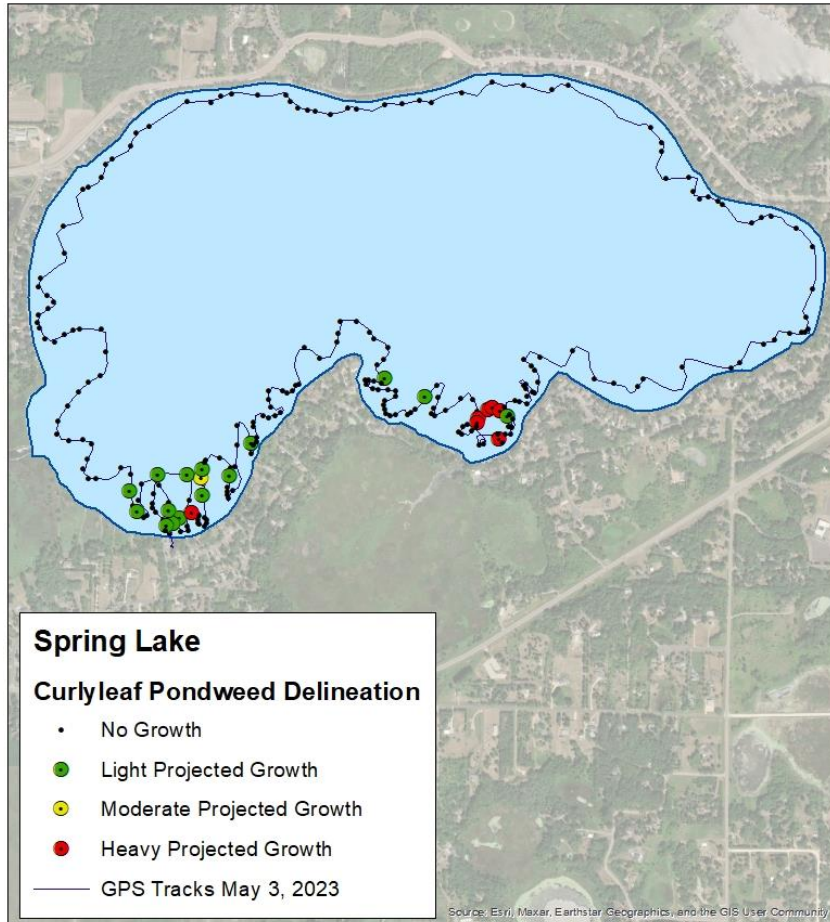
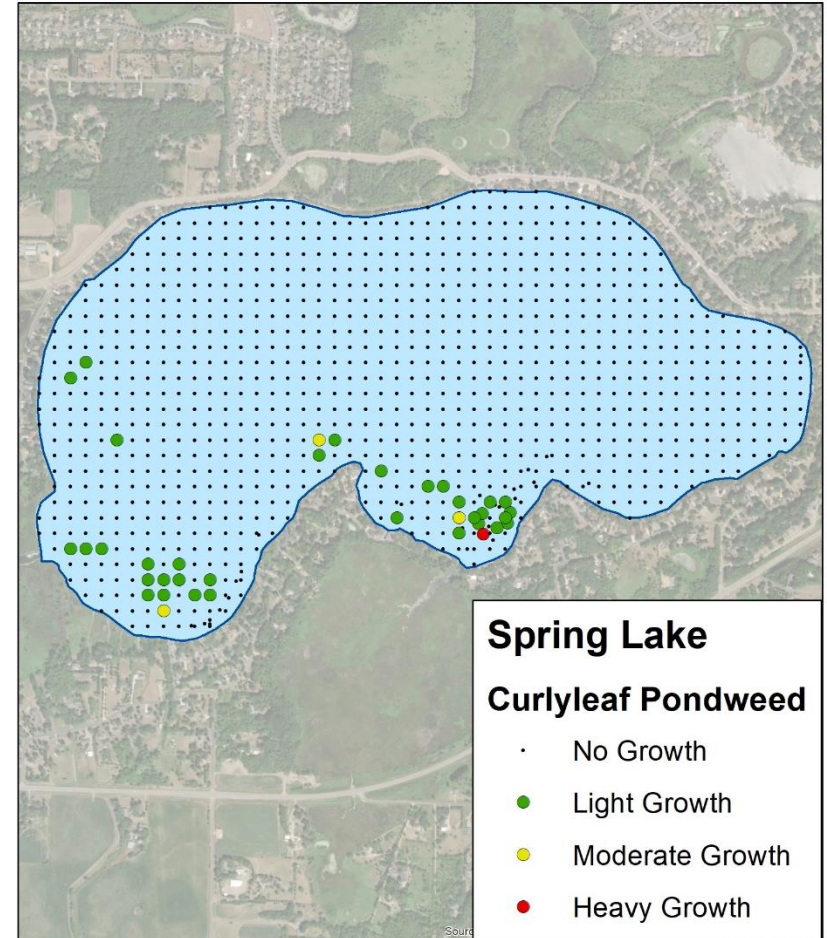


