site were recorded as sparse to moderately dense. The surface temperature was 2 to 3 degrees warmer in the eastern bay (T10-T12) and Badwater Lake (T17-T24) sites versus the sites in the main river channel. The DO readings for T12 through T24 seem high for what has been found in the past.

Table 1-9 2008 (Gray) and 2010 (Yellow) Stem Analysis and Water Quality Data at Each Transect in Twin Falls Reservoir

	Water Quality				Stem Counts			Weevil Count	
Transect	Cond	Temp	pH	DO	Stems	Meristems	Ave. Meristem/ Stem	Total Weevils	Ave. Weevils/ Stem
1	0.156	22.68	8.00	7.50	10	26	2.6	17	1.70
1	0.158	23.08	8.04	6.24	10	24	2.4	15	1.50
2	0.153	22.68	7.82	7.68	10	30	3.1	17	1.50
2	0.160	22.85	7.76	6.45	10	31	3.1	0	0.00
3	0.154	23.30	7.83	8.02	10	22	2.2	22	2.20
3	0.162	23.83	7.85	7.26	10	19	1.9	6	0.60
4	0.151	22.66	8.03	7.46	10	24	2.4	21	2.10
4	0.160	23.41	7.83	6.87	10	16	1.6	3	0.30
5	0.146	23.80	7.96	8.39	10	23	2.3	17	1.70
5	0.164	23.91	7.75	6.31	10	17	1.7	4	0.40
6	0.144	23.45	7.89	7.68	10	29	2.9	15	1.50
6	0.172	24.23	8.81	10.50	10	17	1.7	15	1.50
7	0.148	23.65	7.95	8.92	10	32	3.2	5	0.50
7	0.161	23.35	7.86	6.13	10	33	3.3	1	0.10
8	0.144	23.36	7.99	8.32	10	21	2.1	20	2.00
8	0.163	23.60	8.19	6.91	10	18	1.8	6	0.60
9	0.152	23.62	7.95	8.18	10	23	2.3	7	0.50
9	0.160	22.75	7.89	6.17	10	25	2.5	4	0.40
10	0.151	22.31	7.81	7.78	10	19	1.9	9	0.90
10	0.188	27.50	8.66	7.62	10	21	2.1	0	0.00
11	0.152	22.45	7.78	7.93	10	8	0.8	3	0.30
11	0.187	27.10	8.61	8.04	9	21	2.3	0	0.00
12	0.148	22.35	7.75	7.41	10	23	2.3	9	0.90
12	0.192	27.14	8.39	12.03	10	36	3.6	5	0.50
13	0.149	22.20	7.86	7.71	10	29	2.9	13	1.30
13	0.170	24.47	7.83	12.81	10	25	3.5	4	0.40
14	0.151	22.78	7.82	7.60	10	19	1.9	10	1.00
14	0.181	26.21	8.00	13.41	9	28	3.1	5	0.56

15	0.151	22.52	7.85	7.77	10	16	1.6	7	0.70
15	0.176	25.05	7.94	12.39	10	36	3.6	1	0.10
16	0.152	22.68	8.01	8.12	10	24	2.4	20	2.00
16	0.192	26.48	8.01	13.35	9	23	2.6	4	0.44
17	0.150	22.59	8.08	7.84	9	16	1.78	1	0.11
17	0.181	25.00	8.12	12.92	10	21	2.1	5	0.50
18	0.147	23.26	8.09	7.57	10	13	1.3	5	0.50
18	0.184	27.32	8.94	13.78	10	22	2.2	3	0.30
19	0.151	23.09	8.19	8.48	8	15	2.5	6	0.88
19	0.181	27.04	8.99	15.53	10	26	2.6	0	0.00
20	0.154	24.06	8.21	8.12	10	20	1.4	7	0.70
20	0.181	27.60	9.24	15.71	10	20	2.0	0	0.00
21	0.151	23.86	8.35	8.89	9	14	2.22	0	0.00
21	0.180	27.27	9.23	15.98	10	18	1.8	1	0.10
22	0.153	23.77	8.48	9.07	7	15	2.14	4	0.57
22	0.185	27.51	9.06	11.50	10	21	2.1	0	0.00
23	0.152	23.55	8.36	8.91	9	19	2.0	5	0.56
23	0.184	26.39	8.89	15.39	10	24	2.4	5	0.50
24	0.155	24.42	8.17	8.14	10	22	2.1	6	0.60
24	0.186	26.46	8.60	13.43	10	22	2.2	1	0.10
				2008 TOTAL	**232**	**506**	**2.2**	**236**	**1.02**
				2010 TOTAL	**237**	**564**	**2.4**	**102**	**0.42**

1.2 WEEVIL DISTRIBUTION DISCUSSION

In 2009, EnviroScience biologists performed the weevil distribution study on four of the nine reservoirs (Big Quinnesec, Kingsford, Michigamme Falls, and Peavy Falls) and found that the overall weevil population decreased from 2008 to 2009. The population was found to be increasing in the 2010 study in three of those four reservoirs (Big Quinnesec, Kingsford and Michigamme Falls). The weevil population in Peavy Falls has contiunuously declined over the last three seasons. This is to be expected with the decline of EWM; WE Energies measured 200 acres in 2007 and over 7 acres in 2009. This year it was noted that the EWM was starting to come back. The EWM can grow at a much faster rate than the weevils can reproduce. It may take a season or two for the weevil population to 'catch up'.

