We Energies
2011 Annual Report - Nuisance Plant Control Survey
Way Dam & Michigamme Reservoir
FERC Project #1759

We Energies' Environmental department staff, Mr. Mike Grisar, Mr. Scott Horzen, Mr. Tim Muehlfeld, and Mr. Ron Arndt conducted a survey from a boat at the Way Dam and Michigamme Reservoir project on July 26 and 27, 2011. The survey was specific to monitoring for the presence of purple loosestrife (*Lythrum salicaria*) in the Michigamme River portion of the project area. While the license requires a survey on an alternating year basis, We Energies is committed to minimizing the potential for a prolific invasion of this species at Way Dam and Michigamme Reservoir and conducted an interim survey in 20011.

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 25, 2011. 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.

Way Dam and Michigamme Reservoir Project Area

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 (Table 1). 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.

Table 1. Summary of purple loosestrife observations in Way Dam 2006-2011.

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

Purple loosestrife has been found at 131 total locations in the past 6 years. Of these, only 18 (approximately 14%) stands documented between 2006 and 2010 were locations where the purple loosestrife returned in 2011. 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 were the loosestrife can be seen.

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.

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. In 2010, two stands where found approximately 1.5-miles downstream, one on a small island in the west portion of the basin (stand #96) and one along the far west shoreline (stand #95). Plants were not found at stand #95 in 2011, and the number of plants observed at stand #96 in 2011 was substantially reduced.

The purple loosestrife infestation at Way Dam improved dramatically for the first time since 2006. 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.

Table 2. Summary of purple loosestrife observations, Michigamme River 2009-2011.

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

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, 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.

20111130-4011 FERC PDF (Unofficial) 11/30/2011

Purple Loosestrife

Public Boat Launch

FERC Hydro Project Boundary

Feet

1,000 0 1,000 2,000

N
W E
S

Way Dam Hydro Project - Year 2011
Purple Loosestrife Survey

Source: USDA -NAIP Imagery, 2010
GPS field data collected 7/26/2011 & 7/27/2011

Created by: TKS Wednesday, August 25, 2010 7:42 AM File: J:\DATA\FO\Env_Strategy\GIS Projects\Hydro_lands\Maps\2010_Reports\way dam 2010 exotic monitoring.mxd

Purple Loosestrife

Public Boat Launch

FERC Hydro Project Boundary

Feet

1,000 0 1,000 2,000

N W E S

Michigamme River - Year 2011
Purple Loosestrife Survey

Source: USDA -NAIP Imagery, 2010
GPS field data collected 7/25/2011

Annual Eurasian Water Milfoil Monitoring Summary

Table 2WR. White Rapids

	2011	2010	2009	2008	2007	2006
total # of stands	25	36	35	35	30	21
total acreage (i.e. spatial distribution)	70.28	83.86	61.61	82.37	82.56	85.62
average stand size	2.81	2.33	1.76	2.35	3.84	4.08
average stand density	1.64	1.83	1.86	1.37	2.13	2.67
# low density stands (<25%)	20	27	27	28	20	11
Acres low density stands (<25%)	50.22	53.81	43.37	67.70	65.80	46.04
% # low density stands (<25%)	0.80	0.75	0.77	0.80	0.67	0.52
% acres low density stands (<25%)	0.71	0.64	0.70	0.82	0.80	0.54
# new stands	0	7	8	5	8	-
# stands - density rating increase	2	12	5	1	1	-
# stands - density rating decrease	6	9	3	4	1	-
# high density stands (>75%)	1	7	7	5	10	9
Acres high density stands (>75%)	5.68	29.05	17.64	10.70	22.10	15.16
% # high density stands (>75%)	0.04	0.19	0.20	0.14	0.33	0.43
% acres high density stands (>75%)	0.08	0.35	0.29	0.13	0.27	0.18

Table 2CH. Chalk Hill

	2011	2010	2009	2008	2007	2006
total # of stands	41	45	41	42	38	29
total acreage (i.e. spatial distribution)	95.40	137.37	120.44	137.49	140.53	139.99
average stand size	2.33	3.05	2.94	3.27	3.70	4.83
average stand density	1.34	1.51	1.85	1.69	1.71	1.69
# low density stands (<25%)	36	37	29	28	28	21
Acres low density stands (<25%)	86.95	117.79	76.17	96.09	109.07	127.39
% # low density stands (<25%)	0.88	0.82	0.71	0.67	0.74	0.72
% acres low density stands (<25%)	0.91	0.86	0.63	0.70	0.78	0.91
# new stands	8	9	9	6	8	-
# stands - density rating increase	2	2	3	5	5	-
# stands - density rating decrease	6	12	6	1	0	-
# high density stands (>75%)	0	2	5	4	1	1
Acres high density stands (>75%)	0	0.19	15.34	1.08	0.13	0.13
% # high density stands (>75%)	0.00	0.04	0.12	0.10	0.03	0.03
% acres high density stands (>75%)	0.00	0.00	0.13	0.01	0.00	0.00

