Aquatic Plant Management Plan for the St. Croix Flowage, Douglas County 2010 Addition

2010 CLP/EWM AIS Education Project

Douglas County, Wisconsin

DNR WBIC. 2740300
SEH No. STCFA 112124

January 2011

January 26, 2011

RE: 2010 CLP/EWM AIS Education Project
Aquatic Plant Management Plan for the
St. Croix Flowage, Douglas County
Douglas County, Wisconsin
DNR Project No. WBIC. 2740300
SEH No. STCFA 112124

Mr. Roger Wilson, President
Gordon-St. Croix Flowage Association
8728 E. Flowage Lane
Gordon, WI 54838

Dear Roger:

Enclosed is an update/addition for 2010-11 to the APM Plan completed on behalf of the Gordon-St Croix Flowage Association by SEH in 2009 and submitted to the WDNR for approval. The addition includes an outline of all the goals, objectives, and actions in the 2009 APM Plan and in this update. It also includes a Five-year Timeline for expected implementation of the objectives and actions included. This document only updates the APM Plan, it is not intended to be a final end-of-year summary for the existing AIS Education, Prevention, and Planning Project awarded in early 2010. The end-of-year summary document will be completed at a later time.

Please review this document. If it meets with your expectations, it will be submitted to the WDNR along with the February 2011 AIS Control Grant application being prepared by SEH on behalf of the SCFA.

Sincerely,

Dave Blumer

Dave Blumer
Lake Scientist

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Aquatic Plant Management Plan for the St. Croix Flowage, Douglas County

2010 CLP/EWM AIS Education Project
Douglas County, Wisconsin

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Gordon-St. Croix Flowage Association
Gordon, Wisconsin

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Executive Summary

In 2010, the St. Croix Flowage Association (SCFA) applied for and was awarded a one-year Aquatic Invasive Species (AIS) Education, Prevention, and Planning grant to support AIS activities on the Flowage, and to collect additional lake and plant data to be used to further develop aquatic plant management planning goals for the Flowage. This one year project and the associated activities should be considered the first year of five included in the current Aquatic Plant Management (APM) Plan.

The following document should be considered an addition to the existing Aquatic Plant Management (APM) Plan for the St. Croix Flowage submitted to the WDNR on behalf of the St. Croix Flowage Association in 2009. It further develops the existing APM Plan and adds an outline of the associated goals, objectives, and actions included in the APM Plan and this update. The original 2009 APM Plan and this update include eleven broad goals.

- Eurasian water milfoil control and management
- Curly-leaf pondweed control and management
- Purple loosestrife control and management
- Non-native phragmites control and management
- Japanese knotweed monitoring and management
- AIS Education, Monitoring, and Prevention
- Water quality monitoring
- Water level evaluation
- Wild rice monitoring and education
- Native species preservation, protection, and enhancement
- Assessment and evaluation

Each goal has a list of associated objectives and the actions needed to meet those objectives. A five-year timeline for implementation is included.

The SCFA intends to apply for AIS control grant funding in February of 2011 to continue the activities associated with this APM plan in the next four years. This four year AIS Control project should be considered a continuation of aquatic plant management activities on the St. Croix Flowage.

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Aquatic Plant Management Plan for the St. Croix Flowage, Douglas County

2010 CLP/EWM AIS Education Project

Prepared for Gordon-St. Croix Flowage Association

1.0 Introduction

The following report revises an Aquatic Plant Management (APM) Plan submitted to and approved by the Wisconsin Department of Natural Resources (WDNR) in 2009 (Blumer, 2009). Since the completion of the 2009 APM Plan a new, large bed of Eurasian water milfoil (*Myriophyllum spicatum*) (EWM) was discovered upstream of the previous EWM treatment area in the St. Croix Flowage (Figure 1). EWM management recommendations in the 2009 APM Plan focused on diver removal of isolated EWM plants and small beds in designated areas near the dam and public access site at the Douglas County Campground and just below the dam in the St. Croix River.

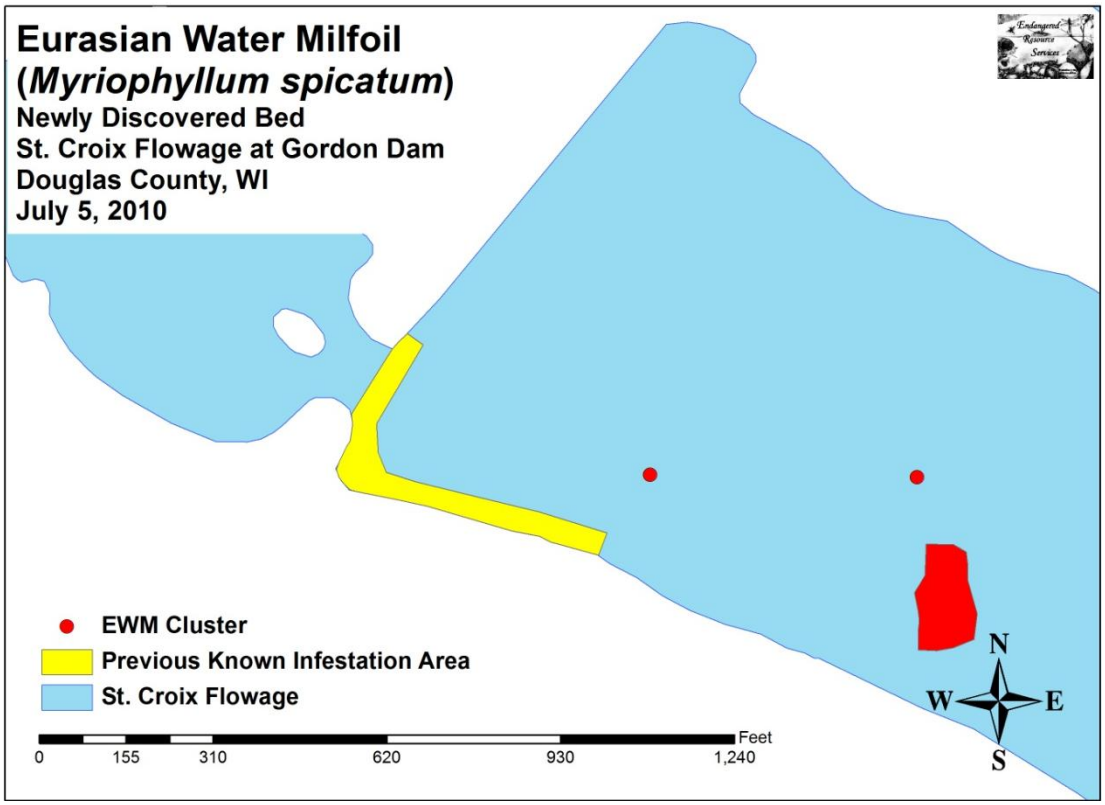

Figure 1 – 2010 EWM Bed

It also focused on monitoring for new beds of EWM. Unfortunately, one was found. Rapid response grant funding was used to chemically treat this new bed of EWM in July and to retreat it in September. This report will update the 2009 APM Plan to include management of this new bed of EWM.

In the 2009 APM Plan information about the level of curly-leaf pondweed (*Potamogetum crispus*) (CLP), another invasive non-native aquatic plant, present in the Flowage, particularly in the area near the "Narrows" (Figure 2), a natural restriction in the Flowage separating the western third of the Flowage from the main body of the Flowage was based on a 2007 survey completed by the University of Wisconsin-Stevens Point, and Citizen Lake Monitoring Network volunteer plant monitoring. No recommendations were made in the 2009 APM Plan to manage CLP except to complete additional point-intercept aquatic plant surveying and bed mapping in 2010 to better document the extent of CLP in this area of the Flowage. The 2010 point-intercept survey reduced the distance between the original point-intercept survey points by half and concentrated on an area beginning just east of the narrows and covering the entire area of the Flowage west of the Narrows to the dam. The 2010 survey identified CLP at a number of points within this area and mapped several small beds of CLP (Figure 3).

