

## We Energies 2011 Annual Report - Nuisance Plant Control Survey Peavy Falls Reservoir FERC Project #11830

### 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 Peavy Falls Reservoir project on July 30, 31, and August 1, 2011. 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 2011 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 1PV. 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:

<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%

### Results and Discussion

No purple loosestrife plants were observed along the shores of the Peavy Falls Reservoir project area.

One hundred thirty-five stands of Eurasian water milfoil were observed at the Peavy Falls Reservoir project area (attached map), an increase of 100 stands since 2009. 56 new stands were documented for the first time in 2011. The identified stands are distributed throughout the project area and range in size from <0.01-acre up to 43.80-acres; the largest stand in 2009 was 2.08-acres.

Eurasian water milfoil is present in approximately 260.52-acres in the Peavy Falls Reservoir project area, which is over 253-acres more than what was observed in 2009. Cumulatively, the average stand size is 1.93-acres and has an average density rating of 1.21 per stand. In 2009, the average stand size was 0.20-acres (nearly 9x that of 2009) and had an average density rating of 1.34 per stand. The increase in stand size is attributable to the 3584% increase of

Eurasian water milfoil coverage and 286% increase in the number of stands. The decrease observed in the average density rating is largely attributable to the number of stands having a density rating of 1 (<5% spatial coverage).

Eighty-four stands changed in spatial coverage between 2009 and 2011, including 8 that were present in 2009 and absent in 2011, 52 stands that were absent in 2009 and present in 2011, and 7 stands that were observed in 2009 and combined with other stands in 2011. The total gross change observed was nearly 247-acres with an average gross change of 2.94-acres per stand. Of these, 16 stands accounted for over 220-acres that either increased or decreased in size (approximate 14-acre average change).

Out of the 135 observed stands, only stand 148 has a high density (>75% cover). This stand accounts for about 0.1% (0.22-acre) of the total area observed to have Eurasian water milfoil present.

The majority of the stands have very low densities of Eurasian water milfoil with single stems growing sporadically among a lot of 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*). 127 of the 135 stands have low densities (<25% cover) and account for 99% (258.64-acres) of the total area observed to have Eurasian water milfoil present.

### Conclusions

Purple loosestrife has yet to be observed at the Peavy Falls project area since the nuisance plant surveys began. Diligent monitoring will continue to prevent an invasion of this species.

In conclusion, Peavy Falls Reservoir continues to experience the most significant changes from a year to year monitoring basis of all the reservoirs. Between 2007 and 2009, a decrease of 86 stands was observed, only to see the opposite between 2009 and 2011 when an increase of 100 stands was observed. Between 2007 and 2009, the total acreage decreased by over 200 acres, with an increase of over 253 acres between 2009 and 2011. Average stand size also drastically decreased between 2007 and 2009 (-1.51-acre per stand), and a drastic increase occurred between 2009 and 2011 (+1.73-acres per stand). These extreme changes from one monitoring year to the next are the most impressive among all the reservoirs.

While the previously cited changes are obvious negative trends, a few observations show positive trends. For instance, the average stand density continues to decline from a peak of 1.59 in 2007 to a low of 1.21 in 2011. Additionally, only 1 stand increased in stand density while 4 decreased between 2009 and 2011. The number of high density stands (>75% spatial coverage) remained constant at just 1 stand (peak of 15 stands in 2007), and the acres of high density area decreased from 0.59-acre in 2009 (stand 90) to 0.22-acre in 2011 (stand 148, a new stand first observed in 2011). The most acres of high density stands occurred in 2007 when 7.45-acres were observed to be high density. Finally, 99% of the Eurasian water milfoil was observed to be sparse.

Overall, the Eurasian water milfoil infestation in Peavy Falls declined greatly between 2009 and 2011 when considering total spatial distribution and the number of stands observed. Consistently, changes in the number of stands, overall coverage, spatial distribution of individual stands, and stand densities continue to be observed on an annual basis in Peavy Falls and all of the We Energies reservoirs where Eurasian water milfoil is present throughout the

Menominee River system. Conditions exhibit a majority of positive trends some years, remain relatively constant in others, and also dramatically decline as observed at Peavy Falls in 2011. Refer to the attached annual Eurasian water milfoil monitoring summary tables for a complete summary of data results since detailed observations were first recorded in 2006.