Data was only collected from the other five reservoirs in 2008 and 2010. The population increased in White Rapids, Chalk Hill, Brule, and Lower Paint Reservoirs. The weevil numbers in Twin Falls Reservoir decreased by over half of what was found in 2008.

The Multi parameter instruments (YSI) used for water quality measurements varied at each site this year. The biggest fluctuation observed was the Dissolved Oxygen. Although the instruments were calibrated, a faulty DO probe could have caused the problem. At this time correlation between weevils and water quality cannot be made.

Staff biologists of WE Energies have not found EWM in Way Dam, Hemlock Falls, and Pine Reservoir since the beginning of their monitoring program in 2005.

We are finding that it is crucial to perform this study annually as we continue to learn about the correlation of the native weevil population and growth of EWM in the Menominee River watershed.

2.0 MIDDFOIL® PROGRAM

During the summer of 2007, a MiddFoil® program was started by stocking 25 units (1,000 weevils = 1 unit) of milfoil weevils on Eurasian watermilfoil (EWM) in three reservoirs in the Menominee River system: Brule, Twin Falls (Badwater), and Lower Paint. The discovery of an indigenous weevil population that year led to the start of a weevil distribution study in 2008. From that, it was decided to further implement the MiddFoil® program in 2009 in Brule, Lower Paint, and Cowboy Lake stocking eight units in each reservoir. No further implementations occurred in Badwater Lake (Twin Falls Reservoir) due to the lack of EWM found in 2008.

In 2010, both initial and follow-up surveys were conducted in Badwater, Brule, and Cowboy. Along with the two surveys, 12,000 weevils were stocked in Lower Paint for a second consecutive year of biological control augmentation. Qualitative and quantitative data were recorded to evaluate weevil and EWM densities, weevil damage, and the

identification and distribution of native macrophytes and their relative densities within the study sites.

The database generated from multiple-year surveys is analyzed and discussed following the results at the end of this section.

2.1 MIDDFOIL® RESULTS

In 2007, 2009, and 2010 two basic types of quantitative data collection along with qualitative information were completed at the time of the initial and follow-up surveys. The first of these involved collecting plants along three transect lines by swimming through the selected beds of Eurasian watermilfoil perpendicular to shore. The tops of two randomly chosen plants were removed at five evenly spaced intervals, for a total of ten plants along each line, and 30 stem samples per site. These plants were analyzed, using a microscope, for the presence of weevils and number of meristems.

Where sufficient EWM stems were found, plant density was determined by collecting all EWM plants within a 0.09 m^2 PVC quadrat. These plants were counted and converted to number of plants per square meter. These data will serve as an indicator of increases or decreases in EWM density in future survey years. Qualitative measurements included visual analysis of the milfoil plants, presence of weevils and weevil-induced damage, and native plant species present in the areas.

2.1.1 Brule Reservoir – S1B

Initial survey

No weevils were stocked in Brule Reservoir in 2010, but two surveys were conducted. On June 15, an initial survey at S1B (formerly called S1BR), was done in the same stocking location from 2007 and 2009 located where the Brule River meets the Menominee River (Figure 2-1). The overall density of EWM in the northern part of S1B was sparse becoming moderate to dense at the south end. Weevils and damage from weevil larvae were seen on about 15% of the plants.