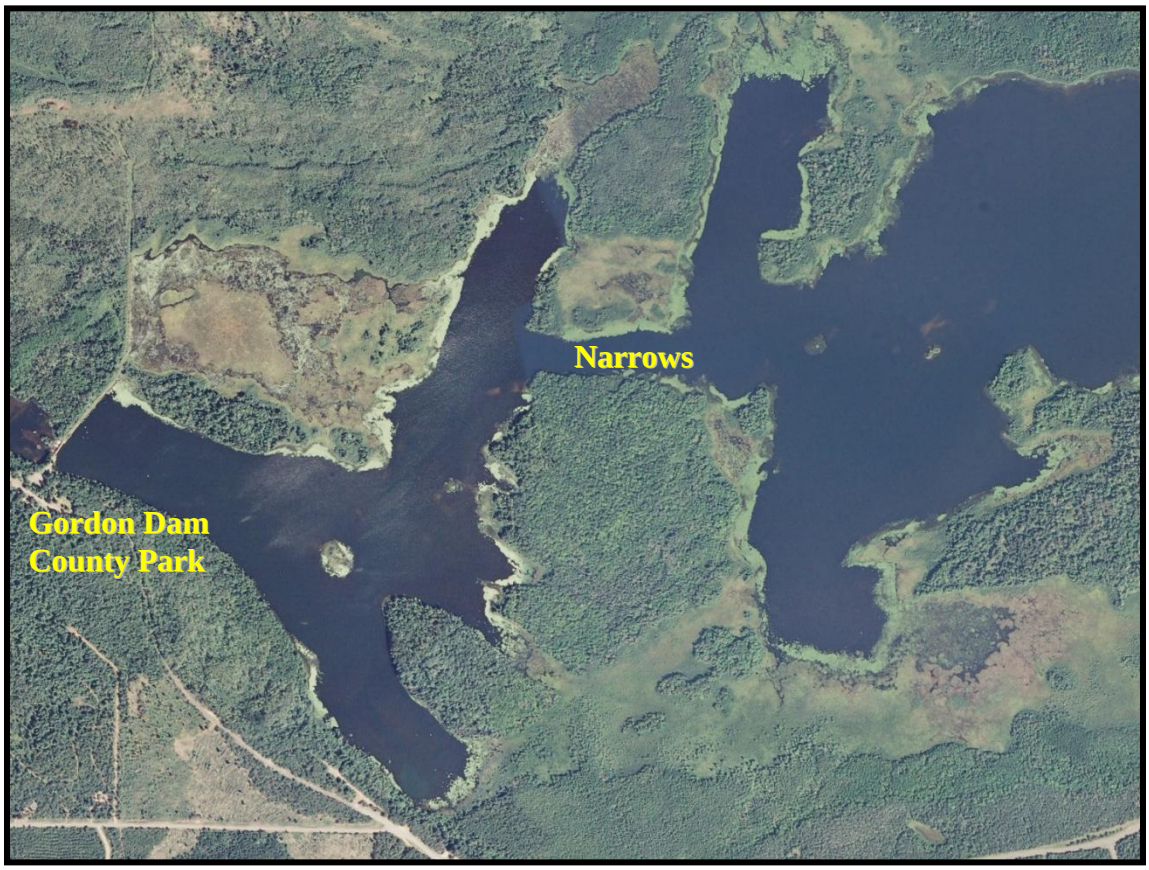

Figure 2 – Western Half of the St. Croix Flowage, Douglas County

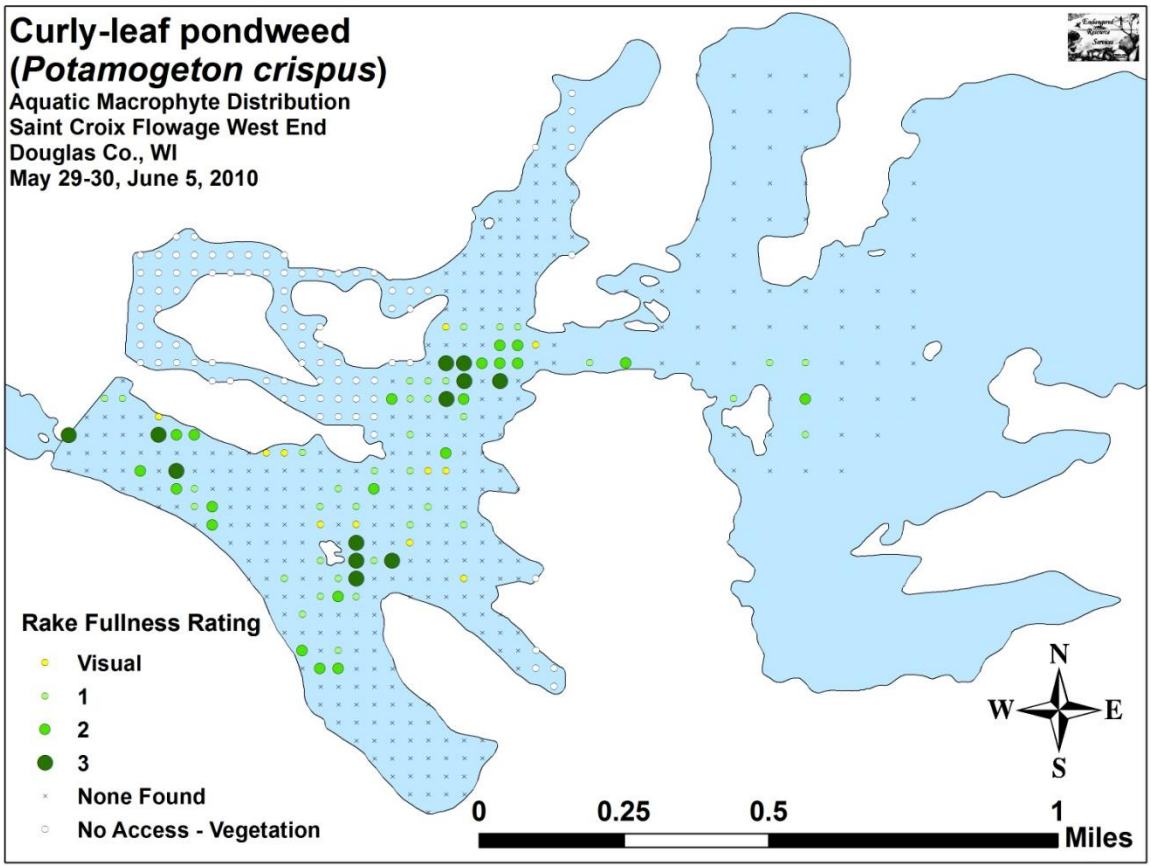

Figure 3 – 2010 Point-intercept Locations and Curly-leaf Pondweed Density From the 2010 Aquatic Plant Survey

In this report the survey data collected in 2010 will be compared to the 2007 and CLMN survey data and further recommendations for management made.

In the 2009 APM Plan, purple loosestrife (*Lythrum salicaria*) management including physical removal, herbicide application, and the rearing and release of biological control agents (Galerucella beetles) was recommended. At that time, purple loosestrife was most prevalent in the extreme east end of the Flowage along the shores of the St. Croix River. Purple loosestrife monitoring in 2010 identified another significant area of purple loosestrife growth in a large bay just east and north of the Narrows.

Giant reed grass (*Phragmites australis*) was mentioned in the 2009 APM Plan but at that time it was not known if it was present in the Flowage or not. Monitoring work completed in 2010 identified an area of giant reed grass along the shores of the St. Croix River on the east end of the Flowage (Figure 4).