These trends indicate the Eurasian water milfoil population is in flux from year to year. 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, and others.

Annual fluctuations in the extent and density of Eurasian water milfoil appear to be due, in large part, to the presence of an indigenous weevil population occurring in the system. After four years of monitoring the weevil population, positive trends are being observed between weevil population and Eurasian water milfoil population fluctuations. These trends indicate the indigenous weevil population tends to increase as the Eurasian water milfoil population increases. Evidence shows the milfoil populations ultimately spike before declining. The weevil populations tend to lag behind the milfoil population spike, and it spikes as the milfoil population begins declining and crashes as observed in some reservoirs. The weevil population spikes are followed by substantial decreases in the respective populations. It appears a cycle occurs between these two populations. See the attached results and discussion regarding the Eurasian water milfoil summary report prepared by EnviroScience for further information about milfoil management activities that occurred in 2011.

**Table 1PF. 2011 Peavy Falls Reservoir  
Eurasian Water Milfoil Stand Data**

<b>Stand Number</b>	<b>Density<sup>1</sup></b>	<b>Mat Thickness</b>	<b>Stand Size<sup>2</sup></b>
1	1	None	5.65
2	1	None	0.01
3	1	None	2.12
4	1	None	0.41
5	1	None	0.27
6	Combined with 7	NA	NA
7	1	None	8.06 (+7.66)
8	1	None	43.80 (+43.79)
9	Not Present	NA	NA
10	Combined with 11	NA	NA
11	1	None	20.60
12	Not Present	NA	NA
13	Not Present	NA	NA
14	Not Present	NA	NA
15	Not Present	NA	NA
16	1	None	4.15
17	Not Present	NA	NA
18	1	None	1.12 (+1.11)
19	Not Present	NA	NA
20	1	None	0.58
21	1	None	1.68
22	1	None	0.01
23	Not Present	NA	NA
24	Not Present	NA	NA
25	1	None	0.01
26	Not Present	NA	NA
27	Not Present	NA	NA
28	Not Present	NA	NA
29	1	None	3.89
30	Not Present	NA	NA
31	1	None	0.96
32	3	None	0.22
33	Not Present	NA	NA
34	1	None	2.03
35	Not Present	NA	NA
36	Not Present	NA	NA
37	1	None	32.92
38	Not Present	NA	NA
39	1	None	12.34
40	Not Present	NA	NA
41	Not Present	NA	NA
42	1	None	0.15
43	1	None	3.58
44	1	None	0.01
45	1	None	0.32
46	1	None	0.01
47	1	None	30.70

**Table 1PF. 2011 Peavy Falls Reservoir  
Eurasian Water Milfoil Stand Data**

48	Not Present	NA	NA
49	Not Present	NA	NA
50	Not Present	NA	NA
51	1	None	0.15
52	2 (-1)	None	0.47 (+0.32)
53	1	None	0.53
54	1	None	0.01
55	1	None	2.41
56	1	None	0.03
57	1	None	0.01
58	1	None	0.25
59	2	None	0.05
60	2	None	0.04
61	2	None	0.05
62	2	None	0.42
63	2	None	0.47
64	2	None	0.34
65	Not Present	NA	NA
66	1	None	21.05
67	Not Present	NA	NA
68	Not Present	NA	NA
69	Combined with 66	NA	NA
70	Not Present	NA	NA
71	Not Present	NA	NA
72	Not Present	NA	NA
73	1	None	14.07
74	Not Present	NA	NA
75	Not Present	NA	NA
76	Not Present	NA	NA
77	1	None	0.02 (+0.01)
78	Not Present	NA	NA
79	1	None	1.61
80	1	None	0.45
81	1	None	0.48
82	1	None	0.04 (-0.05)
83	Not Present	NA	NA
84	1	None	4.30
85	Not Present	NA	NA
86	1	None	0.01
87	1	None	0.37
88	Not Present	NA	NA
89	Not Present	NA	NA
90	1 (-3)	None	1.27 (+0.68)
91	Combined with 92	NA	NA
92	1 (-2)	None	3.70 (+3.56)
93	Not Present	NA	NA
94	3	None	0.16
95	2	None	0.22

