



Flowering Rush Flowerhead, Forest Lake, September 20, 2023

Flowering Rush Delineation, Treatment, and Assessment for Forest Lake, Washington County, Minnesota, 2023

Pre-Treatment Delineation: July 11, 2023

*Treatment: **July 26, 2023***

*Treatment: **August 15, 2023***

*Shoreline Treatment (test): **August 29, 2023***

Post Treatment Assessment: September 20, 2023

*Shoreline Treatment (entire shoreline): **September 27, 2023***

*Treatment - off shore: **October 10, 2023***

Prepared for:
Washington County and
Comfort Lake - Forest Lake
Watershed District



Prepared by:
Steve McComas
Blue Water Science

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Flowering Rush Delineation, Treatment, and Assessment For Forest Lake, Washington County, Minnesota, 2023

Summary

Several flowering rush treatments occurred in 2023. On July 11, 2023, a flowering rush delineation found 84 sites of flowering rush covering about 0.24 acres. A diquat and Cide-kick application on July 26, 2023 was for spot treatment of small individual patches as well as for patches that were grouped closely together. A spot treatment with diquat and Cide-kick occurred on August 15, 2023 on 4.5 acres and another spot treatment with diquat on 1.0 acre occurred on August 29, 2023.

A flowering rush assessment and new delineation survey were conducted on September 20, 2023 and new flowering rush sprouting was found at 160 sites with an estimated area of flowering rush coverage of 0.78 acres. Treatment using diquat was conducted on September 27, 2023 on 1.34 acres and a treatment using diquat and Cide-kick was conducted on October 10, 2023 on 4.5 acres.

In Forest Lake, the total area of flowering rush has decreased from 7.8 acres in 2014 to 0.78 acres in September of 2023 indicating the flowering rush control program is reducing the distribution and density of flowering rush (Figure 1). Although the estimated total area of flowering rush was around 0.78 acres in September of 2023, flowering rush regrowth is expected in 2024. Continuing to control areas of flowering rush should reduce abundant regrowth but it appears eradication will be a challenge.

The steps for controlling flowering rush in the next few years include the following three methods.

1. Treat large continuous patches of flowering rush with diquat and spot treat small patches.
2. Treating small patches should occur 2 or 3 times/season.
3. Continue to remove flowerheads before seeds are produced which should help reduce new sites of flowering rush colonization.

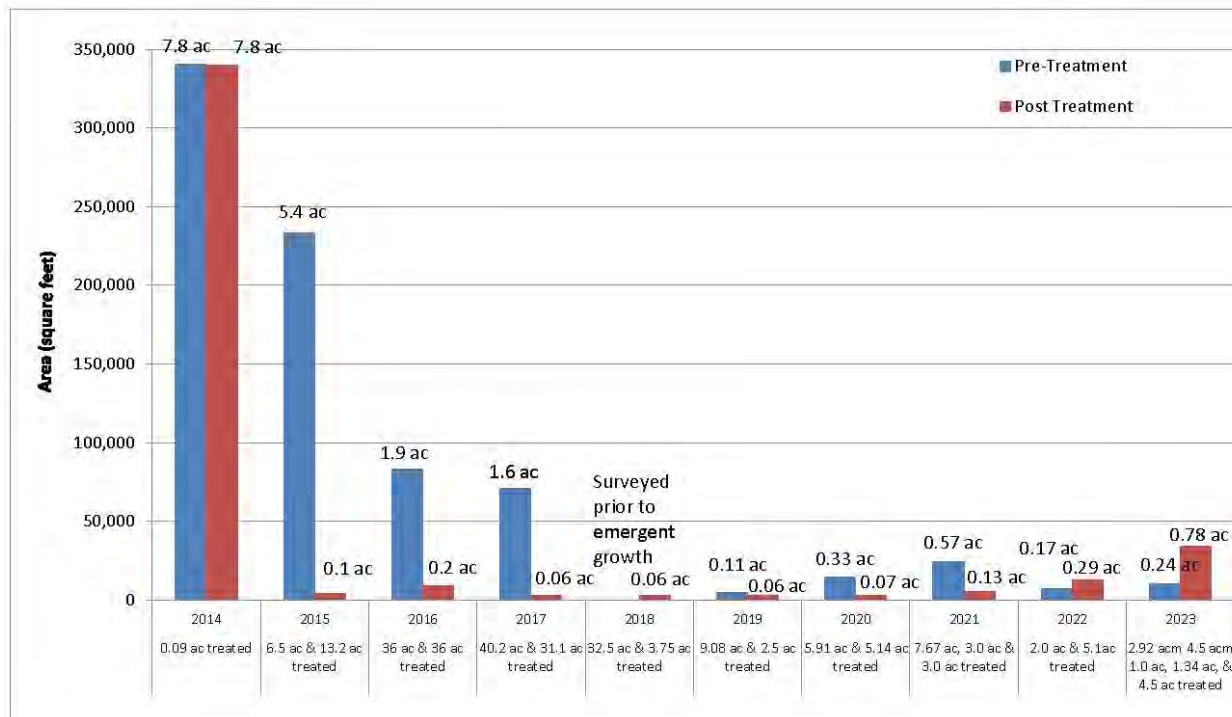
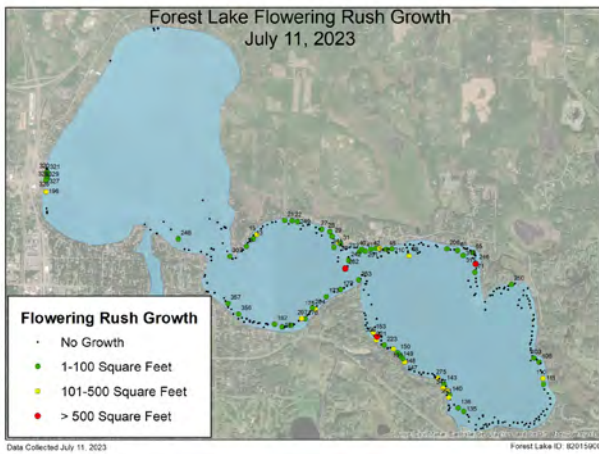


