We Energies
2010 Annual Report - Nuisance Plant Control Survey
Brule Reservoir
FERC Project #2431

Background and Methods

We Energies' Environmental department staff, Mr. Mike Grisar and Mr. Scott Horzen, conducted a survey from a boat of the entire shoreline at the Brule Reservoir project on August 3, 2010. 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 2010 surveys, the stand location and perimeter were compared and verified with the 2009 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

No purple loosestrife plants were observed along the shores of the Brule Reservoir project area. The removal of the plant observed in 2009 was successful with no reoccurrence of this plant in 2010.

Fifty stands of Eurasian water milfoil were observed at the Brule Reservoir project area in 2009 (attached map), a decrease of 2 stands from 2009. While there were 9 new stands recorded, 9 were observed to be absent in 2009, and 5 stands were merged with other stands. The 9 new stands were recorded with an average density rating of 2.44, which is relatively high for new stands system-wide. The identified stands are distributed throughout the project area and range in size from <0.01-acre up to 17.81-acres.

Eurasian water milfoil is present in approximately 96-acres in the Brule Reservoir project area, an increase of about 14-acres from 2009, and about 24-acres since 2007. Cumulatively, the average stand size is 1.91-acres and has an average density rating of 2.08 per stand. In 2009,

the average stand size was 1.57-acres and had an average density rating of 2.02 per stand. While the number of observed stands decreased, the stand size increased. This is attributable to twenty-six stands increasing in size compared to only 8 decreasing.

Additionally, 35 stands changed in spatial coverage with a net change of 17.09-acres overall. The total gross change observed is 35.62-acres with an average gross change of 1.02-acres per stand. 7 stands accounted for about 21-acres that either increased or decreased in size (approximate 3.1-acre average change).

The average stand density leveled off in 2010 following a substantial increase in average stand density between 2008 and 2009, and a consistent increase in stand density since 2006. 6 stands increased in density between 2009 and 2010, while 14 stands decreased.

Out of the 50 observed stands, 9 stands (stands 5, 7, 11, 31, 41, 62, 64, 73, and 74) were observed with high densities (>75% cover), increasing by one stand since 2009. Combined, these stands account for about 28% (26.76-acres) of the total area observed to have Eurasian water milfoil present, which is down from 40% in 2009. These stands generally occur to the east of the Brule River and Paint River confluence and upstream along the Paint River shorelines.

34 of the 50 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 51% (48.79-acres) of the total area observed to have Eurasian water milfoil present, up from 36% in 2009.

Conclusions

In conclusion, both positive and negative trends were observed in 2010 as well as many changes with respect to stand presence, stand size, and stand density. Following a steady increase in stand density and the number of stands observed for several years, these parameters leveled off and were very similar to those values observed in 2009. Additionally, the number of high density stands observed also leveled off after having a spike in 2009.

From a positive trend perspective, only 6 stands increased in density while 14 stands decreased. Additionally, the percentage of acres observed to have high densities dropped substantially between 2009 and 2010 (40% to 28%). Likewise, the percentage of lower density acres dramatically increased from 36% to 51% between 2009 and 2010, climbing from 29.29 to 48.79 acres in the past two seasons.

Additionally, after several years of observing increases in densities and spatial distribution at the confluence of the Brule and Paint Rivers, the density of the milfoil observed decreased. However, the overall spatial distribution slightly increased since 2009.

On the other hand, several negative trends were also observed. The total spatial distribution of Eurasian water milfoil jumped by 14.18-acres since 2009. This when combined with a slight decrease in the total number of stands observed results in a large increase in the average stands size (+0.34-acre) during this period. Finally, of the new stands observed, four were recorded as being moderate to dense stands. This is atypical for new observed stands throughout the system as most new stands have sparse to moderately sparse density ratings.

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 summary report prepared by EnviroScience for further information about milfoil management activities that occurred in 2010.

Table 1BR. 2010 Brule Reservoir
Eurasian Water Milfoil Stand Data.

Stand Number	Density[1]	Mat Thickness	Stand Size[2]
1	3 (-1)	None	4.04 (-0.1)
2	1	None	0.27
3	1 (-1)	None	0.56 (+0.38)
4	3 (-1)	None	6.66 (-0.44)
5	4 (-1)	None	0.43 (-2.32)
6	3	None	6.1 (+2.32)
7	4	None	8.43 (+0.33)
8	2 (+1)	None	0.47 (+0.09)
9	Combined with 7	NA	NA
10	3 (-1)	None	1.33 (-4.21)
11	4 (+1)	None	10.63 (-0.26)
12	Not Present	NA	NA
13	1 (-1)	None	0.09
14	Not Present	NA	NA
15	1	None	0.73
16	Not Present	NA	NA
17	Not Present	NA	NA
18	1 (-1)	None	0.10 (+0.05)
19	Not Present	NA	NA
20	2 (-2)	None	1.70 (+0.55)
21	1 (+1)	None	6.31 (+6.31)
22	Combined with 21	NA	NA
23	1	None	0.15
24	1 (-1)	None	1.91 (+0.14)
25	1 (-1)	None	0.76 (-1.08)
26	Not Present	NA	NA
27	number skip	NA	NA
28	Not Present	NA	NA
29	Not Present	NA	NA
30	1 (-1)	None	1.74 (+1.2)
31	4 (-1)	None	4.07 (+0.46)
32	1	None	0.09
33	Not Present	NA	NA
34	Not Present	NA	NA
35	Not Present	NA	NA
36	2	None	2.44 (+0.25)
37	Not Present	NA	NA
38	Not Present	NA	NA
39	Not Present	NA	NA
40	2 (+1)	None	1.71 (+0.77)
41	4 (+1)	None	0.3 (-0.19)
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

