

HANSON ENVIRONMENTAL

**Post-treatment Assessment of 2014  
Treatment Plots on Noxon and Cabinet  
Gorge Reservoirs**

July 2015

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## Summary

A point intercept survey of all plots treated for Eurasian Watermilfoil in 2014 was performed between June 24<sup>th</sup> and July 3<sup>rd</sup>, 11 MAT. Points were pre-selected using GIS software on a 45 meter grid. A minimum of two points per acre in each plot were sampled. Visual observations were also made on the extent of the Eurasian Watermilfoil infestation within and outside of each treatment plot. Surveys were conducted by boat using Global Positioning System (GPS) technology to navigate to each point. Survey accuracy was 1 -3 meters (3 to 10 ft) depending upon satellite reception. At each survey point, a weighted plant rake was utilized twice to sample for plant species. For each sample, the species and relative density were recorded. Density was measured on a one to five scale based upon the percentage of the rake covered with five being completely covered.

A significant reduction in Eurasian Watermilfoil was found at most treatment plots, with greater than 80% control at most plots. Three plots, C1-14, C2-14, C3-14 and N8-14, still had significant levels of Eurasian Watermilfoil. (See Table 1). Flow rates through these plots likely limited the effectiveness of the treatments.

Water levels in Cabinet Gorge are significantly lower than last year and will make treating C1-14 and possibly C2-14 difficult. Currently, approximately 30% of the C1-14 treatment plot is in less than 1 foot of water and the majority of the plot is not navigable by boat.

A visual survey was made in areas outside of the treatment plots in areas of lower Noxon Reservoir and upper Cabinet Gorge Reservoir. No new areas that would require treatment were identified in Cabinet Gorge but areas along the north shore of Noxon Reservoir in the vicinity of Trout Creek should be monitored and evaluated for treatment. Throughout both reservoirs, Curlyleaf Pondweed has become a dominant aquatic plant. There are significant large beds of Curlyleaf Pondweed in Noxon Reservoir.

## Treatment Plot Effectiveness

The effectiveness of the treatments was measured both by a reduction in detections and densities at sample points as well as a visual estimate of reduction. Most treatment plots saw a significant decrease in Eurasian Watermilfoil levels. Flow rates in C1,C2, C3 and N8 likely limited the effectiveness. Data for control levels is below in Table 1.

Table 1. Levels of Eurasian watermilfoil pre and post treatment

Plot	Acres	Mean Depth Full Pool	Total Sample Points	Pre-treatment		Post Treatment		Percent Decrease in Cover
				EWM positive Points	EWM average Density	EWM positive Points	EWM average Density	
n4	2	3	5	3	2	1	1	80
n5	0.2	2.4	2	2	3	0	0	90
n6	2.3	8.6	6	6	3	1	1	80
n7	1.1	6.2	3	2	3	0	0	90
n8	0.5	9.9	8	5	3	4	3	20
n9	1.1	8.2	3	2	2	0	0	90
n10	0.6	9.9	1	3	2	1	1	80
n12	9.4	7	20			3	1	80
c1	72.5	8.9	148	87	3	70	3	10
c2	60.6	9.9	123	84	3.4	59	1.9	30
c3	21.7	10.1	46	37	3	15	1.5	50
c4	19.4	8.8	38	18	2	6	1	70
c5	8.9	10.4	17	3	2	2	1	70

\*N12 was selected for treatment after the Pre-treatment survey so no pre-treatment survey was conducted on this plot and the Percent decrease in coverage is an estimate.

## Curlyleaf Pondweed

Levels of Curlyleaf Pondweed continue to increase in both reservoirs. In Noxon Reservoir there are many large dense beds and significant areas of shoreline that are being impacted. These infested areas likely limit recreation and impact the aquatic resource. Below are images of dense beds of Curlyleaf Pondweed upstream from Trout Creek in Noxon Reservoir.







## Observed increases in Eurasian Watermilfoil

Areas of Noxon and Cabinet Gorge Reservoirs were visually surveyed during the post-treatment assessment. No new areas were identified in the upper reaches of Cabinet Gorge Reservoir and the lower reaches of Noxon Reservoir. Increases in Eurasian Watermilfoil densities were observed at points along the north shore of Noxon Reservoir in the vicinity of Trout Creek. These areas are denoted by the flags in the image below. These areas should be monitored and evaluated for possible treatment.