Figure 1. Flowering rush areas from 2014 through 2023 for pre-treatment and post treatment conditions.

Flowering Rush Delineation and Treatments in 2023



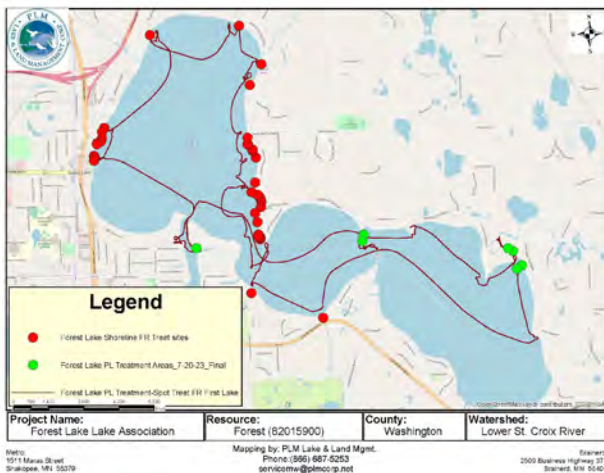
July 11: Delineation



July 26: Treatment - 2.92 ac
(Diquat and Cide-kick)



August 15: Treatment - 4.5 ac
(Diquat and Cide-kick)



August 29: Treatment - 1.0 ac
(Diquat)



September 20: Delineation



September 27: Treatment - 1.34 ac (Diquat)



October 10: Treatment - 4.50 ac (Diquat and Cide-kick)

Overview of Flowering Rush Delineations, Treatments, and Assessments for Forest Lake, in 2023

Project Approach: Flowering rush (*Butomus umbellatus*) is an invasive species and is actively expanding in the United States. It has spread from a limited area around the Great Lakes and the St. Lawrence river to sporadic appearances in the northern U.S. and southern Canada. Populations in the eastern U.S. produce seeds. Only one Minnesota population (Forest Lake, Washington County) produces viable seeds. Otherwise, flowering rush reproduces by vegetative spread from its rootstock in the form of rhizome buds. Both seeds and rhizome buds are dispersed by water current.

A management and control program for flowering rush in Forest Lake was initiated in 2014 and has continued through 2023.

For the delineation and assessment of Forest Lake flowering rush, 2 observers in a boat traveled the entire lake nearshore area and searched for emergent flowering rush stems. A record of the occurrence of all flowering rush sites since 2014 has been recorded by GPS and was placed on the lake map of the Lowrance HDS7 sonar unit. During the survey, a flowering rush occurrence was either associated with a previous point or was assigned a new GPS point if it had not previously been observed at that location. For each flowering rush observation site, an estimated square footage of emergent growth was recorded.

July 11, 2023 - Delineation

- A total of 84 flowering rush sites were observed.
- Over 300 patches of flowering rush were observed.
- A total area of flowering rush was estimated at 10,470 square feet (0.24 acres)
- At least 20 sites had flowers present.

July 26, August 15, August 29 - Flowering Rush Treatments

September 20, 2023

- A total of 160 flowering rush sites were observed.
- Over 1,000 patches of flowering rush were observed.
- A total area of flowering rush was estimated at 33,895 square feet (0.78 acres)
- At least 20 sites had flowers present.

September 27 and October 10 - Flowering Rush Treatments

Table 1. Summary of delineations and herbicide treatments for flowering rush.

	Delineations		Treatment		
	Flowering Rush Sites	Total Area	Diquat*		Cide-kick**
			(acres)	(gal/ac)	(gal/ac)
July 11	84	0.24 ac			
July 26			2.92	2.0	0.137
August 15			4.5	1.0	0.44
August 29			1.0	1.0	
September 20	160	0.78 ac			
September 27			1.34	0.7	
October 10			4.50	0.56	0.11

*Diquat - brand name was Tribune

**Cide-kick: an adjuvant that breaks down the waxy cuticle on a leaf surface to allow more effective herbicide uptake

Review of Flowering Rush Treatments and Results for 2014-2023

A summary of flowering rush treatments and results over the previous 10 years are shown in Table 2. Flowering rush has decreased from 7.8 acres in 2014 to 0.78 acres in September of 2023 roughly, a decrease of about 90% from 2014. Regrowth has occurred at a number of persistent areas located in 2nd and 3rd lakes since 2014.