**Table 1PF. 2011 Peavy Falls Reservoir  
Eurasian Water Milfoil Stand Data**

96	2	None	2.07
97	1 (-1)	None	0.46
98	1	None	7.03 (+4.94)
99	2 (+1)	None	0.37 (-0.57)
100	1	None	0.17 (+0.16)
101	1	None	0.09 (+0.08)
102	1	None	0.41
103	1	None	0.66 (+0.65)
104	Combined with 103	NA	NA
105	1	None	0.34
106	Not Present	NA	NA
107	1	None	0.04
108	Not Present	NA	NA
109	1	None	7.26 (+6.87)
110	1	None	0.30 (+0.14)
111	1	None	0.18 (+0.17)
112	3	None	0.40 (+0.01)
113	1	None	0.77 (+0.60)
114	1	None	0.25 (+0.16)
115	Not Present	NA	NA
116	1	None	0.08 (+0.07)
117	Not Present	NA	NA
118	1	None	0.01
119	1	None	0.01
120	Not Present	NA	NA
121	1	None	0.11 (+0.10)
122	1	None	1.11 (+1.10)
123	3	None	0.11 (-0.03)
124	Not Present	NA	NA
125	1	None	0.01
126	Combined with 113	NA	NA
127	Combined with 113	NA	NA
128	1	None	0.01
129	1	None	0.01 (-0.68)
130*	1	None	0.25
131*	1	None	0.01
132*	1	None	0.06
133*	1	None	0.01
134*	1	None	0.13
135*	1	None	0.01
136*	1	None	0.19
137*	1	None	0.22
138*	1	None	0.01
139*	1	None	0.01
140*	1	None	0.01
141*	1	None	0.01
142*	1	None	0.01
143*	1	None	0.29

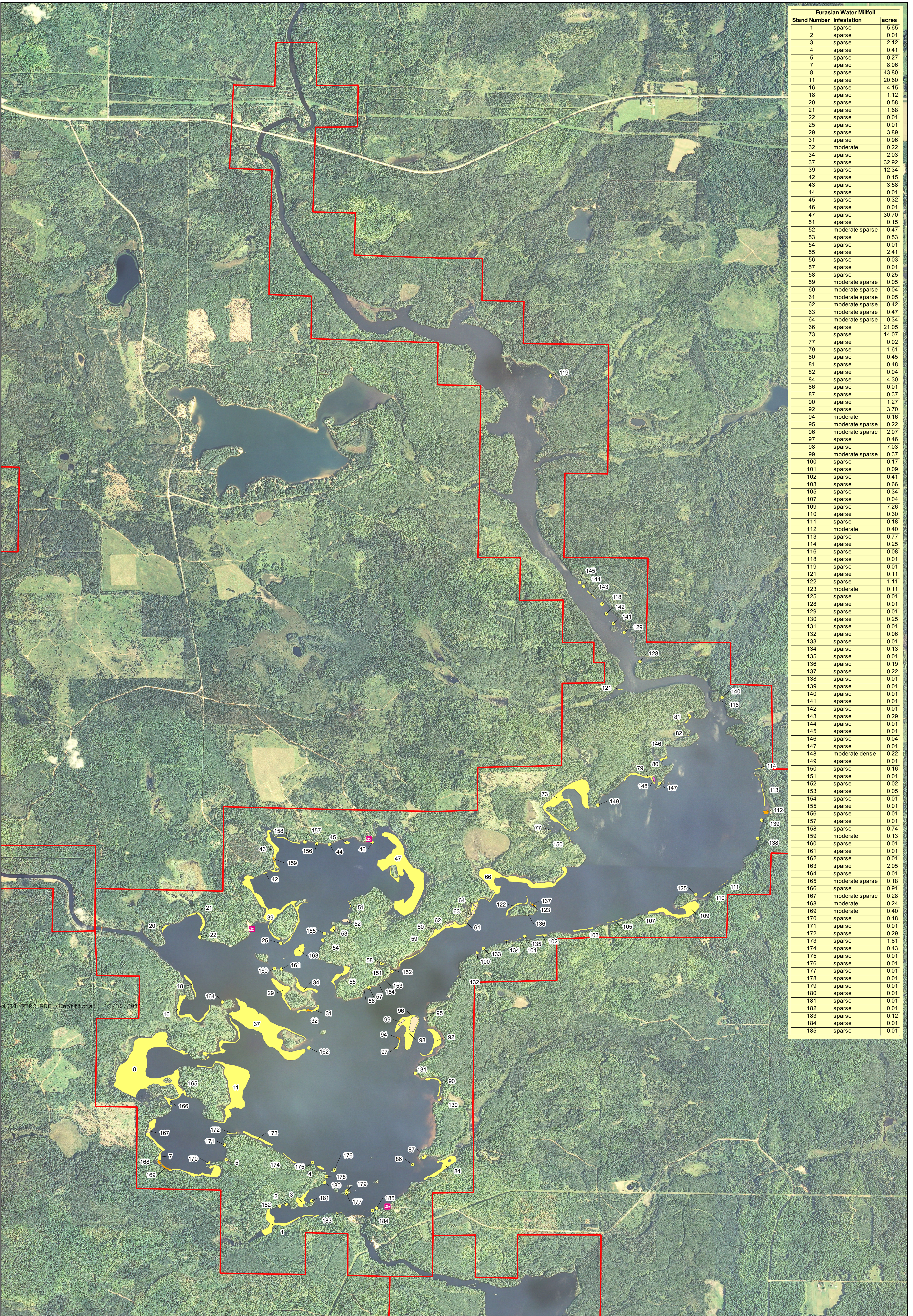
**Table 1PF. 2011 Peavy Falls Reservoir  
Eurasian Water Milfoil Stand Data**

