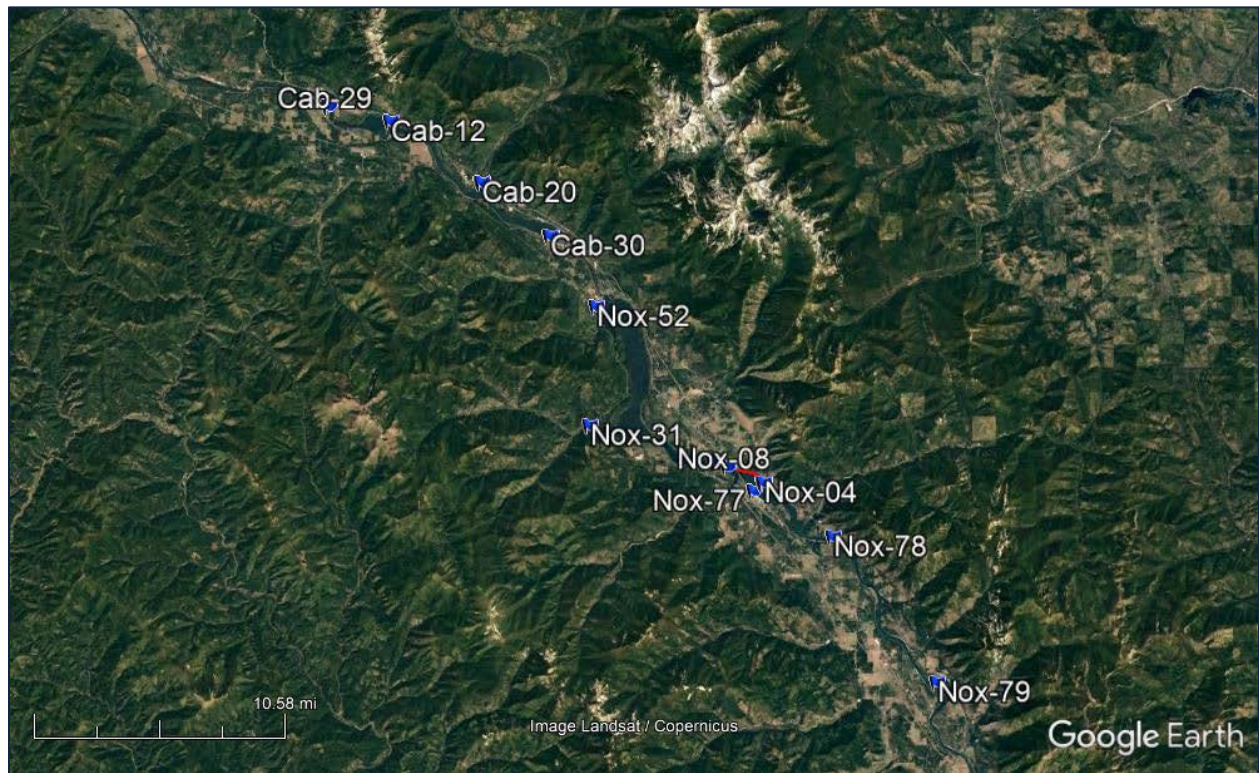


**NOXON RAPIDS & CABINET GORGE RESERVOIRS
SANDERS COUNTY, MONTANA**

**2020 Aquatic Invasive Species (AIS)
Aquatic Pesticide Application Report (APAR)**



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October 2020

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 discrete areas of Noxon Rapids and Cabinet Gorge Reservoirs in 2020. Aquatic herbicide applications were conducted in compliance with the Montana Department of Environmental Quality, Montana Pollutant Discharge Elimination System (NPDES) Pesticide General Permit (PGP) for Pesticide Application (NOI Permit # MTG870011), as well as the Pesticide Discharge Management Plan (PDMP) developed as part of the PGP. The Permit related information is included in the Noxon Rapids & Cabinet Gorge Reservoirs, Sanders County, Montana 2020 Aquatic Invasive Species Aquatic Pesticide Application Plan (APAP)¹.

SCOPE OF WORK: The scope of work was for the application of aquatic herbicides for the control of Eurasian watermilfoil (EWM) and Curly-leaf pondweed (CLP) in a total of 19.4 acres within previously identified and demarcated areas of Noxon Rapids and Cabinet Gorge Reservoirs.

PRE-TREATMENT SURVEYS: In July 2020 Craig McLane (Montana Fish, Wildlife and Parks (MTFWP)) carried out visual and point intercept surveys in areas where nuisance growths of aquatic invasive species (AIS) were identified in previous surveys. On July 17, 2020 CLI received the potential 2020 treatment GIS polygons and survey points from Kim McMahan Bergstrom. CLI surveyed plots July 31 and August 1, 2020. CLI developed a budgetary plan on July 21, 2020 based with a final plan approved on August 3, 2020.

SUMMARY OF ACRES TREATED: The final plan consisted of treating 19.5 acres of EWM in Noxon Rapids and Cabinet Gorge Reservoirs. Treatment plots were identified through GIS shapefiles and treatment plans at the direction of the county.

TREATMENT SCHEDULE: The aquatic herbicide applications were performed on August 10 & 11, 2020, by CLI staff Thomas McNabb and Thomas Moorhouse as outlined in Table 1 below:

¹ NOXON RAPIDS AND CABINET GORGE RESERVOIRS, SANDERS COUNTY, MONTANA, 2020 AIS Aquatic Pesticide Application Plan (APAP)

Table 1: Treatment Plots, Dates and Times

2020 Noxon-Cabinet Reservoirs Treatment Plan									
Plot Number	Acreage (Ac)	Mean Depth (ft)	Date	Start	Stop	Wind (mph)	Wind Direction	Sky	Water Temp (F)
NOX-03	2.2	8.4	8/11/2020	2:11 PM	2:23 PM	7.5	N	Sunny	74.3
NOX-04	5.9	5.9	8/11/2020	9:24 AM	10:21 AM	0.0	N	Sunny	73.7
NOX-31	4.4	8.7	8/11/2020	1:52 PM	2:06 PM	5.0	WNW	Sunny	75.0
NOX-77	0.0	7.7	8/11/2020	n/a	n/a	n/a	n/a	n/a	n/a
Sub Total	12.5								
CAB-06	3.7	3.3	8/10/2020	1:48 PM	2:01 PM	5.0	NNE	Sunny	73.1
CAB-12	1.1	4.9	8/10/2020	2:10 PM	2:13 PM	9.5	NNE	Sunny	72.7
CAB-30	2.1	4	8/10/2020	2:27 PM	2:38 PM	5.0	NNE	Sunny	73.1
Sub Total	6.9								
Sub Total									
Total	19.4								

EQUIPMENT USED: A CLI Littoral Zone Treatment vessel (LittLine[®]) was used to perform the aquatic herbicide applications on August 10 and 11, 2020. The herbicide applications were made to the lower portion of the water column to increase herbicide concentration and exposure time (CET) relationships for the control of the target species. The application vessel was inspected on August 10, 2020 at the Clark Fork, Idaho Aquatic Invasive Species inspection station prior to entering Montana.





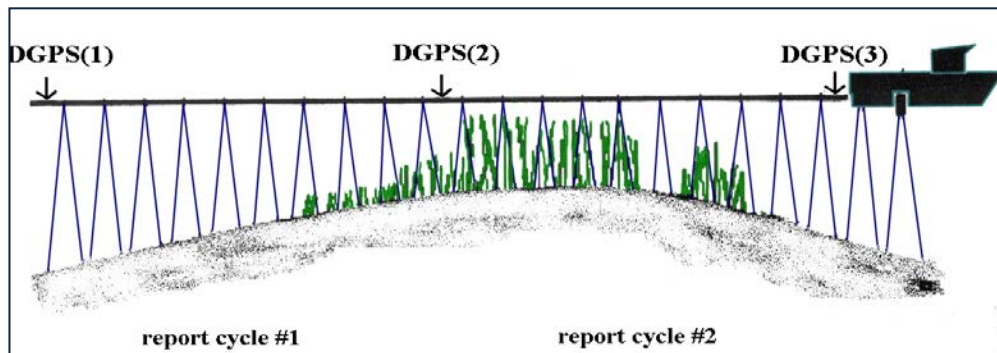
The AIS treatment area GIS shapefiles were loaded into the LittLine[®] computer system for vessel guidance and herbicide application data recording. The LittLine[®] can place herbicides at any depth within the water column (2 - 30 feet), as well as within the bottom 2 foot of the water



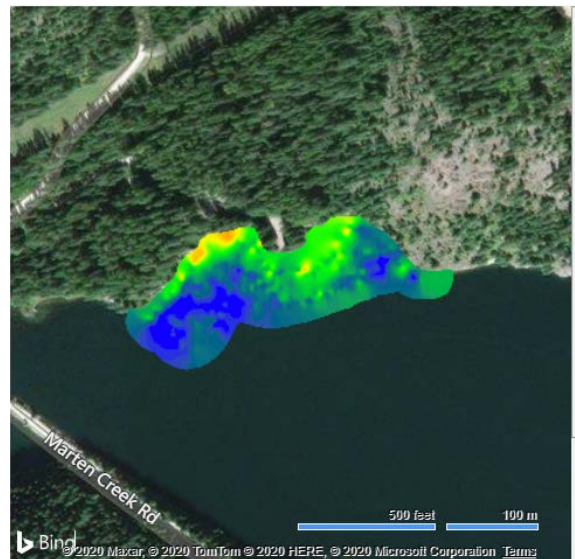
column. Impacts from currents, wind and wave action are reduced in deep water applications through the use of the LittLine[®] application system when compared to conventional subsurface applications. The herbicide application in all of the plots was within the bottom portion of the water column.