At the end September of 2023, there were a total of 160 flowering rush sites identified before the October treatment. Often a flowering rush site is only 10 stems or less. Although large beds of flowering rush of over 1,000 square feet occur, they are rarely found after the second treatment.

Although a total of 459 flowering rush sites have been identified over the last 10 years, only 20% of the sites had flowering rush growth in the July 11, 2023 delineation survey.

It appears flowering rush does not sprout every year at every site, however, it apparently continues to produce new growth at new sites as the summer progresses. Therefore a delineation in July will not delineate all the flowering rush for the summer. New growth will occur in August and September.

Although new flowering rush sites are found annually, the number of new flowering rush sites per year has averaged 36 sites per year for 2017-2023. The number of new sites found annually have decreased since flowering rush flowerheads have been removed from 2017-2023. Prior to flower and seedhead removal, new flowering rush sites averaged 52 new sites per year in 2015 and 2016.

Table 2. Summary of flowering rush sites and areas for 2014-2023.

	All Known Flowering Rush Sites at Start of the Year	New Sites	Total Known Flowering Rush Sites	Flowering Rush Sites with Plants		Flowering Rush (acres)		Average Size of Flowering Rush Patch (square feet)		Percent of All Previously Recorded Sites with Flowering Rush		Acres of Flowering Rush Treated per Application	Total Acres Treated
				start	end	start	end	start	end	start	end		
2014	--	--	142	--	142	7.8	7.8	--	2393	--	100%	0.9 ac	0.9
2015	142	72	214	107	120	5.4	0.1	2198	36	75%	56%	13.2 ac (2 times)	26.4
2016	214	32	246	182	81	1.9	0.2	455	107	87%	33%	36 ac (2 times)	72.0
2017	246	4	250	159	15	1.6	0.06	438	174	65%	1%	40.2 ac and 30.1 ac	70.3
2018	250	ND	250	ND	108	ND	0.06	ND	24	ND	43%	32.5 ac and 3.8 ac	36.3
2019	250	37	287	83	76	0.11	0.06	58	34	33%	27%	9.1 ac and 2.5 ac	11.6
2020	287	24	311	145	53	0.33	0.07	100	53	47%	17%	5.91 ac and 5.14 ac	11.1
2021	311	62	373	75	65	0.57	0.13	329	88	20%	17%	7.67 ac, 3.0 ac, 3.0 ac	13.7
2022	373	36	409	35	25	0.17	0.29	206	530	9%	3%	2.0 ac, 5.1 ac	7.1
2023	409	50	459	84	160*	0.24	0.78*	132	297*	20%	35%	8.4 ac, 5.8 ac	14.26

*160 flowering rush sites and average from September 27, 2023, prior to the last October 10, 2023 treatment.

Flowering Rush Response to Treatments from 2014-2023

Summary of flowering rush areas before and after treatments for 2014 through 2023 are shown in Tables 3 and 4.

Table 3. Summary of flowering rush treatments and resulting flowering rush remaining at the end of the summer from 2014-2023.

	Initial Flowering Rush Area (acres)	TREATMENTS						End of Season		
		1 st Treatment (ac)	2 nd Treatment (ac)	3 rd Treatment (ac)	4 th Treatment (ac)	5 th Treatment (ac)	Total Acres Treated	Flowering Rush Area (acres)	Flowering Rush Sites	Flowering Rush Average Individual Size (sf)
2014	7.8	0.09	--				0.09	7.8*	142	2,392
2015	5.4	6.5	13.2				19.7	0.1	120	37
2016	1.9	36	36				72	0.2	81	113
2017	1.6	40.2	31.1				71.3	0.06**	15	177**
2018	no emergent FR	32.5	3.75				36.25	0.06	108	25
2019	0.11	9.08	2.5				11.58	0.06	76	37
2020	0.33	5.91	5.14				11.05	0.07	53	60
2021	0.57	7.67	3.0	3.0			13.67	0.13	65	87
2022	0.17	2.0	5.1				7.1	0.29	25	530
2023	0.24	2.92	4.5	1.0	1.34	4.50	14.26	0.78	160	297

*Treatment was a trial on a small area to test herbicide effectiveness.

**One flowering rush bed in 3rd lake was 2,000 sf (0.05 ac) which accounted for much of the FR acreage in 2017.

Table 4. Summary of flowering rush sites and areas for 2014 through 2023.