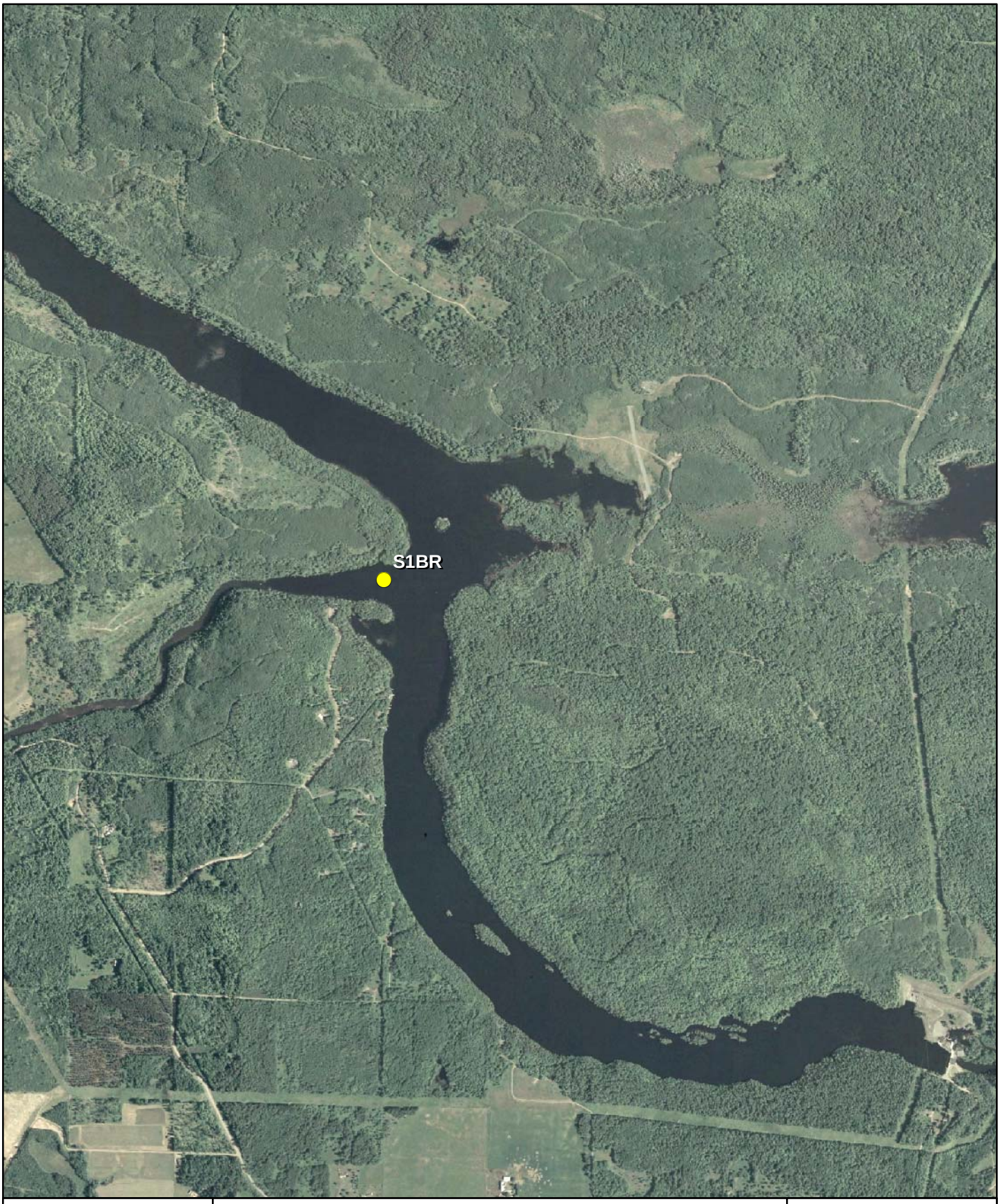

Figure 2-1. MiddFoil Stocking Location, Brule Hydro Project.

2007/2009 Stocking Location

300 150 0 300 Meters

1,000 500 0 1,000 Feet

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The EWM was the dominant plant and comprised about 75% of the aquatic plant community. The plants throughout the site were brown and covered in algae. About 10% of the plants at the south end were at the surface. Other plant species found in lower densities included: Coontail (*Ceratophyllum demersum*), Common waterweed (*Elodea canadensis*), Flat-stem pondweed (*Potamogeton zosterformis*), Thinleaf pondweed (*Potamogeton capillaceus*), and Threadleaf pondweed (*Potamogeton filiformis*),

Representatives of all weevil life stages were found during the quantitative assessment lab analysis with the highest density since the beginning of the program, 0.77 weevils/stem (Table 2-1A). The EWM plants were counted and converted to number of plants per square meter (Table 2-1B) with the density lower than it was at the start of the program in 2007.

Follow-up survey

By the time of the follow-up survey, conducted on August 5, 2010, the overall EWM density was considered sparse, making up 50% of the plant community. Other species noted were Flat-stem pondweed, Coontail, and Water star grass (*Zosterella dubia*).

Weevil adults were observed in the field. Multiple life stages along with weevil damage were found on the stems brought back to the EnviroScience lab (Table 2-1A). The average weevils/stem remained the same between the 2010 surveys and were the highest found since 2007. The EWM density increased slightly over the 2010 initial survey but was about half of what was measured in 2009 follow-up survey (Table 2-1B).

Table 2-1A Summary Data from Site Transect Analysis of EWM During 2007, 2009, and 2010 Initial and Follow-up Surveys of Brule Reservoir

Site #	Parameter Measured	Initial Survey 6/27/07	Follow-up Survey 8/8/07	Initial Survey 6/23/09	Follow-up Survey 8/18/09	Initial Survey 6/15/10	Follow-up Survey 8/5/10
S1B	Total weevils	18.00	15.00	0.00	12.00	24.00	23.00
	Total stems	30.00	30.00	30.00	30.00	30.00	29.00
	Total weevils/stem	**0.60**	**0.50**	**0.00**	**0.40**	**0.80**	**0.79**
	Average meristems/stem	2.13	2.73	3.07	3.13	2.87	1.38

Table 2-1B Density of Eurasian Watermilfoil Collected During 2007, 2009, and 2010 Initial and Follow-up Surveys of Brule Reservoir (stems/m^2)

Site #	Initial Survey 6/27/07	Follow up Survey 8/8/07	Initial Survey 6/22/09	Follow up Survey 8/1/8/09	Initial Survey 6/15/10	Follow up Survey 8/5/10
S1B	88.89	177.78	51.11	93.33	37.03	47.77

2.1.2 Cowboy Lake – S1C

Initial survey

No weevils were stocked in Cowboy Lake in 2010, but two surveys were conducted. On June 15, an initial survey at S1C was completed in the same stocking location from 2009 in the northwest corner of Cowboy Lake, where the lake enters into the Menominee River (Figure 2-2). At the time of the survey the EWM was considered sparse with none at the surface. Weevil adults and eggs were observed in the field