The LittLine system's computerized rate controllers regulate the aquatic herbicide applications through preset treatment rates. When the vessel speeds up and or slows down, the rate controllers adjust the herbicide application rate to match the preset rate in gallons of product per acre.

A Digital Echosounder System with a Structure Scan Module (Lowrance model) was used to record data of the submerged aquatic vegetation (SAV) profile in the control plots during treatment and during the post treatment survey. Data was collected in both the .SLG (traditional sonar on HDS line) and the .SL2 (multi-channel structure scan) formats. Due to an electronic technical difficulty, some plots in Cabinet Gorge reservoir were not captured.



The sonar data collected was processed and analyzed for At Time of Treatment Submerged Aquatic Vegetation (SAV) in the treatment plots (August 10 and 11, 2020), and at six (6) Weeks Post Treatment (September 22, 2020). Some data could not be collected due to plant density or due to shallow water. Data was collected to compare At Time of Treatment to six (6) Week Post Treatment SAV coverage, height in the water column, and bio-volume to support post-treatment efficacy evaluations. An example of SAV conditions at time of treatment for Plot Nox-31, Noxon Reservoir, is pictured at right.



AQUATIC HERBICIDES CLI provided the aquatic herbicides for the project. CLI provided the required support equipment for material handling (herbicide transfer) as well as support vehicles for the vessels assigned to the project. The aquatic herbicides were applied to the specified areas of Noxon Rapids and Cabinet Gorge Reservoirs for the control of Eurasian watermilfoil and Curly-leaf pondweed, as outlined in the Site Data Tables below (Herbicide Label's and Material Safety Data Sheets (MSDS's) are included in the Aquatic Pesticide Application Plan (APAP), provided previously). Kim Bergstrom accompanied CLI for the August 11, 2020 treatments on Noxon Rapids Reservoir. Provided in Table 2 is the Treatment Site Data outlining treatment information for each plot.



TREATMENT SITE DATA

Table 2: Noxon Rapids Reservoir, Plot Treatment Site Data, Aquatic Herbicides Used:

2020 Noxon-Cabinet Reservoirs Treatment Plan						Tribune (Diquat)			Aquathol K (Endothall)			Procellacor (Florpyrauxifen)			
Plot Number	Acreage (Ac)	Mean Depth (ft)	Volume (AF)	Product	AIS	Rate ppm	Gal/Aft	Gal Total Site	Rate ppm	Gal/Aft	Gal Total Site	Rate PDU/AF	Oz/Ac Ft	PDU Total	Gallon Total
NOX-03	2.2	8.4	18.48	End/Diq	EWM	0.37	0.5	9.2	1.8	1.16	21.4				
NOX-04	5.9	5.9	34.81	Procellacor	EWM							5.0	15.9	174.1	4.3
NOX-31	4.4	8.7	38.54	End/Diq	EWM	0.37	0.5	19.3	1.8	1.16	44.5				
NOX-77	0.0	7.7	0.00	End/Diq	EWM	0.37	0.5	0.0	1.8	1.16	0.0				
Sub Total	12.5							28.5			65.9				
CAB-06	3.7	3.3	12.24	End/Diq	EWM	0.37	0.5	6.1	1.8	1.16	14.1				
CAB-12	1.1	4.9	5.39	End/Diq	EWM	0.37	0.5	2.7	1.8	1.16	6.2				
CAB-30	2.1	4	8.32	End/Diq	EWM	0.37	0.5	4.2	1.8	1.16	9.6				
Sub Total	6.9							13.0			30.0				
Sub Total								41.5			95.9				4.3
Total	19.4														

POST TREATMENT SURVEY: The Post Treatment survey was carried out by CLI (Tom Moorhouse and Drew McNabb), and a member of the Task Force (Kim Bergstrom) at Cabinet Gorge and Noxon Rapids Reservoir. Surveys were conducted through visual estimates of injury/control, through occasional rake tosses, and via the use of a Lowrance HDS-9 where depth allowed. Sonar logs were processed as described above. Water temperatures were approximately 64 F in both reservoirs on September 22, 2020. Table 3 provides information related to efficacy in each plot and compared to At-Time of Treatment and Post Treatment. Control. In Noxon Rapids Reservoir the change in SAV Biovolume (BV) shows a reduction range of 36% to 60%, while Post Treatment EWM Injury ranged from 85% to 100%. In Cabinet Gorge Reservoir the change in SAV Biovolume (BV) shows a 156% increase at CAB-12 due to large increase in native vegetation. Two plots could not be sampled due to plant density or shallow water levels. Post Treatment EWM Injury ranged from 90% to 100%.



NOX-02 was not treated in 2020, but observations were made on September 22, 2020 which found the following. EWM present, at the surface in some places and abundant. Not abundant

in other places within the plot. Curly-leaf Pondweed was present. Elodea, Coontail, and some Sago pondweed was also present. Much more EWM was visible on September 22, 2020 than on August 7, 2020.

The Procellacor plot treated in 2019, NOX-08 was also visited. EWM was observed in scattered quantities throughout the plot, but primarily in the upstream half. It is suspected that fragments may have settled in the plot after treatment and potentially grown into the plants observed on September 22, 2020. Plants exhibited three to four stems per plant typical of new growth. A possibility may also exist that one year post treatment regrowth has occurred, though plants did not necessarily exhibit the form typical of regrowth.

Table 3: Plot Percent Submersed Aquatic Vegetation (SAV) Cover and SAV Bio-Volume Present At Time of Application and Six (6) Weeks Post Treatment

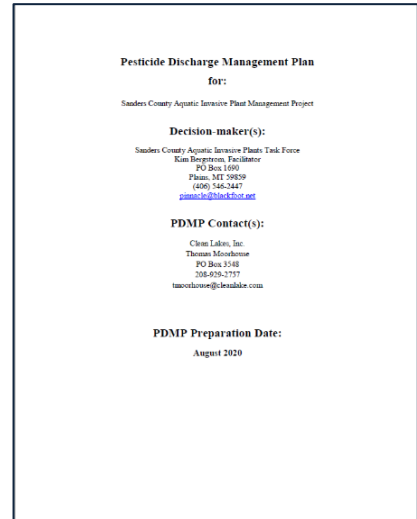
2020 Noxon Rapids Reservoir AIS Treatment Plots: At Time of and ~ Six (6) Week Post Plot SAV % Cover and SAV BioVolume Data (Grid Data)									
Plot Number	SAV % Cover	SAV % Bio-Volume	Date Data Collected Pre Treatment	SAV % Cover	SAV % Bio-Volume	Date Data Collected- Post Treatment	SAV % BV Change	Post Treatment EWM Injury Rank	Herbicides Used (Aquathol K/Tribune or Procellacor)
NOX-03	N/A	N/A	8/11/2020	42.1	12.6	9/22/2020	N/A	85-90% +/-	Endo/Diquat
NOX-04	86.1	32.6	8/11/2020	61.0	13.1	9/22/2020	-60%	100%	Procellacor
NOX-31	67.0	18.9	8/11/2020	24.2	12.1	9/22/2020	-36%	100%	Endo/Diquat
NOX-77	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

2020 Cabinet Gorge Reservoir AIS Treatment Plots: At Time of and ~ Six (6) Week Post Plot SAV % Cover and SAV BioVolume Data (Grid Data)									
Plot Number	SAV % Cover	SAV % Bio-Volume	Date Data Collected Pre Treatment	SAV % Cover	SAV % Bio-Volume	Date Data Collected- Post Treatment	SAV % BV Change	Post Treatment EWM Injury Rank	Herbicides Used (Aquathol K/Tribune or Procellacor)
CAB-06	100	32.8	8/10/2020	100.0	At Surface	9/22/2020	N/A	90 - 95% +/-	Endo/Diquat
CAB-12	66.6	13.2	8/10/2020	100.0	33.8	9/22/2020	156%	100%	Endo/Diquat
CAB-30	Too	Shallow	8/10/2020	Too	Shallow	9/22/2020	N/A	Too shallow	Endo/Diquat

Note: Herbicides used Endo/Diquat = Combination of Aquathol K (Endothal) and Tribune (Diquat). Procellacor active ingredient is Florpyrauxifen-Benzyl
 Post Treatment Injury Rank of herbicide injury to EWM on September 22, 2020, 6 weeks post treatment, were estimated during a survey as outlined above.