Total Sites	1 st Lake		2 nd Lake		3 rd Lake		Total	
	Number of sites with plants	Area (sf)	Number of sites with plants	Area (sf)	Number of sites with plants	Area (sf)	Number of sites with plants	Area (sf)
July 22, 2014 (Delineation)	0	0	34	3,750	--	336,990 (estimated based on Oct 8 survey)	34+ (not including 3 rd lake)	340,740 (estimated) (7.8 ac)
2 nd Lake was treated with diquat on 0.09 ac on September 9, 2014								
October 8, 2014 (Assessment)	0	0	26	3,135	116	336,990	142	340,125 (7.8 ac)
July 17, 2015 (Delineation)	0	0	22	2,360	85	230,939	107	233,299 (5.4 ac)
2 nd and 3 rd Lakes were treated by cutting in July and August; 3 rd Lake treated with diquat twice in August, 2015 (13.2 ac)								
September 28, 2015 (Assessment)	11	170	20	237	88	4,004	120	4,411 (0.1 ac)
(new sites compared to 2014)	(11)	--	(13)	--	(25)	--	(49)	--
July 14 and 15, 2016 (Delineation)	4	100	46	33,000	132	50,000	182	83,189 (1.9 ac)
2 nd and 3 rd Lakes were treated with diquat twice in August, 2016 (36 ac)								
September 21, 2016 (Assessment)	0	0	21	305	60	8,818	81	9,183 (0.2 ac)
(new sites compared to 2015)	(0)	--	(0)	--	(3)	--	(3)	--
August 1, 2017 (Delineation)	4	170	37	1,735	118	69,190	159	71,095 (1.6 ac)
2 nd and 3 rd Lakes were treated with diquat twice, once in August (40.2) and once in September, 2017 (30.1 ac)								
October 23, 2017 (Assessment)	1	20	4	150	10	2,485	15	2,655 (0.06 ac)
(new sites compared to 2016)	(1)	--	(1)	--	(5)	--	(7)	--
July 5, 2018 (Pre-treatment survey)	no emergent plants observed	--	no emergent plants observed	--	no emergent plants observed	--	no emergent plants observed	--
12 areas, delineated in 2017 totaling 32.5 acres were treated with diquat on July 13, 2018.								
July 25, 2018 (Survey)	0	0	73	2,540	54	1,280	127	3,820 (0.09 ac)
Spot treatment of 125 patches totaling 3.75 acres on August 21, 2018.								
September 19, 2018 (Post treatment assessment)	0	0	54	1,160	54	1,566	108	2,726 (0.06 ac)
July 9, 2019 (Pre-treatment survey)	4		34		43		83 (13 new)	4,990 (0.11 ac)
9.1 acres plus spot treatments on July 31, 2019								
August 12, 2019 (Survey)	11		26				105 (17 new)	18,505 (0.42 ac)
Spot treatment of 105 patches totaling 2.5 acres on August 30, 2019.								
September 30, 2019 (Post treatment assessment)	1		21		54		76 (7 new)	2,790 (0.06 ac)
(new sites compared to 2018)	(5)	--	(22)	--	(10)	--	(37)	--
July 21, 2020 (Pre-treatment survey)	7		44		94		145 (21 new)	14,562 (0.33 ac)
5.91 acres plus spot treatments on August 6, 2020.								
August 26, 2020 (Survey)	5		43		83		131 (0 new)	26,330 (0.60 ac)
5.14 ac spot treatments on September 2, 2020								
October 12, 2020 (Post treatment assessment)	0		7		46		53 (3 new)	3,200 (0.07 ac)
(new sites compared to 2019)	(3)	--	(10)	--	(11)	--	(24)	--
7.67 acres plus spot treatments on July 26, 2021.								

Table 4. Summary of flowering rush sites and areas for 2014 through 2023.

Total Sites	1 st Lake		2 nd Lake		3 rd Lake		Total	
	Number of sites with plants	Area (sf)	Number of sites with plants	Area (sf)	Number of sites with plants	Area (sf)	Number of sites with plants	Area (sf)
July 27, 2021 (Pre-treatment survey)	4	1,640	20	1,295	53	2,190	75 (14 new)	24,695 (0.57 ac)
3.0 acres of spot treatments on August 13, 2021.								
September 9, 2021 (Survey)	26	1,923	26	4,540	51	14,169	98 (46 new)	19,082 (0.44 ac)
3.0 ac of spot treatments on September 13, 2021.								
October 18, 2021 (Post treatment assessment)	11	825	19	1,490	35	3,415	65 (2 new)	5,695 (0.13 ac)
(new sites compared to 2020)	(18)	--	(29 less)	--	(84 less)	--	(62)	--
July 12, 2022 (Pre-treatment survey)	3	240	8	920	24	6,065	35 (4 new)	7,225 (0.17 ac)
0.17 acres of spot treatments on July 29, 2022.								
August 9, 2022 (Survey)							157 (32 new)	24,868 (0.57 ac)
0.57 ac of spot treatments September, 2022.								
October 18, 2022 (Post treatment assessment)							25 (0 new)	12,720 (0.29 ac)
(new sites compared to 2021)							(36)	--
July 11, 2023 (Pre-treatment survey)							84	10,470 (0.24 ac)
2.92 ac of spot treatments on July 26, 2023.								
4.5 ac of spot treatments on August 15, 2023.								
1.0 ac of spot treatments on August 29, 2023.								
September 20, 2023 (Post treatment assessment)							160	33,895 (0.78 ac)
1.34 ac of spot treatments on September 27, 2023.								
4.50 ac of spot treatments on October 10, 2023.								
(new sites compared to 2022)							(50)	--

Flowering Rush Status After Final Treatments from 2014-2023

At the middle of October 2023, the area of flowering rush was about 90% less compared to 2014. The number of sites, usually less than 88 square feet per site, also declined slightly compared to 2014. Maps of flowering rush assessments for 2014-2023 are shown in Figure 2.

