NOXON RAPIDS RESERVOIR SANDERS COUNTY, MONTANA

2013 Aquatic Invasive Species Control Program

At Time of and Eight (8) Week Post Treatment Submerged Aquatic Vegetation (SAV) Data





www.cleanlake.com

Prepared For: MSU Extension/Sanders County 2504 Tradewinds Way, Suite 1B Thompson Falls, MT 59873

September 2013

NOXON RAPIDS RESERVOIR, SANDERS COUNTY, MONTANA 2013 Aquatic Invasive Species Control Program At Time of and Eight (8) Week Post Treatment Submerged Aquatic Vegetation (SAV) Data *1 of 35*

BACKGROUND INFORMATION: Clean Lakes, Inc. (CLI) was contracted by Sanders County, Montana to provide aquatic herbicide applications for the control of Aquatic Invasive Species (AIS) within specific areas of Noxon Rapids Reservoir. The aquatic herbicide applications were performed on July 23rd, 24th, 25th and 31st, 2013¹.

SUBMERGED AQUATIC VEGETATION (SAV) SURVEYS: During the aquatic herbicide applications, CLI collected Submerged Aquatic Vegetation (SAV) data that included the

vegetation percent area cover (PC) and vegetation bio-volume (BV) within the majority of the treatment areas. On August 19th and 20th, 2013, CLI staff (McNabb and Moorhouse) toured the Cabinet Gorge Reservoir and the Noxon Rapids Reservoir EWM plots with Dr. Bill Haller, University of Florida and Bo Burns, Valent Corporation. On September 19th 2013, CLI staff (McNabb & Moorhouse) collected Post Treatment SAV data from the 2013 treatment plots on Noxon Rapids Reservoir for comparison purposes. Kim Bergstrom, Pinnacle Research and Dr. Michael Anderson, University of California Riverside were present for the survey. Celestine Duncan planned on participating, but her trip was interrupted due to morning fog. The At Time of Treatment and the Post Treatment comparison data is outlined in this report.



This information contained in this report is for observation uses only. Sanders County hired a third party contractor to perform a Pre and Post Treatment Point Intercept survey, and develop the Pre and Post Treatment efficacy evaluations and reports to document the 2013 EWM Control Program.



¹ 2013 AIS Aquatic Pesticide Application Report (APAR) prepared by Clean Lakes, Inc. NOXON RAPIDS RESERVOIR, SANDERS COUNTY, MONTANA 2013 Aquatic Invasive Species Control Program At Time of and Eight (8) Week Post Treatment Submerged Aquatic Vegetation (SAV) Data 2 of 35

EQUIPMENT USED: CLI's state-of-the-art Littoral Zone Treatment vessels (LittLines®)

equipped with a Digital Echosounder System with a Structure Scan Module was used to record data of the submerged aquatic





vegetation (SAV) profile in the control plots during treatment, and at approximately eight (8) weeks Post Treatment (September 19th 2013). Data was collected in both the .SLG (traditional

sonar on HDS line) and the .SL2 (multi-channel structure scan) formats.



The data collected was processed for At Time of Treatment and Post Treatment SAV data in the treatment plots. Data was collected to evaluate At Time of Treatment SAV coverage, height in the water column, and bio-volume to support Post Treatment efficacy observations. The observations are outlined in Table 2 below. Table 1 outlines the areas treated for reference purposes.

It should be noted that a Post Treatment increase in Submerged Aquatic Vegetation (SAV) Percent Area Coverage, height in the water column, and bio-volume can result, and be attributed to an increase in native vegetation, as is the case in the majority of the plots treatment on Noxon Rapids Reservoir.

TREATMENT SITE DATA

2013 No	oxon Rapid Freatment 1	s Reservoir Plots	Dic	quat	Tri	iclopyr	Endothall	
Plot Number	Acreage	Mean Depth	Rate ppm	Qty Site	Rate ppm	Qty Total Site	Rate ppm	Qty Total Site
T-13-10	1.2	6.70	0.37	4.0				
T-13-17	4.1	8.00	0.37	16.2				
T-13-21	1.6	6.00	0.37	4.7				
T-13-25	5.1	4.60			1.00	21	2.0	30
T-13-26	6.7	9.00	0.37	30.2				
T-13-27	5.1	6.00	0.37	15.2				
T-13-28 b	20.9	4.60			1.00	87	1.0	62
T-13-28 a	21.4	6.25			1.00	121	2.0	171
T-13-30	74.4	7.00			1.00	471	2.0	663
T-13-31 a	9.1	7.00			1.00	58	2.0	82
T-13-31 b	2.1	7.00			1.00	13	2.0	19
T-13-32	18.6	8.00			1.00	135	2.0	190
T-13-0903	14.9	5.00			1.00	67	2.0	95
Sub Total	185.1			70.2		974		1312
T-13-11	1.4	Spot Treatment						0.7
T-13-14	1.9	"		0.3				
Total	188.3			70.5		974		1313

Table 1: Plots Treated on Noxon Rapids Reservoir, Treatment Site Data, Aquatic Herbicides Used:

2013 No	von Ranid	s Beservoir	AIS Treatmo	nt Plots. At 7	Time of and F	ight (8) Wook	Post Plot S	V % Cover s	nd SAV
2015 110		5 Kesel voli	Als freathe	BioVo	lume Data	ight (0) week	1 05t 1 10t 52	1 /0 Cover a	
								Post	
						Date Data		Treatment	
	SAV	SAV		SAV		Collected-		EWM	
Plot	Percent	Bio-	Date Data	Percent	SAV Bio-	Post	% BV	Injury	Herbicides
Number	Cover	Volume	Collected	Cover	Volume	Treatment	Change	Rank	Used
T-13-10	N/A	N/A	7/23/2013	84.60	46.3	9/19/2013	N/A	40+-	Diquat
T-13-17	78.50	24.80	7/23/2013	70.40	45.9	9/19/2013	85%	90+	Diquat
T-13-21	90.50	62.00	7/23/2013	85.90	58.8	9/19/2013	-5%	90 +	Diquat
T-13-25	84.00	53.80	7/24/2013	78.00	59.3	9/19/2013	10%	50+-	End/Tri
T-13-26	54.00	35.10	7/23/2013	48.30	22.8	9/19/2013	-35%	90 +	Diquat
T-13-27	95.00	51.90	7/23/2013	N/A	N/A	9/19/2013	N/A	90+	Diquat
T-13-28b	100.00	99.90	7/24/2013	N/A	N/A	9/19/2013	N/A	90 +	End/Tri
T-13-28 a	89.80	61.20	7/31/2013	57.00	41.6	9/19/2013	-32%	90 +	End/Tri
T-13-30	92.10	71.40	7/25/2013	37.30	9.1	9/19/2013	-87%	90 +	End/Tri
T-13-31 a	72.30	58.20	7/25/2013	63.90	33.3	9/19/2013	-43%	90 +	End/Tri
T-13-31 b	75.10	50.10	7/25/2013	86.70	55.7	9/19/2013	11%	90 +	End/Tri
T-13-32	69.10	45.90	7/24/2013	44.00	31.6	9/19/2013	-31%	90+	End/Tri
T-13-0903	92.20	65.10	7/31/2013	67.80	42.0	9/19/2013	-35%	90+	End/Tri
T-13-11	N/A	N/A	N/A					70+-	End
T-13-14	N/A	N/A	N/A					70+-	Diquat

Table 2: Plots Treated: Percent SAV Cover and SAV Bio-Volume at Time of Treatment andEight (8) Weeks Post Treatment, Post Treatment EWM Injury Rank Data

Note: Herbicides Used: End/Tri = Combination of Endothall and Triclopyr

* Plot T-13-10 SAV Percent Cover and Bio-Volume Data Not Available At Time of Treatment: Plots T-13-27 and T-13-28 b Percent Cover and Bio-Volume Data Not Available Eight Week Post Treatment due to a data collection error.

**Post Treatment EWM Injury Rank is the observers (McNabb, Moorhouse) visual estimate of herbicide injury to the EWM on September 19th 2013, approximately eight (8) weeks Post Treatment.

EWM CONTROL OBSERVATIONS/NOTES:

- The EWM in Plot T-13-10 was injury ranked at +-40. This may be associated with shallow water and turbidity created by the application vessel, or water flow conditions at this site. As Diquat binds with sediment, the aquatic herbicide Clipper, which is a fast acting contact herbicide, maybe an appropriate option to evaluate for EWM control in some of these shallow water areas in 2014.
- The EWM in Plot T-13-25 was ranked at +-50. Control in this area should have been higher, and similar to control levels achieved in the majority of the plots. The conditions that limited control in this area are unknown.
- Of the 185.2 acres treated using the LittLine system, the level of control achieved in 6.3 acres (T-13-10 (1.2 acres) and T-13-25 (5.1 acres)), or 3.4% of the areas treated did not meet the desired results, while the level of control achieved in 178.9 acres treated, or 96.6% of the areas treated resulted in excellent control.

