

We Energies
2011 Annual Report - Nuisance Plant Control Survey
Big Quinnesec Falls Reservoir
FERC Project #1980

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 Big Quinnesec Reservoir project on August 4, 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 1BQ. 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 Big Quinnesec Falls Reservoir project area.

Thirteen stands of Eurasian water milfoil were observed to occur in 2011 at the Big Quinnesec project area (attached map), a decrease of 11 stands from 2009. Although Eurasian water milfoil is distributed throughout the project area, it is primarily located in the lower basin just above the dam. Eurasian water milfoil stands range in size from <0.01-acre up to 0.36-acres.

Eurasian water milfoil is present in only 0.89-acres in the Big Quinnesec Falls Reservoir project area, a decrease of approximately 8-acres from 2009. Cumulatively, the average stand size is 0.07-acres with an average density rating of 1.00 per stand. In 2009, the average stand size was 0.37-acres and had an average density rating of 1.25 per stand. Decreases in stand densities were observed in 3 stands between 2009 and 2011 (stands 1, 2, and 8).

Fourteen stands observed in 2009 were absent in 2011. Although the average changes were minor, 7 stands changed in spatial coverage. The total gross change observed is 1.04-acres with an average gross change of 0.15-acre per stand.

Twenty-two stands changed in spatial coverage between 2009 and 2011, including the 14 that were present in 2009 and absent in 2011, and 8 stands present in 2009 that decreased in 2011. The total gross change observed was 8.40-acres with an average gross change of 0.38-acre per stand. Of these, 3 stands accounted for over 5-acres that either were absent from 2009, or increased or decreased in size. The largest changes were observed in stands 2, 8, & 24.

Out of the 13 observed stands, none have a high density (>75% cover). This remained constant from 2009 observations. Conversely, all 13 stands have very low densities (<5%) 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*).

Conclusions

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

Relative to the other reservoirs where Eurasian water milfoil is abundant, it occurs in a few small and sparse stands. Approximately two-thirds of the stands occur in the downstream segment of Big Quinnesec in sheltered bays along the south and southeast shorelines. The relative low Eurasian water milfoil presence can be attributed to steep slopes, deep water, and swift currents occurring within this reservoir. Relatively few slack water alluvial deposits, typical of where Eurasian water milfoil tends occur, are present.

Substantial decreases in the number Eurasian water milfoil stands (-46%), total acres (-90%), average stand size (-81%), and average density rating per stand (-20%) were observed in the Big Quinnesec project area from 2009 to 2011. Fourteen stands observed in 2009 were not present in 2011, and 3 stands that were present in 2009 decreased in density. Additionally, no dense stands (>75% cover) were observed and all of the stands were documented as very sparse stands (<5% cover). These are all positive trends from the perspective that the Eurasian water milfoil improved substantially between 2009 and 2011.

While most of the data indicated positive trends, only one negative observation was made in 2011. Three new stands were observed for the first time in 2011; however, only one to a few individual stems were observed in each.

Overall, the Eurasian water milfoil infestation in Big Quinnesec improved greatly between 2009 and 2011. 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 Big Quinnesec and all of the We Energies reservoirs where Eurasian water milfoil is present throughout the Menominee River system. Conditions exhibit a majority of negative trends some years, remain relatively constant in others, or dramatically improve as observed at Big Quinnesec 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.

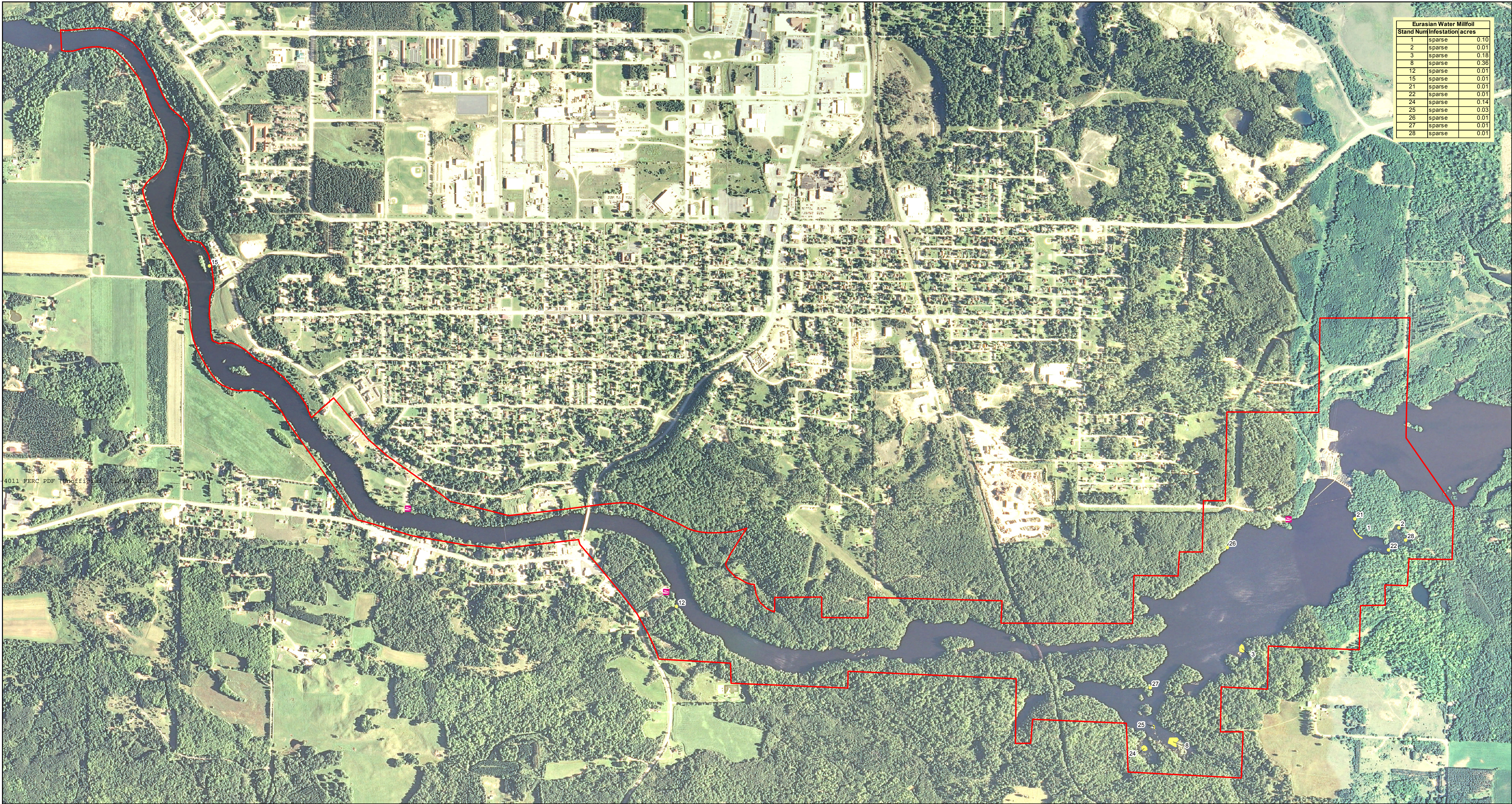
**Table 1BQ. 2011 Big Quinnesec Reservoir
Eurasian Water Milfoil Stand Data**

