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November 7, 2006

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Store Enso North America P.O. Box 8050 Wisconsin Rapids, WI 54495-8050

Telephone 715 422 3111

Office of the Secretary, Federal Energy Regulatory Commission 888 1st Street, N.E. Washington, D.C. 20426

Little Quinnesec Falls Hydroelectric Project, FERC No. 2536 – Article 409, 2006 Exotic Species Report

In accordance with the Commission order approving the monitoring plan for Purple Loosestrife and Eurasian Milfoil within the Project boundary, we are submitting the enclosed report for 2006. No evidence of Purple Loosestrife was found within the Project however, one site downstream of the Project contained a small colony. This site was not manually removed as it was located on private property. A number of small sites contained Eurasian Milfoil and are detailed in the report.

Appropriate signage informing area users of the river are located at the boat access sites. Additionally, this information is being forwarded to the City of Niagara concurrent with this filing recommending that they treat the Purple Loosestrife in accordance with our consultant's comments.

Because we encountered difficulties with manual removal of plants in some areas we will be conferring with the resource agencies on possibly using a herbicide on a couple of test sites this next year. If this is ultimately pursued we will provide comments to the FERC during the annual report next year.

Sincerely,

STORA ENSO NORTH AMERICA CORPORATION

Mark E. Anderson Resources Manager

Enclosure: White Water Associates, Inc. Report

File (Little Quinnesec Falls, LG-90-30 - Article 409) CC:

K.F. Goodreau - N

T.J. Witt - N

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Mr. Don Novak, Administrator, City of Niagara, 1029 Roosevelt Road, Niagara, WI 54151

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#### PROJECT REPORT

# Monitoring The Little Quinnesec Falls Hydroelectric Project for Eurasian Water Milfoil and Purple Loosestrife FERC Hydro Project No. 2536, Little Quinnesec Falls



#### Prepared for:

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Date: October 2006

#### PROJECT REPORT

# Monitoring The Little Quinnesec Falls Hydroelectric Project for Eurasian Water Milfoil and Purple Loosestrife

FERC Hydro Project No. 2536, Little Quinnesec Falls

Fieldwork:

David Tiller, B.S., Field Biologist

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Data Analysis And Report Dean Premo, Senior Ecologist

Kent Premo, Technical Support Scientist

David Tiller, B.S. Field Biologist

Cite as:

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Monitoring The Little Quinnesec Falls Hydroelectric Project for Eurasian Water Milfoil and Purple Loosestrife (FERC Hydro Project No. 2536, Little Quinnesec Falls). Report to Stora Enso North American Corporation. White Water Associates, Inc.

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- Photo 3. Eurasian water milfoil leaf with a typical number of leaflets and some calcium precipitate encrusting the leaf.
- Photo 4. Eurasian water milfoil leaf displaying no evidence of weevil damage to the stems.

#### SUMMARY

Monitoring for Eurasian water milfoil (*Myriophyllum spicatum*) and purple loosestrife (*Lythrum salicaria*) was conducted on the Little Quinnesec Falls Project (FERC Hydro Project No. 2536) in 2006 as required by Article 409 of the FERC order issuing a project license. Annual monitoring for these species has occurred at this project since 1998. Both plants have been reported in the Menominee River basin since 1990 although none in the project area before 2002.

Scientists from White Water Associates (an independent consulting firm) conducted fieldwork from a boat and on foot during the week of August 14, 2006. During part of the survey, Tom Witt (Stora Enso) and Brandi Sangunett (FERC) accompanied White Water scientists.