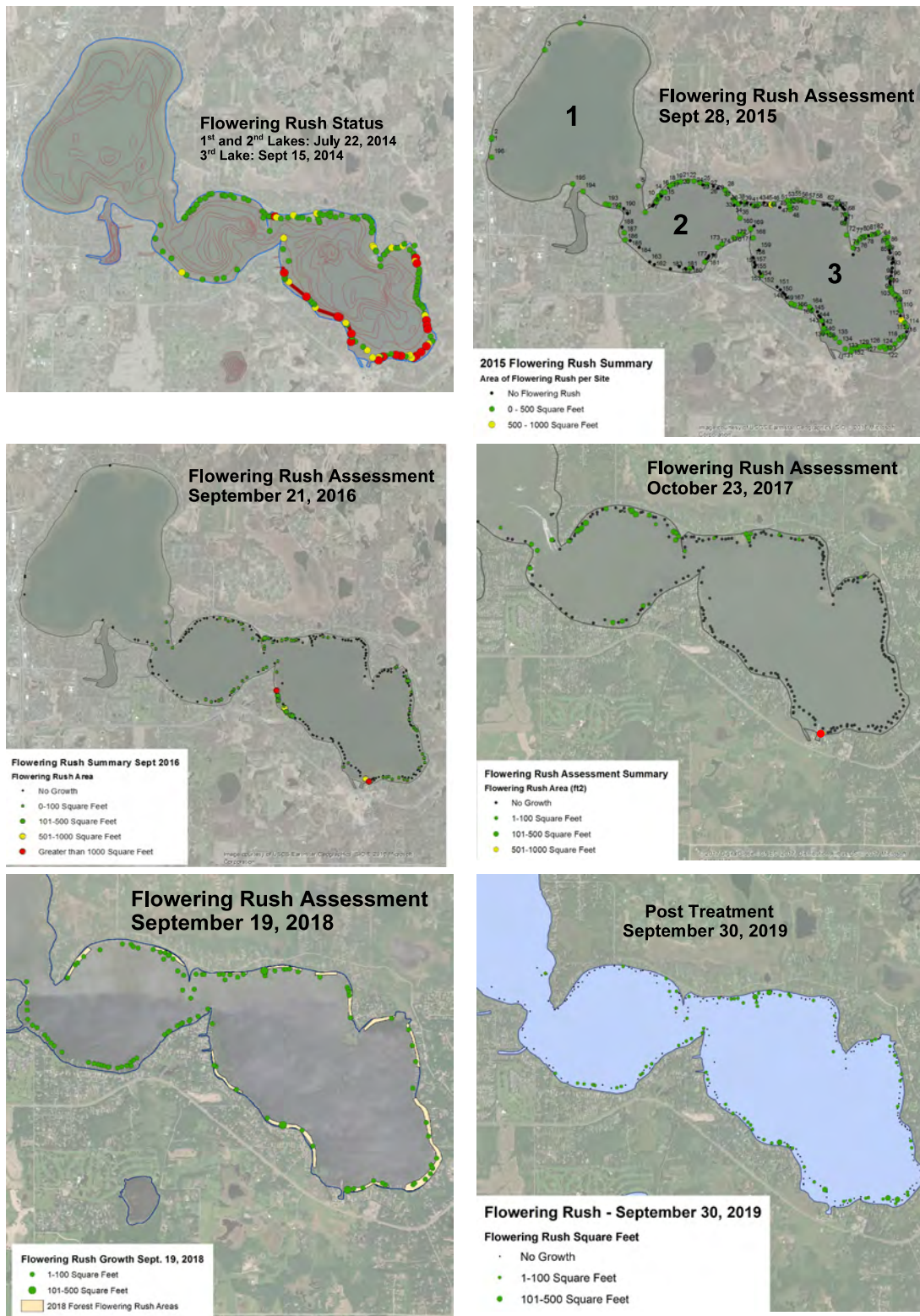


Figure 2. Estimated flowering rush coverage. [top-left] Sept 2014: 340,125 square feet (sf)(only 0.09 acres were treated). [top-right] Sept 2015: 4,411 sf. [middle-left] Sept 2016: 9,183 sf. [middle-right] October 2017: 2,655 sf. [bottom-left] Sept 2018: 2,726 sf. [bottom-right] Sept 2019: 2,790 sf.