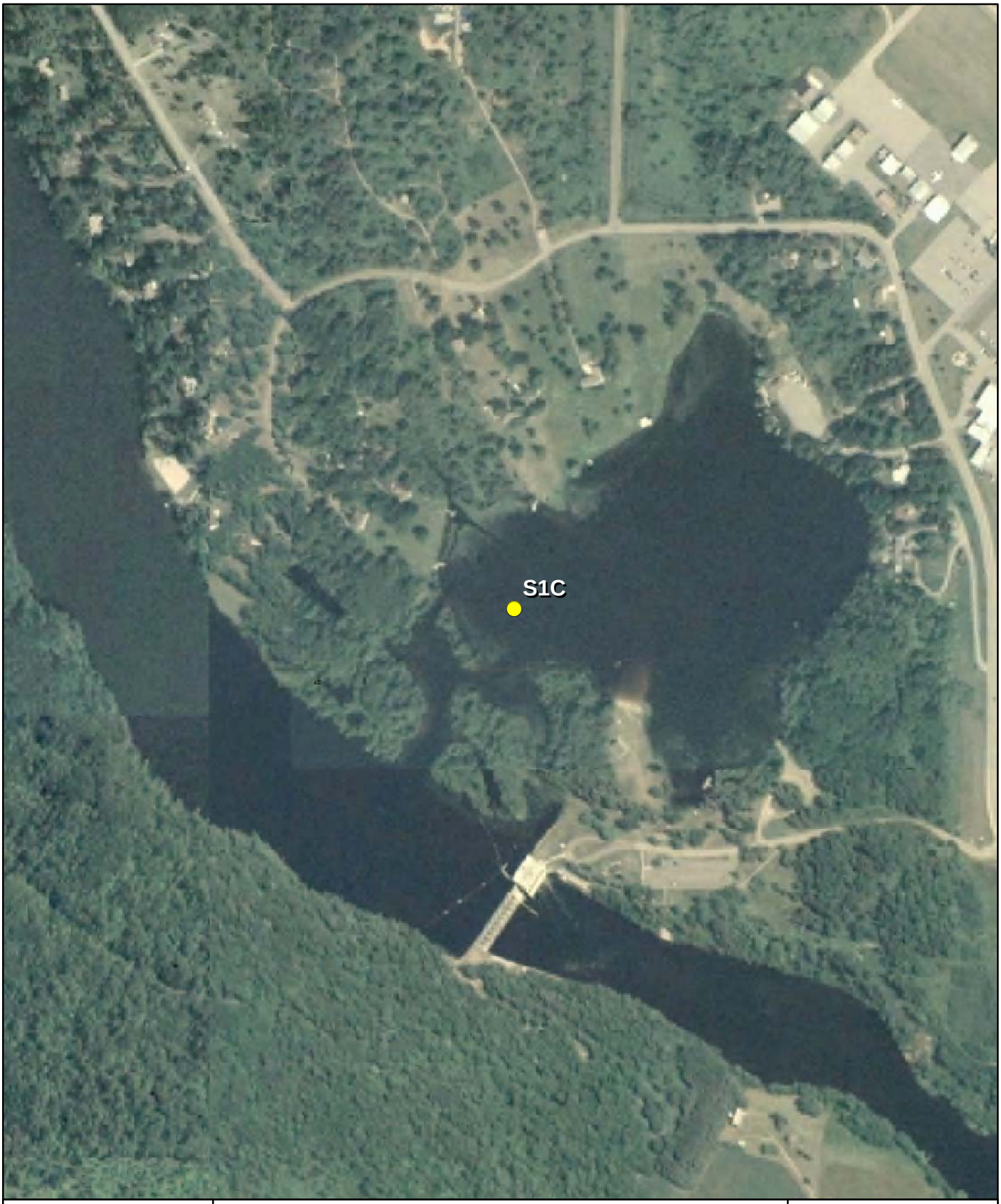

Figure 2-2. MiddFoil Stocking Locations, Cowboy Lake (Kingsford Hydro Project).

2009 Stocking Location

100 50 0 100 Meters

300 150 0 300 Feet

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along with 50% damage on the EWM. The greatest density of weevils to date was found during the lab analysis of the transect stems, at 0.82 weevils/stem (Table 2-2A).

The EWM was noted to be in very poor condition and dying back with heavy weevil damage. The native plant community was more prominent than EWM. Native plant species present included: Common waterweed, Robbins pondweed (*Potamogeton robbinsii*), Large leaf pondweed (*Potamogeton amplifolius*), Illinois pondweed (*Potamogeton illinoensis*).

Follow up survey

By the time of the follow-up survey on August 5, native plants still dominated the plant community at a ratio of 55% to 45% EWM. The EWM was healthy and the density considered moderate with 95% of the stems at the surface. Weevil adults and damage to 5% of the plants were observed. Native plant species included: Common waterweed, Eel grass (*Vallisneria Americana*), Flat-stem pondweed, Star grass, and Water marigold (*Bidens beckii*). Lab analysis of the transect stems revealed the presence of multiple weevil life stages, though at a lower density than the initial 2010 survey (Table 2-2A). The EWM density had risen from the June survey but was at half the amount found in the 2009 follow up survey (Table 2-2B).