• Plots T-13-11 and T-13-14 were spot treated with Aquathol K and Diquat respectively. The herbicide application in these plots entailed the placement of the herbicide directly onto the EWM plants (spot treatments). Control in these plots was ranked at +-70, and thus this spot treatment method may not be an effective application option, when compared to an excellent control level in +-96.6 % of the areas treated. Diver dredging of small EWM patches may result in a higher level of control.

CURLYLEAF PONDWEED (CLP) OBSERVATIONS/NOTES:

- In the open water Plot 2 treated in 2012, the CLP was actively growing +- 2-3 foot below the surface. The turion's had leaves growing off of them (top picture to the right). Not sure if this CLP is late season 2013 regrowth, as we recall the CLP we saw in late July during the treatments was dying back (waiting for Madsen to comment following his survey of Noxon in late August, early September 2013).
- In Plot T-13-32 that was treated on July 24th 2013, the Turion's were sprouting (bottom picture to the right).
- To date, the EWM/CLP herbicide application timing has not been able to catch the CLP prior to turion production.
- Based on the above, an early spring or late season treatment to catch new growth after the turions have sprouted may be the way to attack this plant in the Noxon Rapids.

FLOWERINGS RUSH OBSERVATIONS:

• The flowering rush in the treatment plots appeared to have been impacted from the control efforts. 2014 Post Treatment Surveys will confirm any residual control.









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PROJECT AREA AERIALS AND PRE AND POST TREATMENT SAV DATA

SAV PERCENT COVER AND BIO-VOLUME DATA SETS

Plots T-13-10, 11*, 14* & 17



*Plot T-13-11 and T-13-14 were spot treated, and the SAV data in the Plots was not recorded at the time of treatment

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Plots T-13-10 Eight Week Post Treatment

VEGETATION ANALYSIS REPORT

report link

Noxon Reservoir, Sanders County Montana

Generated: 9/20/2013 11:51:39 PM (UTC)

Waterbody Size: 3,241.65 ha (8,010.30 acres)



Data Co	llector	Survey S	ize	Settings		
Thomas	McNabb	Area:	1.49 ha	Track Buff	er:	25 m
Data Co	llection Date	Percent	(3.67 acres) 0.05% of waterbody	Grid Cell Si Min RV De	ze: tect	5 m
9/19/201	3 9:10:18 PM (UTC)	Volume:	48,656.90 cu. m	Min. Veg D	epth Detect:	0.73152 m
Average	e Water Temperature		(39.45 acre ft)	Quality Co	ontrol	
21.54° C	(70.76* F)			Reviewer:	McCormack, lan	
Locatio	n			Status:	Passed	
Start:	47.77724075, -115.48442078					
End:	47.77342224, -115.48387146					

Area of Interest Summary

AOI ?	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
1	Point	84.5%	46.3%	±29.9%	39.1%	±32.2%	0.37-7.79 m	2.08 m	449.92 m	702
	Grid	97.8%	39.1%	±21.5%	38.3%	±22%	0.08-7.99 m	3.32 m	12	651

Vegetation Biovolume Heat Map

Biovolume Distribution Scatter Chart i Data 100 90 80 70 (%) 60 olumo 50 Bio 40 30 20 10 0 0 2 3 Depth (m)

NOXON RAPIDS RESERVOIR, SANDERS COUNTY, MONTANA 2013 Aquatic Invasive Species Control Program At Time of and Eight (8) Week Post Treatment Submerged Aquatic Vegetation (SAV) Data 8 of 35

Biovolume Distribution Scatter Chart

Plots T-13-17 At Time of Treatment

VEGETATION ANALYSIS REPORT Noxon Reservoir, Sanders County Montana Generated: 8/2/2013 1:52:31 PM (UTC) Waterbody Size: 3,229.58 ha (7,980.50 acres) report link Average Water Temperature Data Collector Survey Size Thomas McNabb Area: 2.98 ha 25.31° C (77.57° F) (7.40 acres) Data Collection Date Location Percent 0.09% of waterbody 7/23/2013 10:18:22 PM (UTC) Start: 47.79731369, -115.50480652 Volume: 274,739.00 cu. m 47.79701233, -115.50534821 End: (222.70 acre ft)

Survey Summary

	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
Full	Point	78.5%	24.8%	±17.3%	19.5%	±18.4%	0.54-27.6 m	6.69 m	984.4 m	573
Survey	Grid	74.3%	22.2%	±11.7%	16.5%	±14%	0.02-29.42 m	9.04 m	100	896

Area of Interest Summary

AOI ?	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
1	Point	82.9%	25%	±17.6%	20.7%	±18.6%	0.54-10.16 m	2.72 m	642.01 m	515
	Grid	98.6%	24.1%	±11.4%	23.7%	±11.7%	0.02-9.96 m	3.12 m		571
2	Point	39.7%	20.7%	±9.4%	8.2%	±11.7%	5.19-27.6 m	20.98 m	205.23 m	58
	Grid	35.8%	14.1%	±8%	5.1%	±8.3%	0.75-29.42 m	18.49 m	172	346

Vegetation Biovolume Heat Map



Biovolume Distribution Scatter Chart



NOXON RAPIDS RESERVOIR, SANDERS COUNTY, MONTANA 2013 Aquatic Invasive Species Control Program At Time of and Eight (8) Week Post Treatment Submerged Aquatic Vegetation (SAV) Data

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Plot T-13-17 Eight Week Post Treatment

Noxon Reservoir, Sanders County Montana

VEGETATION ANALYSIS REPORT

report link

25 m

5 m

5%

0.73152 m

Generated: 9/20/2013 11:42:07 PM (UTC)

Waterbody Size: 3,241.65 ha (8,010.30 acres)



Data Co	llector	Survey S	ize
Thomas	McNabb	Area:	1
Data Co	lection Date		(4
Data CO	liection bate	Percent:	0.
9/19/201	3 8:53:51 PM (UTC)	Volume:	6
Averag	e Water Temperature		(5
21.87° C	(71.37° F)		
Locatio	n		
Start:	47.79813766, -115.50534058		
End:	47.79790878, -115.50527191		

S	ize	Settings	
	1.76 ha	Track Buffer:	
	(4.34 acres)	Grid Cell Size:	
	0.05% of waterbody	Min. BV Detect:	
	61,968.50 cu. m (50.24 acre ft)	Min. Veg Depth Detect:	
		Quality Control	
		Reviewer: McCormack, lan	
		Status: Passed	

Area of Interest Summary

AOI ?	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
1	Point	70.4%	35.9%	±19.4%	25.2%	±23.1%	0.58-5.46 m	2.95 m	449.92 m	737
	Grid	93.4%	26.6%	±14.1%	24.8%	±15.1%	0.01-5.59 m	3.43 m	4	502

Vegetation Biovolume Heat Map

EV' 100 50





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Plot T-13-21 At Time of Treatment



VEGETATION ANALYSIS REPORT

Noxon Reservoir, Sanders County Montana

Generated: 8/1/2013 2:22:45 PM (U

report

Waterbody Size: 3,229.58 ha (7,980.50 acres)



Data Collector	Survey S	ize	Averag	e Water Temperature
Thomas McNabb	Area:	1.54 ha (3.80 acres)	25.79° C	(78.42° F)
Data Collection Date	Percent	0.05% of waterbody	Locatio	n
7/23/2013 10:39:41 PM (UTC)	Volume:	18.604.00 cu. m	Start:	47.82943726, -115.55797577
		(15.10 acre ft)	End:	47.83123016, -115.55854034

Biovolume Distribution Scatter Chart

Area of Interest Summary

AOI ?	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
1	Point	90.5%	62%	±34.1%	56.1%	±37.2%	0.36-5.07 m	1.18 m	378.55 m	274
	Grid	100%	57.2%	±24.7%	57.2%	±24.7%	0-4.82 m	1.09 m	-	594

Vegetation Biovolume Heat Map



Biovolume Analysis by Quantity

Plot T-13-21 Eight Week Post Treatment



VEGETATION ANALYSIS REPOR

Noxon Reservoir, Sanders County Montana

Generated: 9/20/2013 11:49:13 PM (UTC

report lin

Waterbody Size: 3,241.65 ha (8,010.30 acres)



