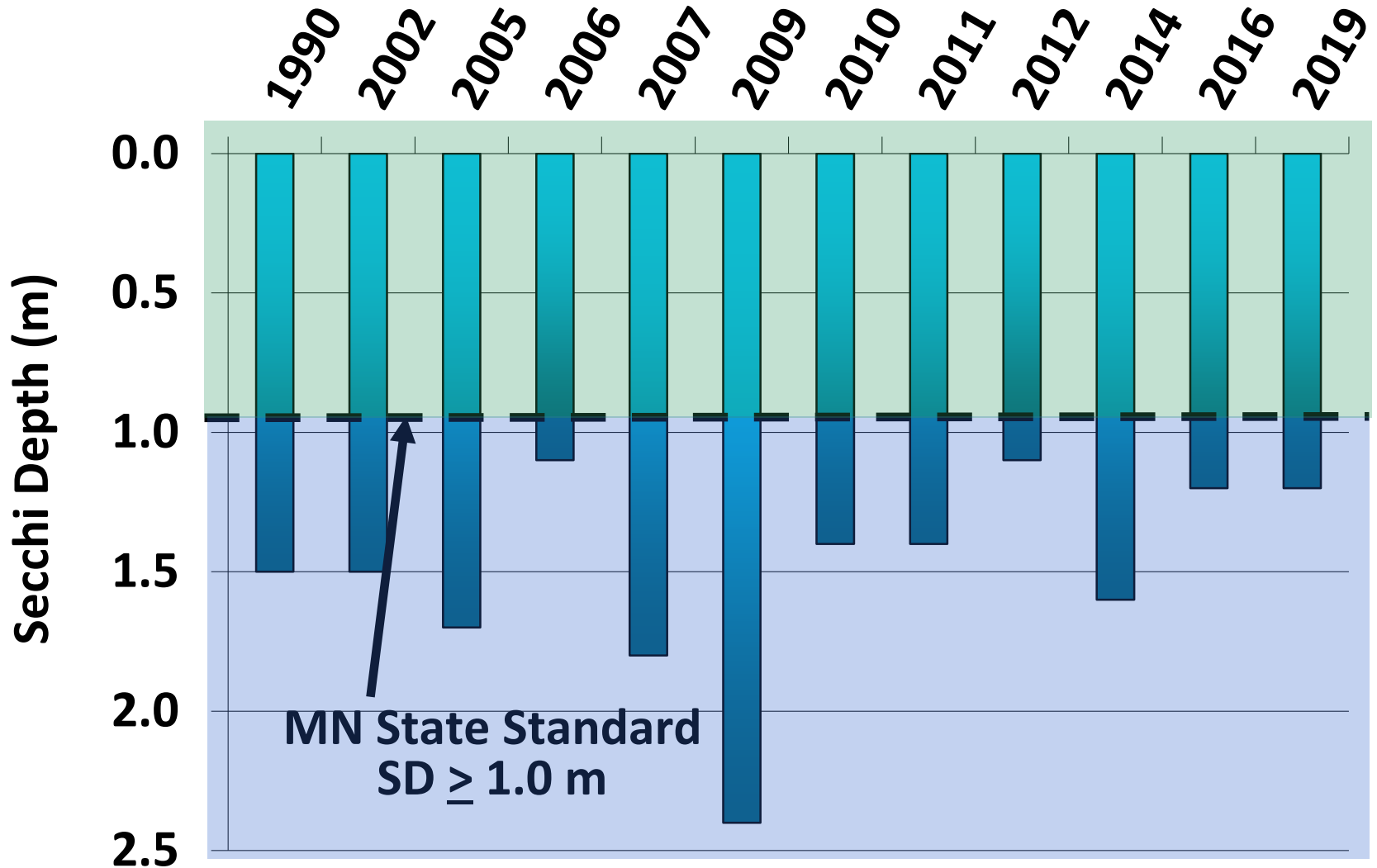


# Normandale Lake Water Quality





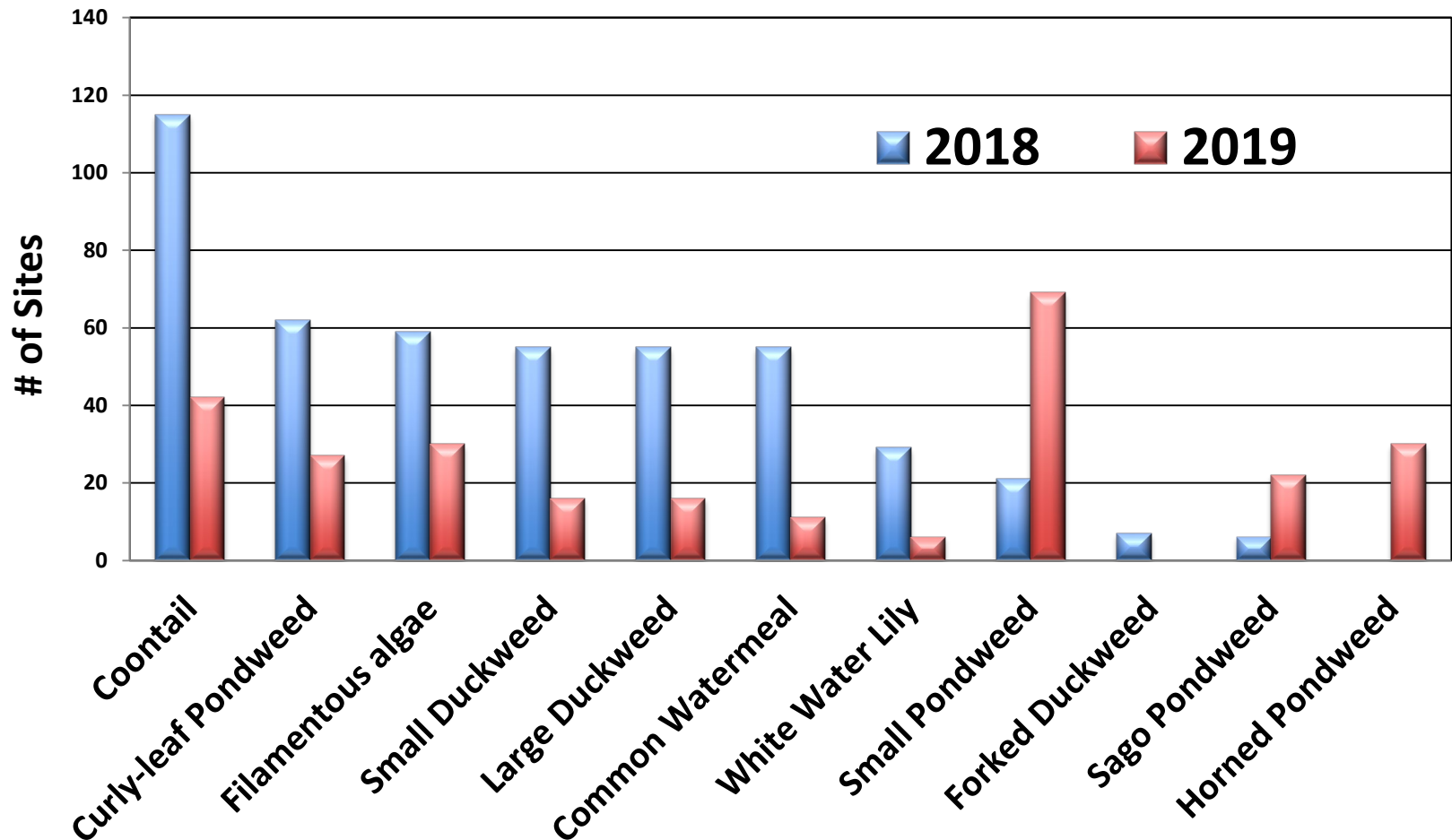
# Normandale Lake Water Quality





