

RESERVOIR-WIDE PLANT SURVEY FOR CABINET GORGE AND NOXON RESERVOIRS, SANDERS COUNTY, MT - 2021

Findings from point-intercept and plot delineation surveys within the littoral zone of Cabinet Gorge and Noxon Reservoirs. Montana Fish, Wildlife, & Parks staff conducted the surveys in partnership with the Sanders County Invasive Plant Task Force during August 2021.



Prepared for: Board of
County Commissioners
Aquatic Invasive Plant Task
Force
Sanders County, Montana

By: Craig McLane
MT Fish, Wildlife, & Parks
1420 E 6th Ave
Helena, MT 59601
12/28/2021

DECEMBER 2021

Contents

Introduction	3
Methods.....	3
Results and Discussion	3
Cabinet Gorge Reservoir	3
Cabinet Gorge Plot Details	4
Cabinet Gorge Reservoir Sampling Details:	6
Noxon Rapids Reservoir	7
Noxon Rapids Plot Details.....	8
Noxon Rapids Reservoir Appendices	10
Comparison among years.....	11
Cabinet Gorge Reservoir	11
Noxon Rapids Reservoir	12
Appendices	
Appendix I – 2021 Montana Fish, Wildlife, & Parks Point- Intercept Survey Map Series for Cabinet Gorge Reservoir	
Appendix II – 2021 Montana Fish, Wildlife, & Parks Eurasian Watermilfoil Point and Plot Abundance Map Series for Cabinet Gorge Reservoir	
Appendix III – 2021 Montana Fish, Wildlife, & Parks Point-Intercept Survey Map Series for Noxon Rapids Reservoir	
Appendix IV – 2021 Montana Fish, Wildlife, & Parks Eurasian Watermilfoil Point and Plot Abundance Map Series for Noxon Rapids Reservoir	
Appendix V – 2021 Montana Fish, Wildlife, & Parks Point-Intercept Sampling Dataset for Cabinet Gorge Reservoir	
Appendix VI – 2021 Montana Fish, Wildlife, & Parks Point-Intercept Sampling Dataset for Noxon Rapids Reservoir	

Introduction

The Sanders County Invasive Plant Task Force has been managing the spread of Eurasian watermilfoil (*Myriophyllum spicatum*) on Noxon Rapids and Cabinet Gorge Reservoirs since 2008. As part of this management, the Task Force performed reservoir-wide surveys in many of the years following 2008. These surveys track the spread and occurrence of Eurasian watermilfoil (EWM) over time. In 2018, Montana Fish, Wildlife, & Parks (FWP) agreed to assist the Task Force with sampling work in both reservoirs to reduce cost burdens on the Task Force. The Task Force could then utilize freed up funds from other management costs. This was the first time FWP performed the surveys for the Task Force. The Task Force and FWP decided to perform this reservoir-wide survey again in 2021 and this report includes those findings.

Methods

The Sanders County Task Force provided FWP GIS data from previous sampling performed in 2017. Staff thought there were still holes in sampling efforts across the reservoir, so FWP staff recreated a sampling grid to provide a more reservoir-wide survey without gaps. FWP sampling in 2021 revisited sites from 2018. The point-intercept grid created was based on a grid of 400-meter intervals on Noxon Rapids Reservoir and 200-meter interval on Cabinet Gorge Reservoir. The reservoir-wide survey was completed from August 23-September 3, 2021. Pre-treatment survey data for potential plots performed in July, 2021 were not included in this report but can be found in the Noxon Rapids Reservoir and Cabinet Gorge Reservoir Herbicide Treatment Survey Report – 2021.

At each point the crews made two thatch rake tosses, one from each side of the boat. Plant species were identified down to species whenever possible. Sampling technicians gave each species present in the rake sample a “rake fullness” score from 0-5 (0 = not present, 5 = rake completely draped with a specific species). Points in deeper water outside the littoral zone were not sampled as it is unlikely to find macrophytes growing at that depth in these systems. Large EWM bed boundaries were delineated including delineations of beds recorded in previous survey efforts. Each bed was also given a density score of 0 to 5 (0= not present, 5= topped out plants with mostly EWM).

Results and Discussion

Maps with details for each point can be seen Appendices I-IV. Data sets of each lake can be seen in Appendices V and VI.