Data Co	llector	Survey S	Size	Settings		
Thomas	McNabb	Area:	1.34 ha	Track Buff	ier:	25 m
Data Co	Data Collection Date		(3.31 acres) 0.04% of waterbody	Gnd Cell Size: Min. BV Detect: Min. Veg Depth Detect:		5 m
9/19/2013 9:54:57 PM (UTC)		Volume:	17,728.30 cu. m			0.73152 m
Average	e Water Temperature		(14.37 acre ft)	Quality Co	ontrol	
22.1° C ((71.78° F)			Reviewer:	McCormack, lan	
Locatio	n			Status:	Passed	
Start:	47.82967377, -115.55809021					
End:	47.83180237, -115.55822754					

Area of Interest Summary

AOI ?	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
1	Point	85.9%	58.8%	±32.8%	50.5%	±36.7%	0.66-5.59 m	1.61 m	255.95 m	562
	Grid	99.6%	53.2%	±20.1%	53%	±20.3%	0.01-5.44 m	1.21 m	1	530

Vegetation Biovolume Heat Map

Biovolume Distribution Scatter Chart



NOXON RAPIDS RESERVOIR, SANDERS COUNTY, MONTANA 2013 Aquatic Invasive Species Control Program At Time of and Eight (8) Week Post Treatment Submerged Aquatic Vegetation (SAV) Data

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Plot T-13-32 & T-13-0903



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Plot T-13-32 At Time of Treatment

VEGETATION ANALYSIS REPO Noxon Reservoir, Sanders County Montana Generated: 9/23/2013 10:06:42 PM (I Waterbody Size: 3,241.65 ha (8,010.30 acres) Data Collector



Data Collector	Survey S	iize	Settings	
Thomas McNabb	Area:	9.24 ha	Track Buffer:	25 m
Data Collection Date	Percent:	0.29% of waterbody	Min. BV Detect	5%
7/24/2013 4:00:33 PM (UTC)	Volume:	525,668.50 cu. m	Min. Veg Depth Detect:	0.73152 m
Average Water Temperature		(426.17 acre π)		
23.9° C (75.02° F)				
Location				

repor

Location Start 47.85894012, -115.65982819 End: 47.85909271, -115.66033936

Survey Summary

	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
Full	Point	69.1%	45.9%	±29.6%	31.7%	±32.5%	0.4-17.44 m	5.73 m	5.08 km	2,508
Survey	Grid	79.8%	44.1%	±28%	35.2%	±30.7%	0-17.85 m	5.69 m	121	2,702

Area of Interest Summary

AOI ?	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
1	Point	80.2%	59.3%	±28.2%	47.5%	±34.6%	0.43-17.44 m	4.84 m	1.39 km	908
	Grid	75.2%	48.7%	±27.1%	36.6%	±31.5%	0-17.85 m	6.12 m	-	1,273
2	Point	80.4%	49.5%	±26.8%	39.8%	±31%	0.4-11.84 m	4.01 m	534.93 m	332
	Grid	91.7%	43.3%	±23.7%	39.7%	±25.6%	0-12.32 m	4.64 m	-	782
3	Point	58.3%	31.5%	±25%	18.3%	±24.6%	0.5-12.75 m	6.86 m	2.69 km	1,268
	Grid	75.4%	39.7%	±27.8%	29.9%	±29.6%	0-17.6 m	5.96 m	-	2,115

Vegetation Biovolume Heat Map

Biovolume Distribution Scatter Chart



Biovolume Analysis by Quantity

NOXON RAPIDS RESERVOIR, SANDERS COUNTY, MONTANA 2013 Aquatic Invasive Species Control Program At Time of and Eight (8) Week Post Treatment Submerged Aquatic Vegetation (SAV) Data 15 of 35

Plot T-13-32 Eight Week Post Treatment

Survey Size Area: Percent 0 Volume: 2

Noxon Reservoir, Sanders County Montana

Waterbody Size: 3,241.65 ha (8,010.30 acres)



Data Co	llector
Thomas	McNabb
Data Co	llection Date
9/19/201	3 7:56:59 PM (UTC)
Average	e Water Temperature
21.77° C	(71.18° F)
Locatio	n
Start:	47.85977936, -115.66572571
End:	47.86049652, -115.65409851

47.86049652, -115.65409851

VEGETATION ANALYSIS REPORT

Generated: 9/20/2013 11:54:32 PM (UTC)

report link

	Settings	
30 ha	Track Buffer:	25 m
(8.05 acres)	Grid Cell Size:	5 m
23% of waterbody	Min. BV Detect:	5%
39,467.50 cu. m 194.14 acre ft)	Min. Veg Depth Detect:	0.73152 m
	Quality Control	
	Reviewer: McCormack	, lan
	Status: Passed	

Area of Interest Summary

AOI ?	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
1	Point	44%	31.6%	±30.6%	13.9%	±25.7%	0.7-8.57 m	2.46 m	1.92 km	2,194
	Grid	52%	24.3%	±20.6%	12.7%	±19.2%	0-8.73 m	3.15 m	2	2,227



Biovolume Analysis by Quantity

NOXON RAPIDS RESERVOIR, SANDERS COUNTY, MONTANA 2013 Aquatic Invasive Species Control Program At Time of and Eight (8) Week Post Treatment Submerged Aquatic Vegetation (SAV) Data 16 of 35

Plot T-13-0903 At Time of Treatment

Noxon Reservoir, Sanders County Montana

Waterbody Size: 3,241.65 ha (8,010.30 acres)



Data Co	Data Collector		Size	Settings	
Thomas	McNabb	Area:	3.04 ha	Track Buffer:	25 m
Data Collection Date 7/31/2013 7:17:17 PM (UTC)			(7.50 acres)	Grid Cell Size:	5 m
		Percent	0.09% of waterbody	Min. BV Detect:	5%
		Volume:	29,209.10 cu. m	Min. Veg Depth Detect:	0.73152 m
Averag	e Water Temperature		(23.68 acre ft)		
26.27° C	(79.29° F)				
Locatio	n				
Start:	47.86210251, -115.64325714				
End:	47 86170578 -115 63846588				

47.86170578, -115.63846588

Survey Summary

	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
Full	Point	92.2%	65.1%	±30.2%	60.1%	±33.9%	0.36-3.4 m	1.12 m	763.74 m	322
Survey	Grid	100%	74.4%	±22.2%	74.4%	±22.2%	0.3-3.03 m	0.94 m	121	715

Area of Interest Summary

AOI ?	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
1	Point	89.5%	60%	±32.4%	53.7%	±35.7%	0.36-1.64 m	0.79 m	365.79 m	105
	Grid	100%	76.1%	±24.4%	76.1%	±24.4%	0.34-1.48 m	0.8 m	1. T. (450
2	Point	93.5%	67.5%	±28.9%	63.2%	±32.5%	0.41-3.4 m	1.48 m	370.12 m	217
	Grid	100%	70.3%	±19.1%	70.3%	±19.1%	0.3-3.03 m	1.03 m		449

Vegetation Biovolume Heat Map

Biovolume Analysis by Quantity

Biovolume Distribution Scatter Chart



NOXON RAPIDS RESERVOIR, SANDERS COUNTY, MONTANA 2013 Aquatic Invasive Species Control Program At Time of and Eight (8) Week Post Treatment Submerged Aquatic Vegetation (SAV) Data 17 of 35

VEGETATION ANALYSIS REPORT

Generated: 9/23/2013 10:11:34 PM (UTC)

report link

Plot T-13-0903 Eight Week Post Treatment



Noxon Reservoir, Sanders County Montana

VEGETATION ANALYSIS REPORT

Generated: 9/20/2013 11:39:16 PM (UTC)

report link

Waterbody Size: 3,241.65 ha (8,010.30 acres)



Data Co	llector
Thomas	McNabb
Data Co	llection Date
9/19/201	3 8:22:56 PM (UTC)
Averag	e Water Temperature
21.93° C	(71.47° F)
Locatio	n
Start:	47.86210251, -115.64437866

End:

Survey Size

Area:

4.46 ha

Percent: 0.14% of waterbody

Volume: 73,650.50 cu. m

(11.03 acres)

(59.71 acre ft)

47.86200714, -115.64334106

Settings	
Track Buffer:	25 m
Grid Cell Size:	5 m
Min. BV Detect:	5%
Min. Veg Depth Detect:	0.73152 m

Reviewer: McCormack, lan Passed Status:

Area of Interest Summary

AOI ?	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
1	Point	67.8%	42%	±33.1%	28.4%	±33.6%	0.34-8.72 m	1.46 m	1.27 km	1,200
	Grid	92.1%	51.8%	±32.8%	47.7%	±34.5%	0.05-8.58 m	1.5 m	1	959