The observations contained in this report are general six (6) week Post Treatment observations, and should not be used for control efficacy evaluations. In addition, 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 can be attributed to an increase in native vegetation in response to selectively controlling the target species.

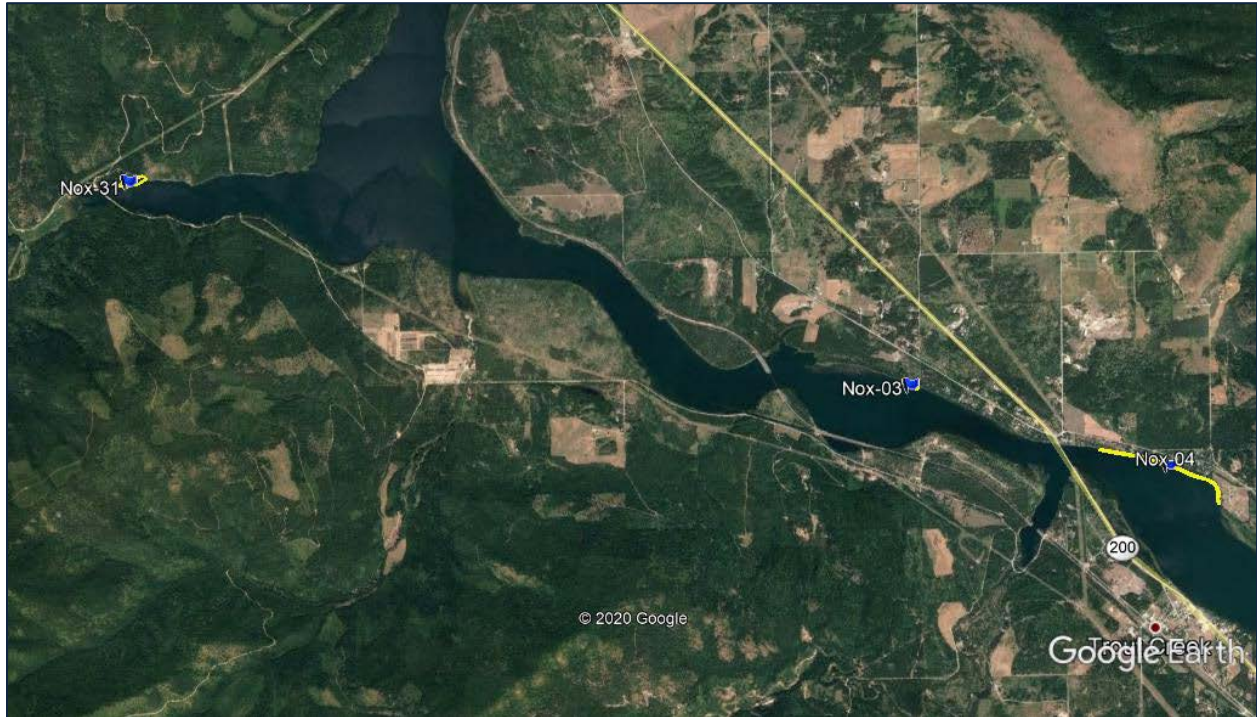
PERMIT COMPLIANCE: CLI developed the Aquatic Pesticide Application Plan on August 6, 2020, as well as the Pesticide Discharge Management Plan (PDMP) required for the new NPDES Permit cycle. Sanders County provided the required permits and approvals for the herbicide treatments from the Montana Department of Environmental Quality. There were no adverse incidents to report. Herbicide equipment calibration occurred on July 27, 2020.



SERVICES PROVIDED BY CLI: All manpower, materials, insurance, equipment and technical advice required to perform aquatic herbicide applications in the project areas.

SERVICES PROVIDED BY SANDERS COUNTY: Sanders County provided the required permits, published legal notices in newspapers, provided notification to property owners, posting at public boat launch facilities, and provided the project area GIS shapefiles from the 2020 Pre-Treatment Surveys that were used to generate the final 2020 Treatment Plan.

TREATMENT AREA PLOT MAPS
Overview of the 2020 Noxon Rapids Reservoir Treatment Plots (8/11/20)



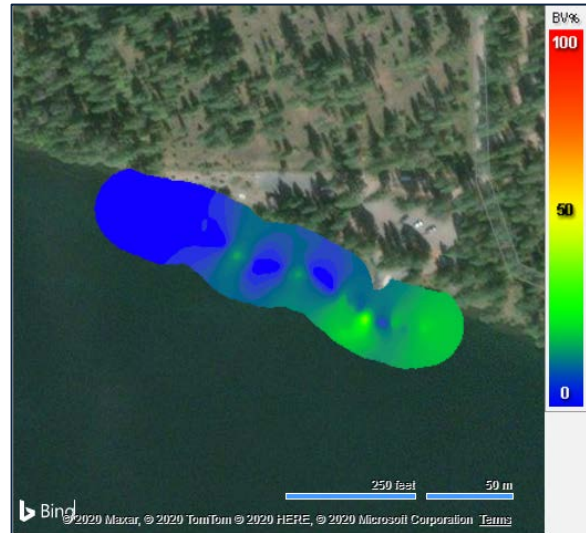
Overview of the 2020 Cabinet Gorge Reservoir Treatment Plots (8/10/20)



PRE AND POST TREATMENT SUBMERSED AQUATIC VEGETATION (SAV) DATA,
SAV PERCENT COVER, AND BIO-VOLUME DATA SETS

NOXON RAPIDS RESERVOIR

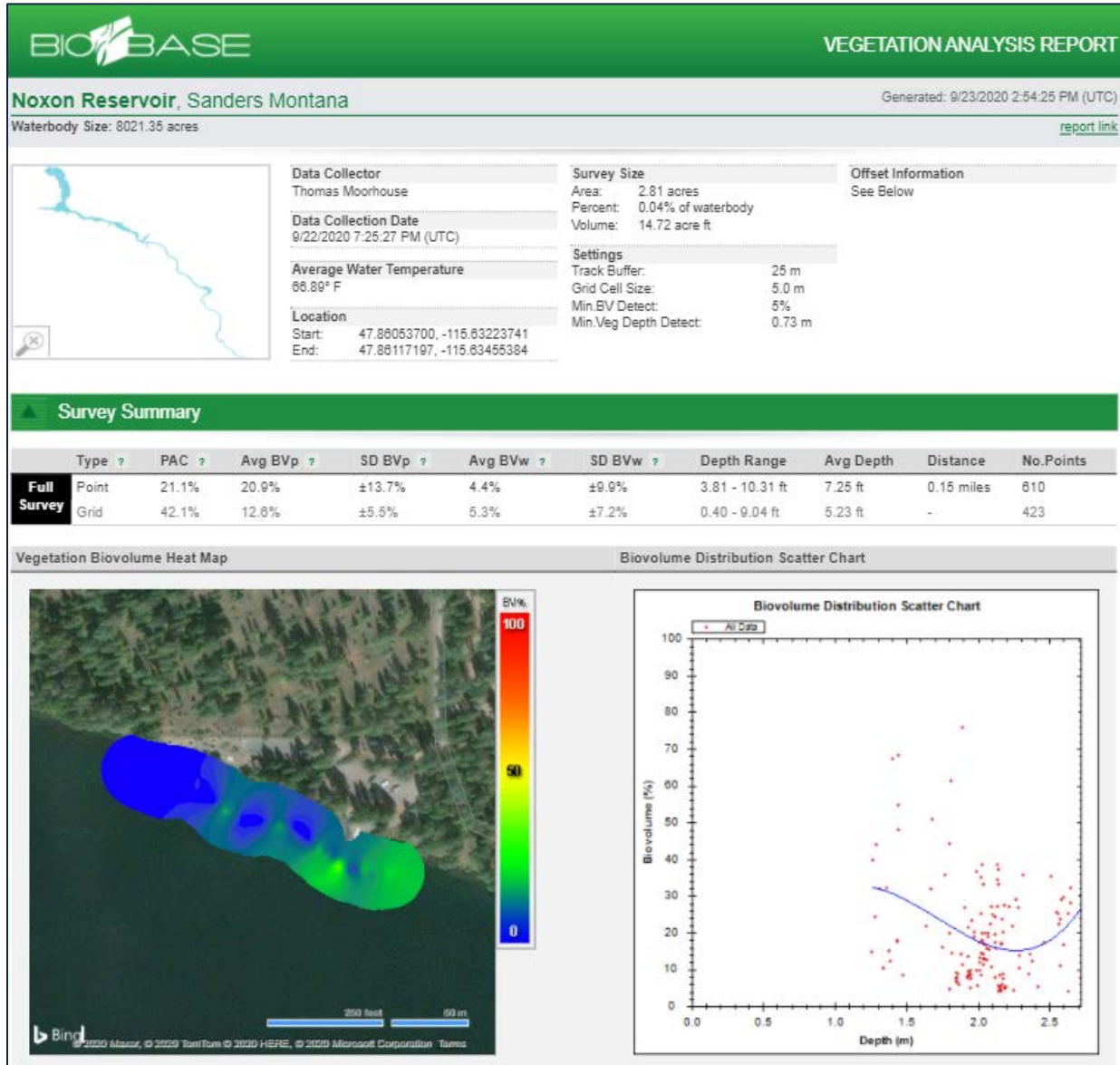
Plot NOX-03: At Time of Treatment (August 11, 2020 Left),
~ Six (6) Weeks Post (September 22, 2020 Right)