Cabinet Gorge Reservoir

Sampling crews collected a total of 182 sample points on Cabinet Gorge Reservoir. A total of 14 species were identified with 11 native species and 3 invasive species. The frequency of occurrence for each species can be seen in Table 1. Coontail (*Ceratophyllum demersum*) was the most prevalent species occurring in 52% of the sample points followed the native species elodea (*Elodea canadensis*) in 49% of the sample points. Eurasian watermilfoil is the most prevalent invasive species occurring in 31% of the sample points.

Scientific Name	Common Name	# of Locations	Percent Occurrence
No Species	no species found at point	57	31%
<i>Ceratophyllum demersum</i>	coontail	94	52%
<i>Elodea canadensis</i>	elodea	90	49%
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	56	31%
<i>Chara spp.</i>	muskgrass	7	4%
<i>Ranunculus aquatilis</i>	white water buttercup	7	4%
<i>Potamogeton crispus</i>	curlyleaf pondweed	3	2%
<i>Potamogeton richardsonii</i>	Richardson's pondweed	3	2%
<i>Sagittaria cuneata</i>	arumleaf arrowhead	2	1%
<i>Butomus umbellatus</i>	flowering rush	1	1%
<i>Myriophyllum sibiricum</i>	northern watermilfoil	1	1%
<i>Najas guadalupensis</i>	common water nymph	1	1%
<i>Potamogeton foliosus</i>	leafy pondweed	1	1%
<i>Potamogeton spp.</i>	unspecified pondweed	1	1%
<i>Potamogeton zosteriformis</i>	flatstem pondweed	1	1%
<i>Heteranthera dubia</i>	water stargrass	0	0%
<i>Isoetes spp.</i>	quillwort	0	0%
<i>Nitella spp.</i>	stonewort	0	0%
<i>Potamogeton amplifolius</i>	largeleaf pondweed	0	0%
<i>Potamogeton epihydrus</i>	Nuttall's pondweed	0	0%
<i>Potamogeton gramineus</i>	grassy pondweed	0	0%
<i>Potamogeton praelongus</i>	whitestem pondweed	0	0%
<i>Potamogeton vaginatus</i>	sheathed pondweed	0	0%
<i>Stuckenia pectinata</i>	sago pondweed	0	0%
<i>Vallisneria americana</i>	American eel-grass	0	0%
<i>Zannichellia palustris</i>	horned pondweed	0	
		Sample pts = 182	

Table 1 - Cabinet Gorge Reservoir species frequency table based on 182 sample points

Cabinet Gorge Plot Details

There are 275 acres of established EWM beds surveyed within Cabinet Gorge Reservoir. However, during 2021 surveys plots CAB_19 and CAB_27 did not contain EWM so roughly 272 acres of EWM beds exist within the reservoir. Beds were mapped as beds if there was at close to 0.1 acres (4,300 ft²) of EWM. There are many points where EWM was found but it was not in a dense bed and excluded from this calculation.

