

We Energies
2012 Annual Report - Nuisance Plant Control Survey
Way Dam & Michigamme Reservoir
FERC Project #1759

We Energies' Environmental department staff, Mr. Mike Grisar, Mr. Bill Braunschweig, Mr. Tim Muehlfeld, and Mr. Ron Arndt conducted a survey from a boat at the Way Dam and Michigamme Reservoir project on July 24 through July 27, 2012. All waters and appropriate wetlands accessible from the boat were evaluated. Those species targeted for the survey included purple loosestrife (*Lythrum salicaria*) and Eurasian water milfoil (*Myriophyllum spicatum*). The visual meander survey included all visible shorelines and areas of shallow water adjacent to the shorelines. Shallow water was surveyed to a point where the water depth and clarity excluded visibility conducive to observing submerged vegetation. On average, this depth was at approximately 7-feet.

Additionally, the We Energies' Environmental Department staff surveyed the Michigamme River from the Highway 95 bridge north of Channing, MI downstream to Newberg Road at the Way Dam project boundary. This survey occurred on July 23, 2012. This is an approximate 5-mile stretch of the river that We Energies committed to surveying during the annual agency meeting in Fall 2008. The effort was done to determine the extent of purple loosestrife immediately upstream of the Way Dam project, and to attempt to minimize the potential for a prolific invasion within the project limits and further down through the Menominee system.

For each stand of Eurasian water milfoil encountered during the 2012 surveys, the stand locations were mapped using a Trimble Geo XH GPS unit. Not all stand perimeters were mapped, but the location of the center of the stands were in those instances.

Various data were collected at each stand including stand/mat density and mat thickness (when present). For those stands where the perimeter was mapped, the size was subsequently calculated from the collected GPS boundaries. A percent cover scale from 1-5 (sparse – dense) was used to accurately and consistently estimate stand densities:

<u>Estimated Density Rating</u>	<u>% Cover</u>
1 (sparse)	0 - 5%
2 (moderately sparse)	>5 - 25%
3 (moderate)	>25 - 75%
4 (moderately dense)	>75 - 95%
5 (dense)	>95%

Way Dam and Michigamme Reservoir Project Area

Eurasian water milfoil

Eurasian water milfoil was first detected in Way Dam during the 2011 season when an interim survey was conducted for purple loosestrife. This stand was observed immediately adjacent to a private campground and recreational site in the east portion of the reservoir (stand 1). In 2012, 39 stands of Eurasian water milfoil were observed. These stands were scattered around the perimeter of the main basin and in those areas where the stream tributaries enter into the west portions of the reservoir. Many of the stands are located in relative close proximity to recreation sites and between the recreation sites.

Of the 39 detected stands, the perimeters of the first 15 stands encountered were mapped and the areas calculated. Due to the amount of time required for this mapping and the effort placed on monitoring and managing for purple loosestrife, the remaining stand perimeters were not mapped. 29 of the 39 stands detected were observed to have very low densities (<25% cover). 5 of the stands were observed to have high densities (>75% cover).

The very sporadic distribution of Eurasian water milfoil and a majority of the stands having very low densities suggest the milfoil infestation is in its infancy. These factors combined with the first observation occurring in 2011 also suggest the milfoil is spreading widely and at a very rapid pace. Approximately 75% of the milfoil stands were observed to occur within approximately one shoreline-mile of boat launches and recreational sites. It is very likely that the rapid spread and broad distribution is a result of recreational boaters spreading the milfoil. This was also evidenced by many cut stems floating in the vicinity of where boating and fishing was observed to be occurring in and adjacent to the documented stands.

Purple loosestrife

Purple loosestrife was observed, mapped, and removed at four locations in 2006. All four locations (stands 1-4) occurred within the eastern portion of the project area along the shorelines of the Michigamme River, three near the mouth of the Michigamme River where it empties into the reservoir and one in the far eastern reaches of the project area.