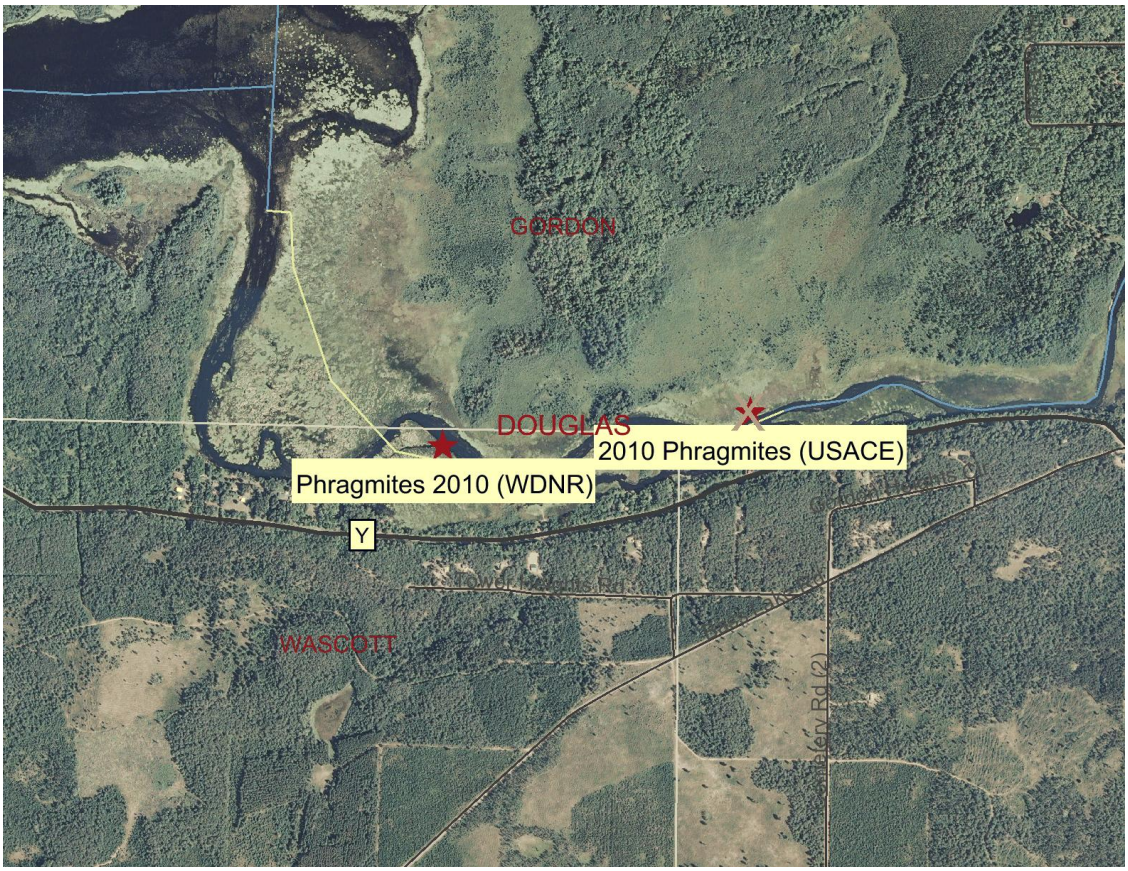

Figure 4 – 2010 Phragmites australis Locations

This report will summarize management alternatives for giant reed grass and make recommendations for treatment of this invasive species.

Finally, Japanese knotweed (*Polygonum cuspidatum*) was discovered in the Village of Solon Springs in 2010. It is not known if Japanese knotweed is present in the Flowage itself, however, this report will present information about Japanese Knotweed and make management recommendations related to it.

2.0 Eurasian Water Milfoil

EWM has been present in the Flowage for several years in an isolated area adjacent to the Douglas County boat landing, dam, and just up the south shoreline form the dam (Figure 1). Regular scuba diving in this area repeatedly found new plants growing throughout the open water season. It was thought that another bed of EWM existed in the Flowage that was acting as a source bed for the new plants repeated identified and removed by diving. Until 2010, this bed had not been identified. It was hoped that a more focused point-intercept survey completed in 2010 would either confirm the presence of a new bed, or show that EWM had not spread in the Flowage past the known infestation area. The 2010 early-season point-intercept survey in that area just east of the Narrows to the dam reduced the distance between

points in the original point-intercept survey completed in 2007 from 100 to 50-meters. The survey was completed by Matt Berg of Endangered Resource Services (ERS), LLC. The new bed of EWM was not identified during this survey. It was not until ERS completed additional 10-meter transects across this area that the new bed was identified. Figure 5 shows the location of the points with EWM identified by ERS in early July 2010. It is interesting to note that the points with EWM fall almost exclusively between the established point-intercept locations (50-m and 100-m) set up for this survey.

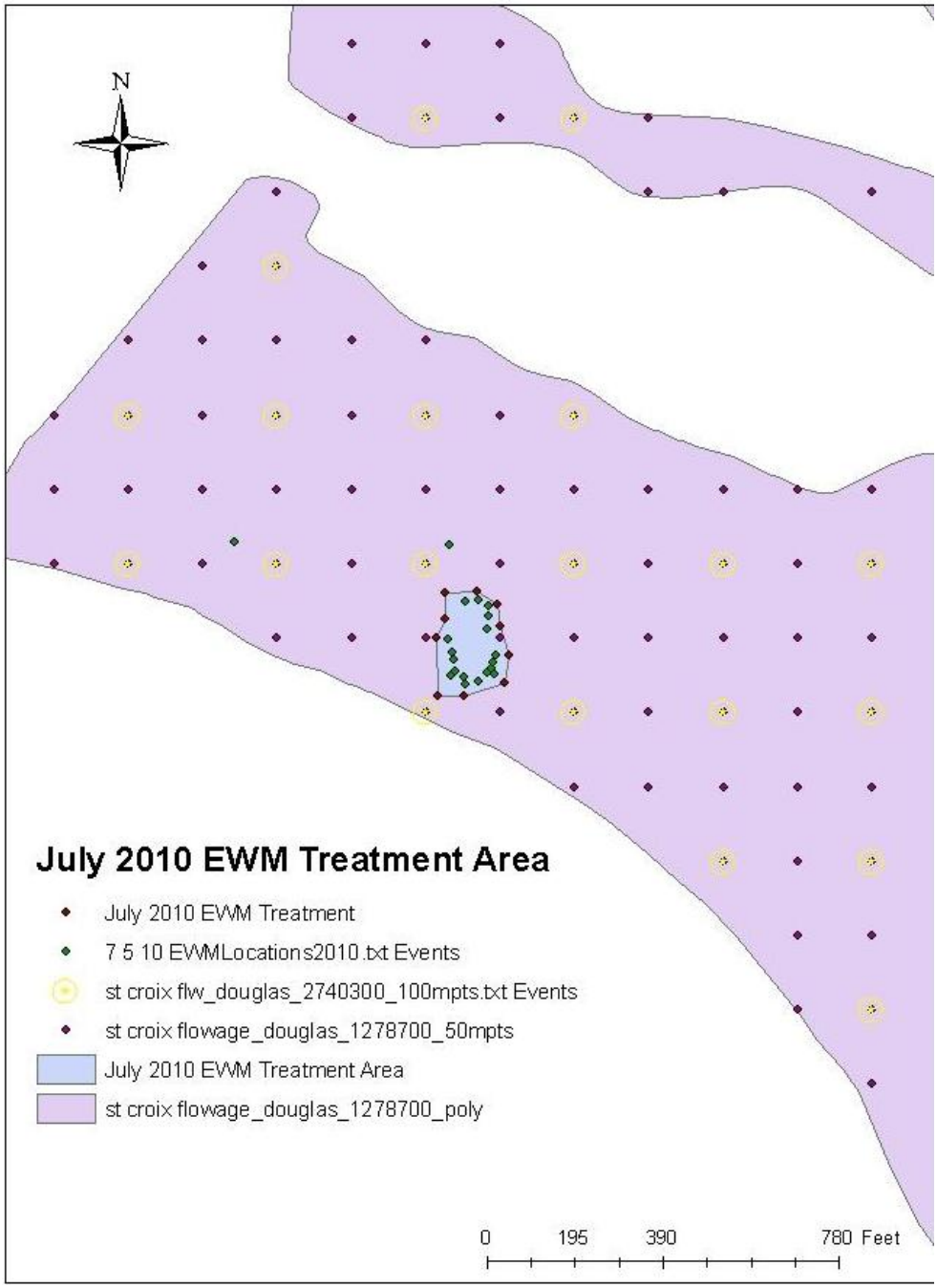

Figure 5 – Location of the New Bed of EWM Discovered July 6, 2010 by ERS

Once discovered, the St. Croix Flowage Association (SCFA) immediately sought permission from the WDNR to chemically treat this new bed. The fear remains, for all the reasons outlined in the 2009 APM Plan; that EWM will spread into other areas of the Flowage and if it does, will have a seriously negative impact.

On July 21, 2010 Dale Dressel of Northern Aquatic Services (NAS), LLC completed a chemical treatment of a 1.3 acres using Navigate, a granular formulation of 2,4-D at the maximum label rate of 200#/acre (Figure 5, Appendix A).

Follow-up diving and boat and rake surveys were completed in this area over the course of the next couple of months. In September 2010, it was decided that a second treatment covering approximately 0.68 acres should be completed. NAS was again contracted to complete the treatment and did so on September 28, 2010 using granular Navigate at 200#/acre (Figure 6, Appendix B).