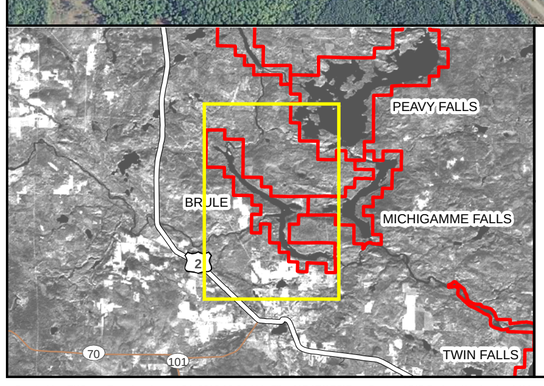
Table 1BR. 2010 Brule Reservoir
Eurasian Water Milfoil Stand Data.

Stand Number	Density[1]	Mat Thickness	Stand Size[2]
48	Not Present	NA	NA
49	2	None	1.31 (+0.52)
50	combined with 30	NA	NA
51	combined with 30	NA	NA
52	1	None	0.18
53	2 (-1)	None	0.85
54	2 (-1)	None	1.98
55	1	None	0.01
56	1	None	0.01
57	1	None	0.01
58	1	None	0.01
59	Not Present	NA	NA
60	2	None	0.47
61	1	None	0.04
62	4 (+3)	None	0.56 (-0.09)
63	1	None	0.93 (+0.67)
64	5	None	1.35 (+0.44)
65	1	None	17.81 (+4.04)
66	Not Present	NA	NA
67	2	None	1.04 (-0.58)
68	3	None	0.35 (+0.18)
69	1	None	0.04
70	Combined with 21	NA	NA
71	3	None	0.47
72	3	None	1.11
73	5	None	0.41
74	5	None	0.59
75	1	None	0.25
76	1	None	3.20
77	1	None	0.54
78	2	None	1.08
79	1	None	0.01

1 – change in density rating from 2009 to 2010

2 – change in stand size from 2009 to 2010

Eurasion Water Milfoil		
Stand Number	Infestation	acres
1	moderate	4.04
2	sparse	0.27
3	sparse	0.56
4	moderate	6.66
5	moderate dense	0.43
6	moderate	6.10
7	moderate dense	8.43
8	moderate sparse	0.47
10	moderate	1.33
11	moderate dense	10.63
13	sparse	0.09
15	sparse	0.73
18	sparse	0.10
20	moderate sparse	1.70
21	sparse	6.31
23	sparse	0.15
24	sparse	1.91
25	sparse	0.76
30	sparse	1.74
31	moderate dense	4.07
32	sparse	0.09
36	moderate sparse	2.44
40	moderate sparse	1.71
41	moderate dense	0.30
49	moderate sparse	1.31
52	sparse	0.18
53	moderate sparse	0.85
54	moderate sparse	1.98
55	sparse	0.01
56	sparse	0.01
57	sparse	0.01
58	sparse	0.01
60	moderate sparse	0.47
61	sparse	0.04
62	moderate dense	0.56
63	sparse	0.93
64	dense	1.35
65	sparse	17.81
67	moderate sparse	1.04
68	moderate	0.35
69	sparse	0.04
71	moderate	0.47
72	moderate	1.11
73	dense	0.41
74	dense	0.59
75	sparse	0.25
76	sparse	3.20
77	sparse	0.54
78	moderate sparse	1.08
79	sparse	0.01



Public Boat Launch

FERC Hydro Project Boundary

Year 2010 Field Work

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

Feet

1,000 0 1,000 2,000

N W E S

Brule Hydro Project - Year 2010
Eurasian Water Milfoil and Purple Loosestrife Survey

Source: USDA -NAIP Imagery, 2009
GPS field data collected 8/3/2010

Created by: TKS Tuesday, August 24, 2010 10:24 AM File: J:\DATA\FO\Env_Strategy\GIS Projects\Hydro_lands\Maps\2010_Reports\brule 2010 exotic monitoring.mxd