While the license requires a survey on an alternating year basis (even years), We Energies conducted interim surveys in 2007, 2009, and again in 2011. In 2007, purple loosestrife was observed at two of the same locations identified in 2006 (i.e. stands 1 and 3). It was observed at four new locations upstream from stands 1 and 3, three of which were in the vicinity of Weber Lake, and one was along the river channel upstream from Weber Lake.

During the 2008 survey, the purple loosestrife population in the Michigamme River portion of this reservoir experienced substantial increases from previous survey years. From 2006 through 2008, increases exceeding 600% and 300% were observed in the number of plants and the number of stems recorded, respectively. In a similar trend, the number of multi-year plant observations doubled in each year between 2006 and 2008. The number of stems recorded per plant substantially decreased from 2007 to 2008 (approximately 14 stems/plant to fewer than 3 stems/plant).

A trend of an increasing purple loosestrife infestation again continued in 2009. Although fewer purple loosestrife locations were observed, the number of plants observed and total number of stems increased by over 60% between 2008 and 2009 (~24x and >5x that of 2006 levels, respectively). The number of stems observed per plant remained relatively constant between 2008 and 2009. The total number of multi-year plants more than tripled between 2008 and 2009.

The 2010 survey resulted in the continued exponential increase of purple loosestrife. When compared to 2009 results, the number of stand locations increased by nearly 2½ times. Approximately 6-fold increases were observed in both the number of plants and stems observed. The number of stems per plant continued to be relatively constant at approximately 3 stems per plant. However, 2010 multi-year plant observations increased 10x the levels observed in 2009.

For the first time since purple loosestrife began exponentially increasing in the Michigamme River portion of Way Dam, population declines were observed in 2011 from 2010 levels. The number of observed stand locations decreased by 22%. The total number of plants and stems

observed decreased substantially, 68% and 77%, respectively. The number of stems per plant decreased slightly. The number of multi-year plants observed decreased by 65%. Purple loosestrife was found at 35 new locations in 2011.

Purple loosestrife observations yielded a negative result between the 2011 and 2012 monitoring years (Table 1). The number of stands, plants, and stems all increased. The highest recorded number of both plants and stems were documented in 2012 with the number of stands only slightly lower (-3) than the highest recorded in 2010. Additionally, the number of multi-year plants was the highest observed to date. However, if four of the stands were removed from the calculations (stands 78, 96, 164, and 172), the total number of plants, stems, and multi-year plants observed would be greatly reduced to 111, 358, and 170, respectively. This would bring the number of plants and stems below 2011 recorded levels. Additionally, the number of stands and multi-year plants would be below 2010 numbers when they were at their peak.

Table 1. Summary of purple loosestrife observations in Way Dam 2006-2012.

	2006	2007	2008	2009	2010	2011	2012
# of Observed Stands	4	6	30	28	68	53	65
# of Plants Observed	4	9	57	94	558	176	1239
# of Stems Observed	51	128	160	271	1732	397	1863
Stems Observed per Plant	12.75	14.22	2.81	2.88	3.10	2.26	1.50
Multi-year Plants Observations	2	4	9	31	314	110	429

Stands 78 & 96 are established stands that were first detected in previous years and at the time of detection, had well established multi-year plants present. Stands 164 and 172 were first detected in 2012 having been established with single plants in each that were at least 3-years old. 146 multi-year plants were observed in stand 164, with what appeared to be 1 plant that was at least 4 years old (initial infestation estimated to be 2008). In contrast, stand 172 had just 3 multi-year plants, one of which was estimated to be 3-years old (initial infestation estimated to be 2009). While these four larger stands contribute a large percentage to the total observed 2012 values, each was detected in their relative infancy with respect to the infestation.

Purple loosestrife has been found at 178 total locations in the past 7 years. Of these, only 19 (approximately 11%) stands documented between 2006 and 2011 were locations where the purple loosestrife returned in 2012. This indicates the manual removal of all plant materials is successful. While it is very labor intensive to conduct these manual removals, it is successful at least at those locations where the loosestrife can be observed.