Vegetation Biovolume Heat Map





Plot T-13-25 & 26



19 of 35

Plot T-13-25 At Time of Treatment



VEGETATION ANALYSIS REPORT

Noxon Reservoir, Sanders County Montana

Generated: 8/2/2013 1:35:05 AM (UTC)

report link

Waterbody Size: 3,229.58 ha (7,980.50 acres)



Data Collector	Survey Siz
Thomas McNabb	Area:
Data Collection Date	Percent
7/24/2013 5:52:39 PM (UTC)	Volume:

rea:	3.46 ha
	(8.60 acres)
ercent:	0.11% of waterbody
olume:	52,193.00 cu. m
	(42.30 acre ft)

e

Average Water Temperature 24.34° C (75.81° F)

Location

Start: 47.88171005, -115.74265289 End: 47.8816185, -115.74314117

Area of Interest Summary

AOI ?	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
1	Point	84%	53.8%	±33.2%	45.2%	±36.3%	0.38-6.08 m	1.61 m	1.33 km	693
	Grid	92.2%	72.1%	±23.4%	66.5%	±29.7%	0-9.04 m	1.41 m	-	843

Vegetation Biovolume Heat Map







NOXON RAPIDS RESERVOIR, SANDERS COUNTY, MONTANA 2013 Aquatic Invasive Species Control Program At Time of and Eight (8) Week Post Treatment Submerged Aquatic Vegetation (SAV) Data 20 of 35

Plot T-13-25 Eight Week Post Treatment

VEGETATION ANALYSIS REPORT Noxon Reservoir, Sanders County Montana Generated: 9/20/2013 11:14:39 PM (UTC) Waterbody Size: 3,241.65 ha (8,010.30 acres) report link Data Collector Survey Size Settings Thomas McNabb 3.20 ha Track Buffer. 25 m Area: (7.90 acres) Grid Cell Size: 5 m Data Collection Date 0.1% of waterbody Percent: Min. BV Detect: 5% 9/19/2013 7:02:17 PM (UTC) Volume: 51,734.70 cu. m Min. Veg Depth Detect: 0.73152 m (41.94 acre ft) Average Water Temperature **Quality Control** 20.96° C (69.73° F) Reviewer: McCormack, lan Status: Passed 1 Location Start: 47.88163757, -115.74336243 End: 47.88077545, -115.74993134

Area of Interest Summary

AOI ?	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
1	Point	78%	59.3%	±37.1%	46.2%	±40.9%	0.38-5.96 m	1.31 m	899.93 m	1,341
	Grid	92.4%	40.2%	±25.4%	37.2%	±26.6%	0.01-5.91 m	1.42 m	141	858



Biovolume Analysis by Quantity

NOXON RAPIDS RESERVOIR, SANDERS COUNTY, MONTANA 2013 Aquatic Invasive Species Control Program At Time of and Eight (8) Week Post Treatment Submerged Aquatic Vegetation (SAV) Data 21 of 35

Plot T-13-26 At Time of Treatment



VEGETATION ANALYSIS REPORT

Noxon Reservoir, Sanders County Montana

Generated: 8/2/2013 2:48:04 PM (UTC)

report link

Waterbody Size: 3,229.58 ha (7,980.50 acres)



Data Collector	Survey S	ize	Averag	e Water Temperature		
Thomas McNabb	Area:	3.61 ha (8.90 acres)	25.69° C (78.24° F)			
Data Collection Date	Percent	Percent: 0.11% of waterbody		Location		
7/23/2013 11:54:08 PM (UTC)	Volume:	85.133.00 cu. m	Start:	47.88191605, -115.72554016		
	volume.	(69.00 acre ft)	End:	47.88121033, -115.73638153		

Biovolume Distribution Scatter Chart

Area of Interest Summary

AOI ?	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
1	Point	54%	35.1%	±21.8%	19%	±23.7%	0.51-6.01 m	2.41 m	845.52 m	604
	Grid	81%	27.7%	±15.3%	22.4%	±17.5%	0.01-7.3 m	2.09 m	-	891

Vegetation Biovolume Heat Map

Biovolume Distribution Scatter Chart Data 100 90 80 70 (%) 60 omu 50 Biov 40 30 20 10 0 Depth (m)

NOXON RAPIDS RESERVOIR, SANDERS COUNTY, MONTANA 2013 Aquatic Invasive Species Control Program At Time of and Eight (8) Week Post Treatment Submerged Aquatic Vegetation (SAV) Data 22 of 35

Plot T-13-26 Eight Week Post Treatment

3.40 ha (8.39 acres) 0.1% of waterbody 83,523.10 cu. m (67.71 acre ft)

BIOFBASE

Noxon Reservoir, Sanders County Montana

Waterbody Size: 3,241.65 ha (8,010.30 acres)



Data Co	llector	Survey S	ize
Thomas	McNabb	Area:	3
Data Co	llection Date	Percent	0
9/19/201	3 6:29:07 PM (UTC)	Volume:	8
Averag	e Water Temperature		(6
21.29° C	(70.31° F)		
Locatio	n		
Start:	47.8819809, -115.72570038		
End	47 001 4C070 11E 70700700		

47.88146973, -115.73793793

VEGETATION ANALYSIS REPORT

Generated: 9/20/2013 10:50:07 PM (UTC)

report link

Settings		
Track Buff	er:	25 m
Grid Cell Si	ze:	5 m
Min. BV De	tect:	5%
Min. Veg D	epth Detect:	0.73152 m
Quality Co	introl	
Reviewer:	McCormack, lan	
Status:	Passed	

Area of Interest Summary

AOI ?	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
1	Point	48.3%	22.8%	±20.3%	11%	±18.1%	0.35-6.62 m	2.25 m	1.05 km	1,066
	Grid	69.1%	25.2%	±22.1%	17.4%	±21.7%	0.01-7.83 m	2.3 m	-	960

Vegetation Biovolume Heat Map

Biovolume Distribution Scatter Chart



Biovolume Analysis by Quantity

NOXON RAPIDS RESERVOIR, SANDERS COUNTY, MONTANA 2013 Aquatic Invasive Species Control Program At Time of and Eight (8) Week Post Treatment Submerged Aquatic Vegetation (SAV) Data 23 of 35



Plots T-13-27, 28 (a) & 28 (b)



Plot T-13-27 At Time of Treatment



VEGETATION ANALYSIS REPORT

Generated: 8/2/2013 12:34:06 AM (UTC)

Noxon Reservoir, Sanders County Montana

report link

Waterbody Size: 3,229.58 ha (7,980.50 acres)



Data Collector	Survey Size		Average Water Temperature		
Thomas McNabb	s McNabb Area:		26.63° C	(79.94° F)	
Data Collection Date	Percent	0.06% of waterbody	Location		
7/23/2013 11:19:14 PM (UTC)	Volume:	24.839.00 cu. m	Start:	47.89736557, -115.70691681	
		(20.10 acre ft)	End:	47.89706421, -115.70662689	

Area of Interest Summary

AOI ?	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
1	Point	95%	51.9%	±25%	49.3%	±26.8%	0.39-4.54 m	2.39 m	448.08 m	280
	Grid	100%	72.6%	±25.3%	72.6%	±25.3%	0.1-4.45 m	1.44 m	-	292

Vegetation Biovolume Heat Map



Biovolume Distribution Scatter Chart



Biovolume Analysis by Quantity

NOXON RAPIDS RESERVOIR, SANDERS COUNTY, MONTANA 2013 Aquatic Invasive Species Control Program At Time of and Eight (8) Week Post Treatment Submerged Aquatic Vegetation (SAV) Data 25 of 35

Plot T-13-28(a) At Time of Treatment

Noxon Reservoir, Sanders County Montana

Waterbody Size: 3,241.65 ha (8,010.30 acres)



	Data Collector	Survey S	lize	Settings	
	Thomas McNabb	Area:	7.75 ha	Track Buffer:	25 m
	Data Collection Data		(19.16 acres)	Grid Cell Size:	5 m
	bata collection bate	Percent:	0.24% of waterbody	Min. BV Detect:	5%
	7/31/2013 4:38:34 PM (UTC)	Volume:	165,001.30 cu. m	Min. Veg Depth Detect:	0.73152 m
5	Average Water Temperature		(133.77 acre ft)		
5	24.26° C (75.67° F)				
4	Location				
	Start. 47.90089798, -115.70613861				

d: 47.90179443, -115.70614624

Survey Summary

	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
Full	Point	89.8%	61.2%	±26.7%	55%	±31.4%	0.36-5.45 m	2.3 m	3.89 km	1,506
Survey	Grid	94.3%	69.2%	±27.5%	65.3%	±31.2%	0.1-5.65 m	2.07 m		1,748