# **ALS Overview in Spring Lake**

# Spring Lake CLP in 2023



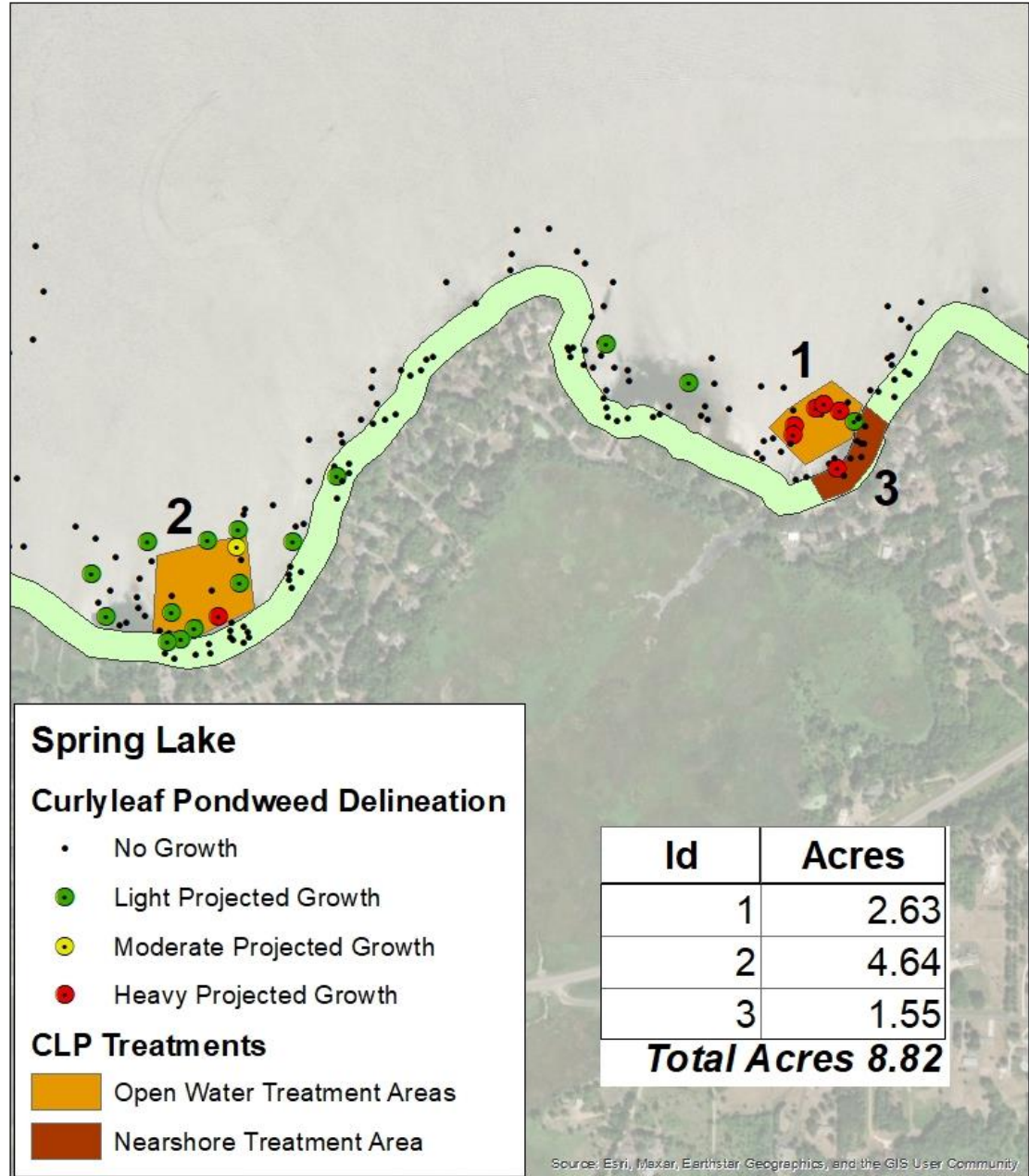
**May 3, 2023**



**June 6, 2023**

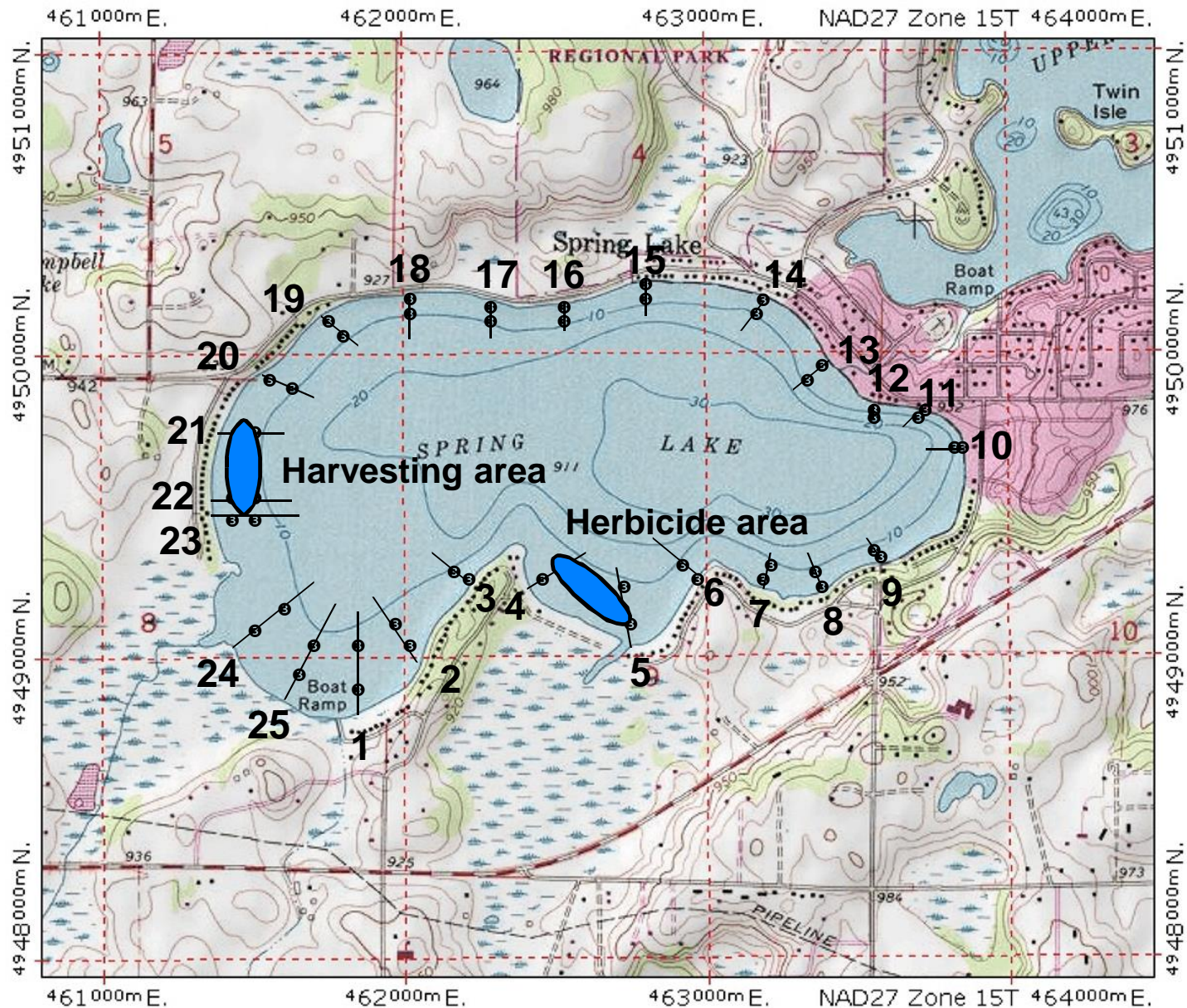
(good CLP control)

# Spring Lake CLP Treatment in 2023





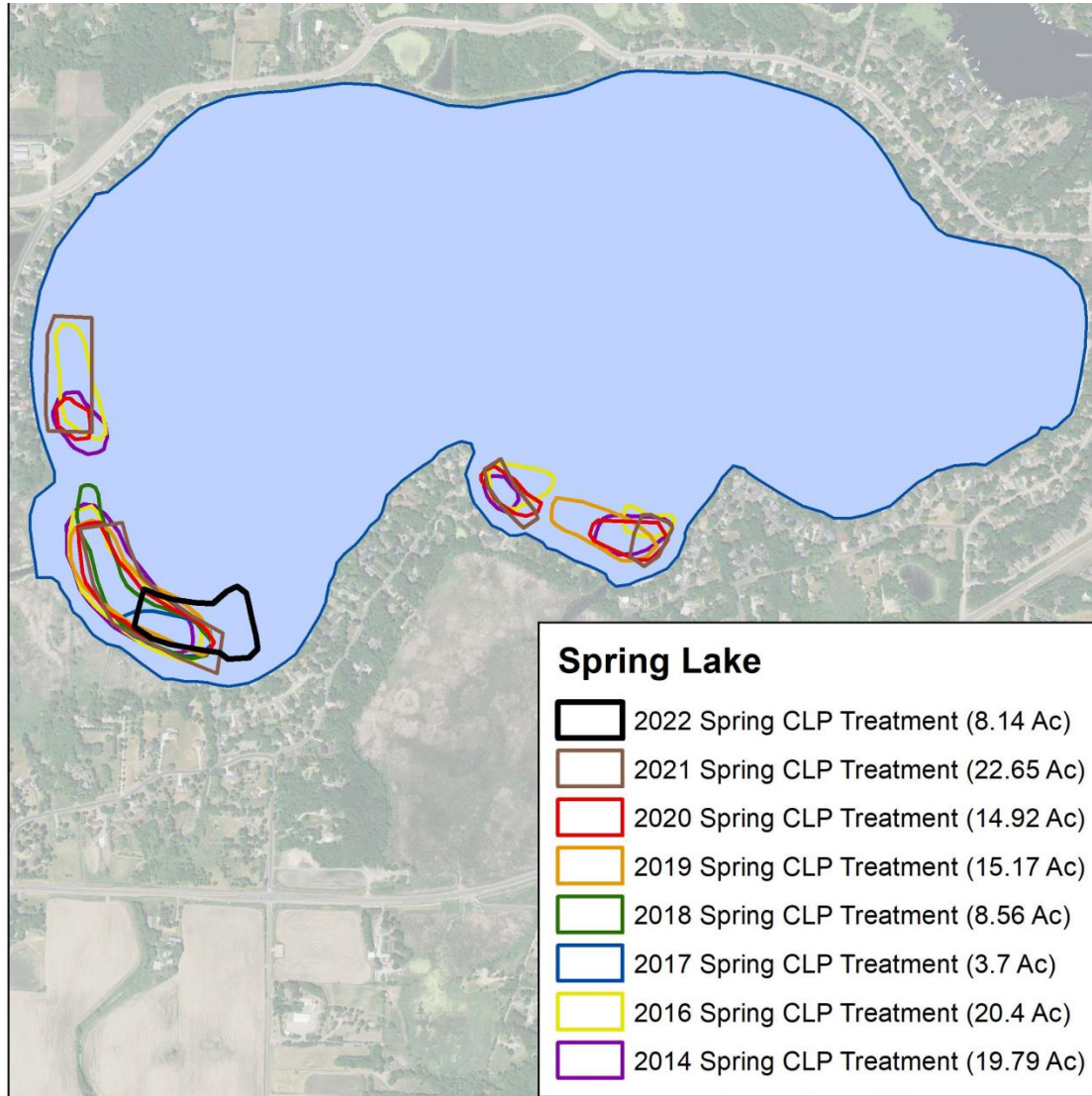
# Spring Lake: Treatments from 2002-2006