The challenge is being able to visually observe all of the stands during the survey period. For example, the peak flowering period for purple loosestrife occurred relatively late in 2009. At the time of the 2009 survey, most of the plants observed had only just begun to flower making it difficult to find the plants. This resulted in having over 300 plants found in 2010 to be at least

two-year old plants. Another contributing factor is that in some cases, shorelines are being infested by reed canary grass, a very dense and tall growing invasive species that makes it difficult to spot the purple loosestrife. The aggressive nature of the reed canary grass tends to reduce the height and vigor of loosestrife plants making it even more difficult to observe loosestrife. An example of this is stand #78, where the shoreline is quite visible, but heavily dominated by reed canary grass. The late flowering period in 2009 and dense reed canary grass growth led to not locating this stand until 2010. 182 plants were found with the vast majority of the plants occurring as 1st and 2nd year plants. Fortunately, the stand was found, and accounted for 32% of all the plants observed in 2010. Similarly, stand 172 which was first detected in 2012, accounts for almost 50% of all the plants observed in 2012.

While a majority of the stand locations are centralized around the Weber Lake area and upstream, purple loosestrife occurrences expanded further downstream into the main reservoir. This was beyond where it had been previously documented prior to 2010. Up until 2010, the furthest downstream observations occurred about ½-mile upstream of where the Michigamme River enters the reservoir basin. By 2012, purple loosestrife has been observed throughout much of the main reservoir basin; however, it is widely distributed and in relatively few locations.

The purple loosestrife infestation at Way Dam improved dramatically for the first time in 2011 since 2006. To a large degree this trend continued in 2012 when considering just four stands accounted for a majority of the total plants and stems recorded. From 2006 through 2010, it expanded exponentially in all categories except the number of stems observed per plant. Exponential increases of an invasive species like purple loosestrife is common. Early detection and prompt management of these infestations is critical for having long term success.

We Energies plans to continue surveying for purple loosestrife at the Way Dam & Michigamme Reservoir project site annually to minimize the potential for mature plants setting and releasing seed into the reservoir.

Michigamme River – Highway 95 to Newberg Road

The increase in purple loosestrife within the Way Dam project lands is concerning as there is a viable purple loosestrife population occurring upstream of the Way Dam project area. In agreeing to conduct a survey on the Michigamme River further upstream from the project area, the company hopes to develop a better understanding of the extent to which purple loosestrife occurs upstream of the reservoir system. We Energies has also been collaborating with Ms. Ann Hruska of the NRCS Dickinson County Conservation District office to combat the purple loosestrife infestation on the Michigamme River.

In 2009, surveys commenced along that stretch of the Michigamme River from the north end of the Way Dam project area to the first road crossing at M-95 near the Dickinson and Marquette County line. The 2009 survey yielded 56 purple loosestrife stands. All stands were mapped and manually removed. Within these stands, 79 multi-year plants were encountered and 34 first-year plants (113 plants in total). A total of 361 stems were counted.

The Michigamme River survey continued in 2010 survey along the same stretch of the Michigamme River. A total of 362 plants were located of which a majority were multi-year plants. Among these plants, 1,234 total stems were tallied. All stands were mapped and manually removed. The same phenomenon that occurred in the Way Dam project area occurred along the Michigamme River with respect to not being able to visually see the purple loosestrife plants in 2009. This was primarily due to the late flowering that occurred in 2009. Reed canary grass infestations are not near as prominent along the river stretch as soil conditions and shaded stream banks are not as suitable for reed canary grass to grow.

The survey was again conducted in 2011 from M-95 down to the Way Dam project area. This year, population reductions were documented in the total number of stems observed (-85 stands), stems observed per plant (-1.47), and the number of multi-year plants observed (-35) (Table 2). Conversely, a slight increase in the total number of stands was observed (+9). The largest change occurred in having an increase of 230 total plants observed, almost a 40% increase. While some of these results are positive, the large increase in the number of plants observed is concerning that the source population upstream remains a significant threat to being able to prevent a widespread outbreak of purple loosestrife in the Way Dam project area.