Flowering Rush Status After Final Treatments from 2014-2023 (Concluded)

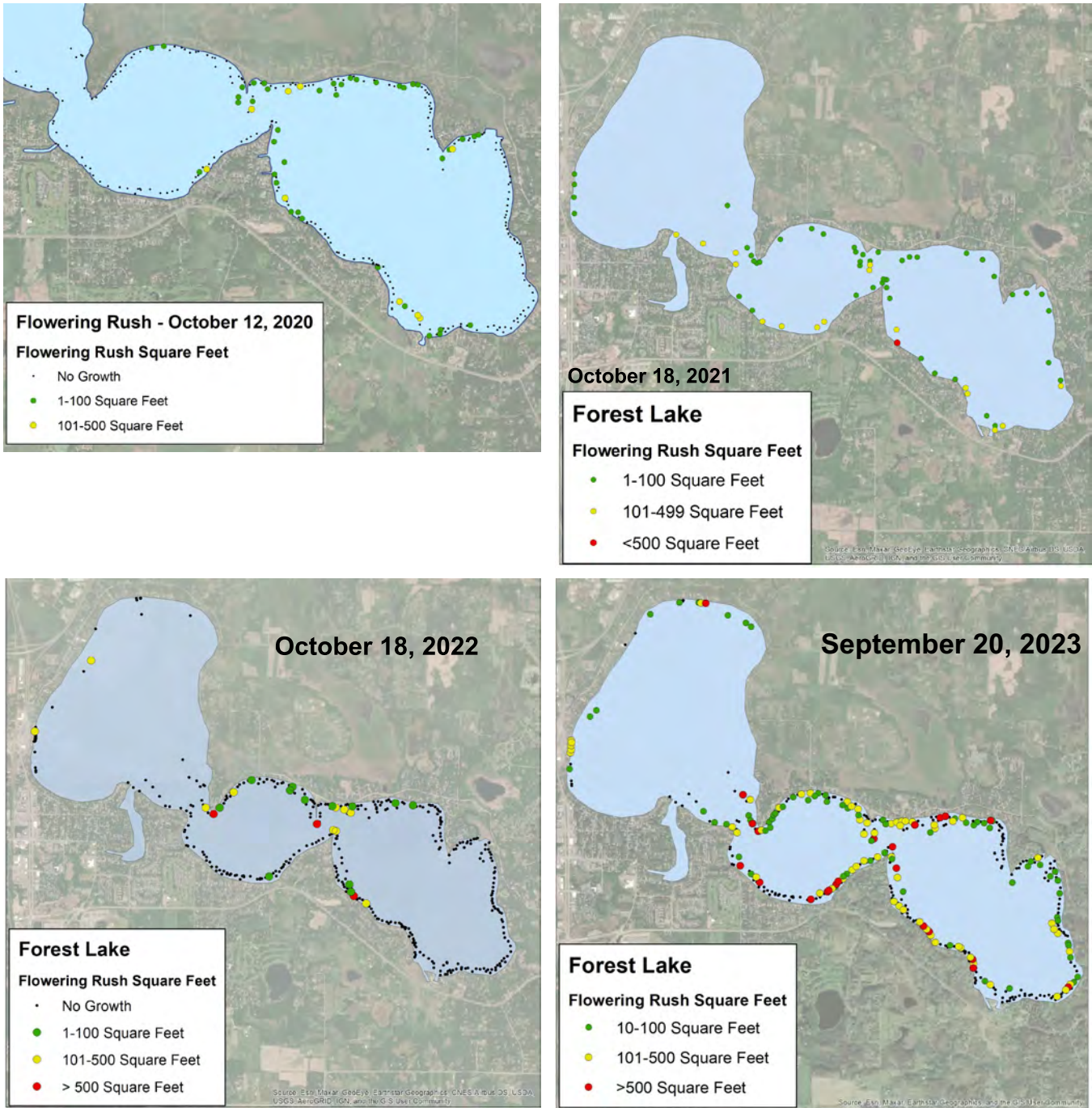


Figure 2 concluded. Estimated flowering rush coverage. [top-left] October 2020, 3,200 square feet (sf). [top-right] October 2021, 5,695 sf. [bottom-left] October 2022, 12,720 sf. [bottom-right] September 2023, 33,895 sf.

Table 5. Surveys and treatments in 2014 through 2023.

2014 - Year 1

Delineation of 1st and 2nd Lakes: July 22, 2014

Delineation of 3rd Lake: September 15, 2014

Herbicide Treatment in 2nd Lake: September 9, 2014 (0.09 ac)

Assessment of 2nd Lake: September 28, 2014

2015 - Year 2

Delineation of 1st, 2nd, and 3rd Lakes: July 17, 2015

Cutting in 2nd and 3rd Lakes: July and August, 2015

Herbicide Treatments in 3rd Lake: August 4 (6.5 ac) and 26 (13.2 ac), 2015

Assessment of 1st, 2nd, and 3rd Lakes: September 28, 2015

2016 - Year 3

Delineation of 1st, 2nd, and 3rd Lakes: July 14 and 15, 2016

Herbicide Treatments in 3rd Lake: August 3 (36 ac) and 31 (36 ac), 2016

Assessment of 1st, 2nd, and 3rd Lakes: September 21, 2016

2017 - Year 4

Delineation of 1st, 2nd, and 3rd Lakes: August 1, 2017

Herbicide Treatments in 2nd and 3rd Lake: August 14 (40.2 ac) and September 27 (31.1 ac), 2017

Assessment of 1st, 2nd, and 3rd Lakes: October 23, 2017

2018 - Year 5

Pre-treatment point intercept survey: July 5, 2018

Treatment: July 13, 2018 (32.5 ac)

Point Intercept Survey Combined with a Meandering Survey: July 25, 2018

Spot Treatments in 2nd and 3rd Lake: August 21, 2018 (3.75 ac)