# Spring Lake

2007-2015: No CLP treatment  
2016-2022: Herbicides

CLP Hot  
Spot Map



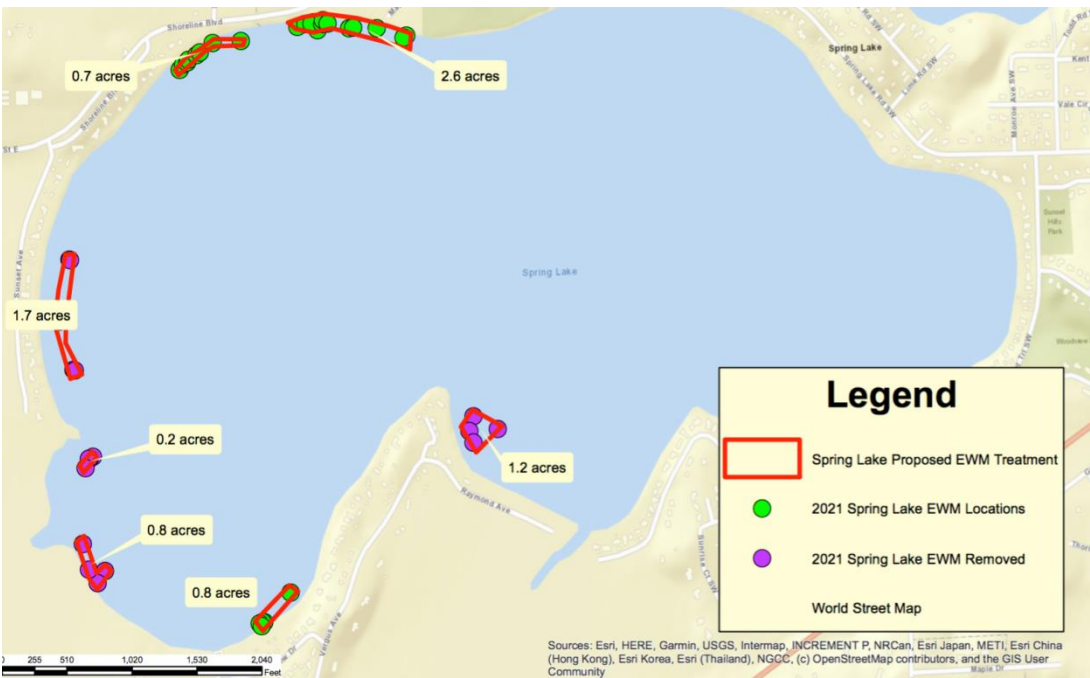
# Spring Lake CLP Treatment Summary

	Iron (kg)	CLP Occurrence	Curlyleaf Treatment (acres)
2000		49	
2001			
2002		43	14 + 60 (H)
2003		35	14 + 74 (H)
2004		40	59
2005	2,629	29	59
2006	895	32	59
2007	920	22	
2008	726	4	
2009	109	5	
2010		25	
2011	1,491	10	
2012		6	
2013	1,248 (J - A)	3	
2014	>4,547	10	
2015	2,800	10	
2016	4,206	11	20.4
2017	4,544	11	3.7
2018	3,656	4	
2019	3,675	29 (144 sites)	15.17
2020	3,453	62 (254 sites)	14.92
2021		55 (142 sites)	22.65
2022		16 (238 sites)	8.14
2023		31 (319 sites)	8.82