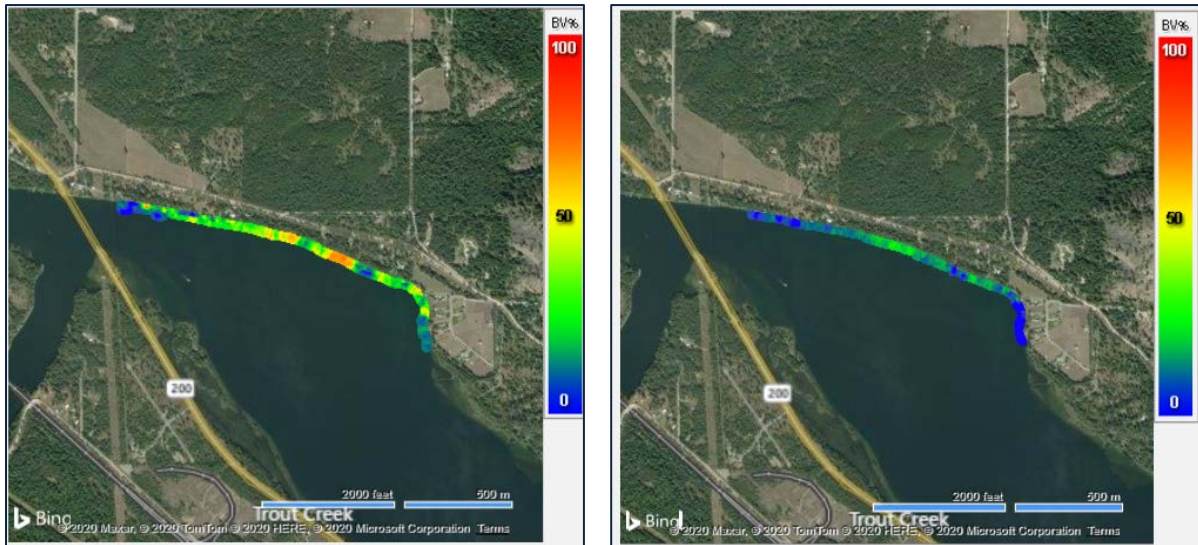
2020 Noxon Rapids Reservoir AIS Treatment Plots: At Time of and ~ Six (6) Week Post Plot SAV % Cover and SAV BioVolume Data (Grid Data)									
Plot Number	SAV % Cover	SAV % Bio-Volume	Date Data Collected Pre Treatment	SAV % Cover	SAV % Bio-Volume	Date Data Collected- Post Treatment	SAV % BV Change	Post Treatment EWM Injury Rank	Herbicides Used (Aquathol K/Tribune or Procellacor)
NOX-03	N/A	N/A	8/11/2020	42.1	12.6	9/22/2020	N/A	85-90% +/-	Endo/Diquat

Observations/Notes NOX-03: Treated with combination of endothall and diquat, control visually estimated at +/- 85 to 95%. Control excellent in downstream plot (~80% of area), poor control in upstream plot that was inside boomed swim area (~20% of area). Elodea in downstream part of plot. Consider treating further upstream in future treatments to allow application to drift/dissipate through the plot. At time of treatment August 11, 2020 image not available due to a technical issue.

Plot NOX-03: At Time of Treatment (August 11, 2020)



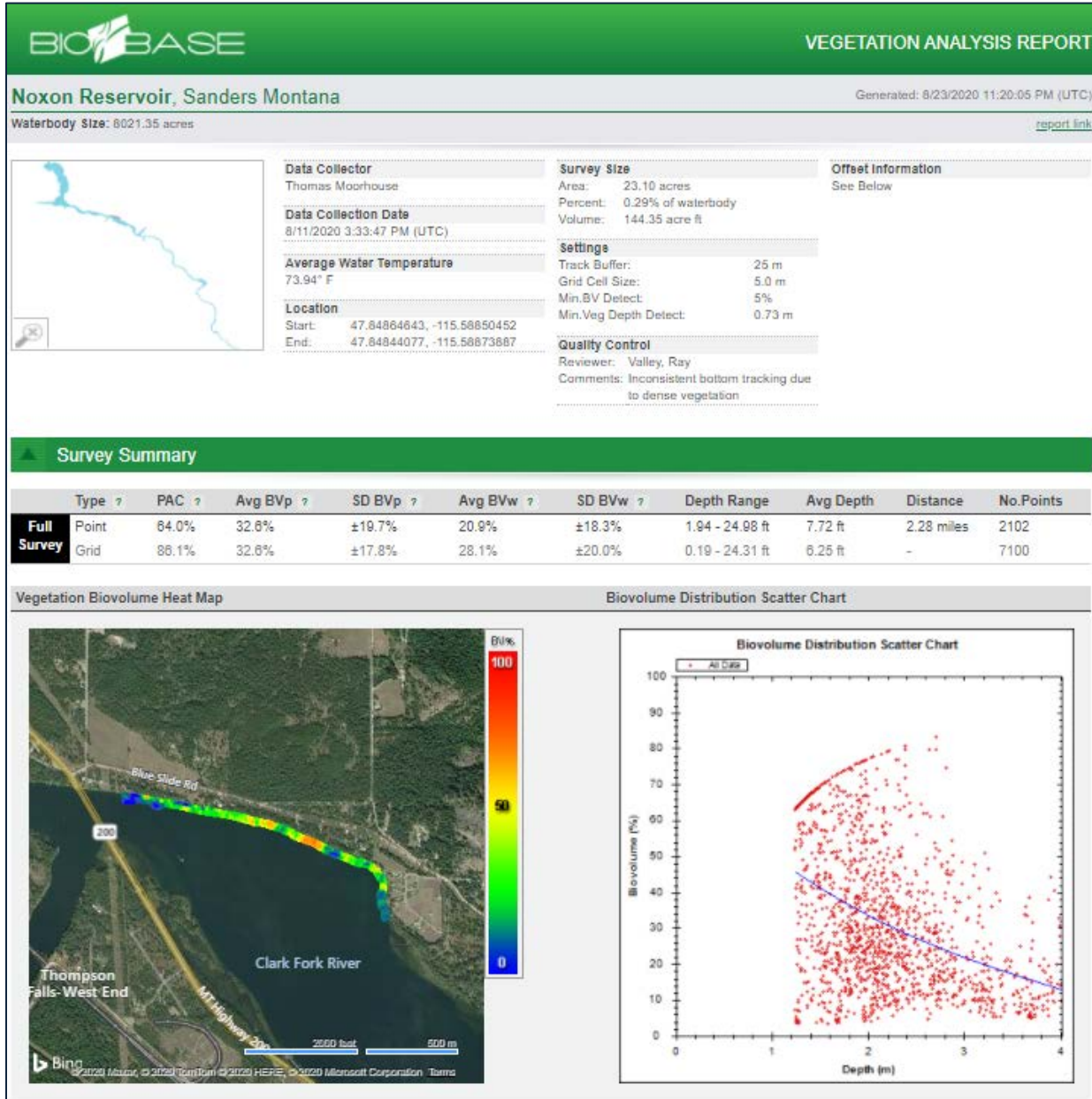
**Plot NOX-04: At Time of Treatment (August 11, 2020 Left),
~ Six (6) Weeks Post (September 22, 2020 Right)**