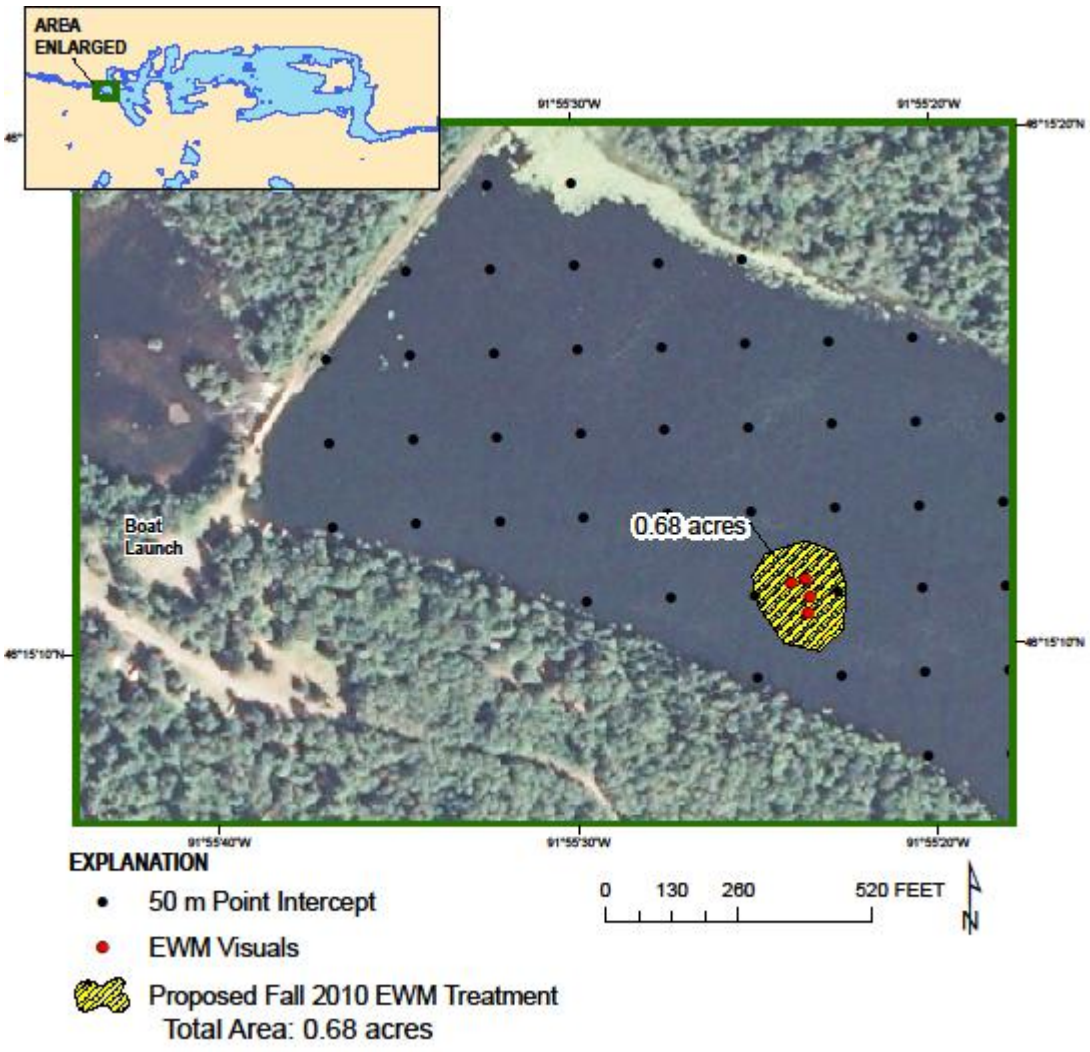

Figure 6 – Fall 2010 EWM Treatment Area

The entire treatment area will be evaluated in the spring of 2011 through a pre treatment aquatic plant survey to determine the overall effectiveness of the summer and fall chemical treatment.

2.1 Management Implications

The discovery of the new bed of EWM changes the overall EWM management program on the Flowage. Diver removal of isolated plants will continue in areas already managed in this way from 2008-2010 according to the recommendations for EWM management in the 2009 APM Plan (Figure 7). It is expected however, that if the new bed was effectively treated in 2010, that there will be fewer isolated plants re-growing in this area.

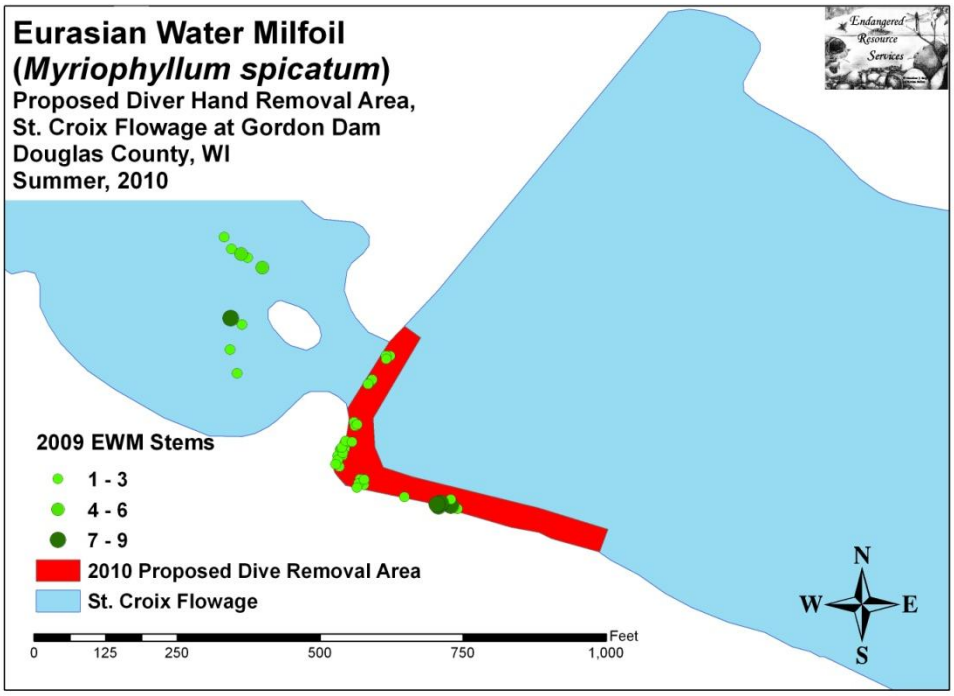

Figure 7 – Proposed Diver Removal Area From 2009 APM Plan

The new bed of EWM will be evaluated with a pretreatment aquatic plant survey set up by this consultant and ERS to occur in late April or early May to determine if any EWM remains in the treated bed and to determine what native plants are located in this area. If necessary an early season chemical treatment using Navigate at no more than 150#/acre will be completed, likely in an area less than two acres. Information about the formulation of 2,4-D found in Navigate, and the Navigate product label are included in Appendix C. Post treatment aquatic plant surveying will be completed to determine treatment impacts on the target plant (EWM) and native plants that may have been present before treatment.

If the diver removal area shows evidence of increased levels of EWM based on a pre-treatment aquatic plant survey, the early season chemical treatment will be expanded to include this area as well.

Through the combined efforts of the SCFA volunteer aquatic invasive species (AIS) monitors, this consultant, and ERS monitoring of the entire Flowage for EWM will be completed on an annual basis as recommended in the 2009 APM Plan. A new recommendation will be to complete fall bed mapping, and pre and post treatment aquatic plant surveying in those areas currently identified as containing EWM, primarily west of the Narrows.

3.0 Curly-leaf Pondweed

As a part of an AIS Education, Prevention, and Planning grant awarded to the SCFA in 2010, an early-season point-intercept aquatic plant survey, primarily for the purpose of determining the level of CLP in the Flowage and if EWM had spread from its known infestation area, was completed. In 2007, UW-Stevens Point completed an aquatic plant survey using an 895 point sampling grid generated by the WDNR. Citizen Lake Monitoring Network AIS volunteers completed additional monitoring from 2008-2010. Volunteer monitoring seemed to indicate that CLP distribution had increased considerably from that documented in 2007, including moving through the Narrows into the eastern 2/3 of the Flowage. The purpose of the 2010 survey was to better document the spread of CLP. Because the points generated in 2007 were 100-m apart, it was decided that for the 2010 survey, a secondary grid at 50-m resolution (1/2 that of the original grid) would be generated for the main CLP area west of the Narrows, but the original 100-m resolution points would be used in the narrows and in the area immediately east of the narrows (Figure 8).