Eurasian Watermilfoil along North shore



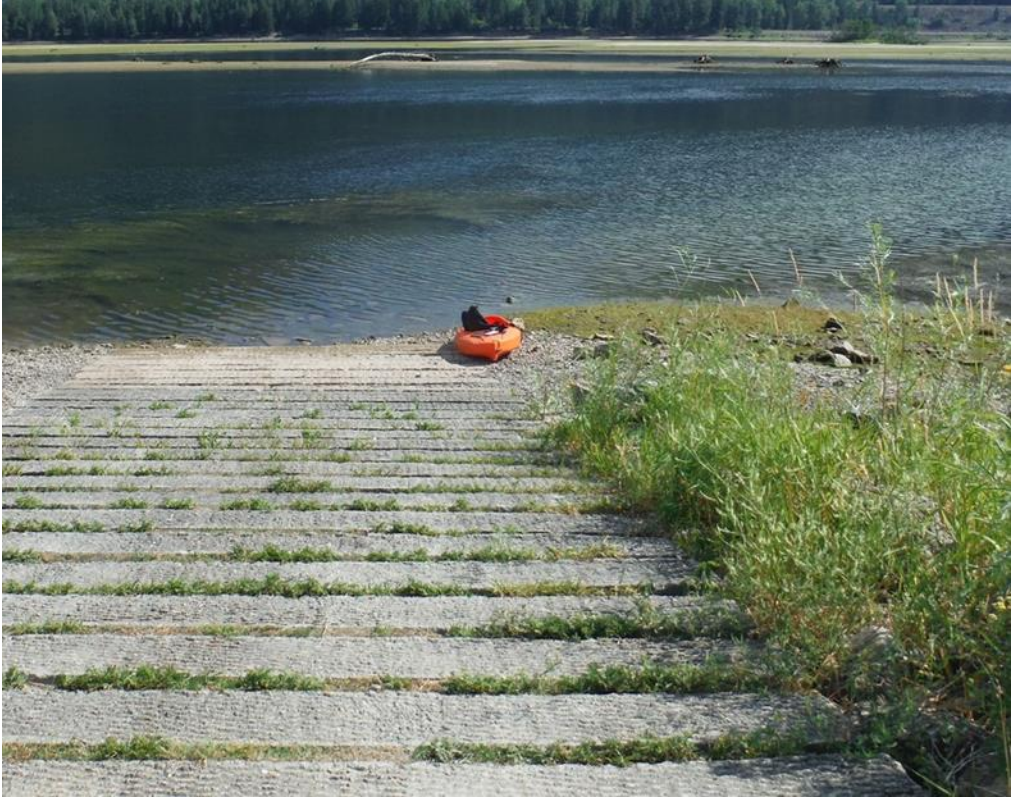
## Cabinet Gorge Reservoir pool levels

The pool level of Cabinet Gorge is significantly lower than the same time period last year. The boat ramp at Noxon is completely out of water and significant areas of the treatment plots are now on dry land or in very shallow water. Treatment plot C1-14 has the most significant impact with about a 30% reduction in treatable acres. The image below shows the treatment plot outline in yellow and a one foot water depth contour in red. Most of c1-14 is too shallow for access by motor boat, except for the outer areas and the uppermost inner area. The flag on the image denotes the most downstream point that a motorboat could safely access from upstream.