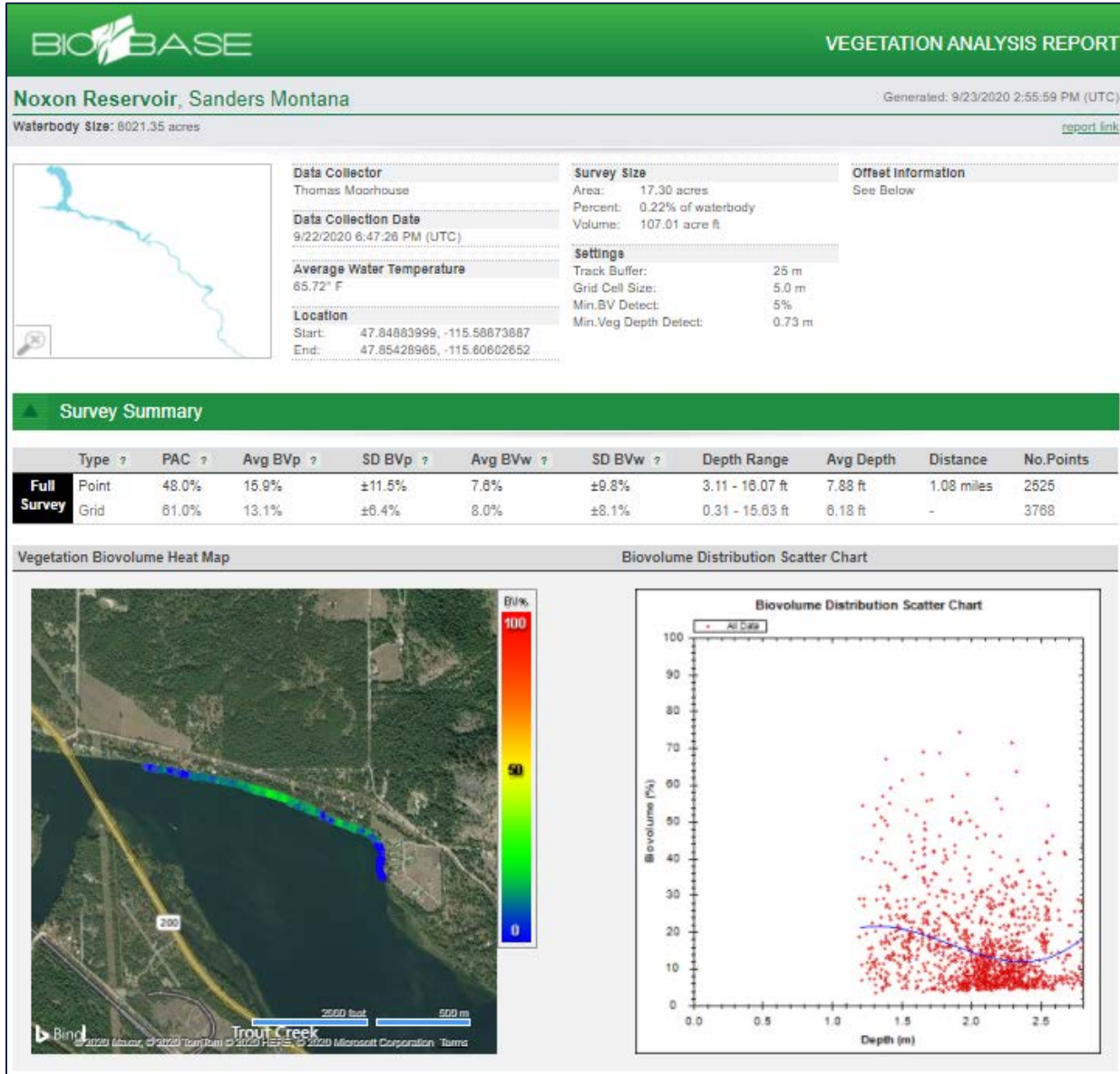
2020 Noxon Rapids Reservoir AIS Treatment Plots: At Time of and ~ Six (6) Week Post Plot SAV % Cover and SAV BioVolume Data (Grid Data)									
Plot Number	SAV % Cover	SAV % Bio-Volume	Date Data Collected Pre Treatment	SAV % Cover	SAV % Bio-Volume	Date Data Collected- Post Treatment	SAV % BV Change	Post Treatment EWM Injury Rank	Herbicides Used (Aquathol K/Tribune or Procellacor)
NOX-04	86.1	32.6	8/11/2020	61.0	13.1	9/22/2020	-60%	100%	Procellacor

Observations/Notes NOX-04: Treated with Procellacor, EWM control visually estimated at 100%. No EWM observed. Curly-leaf Pondweed (CLP) present with mature turions on stem. Elodea abundant, Sago Pondweed senescing, Richardson or White stem pondweed also present.

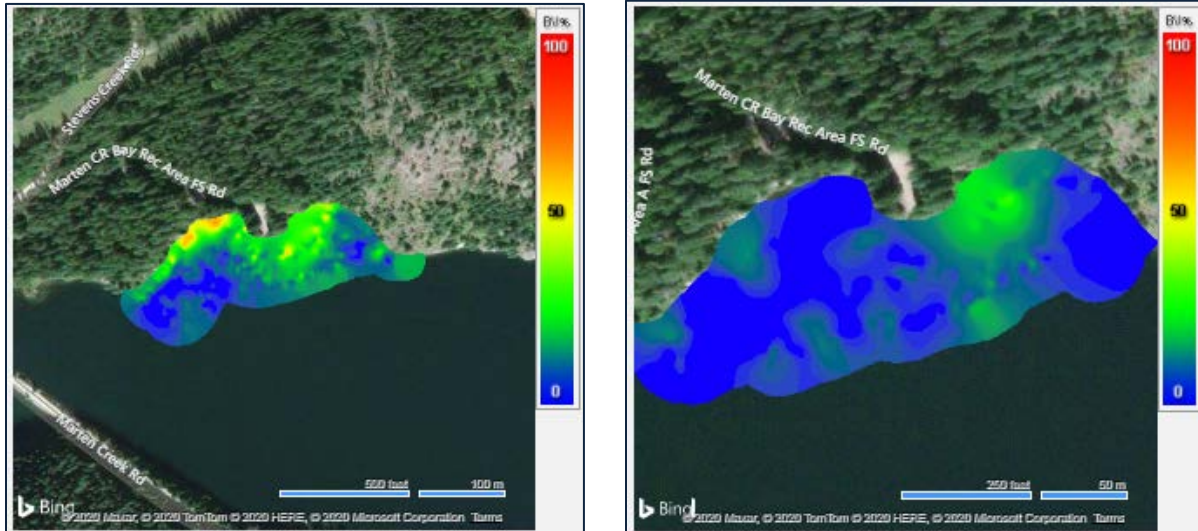
Plot NOX-04: At Time of Treatment (August 11, 2020)



Plot NOX-04: ~ Six (6) Weeks Post (September 22, 2020)



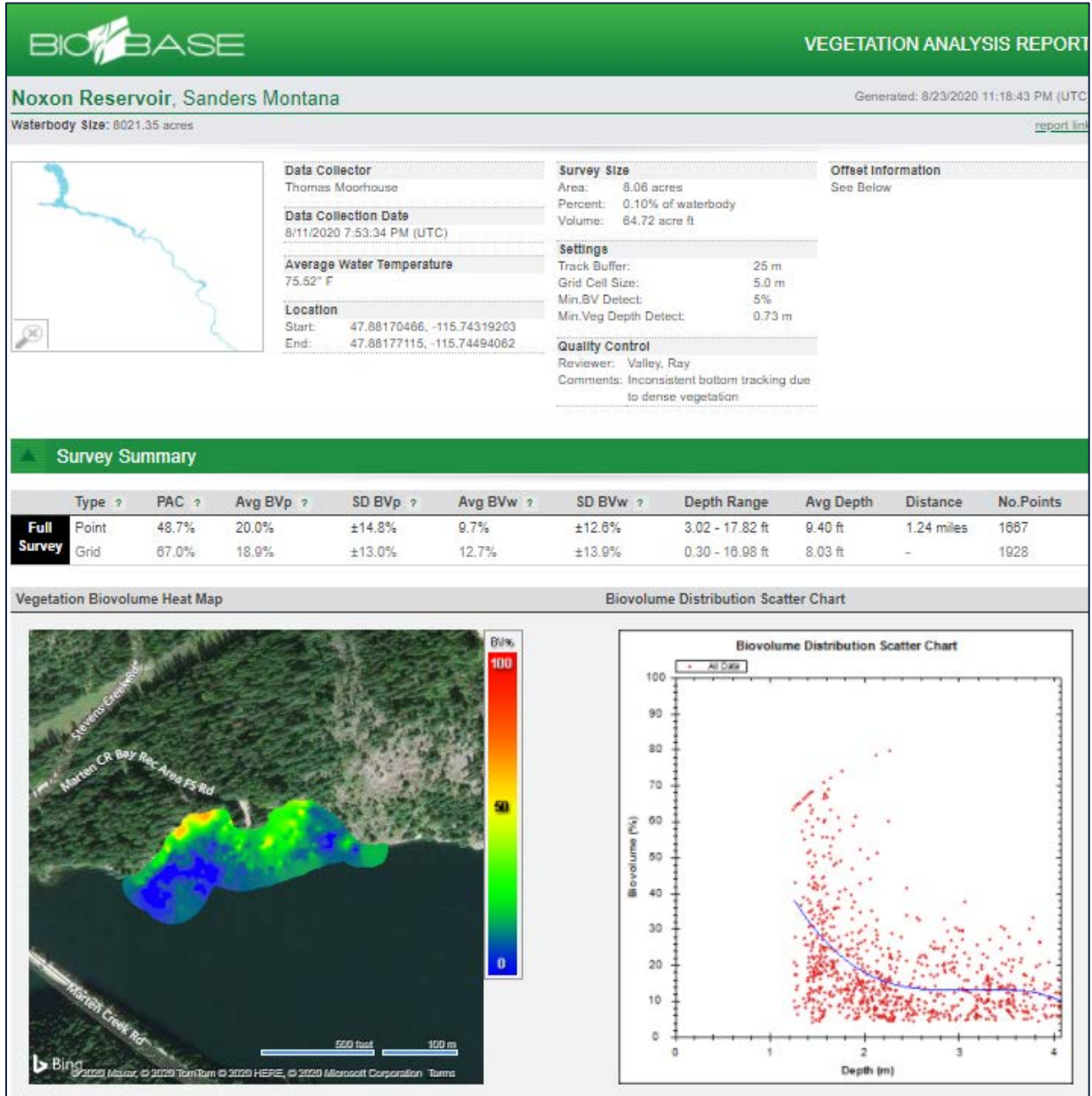
**Plot NOX-31: At Time of Treatment (August 11, 2020 Left),
~ Six (6) Weeks Post (September 22, 2020 Right)**