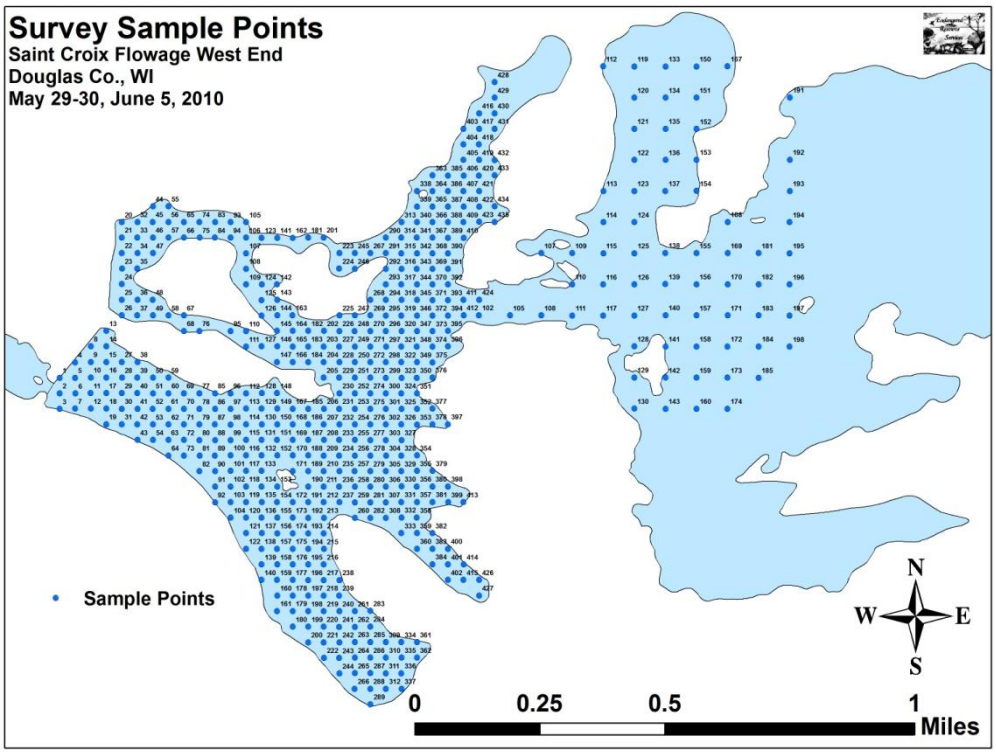

Figure 8 – 2010 Point-intercept Plant Survey Points

Using these grids, a density survey was completed by ERS where the level of CLP at each point in the lake's literal zone along with the depth and bottom substrate was recorded (Figures 3 & 9). CLP density was based on an assigned rake fullness value of 1-3 as an estimation of abundance. The following summarizes the findings of the ERS survey. A full report on the ERS 2010 CLP Survey is included in Appendix D.

A total of 416 points were surveyed for CLP on the Flowage. An additional 86 points were not accessible because of shallow water and excessive/emergent plant growth. CLP was documented in the rake samples at 69 locations and visibly documented at an additional 11 points. These results document CLP being present at approximately 16.6% of the west end of the flowage, with nearly 8% of the Flowage in this area having a significant infestation. CLP was scattered throughout the far west end near the dam, however the only places that consistently had dense CLP were along the river channel at the edge of the littoral zone and along rocky islands. CLP was not present in any of the finger bays off of the main channel despite these bays offering ideal habitat for growth. These areas were dominated by highly diverse and dense beds of native plants, and this may explain why CLP had not invaded.

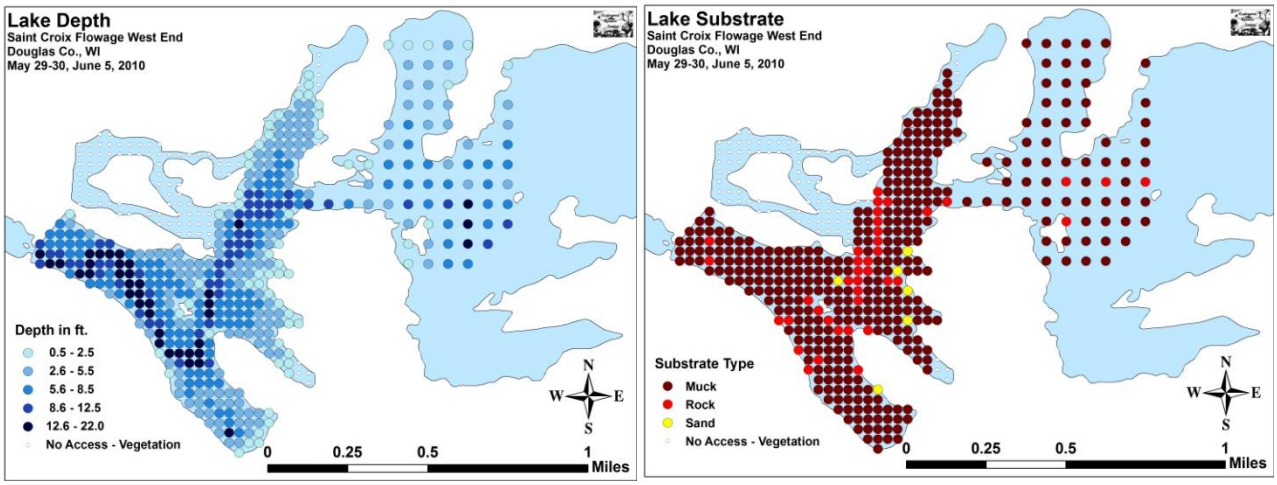

Figure 9 – Depth and Substrate Type as Recorded in the 2010 CLP Survey

Bed-mapping for CLP was also completed as a part of the 2010 aquatic plant survey. A total of 17 beds of CLP ranging in size from <0.01 acre (Bed 2) to 1.68 acres (Bed 5) were mapped in the St. Croix Flowage on June 5, 2010. These beds covered a total of 7.27 acres or just over 1.8% of the approximately 400 acre area that was surveyed (Figure 10). A bed is defined as an area where CLP plants made up greater than 50% of all aquatic plants in the bed, had canopied at the surface or was close enough to the surface that it would likely interfere with normal boat traffic, and had a definable edge. Although other areas of the flowage had CLP, either it was not invasive to the point of excluding natives or the beds were located well below the surface and thus would not interfere with watercraft such as along the river channel in areas over 10ft. of water.

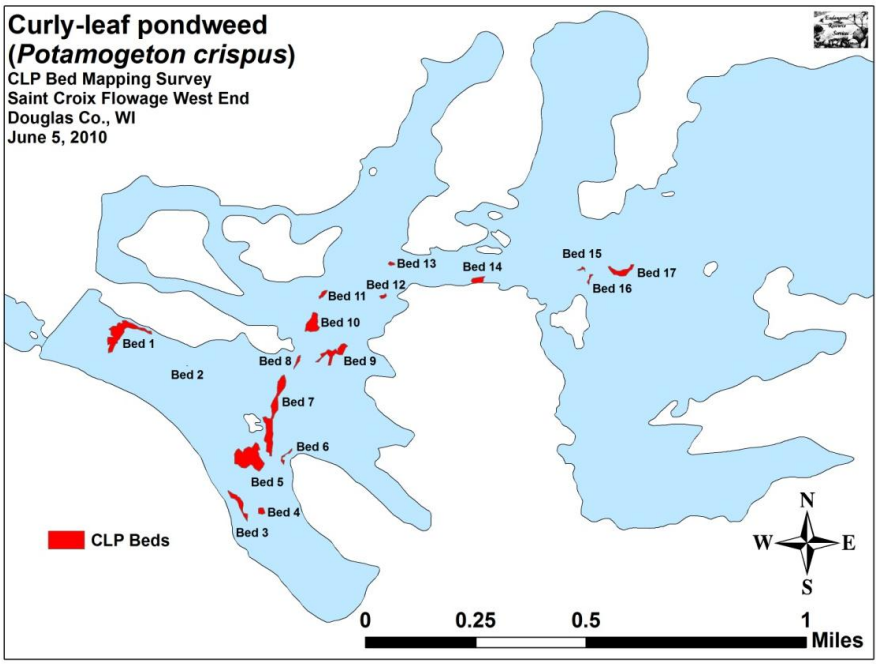

Figure 10 – 2010 Curly-leaf Pondweed Beds

3.1 Management Implications

There are several CLP beds documented in the 2010 survey that if removed would potentially benefit the Flowage for several reasons. At roughly 0.4 acres, Bed 17 has the most CLP east of the narrows. In 2010 it was fairly monotypic and extended from the edge of a Common Bur-reed (*Sparganium eurycarpum*) covered rock bar to the south into water up to 10ft. Eliminating larger beds of CLP east of the Narrows before they become truly dominant will reduce the number of turions annually dispersed from the bed. Bed 17 is far enough away from the known EWM populations that it would be less likely to provide a new area for EWM to grow, once treated.