This was evidenced by the results in 2012. Substantial increases in the total number of stands, plants, stems, and multi-year plants were again observed. Most notably is the substantial increase (>50%) in multi-year plants and the number of new stands observed. 154 stands observed in 2012 were new stands. A positive indication the management is working is that only 41 (15%) of the previously 282 documented stands between 2009 and 2011 were locations where the purple loosestrife returned in 2012.

Table 2. Summary of purple loosestrife observations, Michigamme River 2009-2012.

	2009	2010	2011	2012
# of Observed Stands	56	140	149	195
# of Plants Observed	113	362	592	676
# of Stems Observed	361	1234	1149	1271
Stems Observed per Plant	3.19	3.41	1.94	1.88
Multi-year Plants Observations	79	317	282	429

The effort to expand our understanding of source populations upstream of the Way Dam project area expanded in 2010 by further collaboration with Ms. Hruska. Ms. Hruska was awarded a Wilderness Shores Mitigation Enhancement Fund grant for conducting purple loosestrife management along the Michigamme River upstream of the Way Dam project area. In preparation for implementing this grant, Ms. Hruska conducted road surveys in August 2010 along access points from the M-95 crossing up to and north of Republic. Ms. Hruska found numerous dense monotypic stands of purple loosestrife along the shores of the Michigamme River in and around the Republic, MI area. Some of these stands are several acres in size. Many other small stands were observed along the Michigamme River banks at road vantage points from the M-95 crossing at the Marquette and Dickinson County line upstream to Republic. It is quite evident the source population(s) for the loosestrife occurring in the Way Dam project area is from the area in and around Republic, MI.

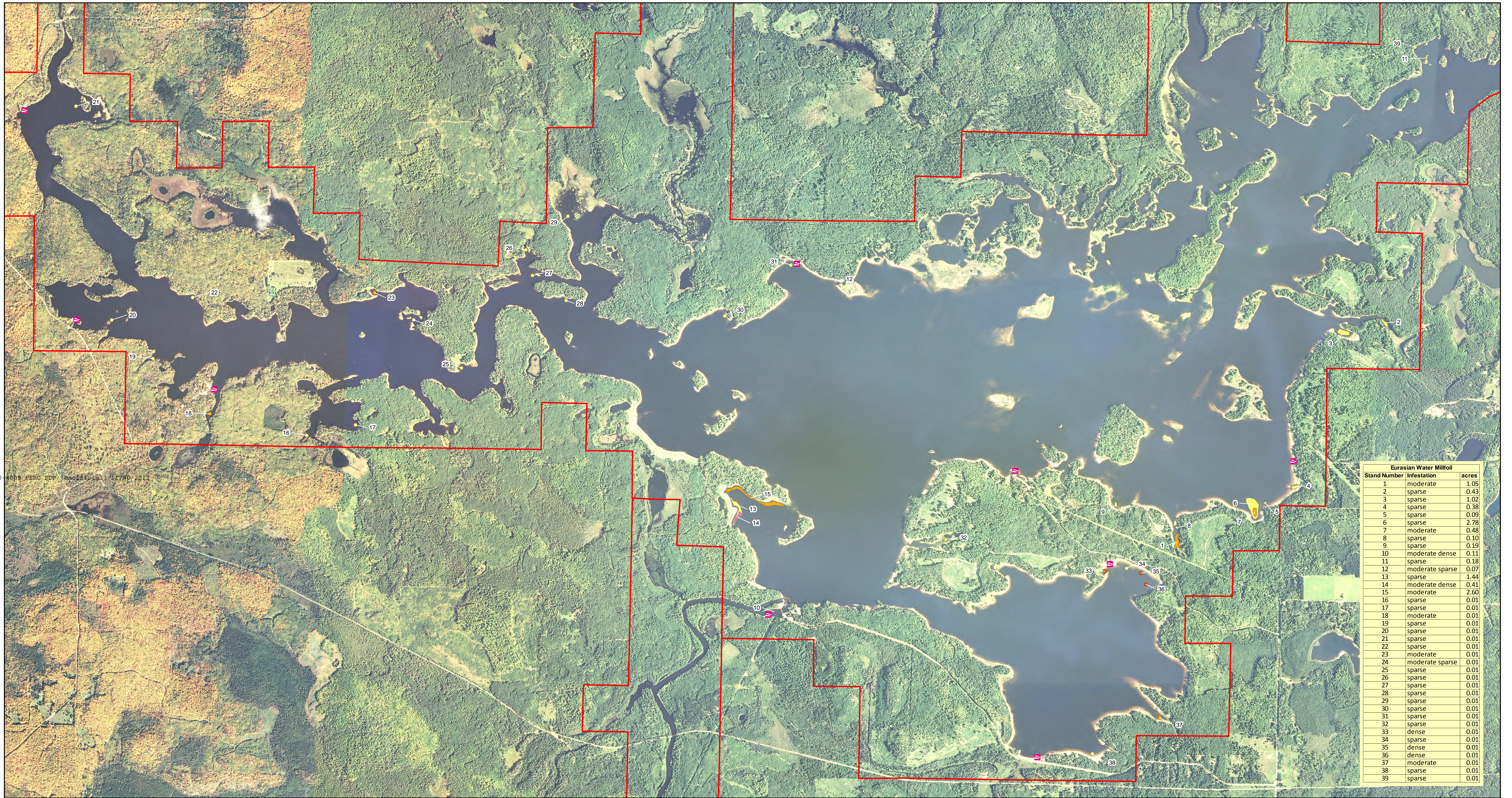
In 2011 and 2012, Ms. Hruska continued the purple loosestrife management efforts upstream of Way Dam by conducting a more detailed survey in the Republic area and on portions of the