# Normandale Lake Plant Surveys

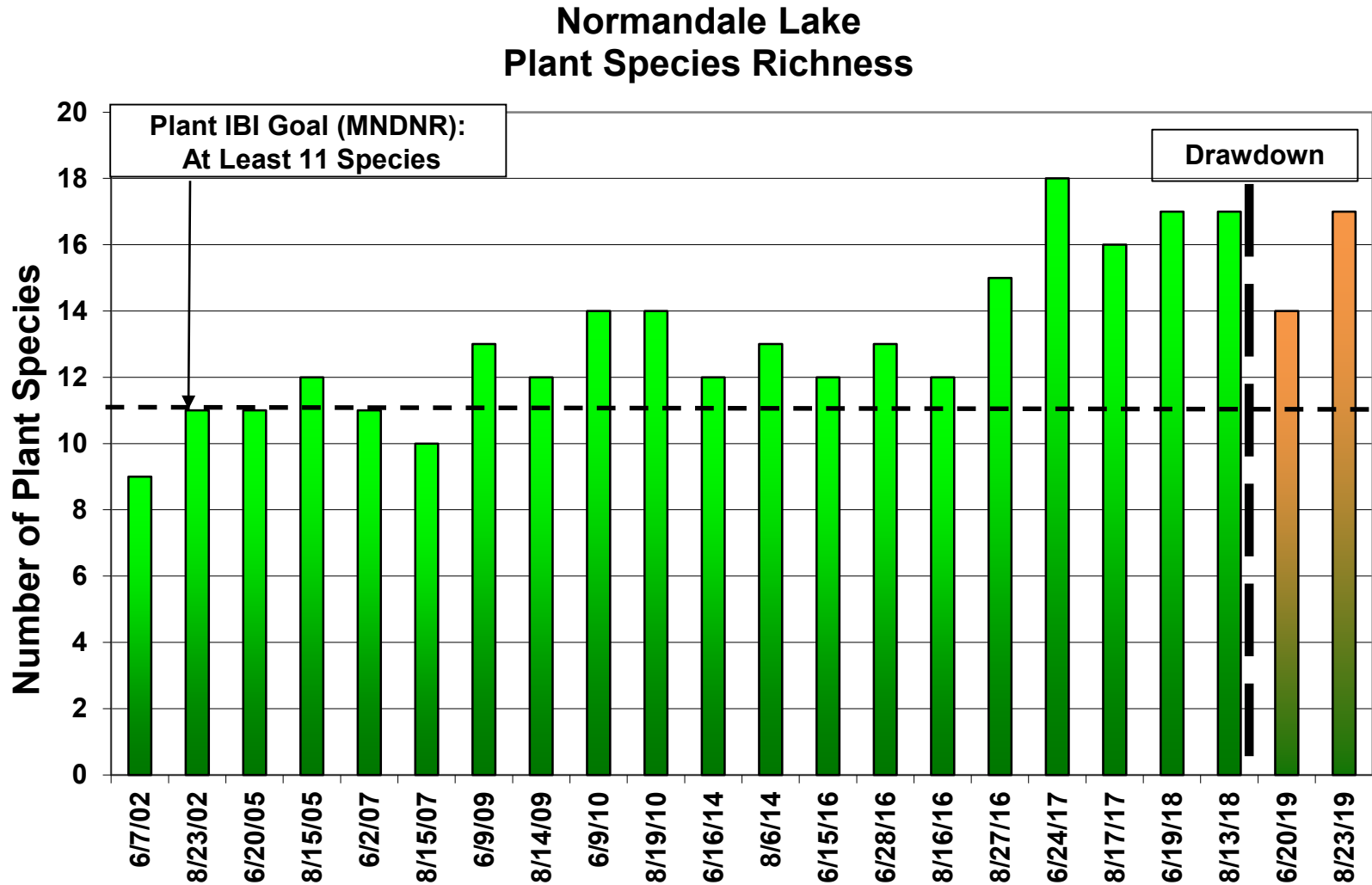
## Comparison of Plants in Normandale Lake Pre- and Post-Drawdown







