INTRODUCTION

In February 2009, the Iron River Area Lakes Association, Inc. (IRALA) successfully applied for Aquatic Invasive Species (AIS) Grant funds to complete a five-year AIS control and prevention project on the Pike Chain of Lakes (Buskey Bay Lake, Lake Millicent, Hart Lake, Twin Bear Lake, Eagle Lake, and Flynn Lake). Following discovery of the invasive plant, Eurasian water milfoil, in summer 2004, chemical treatments and hand-removal efforts have occurred on the chain every year since 2005 and have proven to be very effective at reducing EWM density and colony size. EWM treatments were completed on the Pike Chain of Lakes during May 2009 (Map 1). Treatment areas were delineated surrounding the denser colonies in Hart Lake, Hart Lake Channel and Twin Bear Lake (4.3, 3.2 and 13.2 acres, respectively) and targeting smaller, more recent infestations in Lake Millicent and Eagle Lake Channel (0.8 and 0.1 acres respectively).

Currently there are several management strategies being implemented on the lakes within the Pike Chain. Hart and Twin Bear lakes have advanced stages of infestation, therefore management efforts have sought to control further spread within the lakes themselves and to the other connected waterbodies in the chain. In Lake Millicent, Buskey Bay Lake and the channel leading to Eagle Lake small pioneer infestations have been mapped and aggressively treated with the goal of eradicating the colonies before they have time to fully develop. The final management strategy involves preventative measures that have been taken to reduce the opportunity of EWM to colonize in Eagle and Flynn Lakes.

This report discusses the methods used to evaluate the treatments and the criteria used to determine if they were successful beginning with the summer 2008 peak biomass survey completed during August 2008. The report goes on to discuss the condition of the EWM in the treatment areas in the spring before the 2009 treatment (spring pretreatment) and then in August 2009 (summer post treatment) following the herbicide application. A peak biomass survey was completed in early September 2009 to gather information used in creating the 2010 proposed treatment areas, which are discussed near the end of the report. Once agreed upon by the IRALA and the Wisconsin Department of Natural Resources (WDNR), the proposed treatment areas will be used to obtain a conditional treatment permit for the May 2010 treatments.

TREATMENT MONITORING

Determining the success or failure of chemical treatments on EWM is often a difficult task because the criteria used in determining success or failure is ambiguous. Most people involved with EWM management, whether professionals or laypersons, understand that the eradication of EWM from a lake, or even a specific area of a lake, is nearly, if not totally, impossible. Most understand that achieving control is the best criteria for success. Two different methods of evaluation were used to understand the level of control that was achieved by the chemical treatment. A qualitative assessment was determined for each treatment site by collecting spatial data with a sub-meter Global Positioning System (GPS), in addition to, comparing detailed notes from the pre- and post treatment observations.

Quantitative monitoring of the treatments were completed following protocols disbursed by the Wisconsin Department of Natural Resources (WDNR) in April 2007. This protocol calls for the

monitoring of target plants (EWM) and native plants before and after treatments. Pretreatment surveys are completed the summer before treatment and the spring of the treatment. Post treatment surveys are completed the summer following treatment and the next spring following the treatment. In February 2009, IRALA successfully applied for a multi-phased Aquatic Invasive Species (AIS) Established Infestation Control Project Grant. Due to the timing of this project, a pretreatment point-intercept survey was conducted in May of 2009. Only non-native plant abundances were recorded as the majority of the native plants had not emerged at this time of the year. This grant will be used to monitor herbicide treatments through 2013. A quantitative assessment of the 2009 treatment was made by collecting data at 124 point-intercept sample locations on the Pike Chain of Lakes (Appendix A). At these locations, EWM presence and rake fullness were documented as well as water depth and substrate type. Native plant abundances were determined at each plot during the post treatment survey.

Statistical Analysis of Pre- and Post Treatment Survey Data

Scientists often rely on the use of statistical analysis to understand whether the observed differences in nature are merely a product of chance or can be attributed to a particular factor. In the case of the pre- and post treatment monitoring surveys completed on the Pike Chain, the particular factor we are concerned with is the herbicide treatment. The desired result is a decrease in EWM within the treatment areas. The amount of EWM within a treatment site is measured with the sub-sampling surveys and expressed in terms of percent frequency of occurrence. The EWM frequency is a percentage of sub-sampling sites that contain EWM relative to the total sub-sampling sites in the treatment area. For example if a treatment site has 20 sub-sampling locations and 5 of those locations contained EWM, then the EWM frequency would be 25%.