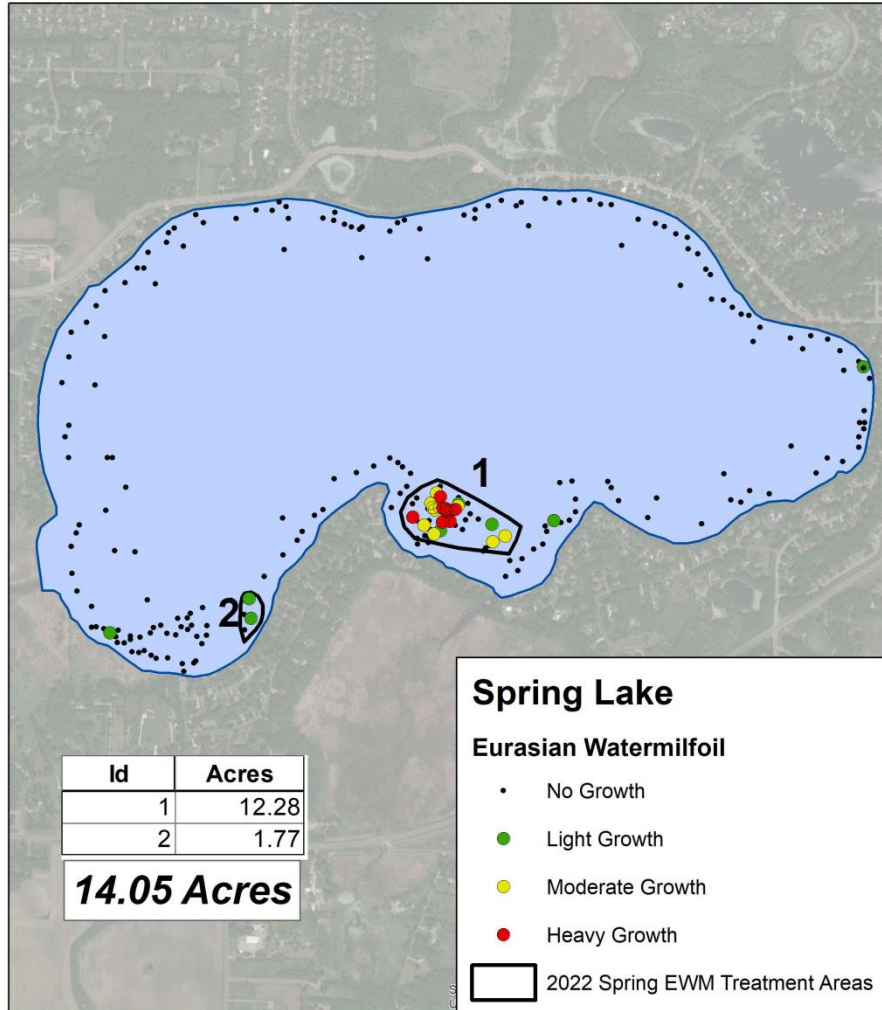
# Spring Lake - EWM

## New Observation in 2021

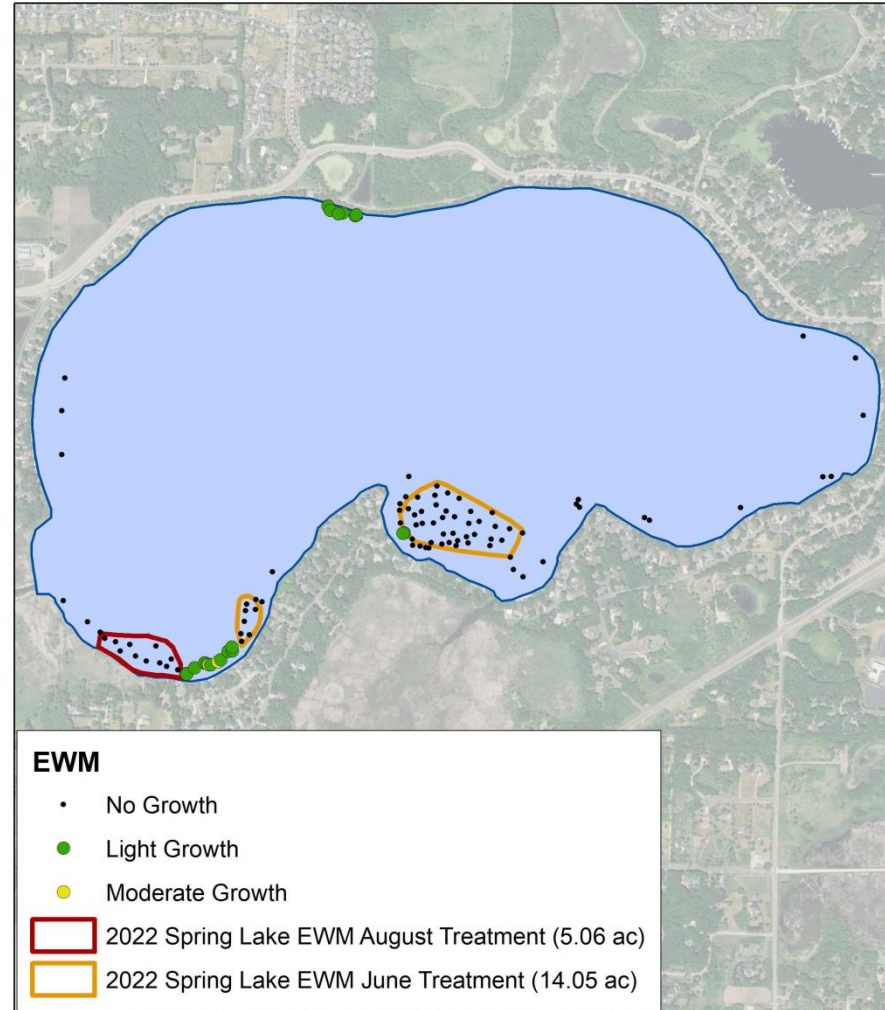


# Spring Lake – EWM in 2022

Spring Lake Eurasian Watermilfoil Growth  
June 8, 2022



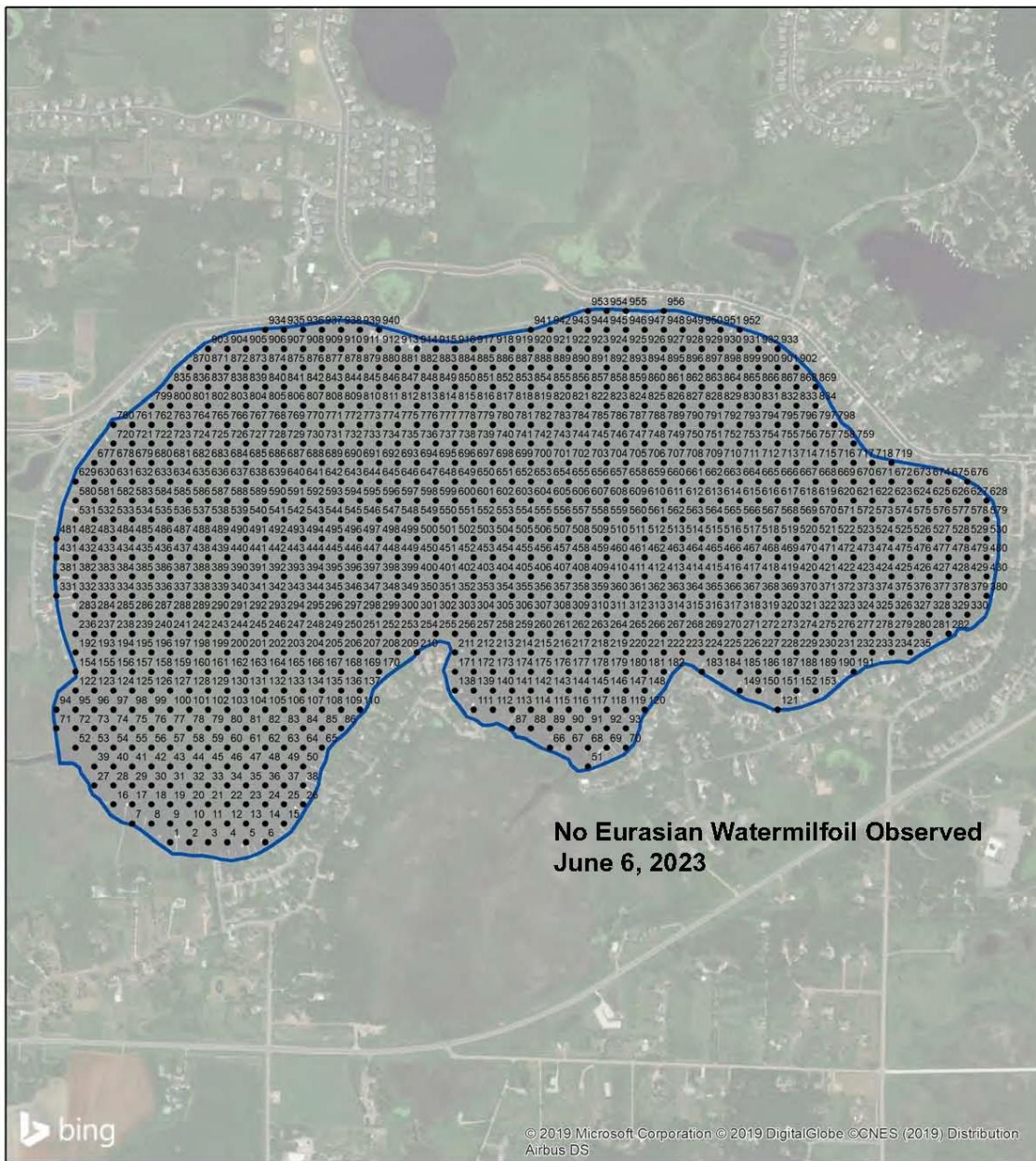
Spring Lake Eurasian Watermilfoil Growth  
September 16, 2022





