

Professional Pond Management Products and Services Aquatic Herbicide and Algaecide Applications Lake Management Planning and Services **Pond Design and Development**

August 29, 2018

White River Flowage Lake Management District Mike Geier

2018 Aquatic Plant Survey, White River Flowage, Waushara County, Wisconsin Re:

Dear Mr. Geier and other Board members:

Currently three aquatic invasive species (AIS) are present in White River Flowage that have been actively managed: Eurasian water-milfoil (EWM), curly-leaf pondweed (CLP), and flowering rush (FR). Wisconsin Lake & Pond Resource, LLC (WLPR) was contacted by the District to provide aquatic plant surveys, management, and reporting. WLPR furnished all labor, materials, tools and equipment necessary to perform all operations in connection with the survey, treatment, and reporting for White River Flowage. This report provides a summary of observations and conclusions from the June 4, 2018 survey.

BACKGROUND INFORMATION

The lake was most recently treated for management of Eurasian water-milfoil and curly-leaf pondweed in 2016 and for flowering rush in 2017-2018. 2016 management of CLP and EWM was completed using a variety of herbicide active ingredients and was very successful, resulting in reduced populations of the target AIS and no active management required for 2017. Flowering rush control was continued in 2017 and again proposed for 2018 by a variety of actions. Golden Sands RC&D completed mapping and hand harvesting efforts with help from AmeriCorps that removed a substantial amount of satellite populations of flowering rush. The densest area, known as "ground zero" was targeted for chemical control due to it's large, dense growth. An initial application of the active ingredient diquat was completed in May, 2017. Results were unsuccessful with only temporary die-off resulting in a regrowth with no change in area or density.

The same area was again targeted in September, 2017 with the active ingredient imazapyr, a systemic herbicide. Due to the later timing to target the plant as it prepares to over-winter results would not be known until regrowth in 2018. Initial reports from within ground zero in 2018 are positive with a substantial reduction in density.

2018 SURVEY

WLPR conducted a survey on June 4, 2018 using the full point-intercept method, mirroring that of past surveys. Overall, 181 points were sampled with 169 of these shallower than the maximum depth of plant growth – 11 feet. Vegetation was found throughout the system, growing at 91.1% of these locations to a depth.

All metrics remained stable compared to past surveys (Attachment B, Table 1). Native species diversity (19), floristic quality index (FQI – 25.01), and average number of native species per



vegetated site (2.58) are all of high quality when compared to lakes within the same region (Attachment B. Tables 1-4). Results discussed here are displayed in the same format as previous surveys for the sake of comparison. Changes in EWM and the most common species present and are displayed below from 2010, 2015, 2016, and 2018.



These results indicate a stable community and with limited impact from prior management. Most common species sampled in 2018 include: common waterweed, coontail, flat-stem pondweed, water star-grass, and small duckweed. As the lake moves farther away from the past fluridone treatment additional species are expected to become established. In 2018 two new species were identified, large-leaf pondweed and leafy pondweed, both native to Wisconsin and of higher fisheries habitat quality. Some native species were indicated to have declined from 2016, but this is likely due to the early timing of the 2018 survey in order to capture the extent of CLP. Both wild celery and slender naiad are typically later-emerging species that are under represented by earlyseason surveys. These species were common in 2016 and are expected to be so in 2018 if sampled later.

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Results of the EWM and CLP applications in 2016 were positive as both species saw a reduction in presence from 2015 pre-treatment to 2016 post-treatment surveys. However, both increased from 2016 to 2018 without active management in 2017 (Attachment B, Table 4). Remaining populations of EWM and CLP are scattered throughout the Flowage, as shown in Attachment A, Figures 1-4. Curly-leaf pondweed was found in only scattered locations mixed in with surrounding vegetation and in no defined beds of dense growth. Eurasian water-milfoil growth was concentrated in the central portion of the Flowage with a dense, 7.25 acre area outline for management in 2019 (Figure 7). Flowering rush was noted as scattered clumps outside of the dense, ground zero location (Figures 5-6). Additional mapping was completed by Golden Sands RC&D.

An aquatic plant community is dynamic and changes year to year based on growing conditions and many other factors. Some species identified in 2016 were not directly sampled in 2018, but this should not be a cause for concern. The aquatic plant community of the White River Flowage continues to remain stable and healthy.

NEXT STEPS

The infestations of EWM and CLP have been monitored since the last management indicating a slight increase. Populations of CLP were very scattered and intermixed within native vegetation with no definitive beds present. Due to this, no direct herbicide management of CLP for 2019 is recommended. However, the population of EWM has increased since 2016 and is primarily located within a central, 7.25 acre bed (Figure 7). Since the White River Flowage has continual flow through any target application area a fast-acting herbicide mixture is recommended. The use of Aquastrike, a combination of diquat and endothall, has shown excellent, longer lasting results in similar situations and should be used in 2019 to control EWM. When applied early in the season as EWM is just emerging it has shown significant reduction of the target species with minimal negative effect on native plants in or outside the treatment areas.

For flowering rush, the continued use of a systemic herbicide that is translocated into the roots and therefore kills the plant in this way is recommended. Initial results of application using Habitat® (AI – imazapyr) in the Flowage from 2017 are promising. It appears that longer term control is possible and, more importantly, this active looks to have strong impact on the root stock of the plant. Plants like flowering rush that spread through asexual rhizomes begin to store nutrients within the roots in early fall to prepare for overwintering. This is an ideal time to treat flowering rush and this same technique has shown great success on controlling the highly invasive common reed (Phragmites), which also spreads primarily through rhizomes.