Area of Interest Summary

AOI ?	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
1	Point	85.5%	38.8%	±19.4%	33.2%	±22.5%	2.16-5.45 m	3.73 m	101.42 m	145
	Grid	93.4%	47.8%	±28.1%	44.7%	±29.6%	0.82-5.65 m	3.37 m		152
2	Point	90.8%	56.3%	±27.5%	51.1%	±30.9%	0.39-3.85 m	1.73 m	783.86 m	206
	Grid	93.1%	68%	±27.7%	63.3%	±31.8%	0.1-4.35 m	1.67 m	(m)	568
3	Point	84.2%	71.1%	±31.5%	59.9%	±38.8%	0.45-4.54 m	1.85 m	551.55 m	203
	Grid	93.8%	75.7%	±30.2%	71%	±34.5%	0.1-4.22 m	1.46 m	100	640
4	Point	91.4%	63.5%	±24.5%	58%	±29.4%	0.36-4.41 m	2.4 m	1.78 km	952
	Grid	92.9%	64.1%	±26.4%	59.5%	±30.3%	0.1-5.65 m	2.38 m	23	1,291

Vegetation Biovolume Heat Map



VEGETATION ANALYSIS REPORT Generated: 9/23/2013 10:13:14 PM (UTC)

report link

Biovolume Analysis by Quantity

NOXON RAPIDS RESERVOIR, SANDERS COUNTY, MONTANA 2013 Aquatic Invasive Species Control Program At Time of and Eight (8) Week Post Treatment Submerged Aquatic Vegetation (SAV) Data 26 of 35

Plot T-13-28(a) Eight Week Post Treatment

Noxon Reservoir, Sanders County Montana

Waterbody Size: 3,241.64 ha (8,010.30 acres)



Data Co	llector
Thomas	McNabb
Data Co	llection Date
9/19/201	3 5:58:06 PM (UTC)
Average	e Water Temperature
20.98° C	(69.77* F)
Locatio	n
Start:	47.90477371, -115.70618439
End:	47.90281677, -115.70788574



report link

Generated: 9/20/2013 10:21:06 PM (UTC)

VEGETATION ANALYSIS REPORT

25 m
5 m
5%
0.73152 m
Ê.

Passed

Area of Interest Summary

AOI ?	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
1	Point	57%	41.6%	±29.7%	23.7%	±30.5%	0.35-4.08 m	1.86 m	800 m	1,647
	Grid	74.5%	32.2%	±17.1%	24%	±20.4%	0.33-4.06 m	2.03 m	1.20	809

Vegetation Biovolume Heat Map

Biovolume Distribution Scatter Chart



Biovolume Analysis by Quantity

NOXON RAPIDS RESERVOIR, SANDERS COUNTY, MONTANA 2013 Aquatic Invasive Species Control Program At Time of and Eight (8) Week Post Treatment Submerged Aquatic Vegetation (SAV) Data

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Plot T-13-28(b) At Time of Treatment*