Beds 5, 7, 8, 10, and 11 border the west side of the river channel and Bed 9 borders the east side. Together they cover an area nearly 5 acres in size. If connected for treatment purposes this area nearly doubles in size. These areas are all similar in that they border the river channel and are established on rocky points in shallow areas that extend into deeper water over muck towards the channel. CLP is generally mixed with natives in water <8 feet, but becomes more monotypic and dense from 8-12ft before disappearing almost entirely at greater depths. The way these beds are situated, essentially north to south, any boat traffic that does not stay in the immediate clear water channel will cut across them, potentially spreading plant fragments and turions to other places in the Flowage. Five to ten acres of dense CLP growth could potentially add 70 to 140 lbs of phosphorous based on calculations completed on Big Chetac Lake in Sawyer County by the WDNR (Roesler, 2008). This amount of phosphorous could equate to 17.5-35 tons of algae growth if other phosphorus sinks were not present in the Flowage.

Removal of a narrow strip of CLP in these areas would lessen the area for boats to cut across, reducing the amount of CLP spread in this manner. Taking out the CLP may re-open the area for greater native plant growth. It could also open the area up to greater expansion of EWM, so there would have to be continuous monitoring post treatment to be aware of this if it happens.

There is some discrepancy regarding how dense the CLP growth is or could be in the areas discussed above. According to volunteer AIS monitoring records, the 2009 distribution of CLP in the Flowage was similar to 2010, but the density was much greater. CLP bed mapping completed by UW-Stevens Points in 2007, showed CLP coverage was not as wide-spread as it was in 2009 and 2010 survey work, suggesting that perhaps the CLP growth has expanded since 2007.

Anecdotally CLP growth was not as great in many lakes in 2010 as it had been previously. This would support volunteer observations from 2009. Annual spring bed mapping should be completed to help determine the extent of the CLP population. Turion density sampling in the fall could also help focus management activities. While actual vegetative biomass is variable on an annual basis, the density of turions in the sediment would likely remain fairly constant unless management is being undertaken. Turion density sampling could then serve two purposes; one to help determine treatment areas, and two to help document changes in CLP density and distribution caused by management.

3.2 Management Alternatives

The densest areas of CLP and where they are located cause some management complications. There are basically three management alternatives to be considered to control CLP; no management, applying aquatic herbicides, and mechanical removal.

3.2.1 No Management

The first alternative is to not manage CLP at all, unless it proves to be a greater problem than currently exists. With removal, there is a risk of providing additional disturbed areas of the Flowage where EWM could become established. If CLP is not removed it will compete with other aquatic plants including EWM for dominance possibly aiding in keeping the spread of EWM in check. Completing no management is not recommended. CLP poses threats to the entire system that may be comparable to those posed by the expansion of EWM. The difference is that it may take longer for CLP to take over than EWM. Regardless, a Flowage dominated by CLP with poor water quality is no more desirable than a Flowage dominated by EWM.

3.2.2 Herbicide Application

Chemical herbicides are a cost effective, immediate, and proven technique for control of CLP. Removing certain areas of CLP would likely promote greater native plant growth; remove a source of phosphorous to the system; and aide in preventing the further expansion of CLP. If CLP and EWM were present in the same locations a combined early season herbicide treatment using low dose 2,4-D to kill EWM, and low dose endothall to kill CLP could be considered. Currently, EWM and CLP do not appear to be colonizing the same areas, though at least in the area of CLP Bed 1 (Figure 10) and the newly discovered EWM bed in 2010 (Figure 5), they are close. The cost of applying aquatic herbicides range from $400 - $800 per acre depending on the cost of additional pre and post treatment monitoring and residual testing. Applying endothall in a granular form would effectively remove CLP before it could out compete native aquatic plant species; mature, senesce and release

phosphorous into the system; and reduce or eliminate annual turion production in the treated areas. Early application of herbicides would limit its impact to non-target species and prevent disturbances to fish spawning habitats within the treatment area. Endothall is the active ingredient that is contained in Aquathol Super K, the herbicide recommended for this use. Information about endothall and the product label for Aquathol Super K is included in Appendix E.

Under normal circumstances, using chemical herbicides to eliminate small areas of undesirable vegetation would be a cost effective and likely successful management tool. However, given the proximity of the CLP beds that could be treated to the river channel coursing through the Flowage, getting the herbicide to stay in place long enough to kill the plants could present a problem. To address this possibility, a cross sectional area based on GIS analysis of WDNR bathymetric mapping and water flow through the Narrows was calculated using 2009 high spring daily outflow from the Flowage. The average velocity calculated in this fashion was 0.07 ft/second. In addition, water velocity measurements were taken at three different times during the summer of 2010 from the west end of the Narrows using a Marsh-McBirney Flow Meter. These measurements were taken at approximately $6/10^{th}$ the depth from the surface to the bottom of the channel. These measurements were inconclusive but seemed to show a velocity of 0.072 ft/second, very similar to what was calculated.

Herbicide application for the control of CLP in the Flowage is recommended in this document. It should be limited at first until it has been determined if the herbicide will stay in place long enough to affect treatment. Pre and post aquatic plant surveying should occur. Chemical residual testing should be completed with sampling sites established within the treatment area, adjacent to the treatment areas, and downstream of the treatment (above and below the dam) to determine how the herbicide moves through the system and if it reaches a sufficient concentration to kill the target plant.

3.2.3 Mechanical Harvesting

Mechanical harvesting could potentially be used to remove CLP from the beds adjacent to the channel. Harvesting assumes that vegetation is cut and removed from the system after cutting. Harvesters are driven by modified paddle wheels and include a cutter that can be raised and lowered, a conveyor system to capture and store the cut plants, and the ability to off-load the cut plants. The depth at which these harvesters cut generally ranges from skimming the surface to as much as five-feet deep. Harvesters can remove thousands of pounds of vegetation in a relatively short time period. They are not, however, species specific. Everything in the path of the harvester will be removed including the target species, other plants, macro-invertebrates, semi-aquatic vertebrates, forage fishes, young-of-the-year fishes, and even adult game fish found in the littoral zone (Booms, 1999). While relatively maneuverable in open water, the sheer size of the machines limits the area they can operate. They are most effective in larger lakes with ample littoral zone depth and where the target species is almost mono-typical.

Several problems can be anticipated if harvesting is chosen to remove CLP from the Flowage. The SCFA is not likely going to purchase and operate its own mechanical harvester, which means they would have to contract harvesting services. Commercial harvesting adds another vector for new AIS to get into the Flowage. If it is used great care should be taken to make sure the contractor and equipment used are clean. Harvesting will create a substantial number of plant fragments that escape from the pick-up conveyor to be spread around the Flowage by natural and man-made means. Most of these fragments will build up at the dam and be

washed over the dam. Due to the nature of CLP, there is a short window of no more than 2-3 weeks where harvesting can be most effective and beneficial. Careful planning and monitoring would need to be completed to make sure harvesting was completed at the best possible time. A plant dump site would have to be designated and approved by the WDNR, County, and local authorities. Harvesting also requires that the area harvested be free of underwater obstructions that could potentially damage harvesting equipment. Being a Flowage, underwater obstructions are plentiful.

A cost-analysis study completed in 2009 estimates the cost of contracted harvesting to $200-$600 per acre depending on the number of acres harvested and this value may increase if transportation and disposal costs are significant (Johnson 2009).

Harvesting is possible on the St. Croix Flowage, but not recommended at this time.

4.0 Purple Loosestrife

An AIS monitoring program expanded in 2010 identified a new area with significant purple loosestrife in a bay northwest of the public boat landing on the North Shore. Attempts made to cut and apply herbicide to plants in this area met with limited success. The SCFA will continue to partner with the Upper St. Croix Lake Association to rear and distribute biological control agents in this area and others around the Flowage. AIS monitoring, physical removal, and limited use of herbicides will continue as outlined in the 2009 APM Plan.

5.0 Giant Reed Grass (*Phragmites australis*)

Non-native Phragmites is an aggressive warm season grass that becomes so tall and dense that it eliminates other plants, reduces wildlife habitat and can block normal stream flows. It was probably introduced to East coast in late 1800s and is spreading west. Native East coast strains of reed grass are now nearly completely replaced by non-native phragmites. Exact locations of non-native phragmites stands in Wisconsin are unknown at this time however one of the worst hit areas of the state is in northeast WI, especially Green Bay.

