

2021 Aquatic Vegetation Report

Invasive Species

In past years, the City of Pittsfield relied on a combination of lake drawdowns and contact herbicide treatments to control three invasive non-native plant species: Curly Leaf Pondweed (*Potamogeton crispus*), Eurasian Watermilfoil (*Myriophyllum spicatum*) and European Naiad (*Najas minor*). Drawdowns were effective at controlling curly leaf and milfoil in the littoral zone near the shoreline. On the herbicide front, an early season treatment with diquat targeted curly leaf and milfoil, and a midsummer treatment target milfoil and naiad. In recent years, however, the shallower drawdowns, in compliance with the conditions of a new permit in 2020, are much less useful for controlling nuisance aquatic vegetation. Furthermore, the diquat treatments would knock back nuisance plants during the season, but failed to control the proliferation of milfoil and naiad from year to year, while at the same time severely damaging the native plant population.

Thus 2021 was a watershed year for aquatic plant management at Onota Lake. Following LOPA's advice, the City changed its herbicide strategy away from using contact herbicides, which fail to kill the roots of plants, to using systemic herbicides that do kill the roots. Specifically, Solitude Lake Management in June treated 260 acres of the lake with ProcellaCor (florpyrauxin), a new systemic herbicide that targets milfoil with minimal collateral damage to most other plant species. Follow-up surveys by Solitude showed that milfoil virtually was eliminated, and native plant species were making a strong comeback. Future surveillance and spot ProcellaCor treatments to control any re-emergence of milfoil are a critical part of the new strategy.

Late summer surveys found healthy beds not only of European Naiad, but also Slender Naiad (*Najas flexilis*), a native species that was scarce to absent in past years. Experience has shown that the invasive non-native naiad has the ability to crowd out the native species. Diquat potentially is an effective herbicide to control nuisance naiad, by damaging the annual plant before it spreads its seed, but it difficult selectively to target Eurasian Naiad and spare Slender Naiad. Furthermore, the City's permit does not permit the use of diquat in the north basin, where the non-native version is most prevalent, because of concerns about endangered plant species that have been found there.

Curly Leaf Pondweed has not been much of a nuisance because it is one of the first rooted plants to emerge in the spring, and dies back by midsummer. There is concern, however, that the very effective control of milfoil could great an opportunity for curlyleaf to spread at the expense of native plants. For this reason, Solitude recommends an early May survey to determine the abundance and prevalence of curlyleaf, and possibly diquat treatments to control it. As already noted, however, the use of diquat in the north basin might require a modification of the City's permit.

Handpulling by LOPA volunteers continues to be effective at controlling invasive Water Chestnut (*Trapa Natans*). Dave Wilson pulled just 57 plants in early July, and a team led by Diane Pero in August did not find any of the plants in the main body of the lake or north of the causeway.

Stands of invasive Common Reed (*Phragmites Australis*) are proliferating around the lake. Solitude's fall survey found 13 locations, including at Thomas Island, and the western and southern shores. The main stand is in the southwest cove, and has been there for more than twenty years. LOPA is recommending a limited project to demonstrate the effectiveness of herbicide treatments to control phragmites.

The attached Solitude Final Report provides details.

Aquatic vegetation assessment

LOPA volunteers conducted an aquatic plant survey under the tutelage of Robert Hartzel of Comprehensive Environmental Inc. CEI. Hartzel spent the day providing instruction and assistance. The rake-toss survey was conducted on July 28, and used the same sampling stations as in 2018 and 2020 CEI aquatic vegetation assessments conducted by Hartzel.

The attached tables presents the results of the survey regarding the diversity and abundance of aquatic vegetation, including a comparison with the 2020 Hartzel survey. The volunteer survey confirmed that Eurasian Watermilfoil is under control, and that native plants are making a comeback.

Particular noteworthy is the greater prevalence and dominance of the native and nonnative naiads. This harkens back to 2018, following a deep drawdown that greatly reduced the abundance of Eurasian watermilfoil, when European Naiad was found to dominant throughout the lake. The difference in 2021 is the abundance of Slender Naiad.

Table 1. Definitions of density, biomass, and rake toss codes used in this report. When multiple rake tosses resulted in different codes, the most common code was used (i.e., when 3 or more tosses were made). When two tosses were made, the higher of the two was noted, preceded by the 'less than' symbol (i.e., '<'). Note that '-1' was used in cases where plant density, biomass, and (or) rake toss results were indicated as '0', but the presence of plants was noted. This category was also used when density, biomass, and (or) rake toss results indicated 'very sparse'.

