INVASIVE SPECIES 5-YEAR COMPREHENSIVE REPORT
(2006 – 2010)
FOR THE
RHINELANDER HYDROELECTRIC PROJECT
ONEIDA COUNTY, WISCONSIN
FERC Project No. 2161

Submitted By
Wausau Paper Corporation

October 2010

Prepared By
North American Hydro, Inc.
P.O. Box 167
116 State Street
Neshkoro, Wisconsin 54960
(920) 293-4628

TABLE OF CONTENTS

1.0 Summary

In 2006, a baseline meandered survey for purple loosestrife (*Lythrum salicaria*) and Eurasian water milfoil (*Myriophyllum spicatum*) was performed at the Rhinelander Hydroelectric Project in Oneida County, Wisconsin. Additional surveys were performed in 2007, 2008, 2009, and 2010. During all of these surveys, no Eurasian water milfoil (EWM) was found. In addition, point intercept surveys for EWM were performed concurrently with the meandered surveys in all survey years at the Project and no EWM was found.

In the all survey years, purple loosestrife was found within the survey limits both upstream and downstream of the dam. The total number of plants (39 in 2007/least – 58 in 2010/most) and occurrences (7 in 2007/least – 17 in 2010/most) have remained relatively low during the five years of surveys. Some of this may be attributed to two factors. The first is the presence of biological control, Galerucella beetles (GC), on PL plants observed from the dam downstream to the survey limits. The second is the ability of the survey crew to pull many of the plants or remove the seed heads in order to prevent further spread.

Overall, the number of PL plants observed downstream of the dam has remained about the same while those above the dam have shown an increase. The difference between these two areas is that there has been no GC beetle damage found on plants above the dam while there are areas that sustain heavy beetle damage below the dam. Additionally, the survey crew had a difficult time locating land owners during the surveys to attain permission to enter their property to remove plants above the dam. Consequently, most PL plants above the dam remained untreated whereas most all plants below the dam were removed in all years.

As of the 2010 survey, PL was observed in only three basic areas within the survey limits. They are the northeast shore of isolated Moonlight Bay in Bass Lake, the northwest shore of Boom Lake, and the bypass reach and tailrace area from the dam downstream to the survey limit. No PL was observed in the Flowage, Thunder Lake, or Lake Creek. The areas where PL was found in the impoundment were small and actual plant numbers were low. The main obstacle in being able to control PL upstream from the dam is the ability to attain landowners permission to remove plants on private property. This was not a problem on the shoreline of the river from the dam to the downstream limit as most of this property is either owned by the licensee or publicly accessible.

2.0 Methods

The upstream and downstream survey limits for both PL and EWM are shown on the following map labeled Survey Limits and were defined as follows. The waters and shoreline of the Rhinelander Flowage from N45° 44' 10.1" W89° 31' 08.4"

WGS84 approximately 0.5 miles upstream of the McNaughton Road Bridge to the dam at the Rhinelander Hydroelectric Project; the waters and shoreline of the power canal, bypass reach, and tailrace from the dam at the Rhinelander Hydroelectric Project downstream to N45° 38' 12.4" W89° 25' 00.0" WGS84 approximately 400' downstream of the Davenport Street Bridge; the waters and shoreline of Boom Lake, Bass Lake, and Thunder Lake; the waters and shoreline of Lake Creek up to the confluence with the stream from South Pine Lake at N45° 40' 24.5" W89° 24' 57.5" WGS84.

SURVEY LIMITS

2.1 Purple Loosestrife

In 2006, a baseline survey for PL was performed at the Rhinelander project. Prior to the 2006 field survey, information on PL distribution and treatment was acquired from the Great Lakes Indian Fish and Wildlife Commission (GLIFWC) and the Wisconsin Department of Natural Resources (WIDNR). In addition, a wetland analysis performed in 1997 by Northern Ecological Services, Inc. and an Environmental Inspection Report performed by the Federal Energy Regulatory Commission (FERC) were analyzed to assist in the planning of the 2006 baseline PL survey.