Noxon boat ramp at C1-14



Mudflats at C1-14



Eurasian watermilfoil in 1 ft of water at C1-14



Mudflats at C1-14 with Eurasian Watermilfoil





## Treatment plot sample points

N4-14 and N5-14



N6-14



N7-14 and N8-14

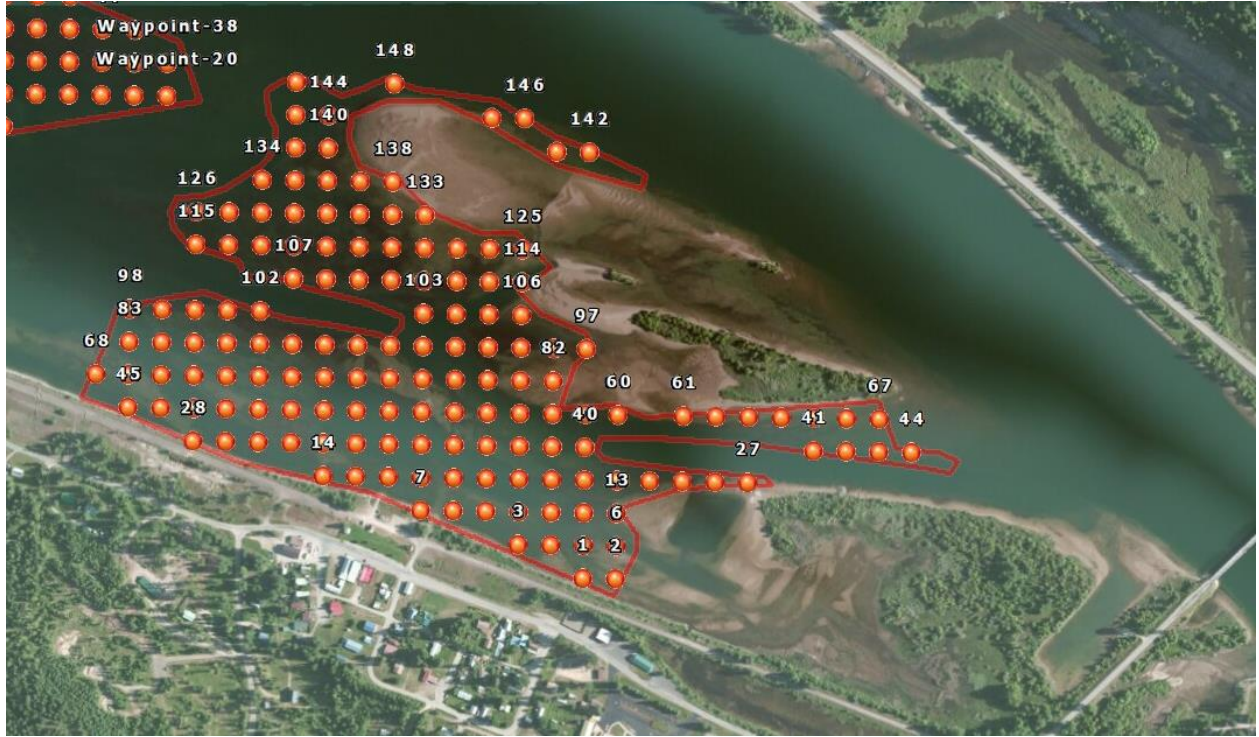


N9-14 and N10-14





C1-14

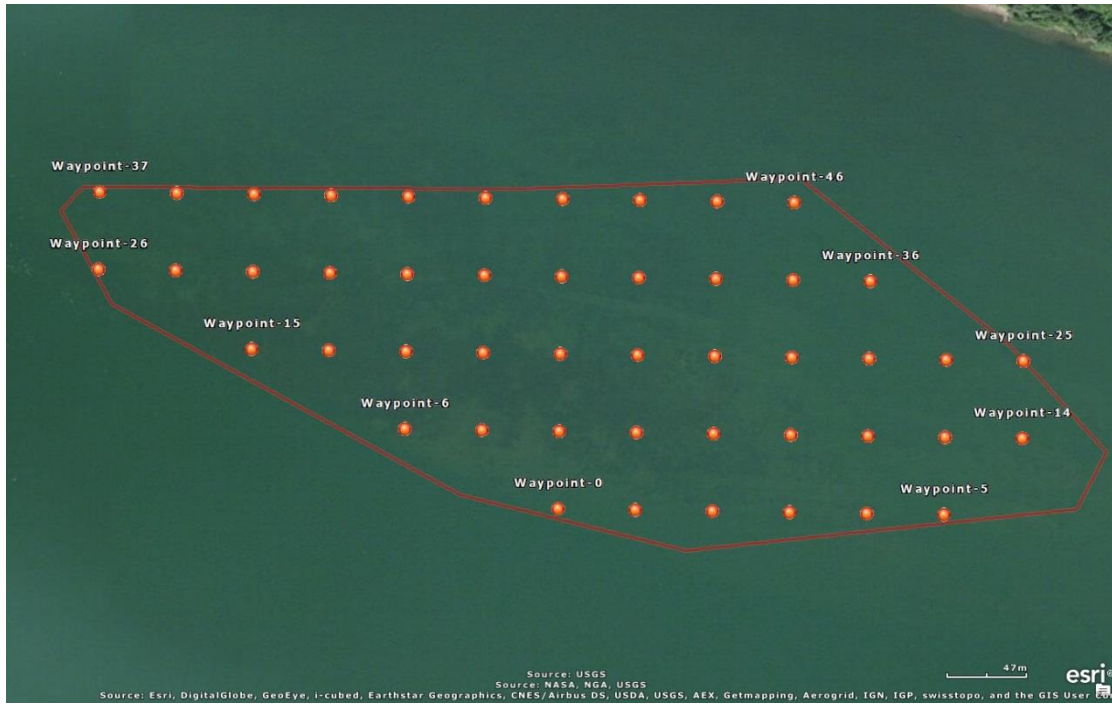


C2-14





C3-14



C4-14



C5-14 and C6-14



C7-14





## Appendix A: Frequency of occurrence in plots

C1-14

Scientific Name	Common Name	% Occurrence
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	48
<i>Potamogeton crispus</i>	curly leaf pondweed	18
<i>Butomus umbellatus</i>	flowering rush	1
<i>Potamogeton richardsonii</i>	Richardson's pondweed	23
<i>Ceratophyllum demersum</i>	coontail	13
<i>Elodea canadensis</i>	common Elodea	11
<i>Ranunculus aquatilis</i>	white waterbuttercup	1
<i>Potamogeton pectinatus</i>	sago pondweed	0
<i>Potamogeton foliosus</i>	leafy pondweed	0
<i>Potamogeton zosteriformis</i>	Flatstem pondweed	0
<i>Myriophyllum sibiricum</i>	northern watermilfoil	0
<i>Potamogeton praelongus</i>	whitestem pondweed	1
<i>Potamogeton illinoensis</i>	Illinois pondweed	0

C2-14

Scientific Name	Common Name	% Occurrence
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	48
<i>Potamogeton crispus</i>	curly leaf pondweed	35
<i>Butomus umbellatus</i>	flowering rush	4
<i>Potamogeton richardsonii</i>	Richardson's pondweed	0
<i>Ceratophyllum demersum</i>	coontail	25
<i>Elodea canadensis</i>	common Elodea	60
<i>Ranunculus aquatilis</i>	white waterbuttercup	0
<i>Potamogeton pectinatus</i>	sago pondweed	2
<i>Potamogeton foliosus</i>	leafy pondweed	0