The project area continues to have a robust diversity of native aquatic plants including native water milfoils. In 2006, relatively high river levels made it possible to access a number of remote backwaters that had not been accessible by boat in the past. This year, eight sites were documented with rooted Eurasian water milfoil. Seven of these had not previously had rooted Eurasian water milfoil. Six of these eight sites had between one and seven plants. One new site near some homes and boat docks on the Michigan side of the river had fifteen rooted plants. Another site (constructed canals outside of the project area) showed a large increase in plant numbers from 2005. The original location for Eurasian water milfoil in the project area has harbored a few rooted plants each year from 2002 to 2005, but the species was surprisingly absent in 2006. Over all the years of monitoring, a total of ten sites have had rooted Eurasian water milfoil. Two of these ten sites no longer have the species present. The site that harbors the largest population of Eurasian water milfoil (estimated at one hundred plants in 2006) is a human-excavated extension (canal) from the river. Some specific conditions at this site (human disturbance, sparser native vegetation, less organic material, and alkaline water chemistry) may combine to make this a particularly suitable place for Eurasian water milfoil.

The actual surface area coverage of Eurasian water milfoil relative to the size of the project area is very small. Sites where Eurasian water milfoil has been found are shallow backwaters and areas with little current. In all cases, the species is part of a diverse community of native plants that seemingly keeps it in check. In 2006 there was an increase in areas of occurrence and numbers of Eurasian water milfoil plants. Eurasian water milfoil should continue to be monitored in the project area and options for control should be reviewed for possible application.

No purple loosestrife plants were observed in the project area in 2006. Hand pulling has eradicated the original colony by the public access and three plants observed in 2005 (all outside of the project area).

#### INTRODUCTION AND BACKGROUND

Monitoring for Eurasian water milfoil (*Myriophyllum spicatum*) and purple loosestrife (*Lythrum salicaria*) was conducted on the Little Quinnesec Falls Project (FERC Hydro Project No. 2536) in 2006 as required by Article 409 of the FERC order issuing a project license. Annual monitoring for these non-native plant species has occurred at this project since 1998. There have been reports of both Eurasian water milfoil and purple loosestrife within the Menominee River basin since 1990 although none from the project area prior to 2002. Eurasian water milfoil has been reported since 1995 from the Twin Falls Flowage immediately upstream of the project area.

Neither Eurasian water milfoil nor purple loosestrife were reported from the Little Quinnesec Falls project during surveys conducted for the license application process (1990) and neither species was confirmed within the project area during monitoring in 1998, 1999, 2000, or 2001. Eurasian water milfoil was first documented in 2002 by observation of a few plants at two locations. All locations where Eurasian water milfoil has been found since 2002 have been small areas containing small numbers of individual plants mixed within a diverse community of native aquatic plants. "Beds" or "colonies" where Eurasian water milfoil is the dominant plant have not been observed. In 2002, several specimens of Eurasian water milfoil and both native water milfoil species (M. sibiricum and M. heterophyllum) were collected from the Little Quinnesec Falls project area and sent to experts Drs. Donald Les and Michael Moody of the University of Connecticut for further identification by genetic analysis. Their analysis of these specimens indicated that no hybrids were present, only the pure forms of each of the three species.

Purple loosestrife has been found since 1998 growing along the Wisconsin shoreline of the river below the Little Quinnesec Dam (about 100 feet below the public access site). This area is within the city of Niagara but outside the project area. Each year these plants were removed by hand pulling, but they persisted until 2005 when they were absent. In 2005 a single non-flowering plant and two flowering plants were found near the first private property residence about 30 feet downstream of the original patch. These three plants were pulled in 2005.

This document reports on the 2006 survey results and presents information in five sections: (1) Summary, (2) Introduction and Background, (3) Methods, (4) Findings, and (5) Conclusions. Two appendices are also included.

#### **METHODS**

The fieldwork for the survey was completed during the week of August 14, 2006. On August 14, 2006, Tom Witt (Stora Enso) accompanied Dean Premo and David Tiller of White Water Associates during the first day of survey work on the reservoir. We used a 14-foot boat and 9.9 HP engine to survey the shoreline and other likely areas between the Little Quinnesec Falls Dam and the more upstream Big Quinnesec Falls Dam, including the numerous backwater wetlands. Most of the backwater wetlands are shallow and densely vegetated with a diversity of aquatic plants making motor use difficult. Oars were used to row the boat into these areas allowing comprehensive coverage. Relatively higher river levels during the 2006 survey made it possible to access a number of remote backwaters that had not been accessible by boat in the past. A second day of sampling the Little Quinnesec Falls project was conducted on August 17, 2006. Brandi Sangunett (FERC Ecologist) accompanied Tiller and Premo during this field day. Tom Witt was with this field crew for the first two hours of survey work.