In 2007, 2008, 2009, and 2010, PL meander surveys were performed in the same areas and using the same methods as the 2006 survey.

All PL surveys were accomplished by scanning the shoreline and shallow areas of the project waters by two people from a boat. Certain areas were surveyed from land where it was not possible to observe from the boat. These would include the power canal, the bypass reach, the tail race, a small bay of Lake Creek, and a large pond on the north side of the golf course between River Road and Manor Country Road. High powered (15 x 50) image stabilization binoculars were used to facilitate the spotting of plants. When PL was identified, a handheld Garmin Global Positioning System (GPS) unit with Wide Area Augmentation System (WAAS) enabled was used to map the location. Small occurrences of PL were pulled to help prevent further spread of the plants.

Maps and results of this survey are included in Appendix A in this report.

2.2 Eurasian Water Milfoil

In 2006, a baseline survey for EWM was performed at the Rhinelander project. Prior to the 2006 field survey, information on EWM distribution and treatment was acquired from the Great Lakes Indian Fish and Wildlife Commission (GLIFWC) and the Wisconsin Department of Natural Resources (WIDNR). In addition, a wetland analysis performed in 1997 by Northern Ecological Services, Inc. was analyzed to assist in the planning of the 2006 EWM survey.

In 2007, 2008, 2009, and 2010, EWM surveys were performed in the same areas and using the same methods as the 2006 survey.

The EWM surveys were performed by visually scanning shallow areas of the project waters during the PL meander survey by two people from a boat. If a suspected plant was observed, a sample was grabbed and identified. During launch and recovery of the survey boat, boat ramps and parking areas were scanned for the presence of EWM plants.

A point intercept survey for EWM was performed concurrently with the PL/EWM meander survey. A document received from the WIDNR entitled *Monitoring of Aquatic Macrophytes 2/13/06* was used as a basis for this survey. This document is included in Appendix C at the end of this survey. In 2006, point intercept sampling locations were acquired from the WIDNR for the Rhinelander Flowage (1,372 acres, 766 sample points), Boom Lake (365 acres, 200 sample points), Bass Lake (184 acres, 99 sample points), Thunder Lake (183 acres, 100 sample points), and Lake Creek (188 acres, 102 sample points).

Besides the standard safety devices located in the survey boat, the following equipment was used; handheld Garmin GPS unit with WAAS enabled (with site locations already loaded), lake maps, field data sheets, 18-foot pole-mounted rake, push pole, depth finder, electric trolling motor, and polarized sunglasses.

When navigating to the sites using the GPS unit, the zoom level was set to 80 feet. Once the GPS navigation arrow covered the sample point, a rake was dropped to the bottom and dragged for about 2.5 feet. Weeds retrieved were sorted for the presence of EWM. For each site, the sample point number, latitude, longitude, depth, sediment type, EWM density, and comments were recorded. If northern water milfoil was observed at a sample point, it was noted in the comments field.

For hard to reach sites where no sample could be taken, the depth, sediment type, and EWM density fields were left blank and N/A (no access) was recorded in the comments field. In the upper reaches of the flowage, wild rice beds are prevalent. If a sample point was surrounded by or located within a rice bed, it was passed to protect the rice from damage and a notation was included in the comments field. If a sample point was located on land, a notation was included in the comments field.

If a sample site produced no weeds, the depth was recorded and a notation was made in the comments field. After the depth of the deepest weed growth was established, for all deeper points, depth was recorded, but no samples were taken and a notation was made in the comments field. It was found that bays and lakes (such as Bass Lake and the northern section of Boom Lake) that were somewhat isolated from the main river current had clearer water and deeper weed growth. When these conditions were observed, intercept points were sampled deeper until the deepest weed growth was reestablished. When returning to more turbid waters, deepest weed growth was reestablished once again.