Plot	Subplot	Plot ID	Eurasian Watermilfoil Abundance	Years Treated	Plot Size (Acres)	SURVEYOR	COMMENTS
CAB_01	1	CAB_01.1	5	2014	16.3	Freeman, Abrams	
	2	CAB_01.2	1	2014	5.7	Freeman, Abrams	Contains part of treatment plot CAB30
	3	CAB_01.3	5	2014	35.7	Freeman, Abrams	Contains part of treatment plot CAB30
	4	CAB_01.4	1	2014	15.3	Freeman, Abrams	Contains part of treatment plot CAB30
	5	CAB_01.5	2	2014	0.8	Freeman, Abrams	Contains part of treatment plot CAB30
	6	CAB_01.6	5	2014	6.8	Freeman, Abrams	Contains part of treatment plot CAB30
	7	CAB_01.7	2	2014	2.3	Freeman, Abrams	Contains part of treatment plot CAB30
					82.8		
CAB_02	1	CAB_02.1	5	2014, 2015	65.2	Freeman, Abrams	
CAB_03	1	CAB_03.1	4	2014, 2015	14.2	Freeman, Abrams	
CAB_04	1	CAB_04.1	4	2014	5.1	Freeman, Abrams	EWM Bed varies between 5 and 3. Center of pink bed is the densest.
CAB_05	1	CAB_05.1	3	2014, 2019	0.3	Freeman, Abrams	
	2	CAB_05.2	1	2014, 2019	8.2	Freeman, Abrams	
	3	CAB_05.3	1	2014, 2019	9.0	Freeman, Abrams	
	4	CAB_05.4	3	2014, 2019	1.0	Freeman, Abrams	
					18.4		
CAB_06	1	CAB_06.1	1	2019, 2020	5.1	Freeman, Abrams	Very little
	2	CAB_06.2	3	2019, 2020	1.5	Freeman, Abrams	Sparse, intermittent
	3	CAB_06.3	3	2019, 2020	3.6	Freeman, Abrams	Sparse, intermittent
	4	CAB_06.4	4	2019, 2020	0.3	Freeman, Abrams	
					10.4		
CAB_08	1	CAB_08.1	1		3.4	Freeman, Abrams	Very little EWM
CAB_09	1	CAB_09.1	2		6.7	Freeman, Abrams	Very Little EWM
	2	CAB_09.2	3		0.6	Freeman, Abrams	
	3	CAB_09.3	1		5.0	Freeman, Abrams	Little EWM
	4	CAB_09.4	3		2.0	Freeman, Abrams	
					14.4		
CAB_10	1	CAB_10.1	3		0.9	Freeman, Abrams	
	2	CAB_10.2	1		4.4	Freeman, Abrams	Little EWM
	3	CAB_10.3	1		7.4	Freeman, Abrams	Almost no EWM
					12.7		
CAB_11	1	CAB_11.1	1		2.2	Freeman, Abrams	Almost no EWM
CAB_12	1	CAB_12.1	2	2018, 2019, 2020	1.9	Freeman, Abrams	Little EWM
CAB_13	1	CAB_13.1	3		0.8	Freeman, Abrams	
CAB_14	1	CAB_14.1	1		1.9	Freeman, Abrams	Very little EWM
	2	CAB_14.2	3		0.1	Freeman, Abrams	
					2.0		
CAB_15/33	1	CAB_15/33.1	1		8.0	Freeman, Abrams	Almost no EWM
CAB_16	1	CAB_16.1	4		1.6	Freeman, Abrams	
CAB_17	1	CAB_17.1	2		5.7	Freeman, Abrams	
CAB_18	1	CAB_18.1	3		2.1	Freeman, Abrams	Sparse EWM
CAB_19	1	CAB_19.1	0		0.6	Freeman, Abrams	Almost no EWM
CAB_20	1	CAB_20.1	2	2018	2.9	Freeman, Abrams	
CAB_21	1	CAB_21.1	0		2.2	Freeman, Abrams	Almost no EWM
CAB_22	1	CAB_22.1	2		0.1	Freeman, Abrams	Little EWM
CAB_24	1	CAB_24.1	2		1.9	Freeman, Abrams	Little EWM
CAB_25	1	CAB_25.1	2		1.9	Freeman, Abrams	Little EWM
CAB_26	1	CAB_26.1	1		6.2	Freeman, Abrams	Almost No EWM
CAB_27	1	CAB_27.1	0		1.9	Freeman, Abrams	No EWM observed; Deep water

Table 2 – Details of EWM abundances within defined plots on Cabinet Gorge Reservoir.

Plot	Subplot	Plot ID	Eurasian Watermilfoil Abundance	Years Treated	Plot Size (Acres)	SURVEYOR	COMMENTS
CAB_28	1	CAB_28.1	3		0.2	Freeman, Abrams	
	2	CAB_28.2	4		0.2	Freeman, Abrams	
					0.4		
CAB_29	1	CAB_29.1	1	2018, 2019	0.4	Freeman, Abrams	Almost no EWM
	2	CAB_29.2	3	2018, 2019	0.2	Freeman, Abrams	
					0.5		
CAB_34	1	CAB_34.1	4		0.05	Freeman, Abrams	
CAB_35	1	CAB_35.1	5		0.1	Freeman, Abrams	
CAB_36	1	CAB_36.1	4		0.1	Freeman, Abrams	
CAB_37	1	CAB_37.1	4		4.4	Freeman, Abrams	
CAB_38	1	CAB_38.1	3		0.2	Freeman, Abrams	
CAB_39	1	CAB_39.1	4		0.5	Freeman, Abrams	
CAB_40	1	CAB_40.1	4		0.02	Freeman, Abrams	
CAB_41	1	CAB_41.1	4		0.02	Freeman, Abrams	
CAB_42	1	CAB_42.1	2		0.04	Freeman, Abrams	Called CAB-30 in 2017 survey Renamed to differentiate from CAB30 Treatment Plot within CAB_01
Cabinet Gorge Plot Total					275.0		

Table 2 continued. Details of EWM abundances within defined plots on Cabinet Gorge Reservoir.