We visually surveyed for Eurasian water milfoil in aquatic plant beds and took samples by hand and metal garden rake. We closely examined the leaves of suspect plants, counting leaflets (average number of leaflets is the main morphological trait used to separate the native northern water milfoil (*Myriophyllum sibiricum*) from Eurasian water milfoil, although there is considerable variability within each species. Generally, the average number of leaflets for northern water milfoil is 5-11 with a reported maximum of 13. The average number for Eurasian water milfoil is 14-17 with a maximum of 20. Also useful later in the season is the presence of winter buds (turions) on northern water milfoil, structures not found on Eurasian water milfoil. Where Eurasian water milfoil was observed, we also examined for evidence of weevil herbivory.

When flowering, purple loosestrife is showy and easily identifiable. Peak blossoming extends from late July through August in northern Michigan. All wetlands and backwaters connected to the project area reservoir were visually inspected. Binoculars were used to scan the shore and less accessible backwaters. The project area downstream of the Little Quinnesec Falls dam was surveyed on foot on August 18, 2006. As a single loosestrife plant can produce prodigious quantities of seeds, physical on-site surveys are necessary to ensure thorough survey.

#### **FINDINGS**

This report section presents the findings from the 2006 survey and integrates information from past surveys to provide insight into population dynamics of Eurasian water milfoil and purple loosestrife in the Little Quinnesec Falls project area.

#### **Eurasian Water Milfoil**

The project area continues to have a robust diversity of native aquatic plants. Native water milfoils in the flowage include Myriophyllum heterophyllum and M. sibiricum. Vallisneria americana and Potamogeton richardsonii continue to be some of the most abundant species throughout the flowage. Other species comprising the aquatic plant community include Elodea canadensis, Elodea nuttallii, Potamogeton spirillus, P. epihydrus, P. diversifolius, P. zosterformis, P. robbinsii, Zosterella dubia, Ceratophyllum demersum, Ranunculus longirostris, and Utricularia vulgaris.

The aerial photo shown in Figure 1 summarizes shows all sites where Eurasian water milfoil has been detected in the Little Quinnesec Falls project area since 2002. Table 1 presents additional information about these areas, including the latitude/longitude, number of plants, and surface area involved. Table 2 summarizes the data over all years to provide historical context.

As in past years of monitoring at the Little Quinnesec Falls project area, the plants identified as Eurasian water milfoil exhibit considerable morphological variation. The numbers of leaflets are sometimes intermediate between the northern water milfoil and the Eurasian water milfoil. Appendix B presents photos that illustrate some of the variability. To verify the identification of the Eurasian water milfoil we collected in 2006, we shipped specimens to be examined by Dr. Susan Knight (Trout Lake Research Station) and Dr. Robert Freckman (University of Wisconsin, Steven Point).

In the 2006 survey, we detected eight sites in the project area with rooted Eurasian water milfoil. Seven of these eight sites had not had rooted Eurasian water milfoil in the past. These included Sites A, E, K, L, M, N, and O (see Figure 1). Six of these eight sites (Sites A, E, K, M, N, and O) had between one and seven individual plants. Site L (a new site) had an estimated fifteen plants. Site D has had Eurasian water milfoil since 2004, but showed an estimated ten-

fold increase in number of rooted plants since the 2005 survey (from ten plants to one hundred plants). Site D is in a human-created canal that extends from the river (see Figure 1).