During the 2006 point intercept survey, a large portion of the points were not sampled due to being located on land, encompassed by wild rice, encompassed by heavy weed growth, or blocked by stumps and logs. During the 2007, 2008, 2009, and 2010 surveys, these same points were not sampled due to the same reasons.

Maps and comparative results of these surveys are included in Appendix B in this report.

2.3 Miscellaneous

Previous to initially launching into Rhinelander Hydroelectric Project waters, the survey boat and survey equipment were treated with a bleach solution to prevent possible spread of invasive species from other

locations. After the survey was completed and before launching into other waters, the survey boat and survey equipment were again treated with a bleach solution. Weeds were removed from boat and trailer after each recovery and before leaving the boat launch.

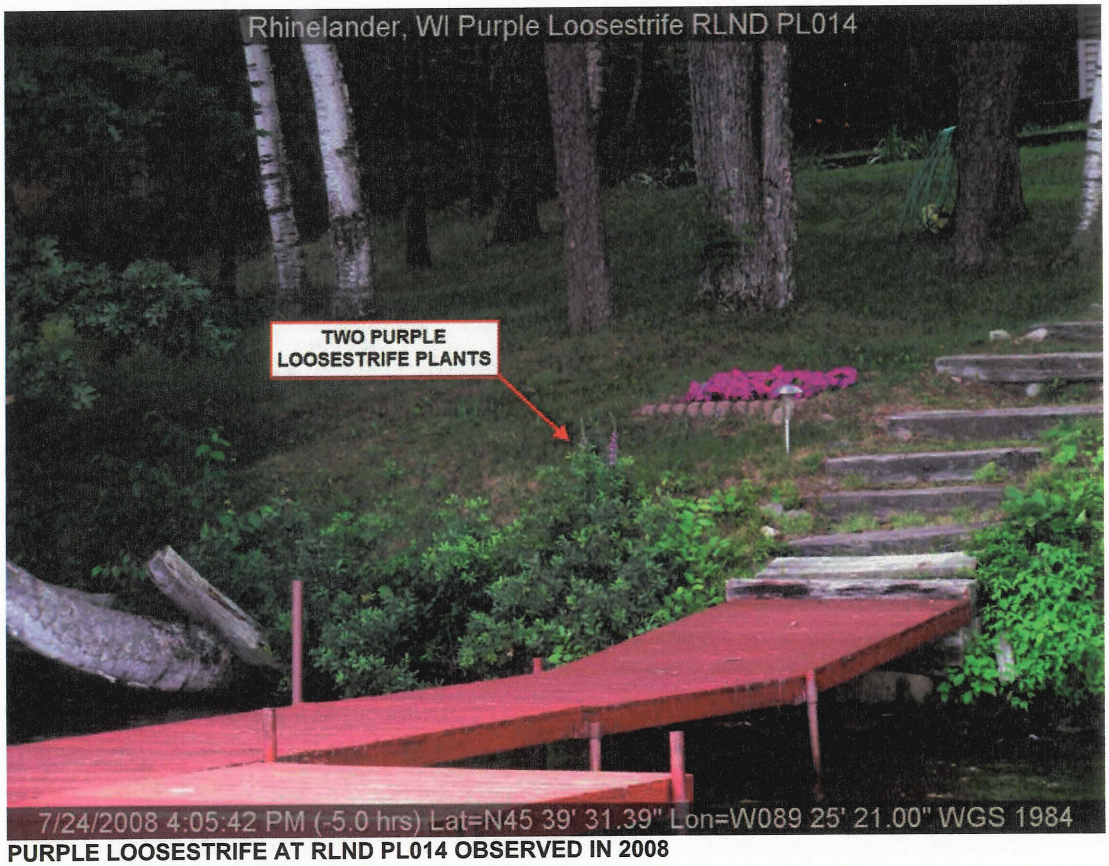
3.0 Observations

3.1 Purple Loosestrife

Meandered surveys for PL were performed at the Rhinelander Hydroelectric Project in 2006, 2007, 2008, 2009, and 2010. In 2006, a total of 9 occurrences (44 plants) were found of which one (16 plants) was located upstream from the dam and 8 (28 plants) were located downstream of the dam. In 2007, a total of 7 occurrences (39 plants) were found of which two (14 plants) were located upstream from the dam and 5 (25 plants) were located downstream of the dam. In 2008, a total of 11 occurrences (52 plants) were found of which two (12 plants) were located upstream from the dam and 9 (40 plants) were located downstream of the dam. In 2009, a total of 9 occurrences (48 plants) were found of which 5 (20 plants) were located upstream from the dam and 4 (28 plants) were located downstream of the dam. In 2010, a total of 17 occurrences (58 plants) were found of which 9 (35 plants) were located upstream from the dam and 8 (23 plants) were located downstream of the dam.

Plants found in the impoundment were all located on the northwest shore of Boom Lake (RLND PL010, RLND PL014, RLND PL016, RLND PL017, RLND PL018, RLND PL023, RLND PL024, and RLND PL025) and the northeast shore of Moonlight Bay (RLND PL001 and RLND PL023) in Bass Lake. No Galerucella beetle damage was observed on any of the plants in the impoundment. Most of the time, the survey crew was unable to locate landowners to acquire permission to access their property in these locations and most of these plants were not treated by the survey crew. At one location (RLND PL014) in 2008, the crew was able to