Post Treatment Assessment: September 19, 2018

2019 - Year 6

Delineation of 1st, 2nd, and 3rd Lakes: July 9, 2019

Spot Herbicide Treatments in 2nd and 3rd Lake: July 31, 2019 (9.08 ac)

Assessment of 1st, 2nd, and 3rd Lakes: August 12, 2019

Spot Herbicide Treatments in 2nd and 3rd Lake: August 30, 2019 (2.5 ac)

Assessment of 1st, 2nd, and 3rd Lakes: September 30, 2019

2020 - Year 7

Delineation of 1st, 2nd, and 3rd Lakes: July 21, 2020

Spot Herbicide Treatments in 2nd and 3rd Lake: August 2, 2020 (5.91 ac)

Assessment of 1st, 2nd, and 3rd Lakes: August 26, 2020

Spot Herbicide Treatments in 2nd and 3rd Lake: September 2, 2020 (5.14 ac)

Assessment of 1st, 2nd, and 3rd Lakes: October 12, 2020

2021 - Year 8

Delineation of 1st, 2nd, and 3rd Lakes: Based on areas of heavy growth from 2020

Spot Herbicide Treatments: July 26, 2021 (7.67 ac)

Assessment and Delineation of 1st, 2nd, and 3rd Lakes: July 27, 2021

Spot Herbicide Treatments in 2nd and 3rd Lake: August 13, 2021 (3.0 ac)

Assessment of 1st, 2nd, and 3rd Lakes:

September 9, 2021

Spot Herbicide Treatments in 2nd and 3rd Lake: September 13, 2021 (3.0 ac)

Assessment of 1st, 2nd, and 3rd Lakes:

October 18, 2021

2022 - Year 9

Delineation of 1st, 2nd, and 3rd Lakes: July 12, 2022

Spot Herbicide Treatments: July 29, 2022

Assessment and Delineation of 1st, 2nd, and 3rd Lakes: August 9, 2022

Spot Herbicide Treatments in 2nd and 3rd Lake: September 19, 2022

Assessment of 1st, 2nd, and 3rd Lakes:

October 18, 2022

2023 - Year 10

Delineation of 1st, 2nd, and 3rd Lakes: July 11, 2023

Spot Herbicide Treatments: July 26, August 15, and August 29, 2023

Assessment and Delineation of 1st, 2nd, and 3rd Lakes: September 20, 2023

Spot Herbicide Treatments in 2nd and 3rd Lake: September 27 and October 10, 2023



The 3 basins in Forest Lake.

APPENDIX

Individual flowering rush sites on July 11, 2023. Gray shading indicates largest groups of flowering rush patches.

Site	FR (sq ft)	FR patches	FR on shore (out to edge of docks)	FR off shore	Site with Flowers	Notes
9	100			1		
13	20	2		1		
15	200	8		1		
21	20			1		
22	10			1		
27	20	2		1		
28	10			1		
29	40	3		1		
30	140	7	1		1	
31	100	1	1		1	
40	100		1			
41	60			1		
42	100	6		1		
45	100	2		1		
48	200			1		
61	20	2		1		
65	300	20	1			
71	100			1		
103	20		1		1	
106	10	1		1		
110	200	1				
111	40	2	1			
135	50	5		1		
136	60	4		1		
140	60	4		1		
141	160	8	1	1		
143	60	5		1		
147	150		1			
148	100			1		
149	100		1			
150	50		1			
151	300	2	1			
153	110	6	1			
172	60		1			
173	100	2	1			
175	200		1		1	
178	100		1		1	
179	60	3		1		
181	80	6		1		
182	10			1		
196	400		1			
206	10	1		1		
210	100	2	1			
211	100	6	1	1		
212	100	2		1		
221	300	30	1		1	
223	100		1			
241	10			1		
242	100			1		
246	1000	15		1		
248	30			1		
249	100		1		1	
250	100		1			
261	200	12				

Individual flowering rush sites on July 11, 2023. Gray shading indicates largest groups of flowering rush patches.

Site	FR (sq ft)	FR patches	FR on shore (out to edge of docks)	FR off shore	Site with Flowers	Notes
262	800	20		1		
275	200	1	1			
284	100			1		
291	120	6	1			
297	400	20		1	1	
307	100			1		
309	510	50	1	1		
315	10	1		1		
320	100		1		1	Continuous bed
321	100		1		1	Continuous bed
322	100		1		1	Continuous bed
323	100		1		1	Continuous bed
324	100		1		1	Continuous bed
325	100		1		1	Continuous bed
326	100		1		1	Continuous bed
327	100		1		1	Continuous bed
328	100		1		1	Continuous bed
329	100		1		1	Continuous bed
347	150	10	1			
353	100		1		1	
356	100		1			
357	10	1		1		
1N	100					Beginning of NWM bed
2N						End of NWM bed
3N	100	10		1		
4N	200	6		1		
5N						NWM 2 ac topping out
6N	200		1		1	
7N						NWM 1 ac topping out
Average	132.1	7.4				
Occur	84	40	40	40	20	
Total	10570	295				

Individual flowering rush sites on September 20, 2023.