Naterbody Size: 3,241.65 ha (8,010.30 acres) Data Collector Survey Size Settings Thomas McNabb Data Collector Track Buffer: (11.56 acres) Settings Data Collection Date 724/2013 6:15:25 PM (UTC) Percent: 0.14% of waterbody Waterbody Average Water Temperature 26.04° C (78.08° F) Percent: 0.14% of waterbody Min. Veg Depth Contion Start: 47.90517807, -115.70926666 End: 47.9039788, -115.71079254 Percent: 0.14% of waterbody Min. Veg Depth Full Point 100% 99.9% ±0% 99.9% ±0% 99.9% ±0% 0.31-3.64 m 1.51 m 0.65 m Crid 100% 99.9% ±0% 99.9% ±0% 99.9% ±0% 0.02-1.2 m 0.65 m 0.65 m Area of Interest Summary Area of Interest Summary Area of Interest Summary 208 VP ? SD BVP ? Avg BVP ? SD BVP ? Avg BVP ? Ng BPH I Area of Interest Summary Area of Interest Summary Avg BVP ? SD BVP ? Avg BVP ? SD BVP ? Avg BVP ? Ng BPH I Area of Interest Summary Avg BVP ? SD BVP ? Avg BVP ? SD BVP ?	: 25 r c: 5 m ct 5% th Detect: 0.73 Distance No. Pa 1.29 km 65 - 344	gs Buffer: I Size: I Detect: eg Depth Detect: Distance 1.29 km	Settings Track Buff Grid Cel S Min. Veg D Min. Veg D	ha 6 acres) 6 of waterbody 3.80 cu. m 7 acre ft) Depth Range	Survey Size Area: 4.88 hi (11.56 Percent 0.14% Volume: 59,293 (48.07	c) ature -115.70926666 -115.71079254	ollector s McNabb ollection Date 113 6:15:25 FM (UTC ge Water Temper C (78.88° F) on 47.90517807, 47.90398788,	Data C Thoma: Data C Thoma: Data C 7/24/20 Avera: 26.04" Locati Start: End:	1.65 ha (8,010.	ody Size: 3,24
Data Collector Survey Size Settings Thomas McNabb Area: 4.68 ha Grid Cel Size Data Collection Date 7/24/2018 51:525 PM (UTC) Percent: 0.14% of waterbody Min. BV Deter Volume: 50/293.80 cu. m (48.07 acre ft) Min. BV Deter Average Water Temperature 26.04° C (78.88° F) (48.07 acre ft) Min. Veg Dep Location Start: 47.90398788, -115.71079254 SD BVw ? Depth Range Avg Depth Full Point 100% 99.9% ±0% 99.9% ±0% 0.31-3.64 m 1.51 m Survey Summary Area of Interest Summary Area of Interest Summary 0.65 m 0.65 m 0.65 m 0.71-12 m 0.65 m 0.71 - 12 m 0.65 m 0.71 - 12 m 0.69 m 1	: 25 r : 5 m ct 5% th Detect: 0.73 Distance No. Pe 1.29 km 65 - 344	gs Buffer: #I Size: / Detect: eg Depth Detect: Distance 1.29 km	Settings Track Buff Grid Cel S Min. BV De Min. Veg D Min. Veg D	ha 5 acres) 6 of waterbody 13.80 cu. m 7 acre ft) Depth Range	Survey Size Area: 4,88 h (11.56 Percent: 0.14% Volume: 59,293 (48.07	2) ature -115.70926666 -115.71079254	ollector s McNabb ollection Date 113 6:15:25 PM (UT(ge Water Temper C (78.88 ⁺ F) on 47.90517807, 47.90398788,	Data C Thoma: Data C 7/24/20 Avera: 26.04* Locati Start: End:	nmary	Survey Sur
Data Collector Survey Size Settings Thomas McHabb Thomas McHabb Area: 4.68 ha Track Buffer. Data Collection Date Thomas McHabb Percent: 0.14% of waterbody. Min. BV Dete Average Water Temperature 26.04° C (78.85° F) Percent: 0.14% of waterbody. Min. Veg Dep Coation Stat: 47.90517807, -115.70926666 End: 47.90398788, -115.71079254 SD BVw ? Depth Range Avg Depth Full Point 100% 99.9% ±0% 99.9% ±0% 0.31-3.64 m 1.51 m Cridit 100% 99.9% ±0% 99.9% ±0% 0.02-1.2 m 0.85 m Area of Interest Summary Avg BVp ? SD BVp ? Avg BVw ? SD BVw ? Depth Range Avg Depth Area of Interest Summary Avg BVp ? SD BVp ? Avg BVw ? SD BVw ? Depth Range Avg Depth Area of Interest Summary Avg BVp ? SD BVp ? Avg BVw ? SD BVw ? Depth Range Avg Depth Area of Interest Summary	25 r 25 r 5 m 5 m ct 5 % th Detect: 0.73 Distance No. Pr 1.29 km 65 - 344	gs Suffer: ell Size: Doetect eg Depth Detect: Distance 1.29 km	Settings Track Buff Grid Cell S Min. BV De Min. Veg D Min. Veg D	ha 6 acres) 6 of waterbody 13.80 cu. m 7 acre ft) Depth Range	Survey Size Area: 4.68 h (11.56 Percent: 0.14% Volume: 59,293 (48.07	-115.70926666 -115.71079254	ollector s McNabb ollection Date 113 6:15:25 PM (UTC ge Water Temper C (78.88* F) on 47.90517807, 47.90398788,	Data C Thoma: Data C 7/24/20 Avera: 26.04* Locati Start: End:	nmary	Super Sur
Thomas McNabb Area: 4.68 ha Track Buffer: Data Collection Date (11.56 acres) Grid Cell Size 724/2013 6:15.25 PM (UTC) Average Water Temperature 25.04° C (78.85° F) Average Water Temperature 25.04° C (78.85° F) (48.07 acre ft) Location Survey Summary Survey Summary Full Point 100% 99.9% ±0% 99.9% ±0% 0.31-3.64 m 1.51 m Grid 100% 99.9% ±0% 99.9% ±0% 0.02-1.2 m 0.65 m Area of Interest Summary Area of Interest Summary Area of 99.9% ±0% 0.31-3.64 m 1.51 m Area of Interest Summary Area of 99.9% ±0% 99.9% ±0% 0.32-1.2 m 0.65 m Area of Interest Summary Area of 99.9% ±0% 99.9% ±0% 0.37-1.21 m 0.69 m 1 1 Point 100% 99.9% ±0% 90.9% ±0% 0.37-1.21 m 0.69 m 2	E 25 r S m ct 5 w th Detect 0.73 Distance No. Pe 1.29 km 65 - 344	Buffer: ell Size: / Detect: gg Depth Detect: Distance 1.29 km	Track Buff Grid Cell S Min. Veg D Min. Veg D	ha 5 acres) 6 of waterbody (3.80 cu. m 7 acre ft) Depth Range	Area: 4.88 hr (11.56 Percent: 0.14% Volume: 59,293 (48.07	-115.70926666 -115.71079254	s McNabb ollection Date 113 6:15:25 PM (UTC ge Water Temper C (78.88* F) on 47.90517807, 47.90398788,	Thomas Data C 7/24/20 Averay 26.04* Locati Start: End:	nmary	Support Sur
Data Collection Date Percent: 0.14% of valerbody Min. BV Deter Min. BV Deter 7/24/2013 6:15.25 PM (UTC) Average Water Temperature 26.04° C (78.86° F) Volume: 59,293.80 cu. m Min. Veg Dep Average Water C (78.86° F) Location Start: 47.90398788, -115.70926666 End: 47.90398788, -115.71079254 Volume: 59,293.80 cu. m Min. Veg Dep Survey Summary Survey Summary Survey Summary Avg BVp ? SD BVp ? Avg BVw ? SD BVw ? Depth Range Avg Depth Full Point 100% 99.9% ±0% 99.9% ±0% 0.31-3.64 m 1.51 m Grid 100% 99.9% ±0% 99.9% ±0% 0.02-1.2 m 0.65 m Area of Interest Summary Xong BVp ? SD BVp ? Avg BVw ? SD BVw ? Depth Range Avg Depth Mage 1 Point 100% 99.9% ±0% 0.37-1.21 m 0.69 m 2	E. 5 m ct 5% hth Detect: 0.73 Distance No. Pe 1.29 km 65 - 344	Josec: / Detect: g Depth Detect: Distance 1.29 km	Avg Depth	o actes) of waterbody (3.80 cu. m 7 acre ft) Depth Range	Percent: 0.14% Volume: 59,293 (48.07	c) ature -115.70926666 -115.71079254	ollection Date 113 6:15:25 PM (UTI ge Water Temper C (78.88* F) on 47.90517807, 47.90398788,	Data C 7/24/20 Avera 26.04* Locati Start: End:	nmary	Survey Sur
Type ? PAC ? Avg BVp ? SD BVp ? Avg BVw ? SD BVw ? Depth Range Avg Depth Full 100% 99.9% ±0% 99.9% ±0% 0.31-3.64 m 1.51 m Crid 100% 99.9% ±0% 99.9% ±0% 0.02-1.2 m 0.65 m Area of Interest Summary Crid 100% 99.9% ±0% 99.9% ±0% 0.37-1.21 m 0.69 m 2 1 Point 100% 99.9% ±0% 99.9% ±0% 0.37-1.21 m 0.69 m 2	Distance No. Pe 1.29 km 65 - 344	Distance 1.29 km	Min. Veg D Avg Depth	13.80 cu. m 7 acre ft) Depth Range	Volume: 59,293 (48.07	c) ature -115.70926666 -115.71079254	013 6:15.25 PM (UTI ge Water Temper C (78.88* F) on 47.90517807, 47.90398788,	7/24/20 Avera 26.04* Locati Start: End:	nmary	Survey Sur
Average Water Temperature (48.07 acre ft) 26.04* C (78.88* F) Location Start: 47.90517607, -115.70926666 End: 47.90398788, -115.71079254 Survey Summary Type ? PAC ? Avg BVp ? SD BVp ? Avg BVw ? SD BVw ? Depth Range Avg Depth Futturvey Point 100% 99.9% ±0% 99.9% ±0% 0.31-3.64 m 1.51 m Area of Interest Summary Avg BVp ? SD BVp ? Avg BVw ? SD BVw ? Depth Range Avg Depth Point 100% 99.9% ±0% 99.9% ±0% 0.37-1.21 m 0.69 m 2 Point 100% 99.9% ±0% 99.9% ±0% 0.37-1.21 m 0.69 m 2	Distance No. Po 1.29 km 65 - 344	Distance 1.29 km	Avg Depth	7 acre ft) Depth Range	(48.07	ature -115.70926666 -115.71079254	ge Water Temper C (78.88* F) on 47.90517807, 47.90398788,	Avera 26.04* Locati Start: End:	nmary	Sunov Su
Z6.04*C (78.88*F) Location Stat:: 47.90517607, -115.70926666 End:: 47.90398788, -115.71079254 Survey Summary Type ? PAC ? Avg BVp ? SD BVp ? Avg BVw ? SD BVw ? Depth Range Avg Depth Fut Point 100% 99.9% ±0% 99.9% ±0% 0.31·3.64 m 1.51 m Area of Interest Summary Area of Interest Summary SD BVp ? Avg BVw ? SD BVw ? Depth Range Avg Depth Point 100% 99.9% ±0% 99.9% ±0% 0.37·1.21 m 0.69 m 2 Point 100% 99.9% ±0% 99.9% ±0% 0.37·1.21 m 0.69 m 2	Distance No. Po 1.29 km 65 - 344	Distance 1.29 km	Avg Depth	Depth Range	SD B1/w 2	-115.70926666 -115.71079254	C (78.88° F) on 47.90517807, 47.90398788,	26.04* Locati Start: End:	nmary	
Survey Summary Type ? PAC ? Avg BVp ? SD BVp ? Avg BVw ? SD BVw ? Depth Range Avg Depth Full Point 100% 99.9% ±0% 99.9% ±0% 0.31·3.64 m 1.51 m Area of Interest Summary Area of Interest Summary SD BVp ? Avg BVw ? SD BVw ? Depth Range Avg Depth 1 Point 100% 99.9% ±0% 99.9% ±0% 0.37·1.21 m 0.69 m 1	Distance No. Po 1.29 km 65 - 344	Distance 1.29 km	Avg Depth	Depth Range	SD B\/w 2	-115.70926666 -115.71079254	on 47.90517807, 47.90398788,	Locati Start End:	nmary	Survey Su
Survey Summary Type ? PAC ? Avg BVp ? SD BVp ? Avg BVw ? SD BVw ? Depth Range Avg Depth Full Point 100% 99.9% ±0% 99.9% ±0% 0.31-3.64 m 1.51 m Grid 100% 99.9% ±0% 99.9% ±0% 0.02-1.2 m 0.65 m Area of Interest Summary N ? Type ? PAC ? Avg BVp ? SD BVp ? Avg BVw ? SD BVw ? Depth Range Avg Depth 1 Point 100% 99.9% ±0% 99.9% ±0% 0.37-1.21 m 0.69 m 1	Distance No. Po 1.29 km 65 - 344	Distance 1.29 km	Avg Depth	Depth Range	SD B1/w 2	-115.70926666 -115.71079254	47.90517807, 47.90398788,	Start: End:	nmary	Survey Sur
Ent: 47.90398788, -115.71079254 Survey Summary Type ? PAC ? Avg BVp ? SD BVp ? Avg BVw ? SD BVw ? Depth Range Avg Depth Full print 100% 99.9% ±0% 99.9% ±0% 0.31-3.64 m 1.51 m Grid 100% 99.9% ±0% 99.9% ±0% 0.02-1.2 m 0.65 m Area of Interest Summary N ? Type ? PAC ? Avg BVp ? SD BVp ? Avg BVw ? SD BVw ? Depth Range Avg Depth I 1 Point 100% 99.9% ±0% 99.9% ±0% 0.37-1.21 m 0.69 m 2	Distance No. Po 1.29 km 65 - 344	Distance 1.29 km	Avg Depth	Depth Range	SD BV/w 2	-115.71079254	47.90398788,	End:	nmary	SUIVEV SU
Survey Summary Type ? PAC ? Avg BVp ? SD BVp ? Avg BVw ? SD BVw ? Depth Range Avg Depth Full prvey Point 100% 99.9% ±0% 99.9% ±0% 0.31-3.64 m 1.51 m Grid 100% 99.9% ±0% 99.9% ±0% 0.02-1.2 m 0.65 m Area of Interest Summary DI ? Type ? PAC ? Avg BVp ? SD BVp ? Avg BVw ? SD BVw ? Depth Range Avg Depth I 1 Point 100% 99.9% ±0% 99.9% ±0% 0.37-1.21 m 0.69 m 2	Distance No. Po 1.29 km 65 - 344	Distance 1.29 km	Avg Depth	Depth Range	SD Bl/w 2				nmary	SUIVEN SU
Survey Summary Type ? PAC ? Avg BVp ? SD BVp ? Avg BVw ? SD BVw ? Depth Range Avg Depth Full urvey Point 100% 99.9% ±0% 99.9% ±0% 0.31-3.64 m 1.51 m Grid 100% 99.9% ±0% 99.9% ±0% 0.02-1.2 m 0.65 m Area of Interest Summary Avg BVp ? SD BVp ? Avg BVw ? SD BVw ? Depth Range Avg Depth I 0I ? Type ? PAC ? Avg BVp ? SD BVp ? Avg BVw ? SD BVw ? Depth Range Avg Depth I 1 Point 100% 99.9% ±0% 99.9% ±0% 0.37-1.21 m 0.69 m 2	Distance No. Po 1.29 km 65 - 344	Distance 1.29 km	Avg Depth	Depth Range	SD Bl/w 2				nmary	Survey Sur
Full NUTVey Point 100% 99.9% ±0% 99.9% ±0% 0.31-3.64 m 1.51 m Grid 100% 99.9% ±0% 99.9% ±0% 0.02-1.2 m 0.65 m Area of Interest Summary OI ? Type ? PAC ? Avg BVp ? SD BVp ? Avg BVw ? SD BVw ? Depth Range Avg Depth I 1 Point 100% 99.9% ±0% 99.9% ±0% 0.37-1.21 m 0.69 m 3	1.29 km 65 - 344	1.29 km			30 0 4 4	Avg BVw ?	SD BVp ?	Avg BVp ?	PAC ?	Type ?
urvey Grid 100% 99.9% ±0% 99.9% ±0% 0.02-1.2 m 0.65 m Area of Interest Summary Area of Interest Summary SD BVp ? Avg BVw ? SD BVw ? Depth Range Avg Depth I 1 Point 100% 99.9% ±0% 99.9% ±0% 0.37-1.21 m 0.69 m 2	- 344		1.51 m	0.31-3.64 m	±0%	99.9%	±0%	99.9%	100%	Point
Area of Interest Summary 01 ? Type ? PAC ? Avg BVp ? SD BVp ? Avg BVw ? Depth Range Avg Depth I 1 Point 100% 99.9% ±0% 0.37-1.21 m 0.69 m 2		121	0.65 m	0.02-1.2 m	±0%	99.9%	±0%	99.9%	100%	Grid
OI ? Type ? PAC ? Avg BVp ? SD BVp ? Avg BVw ? SD BVw ? Depth Range Avg Depth I 1 Point 100% 99.9% ±0% 99.9% ±0% 0.37-1.21 m 0.69 m 2								imary	erest Sumr	Area of Inte
1 Point 100% 99.9% ±0% 99.9% ±0% 0.37-1.21 m 0.69 m 2	Distance No. Po	Distance	Avg Depth	Depth Range	SD BVw ?	Avg BVw ?	SD BVp ?	Avg BVp ?	PAC ?	Type ?
	211.51 m 65	211.51 m	0.69 m	0.37-1.21 m	±0%	99.9%	±0%	99.9%	100%	Point
Grid 100% 99.9% ±0% 99.9% ±0% 0.02-1.2 m 0.65 m	. 344	-	0.65 m	0.02-1.2 m	±0%	99.9%	±0%	99.9%	100%	Grid
agetation Biovolume Heat Map Biovolume Distribution Scatter Chart			tter Chart	me Distribution Sca	Biovolun			0	ne Heat Map	tion Biovolur
Biovolume Distribution Sca	tter Chart	n Scatter Chart	me Distribution S	Biovolu		BV%				
100 · A/Data				All Data	10	100			A. A.	1957
				1	10				STAR S	
				eo 🕂	90				6. 3.5	Star 1
				30 +	80			Υ.	Teres	
				70 -	70				5400	
				70 🚦	70	50			2	