talk with the landowners and show them the two plants that were found on their shoreline (see photo). In 2009, the crew was unable to contact the landowners and 6 plants were observed on their shoreline. None of these were treated by the crew. In 2010, the crew was once again unable to contact the landowner and only one plant was observed on their shoreline. The reduced number of plants from 2009 to 2010 may indicate that the landowner is actively controlling these plants.

All PL plants located in the by-pass reach and tailrace areas downstream of the dam (RLND PL002, RLND PL004, RLND PL007, RLND PL019, RLND PL020, RLND PL021, and RLND PL022) were either pulled or cut in the years that they were observed except for the furthest occurrence



PURPLE LOOSESTRIFE AT RLND PL014 OBSERVED IN 2008

downstream (RLND PL002). RLND PL002 was first observed in the baseline survey in 2006 and, at that time it was the heaviest concentration of PL discovered at the project estimated at 15 – 20 plants. Since 2006, this site has declined in size and density primarily due to the presence of GC beetles. In 2009, it was comprised of 12 plants of which no plants had flowering heads, and, in 2010, only 8 plants were found of which no plants had flowering heads. All of these plants had heavy beetle damage in 2010 and Galerucella beetles were once again confirmed to exist on a number of the plants. No control measures were performed by the survey crew (i.e. pulling plants, cutting seed heads, releasing beetles, spraying herbicide, etc.) at this site since it was first discovered in 2006 when it was determined that this would be an ideal location to observe the effectiveness of GC beetle control in the area due to the apparent presence of heavy GC damage. Although GC beetles haven't totally eliminated all the plants at this location, they have reduced plant numbers and vigor.

Many other occurrences located in the by-pass reach and tailrace areas downstream of the dam had beetle damage on plants and GC beetle larvae were observed on three plants at one location (RLND PL004) in 2009. In surveys prior to and inclusive of 2009, this location had sustained medium to heavy GC beetle damage. In all years, all of the

plants had been pulled and some grew back the following year. In 2010, there was no damage observed on any of the plants at this location (RLND PL004). This may be a possible indication that removing plants while GC beetle larvae are present is not a good method of PL control when promotion of beetle population is desired.