Cabinet Gorge Reservoir Sampling Details:

Additional details can be found in the following appendices to this report:

- Appendix I (Point-Intercept Map Series) contains both native and invasive species.
- Appendix II (EWM Abundance Map Series) contains shows details of points and beds with Eurasian watermilfoil abundances
- Appendix V contains the dataset with specifics of species abundances found at each sampling point.

Noxon Rapids Reservoir

Sampling crews collected a total of 292 sample points on Noxon Rapids Reservoir. A total of 21 species were identified with 18 native species and 3 invasive species. The frequency of occurrence for each species can be seen in Table 3. The invasive species Eurasian watermilfoil (*Myriophyllum spicatum*) was the most prevalent species occurring in 69% of the sample points followed by elodea (*Elodea canadensis*) occurring in 61% of the sample points followed by coontail (*Ceratophyllum demersum*) at 58%.

Scientific Name	Common Name	# of Locations	Percent Occurrence
No Species	no species found at point	23	8%
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	201	69%
<i>Elodea canadensis</i>	elodea	177	61%
<i>Ceratophyllum demersum</i>	coontail	170	58%
<i>Potamogeton richardsonii</i>	Richardson's pondweed	57	20%
<i>Potamogeton spp.</i>	unspecified pondweed	55	19%
<i>Ranunculus aquatilis</i>	white water buttercup	50	17%
<i>Butomus umbellatus</i>	flowering rush	45	15%
<i>Chara spp.</i>	muskgrass	26	9%
<i>Stuckenia pectinata</i>	sago pondweed	26	9%
<i>Potamogeton crispus</i>	curlleaf pondweed	20	7%
<i>Potamogeton foliosus</i>	leafy pondweed	20	7%
<i>Unidentified species</i>	Unidentified species	20	7%
<i>Potamogeton praelongus</i>	whitestem pondweed	10	3%
<i>Potamogeton zosteriformis</i>	flatstem pondweed	10	3%
<i>Najas guadalupensis</i>	common water nymph	7	2%
<i>Myriophyllum sibiricum</i>	northern watermilfoil	5	2%
<i>Vallisneria americana</i>	American eel-grass	5	2%
<i>Nitella spp.</i>	stonewort	4	1%
<i>Potamogeton gramineus</i>	grassy pondweed	1	0%
<i>Potamogeton vaginatus</i>	sheathed pondweed	1	0%
<i>Sagittaria cunneata</i>	arumleaf arrowhead	1	0%
<i>Heteranthera dubia</i>	water stargrass	0	0%
<i>Isoetes spp.</i>	quillwort	0	0%
<i>Potamogeton amplifolius</i>	largeleaf pondweed	0	0%
		Sample pts=292	

Table 3- Noxon Rapids Reservoir species frequency table based on 292 sample points

Noxon Rapids Plot Details

There are 481 acres of established EWM beds surveyed within Noxon Rapids Reservoir. However, during 2021 surveys plots NOX_12, NOX_48.1, NOX_61, and NOX_69 did not contain enough EWM to be considered a bed so roughly 457 acres of EWM beds exist within the reservoir. Beds were mapped as beds if there was at close to 0.1 acres (4,300 ft²) of EWM. There are many points where EWM was found but it was not in a dense bed and excluded from this calculation.

