We Energies
2009 Annual Report - Nuisance Plant Control Survey
Brule Reservoir
FERC Project #2431

Background and Methods

We Energies' Environmental department staff, Mr. Mike Grisar and Mr. John Hrobar, conducted a survey from a boat of the entire shoreline at the Brule Reservoir project on August 4, 2009. 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 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.

For each stand of Eurasian water milfoil encountered during the 2009 surveys, the stand location and perimeter were compared and verified with the 2008 monitoring data using a Trimble Geo XH GPS unit. Where the stand size was negligible, a single point in the center of the stand was located with the GPS. When significant changes in the stand perimeter were observed, these changes were marked with the GPS and reflected in the attached map. Changes in stand density were updated and are shown in Table 1BR. New stands not previously observed were mapped and recorded.

Various data were collected at each stand including stand/mat density and mat thickness (when present). The stand 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:

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

Results & Discussion

One purple loosestrife plant was observed along the shores of the Brule Reservoir project area. This is the first time since invasive species monitoring began at Brule that purple loosestrife was observed. The single plant was found in large backwater bay along a marshy shoreline to the east of the confluence between the Brule and Paint Rivers. The entire plant was removed including the flowering heads, stems, and root mass.

Fifty-two stands of Eurasian water milfoil were observed at the Brule Reservoir project area in 2009 (attached map), an increase of 8 stands from 2008, and 24 stands since 2007. While there were 22 new stands recorded, 12 were observed to be absent in 2009, and 5 stands were merged with other stands. The identified stands are distributed throughout the project area and range in size from <0.01-acre up to 13.77-acres.

Eurasian water milfoil is present in approximately 81-acres in the Brule Reservoir project area, an increase of about 13-acres from 2008, and about 24-acres since 2007. Cumulatively, the

average stand size is 1.57-acres and has an average density rating of 2.02 per stand. In 2008, the average stand size was 1.55-acres and had an average density rating of 1.36 per stand. Even though the number of observed stands increased, the stand size remained constant. This is attributable to one relatively large stand being observed for the first time along the west shore of the Brule and Paint River confluence.

A substantial increase in average stand density was observed in 2009, which continues a consistent average density increase that has been observed over the past several years. 14 stands increased in density between 2008 and 2009. Five stands (stands 4, 7, 10, 20, and 31) were observed with high densities (>75% cover), resulting in an average density rating change of +2.4 per stand. Conversely, stand 3 was the only stand to decrease in density from 2008. Further, the 22 new stands were recorded with an average density rating of 1.68, which is generally high for new stands system-wide.

Additionally, 19 stands changed in spatial coverage with a net change of -2.74-acres overall. The total gross change observed is 27.37-acres with an average gross change of 1.44-acres per stand. 7 stands accounted for over 20-acres that either increased or decreased in size (approximate 2.9-acre average change).

Out of the 52 observed stands, 8 stands have a high density rating, increasing from only 1 stand in 2008. Combined, these stands account for over 40% (33.30-acres) of the total area observed to have Eurasian water milfoil present. These stands generally occur in the vicinity of the Brule River and Paint River confluence and upstream along the Paint River shorelines.

37 of the 52 stands have very low densities (<25% cover) of Eurasian water milfoil with single stems growing sporadically among native species. The most common native species included northern water milfoil (*Myriophyllum sibiricum*), two-leaf water milfoil (*Myriophyllum heterophyllum*), a variety of pondweeds (*Potamogetan* sp.), common waterweed (*Elodea canadensis*), bladderwort (*Utricularia* sp.), coon's tail (*Ceratophyllum demersum*), water celery (*Vallisneria americana*), yellow pond lilies (*Nuphar* sp.), and white pond lily (*Nymphaea odorata*). These low density stands account for only 36% (29.29-acres) of the total area observed to have Eurasian water milfoil present.

Conclusions

In conclusion, there has been a steady increase in the number Eurasian water milfoil stands and spatial coverage at the Brule Reservoir project area since 2007. There has also been a substantial increase in the average density per stand. This is demonstrated by those areas in the vicinity of the confluence between the Brule River and Paint River and upstream from the confluence along the shorelines. These are relatively negative results with respect to whether the conditions are improving.

While the average stand size remained relatively constant, substantial changes in the area of the stands were observed in individual stands that remained present from 2007. The changes in individual stand sizes resulted in actual net loss spatial coverage of theses stands.

Not only were there large changes in the stand sizes, many changes occurred with respect to presence of stands as well. Twenty stands were observed for the first time in 2009, while twelve stands previously observed are no longer present. Additionally, 5 stands merged with other stands due to changes in annual densities, generally from more dense to less.

These trends of changing spatial distribution, overall coverage, and stand densities indicate the Eurasian water milfoil population is in flux from year to year within the Menominee River system.

Contributing factors include influences of local and annual climate variances (i.e. precipitation and temperature), the presence of the indigenous milfoil weevil population, extent of milfoil hybridization, fish predation, and others.

Annual fluctuations in the extent and density of Eurasian water milfoil may be due, in part, to the presence of an indigenous weevil population occurring in the system. See the attached discussion regarding the Eurasian water milfoil management plan and the summary report prepared by EnviroScience for further information about milfoil management activities.

Table 1BR. 2009 Brule Reservoir Eurasian Water Milfoil Stand Data.

