

HANSON ENVIRONMENTAL

**Noxon and Cabinet Gorge Reservoirs
Littoral Survey 2016**

Contents

Preface	1
Materials and Methods	2
Results and Discussion	2
Conclusions and Recommendations	3
References.....	13

Figures

Figure 1: Noxon Reservoir survey points	6
Figure 2: Noxon Reservoir survey points	6
Figure 3: Noxon Reservoir survey points	7
Figure 4: Cabinet Gorge Reservoir survey points	7
Figure 5: Noxon Reservoir Eurasian watermilfoil bed NOX-43+44.....	8
Figure 6: Noxon Reservoir Eurasian watermilfoil beds NOX-9, NOX-12, NOX-50, NOX-62, NOX-63, and NOX-64.....	9
Figure 7: Noxon Reservoir Eurasian watermilfoil bed NOX-38.....	10
Figure 8: Noxon Reservoir Eurasian watermilfoil bed NOX-48.....	11
Figure 9: Cabinet Gorge Reservoir Eurasian watermilfoil beds CAB-1, CAB-2, CAB-3, CAB-4, CAB-6, CAB-8, CAB-9 and CAB-16	12
Figure 10: Cabinet Gorge Reservoir Eurasian watermilfoil beds CAB-10, CAB-11, CAB-12, CAB-13, CAB-14 and CAB-15	13

Tables

Table 1: Percent frequency of aquatic plant species in Noxon Reservoir in 2016.	4
Table 2: Dense Beds of Eurasian watermilfoil identified in Noxon Reservoir in 2016	4
Table 3: Percent frequency of aquatic plant species in Cabinet Gorge Reservoir in 2016.	5
Table 4: Dense Beds of Eurasian watermilfoil identified in Cabinet Gorge Reservoir in 2016	5

Preface

This report summarizes work conducted in 2016 by Hanson Environmental. Funding was provided by Sanders County, Montana through the Sanders County Aquatic Invasive Plants Task Force. All surveys were conducted by Erik Hanson.

For more information please contact Erik Hanson at hanson.environmental@gmail.com

Materials and Methods

Point Intercept Assessments. A point intercept survey of Noxon and Cabinet Gorge Reservoirs was conducted the last week of August 2016 and the first week of September 2016 to assess the aquatic plant communities and level of infestation of Eurasian watermilfoil. To be consistent with previous surveys, sampling was conducted at points selected by (Turnage, G. and J. D. Madsen. 2014). A 150m grid was used for the Noxon assessment and a 125 m grid for the Cabinet Gorge assessment. Any dense beds of Eurasian watermilfoil that were not mapped in previous surveys were mapped by conducting transects along the outer edge of the bed.

Surveys and bed mapping were conducted by boat using Global Positioning System (GPS) technology that permitted an accuracy of 1 to 3 m (~3-10 ft.) depending upon satellite reception. At each survey point, the presence and density of plant species was determined by rake throws.

Results and Discussion

Noxon Reservoir

Noxon Reservoir has an aquatic plant community of 17 species (Table 1). The non-native species Eurasian watermilfoil, curlyleaf pondweed and flowering rush were found at 27%, 12% and 15% percent of surveyed points within the littoral zone, respectively (Table 1). The most common native species observed were elodea (*Elodea canadensis*) 25%, coontail (*Ceratophyllum demersum*) 24% and northern watermilfoil (*Myriophyllum sibiricum*) 17%. Researchers have identified a hybrid Eurasian/northern watermilfoil in Noxon reservoir and are assessing its population level.

There are 1,942 acres of littoral habitat in Noxon Reservoir (Wersal et al 2010). Sampling occurred at 448 points throughout the reservoir (Figures 1 to 3). Ninety Seven acres of dense Eurasian watermilfoil were identified (Table 2 and Figures 5, 6, 7 and 8). In 2008, the initial estimate of dense Eurasian watermilfoil was 247 acres, with 323 acres in 2009, 96.6 acres in 2013, 19.7 acres in 2014 and 90.8 acres in 2015.

Cabinet Gorge Reservoir

Cabinet Gorge Reservoir has an aquatic plant community of 15 species. The non-native species Eurasian watermilfoil, curlyleaf pondweed and flowering rush were found at 40%, 7%, and 2% percent of survey points within the littoral zone, respectively. The most common native species observed were elodea (*Elodea canadensis*) 30% and coontail (*Ceratophyllum demersum*) 24% (Table 3).