Table 2-2A Summary Data from Site Transect Analysis of EWM During 2009 and 2010 Initial and Follow-up Surveys of Cowboy Lake

Site #	Parameter Measured	Initial Survey 6/23/09	Follow-up Survey 8/18/09	Initial Survey 6/15/10	Follow-up Survey 8/5/10
S1C	Total weevils	0.00	2.00	23.00	4.00
	Total stems	30.00	30.00	28.00	30.00
	Total weevils/stem	**0.00**	**0.07**	**0.82**	**0.13**
	Average meristems/stem	1.13	1.90	2.04	1.97

Table 2-2B Density of Eurasian Watermilfoil Collected During 2009 and 2010 Initial and Follow-up Surveys of Cowboy Lake

Site #	Initial Survey 6/23/09	Follow-up Survey 8/18/09	Initial Survey 6/15/10	Follow-up Survey 8/5/10
S1C	50.00	88.89	7.33	24.44

2.1.3 Lower Paint Reservoir – S2LP, S3LP, S4LP

Initial survey

On June 15, 2010, one site, S2LP, established in 2009, was surveyed along with two new sites, S3LP and S4LP established in 2010. S3LP is located in a northwestern bay approximately 150 feet from parallel to S1LP and S4LP is in the center of the river about 200 feet from shore (Figure 2-3). The EWM density was moderate in all three sites with a similar ratio of EWM to native plants, approximately 50% each. The milfoil was brownish with none at the surface in all of the sites. Weevil life stages were observed in the water along with significant damage: 40% in S2LP, 75% in S3LP, and 50% in S4LP.

The native plant community seen in the sites included: Common waterweed, Coontail, Northern watermilfoil, Flat-stem pondweed, Robbins pondweed, Thin-leaf pondweed, Whorled watermilfoil (*Myriophyllum verticulatum*), and a lily (*Nuphar sp.*)

Quantitative analysis revealed the presence of high numbers of multiple weevil life stages and extensive damage on stems from all three sites (Table 2-3A). EWM density varied and was highest in S2LP and lowest in S3LP (Table 2-3B).

After the initial surveys, 8,000 weevils were stocked in S3LP and 4,000 stocked in S4LP.