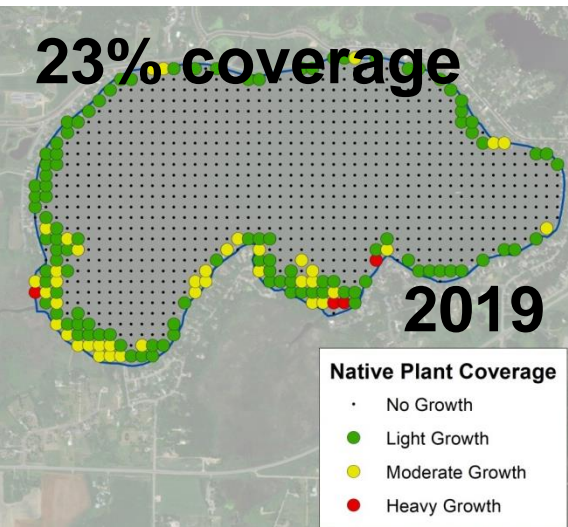
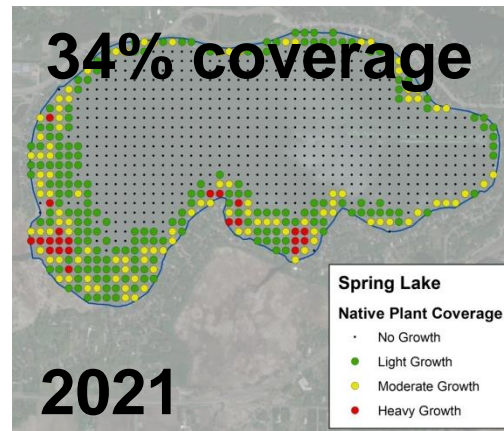
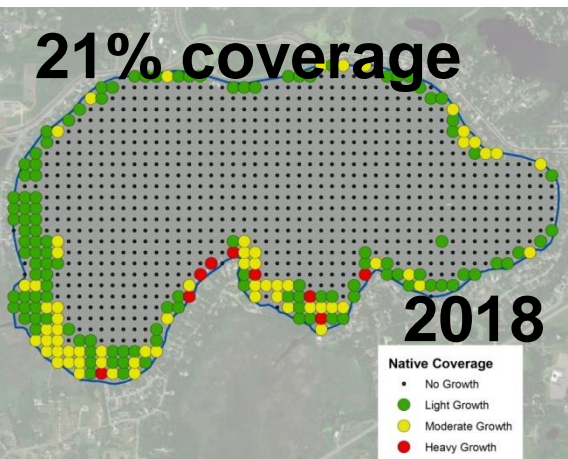
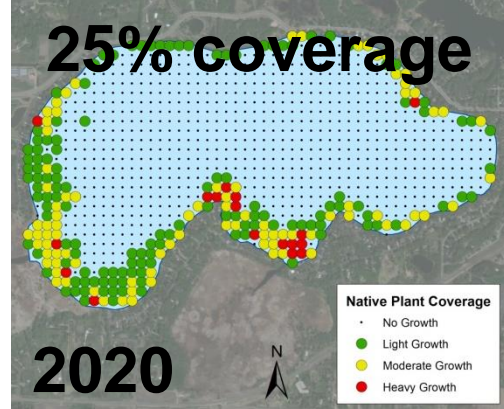
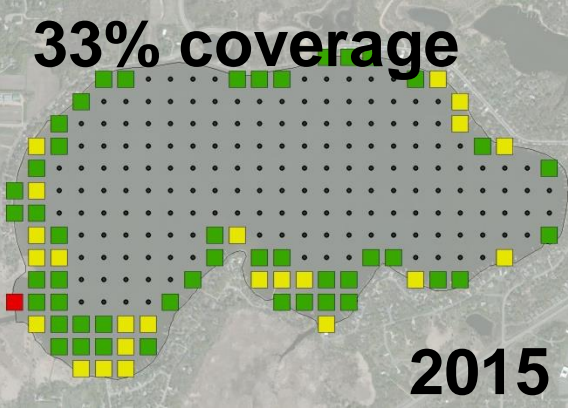
# Spring Lake Eurasian Watermilfoil Coverage June 6, 2023