Plot	Subplot	Plot ID	Eurasian Watermilfoil Abundance	Years Treated	Plot Size (Acres)	SURVEYOR	COMMENTS
NOX_01/45	1	NOX_01/45.1	5	2009, 2013, 2016, 2019, 2021	19.9	Freeman, Abrams	
	2	NOX_01/45.2	2	2009, 2013, 2016, 2019, 2021	11.0	Freeman, Abrams	
					30.9		
NOX_02	1	NOX_02.1	2	2012, 2016, 2019, 2021	7.7	Freeman, Abrams	
	2	NOX_02.2	2	2012, 2016, 2019, 2021	6.3	Freeman, Abrams	
					14.0		
NOX_03/ 37/59	1	NOX_03/ 37/59.1	5	2009, 2013, 2015, 2018, 2019, 2020, 2021	14.8	Freeman, Abrams	
	2	NOX_03/ 37/59.2	2	2009, 2013, 2015, 2018, 2019, 2020, 2021	3.1	Freeman, Abrams	
	3	NOX_03/ 37/59.3	5	2009, 2013, 2015, 2018, 2019, 2020, 2021	2.5	Freeman, Abrams	
					20.3		
NOX_04	1	NOX_04.1	2	No Treatments	7.4	Freeman, Abrams	
	2	NOX_04.2	2	2012, 2015, 2016, 2018, 2019, 2020, 2021	13.6	Freeman, Abrams	
					21.0		
NOX_05	1	NOX_05.1	5	2012, 2015, 2018, 2019	22.0	Freeman, Abrams	Contains part of treatment plot NOX77
	2	NOX_05.2	2	2012, 2015, 2018, 2019	0.0	Freeman, Abrams	Contains part of treatment plot NOX77
	3	NOX_05.3	2	2012, 2015, 2018, 2019	0.0	Freeman, Abrams	Contains part of treatment plot NOX77
	4	NOX_05.4	2	2012, 2015	0.1	Freeman, Abrams	Contains part of treatment plot NOX77
	5	NOX_05.5	5	2012, 2015	19.7	Freeman, Abrams	Couldn't Access- estimated at a distance
					41.9		
NOX_06	1	NOX_06.1	4	2012, 2015	13.6	Freeman, Abrams	
	2	NOX_06.2	5	2012, 2015	1.5	Freeman, Abrams	
					15.1		
NOX_07	1	NOX_07.1	5	2010, 2016	3.4	Freeman, Abrams	
	2	NOX_07.2	1	2010, 2016	5.0	Freeman, Abrams	
	3	NOX_07.3	5	2010, 2016	0.2	Freeman, Abrams	
	4	NOX_07.4	5	2010, 2016	10.0	Freeman, Abrams	
					18.7		
NOX_08	1	NOX_08.1	2	2010, 2012, 2014, 2015, 2016	11.3	Freeman, Abrams	

Table 4– Details of EWM abundances within defined plots on Noxon Rapids Reservoir.