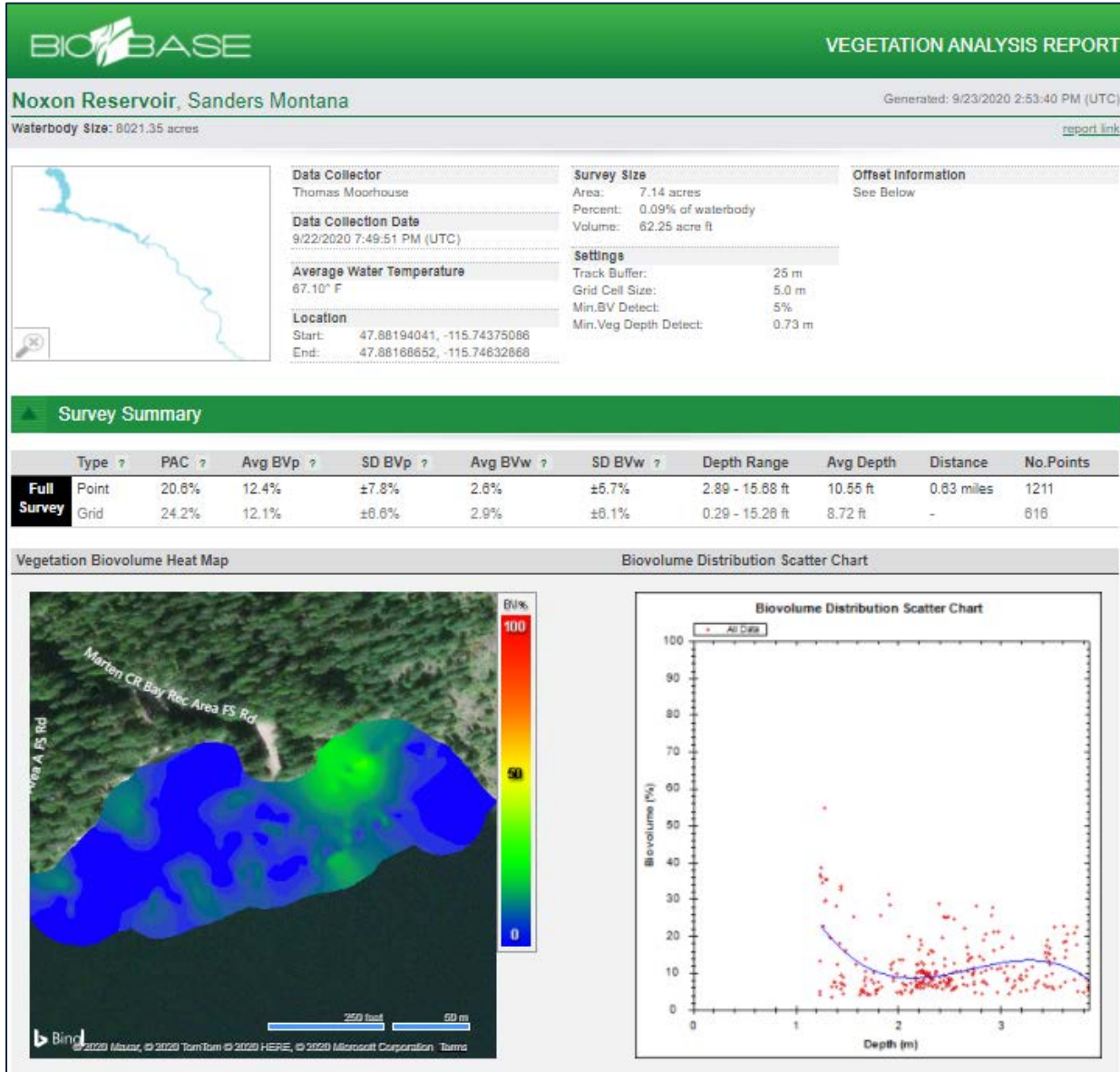
2020 Noxon Rapids Reservoir AIS Treatment Plots: At Time of and ~ Six (6) Week Post Plot SAV % Cover and SAV BioVolume Data (Grid Data)									
Plot Number	SAV % Cover	SAV % Bio-Volume	Date Data Collected Pre Treatment	SAV % Cover	SAV % Bio-Volume	Date Data Collected-Post Treatment	SAV % BV Change	Post Treatment EWM Injury Rank	Herbicides Used (Aquathol K/Tribune or Procellacor)
NOX-31	67.0	18.9	8/11/2020	24.2	12.1	9/22/2020	-36%	100%	Endo/Diquat

Observations/Notes NOX-31: Treated with combination of endothall and diquat, control visually estimated at 100% control. No plants visible at or near surface. Rake toss consisted of Coontail and Elodea.

Plot NOX-31: At Time of Treatment (August 11, 2020)



Plot NOX-31: ~ Six (6) Weeks Post (September 22, 2020)



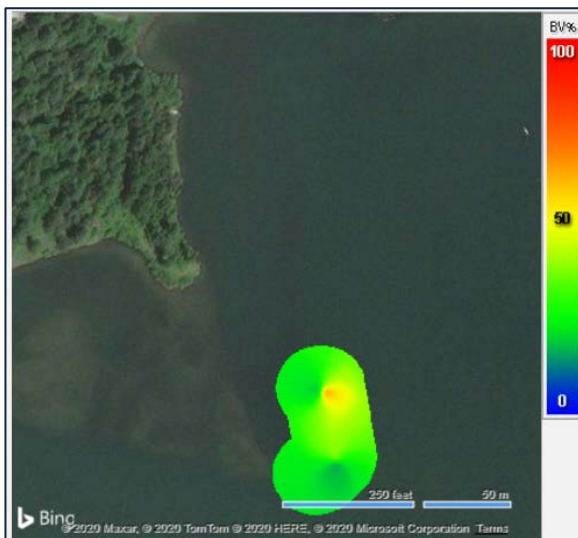
**Plot NOX-77: At Time of Treatment (August 11, 2020 Left),
~ Six (6) Weeks Post (September 22, 2020 Right)**

Observations/Notes NOX-77: Due to low quantities of EWM observed on treatment day this plot was dropped. On September 22, 2020 EWM was visually observed to be present below the surface around the deep end of swim dock and downstream.