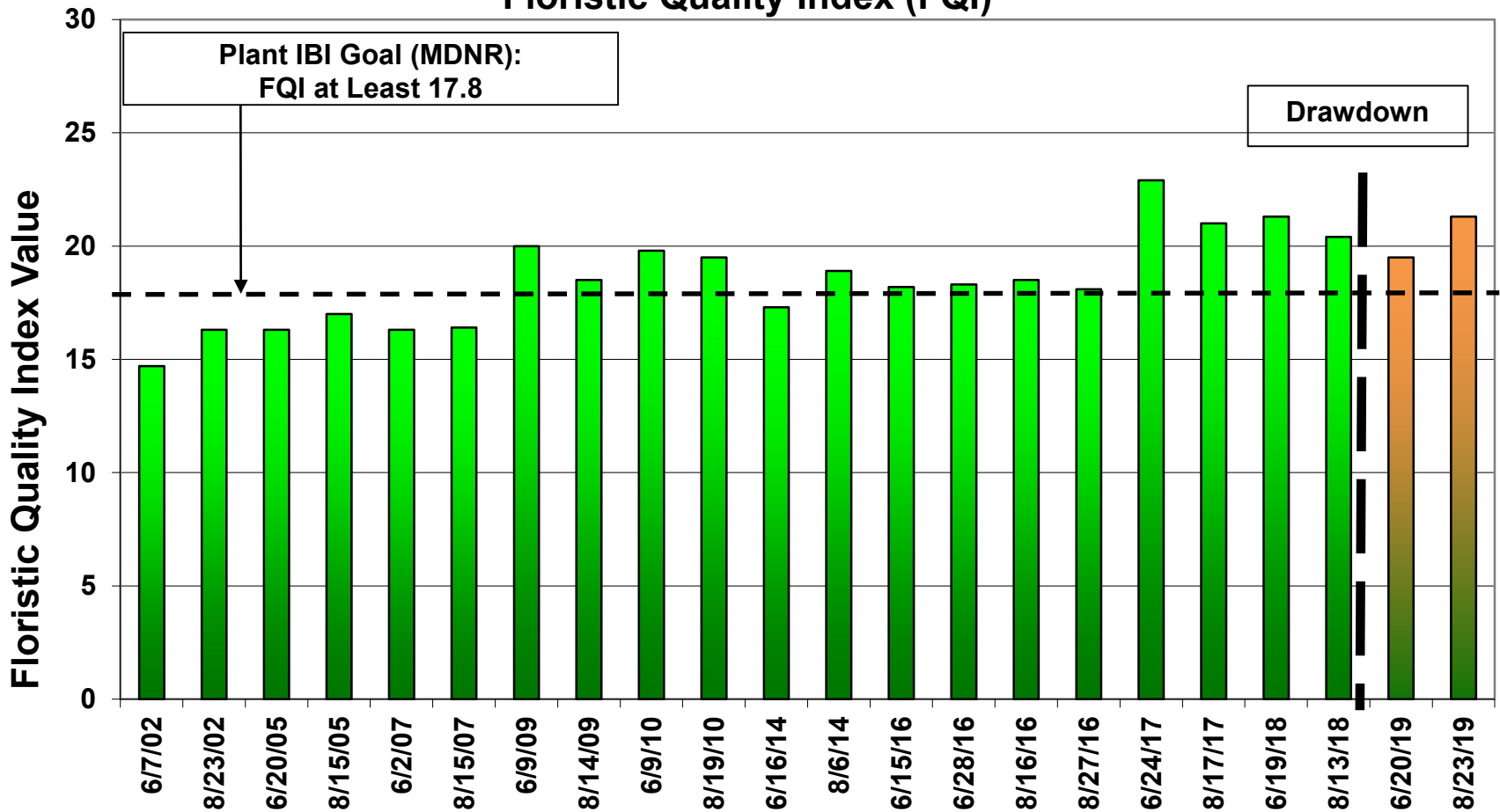
# Normandale Lake Plant IBI: Number of Plant Species