When PL information was acquired prior to performing the first survey in 2006, the WIDNR indicated that bio-control methods (Galerucella beetle release) had been performed on a site on an island a short distance downstream from the Project. Beetle migration from that site may explain the damage to the plants at the Project. Beetle damage had been observed in the 2006 and 2007 surveys, but it wasn't until the 2008 survey that Galerucella beetles were actually confirmed at the Rhinelander Project. The 2009 survey marked the first time GC beetle larvae were discovered (RLND PL004) at the project during a survey.

Information acquired from GLIFWC for the 2006 baseline survey indicated one PL sighting within the area of the survey limits. This listing was observed in 1985, was located in the wild rice beds of the upper reaches of the flowage at N45° 42' 24" W89° 30' 24" with an accuracy of 1/8 mile, and contained less than 20 plants. No further information (whether pulled, treated, or observed later) was available for this location. No PL was found in this area during the 2006, 2007, 2008, 2009, or 2010 surveys.

Other PL plants were observed by the survey crew blooming in road ditches outside of the survey limits in the Rhinelander area in all years that the surveys were performed.

Maps and comparative results of these surveys are included in Appendix B in this report.

3.2 Eurasian Water Milfoil

No EWM was discovered at the Rhinelander project during the 2006 baseline, 2007, 2008, 2009, and 2010 surveys. A few occurrences of native northern water milfoil were observed and are noted in Appendix B.

Water clarity in the project waters varied greatly. Attention was paid to this factor as water clarity is a determining factor in the maximum depth of weed growth. Where waters tended to be clearer it was necessary to take samples from deeper areas in order not to miss any weed growth. During the 5-year survey period, maximum weed depth varied from 4' – 7' in the main river channel areas of the upper reaches of the flowage to 12' – 16' in the deep clearer sections of Bass Lake. The 18' rake used during the survey was sufficient to sample all points where weed growth occurred and a rope rake was not needed.

Maps and comparative results of these surveys are included in Appendix B in this report.

3.3 Miscellaneous

PL plants were observed outside of the survey limits along river shorelines and in road ditches downstream from the survey area.

The scope of these surveys was specifically targeting PL and EWM for inventory, mapping, and analysis. However, the following species that are listed as non-native on the WDNR WEB site http://dnr.wi.gov/invasives/plants.asp) were also found in or very near to the survey limits:

Tansy has been observed in the by-pass reach. It was frequently observed in road ditches, pastures, fencerows, and edges of woods in other areas close to, but not within the survey limits.

Spotted knapweed was found on the edge of roadways within a few feet of the survey area, but not on the shoreline. Spotted knapweed was very commonly observed in outlying areas such as roadway ditches, parking areas, and pasture land.

It would be very difficult to control these varieties of plants without extending the same type of control into outlying areas to prevent them from spreading into the survey area.

4.0 Recommendations

4.1 Purple Loosestrife

Continue monitoring PL plants from the dam to the downstream limit annually. It would be best to treat as many PL plants on licensee owned property in this area with an herbicide. It has been difficult to remove the entire root of plants in this locale due to its rocky nature. Consequently, many of the plants grow back the following year. Chemical treatment would help eliminate the entire root. During the past five years, it has taken a survey crew of two people approximately 2 – 3 hours to locate and remove most all PL plants from the dam to the downstream survey limit.

Continue monitoring Bass Lake and Boom Lake annually for PL. Since PL already exists here in small quantities, continued monitoring would be advised. A cooperative could be established between the WDNR, Oneida County, and the licensee in order to locate PL, contact landowners, and remove the plants. It would be realistic to estimate that if permission had been already attained or if it weren't necessary to attain permission from landowners in order to enter their property, it would only take a couple of

hours to remove all of the 35 plants that were observed in these areas above the dam in 2010 by a crew of two people in a boat.

Extend the frequency of PL monitoring in all other waters of the survey limits. No PL has been found in these areas during the five year survey period.

4.2 Eurasian Water Milfoil

Extend the frequency of EWM monitoring in all waters of the survey limits. No EWM has been found during the five year survey period.