144*	1	None	0.01
145*	1	None	0.01
146*	1	None	0.04
147*	1	None	0.01
148*	4	None	0.22
149*	1	None	0.01
150*	1	None	0.16
151*	1	None	0.01
152*	1	None	0.02
153*	1	None	0.05
154*	1	None	0.01
155*	1	None	0.01
156*	1	None	0.01
157*	1	None	0.01
158*	1	None	0.74
159*	3	None	0.13
160*	1	None	0.01
161*	1	None	0.01
162*	1	None	0.01
163*	1	None	2.05
164*	1	None	0.01
165*	2	None	0.18
166*	1	None	0.91
167*	2	None	0.28
168*	3	None	0.24
169*	3	None	0.40
170*	1	None	0.18
171*	1	None	0.01
172*	1	None	0.29
173*	1	None	1.81
174*	1	None	0.43
175*	1	None	0.01
176*	1	None	0.01
177*	1	None	0.01
178*	1	None	0.01
179*	1	None	0.01
180*	1	None	0.01
181*	1	None	0.01
182*	1	None	0.01
183*	1	None	0.12
184*	1	None	0.01
185*	1	None	0.01

1 – (+/-) change in density rating from 2009 to 2011

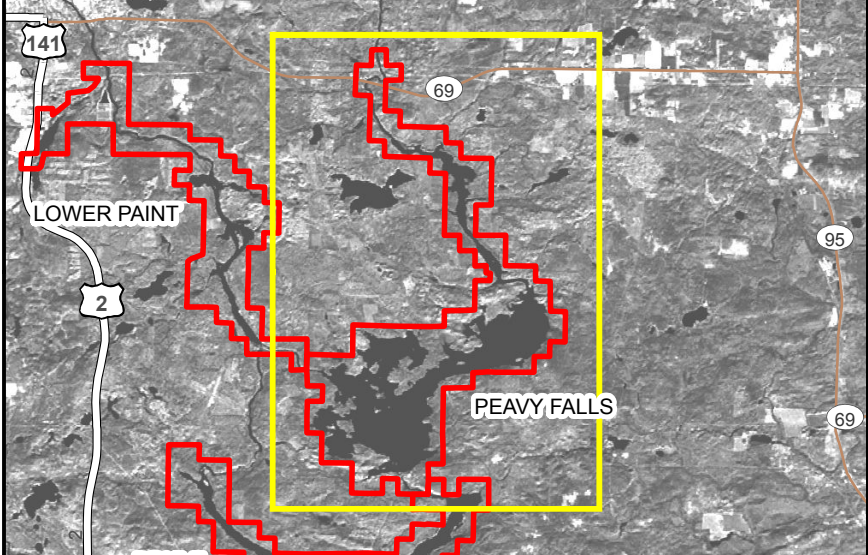
2 – (+/-) change in stand size in acres from 2009 to 2011