Site I (see Figure 1) is the original location for Eurasian water milfoil on the Little Quinnesec Falls project area. It has consistently had a few rooted plants in 2002, 2003, 2004, and 2005. Despite very thorough searching in this area, we could not detect any plants in 2006. We can think of no reason why the species disappeared from this site. Over all the years of monitoring, a total of ten sites have had rooted Eurasian water milfoil. Two of these ten sites (Site I and Site C) no longer have the species present.

Both the number of sites with rooted plants and the number of rooted plants increased in 2006, although a population increase at Site D accounts for a large proportion of the increase in plant numbers. Seven of the eight sites with rooted plants in 2006 had relatively small numbers of plants.

Site D harbors the largest population of Eurasian water milfoil (estimated at one hundred plants). This site is a human-excavated extension from the river (a canal that was constructed more than twenty years ago as part of a development). The existing wetland and open water habitat that was present was "disturbed" from this excavation process. Because this is a relatively new (or newly disturbed) open water habitat, there seems to be less organic material in the substrate. Generally the native plants in this area don't form a dense coverage of the substrate, but instead are distributed more sparsely. In fact, there are some areas where sand substrate is visible. The water in this area is apparently more alkaline than in other parts of the project area. Evidence from this is in two forms. First, there is a fairly healthy growth of the calcium-loving alga called *Chara sp.* Second, there is a flocculent precipitate that encrusts and covers much of the aquatic vegetation in this area. Presumably this is a precipitate of calcium carbonate that results when calcium concentration (and therefore alkalinity) is high. These factors (disturbed site, sparser native vegetation, less organic material, alkaline water chemistry) may combine to make this a particularly suitable place for Eurasian water milfoil to grow.

Site L (a new site in 2006) and Site E may receive introductions of Eurasian water milfoil from boat traffic as nearby riparian homeowners moor their boats at piers along the north side of the river at this site.

Despite the increase of sites and numbers of plants in 2006, the actual surface area coverage of Eurasian water milfoil relative to the size of the impoundment is very small (see Table 2 for summary). We used 349 acres as the size of the project area when calculating percentages. Clearly not all of the impoundment is suitable to Eurasian water milfoil because of depth or water

current. Using aerial photo interpretation and in-the-field ground-truthing, we roughly estimate that between 100 and 150 acres of the project area might be suitable Eurasian water milfoil habitat (primarily consisting of shoreline areas and quiet backwaters). Even if this more conservative estimate of habitat is used the relative amount of coverage of existing Eurasian water milfoil is miniscule. The sites where Eurasian water milfoil has been found in the Little Quinnesec Fall project have been fairly shallow backwaters and areas with little current. In all cases, the species is part of a diverse and healthy community of native aquatic plants including *Potamogeton foliosus, Ranunculus longgirostris, Utricularia vulgaris, Ceratophyllum demersum* and the native milfoil, *Myriophyllum sibiricum*. In most of the sites where it is found as a rooted plant, the number of plants is very low. Eurasian water milfoil does not appear to be "taking over" the locations in which it is found, although the population size at Site D is increasing.

#### **Purple Loosestrife**

As in past years of the survey, no purple loosestrife was found within the portion of the project area, lying between the Little Quinnesec Dam and the Big Quinnesec Dam.

Purple loosestrife has been found each year starting in 1998 until present growing along the Wisconsin shoreline of the river downstream of the Little Quinnesec Dam about 100 feet below the public access site. This area is within the city of Niagara but outside the project area. Each year these plants were removed by hand pulling, but they persisted until 2005 when they were absent. In 2005 a single non-flowering plant and two flowering plants were found near the first private property residence about 30 feet downstream of the original patch. These three plants were pulled in 2005 and were absent in 2006.

Pulling plants is not sufficient to eliminate the species as it can sprout from fragments of roots left in the soil, or seeds still present in the seed bank. Removal of the flowering stalks each year limits the number of seeds produced and the species' ability to propagate via seeds. More effective control would require application of herbicide to freshly cut stems. Pulling the existing stems of loosestrife has prevented it from blooming and spreading and may finally effect its to complete eradication at this site.