There are 1,121 acres of littoral habitat in Cabinet Gorge Reservoir (Wersal et al 2010). Sampling occurred at 338 points throughout the reservoir (Figure 4). Two hundred and nine acres of dense Eurasian watermilfoil were identified (Table 4 and Figures 9 and 10). In 2008 the initial estimate of dense Eurasian watermilfoil was 78 acres, 328 acres in 2010, 205 acres in 2013 and 205 acres in 2015.

Conclusions and Recommendations

Noxon Reservoir. Eurasian watermilfoil occurs throughout the reservoir and represents 20 to 30% of the plant community. Dense beds were identified in plots that have been treated in previous years as well as in new areas. Hybrid watermilfoil occurs throughout the Reservoir (Thum 2016). The research on the efficacy of herbicide treatments on the hybrid Eurasian/northern watermilfoil needs to continue.

Cabinet Gorge Reservoir. The levels of Eurasian watermilfoil have increased in Cabinet Gorge Reservoir and several new dense beds were identified. Of concern are the dense beds that are now occur in the most downstream area of the reservoir as there is approximately 150 littoral acres that could become infested. No hybrid Eurasian watermilfoil was found.

Hybrid identification. The ability to distinguish between the native northern watermilfoil and the invasive Eurasian watermilfoil has become difficult due to the presence of hybrids. The hybrids can resemble either species but tend to exhibit growth characteristics like Eurasian watermilfoil. As such, hybrid water milfoil may exhibit characteristics of both native and non-native watermilfoil, and there is a need to classify the species along a spectrum of characteristics ranging from native to non-native species.

Survey timing. Throughout the growing season, there is a shift in plant communities from being dominated by curlyleaf pondweed to being dominated by Eurasian watermilfoil. In June to mid-July there will be areas that are 100% curlyleaf pondweed. In those same areas, there will be 100% Eurasian watermilfoil in late August. The plots Nox 9, 12, 48, 50, and 64 were areas surveyed at the end of June 2016, with low amounts of Eurasian watermilfoil and high amounts of curlyleaf pondweed identified at that time. The pre-treatment survey of potential treatment plots should be delayed until mid-July to more accurately assess the level of Eurasian watermilfoil in those plots.

Table 1: Percent frequency of aquatic plant species in Noxon Reservoir in 2016.

Scientific Name	Common Name	Percent Occurrence
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	27
<i>Potamogeton crispus</i>	curly leaf pondweed	12
<i>Butomus umbellatus</i>	flowering rush	15
<i>Ceratophyllum demersum</i>	coontail	24
<i>Chara spp.</i>	chara	10
<i>Elodea canadensis</i>	elodea	25
<i>Heteranthera dubia</i>	water stargrass	5
<i>Myriophyllum sibiricum</i>	northern watermilfoil	17
<i>Najas flexilis</i>	slender naiad	<1
<i>Ranunculus aquatilis</i>	white waterbuttercup	10
<i>Potamogeton foliosus</i>	leafy pondweed	8
<i>Potamogeton illinoensis</i>	Illinois pondweed	2
<i>Potamogeton pectinatus</i>	sago pondweed	10
<i>Potamogeton praelongus</i>	whitestem pondweed	1
<i>Potamogeton richardsonii</i>	Richardson's pondweed	10
<i>Sagittaria cuneata</i>	arum-leaf arrowhead	<1
<i>Vallisneria americana</i>	water celery	<1

Table 2: Dense Beds of Eurasian watermilfoil identified in Noxon Reservoir in 2016

Plot	Acres
NOX-9	10.8
NOX-12	3
NOX-38	1.1
NOX-43+44	32
NOX-48	29.2
NOX-50	14.6
NOX-62	1.9
NOX-63	0.8
NOX-64	3.3
TOTAL	96.7

Table 3: Percent frequency of aquatic plant species in Cabinet Gorge Reservoir in 2016.

Scientific Name	Common Name	Percent Occurrence
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	40
<i>Potamogeton crispus</i>	curly leaf pondweed	7
<i>Butomus umbellatus</i>	flowering rush	2
<i>Ceratophyllum demersum</i>	coontail	24
<i>Chara spp.</i>	chara	5
<i>Elodea canadensis</i>	elodea	30
<i>Heteranthera dubia</i>	water stargrass	<1
<i>Myriophyllum sibiricum</i>	northern watermilfoil	10
<i>Ranunculus aquatilis</i>	white waterbuttercup	12
<i>Potamogeton foliosus</i>	leafy pondweed	15
<i>Potamogeton illinoensis</i>	Illinois pondweed	6
<i>Potamogeton pectinatus</i>	sago pondweed	4
<i>Potamogeton praelongus</i>	whitestem pondweed	1
<i>Potamogeton richardsonii</i>	Richardson's pondweed	16
<i>Potamogeton zosteriformis</i>	Flatstem pondweed	12