Stand Number	Density[1]	Mat Thickness	Stand Size[2]
1	4 (+1)	None	4.14 (+3.92)
2	1	None	0.27 (-2.04)
3	2 (-1)	None	0.18 (-0.73)
4	4 (+3)	None	7.1 (-0.6)
5	5 (+1)	None	2.75 (+2.32)
6	3 (+1)	None	3.78 (-0.63)
7	4 (+2)	None	8.10
8	1	None	0.39
9	2 (+1)	None	0.37 (-0.74)
10	4 (+1)	None	5.54 (-2.66)
11	3 (+2)	None	10.89 (+3.3)
12	Not Present	NA	NA
13	2	None	0.09
14	1	None	0.06
15	1	None	0.73 (-0.19)
16	2	None	0.13
17	1	None	0.33
18	2	None	0.05
19	1	None	0.01
20	4 (+4)	None	1.15 (+1.15)
21	Not Present	NA	NA
22	1	None	0.4 (-0.57)
23	1	None	0.15
24	2	None	1.76 (-3.57)
25	2 (+1)	None	1.84 (+1.18)
26	Not Present	NA	NA
27	number skip	NA	NA
28	Not Present	NA	NA
29	1	None	0.01
30	2 (+1)	None	0.54
31	5 (+2)	None	3.61 (-2.23)
32	1	None	0.09 (+0.08)
33	Not Present	NA	NA
34	combined into 61	NA	NA
35	combined into 63	NA	NA
36	2 (+1)	None	2.19 (+0.11)
37	combined into 40	NA	NA
38	combined into 40	NA	NA
39	combined into 40	NA	NA
40	1	None	0.93 (-1.1)
41	3 (+2)	None	0.49 (+0.25)
42	Not Present	NA	NA
43	Not Present	NA	NA
44	Not Present	NA	NA
45	Not Present	NA	NA
46	Not Present	NA	NA
47	Not Present	NA	NA

Table 1BR. 2009 Brule Reservoir Eurasian Water Milfoil Stand Data.

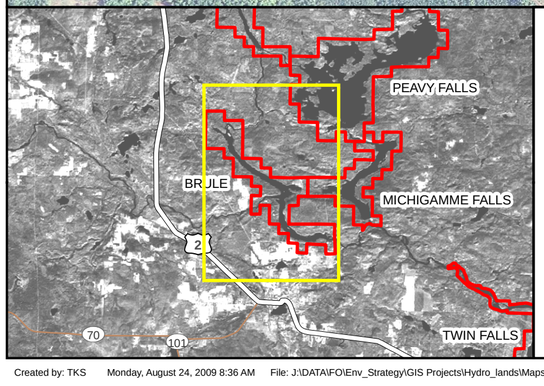
Stand Number	Density[1]	Mat Thickness	Stand Size[2]
48	Not Present	NA	NA
49	2	None	0.78
50	1	None	0.89
51	1	None	0.01
52	1	None	0.18
53	3	None	0.85
54	3	None	1.98
55	1	None	0.01
56	1	None	0.01
57	1	None	0.01
58	1	None	0.01
59	1	None	0.01
60	2	None	0.47
61	1	None	0.04
62	1	None	0.64
63	1	None	0.26
64	5	None	0.91
65	1	None	13.77
66	1	None	0.01
67	2	None	1.61
68	3	None	0.17
69	1	None	0.04
70	3	None	0.67

1 – change in density rating from 2008 to 2009

2 – change in stand size from 2008 to 2009

Purple Loosestrife		
Stand Number	**Infestation**	**acres**
1	sparse	0.01

Eurasion Water Milfoil		
Stand Number	**Infestation**	**acres**
1	moderate dense	4.14
2	sparse	0.27
3	moderate sparse	0.18
4	moderate dense	7.10
5	dense	2.75
6	moderate	3.78
7	moderate dense	8.10
8	sparse	0.39
9	moderate sparse	0.37
10	moderate dense	5.54
11	moderate	10.89
13	moderate sparse	0.09
14	sparse	0.06
15	sparse	0.73
16	moderate sparse	0.13
17	sparse	0.33
18	moderate sparse	0.05
19	sparse	0.01
20	moderate dense	1.15
22	sparse	0.40
23	sparse	0.15
24	moderate sparse	1.76
25	moderate sparse	1.84
29	sparse	0.01
30	moderate sparse	0.54
31	dense	3.61
32	sparse	0.09
36	moderate sparse	2.19
40	sparse	0.93
41	moderate	0.49
49	moderate sparse	0.78
50	sparse	0.89
51	sparse	0.01
52	sparse	0.18
53	moderate	0.85
54	moderate	1.98
55	sparse	0.01
56	sparse	0.01
57	sparse	0.01
58	sparse	0.01
59	sparse	0.01
60	moderate sparse	0.47
61	sparse	0.04
62	sparse	0.64
63	sparse	0.26
64	dense	0.91
65	sparse	13.77
66	sparse	0.01
67	moderate sparse	1.61
68	moderate	0.17
69	sparse	0.04
70	moderate	0.67



Public Boat Launch

FERC Hydro Project Boundary

Year 2009 Field Work

- sparse
- moderate sparse
- moderate
- moderate dense
- dense
- Purple Loosestrife - sparse

Feet

1,000 0 1,000 2,000

N W E S

Brule Hydro Project - Year 2009
Eurasian Water Milfoil and Purple Loosestrife Survey

Source: USDA -NAIP Imagery, 2008
GPS field data collected 8/4/2009

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