#### CONCLUSIONS

Eurasian water milfoil is known for spreading rapidly, usurping space, and dominating the aquatic plant community. Over the years at the Little Quinnesec Falls Project area, the Eurasian water milfoil has been quite limited in occurrence and numbers. It may be that the robust populations of native plants help keep this invasive species in check. In 2006 there was an increase in areas of occurrence and numbers of plants. Eurasian water milfoil should continue to be monitored in the project area for changes in extent and population size.

During our field surveys, we attempted to hand-pull some of the individual Eurasian water milfoil plants, but found this to be an impractical means of control in this setting. First of all there is uncertainty about getting the underground portion of the plant and a danger of fragmenting the upper portions and setting some adrift to possibly colonize other areas. The process of wading or swimming and pulling the plants muddles the water making for difficult visibility. We also tried using a rake to pull the plants but the same difficulties exist as with the hand pulling.

No purple loosestrife plants were observed in the project area in 2006. Annual hand pulling has eradicated the original colony by the public access and one-time hand pulling has removed the three plants observed in 2005 (all outside of the project area).

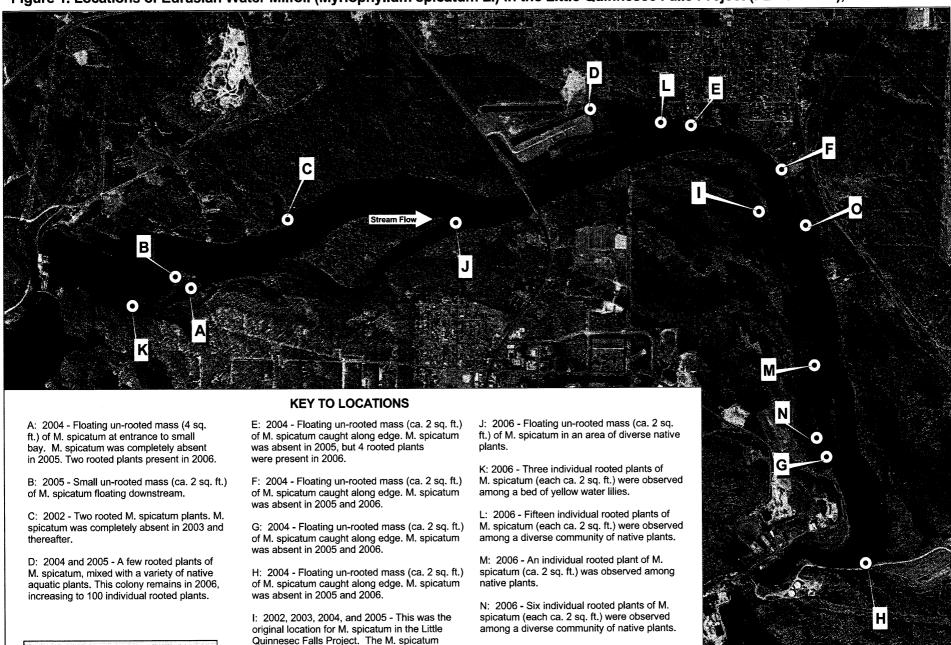
In 1999, brochures on loosestrife control were made available to the public. Warning signs from the Wisconsin DNR, advocating that boaters clean their boats and motors of any plant material from other bodies of water, were posted at boat landings in 2001 and are still present.

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# **APPENDIX A**

(FIGURE 1 TABLES 1 AND 2)

Figure 1. Locations of Eurasian Water Milfoil (Myriophyllum spicatum L.) in the Little Quinnesec Falls Project (FERC #2536), 2002-2006.



presence here consists of a few rooted plants scattered within a species-rich community of

native aquatic plants. Each single rooted M.

spicatum has a surface area of less than 2 sq. ft. No change in coverage was observed from 2002

to 2005. In 2006, all M. spicatum were absent.

O: 2006 - Seven individual rooted plants of M.

spicatum (each ca. 2 sq. ft.) were observed

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among a diverse community of native plants.