# Normandale Lake Plant IBI: Floristic Quality Index

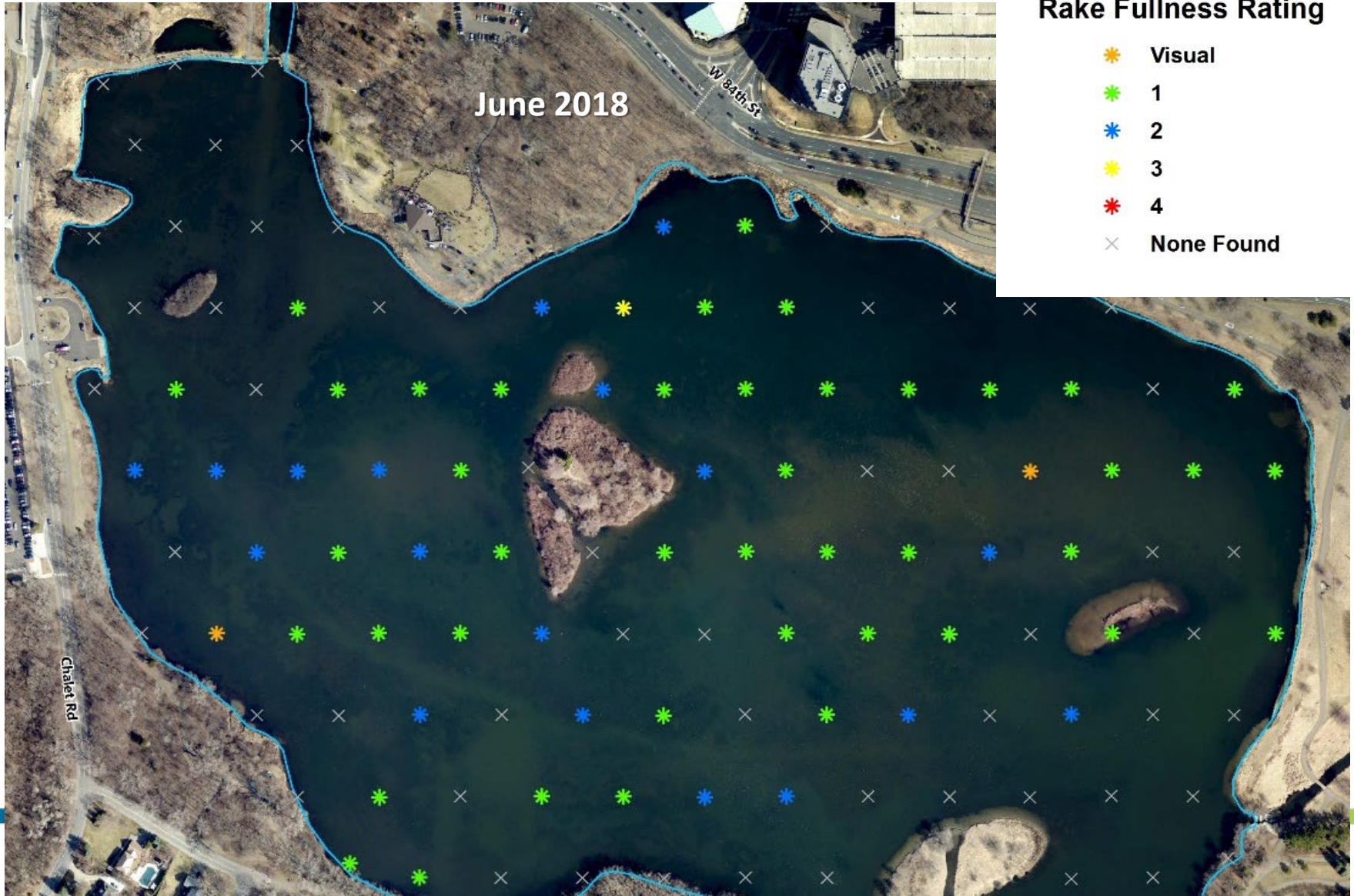
Normandale Lake:  
Quality of the Plant Community Per  
Floristic Quality Index (FQI)