Distinguishing native reed grass from non-native reed grass can be difficult. A suite of morphological characters based on genetic work is now available for official vouchering of non-native phragmites. If a sample cannot be identified by the following list of characteristics, samples collected in the field may be sent to Bernd Blossey at Cornell University. The WDNR will assist with the transfer of samples in this case.

Table 1
Distinguishing Characteristics of Native and Non-native Phragmites

Native Phragmites	Non-native Phragmites
shorter total plant height in same habitat (4-8 ft)	taller (10-15 ft)
found in undisturbed sites	found in disturbed sites
leaves yellow-green and lighter	leaves blue-green and darker
static, thin distribution w/other plants present	dense and spreading distribution, mono-typical
green to red stems may have small round spots	green stems with yellow leaf nodes with black patches, no spots
leaf sheaths readily fall off in the fall leaving smooth stems	leaf sheaths remain attached in the fall

Native phragmites has low stem density and low seed viability. It has a slow rate of spread through runners and seeds. Seed heads are shorter than those of non-native phragmites and not as robust (Figure 11). Non-native phragmites has high stem density and high seed viability. It spreads quickly by runners that can be up to 50-ft long (Figure 12), pieces of runners, and seeds. It has a tall robust seed head (Figure 11).

Figure 11 – Native (left) and Non-native (right) Phragmites

Figure 12 – Non-native Phragmites Runner

5.1 Management Alternatives

The US Fish and Wildlife Service recommendations for control include the use of herbicides, mowing, disking, dredging, flooding, draining, burning, and grazing (Tewksbury et al. 2002). Biological control agents are being studied and several species of insects in Europe can have large detrimental impacts, but none have been approved for general use in the United States.

The application of glyphosate (Rodeo) late in the season followed by prescribed burning or mechanical removal of dead stalks, and often subsequent application of glyphosate the next year appears to be the most widespread and successful control method (Blossey 2003). There are several treatment regimes that incorporate the use of herbicides including "Bundle, Cut, and Treat", "Backpack Spraying" and "Helicopter Spraying".

5.1.1 Bundle, Cut and Treat

Bundle, cut, and treat involves gathering a bunch of phragmites stems into a bundle, binding them, cutting them together as a unit, and then painting a 1:1 herbicide/water ratio solution onto the cut stems remaining in the ground. It should be completed in the late summer or early fall. Treatment in this fashion allows the plant to be physically removed and chemically treated at the same time. Advantages include: minimal equipment, only the chemical applicator needs certification, minimal herbicide drift, any height of stem can be treated, and treatment progress is easy to track. This method is effective and results can be seen in the same growing season and in the next season. Usually there is minimal follow-up treatment needed.

Some disadvantages include this method only being feasible with smaller populations. As populations get larger many more people are needed and though the impact of treatment is easily seen, progress is very slow. Furthermore, the process will likely need to be repeated every 2-4 years.

5.1.2 Backpack Spraying

Backpack spraying of chemical herbicides is a more aggressive approach to treating larger areas of phragmites. Backpack spraying is a 100% foliar application of herbicide best completed in September or October. Backpack spraying is ideal for larger areas of monotypic phragmites, quicker than bundle, and when applied correctly can be effective with minimal follow-up treatment. Disadvantages include the possibility for chemical overspray and drift that may cause collateral damage, increased chemical exposure on the part of the applicator, even with dyes in the herbicide solution tracking treatment progress can be difficult, and taller plants are difficult to treat. Since the herbicide is applied to the leaves, it takes longer for the plants to be impacted.

5.1.3 Helicopter Spraying

Helicopter spraying can be effective on larger populations of phragmites, and is often nearly 100% effective. Assuming a large acreage, the cost per acre treated is less than the other methods in time and resources, except that a great deal of preparation time is needed to make sure the helicopter treatment is done appropriately. Weather is a limiting factor in this approach, as anything less than ideal conditions will hamper treatment and may cause a tremendous amount of collateral damage.

5.2 Management Recommendations

Once the areas of phragmites identified in the Flowage in 2010 have been confirmed as the non-native invasive, treatment using the Bundle, Cut and Treat method is recommended. Glyphosate is already used for control of purple loosestrife in and around the Flowage. Through the summer of 2011, the suspect plant can be officially vouchered, with treatment beginning in September. AIS monitors should be educated in identifying non-native phragmites and monitoring of the entire Flowage should continue on an annual basis. The SCFA will likely be able to partner with the WDNR, Douglas County, and others to affect treatment.

6.0 Japanese knotweed (*Polygonum cuspidatum*)

Knotweeds are robust, bamboo-like perennials introduced from Asia that are spreading throughout the Great Lakes states. The main species is Japanese Knotweed. Knotweed grows in dense stands 6-12-ft tall. Its stems are hollow, green to reddish in color and bamboo-like. Its leaves are bright green, broad, egg or heart shaped, with a pointed tip. Small white flowers in branched spray appear July through August (Figure 13).

Figure 13 – Japanese Knotweed

Dormant in winter, the dead reddish brown stems often remain standing. It emerges from root crowns in April and reaches full height in June. The heaviest concentrations of knotweed are usually along rivers and roads, but are also found in parks, backyards, along lake shore, in forests and on farms. Japanese knotweed reproduces occasionally by seed, but spreads primarily by extensive networks of underground rhizomes, which can reach 6 feet deep, 60 feet long, and become strong enough to damage pavement and penetrate building foundations. Controlling Japanese knotweed is difficult and requires persistence and diligence. It can be dug, cut, covered, chemically sprayed, or have herbicide injected into individual stems.

Japanese Knotweed was discovered in the Village of Solon Springs during the summer of 2010. It is not known if it is present along the shore of the St. Croix Flowage. In 2011, AIS monitors will be trained to identify this invasive species and will cover all accessible shoreland around the Flowage to look for it. If identified, the SCFA will work with the WDNR, Douglas County and other partners to determine an appropriate management plan.

7.0 Aquatic Plant Management Goals, Objectives, and Actions to add to the 2009 APM Plan

Appendix F provides an outline of the aquatic plant and related management activities included in this addition to the 2009 APM Plan. There are eleven broad goals followed by the specific objectives and actions necessary to meet those goals over the course of the next five years. These eleven goals include goals from the 2009 APM Plan and this update. The 2009 APM Plan and this update are intended to be a fluent document able to be revised based on the results attained each year. Minor changes and adaptations are expected and will be made annually, but any major change in activities or management philosophy will be presented to the SCFA and the WDNR for approval. The eleven goals for this project are as follows:

- Eurasian water milfoil control and management

- Curly-leaf pondweed control and management
- Purple loosestrife control and management
- Non-native phragmites control and management
- Japanese knotweed monitoring and management
- AIS Education, Monitoring, and Prevention
- Water quality monitoring
- Water level evaluation
- Wild rice monitoring and education
- Native species preservation, protection, and enhancement
- Assessment and evaluation

7.1 EWM Control and Management

With the identification of a more substantial bed of EWM in an area previously unknown to harbor it, management recommendations have been expanded. In the 2009 APM Plan, EWM was to be monitored and removed by divers in a designated area near the dam and adjacent shoreline relative to the Douglas County Campground. Further diver removal was to occur below the dam in the St. Croix River. These objectives do not change. Diver removal in the area designated in the 2009 APM Plan is still considered a viable alternative, and in fact may be easier now that a source bed for fragments has been identified. Monitoring of the entire Flowage and in particular those areas considered at even higher risk (North Shore) will continue as planned.

In addition to the diver monitoring and removal, small-scale (< 10 acres), and potentially large-scale (>10 acres) herbicide application, preferably in the early season using the granular form of 2,4-D (Navigate) will be completed in the new bed identified in 2010. Initial herbicide treatment areas will be determined annually by looking at the previous year's distribution. The 2011 suggested treatment area is included in Appendix G. Pre treatment aquatic plant surveying following established WDNR guidelines will be completed in those areas that are assumed to undergo a chemical treatment. Permits for application will be based on the initial treatment area, but be revised according to the findings of the pre-treatment survey. Post treatment plant surveying will be completed 4-6 weeks after chemical treatment. Results will be used to determine the effect of the treatment on target and non-target species.

It is expected that small-scale herbicide application, at least for EWM control will be sufficient, unless a new larger area of EWM is discovered or existing beds expand. Navigate will be applied by a professional applicator at no more than 150#/acre for an early season application. If a late season application to control a new bed, or to follow up the initial spring treatment is determined necessary, than a max label rate of 200#/acre could be used.