Michigamme River up and downstream of Republic. She also began implementing a biological control management program for purple loosestrife targeting the most problematic stands documented in the presence/absence surveys she conducted.

The management activities that have occurred both within the Way Dam project area and the approximate 5-mile stretch of the Michigamme River upstream have had a direct and positive impact on reducing the purple loosestrife infestation within Way Dam. We Energies plans to continue to survey and remove purple loosestrife from this stretch between Highway 95 and Newberg Road in 2011. We intend to continue collaborating with Ms. Hruska in further investigating source populations and management for purple loosestrife upstream of the Way Dam project area.

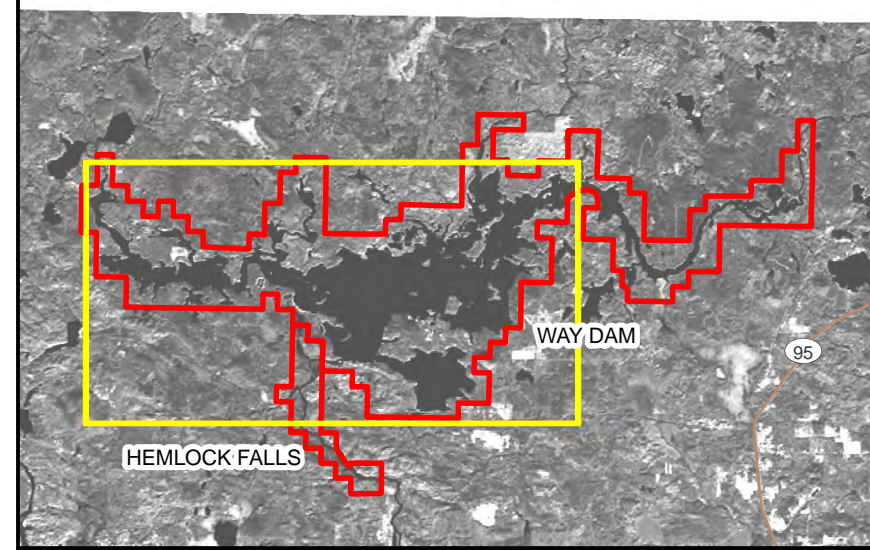
**Table 1WD. 2012 Way Dam Reservoir
Eurasian Water Milfoil Stand Data**