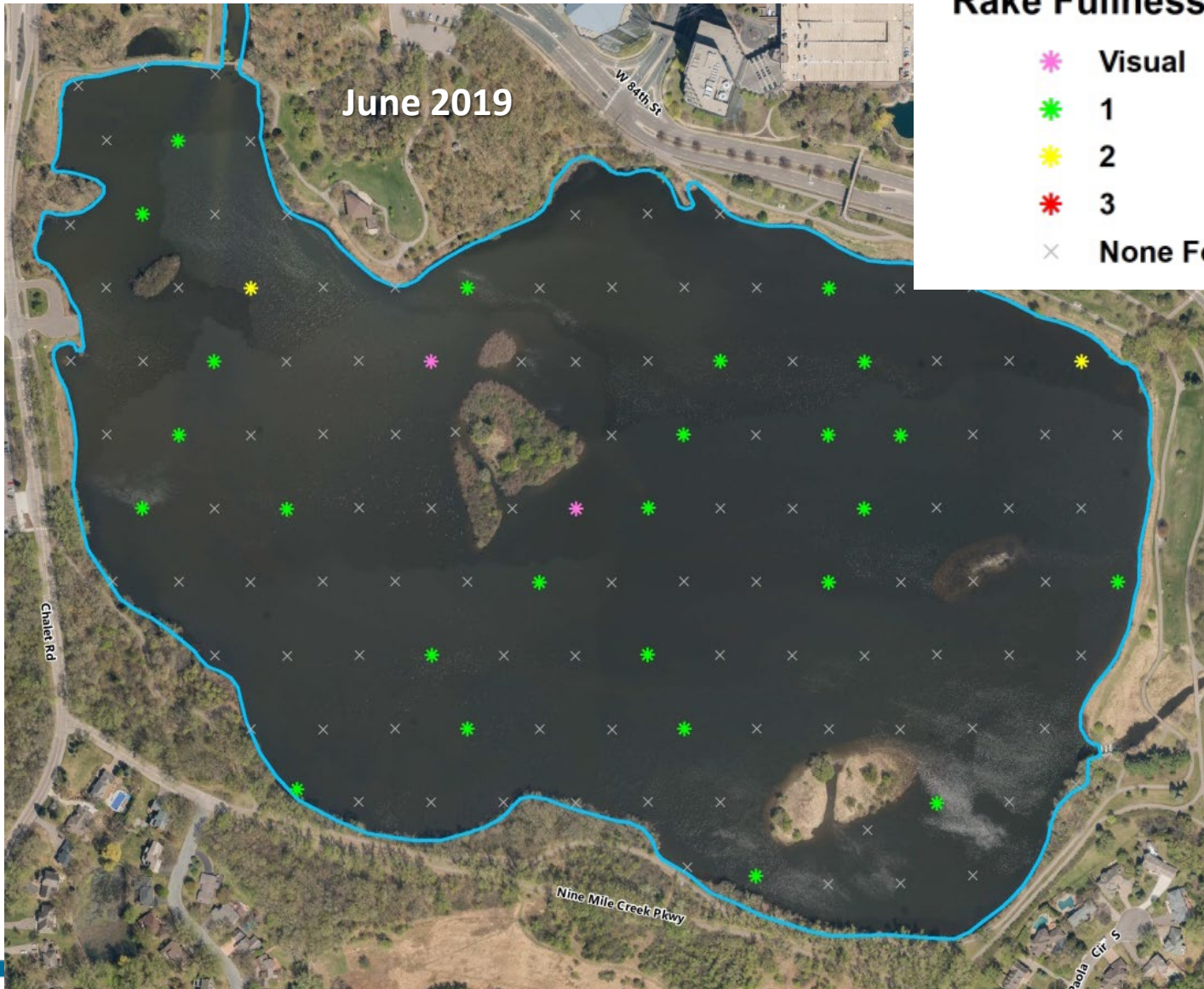




# Curly-leaf Pondweed Rake Survey Results



# Curly-leaf Pondweed Rake Survey Results



## Rake Fullness Rating

-  Visual
-  1
-  2
-  3
-  None Found



# Upstream Ponds – Rake Survey Results



## Rake Fullness Rating

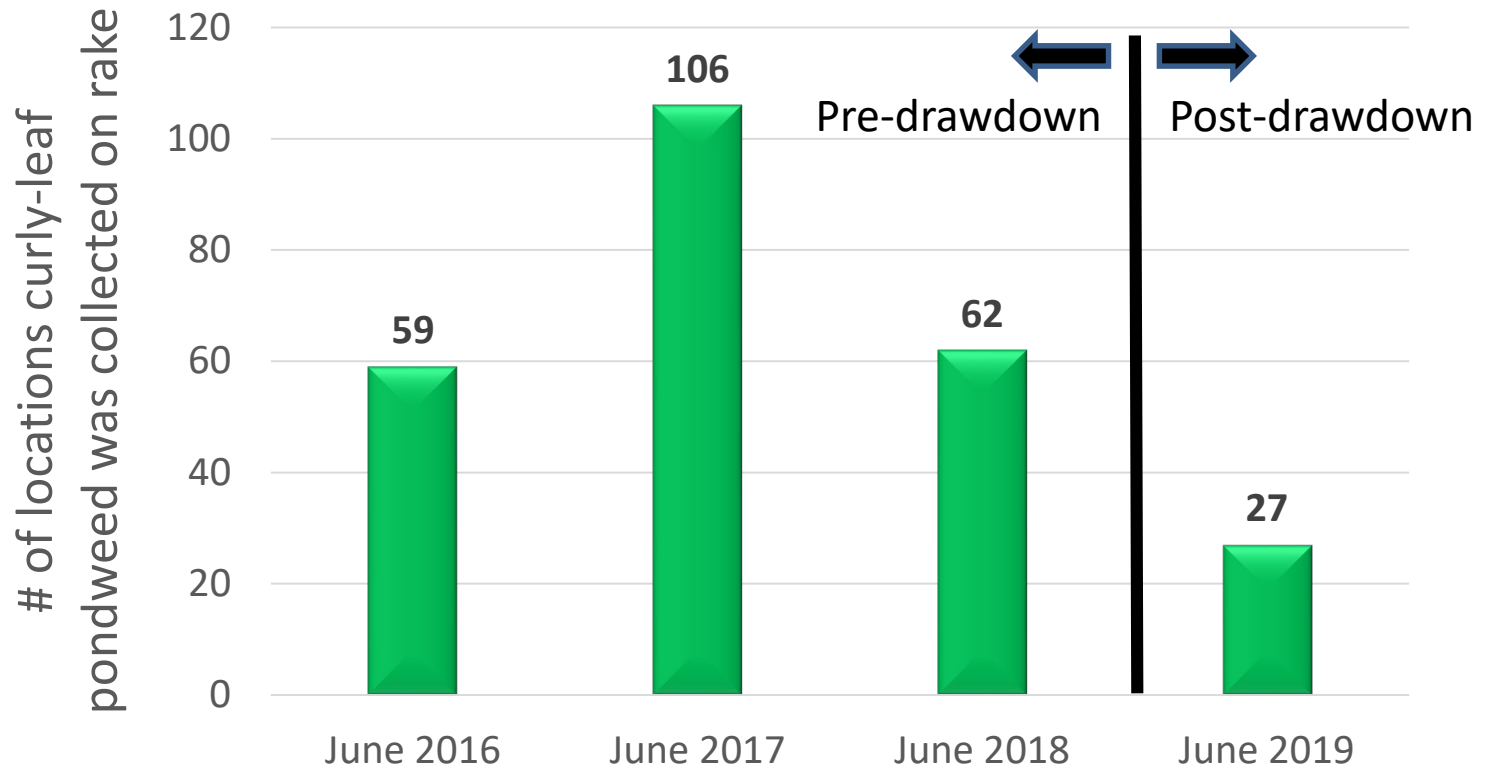
-  Visual
-  1
-  2
-  3
-  None Found



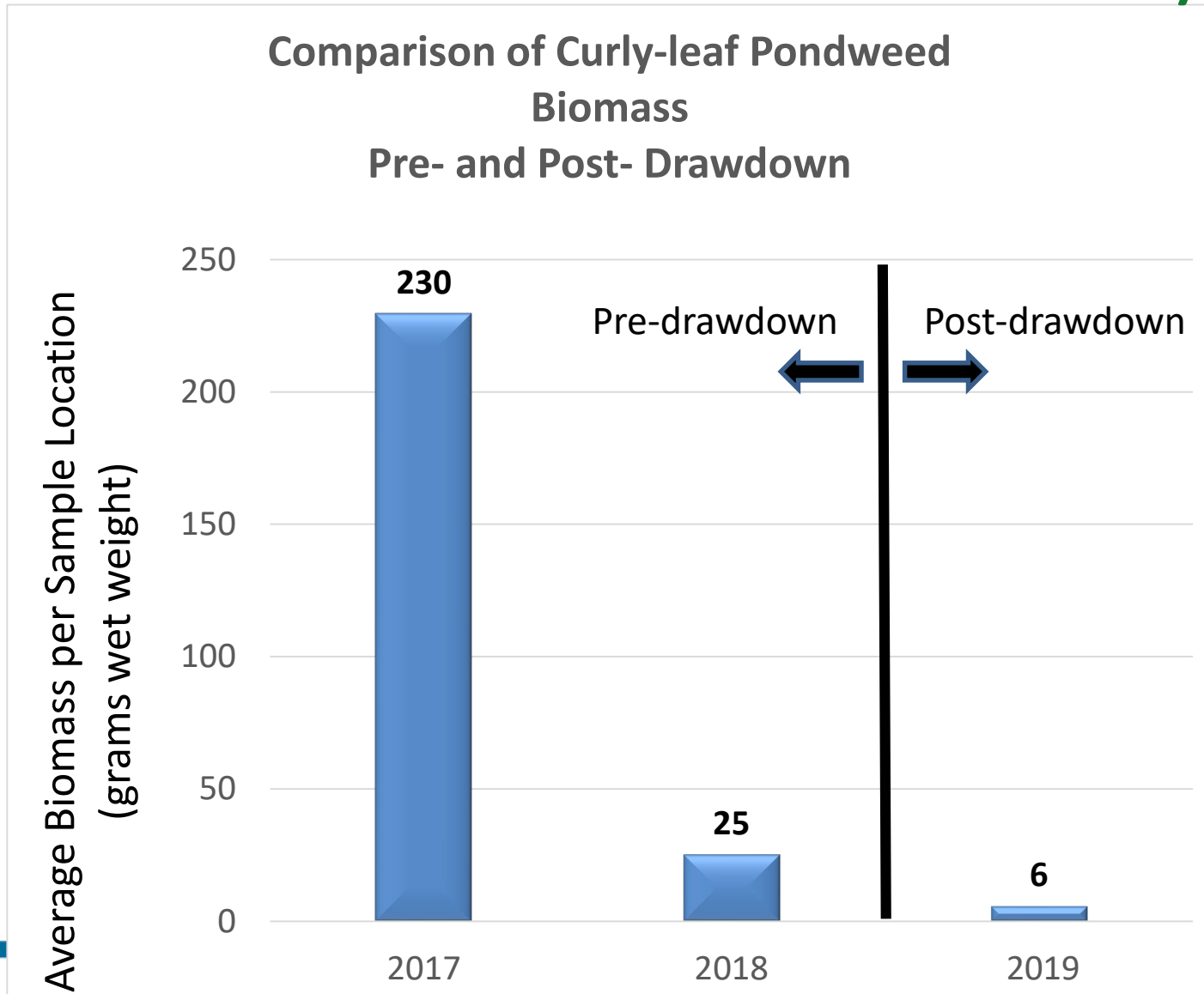