Code	Density	Biomass	Rake toss
0	Absent	Absent	Absent; no plants on rake
-1	Plants present but very sparse, areal coverage < 5%	Very low, very sparse growth, primarily at bottom	Very sparse; a few strands on rake
1	Sparse; areal coverage 5-25%	Low; scattered growth, primarily at bottom	Sparse; More than above but < 25% full
2	Moderate; areal coverage 26-50%	Intermediate; scattered to moderate growth primarily in the lower half of the water column	Moderate; between 25% and 50% full
3	Dense; areal coverage 51-75%	High; substantial growth through most of the water column	Dense; more than 50% full to nearly full
4	Very dense; areal coverage 76-100%	Very high; abundant growth through the water column to the surface	Very dense; full to overflowing

Table 2A. Aquatic vegetation survey results for Onota Lake stations 2-19B. Non-native species are listed in red font. X denotes present. X is red in the case of non-native species. Green or orange shading (native or non-native species, respectively) denotes dominant species at that station, in terms of estimated biomass. Stations with grey shading throughout are those deemed too deep for effective sampling. Density and biomass rating codes are defined in Table 1. Dominance was not indicated where density and biomass were noted as 'very sparse'.

Station:	2	2A	5	5A	6	6A	7	7A	9	9A	10	11	12	12A	14	14A	14B	15	16	16A	17	17A	18	18A	19	19A	
Depth (ft) measured 7/27/21 < storm:	6	21	8	27	7	30	7	12	7	16	6	4	3	6	5	7	15	4	6	25	8	26	4	12	7	10	
Scientific name																											
Common name																											
<i>Ceratophyllum demersum</i> Coontail								X																			
<i>Chara vulgaris</i> * Musk grass							x				x		x	x	x									X	X	X	
<i>Elodea nuttallii</i> Free-flowered waterweed							x				x	x	x		x										x	X	
<i>Najas flexilis</i> Northern water nymph			x		x		x	X			X							x	x				x	x	X	X	
<i>Najas minor</i> Brittle water nymph					x														x	X				x	x		
<i>Nitella sp.</i> * Stonewort																											
<i>Nuphar variegata</i> Yellow pond lily																											
<i>Potamogeton amplifolius</i> Big-leaved pondweed							x																				
<i>Potamogeton crispus</i> Curly pondweed													x													X	X
<i>Potamogeton foliosus</i> (?) Leafy pondweed																						X					
<i>Potamogeton illinoensis</i> Illinois pondweed					x				x																		
<i>Potamogeton pusillus</i> Small pondweed									x		X						x								X		X
<i>Potamogeton robbinsii</i> Robbin's pondweed								X																	X		
<i>Sagittaria sp.</i> Arrowhead																											
<i>Valisneria americana</i> American eel-grass							x		x				x						X	X							
Density rating	0		1		-1		1	2	-1		-1	1	-1	2	2	1	-1	1	1		-1		-1	1	2	2	
Biomass rating	0		1		-1		1	2	-1		-1	1	-1	2	2	2	-1	1	1		-1		-1	1	2	2	
Rake toss rating	0		0		-1		-1	2	0		1	1	-1	<3	2	<2	<-1	-1	<2		-1		<-1	1	---	<2	
Total species	0		1		3		5	3	3		1	2	3	2	1	2	1	2	3	1	1		2	5	5	4	
Native species	0		1		2		5	3	3		1	2	2	2	1	2	1	2	2	0	1		2	4	3	3	

* *Chara vulgaris* and *Nitella sp.* are structured algae; all others are seed plants

Table 2B. Aquatic vegetation survey results for Onota Lake stations 19B-40A. Non-native species are listed in red font. X denotes present; X is red in the case of non-native species. Green or orange shading (native or non-native species, respectively) denotes dominant species at that station, in terms of estimated biomass. Density and biomass rating codes are defined in Table 1. Dominance was not indicated where density and biomass were noted as 'very sparse'.