Stand Number	Density¹	Mat Thickness	Stand Size²
1	moderate	None	1.05
2	sparse	None	0.43
3	sparse	None	1.02
4	sparse	None	0.38
5	sparse	None	0.09
6	sparse	None	2.78
7	moderate	None	0.48
8	sparse	None	0.10
9	sparse	None	0.19
10	moderate dense	None	0.11
11	sparse	None	0.18
12	moderate sparse	None	0.07
13	sparse	None	1.44
14	moderate dense	None	0.41
15	moderate	None	2.60
16	sparse	None	Not Recorded
17	sparse	None	Not Recorded
18	moderate	None	Not Recorded
19	sparse	None	Not Recorded
20	sparse	None	Not Recorded
21	sparse	None	Not Recorded
22	sparse	None	Not Recorded
23	moderate	None	Not Recorded
24	moderate sparse	None	Not Recorded
25	sparse	None	Not Recorded
26	sparse	None	Not Recorded
27	sparse	None	Not Recorded
28	sparse	None	Not Recorded
29	sparse	None	Not Recorded
30	sparse	None	Not Recorded
31	sparse	None	Not Recorded
32	sparse	None	Not Recorded
33	dense	None	Not Recorded
34	sparse	None	Not Recorded
35	dense	None	Not Recorded
36	dense	None	Not Recorded
37	moderate	None	Not Recorded
38	sparse	None	Not Recorded
39	sparse	None	Not Recorded



Eurasian Water Milfoil		
Stand Number	Infestation	acres
1	moderate	1.05
2	sparse	0.43
3	sparse	1.02
4	sparse	0.38
5	sparse	0.09
6	sparse	2.78
7	moderate	0.48
8	sparse	0.10
9	sparse	0.19
10	moderate dense	0.11
11	sparse	0.18
12	moderate sparse	0.07
13	sparse	1.44
14	moderate dense	0.41
15	moderate	2.60
16	sparse	0.01
17	sparse	0.01
18	moderate	0.01
19	sparse	0.01
20	sparse	0.01
21	sparse	0.01
22	sparse	0.01
23	moderate	0.01
24	moderate sparse	0.01
25	sparse	0.01
26	sparse	0.01
27	sparse	0.01
28	sparse	0.01
29	sparse	0.01
30	sparse	0.01
31	sparse	0.01
32	sparse	0.01
33	dense	0.01
34	sparse	0.01
35	dense	0.01
36	dense	0.01
37	moderate	0.01
38	sparse	0.01
39	sparse	0.01

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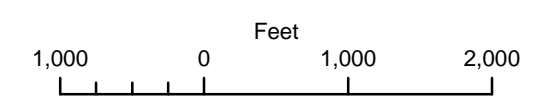
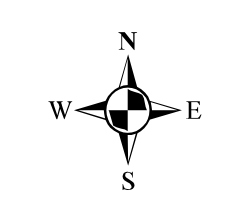