Plot	Subplot	Plot ID	Eurasian Watermilfoil Abundance	Years Treated	Plot Size (Acres)	SURVEYOR	COMMENTS
NOX_09	1	NOX_09.1	5	2012	3.1	Freeman, Abrams	
NOX_10	1	NOX_10.1	2	2012, 2015, 2016	13.1	Freeman, Abrams	
NOX_11	1	NOX_11.1	5	2012, 2019	2.1	Freeman, Abrams	
	2	NOX_11.2	5	2012, 2019	3.1	Freeman, Abrams	
	3	NOX_11.3	4	2012, 2019	2.1	Freeman, Abrams	
	4	NOX_11.4	2	2012, 2019	13.3	Freeman, Abrams	
					20.5		
NOX_12	1	NOX_12.1	0	2012	16.8	Freeman, Abrams	
NOX_24	1	NOX_24.1	1	2012	3.8	Freeman, Abrams	
NOX_30	1	NOX_30.1	5	2013, 2016	4.6	Freeman, Abrams	
NOX_31	1	NOX_31.1	1	2010, 2013, 2014, 2016, 2018, 2019, 2020	0.9	Freeman, Abrams	
	2	NOX_31.2	3	2010, 2013, 2014, 2016, 2018, 2019, 2020	0.1	Freeman, Abrams	
	3	NOX_31.3	2	2010, 2013, 2014, 2016, 2018, 2019, 2020	0.1	Freeman, Abrams	
	4	NOX_31.4	2	2010, 2013, 2014, 2016, 2018, 2019, 2020	0.7	Freeman, Abrams	
	5	NOX_31.5	3	2010, 2013, 2014, 2016, 2018, 2019, 2020	0.1	Freeman, Abrams	
					1.9		
NOX_42	1	NOX_42.1	5	2013	0.7	Freeman, Abrams	
NOX_43/44	1	NOX_43/44.1	2	2013	32.0	Freeman, Abrams	
	2	NOX_43/44.2	5	2013	1.4	Freeman, Abrams	
					33.3		
NOX_46	1	NOX_46.1	5	2013	2.7	Freeman, Abrams	
NOX_48	1	NOX_48.1	0	2018, 2019	0.4	Freeman, Abrams	Contains part of treatment plot NOX79
	2	NOX_48.2	1	2018, 2019	2.0	Freeman, Abrams	Contains part of treatment plot NOX79
	3	NOX_48.3	1	No treatments	1.6	Freeman, Abrams	Contains part of treatment plot NOX79
	4	NOX_48.4	1	2018, 2019	81.8	Freeman, Abrams	Contains part of treatment plot NOX79
	5	NOX_48.5	1	No treatments	21.3	Freeman, Abrams	
	6	NOX_48.6	1	No treatments	5.3	Freeman, Abrams	
	7	NOX_48.7	4	No treatments	5.6	Freeman, Abrams	
	8	NOX_48.8	5	No treatments	2.6	Freeman, Abrams	Contains part of treatment plot NOX79
					120.7		
NOX_50	1	NOX_50.1	2	No treatments	18.6	Freeman, Abrams	
	2	NOX_50.2	5	No treatments	0.2	Freeman, Abrams	
	3	NOX_50.3	5	No treatments	3.9	Freeman, Abrams	
					22.8		
NOX_52	1	NOX_52.1	2	No treatments	0.7	Freeman, Abrams	
	2	NOX_52.2	1	2018, 2019	0.4	Freeman, Abrams	
	3	NOX_52.3	1	2018, 2019	1.4	Freeman, Abrams	
	4	NOX_52.4	2	2018, 2019	0.6	Freeman, Abrams	
					3.0		

Table 4 continued. Details of EWM abundances within defined plots on Noxon Rapids Reservoir.

Plot	Subplot	Plot ID	Eurasian Watermilfoil Abundance	Years Treated	Plot Size (Acres)	SURVEYOR	COMMENTS
NOX_54	1	NOX_54.1	2	2014	2.5	Freeman, Abrams	
NOX_56	1	NOX_56.1	5	2015	1.6	Freeman, Abrams	
NOX_57	1	NOX_57.1	5	2015	7.4	Freeman, Abrams	
NOX_60	1	NOX_60.1	5		3.4	Freeman, Abrams	
NOX_61	1	NOX_61.1	0		0.2	Freeman, Abrams	
NOX_63	1	NOX_63.1	2		0.8	Freeman, Abrams	
	2	NOX_63.2	5		0.1	Freeman, Abrams	
					0.9		
NOX_66	1	NOX_66.1	2	2018, 2019	2.5	Freeman, Abrams	Contains treatment plot 78
NOX_67	1	NOX_67.1	1		0.6	Freeman, Abrams	
NOX_68	1	NOX_68.1	2		0.6	Freeman, Abrams	
NOX_69	1	NOX_69.1	0		6.4	Freeman, Abrams	
NOX_70	1	NOX_70.1	2		2.6	Freeman, Abrams	
NOX_71	1	NOX_71.1	2		5.0	Freeman, Abrams	
	2	NOX_71.2	5		1.1	Freeman, Abrams	
	3	NOX_71.3	5		0.6	Freeman, Abrams	
					6.7		
NOX_72	1	NOX_72.1	4		2.6	Freeman, Abrams	
NOX_73	1	NOX_73.1	1	2019, 2021	0.4	Freeman, Abrams	
NOX_74	1	NOX_74.1	2		1.2	Freeman, Abrams	
NOX_75	1	NOX_75.1	2		1.4	Freeman, Abrams	
	2	NOX_75.2	5		1.1	Freeman, Abrams	
					2.5		
NOX_76	1	NOX_76.1	3		0.3	Freeman, Abrams	
NOX_77	1	NOX_77.1	5	2018, 2019	2.8	Freeman, Abrams	
NOX_80	1	NOX_80.1	5		0.6	Freeman, Abrams	
NOX_81	1	NOX_81.1	5		0.1	Freeman, Abrams	
NOX_82	1	NOX_82.1	5		0.9	Freeman, Abrams	
NOX_83	1	NOX_83.1	5		0.5	Freeman, Abrams	
NOX_84	1	NOX_84.1	5		2.6	Freeman, Abrams	
NOX_85	1	NOX_85.1	5		1.3	Freeman, Abrams	
NOX_86	1	NOX_86.1	5		0.5	Freeman, Abrams	
NOX_87	1	NOX_87.1	5		2.9	Freeman, Abrams	
NOX_88	1	NOX_88.1	3		7.5	Freeman, Abrams	No levels provided so listed as average- Next survey will need to reassess
Noxon Rapids Plot Totals					481.8		