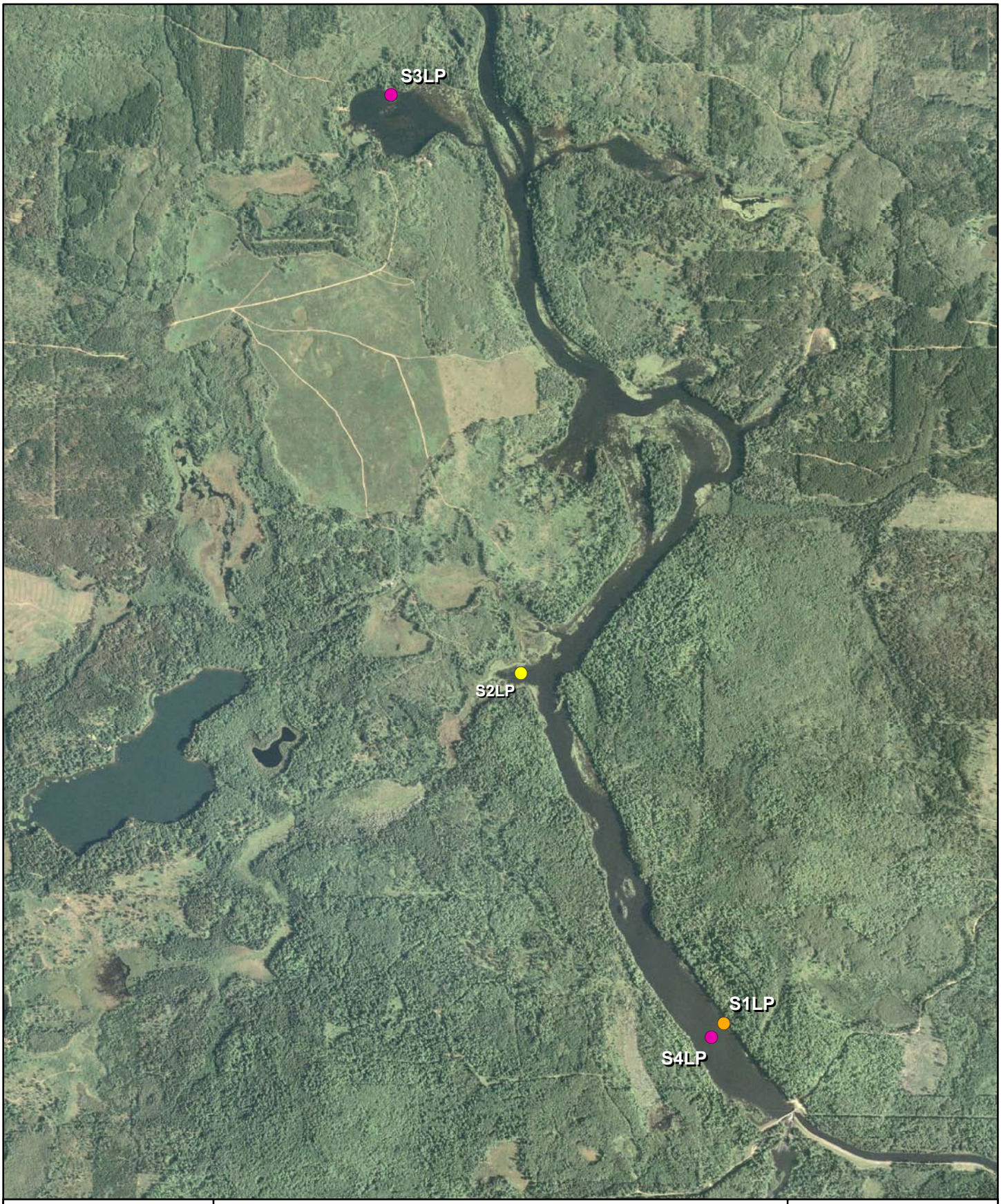

Figure 2-3. MiddFoil Stocking Locations, Lower Paint Hydro Project.

2010 Stocking Location
2007 Stocking Location
2009 Stocking Location

1,000 500 0 1,000 Feet

300 150 0 300 Meters

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Follow up survey

All three sites were revisited on August 5, 2010, to conduct a follow-up survey. The milfoil density was in S2LP and S3LP was ranked as moderate and in S4LP it was considered dense. EWM was healthy overall and at the surface in S3LP and S4LP.The percent EWM to native plants was 40:60 in S3LP and 80:20 in S4LP (no data was recorded for S2LP). Native plants found in the sites include: Common bladderwort (*Utricularia vulgaris*), Common waterweed, Coontail, Flat-stem pondweed, Illinois pondweed, Northern watermilfoil, Robbins pondweed, Spadderdock *(Nuphar variegate*), Water marigold, and Water star grass.

Weevil life stages were observed in S3LP and S4LP along with weevil damage to 20% of the plants in S3LP and 5% in S4LP. The weevil density found on the stems examined in the lab was much lower than in the initial survey, but highest in S2LP, a site that was stocked in 2009 only (Table 2-3A).

Quantitative milfoil density increased in S2LP and decreased in the other two sites (Table 2-3B). Milfoil was down to 20% and 75% of the initial survey in S3LP and S4LP respectively.

Table 2-3A Summary Data from Site Transect Analysis of EWM During 2007, 2009, and 2010 Initial and Follow-up Surveys of Lower Paint Reservoir

Site #	Parameter Measured	Initial Survey 6/27/07	Follow-up Survey 8/8/07	Initial Survey 6/22/09	Follow-up Survey 9/18/09	Initial Survey 6/15/10	Follow-up Survey 8/5/10
S1LP	Total weevils	77.00	25.00	45.00	8.00	--	--
	Total stems	30.00	30.00	30.00	30.00	--	--
	Total weevils/stem	**2.57**	**0.67**	**1.50**	**0.27**	--	--
	Average meristems/stem	1.37	2.47	2.80	2.10	--	--
S2LP	Total weevils	n/a	n/a	11.00	20.00	95.00	20.00
	Total Stems	n/a	n/a	47.00	30.00	27.00	28.00
	Total weevils/stem	n/a	n/a	**0.23**	**0.67**	**3.52**	**0.71**
	Average Meristems/stem	n/a	n/a	2.83	2.00	4.04	2.32
S3LP	Total weevils	n/a	n/a	n/a	n/a	84.00	14.00
	Total stems	n/a	n/a	n/a	n/a	30.00	30.00
	Total weevils/stem	n/a	n/a	n/a	n/a	**2.80**	**0.47**
	Average meristems/stem	n/a	n/a	n/a	n/a	4.04	1.77
S4LP	Total weevils	n/a	n/a	n/a	n/a	151.00	11.00
	Total stems	n/a	n/a	n/a	n/a	60.00	28.00
	Total weevils/stem	n/a	n/a	n/a	n/a	**2.52**	**0.39**
	Average meristems/stem	n/a	n/a	n/a	n/a	2.67	2.64

Table 2-3B Density of Eurasian Watermilfoil Collected During 2007 and 2009 Initial and Follow-up Surveys of Lower Paint Reservoir (stems/m^2)

Site #	Initial Survey 6/27/07	Follow-up Survey 8/8/07	Initial Survey 6/22/09	Follow-up Survey 9/18/09	Initial Survey 6/15/10	Follow-up Survey 8/5/10
S1LP	55.56	72.22	22.22	41.67	--	--
S2LP	n/a	n/a	28.89	37.78	37.00	94.44
S3LP	n/a	n/a	n/a	n/a	77.78	16.67
S4LP	n/a	n/a	n/a	n/a	66.67	50.00

n/a = site not established

2.1.4 Badwater Lake – S1BT

Initial survey

No weevils were stocked in Badwater Lake (Twin Falls Reservoir) in 2010, but two surveys were conducted. On June 15, an initial survey at S1BT was completed in the same stocking location from 2007 (Figure 2-4). The EWM was healthy with some algae present and was less dominant than the natives in the plant community. Native plant species present included: Common waterweed, Coontail, Flat-stem pondweed, Illinois pondweed, Large-leaf pondweed, and Robbins pondweed.