If you have any questions, or require any additional information, please contact us directly as follows:

Jim Scharl: (920) 872-2032 or jim@wisconsinlpr.com



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Attachment A – Figures

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White River Flowage, Waushara County Survey Date: June 4, 2018

Figure 1



2018 Eurasian Water-milfoil Locations - South

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White River Flowage, Waushara County Survey Date: June 4, 2018

Figure 3





2018 Curly-leaf Pondweed Locations - South White River Flowage, Waushara County

Survey Date: June 4, 2018 Figure 4





2018 Flowering Rush Locations - North





2018 Flowering Rush Locations - South



2019 EWM Treatment Location - 7.25 acres

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Attachment B – Tables

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Table 1: Aquatic Plant Community Statistics. White River Flowage, Waushara County, Wisconsin.					
	2010	2015	2016	2018	
Number of sites sampled	190	187	166	181	
Number of sites with vegetation	174	164	159	154	
Number of sites shallower than maximum depth of plants	183	177	159	169	
Frequency of occurrence at sites shallower than maximum depth of plants (%)	95.1%	92.7%	100.0%	91.1%	
Simpson Diversity Index	0.88	0.92	0.87	0.86	
Maximum Depth of Plants (Feet)	16	12	12	11	
Taxonomic Richness (Number Taxa - includes visuals)		26	21	22	
Average Number of Species per Site (less than max depth of plant growth)		2.62	3.03	2.53	
Average Number of Species per Site (sites with vegetation)		2.84	3.04	2.78	
Average Number of Native Species per Site (less than max depth of plant growth)		2.42	2.97	2.36	
Average Number of Native Species per Site (sites with vegetation)		2.64	2.98	2.58	

Table 2: Frequency of Occurrence of Aquatic Plant Species by Year. White River Flowage, Waushara County, Wisconsin.

Frequency of Occurrence (%)				%)	
Species	2010	2015	2016	2018	
Eurasian water-milfoil	7.1	10.2	4.4	5.3	
Curly-leaf pondweed	4.9	10.7	1.3	12.4	
Flowering rush (emergent)		3.4		1.8	
Coontail	62.3	29.9	69.8	47.9	
Muskgrass	3.8	4.0	12.0	1.2	
Common waterweed	55.7	44.6	61.6	71.6	
Water star-grass	20.8	15.3	32.7	17.8	
Small duckweed	25.7	6.2	8.8	13.0	
Forked duckweed		0.6	0.6		
Northern water-milfoil	20.2	23.7	31.5	5.9	
Slender naiad	3.8	1.7	15.7		
Nitella			5.0	0.6	
White water lily	3.8	6.8	4.4	4.1	
Large-leaf pondweed				0.6	
Leafy pondweed				10.1	
Frie's pondweed		7.9			
Floating-leaf pondweed	14.8	17.0	8.8	11.2	
Long-leaf pondweed		0.6			
White-stem pondweed	3.3	0.6	2.5	2.4	
Small pondweed		4.5			
Flat-stem pondweed	4.9	16.4	5.7	18.3	
White water crowfoot	3.3	7.3	1.9	1.2	
Common arrowhead		0.6			
Large duckweed	29.5	12.4	1.9	12.4	
Flliform pondweed	0.6				
Sago pondweed	2.7	7.9	2.5	9.5	
Wild celery	6.6	14.1	22.6	1.2	
Common watermeal	21.3	11.9	9.4	0.6	
Horned pondweed		1.1			
Southern wild rice	1.1	3.4	0.6	4.1	
Filamentous algae		2.3	3.8		
species not sampled					

Table 3: FQI and Average Coefficient of White River Flowage Compared to Northern Central Hardwood Fore							
	verage Coefficient of Conservatisr			Floristic Quality			
Quartile	Lower	Mean	Upper	Lower	Mean	Upper	
Wisconsin Lakes	5.5	6	6.9	16.9	22.2	27.5	
Northern Central Hardwoods Forests	5.2	5.6	5.8	17	20.9	24.4	
2018	5.74			25.01			
2016	5.68			24.78			
2015	5.78			27.73			
2010	5.72			24.28			

Table 4: FQI Breakdown by species for White River Flowage, WausharaCounty, Wisconsin

	Coefficient of Conservatism				
Common Name	2010	2015	2016	2018	
Coontail	3	3	3	3	
Muskgrass	7	7	7	7	
Common waterweed	3	3	3	3	
Water star-grass	6	6	6	6	
Small duckweed	4	4	4	4	
Forked duckweed		6	6		
Northern water-milfoil	6	6	6	6	
Slender naiad	6	6	6		
Nitella			7	7	
White water lily	6	6	6	6	
Large-leaf pondweed				7	
Leafy pondweed				6	
Frie's pondweed		8			
Floating-leaf pondweed	5	5	5	5	
Long-leaf pondweed		7			
White-stem pondweed	8	8	8	8	
Small pondweed		7			
Flat-stem pondweed	6	6	6	6	
White water crowfoot	8	8	8	8	
Common arrowhead		3			
Large duckweed	5	5	5	5	
Flliform pondweed	8				
Sago pondweed	3	3	3	3	
Wild celery	6	6	6	6	
Common watermeal	5	5	5	5	
Horned pondweed		7			
Southern wild rice	8	8	8	8	
Total Species	18	23	19	19	
Mean C	5.72	5.78	5.68	5.74	
Floristic Quality Index (FQI)	24.28	27.73	24.78	25.01	