Table 4 continued. Details of EWM abundances within defined plots on Noxon Rapids Reservoir.

Noxon Rapids Reservoir Appendices

Additional details can be found in the following appendices to this report:

- Appendix III (Point-Intercept Map Series) contains both native and invasive specie
- Appendix IV (EWM Abundance Map Series) contains shows details of points and beds with Eurasian watermilfoil abundances
- Appendix VI contains the dataset with specifics of species abundances found at each sampling point.

Comparison among years

Cabinet Gorge Reservoir

Table 3 contains a comparison among years for each species. EWM was found at locations comparable to levels in 2014 which is lower than results from 2017 and 2018. Curlyleaf pondweed was found at much lower levels and show a general decrease in occurrence since 2014. Flowering rush was found sporadically throughout the reservoir generally in patchy populations.

Cabinet Gorge Reservoir	Year	2014	2017	2018	2021	2014	2017	2018	2021
	# Sampling Locations	335	152	175	182	335	152	175	182
Scientific Name	Common Name	Sampling locations w/ species detected				Percent of sampling locations with species detected			
No Species detected	No Species detected		79	65	57	-	52%	37%	31%
<i>Butomus umbellatus</i>	flowering rush	6	1	4	1	2%	1%	2%	1%
<i>Ceratophyllum demersum</i>	coontail	61	91	90	94	18%	60%	51%	52%
<i>Chara spp.</i>	muskgrass	8	13	12	7	2%	9%	7%	4%
<i>Elodea canadensis</i>	elodea	65	62	100	90	19%	41%	57%	49%
<i>Heteranthera dubia</i>	water stargrass	1	0	1	0	0%	0%	1%	0%
<i>Isoetes spp.</i>	quillwort	1	0	2	0	0%	0%	1%	0%
<i>Myriophyllum sibiricum</i>	northern watermilfoil	27	9	9	1	8%	6%	5%	1%
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	52	69	86	56	16%	45%	49%	31%
<i>Najas spp.</i>	waternymph species	0	1	0	1	0%	1%	0%	1%
<i>Nitella spp.</i>	stonewort	0	0	4	0	0%	0%	2%	0%
<i>Potamogeton amplifolius</i>	largeleaf pondweed	0	0	2	0	0%	0%	1%	0%
<i>Potamogeton crispus</i>	curlyleaf pondweed	26	14	11	3	8%	9%	6%	2%
<i>Potamogeton epihydrus</i>	ribbon-leaved pondweed	0	0	0	0	0%	0%	0%	0%
<i>Potamogeton foliosus</i>	leafy pondweed	35	24	13	1	10%	16%	7%	1%
<i>Potamogeton gramineus</i>	variableleaf pondweed	0	0	0	0	0%	0%	0%	0%
<i>Potamogeton illinoensis</i>	Illinois pondweed	16	6	0	0	5%	4%	0%	0%
<i>Potamogeton praelongus</i>	whitestem pondweed	2	13	0	0	1%	9%	0%	0%
<i>Potamogeton richardsonii</i>	Richardson's pondweed	42	22	18	3	13%	15%	10%	2%
<i>Potamogeton spp.</i>	unspecified pondweed	0	0	1	1	0%	0%	1%	1%
<i>Potamogeton vaginatus</i>	sheathed pondweed	0	0	3	0	0%	0%	2%	0%
<i>Potamogeton zosteriformis</i>	flatstem pondweed	29	12	1	1	9%	8%	1%	1%
<i>Ranunculus aquatilis</i>	white water buttercup	29	3	9	7	9%	2%	5%	4%
<i>Sagittaria cuneata</i>	arumleaf arrowhead	0	0	1	2	0%	0%	1%	1%
<i>Stuckenia pectinata</i>	sago pondweed	13	12	4	0	4%	8%	2%	0%
<i>Vallisneria americana</i>	American eel-grass	0	0	0	0	0%	0%	0%	0%
<i>Zannichellia palustris</i>	horned pondweed	0	0	0	0	0%	0%	0%	0%

Table 5 – Comparison of species occurrences among years 2014, 2017, 2018, 2021 for each species found on Cabinet Gorge Reservoir.