PRE AND POST TREATMENT SUBMERSED AQUATIC VEGETATION (SAV) DATA,
SAV PERCENT COVER, AND BIO-VOLUME DATA SETS

CABINET GORGE RESERVOIR

Plot CAB-06: At Time of Treatment (August 10, 2020 Left),
~ Six (6) Weeks Post (September 22, 2020 Right)

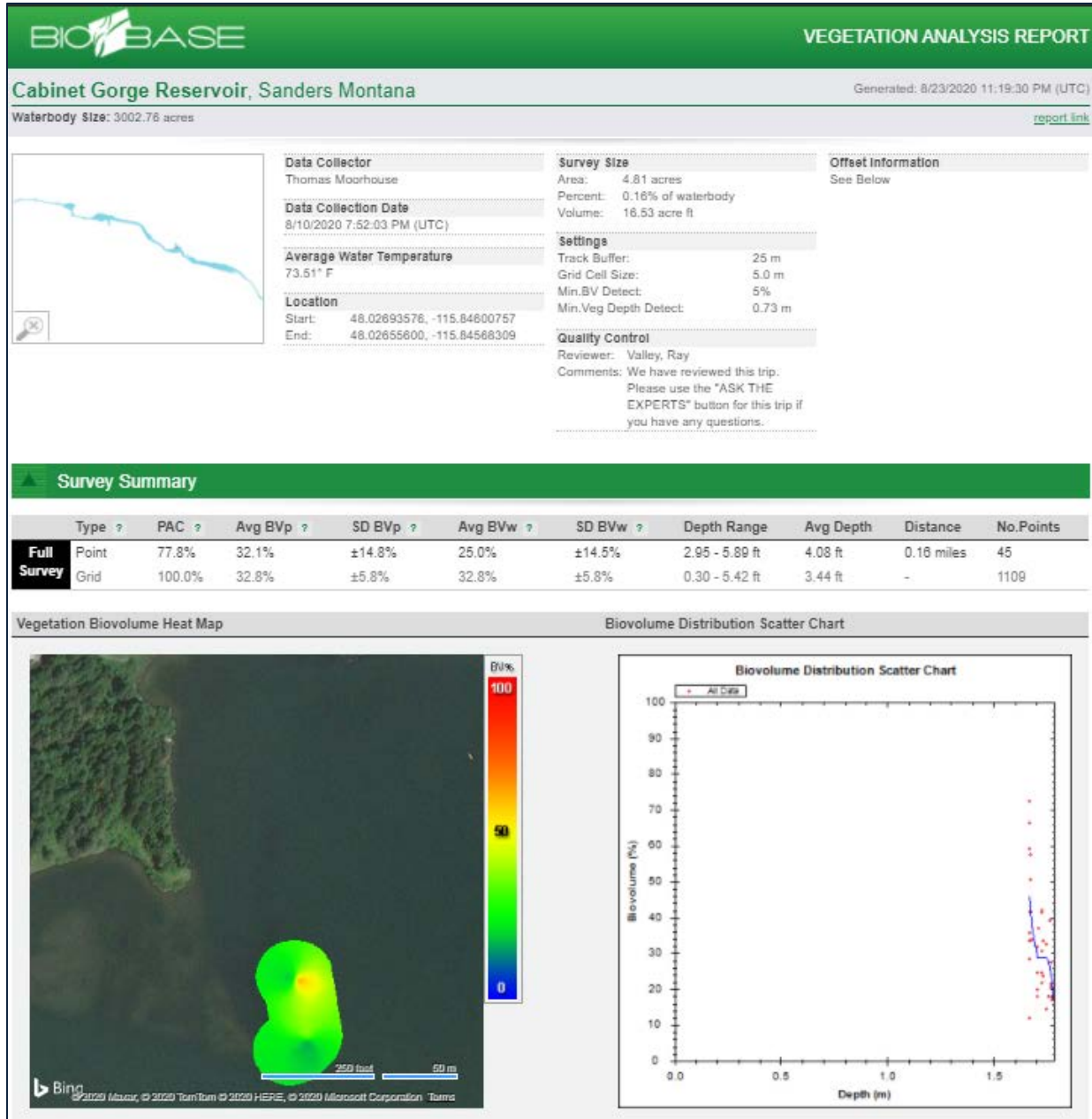


2020 Cabinet Gorge Reservoir AIS Treatment Plots: At Time of and ~ Six (6) Week Post Plot SAV % Cover and SAV BioVolume Data (Grid Data)									
Plot Number	SAV % Cover	SAV % Bio-Volume	Date Data Collected Pre Treatment	SAV % Cover	SAV % Bio-Volume	Date Data Collected-Post Treatment	SAV % BV Change	Post Treatment EWM Injury Rank	Herbicides Used (Aquathol K/Tribune or Procellacor)
CAB-06	100	32.8	8/10/2020	100.0	At Surface	9/22/2020	N/A	90 - 95% +/-	Endo/Diquat

Observations/Notes CAB-06: Treated with combination of endothall and diquat, control visually estimated at +/-90 to 95%. Coontail and Elodea present and dominate. EWM present and scattered, not abundant. Plot not surveyed by sonar on September 22, 2020 due submersed aquatic vegetation on surface throughout plot. At time of treatment sonar and associated map impacted by plant density.

Plot CAB-06: At Time of Treatment (August 11, 2020)

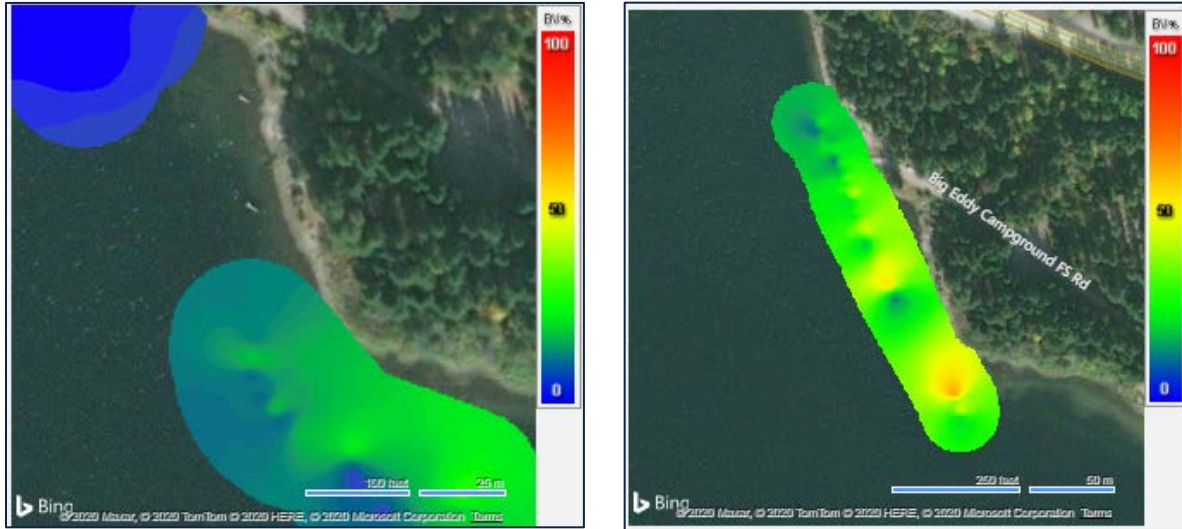
Due to depth and abundance of submersed aquatic vegetation a limited amount of sonar was collected.



Plot CAB-06: ~ Six (6) Weeks Post (September 22, 2020)

No data available. Plot too shallow and topped out 100% of submersed aquatic vegetation.