Graphic produced by White Water Associates

SCALE and DIRECTION

600 Meters

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Site Code	Year	Latitude & Longitude Coordinates	Present (Y/N)	Rooted (Y/N)	Number of Plants	Surface Area (sq. ft).	Surface Area (acres)	% Project boundary acres (349 acres)	Weevil evidence (Y/N) <sup>1</sup>	Comments
A	2004	45.78759 -88.03029	Y	N	1	2	0.00005	0.000000	<del>- · · · -</del>	Floating un-rooted mass (ca. 4 square feet) of <i>M. spicatum</i> at entrance to small bay.
A	2008		Y	Y	2	4	0.00009	0.000000	N	After absence in 2005, two rooted M. spicatum in 2006.
В	2005	45.78848 -88.03040	Y	N	1	2	0.00005	0.000000		Small un-rooted mass (ca. 2 square feet) of M. spicatum floating downstream.
С	2002	45.79125 -88.02352	Y	Y	2	4	0.00009	0.000000		Two rooted plants present in 2002, but absent in subsequent years.
D	2004	45.79701 -88.00139	Y	Y	6	12	0.00028	0.000001		A few rooted plants of <i>M. spicatum</i> , mixed with a variety of native aquatic plants.
D	2005		Y	Y	10	20	0.00046	0.00001		A few rooted plants of <i>M. spicatum</i> , mixed with a variety of native aquatic plants.
D	2006		Y	Y	100	200	0.00459	0.000013	N	Rooted plants has increased in number to ca. 100 rooted plants approximately 150 fee in either direction from the GPS point.
E	2004	45.7963 -87.99399	Y	N	1	2	0.00005	0.000000		Floating un-rooted mass (ca. 2 square feet) of M. spicatum found along river's edge.
E	2006		Y	Υ	4	8	0.00018	0.000001	N	After an absence in 2005, 4 rooted plants were present in 2006. These are downslop from several houses on the bank and docks that accommodate boats and pontoon boats.
F	2004	45.7921 -87.98744	Y	N	1	2	0.00005	0.000000		Floating un-rooted mass (ca. 2 square feet) of <i>M. spicatum</i> found along river's edge right at the mouth of Fumes Creek.
G	2004	45.77982 -87.98366	Y	N	1	2	0.00005	0.000000		Floating un-rooted mass (ca. 2 square feet) of <i>M. spicatum</i> caught along river's edge upstream of fire dock.
Н	2004	45.77453 -87.98065	Y	N	1	2	0.00005	0.000000	<u> </u>	Floating un-rooted mass (ca. 2 square feet) caught along river's edge.

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Table 1. History of Eurasian Water Milfoil (Myriophyllum spicatum L.) in the Little Quinnesec Falls Project (FERC #2536)

Site Code	Year	Latitude & Longitude Coordinates	Present (Y/N)	Rooted (Y/N)	Number of Plants	Surface Area (sq. ft).	Surface Area (acres)	% Project boundary acres (349 acres)	Weevil evidence (Y/N) <sup>1</sup>	Comments
ı	2002	45.79204 -87.98893	Y	Y	3	6	0.00014	0.000000		A few rooted plants scattered within a species-rich community of native aquatic plants. This was original site for <i>M. spicatum</i> in the Little Quinnesec Falls Project area.
ı	2003		Y	Y	4	12	0.00028	0.000001		A few rooted plants scattered within a species-rich community of native plants.
ı	2004		Y	Y	4	12	0.00028	0.000001		A few rooted plants scattered within a species-rich community of native plants.
ı	2005		Y	Y	4	12	0.00028	0.000001		A few rooted plants scattered within a species-rich community of native plants.
1	2006		N N							All M. spicatum were absent.
J	2006	45.79119 -88.01104	Y	N	1	2	0.00005	0.000000	N	Floating un-rooted mass (ca. 2 sq. feet) of M. spicatum in area of diverse native plants.
К	2006	45.78874 -88.034822	Y	Y	3	6	0.00014	0.000000	N	Three rooted M. spicatum (each ca. 2 sq ft) observed in a bed of yellow water lilies.
L	2006	45.796423 -87.996196	Y	Y	15	30	0.00069	0.000002	N	Fifteen rooted <i>M. spicetum</i> (each ca. 2 sq ft) were observed among a diverse community of native aquatic plants.
М	2006	45.78440 -87.984675	Y	Y	1	2	0.00005	0.000000	N	An individual rooted plant of <i>M. spicatum</i> (ca. 2 square feet) was observed among native plants at the mouth of a small bay.
N	2006	45.780751 -87.984406	Y	Y	6	12	0.00028	0.000001	N	Six individual rooted <i>M. spicatum</i> (each ca. 2 sq ft) observed among a community of native plants at the mouth of a small bay.
0	2006	45.791406 -87.985502	Y	Y	7	14	0.00032	0.000001	N	Seven individual rooted <i>M. spicatum</i> (each ca. 2 sq ft) observed among a diverse community of native plants in a bay upstream of Verso park.