Table 4: Dense Beds of Eurasian watermilfoil identified in Cabinet Gorge Reservoir in 2016

Plot	Acres
CAB-1	72.6
CAB-2	60.6
CAB-3	21.7
CAB-4	19.5
CAB-6	11.5
CAB-8	3
CAB-9	1.4
CAB-10	5.4
CAB-11	2.2
CAB-12	1.3
CAB-13	1.5
CAB-14	1.6
CAB-15	2.7
CAB-16	3.6
TOTAL	208.6

Figure 1: Noxon Reservoir survey points



Figure 2: Noxon Reservoir survey points



Figure 5: Noxon Reservoir Eurasian watermilfoil bed NOX-43+44



Figure 6: Noxon Reservoir Eurasian watermilfoil beds NOX-9, NOX-12, NOX-50, NOX-62, NOX-63, and NOX-64



Figure 7: Noxon Reservoir Eurasian watermilfoil bed NOX-38



Figure 8: Noxon Reservoir Eurasian watermilfoil bed NOX-48



Figure 9: Cabinet Gorge Reservoir Eurasian watermilfoil beds CAB-1, CAB-2, CAB-3, CAB-4, CAB-6, CAB-8, CAB-9 and CAB-16

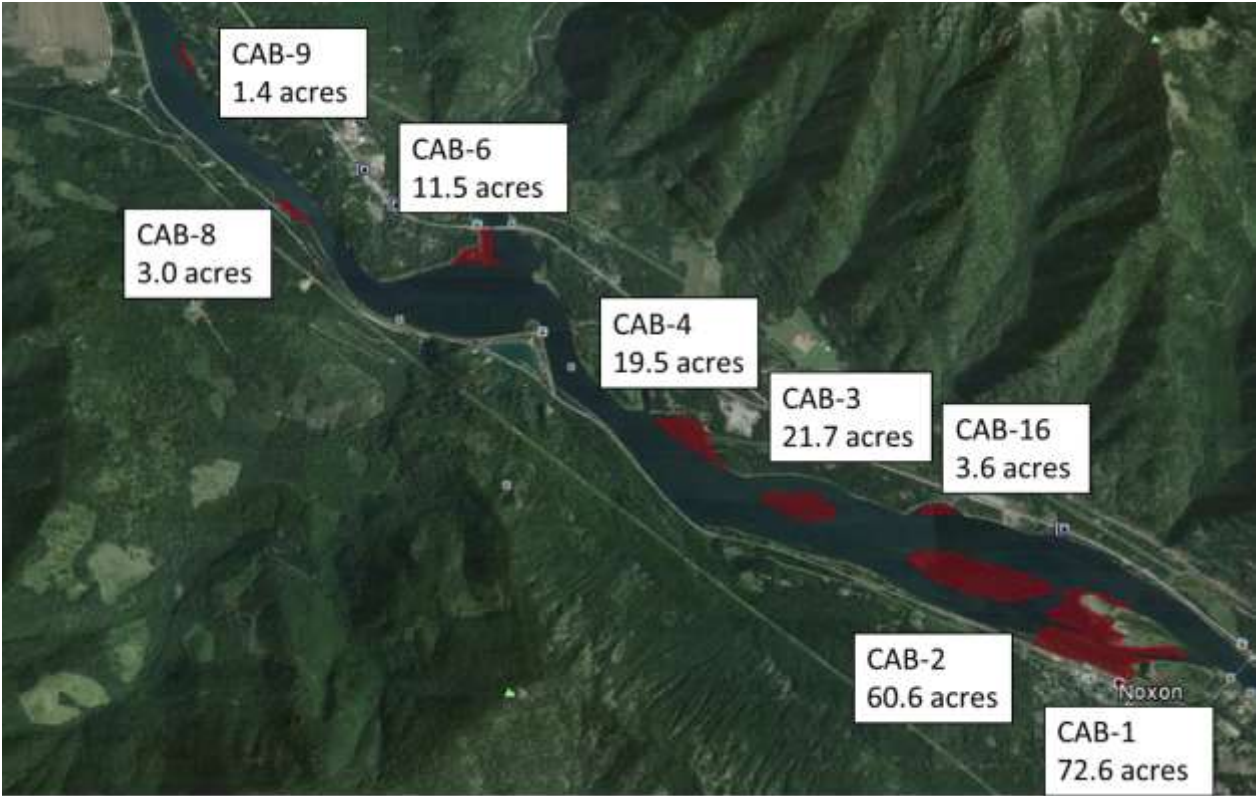
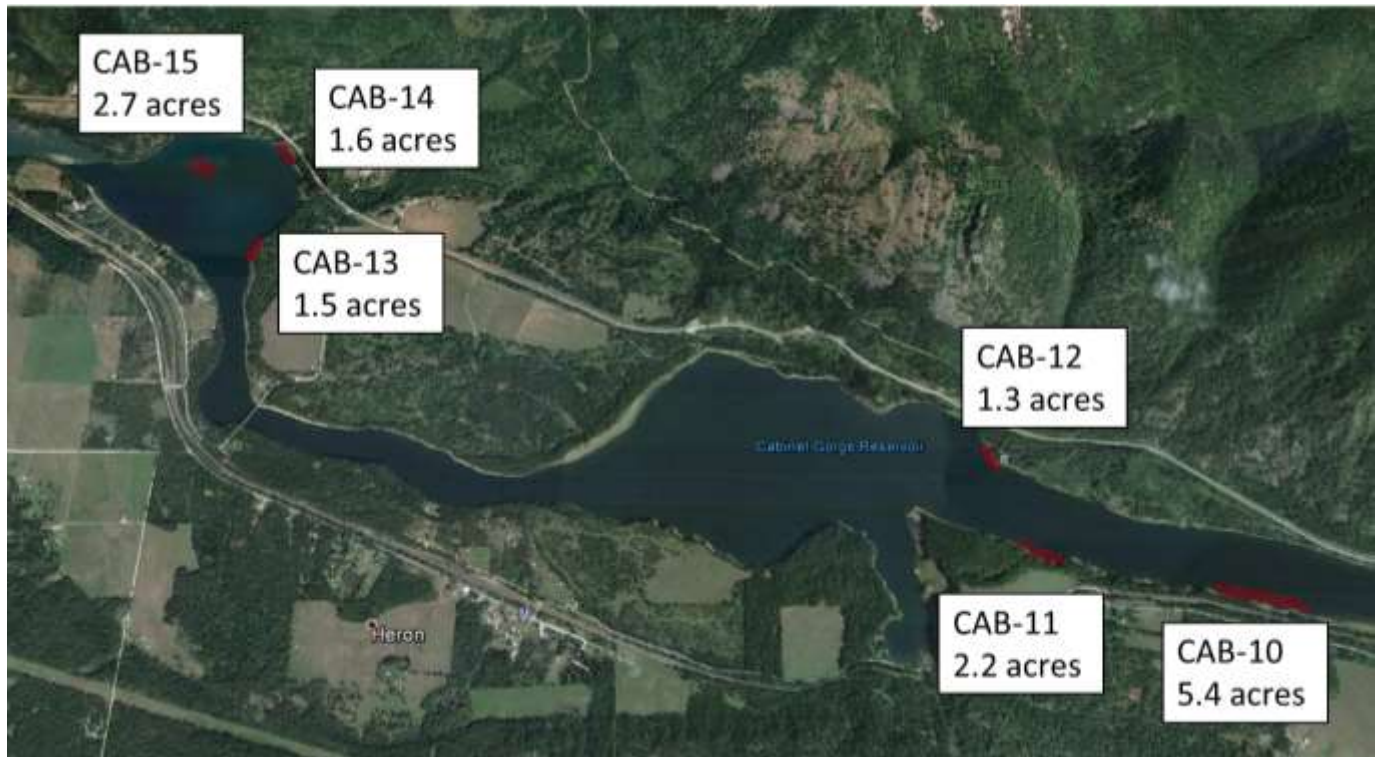


Figure 10: Cabinet Gorge Reservoir Eurasian watermilfoil beds CAB-10, CAB-11, CAB-12, CAB-13, CAB-14 and CAB-15



References

Thum, R. 2016 Project Progress Report. Grant Agreement Number RITA-16-8827

Turnage, G. and J. D. Madsen. 2014. Littoral Survey of Noxon and Cabinet Gorge Reservoirs, Montana, 2013. GRI Report #5061, Geosystems Research Institute, Mississippi State University. January 2014.

Wersal, R.M., J.D. Madsen, & J.C. Cheshier. 2010. Aquatic plant monitoring in Noxon Rapids Reservoir and Cabinet Gorge Reservoir for 2010. Geosystems Research Institute Report# 5042, 18p.