Stand Number	Density¹	Mat Thickness	Stand Size²
1	1 (-2)	None	0.10 (-0.50)
2	1 (-1)	None	0.01 (-2.02)
3	1	None	0.18 (+0.17)
4	Not Present	NA	NA
5	Not Present	NA	NA
6	Not Present	NA	NA
7	Not Present	NA	NA
8	1 (-1)	None	0.36 (-1.90)
9	Not Present	NA	NA
10	Not Present	NA	NA
11	Not Present	NA	NA
12	1	None	0.01 (-0.06)
13	Not Present	NA	NA
14	Not Present	NA	NA
15	1	None	0.01
16	Not Present	NA	NA
17	Not Present	NA	NA
18	Not Present	NA	NA
19	Not Present	NA	NA
20	Not Present	NA	NA
21	1	None	0.01
22	1	None	0.01 (-0.50)
23	Not Present	NA	NA
24	1	None	0.14 (-1.10)
25	1	None	0.03 (+0.02)
26*	1	None	0.01
27*	1	None	0.01
28*	1	None	0.01

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

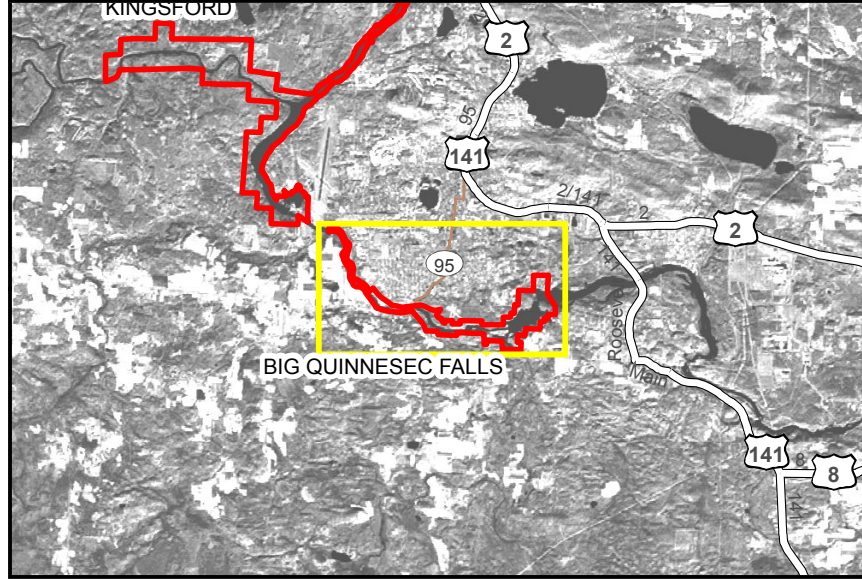
2 – (+/-) change in stand size in acres from 2009 to 2011

* - new stand observed for the first time in 2011



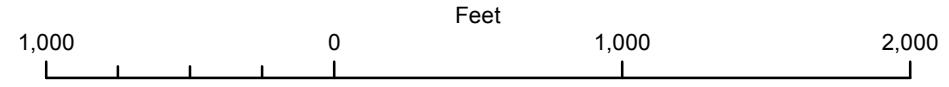
Eurasian Water Milfoil		
Stand Num	Infestation	acres
1	sparse	0.10
2	sparse	0.01
3	sparse	0.18
8	sparse	0.36
12	sparse	0.01
15	sparse	0.01
21	sparse	0.01
22	sparse	0.01
24	sparse	0.14
25	sparse	0.03
26	sparse	0.01
27	sparse	0.01
28	sparse	0.01

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- Public Boat Launch
- FERC Hydro Project Boundary

- Year 2011 Field Work
- sparse
 - moderate sparse
 - moderate
 - moderate dense
 - dense



Big Quinnesec Falls Hydro Project - Year 2011 Eurasian Water Milfoil and Purple Loosestrife Survey

Source: USDA-NAIP Imagery, 2010
GPS field data collected 8/4/2011