Residual testing for 2,4-D will be completed in each year that a chemical application occurs. Residual testing sites will be established within the treatment area, areas outside of the treatment zone, and downstream of the Dam. Samples will be collected by SCFA volunteers and this consultant prior to treatment (Day Zero), and Days One, Four, Seven, Fourteen, and Twenty-one. At the present time samples will be analyzed at the Wisconsin State Lab of Hygiene (SLOH). The SLOH will be instructed to dilute samples collected on Day One, Four, and Seven to get a better idea as to the concentration of 2,4-D reached by the treatment.

Fall bed mapping of EWM will occur annually in the area west of the narrows.

7.2 CLP Control and Management

Approximately 12 acres of dense CLP growth was documented in the Flowage in 2010. The majority of this growth was west of the Narrows however, one small monotypic bed was mapped east of the Narrows. CLP was recorded in more areas of the Flowage, but was not considered to be detrimental to native plants, a navigation issue, or to have nuisance level growth. These assumptions are based on only one official bed mapping survey completed in 2010. Future bed mapping surveys could identify a greater area negatively impacted by CLP.

CLP can out compete native plants trying to get established in the spring; can form dense vegetative canopies that shade out other plant growth; produce thousands of new turions for future growth, contribute to dissolved oxygen depletion and increased nutrient loading; and can open disturbed areas for additional EWM growth when it dies in early July. For all of these reasons, management of CLP is recommended in the Flowage. Low dose, early-season application of a granular form of endothall (Aquathol Super K) is recommended for use in the Flowage in beds established west and east of the Narrows (Appendix G). Pre and post treatment aquatic plant surveying, and fall turion density sampling will help determine annual treatment areas and treatment results. Reducing the amount of CLP in the Flowage west of the Narrows over the course of the next five years by 50% as shown by bed mapping and turion density sampling, and preventing CLP from establishing new monotypic beds east of the Narrows is the goal of CLP management.

Residual testing for endothall is not required by the WDNR however, because there is some questions as to the effectiveness of CLP treatment near the sub-surface channel moving through the Flowage, it will be completed in the first year of CLP management. Water samples will be collected by SCFA volunteers and this consultant similar to the program set up for residual testing for 2,4-D. At the time this addition was written, the SLOH had been contacted about the desire to test of endothall residuals and were looking for an assay to complete such testing.

7.3 Purple Loosestrife Control and Management

The SCFA will continue its current efforts to monitor for and manage the spread of purple loosestrife in the Flowage. SCFA AIS monitoring teams will continue to monitor the shoreline of the Flowage for purple loosestrife in July and August. Physical removal with and without herbicide application will continue, as will the SCFA involvement in rearing and distributing biological control agents (Galerucella beetles).

7.4 Phragmites australis Control and Management

During the 2011 summer season the two suspected areas of non-native phragmites growth will be sampled and sent to Benrd Blossey at Cornell University for vouchering. A shoreland survey of the entire lake will be conducted by AIS monitoring volunteers and resource professionals to determine if there are any other areas of suspected non-native phragmites growth. If the suspect plants are identified as the non-native phragmites, control work, following the "bundle, cut, and treat" methods will be applied. The SCFA will work with Douglas County, the WDNR, and others to establish who will complete the treatment program if required. After initial treatment, the treated area and other areas of the Flowage will be monitored on an annual basis for re-growth, and retreat if necessary. As of now, Rodeo, a glyphosate formulation approved for use over water with an added surfactant and dye will be used.

7.5 Japanese Knotweed Monitoring and Control

SCFA AIS monitors will be trained to identify Japanese Knotweed and instructed to monitor for it as a part of their previously designated tasks. If suspect plants are found, monitors will collect samples, record the location, and contact resource professionals in the WDNR, Douglas County, or through their consultant to make a final determination. If Japanese knotweed is discovered, an appropriate management plan will be completed and added to the APM Plan.

8.0 AIS Education, Monitoring and Prevention

In order to prevent any new introduction of AIS and to prevent existing AIS from leaving the Flowage, a Clean Boats Clean Waters (CBCW) watercraft inspection program will be continued at both public access on the Flowage.

The AIS monitoring program established in the 2009 APM Plan and implemented for the first time in 2010 will be continued. Teams of volunteers will monitor established areas of the Flowage for AIS according to a schedule set up by the SCFA and this consultant. If volunteer complete the program according to the guidelines set, they will receive a stipend that covers a portion of their volunteer time. All data collected by the CBCW and AIS monitoring program will follow approved WDNR and UW-Extension guidelines and be submitted to the SWIMS database.

The SCFA will keep the general public involved by publishing a newsletter, hosting at least one open annual meeting, holding a Lake Fair or similar event, and maintain an Association webpage to help disseminate information.

9.0 Water Quality Monitoring

WDNR/UW-Extension sponsored Citizen Lake Monitoring Network (CLMN) volunteer water quality testing will continue on four sites in the Flowage. In addition, additional parameters will be collected by SCFA volunteers and this consultant to help better track impacts of aquatic plant management on water quality.

10.0 Water Level Evaluation

In 2010 the placement of the Staff Gauge on the Dam used for tracking water level was evaluated for its accurate placement. According to survey work performed in 2010 the Staff Gauge placement is accurate. This being the case, there are still questions as to the actual depth in the Flowage now, compared to the 1960's when the WDNR last completed bathymetric work on the Flowage. Complete depth sampling of the Flowage will be completed during the next full system early season point intercept aquatic plant survey. The original plant survey points are 100-m apart. For the depth sampling, a maximum distance between points will be 50-meters. Additional transact data will be collected to verify the point intercept depths and better distinguish the sub-surface channel moving through the Flowage.

11.0 Wild Rice Monitoring and Education

The extent of the wild rice beds on the Flowage will be bed-mapped on an annual basis. Bed-mapping will initially be completed by this consultant, but subsequent bed mapping could be completed by SCFA volunteers and/or the Great Lakes Indian Fish and Wildlife Commission.

12.0 Native Species Preservation. Protection, and Enhancement

It is the intent of the SCFA to have a full wetland survey completed for the roughly 100acres of wetlands around the main body of the Flowage. The WDNR has a three level wetland assessment program that will form the basis for this evaluation. Data collected by outside sources including the University of Wisconsin – Stevens Point and the US Army Corps of Engineers will be used to help with this evaluation. Level One will potentially be completed in 2012, Level Two in 2013, and Level Three in 2014. The SCFA and this consultant will work with the WDNR to determine the best way to approach this goal and the associated objectives and actions.

13.0 Assessment and Evaluation

The impact of the CLP and EWM treatment program to target and non-target plant species will be evaluated with pre and post treatment aquatic plant surveys according to guidelines established by the State. Actual pre post surveying points will be established in each year of this APM Plan. For 2011, there are 179 pre post points established within the expected EWM and CLP chemical treatment zone (Appendix G). Pre post results will be used to determine treatment effectiveness and the level of treatment in subsequent years.

In the last year of this APM Plan a full system early and mid season aquatic plant point-intercept survey will be completed.

Annual summaries of the activities completed in a given year, the following years treatment program, and minor revisions to the APM Plan will be completed annually. At the end of the overall project a final report will be created, as will a revised or updated APM Plan to be used for the next five years of management.

All assessment and evaluation documents will be submitted to the SCFA, WDNR, and Douglas County for their perusal in both bound paper and digital format.

14.0 Timeline for Implementation of Aquatic Plant Management Goals, Objectives and Actions

Appendix I provides a four-year timeline for the implementation of the remaining actions outlined in the 2009 APM Plan and this addition to it. 2010 was considered Year One of the implementation plan and was funded by an AIS Education grant. Funding will be sought by the SCFA through an AIS Established Population Control grant applied for in February 2011. Additional funding will be sought through partners including Douglas County, the Douglas County Association of Lakes, National Park Service, Friends of the Upper St. Croix, and others. In addition, the SCFA will continue raising money for management through events like the annual Canoe/Kayak Race begun in 2010, donations from its members, and SCFA membership dues. Other funding sources may be developed as this five year aquatic plant management plan progresses.

15.0 References

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Appendix A

July 2010 EWM Treatment Record

Appendix B

September 2010 EWM Treatment Record

Appendix C

Navigate Product Label

Appendix D

ERS 2010 Curly-leaf Pondweed Report

Appendix E

Aquathol Super K Product Label

Appendix F

APM Plan Goals, Objectives, and Actions

Appendix G

2011 EWM-CLP Treatment Plan

Appendix H

Four Year Timeline for Implementation