# Spring Lake – EWM in 2023



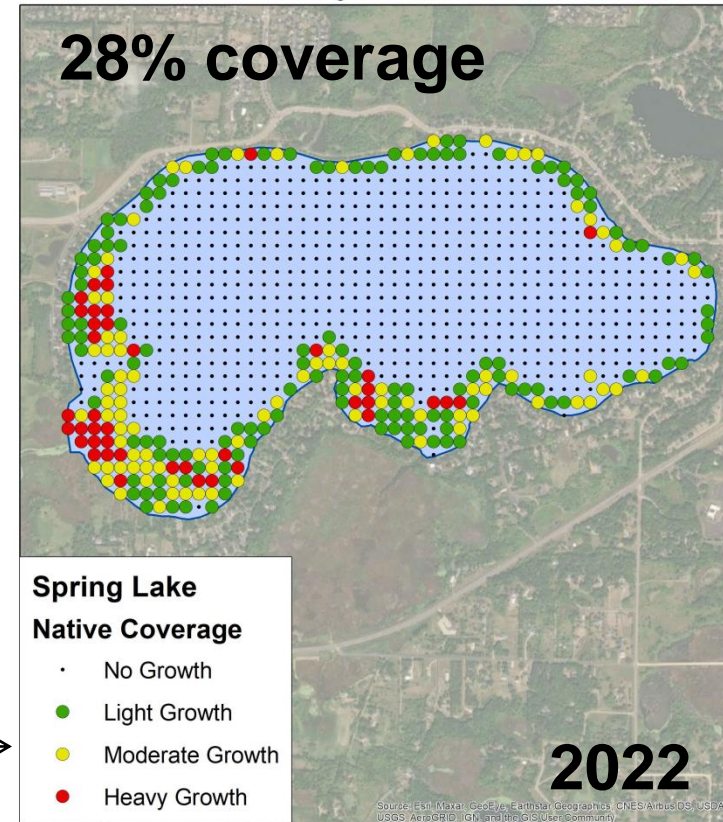


# Spring Lake Point Intercept Survey Summaries (592 ac)



↑ **Plant depth: 12 ft**

**Plant depth: 9 ft** →





# Spring Lake Point Intercept Survey

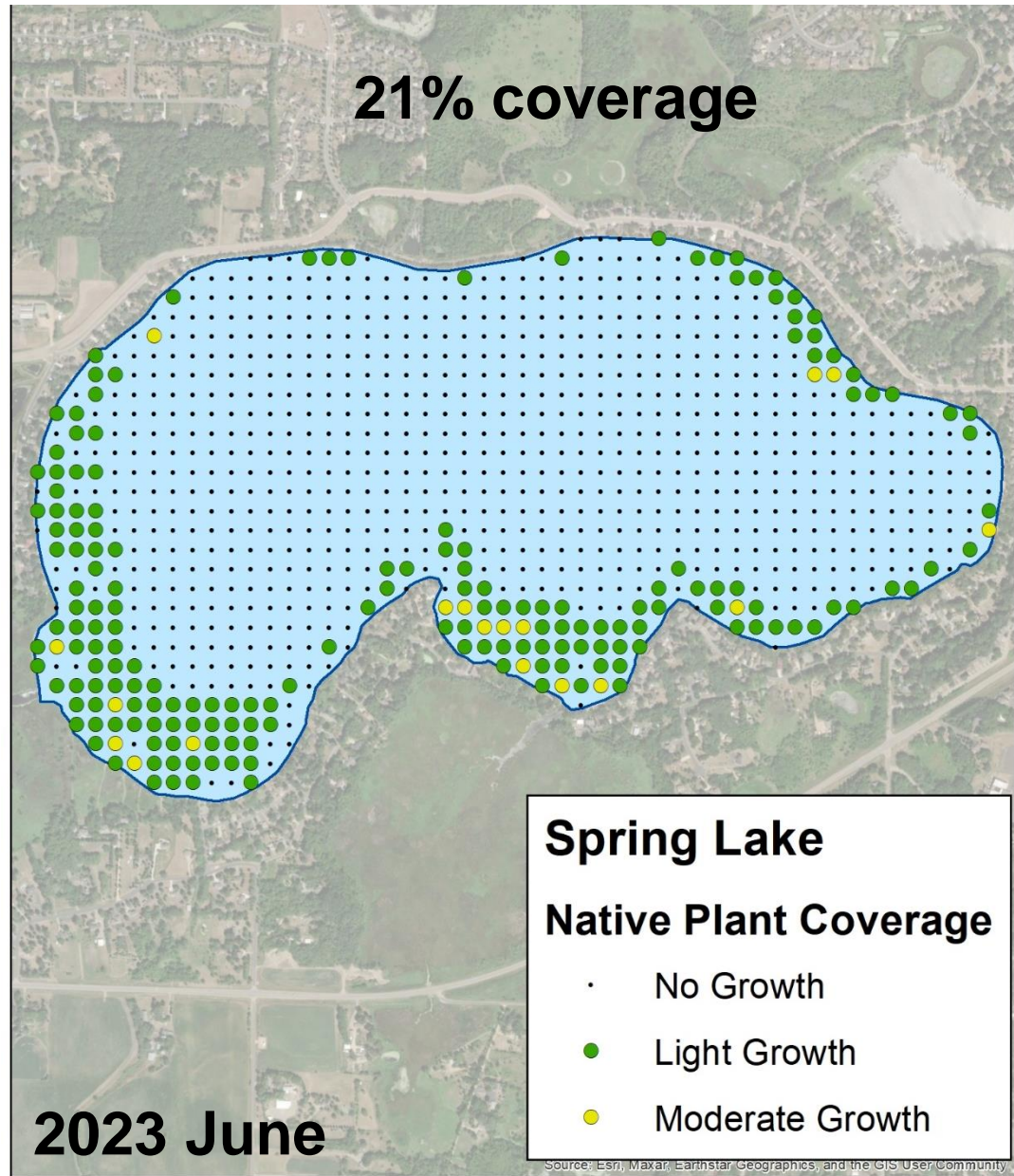
(592 ac)

June 6, 2023

Number of submerged  
species: 4

Dominant plant:  
Claspingleaf pondweed

Growing depth: 11 feet





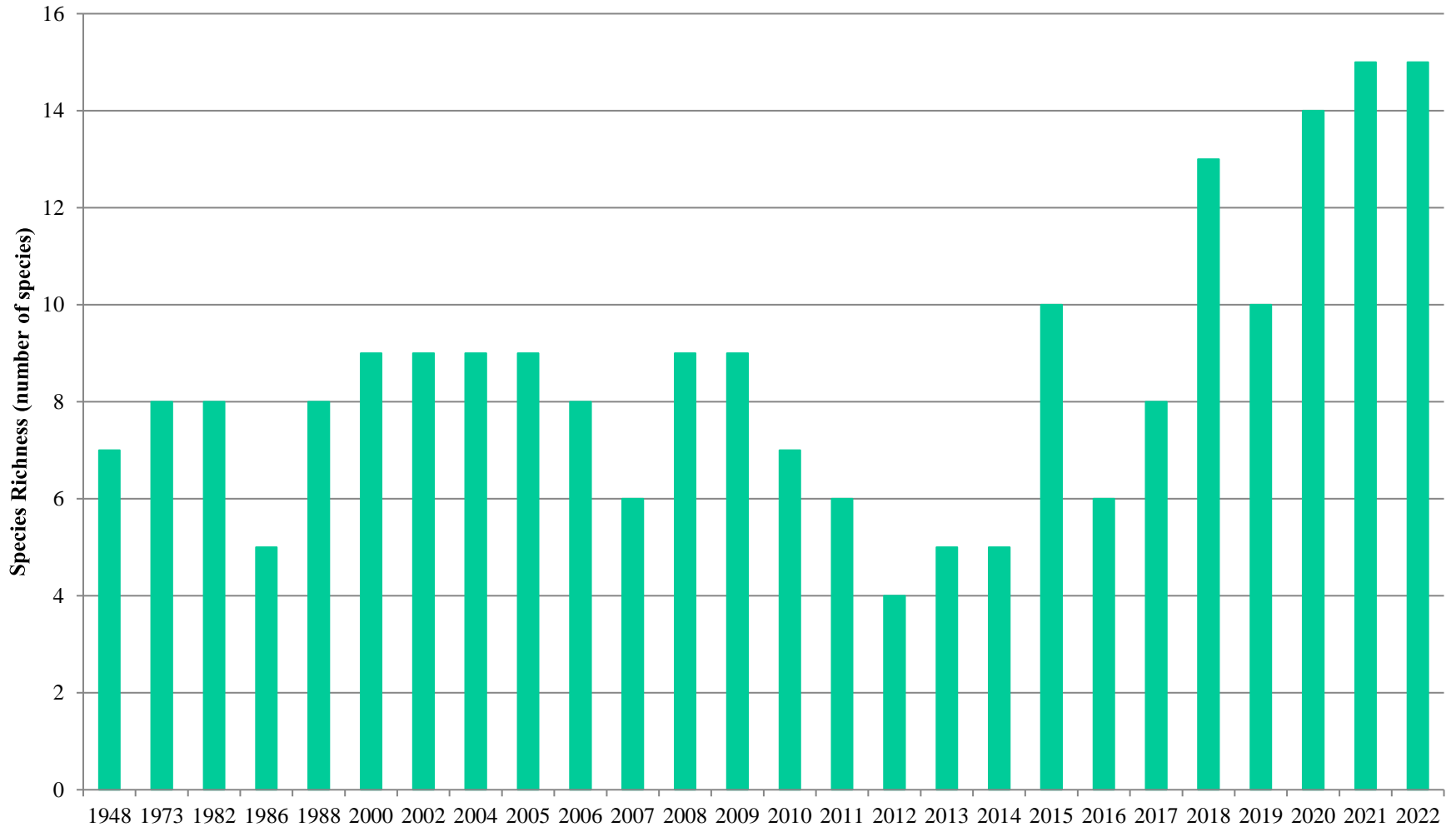
# Aquatic Plant Coverage

	Depth of Growth (ft)	Spring
2015	9	29%
2018	8	21%
2019	8	17%
2020	9	25%
2021	12	34%
2022	9	28%
2023*	11	21%

\*June survey

# Spring Lake

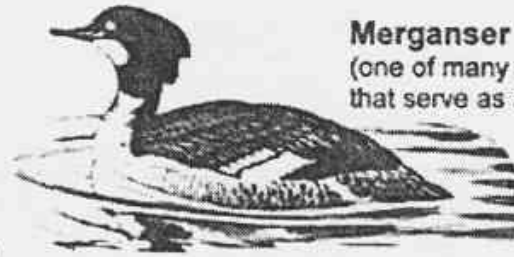
## Aquatic Plant Species Richness: 1948-2022



# Swimmer's itch



**Accidental Host**



**Merganser**  
(one of many duck species that serve as a host)

**Primary Host**  
Warm blooded duck.  
Adult flukes in blood system.

Fluke eggs leave with bird droppings, hatch into miracidia.