<i>Potamogeton zosteriformis</i>	Flatstem pondweed	1
<i>Myriophyllum sibiricum</i>	northern watermilfoil	1
<i>Potamogeton praelongus</i>	whitestem pondweed	4
<i>Potamogeton illinoensis</i>	Illinois pondweed	0

## C3-14

Scientific Name	Common Name	% Occurrence
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	32
<i>Potamogeton crispus</i>	curly leaf pondweed	46
<i>Butomus umbellatus</i>	flowering rush	0
<i>Potamogeton richardsonii</i>	Richardson's pondweed	7
<i>Ceratophyllum demersum</i>	coontail	45
<i>Elodea canadensis</i>	common Elodea	83
<i>Ranunculus aquatilis</i>	white waterbuttercup	4
<i>Potamogeton pectinatus</i>	sago pondweed	2
<i>Potamogeton foliosis</i>	leafy pondweed	2
<i>Potamogeton zosteriformis</i>	Flatstem pondweed	0
<i>Myriophyllum sibiricum</i>	northern watermilfoil	0
<i>Potamogeton praelongus</i>	whitestem pondweed	6
<i>Potamogeton illinoensis</i>	Illinois pondweed	0

## C4-14

Scientific Name	Common Name	% Occurrence
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	15
<i>Potamogeton crispus</i>	curly leaf pondweed	72
<i>Butomus umbellatus</i>	flowering rush	0
<i>Potamogeton richardsonii</i>	Richardson's pondweed	2
<i>Ceratophyllum demersum</i>	coontail	5
<i>Elodea canadensis</i>	common Elodea	51
<i>Ranunculus aquatilis</i>	white waterbuttercup	8
<i>Potamogeton pectinatus</i>	sago pondweed	3
<i>Potamogeton foliosis</i>	leafy pondweed	2
<i>Potamogeton zosteriformis</i>	Flatstem pondweed	0
<i>Myriophyllum sibiricum</i>	northern watermilfoil	0
<i>Potamogeton praelongus</i>	whitestem pondweed	2
<i>Potamogeton illinoensis</i>	Illinois pondweed	0