# Normandale Lake Plant Surveys

## Comparison of Curly-leaf Pondweed Frequency Pre- and Post- Drawdown



# Normandale Lake Plant Surveys



# Curly-leaf Pondweed Turion Sampling Results



Figure 1: Germinating CLP Turion





# Curly-leaf Pondweed Turion Sampling Results



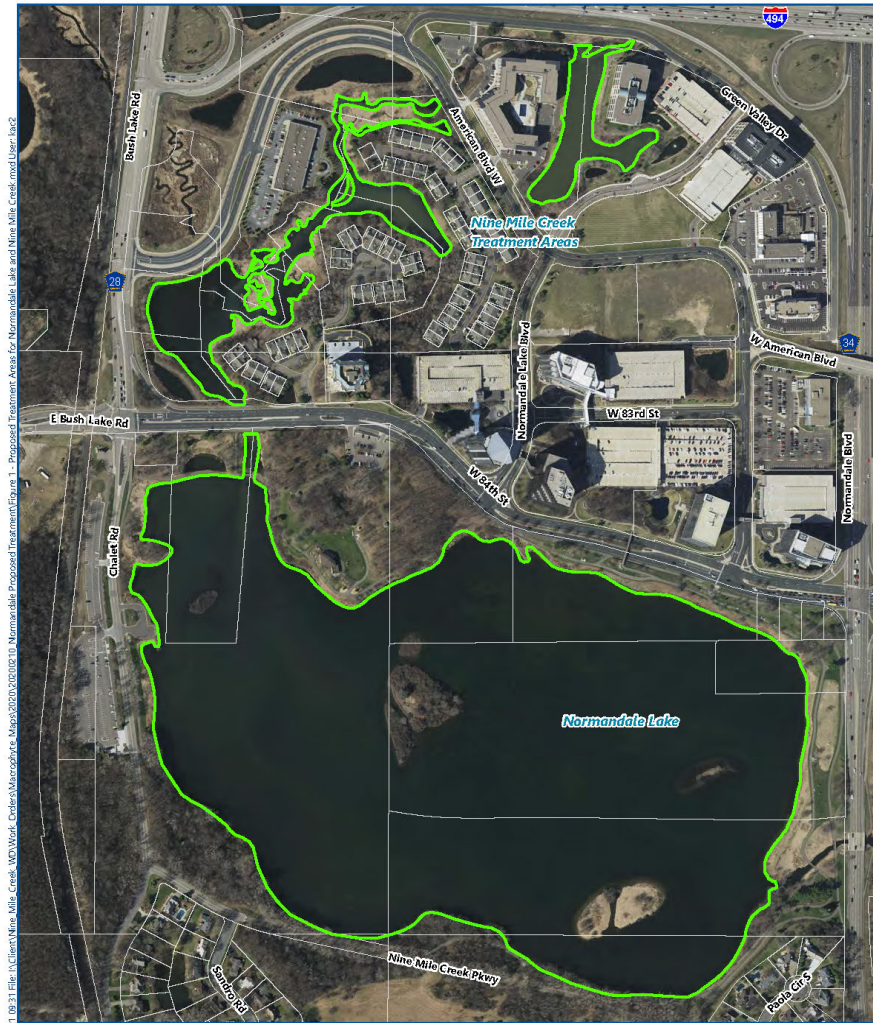


# Herbicide Treatment

Target remaining curly-leaf pondweed

## Lake Vegetation Management Plan

- allows for whole lake treatment, dependent on spring plant surveys
- Sets lake management goals

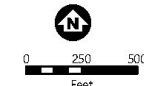


Source: AEGIS 10.7.1, 2020-02-27, 109-31 File: C:\Client\Nine Mile Creek\NORMANDALE\Proposed Treatment\CityMap\_1\_1\_Proposed Treatment Areas For Normandale Lake and Nine Mile Creek.mxd User: bap



### Legend

- Proposed Treatment Area
- Parcels



PROPOSED TREATMENT AREAS FOR  
NORMANDALE LAKE AND NINE  
MILE CREEK  
Nine Mile Creek Watershed District  
Bloomington, MN