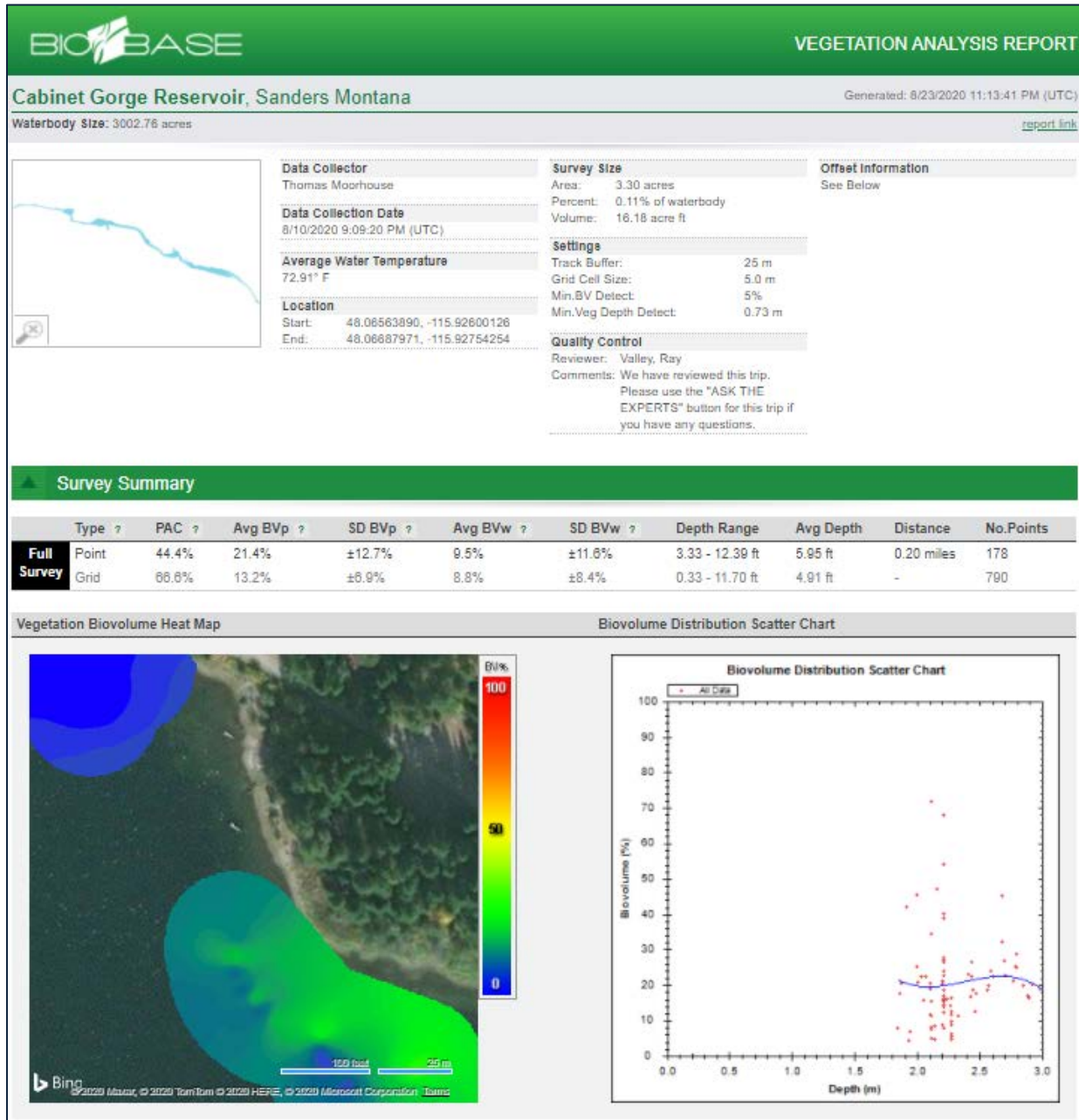
**Plot CAB-12: At Time of Treatment (August 10, 2020 Left),
~ Six (6) Weeks Post (September 22, 2020 Right)**



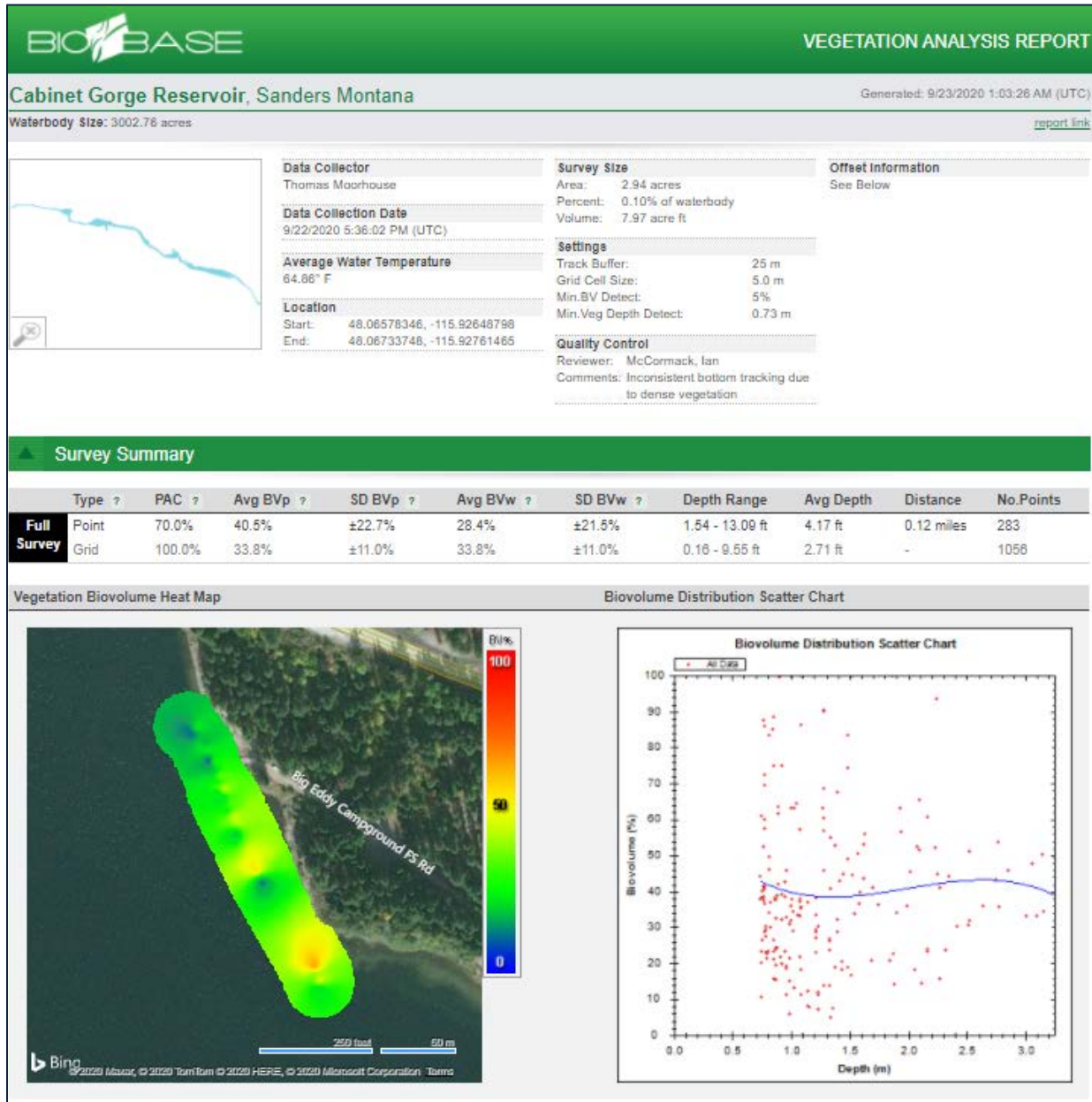
2020 Cabinet Gorge Reservoir AIS Treatment Plots: At Time of and ~ Six (6) Week Post Plot SAV % Cover and SAV BioVolume Data (Grid Data)									
Plot Number	SAV % Cover	SAV % Bio-Volume	Date Data Collected Pre Treatment	SAV % Cover	SAV % Bio-Volume	Date Data Collected-Post Treatment	SAV % BV Change	Post Treatment EWM Injury Rank	Herbicides Used (Aquathol K/Tribune or Procellacor)
CAB-12	66.6	13.2	8/10/2020	100.0	33.8	9/22/2020	156%	100%	Endo/Diquat

Observations/Notes CAB-12: Treated with combination of endothall and diquat, control visually estimated at 100%. Looks great. Elodea dominates and Coontail present post treatment. Some EWM fragments present in plots from river current.

Plot CAB-12: At Time of Treatment (August 10, 2020)



Plot CAB-12: ~ Six (6) Weeks Post (September 22, 2020)



**Plot CAB-30: At Time of Treatment (August 10, 2020 Left),
~ Six (6) Weeks Post (September 22, 2020 Right)**

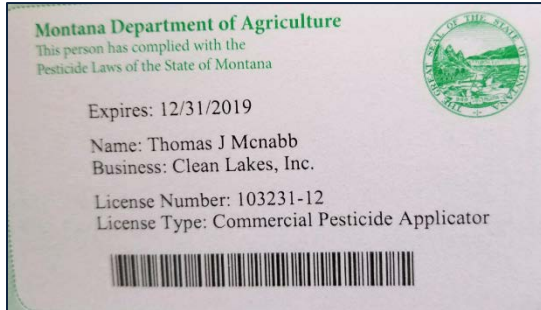
No Sonar data available on August 10, 2020 due shallowness at time of treatment. Picture at right was taken on August 7, 2020 by wading into plot. No data available on September 22, 2020 due inability to access the treatment site due low water. Picture at right taken from shoreline on September 22, 2020.



Observations/Notes CAB-30: Treated with combination of endothall and diquat, control visually could not be estimated due to inaccessibility into plot by boat. Submersed aquatic vegetation visible, species unknown.

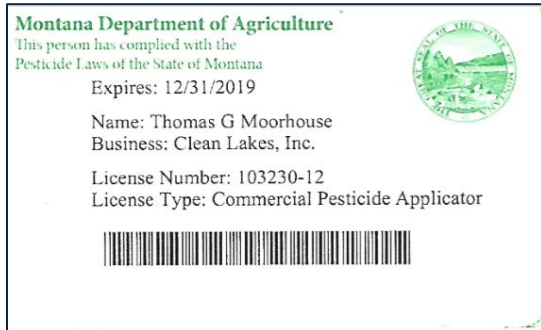
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END OF AQUATIC PESTICIDE APPLICATION REPORT