C5-14

Scientific Name	Common Name	% Occurrence
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	12
<i>Potamogeton crispus</i>	curly leaf pondweed	88
<i>Butomus umbellatus</i>	flowering rush	0
<i>Potamogeton richardsonii</i>	Richardson's pondweed	0
<i>Ceratophyllum demersum</i>	coontail	0
<i>Elodea canadensis</i>	common Elodea	24
<i>Ranunculus aquatilis</i>	white waterbuttercup	12
<i>Potamogeton pectinatus</i>	sago pondweed	5
<i>Potamogeton foliosis</i>	leafy pondweed	0
<i>Potamogeton zosteriformis</i>	Flatstem pondweed	0
<i>Myriophyllum sibiricum</i>	northern watermilfoil	0
<i>Potamogeton praelongus</i>	whitestem pondweed	0
<i>Potamogeton illinoensis</i>	Illinois pondweed	0

N4-14

Scientific Name	Common Name	% Occurrence
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	20
<i>Potamogeton crispus</i>	curly leaf pondweed	60
<i>Butomus umbellatus</i>	flowering rush	0
<i>Potamogeton richardsonii</i>	Richardson's pondweed	0
<i>Ceratophyllum demersum</i>	coontail	20
<i>Elodea canadensis</i>	common Elodea	80
<i>Ranunculus aquatilis</i>	white waterbuttercup	80
<i>Potamogeton pectinatus</i>	sago pondweed	0
<i>Potamogeton foliosis</i>	leafy pondweed	0
<i>Potamogeton zosteriformis</i>	Flatstem pondweed	0
<i>Myriophyllum sibiricum</i>	northern watermilfoil	20
<i>Potamogeton praelongus</i>	whitestem pondweed	0
<i>Potamogeton illinoensis</i>	Illinois pondweed	0



N5-14

Scientific Name	Common Name	% Occurrence
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	0
<i>Potamogeton crispus</i>	curly leaf pondweed	100
<i>Butomus umbellatus</i>	flowering rush	0
<i>Potamogeton richardsonii</i>	Richardson's pondweed	100
<i>Ceratophyllum demersum</i>	coontail	0
<i>Elodea canadensis</i>	common Elodea	50
<i>Ranunculus aquatilis</i>	white waterbuttercup	50
<i>Potamogeton pectinatus</i>	sago pondweed	0
<i>Potamogeton foliosis</i>	leafy pondweed	0
<i>Potamogeton zosteriformis</i>	Flatstem pondweed	0
<i>Myriophyllum sibiricum</i>	northern watermilfoil	0
<i>Potamogeton praelongus</i>	whitestem pondweed	0
<i>Potamogeton illinoensis</i>	Illinois pondweed	0

N6-14

Scientific Name	Common Name	% Occurrence
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	14
<i>Potamogeton crispus</i>	curly leaf pondweed	100
<i>Butomus umbellatus</i>	flowering rush	0
<i>Potamogeton richardsonii</i>	Richardson's pondweed	0
<i>Ceratophyllum demersum</i>	coontail	14
<i>Elodea canadensis</i>	common Elodea	0
<i>Ranunculus aquatilis</i>	white waterbuttercup	71
<i>Potamogeton pectinatus</i>	sago pondweed	0
<i>Potamogeton foliosis</i>	leafy pondweed	0
<i>Potamogeton zosteriformis</i>	Flatstem pondweed	0
<i>Myriophyllum sibiricum</i>	northern watermilfoil	0
<i>Potamogeton praelongus</i>	whitestem pondweed	0
<i>Potamogeton illinoensis</i>	Illinois pondweed	0