Station:	19B	20	20A	20B	20C	21	21A	21B	22	22A	23	23A	24	25	26	26A	27	28	29	30	32	33	34	35	36	37	38	39	40	40A		
Depth (ft) measured 7/27/21 < storm:	10	5	9	9	5	4	7	5	5	10	3	5	3	3	3	5	4	2	5	6	3	5	5	3	2	3	4	5	5	9		
Scientific name																																
Common name																																
<i>Ceratophyllum demersum</i> Coontail			X												X																	
<i>Chara vulgaris</i> * Musk grass		X			X		X	X	X	X		X								X	X	X				X	X	X	X			
<i>Elodea nuttallii</i> Free-flowered waterweed		X	X			X	X				X	X			X	X	X				X		X	X	X	X		X		X		
<i>Najas flexilis</i> Northern waternymph	X	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X	X	X		X	X	X	X		X	X	X	X	X	
<i>Najas minor</i> Brittle waternymph					X					X					X	X	X	X			X	X	X	X	X	X	X	X	X	X		
<i>Nitella sp.</i> * Stonewort																								X	X							
<i>Nuphar variegata</i> Yellow pond lily											X		X																			
<i>Potamogeton amplifolius</i> Big-leaved pondweed																																
<i>Potamogeton crispus</i> Curly pondweed																																
<i>Potamogeton foliosus</i> (?) Leafy pondweed																																
<i>Potamogeton illinoensis</i> Illinois pondweed				X																												
<i>Potamogeton pusillus</i> Small pondweed					X		X									X						X					X			X		
<i>Potamogeton robbinsii</i> Robbin's pondweed	X		X	X						X																X			X	X		
<i>Sagittaria sp.</i> Arrowhead		X																														
<i>Valisneria americana</i> Amerian eel-grass			X											X							X			X	X		X					
Density rating	2	2	2	2	1	1	1	1	2	-1	1	3	3	1	1	1	2	4	-1	3	1	1	2	1	3	1	1	1	-1	1		
Biomass rating	1	2	2	2	1	1	1	1	2	-1	1	2	3	1	1	1	2	3	-1	2	1	1	2	1	2	1	1	1	-1	1		
Rake toss rating	<3	2	2	2	1	1	1	<1	2	-1	-1	<4	<1	<1	<2	1	<3	<3	-1	<4	-1	-1	2	1	2	---	1	<2	<1	-1		
Total species	2	4	5	3	4	2	4	2	2	4	3	2	2	2	4	3	3	2	1	2	4	4	3	5	4	4	6	2	5	3		
Native species	2	4	5	3	3	2	4	2	2	3	3	2	2	2	3	2	2	1	1	2	3	3	2	4	3	3	5	2	4	3		

* *Chara vulgaris* and *Nitella sp.* are structured algae; ; all others are seed plants

Table 3. Comparison of results of the volunteer survey of 2021 and the survey of R. Hartzel in 2020. Native species are listed in black font; non-native species are listed in red font. Also listed is the number of stations at which each species was observed, the percent of all stations at which each species occurred, the number of stations at which the species was dominant, and the percentage of all stations at which each species was dominant is also listed. Note that dominance was not assessed when overall density and biomass were 'very sparse' (category '-1'). The total number of species, total number of native species, and total number of non-native species are also provided for comparison between the surveys of 2021 and the previous year.

Scientific name	Common name(s)	Total number & % of stations at which species is present		Total number & % of stations at which species is dominant	
		July 2021 (n=50)*	July 2020 (n=56)	July 2021 (n=50)	July 2020 (n=56)
<i>Ceratophyllum demersum</i>	Common hornwort; Coontail	3 (6.0%)	3 (5.4%)	3 (6.0%)	2 (3.6%)
<i>Chara vulgaris</i> **	Musk grass	22 (44%)	25 (45%)	9 (18%)	13 (23%)
<i>Elodea nuttallii</i>	Free-flowered waterweed	22 (44%)	16 (29%)	3 (6.0%)	2 (3.6%)
<i>Myriophyllum spicatum</i>	Eurasian water-milfoil	0	43 (77%)	0	13 (23%)
<i>Najas flexilis</i>	Northern waternymph, slender naiad	36 (72%)	23 (41%)	11 (22%)	0
<i>Najas minor</i>	Brittle waternymph, European naiad	18 (36%)	18 (32%)	6 (12%)	3 (5.4%)
<i>Nitella</i> sp.**	Stonewort	1 (2.0%)	0	0	0
<i>Nuphar variegata</i>	Yellow pond lily	2 (4.0%)	5 (8.9%)	1 (2.0%)	3 (5.4%)
<i>Potamogeton amplifolius</i>	Big-leaved pondweed	1 (2.0%)	2 (3.6%)	0	1 (1.8%)
<i>Potamogeton crispus</i>	Curly leaf pondweed	2 (4.0%)	3 (5.4%)	0	0
<i>Potamogeton foliosus</i> (?)	Leafy pondweed	1 (2.0%)	0	0	0
<i>Potamogeton illinoensis</i>	Illinois pondweed	3 (6%)	0	1 (2.0%)	0
<i>Potamogeton pusillus</i>	Small pondweed	10 (20%)	10 (18%)	1 (2.0%)	2 (3.6%)
<i>Potamogeton robbinsii</i>	Robbin's pondweed	9 (18%)	6 (11%)	1 (2.0%)	1 (1.8%)
<i>Sagittaria</i> sp.	Arrowhead	1 (2.0%)	0	0	0
<i>Valisneria americana</i>	American eel-grass, tapegrass	11 (22%)	9 (16%)	2 (4.0%)	0
Total number of species***		14	12	9	9
Total number of native species***		12	9	8	7
Total number of non-native species		2	3	1	2

* Does not include stations too deep to sample effectively

** *Chara vulgaris* and *Nitella* sp. are structured algae

*** Does not include *Potamogeton foliosus*, the field identification of which has not been confirmed