Year 2012 Field Work

- sparse
- moderate sparse
- moderate
- moderate dense
- dense

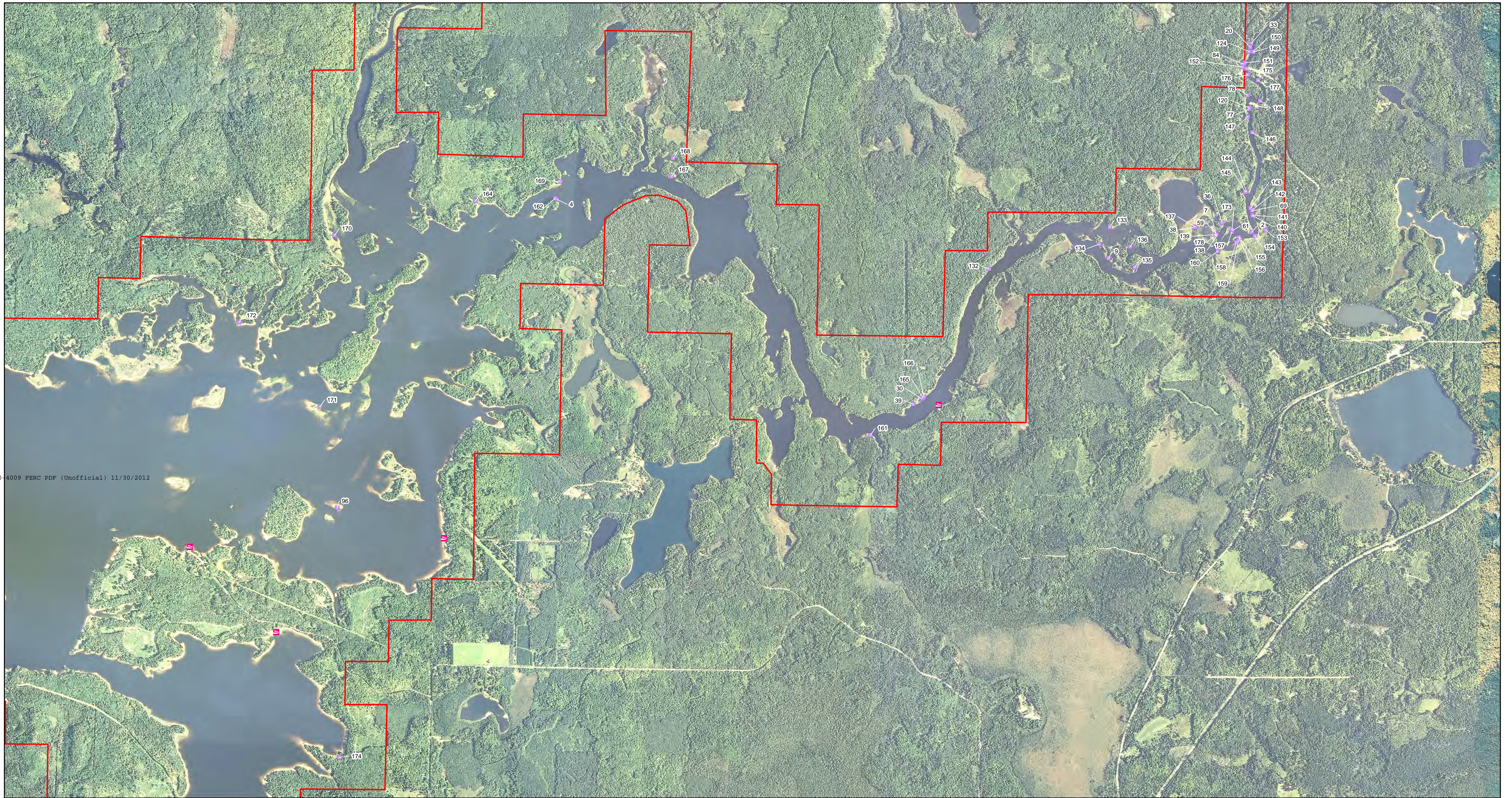
Public Boat Launch

FERC Hydro Project Boundary

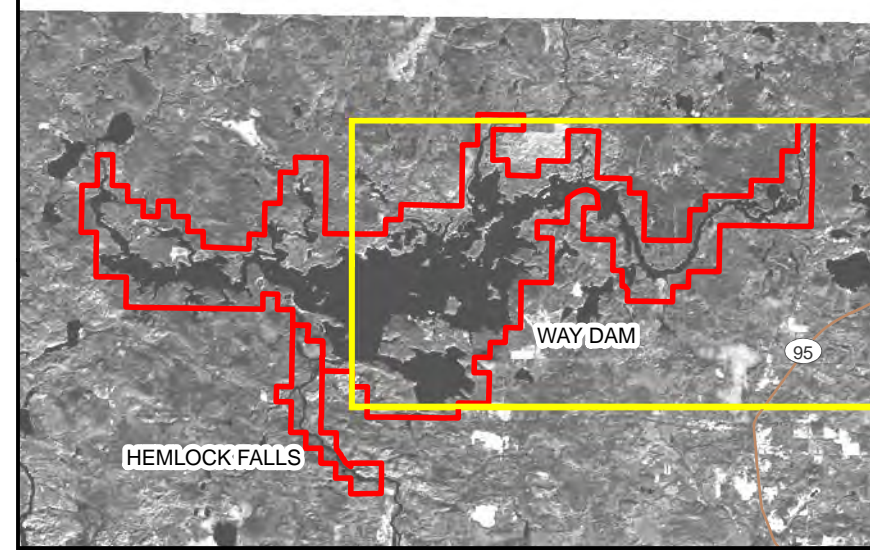


**Way Dam Hydro Project - Year 2012
Eurasian Water Milfoil Survey**

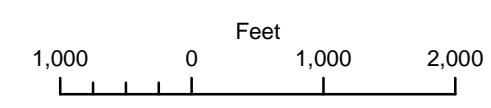
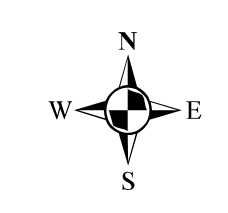
Source: USDA-NAIP Imagery, 2010
GPS field data collected 7/24/2012, 7/25/2012, 7/26/2012, 7/27/2012, 7/29/2012



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- Purple Loosestrife
- FERC Hydro Project Boundary