N7-14

Scientific Name	Common Name	% Occurrence
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	0
<i>Potamogeton crispus</i>	curly leaf pondweed	66
<i>Butomus umbellatus</i>	flowering rush	0
<i>Potamogeton richardsonii</i>	Richardson's pondweed	33
<i>Ceratophyllum demersum</i>	coontail	33
<i>Elodea canadensis</i>	common Elodea	66
<i>Ranunculus aquatilis</i>	white waterbuttercup	33
<i>Potamogeton pectinatus</i>	sago pondweed	0
<i>Potamogeton foliosis</i>	leafy pondweed	0
<i>Potamogeton zosteriformis</i>	Flatstem pondweed	0
<i>Myriophyllum sibiricum</i>	northern watermilfoil	0
<i>Potamogeton praelongus</i>	whitestem pondweed	0
<i>Potamogeton illinoensis</i>	Illinois pondweed	0

N8-14

Scientific Name	Common Name	% Occurrence
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	50
<i>Potamogeton crispus</i>	curly leaf pondweed	25
<i>Butomus umbellatus</i>	flowering rush	0
<i>Potamogeton richardsonii</i>	Richardson's pondweed	0
<i>Ceratophyllum demersum</i>	coontail	13
<i>Elodea canadensis</i>	common Elodea	25
<i>Ranunculus aquatilis</i>	white waterbuttercup	0
<i>Potamogeton pectinatus</i>	sago pondweed	0
<i>Potamogeton foliosis</i>	leafy pondweed	0
<i>Potamogeton zosteriformis</i>	Flatstem pondweed	0
<i>Myriophyllum sibiricum</i>	northern watermilfoil	0
<i>Potamogeton praelongus</i>	whitestem pondweed	0
<i>Potamogeton illinoensis</i>	Illinois pondweed	0

N9-14

Scientific Name	Common Name	% Occurrence
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	0
<i>Potamogeton crispus</i>	curly leaf pondweed	100
<i>Butomus umbellatus</i>	flowering rush	0
<i>Potamogeton richardsonii</i>	Richardson's pondweed	0
<i>Ceratophyllum demersum</i>	coontail	6
<i>Elodea canadensis</i>	common Elodea	66
<i>Ranunculus aquatilis</i>	white waterbuttercup	33
<i>Potamogeton pectinatus</i>	sago pondweed	0
<i>Potamogeton foliosis</i>	leafy pondweed	0
<i>Potamogeton zosteriformis</i>	Flatstem pondweed	0
<i>Myriophyllum sibiricum</i>	northern watermilfoil	0
<i>Potamogeton praelongus</i>	whitestem pondweed	0
<i>Potamogeton illinoensis</i>	Illinois pondweed	0

N10-14

Scientific Name	Common Name	% Occurrence
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	33
<i>Potamogeton crispus</i>	curly leaf pondweed	33
<i>Butomus umbellatus</i>	flowering rush	33
<i>Potamogeton richardsonii</i>	Richardson's pondweed	0
<i>Ceratophyllum demersum</i>	coontail	0
<i>Elodea canadensis</i>	common Elodea	100
<i>Ranunculus aquatilis</i>	white waterbuttercup	66
<i>Potamogeton pectinatus</i>	sago pondweed	0
<i>Potamogeton foliosis</i>	leafy pondweed	0
<i>Potamogeton zosteriformis</i>	Flatstem pondweed	0
<i>Myriophyllum sibiricum</i>	northern watermilfoil	33
<i>Potamogeton praelongus</i>	whitestem pondweed	0
<i>Potamogeton illinoensis</i>	Illinois pondweed	0

N12-14

<b>Scientific Name</b>	<b>Common Name</b>	<b>% Occurrence</b>
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	6
<i>Potamogeton crispus</i>	curly leaf pondweed	23
<i>Butomus umbellatus</i>	flowering rush	4
<i>Potamogeton richardsonii</i>	Richardson's pondweed	4
<i>Ceratophyllum demersum</i>	coontail	6
<i>Elodea canadensis</i>	common Elodea	17
<i>Ranunculus aquatilis</i>	white waterbuttercup	4
<i>Potamogeton pectinatus</i>	sago pondweed	17
<i>Potamogeton foliosus</i>	leafy pondweed	0
<i>Potamogeton zosteriformis</i>	Flatstem pondweed	0
<i>Myriophyllum sibiricum</i>	northern watermilfoil	0
<i>Potamogeton praelongus</i>	whitestem pondweed	2
<i>Potamogeton illinoensis</i>	Illinois pondweed	0