*Due to the dense growth of EWM in this site, the Echosounder System was unable to penetrate and collect all of the data.

0.2 0.4

0.6 0.8

Depth (m)

1.2

1.0

NOXON RAPIDS RESERVOIR, SANDERS COUNTY, MONTANA 2013 Aquatic Invasive Species Control Program At Time of and Eight (8) Week Post Treatment Submerged Aquatic Vegetation (SAV) Data 28 of 35

Plots T-13-30, 31 (a) & 31 (b)



Plot T-13-30 At Time of Treatment

leves Beenvis Co	adam Caustu Mastasa			VEGETATION ANALY	SIS REPO
aterbody Size: 3,241.65 ha (8,010	30 acres)			Control Monte, and or any	repo
4	Data Collector	Survey S	iize	Settings	
2	Thomas McNabb	Area:	28.81 ha (71.20 acres)	Track Buffer: Grid Cell Size	25 m 5 m
No.	Data Collection Date 7/25/2013 7:40:14 AM (UTC)	Percent: Volume	0.89% of waterbody 374.301.40 cu.m.	Min. BV Detect:	5%
5	Average Water Temperature		(303.45 acre ft)	www.veg.beptil.betect	0.75152.1
	24.08° C (75.34° F)				
	Location Start 47.94509508 -115.7088623				
	End: 47.04442369, 115.7000023				

A S	urvey Su	mmary								
	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
Full	Point	92.1%	71.4%	±30.5%	65.7%	±35%	0.35-8.38 m	1.12 m	13.06 km	3,325
Survey	Grid	98.5%	68.5%	±27%	67.5%	±28.1%	0.32-8.32 m	1.22 m		8,475

AOI ?	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
	Point	81.5%	71%	±38.1%	57.9%	±44.1%	0.39-0.88 m	0.74 m	188.99 m	27
	Grid	100%	78.7%	±22.7%	78.7%	±22.7%	0.39-1.08 m	0.7 m		296
	Point	87.8%	69.9%	±35.6%	61.4%	±40.5%	0.39-1.24 m	0.73 m	1.12 km	197
	Grid	99.9%	76.8%	±22.1%	76.7%	±22.2%	0.42-5.87 m	0.81 m		1,328
3	Point	94.1%	81.8%	±29.6%	77%	±34.6%	0.39-3.61 m	0.8 m	2.16 km	493
	Grid	99.9%	77.4%	±23.1%	77.3%	±23.2%	0.4-6.04 m	0.86 m	100	2,429
4	Point	92.9%	76.3%	±29.2%	70.9%	±34.3%	0.37-6.22 m	1.08 m	2 km	932
	Grid	99.8%	75.2%	±22.2%	75.1%	±22.4%	0.32-7.23 m	1.04 m		2,871
	Point	100%	79.7%	±35%	79.7%	±35%	0.47-0.78 m	0.64 m	11.83 m	4
	Grid	100%	60.4%	±20.8%	60.4%	±20.8%	0.42-2.02 m	0.86 m	147	84
6	Point	98.6%	82.6%	±22.7%	81.5%	±24.5%	0.46-1.19 m	0.73 m	632.81 m	74
	Grid	100%	74.2%	±24.3%	74.2%	±24.3%	0.44-1.64 m	0.79 m	2	661
	Point	96.7%	79.8%	±22.9%	77.1%	±26.7%	0.55-8.38 m	1.81 m	503.21 m	211
	Grid	99.1%	80%	±20.8%	79.3%	±22.1%	0.49-8.32 m	1.61 m	14.C	847
8	Point	97.8%	72.2%	±26.5%	70.6%	±28.3%	0.4-3.64 m	1.53 m	1.17 km	544
	Grid	99.7%	75.6%	±23%	75.3%	±23.4%	0.46-6.98 m	1.42 m		1,253
	Point	85.9%	55%	±29.7%	47.3%	±33.6%	0.35-6.88 m	1.32 m	3.77 km	843
	Grid	96.6%	55.6%	±27.8%	53.7%	±29.1%	0.32-7 m	1.4 m		3.355



me Distribution Scatter Chart



Area of Interest Summary

AOI ?	0-5%	5-20%	20-40%	40-60%	60-80%	>80%
	18.52%	14.81%	11.11%	0%	3.7%	51.85%
2	12.18%	15.23%	9.14%	5.58%	6.09%	51.78%
3	5.88%	8.92%	4.67%	5.48%	7.91%	67.14%
4	7.08%	4.94%	11.05%	10.94%	10.19%	55.79%
5	1.35%	1.35%	6.76%	10.81%	8.11%	71.6296
6	3.32%	0%	8.06%	16.11%	14.69%	57.82%
	2.21%	5.88%	7.9%	17.65%	20.59%	45.77%
8	14.12%	11.27%	20.4%	19.93%	11.63%	22.66%