**Miracidium**  
(first larval stage)

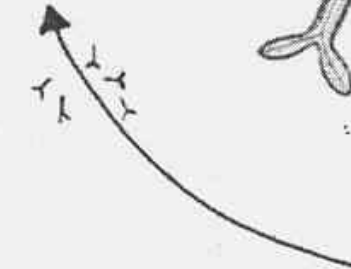
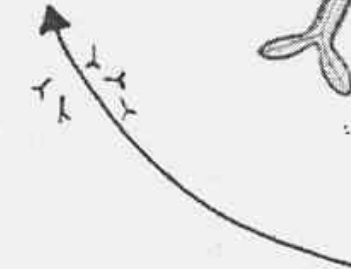
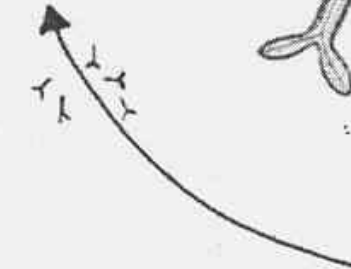
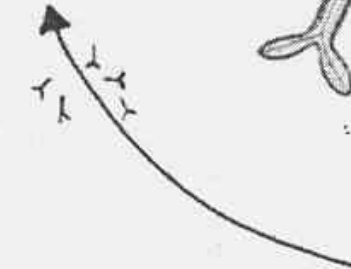
Invade snail.



*Lymnaea stagnalis*

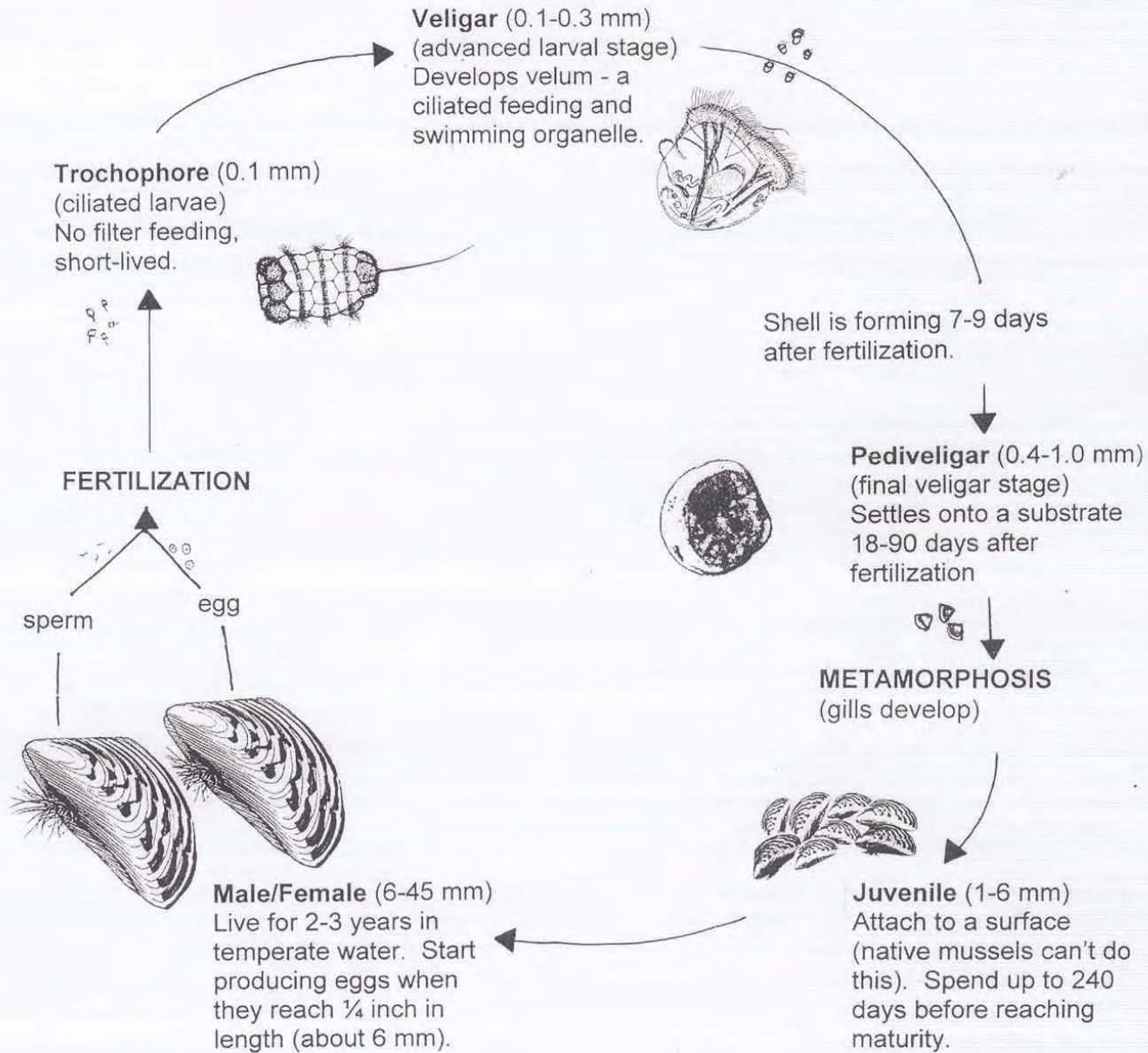
**Intermediate Host**  
(16 species of snails are known hosts).