<sup>&</sup>lt;sup>1</sup>Field staff began checking for evidence of weevil herbivory on M. spicatum in 2006.

	. Summary le Quinnes					sian Water	Milfoil in
Year of Survey	Number of Sites with Rooted Plants	Number of Rooted Plants	Number of Un- rooted Plants	Total Number of Plants	Surface Area (sq. ft.) <sup>1</sup>	Surface Area (acres) <sup>1</sup>	Percent Project Boundary Acres <sup>2</sup>
2002	2	5	0	5	10	0.00023	0.000001
2003	1	4	0	4	12	0.00028	0.000001
2004	2	10	5	15	34	0.00078	0.000002
2005	2	14	1	14	32	0.00073	0.000002
2006	8	138	1	139	278	0.00638	0.000018

<sup>&</sup>lt;sup>1</sup> The surface area is based on the total number of plants (rooted and un-rooted) and assumes two square feet of surface area coverage (as viewed from above) for each plant.

<sup>&</sup>lt;sup>2</sup> Calculation of percent project boundary acres assumes 349 acres for the project area.

	APPENDIX B	
	(PHOTOS)	



Photo 1. Mryiophyllum spicatum (Eurasian water milfoil) with a typical number of leaflets (14 on this specimen -counting on one side of the leaf).

Photo 2. Eurasian water milfoil leaf with a typical number of leaflets (14 on this specimen -counting on one side of the leaf).

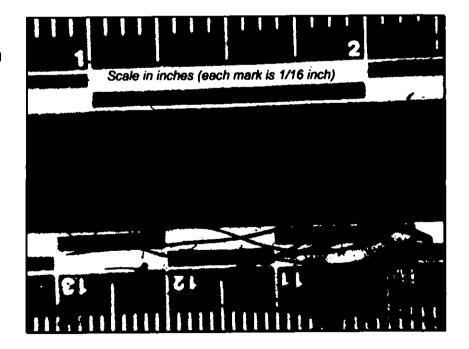


Photo 3. Eurasian water milfoil leaf with a typical number of leaflets and some calcium precipitate encrust-ing the leaf (this specimen was from the humanmade channel designated Location D on Figure 1).

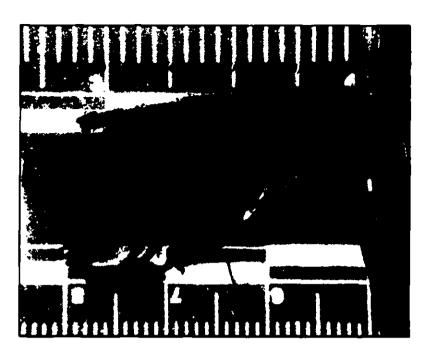




Photo 4. Eurasian water milfoil leaf displaying no evidence of weevil damage to the stems. (Despite careful inspection, no weevil evidence was detected on Eurasian water milfoil in the Little Quinnesec Falls population.)