Noxon Rapids Reservoir

Table 4 contains a comparison among years for each species. EWM was found at locations like levels in 2018 which is much higher than results from 2014 and 2017. Curlyleaf pondweed was found at much lower levels compared to 2018. Flowering rush was found throughout the reservoir in slightly lower levels compared to 2018.

Noxon Rapids Reservoir	Year	2014	2017	2018	2021	2014	2017	2018	2021
	# Sampling Locations	228	235	299	292	228	235	299	292
Scientific Name	Common Name	Sampling locations w/ species detected				Percent of sampling locations with species detected			
No Species detected	No Species detected		101	42	23		43%	14%	8%
<i>Butomus umbellatus</i>	flowering rush	57	16	52	45	25%	7%	17%	15%
<i>Ceratophyllum demersum</i>	coontail	81	114	195	170	36%	49%	65%	58%
<i>Chara spp.</i>	muskgrass	37	19	47	26	16%	8%	16%	9%
<i>Elodea canadensis</i>	elodea	87	68	183	177	38%	29%	61%	61%
<i>Heteranthera dubia</i>	water stargrass	26	10	1	0	11%	4%	0.3%	0%
<i>Isoetes spp.</i>	quillwort	0	0	0	0	0%	0%	0%	0%
<i>Myriophyllum sibiricum</i>	northern watermilfoil	87	26	64	5	38%	11%	21%	2%
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	65	89	201	201	29%	38%	67%	69%
<i>Najas spp.</i>	waternymph species	0	2	2	7	0%	1%	1%	2%
<i>Nitella spp.</i>	stonewort	0	0	0	4	0%	0%	0%	1%
<i>Potamogeton amplifolius</i>	largeleaf pondweed	0	0	1	0	0%	0%	0.3%	0%
<i>Potamogeton crispus</i>	curlyleaf pondweed	48	42	85	20	21%	18%	28%	7%
<i>Potamogeton epihydrus</i>	ribbon-leaved pondweed	0	0	5	0	0%	0%	2%	0%
<i>Potamogeton foliosus</i>	leafy pondweed	30	30	72	20	13%	13%	24%	7%
<i>Potamogeton gramineus</i>	variableleaf pondweed	0	0	2	1	0%	0%	1%	0%
<i>Potamogeton illinoensis</i>	Illinois pondweed	8	7	0	0	4%	3%	0%	0%
<i>Potamogeton praelongus</i>	whitestem pondweed	2	4	14	10	1%	2%	5%	3%
<i>Potamogeton richardsonii</i>	Richardson's pondweed	34	24	60	57	15%	10%	20%	20%
<i>Potamogeton spp.</i>	unspecified pondweed	0	0	40	55	0%	0%	13%	19%
<i>Potamogeton vaginatus</i>	sheathed pondweed	0	0	2	1	0%	0%	1%	0%
<i>Potamogeton zosteriformis</i>	flatstem pondweed	6	4	0	10	3%	2%	0%	3%
<i>Ranunculus aquatilis</i>	white water buttercup	39	12	21	50	17%	5%	7%	17%
<i>Sagittaria cuneata</i>	arumleaf arrowhead	0	1	2	1	0%	0.4%	1%	0%
<i>Stuckenia pectinata</i>	sago pondweed	45	26	28	26	20%	11%	9%	9%
<i>Vallisneria americana</i>	American eel-grass	1	1	0	5	0.4%	0.4%	0%	2%
<i>Zannichellia palustris</i>	horned pondweed	0	0	1	0	0%	0%	0.3%	0%

Table 6 – Comparison of species occurrences among years 2014, 2017, 2018, 2021 for each species found in Noxon Rapids Reservoir