**Cercariae**  
(advanced larval stage)  
Leave snail.





# Zebra Mussel Life Stages



# Spring Lake – CLP Growth Potential

## Spring Lake Curlyleaf Growth Potential Based on Lake Sediments

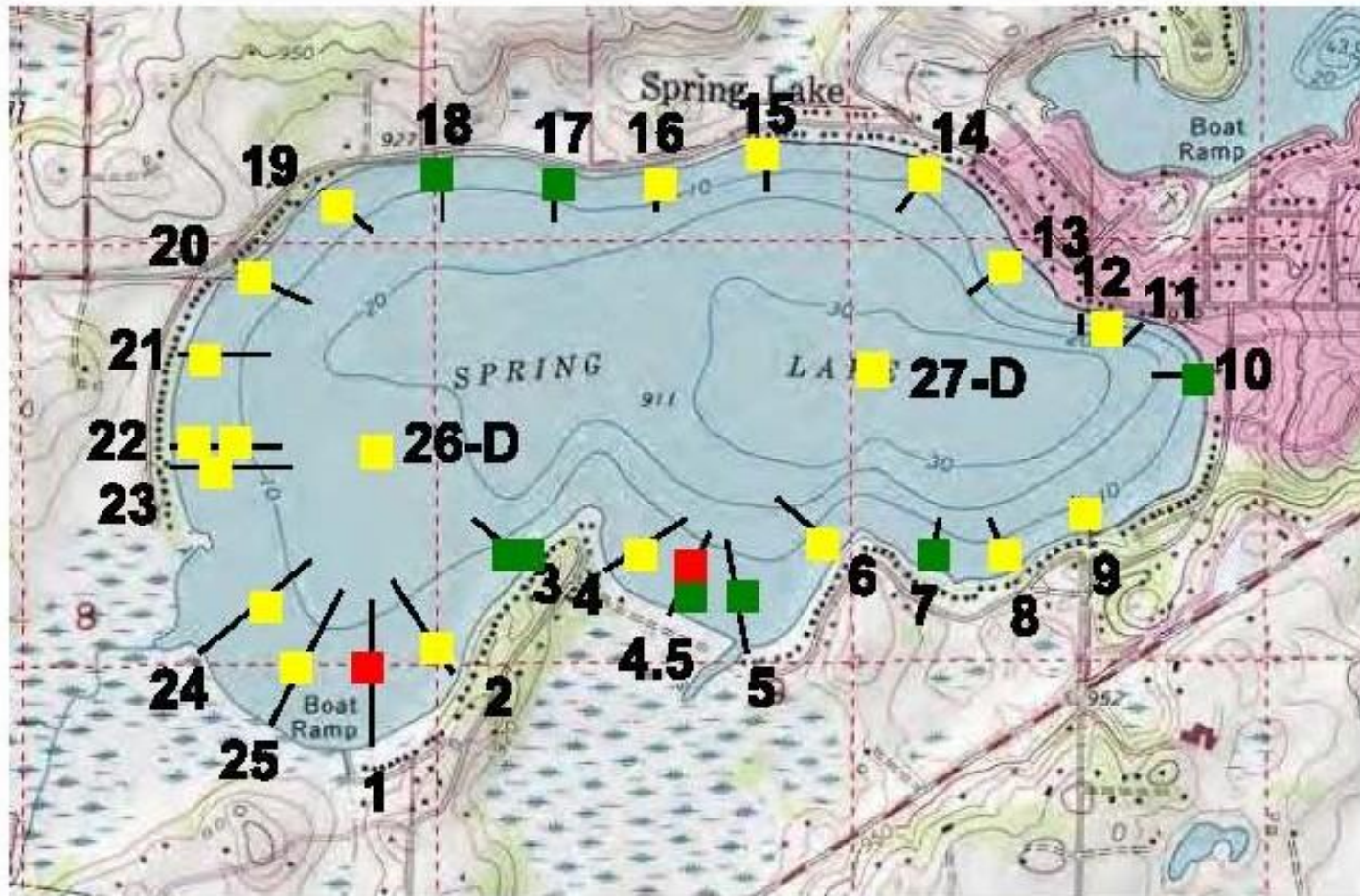


Figure 3. Sediment sample locations are shown with a square. The square color indicates the potential for nuisance curlyleaf pondweed to occur at that site. Key: green = low; yellow = medium; red = high potential



# Spring Lake – EWM Growth Potential

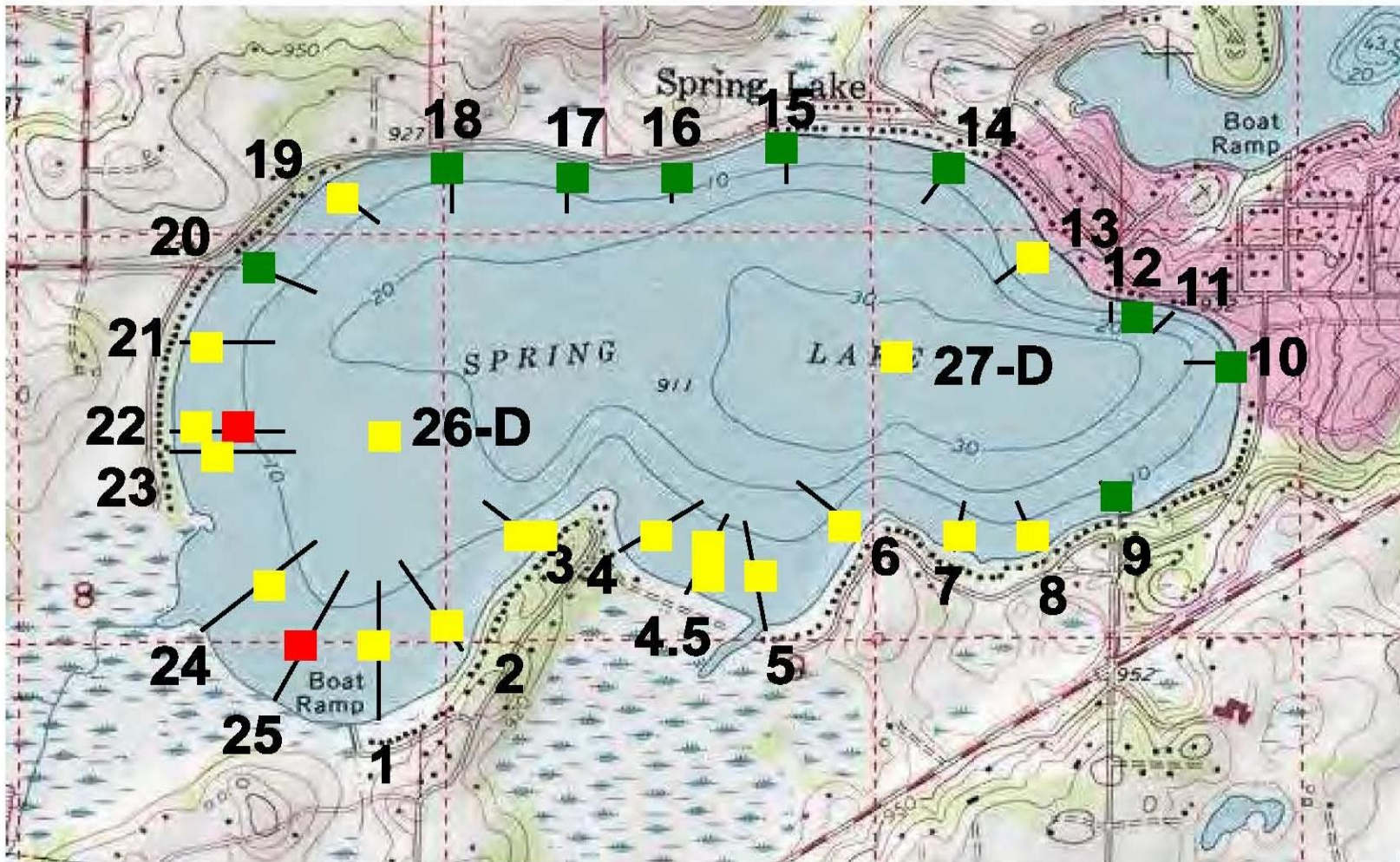


Figure 4. Sediment sample locations are shown with a square. The square color indicates the potential for nuisance Eurasian watermilfoil to occur at that site. Key: green = low; yellow = medium; red = high potential.



# Spring Lake – ZM Growth Potential

Spring Lake		Little Potential for Adult Survival	Little Potential for Larval Development	Moderate (survivable, but will not flourish)	High (favorable for optimal growth)
<b>Food Factors</b>					
Chlorophyll a (ug/l) (June-Sept)	PLSLWD	30			
	Mackie and Claudi 2010*	<2.5 or >25	2.0 - 2.5 or 20 - 25	8 - 20	2.5 - 8
Secchi depth (m) (June-Sept)	PLSLWD	1	1		
	Mackie and Claudi 2010	<1 or >8	1 - 2 or 6 - 8	4 - 6	2 - 4
Total phosphorus (ug/l) (June-Sept)	PLSLWD	50	50		
	Mackie and Claudi 2010	<5 or >50	5 - 10 or 35 - 50	10 - 25	25 - 35

\*Mackie, G.L. and R. Claudi. 2010. Monitoring and control of macrofouling mollusks in fresh water systems. Second Edition. CRC Press, Boca Raton, FL.