- S Public Boat Launch

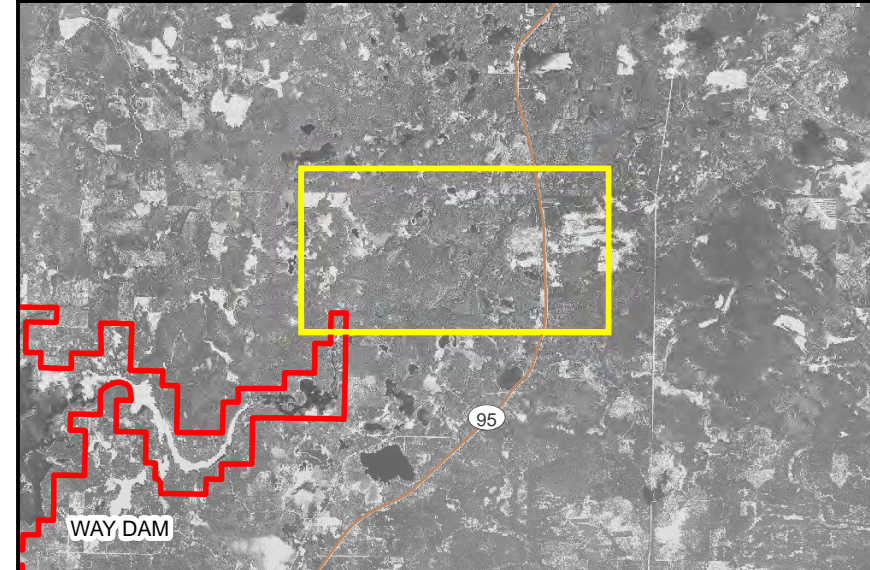


**Way Dam Hydro Project - Year 2012
Purple Loosestrife Survey**

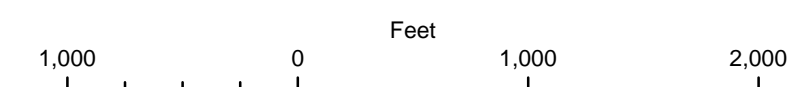
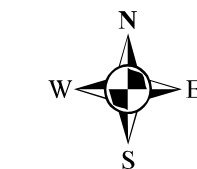
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GPS field data collected 7/24/2012, 7/25/2012, 7/26/2012, 7/27/2012, 7/29/2012



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- Purple Loosestrife
- Public Boat Launch
- FERC Hydro Project Boundary



**Michigamme River - Year 2012
Purple Loosestrife Survey**

Source: USDA-NAIP Imagery, 2010
GPS field data collected 7/23/2012