\* - new stand observed for the first time in 2011



Eurasian Water Milfoil		
Stand Number	Infestation	acres
1	sparse	5.65
2	sparse	0.01
3	sparse	2.12
4	sparse	0.41
5	sparse	0.27
7	sparse	8.06
8	sparse	43.80
11	sparse	20.60
16	sparse	4.15
18	sparse	1.12
20	sparse	0.58
21	sparse	1.68
22	sparse	0.01
25	sparse	0.01
29	sparse	3.98
31	sparse	0.96
32	moderate	0.22
34	sparse	2.03
37	sparse	32.92
39	sparse	12.34
42	sparse	0.15
43	sparse	3.58
44	sparse	0.01
45	sparse	0.32
46	sparse	0.01
47	sparse	30.70
51	sparse	0.15
52	moderate sparse	0.47
53	sparse	0.53
54	sparse	0.01
55	sparse	2.41
56	sparse	0.03
57	sparse	0.01
58	sparse	0.25
59	moderate sparse	0.05
60	moderate sparse	0.04
61	moderate sparse	0.05
62	moderate sparse	0.42
63	moderate sparse	0.47
64	moderate sparse	0.34
66	sparse	21.05
73	sparse	14.07
77	sparse	0.02
79	sparse	1.61
80	sparse	0.45
81	sparse	0.48
82	sparse	0.04
84	sparse	4.30
86	sparse	0.01
87	sparse	0.37
90	sparse	1.27
92	sparse	3.70
94	moderate	0.16
95	moderate sparse	0.22
96	moderate sparse	2.07
97	sparse	0.46
98	sparse	7.03
99	moderate sparse	0.37
100	sparse	0.17
101	sparse	0.09
102	sparse	0.41
103	sparse	0.66
105	sparse	0.34
107	sparse	0.04
109	sparse	7.26
110	sparse	0.30
111	sparse	0.18
112	moderate	0.40
113	sparse	0.77
114	sparse	0.25
116	sparse	0.08
118	sparse	0.01
119	sparse	0.01
121	sparse	0.11
122	sparse	1.11
123	moderate	0.11
125	sparse	0.01
128	sparse	0.01
129	sparse	0.01
130	sparse	0.25
131	sparse	0.01
132	sparse	0.06
133	sparse	0.01
134	sparse	0.13
135	sparse	0.01
136	sparse	0.19
137	sparse	0.22
138	sparse	0.01
139	sparse	0.01
140	sparse	0.01
141	sparse	0.01
142	sparse	0.01
143	sparse	0.29
144	sparse	0.01
145	sparse	0.01
146	sparse	0.04
147	sparse	0.01
148	moderate dense	0.22
149	sparse	0.01
150	sparse	0.16
151	sparse	0.01
152	sparse	0.02
153	sparse	0.05
154	sparse	0.01
155	sparse	0.01
156	sparse	0.01
157	sparse	0.01
158	sparse	0.74
159	moderate	0.13
160	sparse	0.01
161	sparse	0.01
162	sparse	0.01
163	sparse	2.05
164	sparse	0.01
165	moderate sparse	0.18
166	sparse	0.91
167	moderate sparse	0.28
168	moderate	0.24
169	moderate	0.40
170	sparse	0.18
171	sparse	0.01
172	sparse	0.29
173	sparse	1.81
174	sparse	0.43
175	sparse	0.01
176	sparse	0.01
177	sparse	0.01
178	sparse	0.01
179	sparse	0.01
180	sparse	0.01
181	sparse	0.01
182	sparse	0.01
183	sparse	0.12
184	sparse	0.01
185	sparse	0.01

20111130-4011 PERC PDR (unofficial) 11/30/2011



■ Public Boat Launch

FERC Hydro Project Boundary

**Year 2011 Field Work**

sparse

moderate sparse

moderate

moderate dense

dense

1,000 0 Feet 1,000 2,000

**Peavy Hydro Project - Year 2011**

**Eurasian Water Milfoil and Purple Loosestrife Survey**

Source: USDA - NAIP Imagery, 2010  
GPS field data collected 7/30/2011, 7/31/2011 and 8/1/2011