New Site	Existing Site	FR (sq ft)	FR patches	FR on shore	FR between docks	FR past docks	Site with Flowers	Sagittaria (sq ft)	Sagittaria present	Sagittaria patches	Wild rice (sf)	Wild rice present
	2	200			1		1					
	5	300				1	1					
	6	600	50		1							
	8	10			1							
	9	100			1							
	10	20			1							
	11	100	10			1						
	14	400	20			1						
	15	80	4			1						
	18	60	5		1	1						
	20	150	10			1						
	21	150	10			1						
	22	100	5			1						
	23	60	6			1						
	27	200	1			1						
	29	300	15		1	1						
	34	200	5			1						
	35	2000	50			1						
	39	100	10		1							
	41	200	10			1						
	42	400	20			1						
	45	200	10			1						
	48	200	1			1						
	49	200	10			1						
	54	600	15			1						
	55	600				1						
	57	100				1						
	59	80	4			1						
	61	80	4			1						
	62	50	2			1						
	73	20				1						
	86	60	3			1						
	89	40	3		1	1						
	92	20	1		1							
	98	20				1						
	99	60	4			1						
	108	20			1							
	108	300	10		1	1						
	109	40			1							
	110	400		1								
	111	80	50		1							
	115	100			1							
	116	100			1							
	117	200			1							
	118	800			1							
	120	300			1	1						
	135	300	30									
	136	60	5			1						
	141	200	10		1							
	142	600	50		1	1	1					
	143	400			1							
	146	200			1							
	147	500			1	1						
	148	1000	50		1	1						
	149	500			1	1						
	150	1000	50		1	1						
	151	400	20		1							
	153	200	20			1						
	159	500	15			1						
	161	20	1			1						
	164	400			1							
	170	200			1	1						
	173	150	10			1						
	174	20	2			1						
	176	800	20			1	1					
	184	100	5			1						
	185	600	30			1						
	189	400	16			1						
	190	150	10			1						

Individual flowering rush sites on September 20, 2023.

New Site	Existing Site	FR (sq ft)	FR patches	FR on shore	FR between docks	FR past docks	Site with Flowers	Sagittaria (sq ft)	Sagittaria present	Sagittaria patches	Wild rice (sf)	Wild rice present
	191	100	6			1						
	192	100		1			1					
	198	100	8			1						
	205	1000	10			1						
	207	150	10			1						
	211	200	10			1						
	212	80	2			1						
	214	60	3			1						
	216	80	4			1						
	226	300			1							
	240	200				1						
	241	400	2			1						
	242	400	10			1						
	248	100	4			1						
	250	600	20			1						
	250	200			1							
	256	50			1		1					
	256	1000			1	1	1					
	260	200			1							
	261	300	15			1						
	261	100				1						
	262	100	5			1						
	263	400	20		1							
	263	60				1						
	264	60	3			1						
	269	600				1						
	272	200	5			1						
	273	200	10			1						
	283	400			1		1					
	284	800			1		1					
	286	100	5			1						
	292	100			1							
	294	400	15		1	1	1					
	295	200			1							
	297	600	20			1	1					
	299	600				1	1					
	309	300	20			1	1					
	312	40	2			1						
	313	600	30			1						
	315	80	4			1						
	317	20	3			1						
	318	30	3			1						
	332	100				1						
	333	10				1						
	341	400	12									
	345	600	20		1							
	351	50	5									
	353	100			1	1						
1								1000				
2								1000				
3								100				
4								50				
5		100		1								
6		50		1								
7								100		2		
8								20				
9								10				
10								20				
11		20			1							
12								20				
13								20				
14								20				
15								20				
16								20				
17		10			1							
18		20			1							
19		20			1							
20		20			1							
21		500		1			1					

Individual flowering rush sites on September 20, 2023.

New Site	Existing Site	FR (sq ft)	FR patches	FR on shore	FR between docks	FR past docks	Site with Flowers	Sagittaria (sq ft)	Sagittaria present	Sagittaria patches	Wild rice (sf)	Wild rice present
22												1
23												1
24											1000	
25				1								
26		1000		1								
27												1
28								20	1			
29								20	1			
30												300
31												3000
32								600				
33												10
34		15		1								
35		60		1								
36		10		1								
37									1			
38									1			
39									1			
40												
41								2500				
42								300				
43		100				1						
44		1000	30			1						
45		20	2		1							
46		20				1						
47		60	3			1						
48		200	1		1	1						
49		50	5			1						
50		200				1						
51		100	6			1						
52		40	2			1						
53		40	2			1						
54		20	1			1						
55		200	9			1						
56		200	10									
57		1000	30			1						
58		60	20			1						
59		2000	100			1						
60		300	10			1						
61		150	6			1						
63		10				1						
64		400	10			1	1					
65		1000	30			1	1					
66		150	6			1						
67		1000	20		1	1						
68		300	20			1						
69		60	4			1						
70		1000		1	1				1			
71		1000		1	1		1					
72		1000		1	1		1					
73		1000		1	1		1					
74		1000		1	1		1					
Average		296.7	13.3					324.4	1.0	2.0		
Occurrence		160	98	15	56	107	20	84	6	1	1	6
Total		33895	1305					5840	6	2		