At the time of the survey the EWM was considered sparse with 2% of the stems at the surface. No weevil life stages or damage were observed in the field. A weevil larva and larval, pupal, and adult damage were found on the transect stems analyzed in the lab (Table 2-4A).

The EWM density in the area sampled was low, 13.89 stems/meter^2, which is about 12% of the original 2007 measurement (Table 2-4B). The ES biologist noted that

Figure 2-4. MiddFoil Stocking Locations, Twin Falls Hydro Project.

2007 Stocking Site

0 150 300 600 Feet

0 50 100 200 Meters

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although this area was sparse overall, other patches of EWM in the middle of the lake and along western shoreline looked thicker and some were at the surface.

Follow up survey

A healthy dense bed of EWM, dominated the native plants at the time of the follow-up survey on August 5. Weevil damage to a little over 5% of the plants was observed. A large selection of native plants were present around the edge of the milfoil be. Native plant species surveyed included: Northern watermilfoil (*Myriophyllum* sibiricum), Common waterweed, Coontail, Flat-stem pondweed, Illinois pondweed, Large-leaf pondweed, and Robbins pondweed, Water marigold, White-stem pondweed (*Potamogeton praelongus*), and Yellow pond lily (*Nuphar advena*).

Milfoil weevil eggs and damage caused by adult weevils were found on the transect stems examined in the lab (Table 2-4A). The EWM density had risen from the June survey but was at half the amount found in the 2007 surveys (Table 2-4B).

Table 2-4A Summary Data from Site Transect Analysis of EWM During 2007 and 2010 Initial and Follow-up Surveys of Badwater Lake

Site #	Parameter Measured	Initial Survey 6/23/07	Follow-up Survey 8/18/07	Initial Survey 6/15/10	Follow-up Survey 8/5/10
S1BT	Total weevils	0.00	0.00	1.00	3.00
	Total stems	29.00	30.00	29.00	30.00
	Total weevils/stem	**0.00**	**0.0**	**0.03**	**0.10**
	Average meristems/stem	1.93	1.77	1.97	1.23

Table 2-4B Density of Eurasian Watermilfoil Collected During 2009 and 2010 Initial and Follow-up Surveys of Badwater Lake

Site #	Initial Survey 6/23/09	Follow-up Survey 8/18/09	Initial Survey 6/15/10	Follow-up Survey 8/5/10
S1BT	114.44	117.77	13.89	58.33

2.2 MIDDFOIL® DISCUSSION

The four reservoirs/lakes surveyed in 2010, have all been stocked with milfoil weevils at one time: Badwater in 2007; Brule in 2007 and 2009; Cowboy Lake in 2009; and Lower Paint in 2007, 2009, and 2010. In examining the survey results some general trends are detected.

1. Weevil density is typically highest in the initial surveys, which are conducted in June, and lower by the follow-up surveys done in August. (Exceptions are found in the 2007 surveys for S1C and S1BR and 2010 survey for S1BT.)
2. Conversely, the density of EWM tends to increase between the June and August surveys. (Warming summer temperatures are likely a driving environmental influence on this growth.)
3. The higher weevil densities found in June may be responsible for the lower EWM densities measured at that time. In the case of S3LP and S4LP, the 2010 initial survey weevil densities are extremely high (2.8 and 2.52 weevils/stem) and those sites experienced a significant decline in EWM in the follow-up survey. These weevil density measures are well above what researchers have found to cause declines in EWM, between .5 and 1.5 weevils/stem (Newman and Biesboer, 2000)
4. Between the initial survey at establishment of a given site to the 2010 follow-up survey, 6 of the 7 sites experienced an overall decrease in EWM density, ranging

from 20% to 75%. Only one site, S2LP, had a 66% increase in the milfoil during this period of time.

Brule Reservoir – the weevil density has gradually increased, though not dramatically, since 2007 and the EWM remains at a moderate to low density.
Cowboy Lake – no native weevil population was detected in 2007 but a significant density of weevils, 0.82 weevils/stem, was measured in June 2010. EWM remains at a low density.
Lower Paint Reservoir – has maintained the highest weevil populations of the 2010 surveyed lakes with a range of EWM densities between sites, from sparse to moderately dense.
Badwater Lake – the weevil density has increased only slightly but the EWM density has decreased by half between 2007 and 2010.

Biological control organisms require adequate time to build their populations to a critical density before an effective program can be realized. Control using the MiddFoil® process is defined as reduction in the density of EWM, maintaining the exotic plant at non-nuisance levels, an increase in native plants, and often elimination of entire milfoil beds. Recently completed and ongoing MiddFoil® programs in the United States and Canada have demonstrated that three years of stocking typically result in effective lake-wide control. Multiple-year stocking of milfoil weevils allows for local environmental variations and an adequate time to for the weevils to increase in number. In addition, stocking lakes that maintain an ample native weevil population serves as an important component in successful programs.

At a minimum, another year of weevil stocking is recommended for S3LP, and S4LP in Lower Paint Reservoir and S1BR in Brule Reservoir. Surveys of study lakes that were stocked with weevils, once or not in consecutive years, should also be continued to monitor the progress in those sites.

References:

Newman, R.M. and Biesboer, D.D. 2000. A Decline of Eurasian Watermilfoil in Minnesota Associated with the Milfoil Weevil *Euhrychiopsis lecontei* J Aquat. Plant Manage. 38: 105-111.