NOXON RAPIDS RESERVOIR, SANDERS COUNTY, MONTANA 2013 Aquatic Invasive Species Control Program At Time of and Eight (8) Week Post Treatment Submerged Aquatic Vegetation (SAV) Data 30 of 35

Plot T-13-30 Eight Week Post Treatment

Area:

Volume:

BIOFBASE

Noxon Reservoir, Sanders County Montana

Waterbody Size: 3,241.65 ha (8,010.30 acres)



Data Co	llector
Thomas	McNabb
Data Co	llection Date
9/19/201	3 4:26:51 PM (UTC)
Average	e Water Temperature
20.63° C	(69.13° F)
Locatio	n
Start:	47.94548798, -115.71112823
End:	47.95032501, -115.70921326



5% 0.73152 m Reviewer: McCormack, lan

VEGETATION ANALYSIS REPORT

Generated: 9/20/2013 11:26:04 PM (UTC)

report link

25 m

5 m

Status: Passed

Area of Interest Summary

AOI ?	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
1	Point	37.3%	9.1%	±11.6%	3.4%	±8.4%	1.02-6.93 m	2.02 m	1.83 km	3,361
	Grid	31.5%	20%	±29.3%	6.3%	±18.9%	1.06-6.82 m	2.12 m	-	1,754

Vegetation Biovolume Heat Map

Biovolume Distribution Scatter Chart



Biovolume Analysis by Quantity

NOXON RAPIDS RESERVOIR, SANDERS COUNTY, MONTANA 2013 Aquatic Invasive Species Control Program At Time of and Eight (8) Week Post Treatment Submerged Aquatic Vegetation (SAV) Data 31 of 35

Plot T-13-31(a) At Time of Treatment



VEGETATION ANALYSIS REPORT

Noxon Reservoir, Sanders County Montana

Generated: 8/2/2013 4:06:40 AM (UTC)

report link

Waterbody Size: 3,229.58 ha (7,980.50 acres)



Data Colle	ector
Thomas M	cNabb
Data Colle	ection Date
7/25/2013	1:25:31 PM (UTC)

Survey Size Area: 4.78 ha (11.80 acres) Percent: 0.15% of waterbody Volume: 94,918.00 cu. m (77.00 acre ft)

Biovolume Distribution Scatter Chart

Average Water Temperature 23.14° C (73.65° F)

Location

Start: 47.95952988, -115.71844482 End: 47.96015167, -115.72176361

Area of Interest Summary

AOI ?	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points	
1	Point	72.3%	58.2%	±32.5%	42.1%	±38%	0.35-8.45 m	1.71 m	2.16 km	755	
	Grid	81.1%	53.4%	±28.2%	43.3%	±32.9%	0.02-8.3 m	1.95 m		1,210	

Vegetation Biovolume Heat Map

Biovolume Distribution Scatter Chart All Data 100 90 80 70 8 60 olume 50 Bio 40 30 20 10 0 2 3 © 2013 Microsoft Cor © 2013 N Depth (m)

Biovolume Analysis by Quantity

AOI ?	0-5%	5-20%	20-40%	40-60%	60-80%	>80%
1	27.68%	14.3%	9.8%	12.19%	12.19%	23.84%

NOXON RAPIDS RESERVOIR, SANDERS COUNTY, MONTANA 2013 Aquatic Invasive Species Control Program At Time of and Eight (8) Week Post Treatment Submerged Aquatic Vegetation (SAV) Data 32 of 35

Plot T-13-31(a) Eight Week Post Treatment

2.85 ha

Noxon Reservoir, Sanders County Montana

Waterbody Size: 3,241.65 ha (8,010.30 acres)



Data Co	llector	Survey S	ize
Thomas	McNabb	Area:	2
Data Co	llection Date		(7
Data CO	needon bate	Percent	0.
9/19/201	3 5:21:20 PM (UTC)	Volume:	5
Averag	e Water Temperature		(4
20.81° C	(69.45° F)		
Locatio	n		
Start:	47.95968628, -115.71838379		
End:	47.95795822, -115.72370148		

Settings Track Buffer: (7.03 acres) Grid Cell Size: Percent: 0.09% of waterbody Min. BV Detect: 55,273.30 cu. m Min. Veg Depth Detect: (44.81 acre ft) Quality Control Reviewer: McCormack, lan Status: Passed

VEGETATION ANALYSIS REPORT

Generated: 9/20/2013 10:38:15 PM (UTC)

report link

25 m

5 m

5%

0.73152 m

Area of Interest Summary

AOI ?	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
1	Point	63.9%	33.3%	±31.9%	21.3%	±30.1%	0.55-4.85 m	1.87 m	617.43 m	1,416
	Grid	62.2%	22.3%	±25.6%	13.8%	±22.9%	0.04-6.72 m	1.81 m	-	764

Vegetation Biovolume Heat Map

Biovolume Distribution Scatter Chart



Biovolume Analysis by Quantity

NOXON RAPIDS RESERVOIR, SANDERS COUNTY, MONTANA 2013 Aquatic Invasive Species Control Program At Time of and Eight (8) Week Post Treatment Submerged Aquatic Vegetation (SAV) Data 33 of 35

Plot T-13-31(b) At Time of Treatment



Noxon Reservoir, Sanders County Montana

VEGETATION ANALYSIS REPORT

Generated: 8/2/2013 4:01:14 AM (UTC)

report link

Waterbody Size: 3,229.58 ha (7,980.50 acres)



Data Collector	Survey S	ize	Average Water Temperature 23.39° C (74.11° F) Location		
Thomas McNabb	Area: 1 (Percent: 0 Volume: 5	1.35 ha (3.30 acres)			
Data Collection Date		0.04% of waterbody			
7/25/2013 1:48:21 PM (UTC)	Volume:	58.293.00 cu. m	Start:	47.95667267, -115.72455597	
		(47.30 acre ft)	End:	47.95684814, -115.72650146	

Area of Interest Summary

AOI ?	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
1	Point	75.5%	50.1%	±28.8%	37.8%	±33%	0.41-12.36 m	3.68 m	537.41 m	576
	Grid	89.2%	26.9%	±20.8%	24%	±21.3%	0.02-11.78 m	4.13 m	-	332

Vegetation Biovolume Heat Map

Biovolume Distribution Scatter Chart



Biovolume Analysis by Quantity

Plot T-13-31(b) Eight Week Post Treatment

Noxon Reservoir, Sanders County Montana

Waterbody Size: 3,241.64 ha (8,010.30



Data Co	llector	Survey S	ize	Settings		
Thomas McNabb		Area:	0.74 ha	Track Buffer:		25 m
Date Collection Date			(1.83 acres)	Grid Cell S	ize:	5 m
Data Collection Date		Percent:	0.02% of waterbody	Min. BV De	etect	5%
9/19/2013 5:31:41 PM (UTC)		Volume:	16,588.10 cu. m	Min. Veg Depth Detect:		0.73152 m
Average	e Water Temperature		(13.45 acre ft)	Quality C	ontrol	
20.99° C	(69.78° F)			Deviewer	McCormack lan	
Locatio	n			Status:	Passed	
Start:	47.95667267, -115.72455597					
End:	47.95703125115.72612					

VEGETATION ANALYSIS REPORT

Generated: 9/20/2013 10:00:36 PM (UTC)

Area of Interest Summary

AOI ?	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
1	Point	86.7%	55.7%	±36.6%	48.3%	±39%	0.57-6.36 m	1.97 m	188.4 m	1,108
	Grid	72%	34.1%	±23.3%	24.6%	±25%	0.01-6.54 m	2.09 m	-	236

Vegetation Biovolume Heat Map **Biovolume Distribution Scatter Chart Biovolume Distribution Scatter Chart** 100 90 80 70 (%) 60 50 OIE 40 30 20 10 0 0.0 0.5 1.0 3.5 1.5 2.5 3.0 4.0 2.0 @ 2013 M Depth (m)

Biovolume Analysis by Quantity

END OF SURVEY REPORT

NOXON RAPIDS RESERVOIR, SANDERS COUNTY, MONTANA 2013 Aquatic Invasive Species Control Program At Time of and Eight (8) Week Post Treatment Submerged Aquatic Vegetation (SAV) Data 35 of 35