# Herbicide Treatment

Endothall or diquat

Applied by treatment boat or barge by qualified applicator

Early spring before native plants emerge

Successive treatments for 2-5 years may be necessary







# Fish Surveys

## Fish Surveys

2018	2019
Carp need to be managed	Major carp spawning event occurred after drawdown
Sunfish and crappies common	Drawdown didn't have an impact on number of native fish species
Low # of predator fish	



## DNR stocked (2019)

black crappie

largemouth bass

yellow perch

bluegill

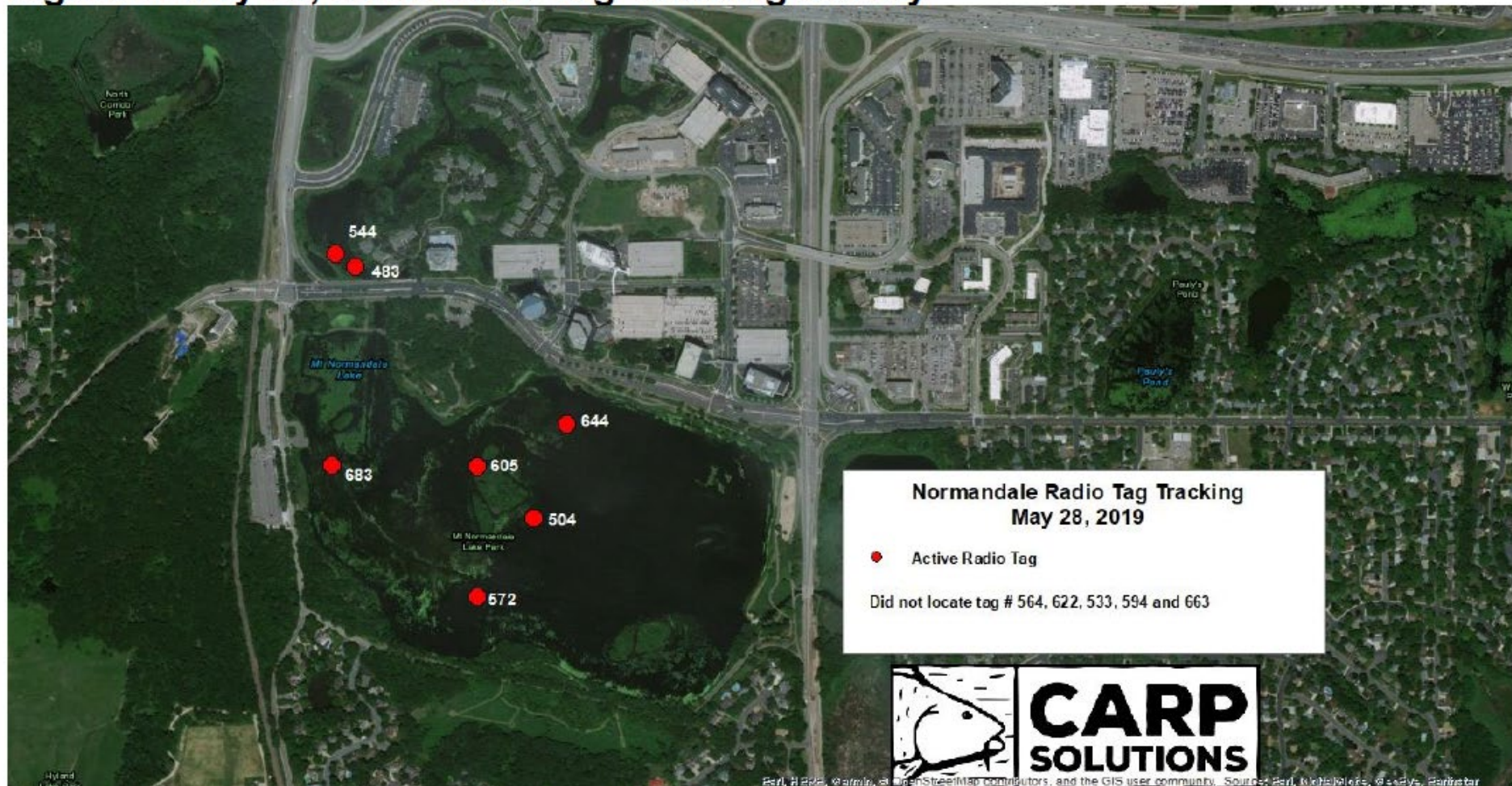
northern pike



# Carp Tracking

2019

Figure 2. May 28, 2019 Radio Tag Tracking Survey



**Normandale Radio Tag Tracking  
May 28, 2019**

● Active Radio Tag

Did not locate tag # 564, 622, 533, 594 and 663



**CARP  
SOLUTIONS**





# Questions?

[ninemilecreek.org/normandale](http://ninemilecreek.org/normandale)

Erica Sniegowski, NMCWD  
[esniegowski@ninemilecreek.org](mailto:esniegowski@ninemilecreek.org)

Janna Kieffer, Barr Engineering  
[jkieffer@barr.com](mailto:jkieffer@barr.com)



Normandale Lake, August 2019