3.0 SUNFISH PREDATION ASSESSMENT METHODS

EnviroScience conducted a sunfish survey to evaluate the impact of these fish on weevil populations. This was accomplished by analyzing the gut contents of sunfish *Lepomis macrochirus*, Bluegill, *Lepomis gibbosus*, pumpkinseed, and *Perca flavescens*, yellow perch, obtained by electrofishing from Lower Paint and Brule reservoirs. Fish were collected from each water body using a Smith-Root® 5.0 electrofisher. The electrofisher uses pulsed-direct current from anodes mounted to a boom on the front of a 5.33 m (17'6") boat. Electrofishing was performed at night because of the tendency of fish to rise within four to six feet of the surface at night to feed. When shocked, the fish became temporarily stunned and floated to the surface where they were netted. Sampling zones were determined for the areas where weevils were located within the lake. Each sampling zone was approximately 500 m (1640.4 ft.) in length and all available habitats were sampled for approximately 2000 seconds, or until approximately 25 specimens were available. All specimens were immediately sorted and stored on ice for gut analysis at the EnviroScience laboratory. The collected fish were identified, weighed, and length measured. Each fish was dissected and any internal anomalies were noted. The digestive tract of each fish was removed using scissors and scalpel, starting at the esophagus and ending at the anus. The contents of the esophagus, stomach (including pyloric caeca), and entire length of intestine was thoroughly investigated under a mounted dissecting microscope. All contents were identified to lowest possible taxa, and any *E. lecontei* encountered (whole and body parts) were to be enumerated and preserved in 70% ethanol. Data sheets for gut analysis were completed and remaining fish portions were disposed.

3.1 SUNFISH PREDATION ASSESSMENT RESULTS

3.1.1 Lower Paint Reservoir

Three sampling zones were electro fished in the Lower Paint Reservoir on July 8, 2010, collecting a total of 40 fish with a mean length of 127.72 mm. Fifteen fish (twelve bluegill and three pumpkinseed) were collected from population transect T5 along the western shore in a north to south direction. No milfoil weevils were found in the stomach contents of the fish at T5, but 64 non-milfoil weevil species were found, most having an iridescent or brown appearance. Ten bluegill were collected from population transect T9. No milfoil weevils were found in this gut analysis. Ten non-milfoil weevil species were found.. One bluegill displayed a moderate amount of exterior black spots. Fifteen fish (eleven bluegill and four pumpkinseed) were collected north of population transect T12 in an east to west direction. As with the previous analysis, no milfoil weevils were found in the stomach contents of the fish near T12. Five non-milfoil weevil species were found at this sampling site. Gut contents of the three sites also revealed plant material, chironomid larvae, nymphs, amphipods, mayflies, snails, crayfish, unidentified invertebrates, algae, and various shells.

3.1.2 Brule Reservoir

Three sampling zones were electro fished in the Brule Reservoir on July 8, 2010, collecting a total of 69 fish with a mean length of 130.99 mm. Nineteen sunfish (seven bluegill, four yellow perch, and eight pumpkinseed) were collected between population transects T3 and T4. No milfoil weevils were found in the stomach contents of these fish, but approximately 30 non-milfoil weevil species were found. Twenty yellow perch were collected north of population transect T7. No milfoil weevils were found in the perch gut analysis. Five fish from this sample were found to have exterior black spots. Ten non-milfoil weevil species were found. Thirty fish (twelve bluegill, fifteen yellow perch, and three pumpkinseed) were collected near population transect T9. A total of ten milfoil weevils were found in the gut contents of two bluegills from this site. One bluegill contained seven milfoil weevils as well as snails, hydracarina (water mites), plant material and unidentified invertebrate components. Another bluegill contained

three milfoil weevils as well as hydracarina, snail shells, and digested materials. Gut contents of the three sites also included plant material, chironomids, nymphs, hydracarina, amphipods, mayflies, diptera, snails, crayfish, various shells, and other unidentified invertebrates.

3.1.3 Big Quinnesec Reservoir

Fifty fish were collected from the Big Quinnesec Reservoir in 2009 with gut analysis revealing no milfoil weevils. A 2010 survey was not possible due to excessively foggy conditions, but is expected to resume next summer.

3.2 Sunfish Predation Assessment Discussion

Based on the results of gut analyses for the two reservoirs sampled in 2010, milfoil weevil predation was found only in Brule. Milfoil weevil predation by sunfish was found in the Brule reservoir at population transect T9, with a total of 10 weevils found in two bluegills. The two bluegills from Brule Reservoir containing milfoil weevils also had ingested snails and hydracarina. No milfoil weevils were found in any of the sunfish examined from the Lower Paint Reservoir; despite a weevil population transect analysis average of 2.36 milfoil weevils/stem of milfoil. This average indicates that Lower Paint Reservoir maintains a healthy milfoil weevil population in spite of the presence of sunfish. Weevil population transect analysis in Brule Reservoir resulted in an average milfoil weevil population of 1.08 weevils/stem, a figure almost half of what was found at Lower Paint. While 1.08 weevils/stem is considered within a high density range, the reservoir displaying weevil predation also had the lower density of weevils of the two studied.