Table 2BQ. Big Quinnesec

	2011	2009	2007
total # of stands	13	24	16
total acreage (i.e. spatial distribution)	0.89	8.88	6.08
average stand size	0.07	0.37	0.38
average stand density	1.00	1.25	1.06
# low density stands (<25%)	13	22	16
Acres low density stands (<25%)	0.89	8.12	6.08
% # low density stands (<25%)	1.00	0.92	1.00
% acres low density stands (<25%)	1.00	0.91	1.00
# new stands	3	9	-
# stands - density rating increase	0	3	-
# stands - density rating decrease	3	1	-
# high density stands (>75%)	0	0	0
Acres high density stands (>75%)	0	0	0
% # high density stands (>75%)	0.00	0.00	0.00
% acres high density stands (>75%)	0.00	0.00	0.00

Annual Eurasian Water Milfoil Monitoring Summary

Table 2KF. Kingsford

	2011	2009	2007
total # of stands	35	34	42
total acreage (i.e. spatial distribution)	71.56	131.65	160.21
average stand size	2.04	3.87	3.81
average stand density	1.11	1.88	1.69
# low density stands (<25%)	34	22	31
Acres low density stands (<25%)	69.77	74.73	100.60
% # low density stands (<25%)	0.97	0.65	0.74
% acres low density stands (<25%)	0.97	0.57	0.63
# new stands	12	5	-
# stands - density rating increase	0	7	-
# stands - density rating decrease	9	4	-
# high density stands (>75%)	0	4	2
Acres high density stands (>75%)	0	2.89	23.60
% # high density stands (>75%)	0.00	0.12	0.05
% acres high density stands (>75%)	0.00	0.02	0.15

Table 2BR. Brule

	2011	2010	2009	2008	2007	2006
total # of stands	25	50	52	44	27	22
total acreage (i.e. spatial distribution)	7.43	95.60	81.42	68.21	57.59	45.10
average stand size	0.30	1.91	1.57	1.55	2.13	2.05
average stand density	1.00	2.08	2.02	1.36	1.56	1.91
# low density stands (<25%)	25	34	37	38	23	16
Acres low density stands (<25%)	7.43	48.79	29.29	52.61	47.26	34.67
% # low density stands (<25%)	1.00	0.68	0.71	0.86	0.85	0.73
% acres low density stands (<25%)	1.00	0.51	0.36	0.77	0.82	0.77
# new stands	0	9	22	19	4	-
# stands - density rating increase	0	6	14	5	3	-
# stands - density rating decrease	18	14	3	3	5	-
# high density stands (>75%)	0	9	8	5	2	4
Acres high density stands (>75%)	0	26.76	33	15.60	9.41	9.80
% # high density stands (>75%)	0.00	0.18	0.15	0.11	0.07	0.18
% acres high density stands (>75%)	0.00	0.28	0.41	0.23	0.16	0.22

Table 2MF. Michigamme Falls

	2011	2009	2007
total # of stands	30	37	24
total acreage (i.e. spatial distribution)	20.23	66.69	120.79
average stand size	0.67	1.80	5.03
average stand density	1.10	1.73	2.04
# low density stands (<25%)	29	28	13
Acres low density stands (<25%)	19.45	52.50	107.63
% # low density stands (<25%)	0.97	0.76	0.89
% acres low density stands (<25%)	0.96	0.79	0.54
# new stands	8	17	-
# stands - density rating increase	0	1	-
# stands - density rating decrease	8	7	-
# high density stands (>75%)	0	4	1
Acres high density stands (>75%)	0	2.77	0.10
% # high density stands (>75%)	0.00	0.11	0.04
% acres high density stands (>75%)	0.00	0.04	0.00

Annual Eurasian Water Milfoil Monitoring Summary

Table 2PF. Peavy Falls

	2011	2009	2007
total # of stands	135	35	121
total acreage (i.e. spatial distribution)	260.52	7.07	207.37
average stand size	1.93	0.20	1.71
average stand density	1.21	1.34	1.59
# low density stands (<25%)	127	30	106
Acres low density stands (<25%)	258.64	5.66	196.09
% # low density stands (<25%)	0.94	0.86	0.95
% acres low density stands (<25%)	0.99	0.80	0.88
# new stands	56	8	-
# stands - density rating increase	1	2	-
# stands - density rating decrease	4	4	-
# high density stands (>75%)	1	1	15
Acres high density stands (>75%)	0.22	0.59	7.45
% # high density stands (>75%)	0.01	0.03	0.12
% acres high density stands (>75%)	0.00	0.08	0.04