As a part of the treatment monitoring, the sub-sampling sites are visited before and after the treatments to produce the pre- and post treatment data. By comparing those data, we can see if there is more, less, or the same amount of EWM before and after the treatment. As mentioned above, the desired result is to have less EWM after treatment. If there is a difference between the pre- and post treatment data, statistical analysis is used to determine if the difference is sufficient to be attributed to the treatment or if the difference may have occurred randomly. If the difference is sufficient, it is considered to be *significantly different*, if it is not sufficient, it is considered to be *insignificantly different*. In the end, a significant difference can be attributed to some factor, while an insignificant difference can only be attributed to random chance.

With guidance from WDNR Integrated Sciences, a Chi-square distribution analysis (alpha = 0.05) was used to determine if the quantitative data collected before the treatment are statically different from the data collected after the treatment. The alpha value is set such that we consider the results statistically significant when the test is 95% confident that the results are truly different and non-random.

The number of sub-sample sites within a treatment area must be considered when evaluating the treatment impacts on that particular site. A higher sample size (N), leads to more credible results and conclusions. In general, sites containing less than eight sub-sample locations are not considered sufficient for analysis; however, those data are considered valuable when pooled (combined) with the other sub-sample sites within the lake for the lake-wide analysis. A 20-

meter spacing (resolution) between sub-sample locations is considered the closest that hand-held GPS technology can effectively allow. Eight out of twelve treatment sites on the Pike Chain of Lakes had at least eight sub-sample locations and were included for analysis. The remaining three sites fell short of this number so they were not evaluated on a site-specific basis.

The caveat to all of this is that we assume that the differences observed were caused by the herbicide treatment, but truly, without having comparable data from a non-treatment site (control group), this cannot be absolutely certain. For example, was the reduction in EWM caused by inter-annual variations caused by competitive dynamics between species, fluctuating water levels, natural plant cycles, or changes due to climatic conditions? Without a true experimental design that uses a control site, we cannot absolutely answer that question. In the end, it is impractical to take the risk of not treating a colony of EWM within a lake just to make sure that the results of the studies are scientifically sound; therefore making the educated-assumption that the difference is caused by the herbicide treatment is reasonable.

Volunteer Monitoring and Hand-Removal Efforts

Volunteers have dedicated many hours towards the comprehensive management of EWM on the Pike Chain of Lakes, and have certainly made a substantial impact. In 2009, 18 individuals spent a total of 645.5 hours volunteering in AIS-related control efforts on the Pike Chain of Lakes. These hours include monitoring for EWM (253 hours) and Purple loosestrife (29 hours). These data were compiled and provided by the volunteer coordinator for the Pike Chain of Lakes, Al Bochler.

In the past, the locations of EWM infestations came from numerous sources which made coordinating survey and treatment efforts difficult. The process has now been streamlined through Al Bochler, who collects EWM site information, verifies the infestation and collects spatial data regarding its location, then sends these data to Onterra for final verification and mapping during their surveys. This process allows Onterra to manage spring and summer surveys more efficiently by concentrating their efforts towards "Focus Areas". These areas are a combination of previous treatment sites as well as locations spotted by volunteers and mapped by Al Bochler (Maps 5 and 6). These Focus Areas will be covered extensively in the upcoming May 2010 EWM pretreatment survey to see if new growth has occurred.

The excellent clarity of water in the Pike Chain of Lakes allows for snorkelers and SCUBA divers to survey the shorelines and manually remove scattered EWM plants they may come across (Maps 5 and 6). There has been a tremendous amount of interest amongst the stakeholders in assisting with this effort. In 2009, volunteers spent a combined total of 164.5 hours removing EWM through SCUBA and snorkeling. The outcome of their labors has been a reduced cost for the IRALA in terms of contracted labor and herbicide costs, as well as the opportunity for an effective low impact solution to EWM control. Additionally, volunteer-led surveys routinely cover Eagle and Flynn Lakes for signs of EWM. These surveys serve as the primary safeguard to keeping established infestations out of these lakes.

Pretreatment Survey – 05/18 & 19/09

The purpose of this survey was to refine the treatment areas used in the conditional permit (based on a 2008 peak biomass survey) to more accurately and effectively coordinate the control

method. These areas were accepted by the IRALA and the WDNR, and considered the *final* treatment areas. These data were then provided to the herbicide applicator.

The weather conditions on the day of the survey were sunny and fairly warm, but with high winds. Although the EWM was visible from the surface, an aqua scope and submersible video camera were used to aid in the survey. The ambient air temperature was 67°F.

The final treatment areas changed slightly from the areas defined in the conditional permit (Map 1). Some sites (C-09, D-09, and Q-09) were expanded to encompass EWM observed growing outside the proposed treatment sites, while many sites (E-09, G-09, I-09, J-09, M-09, N-09, O-09 and R-09) were reduced in size (Map 1). Additionally, seven sites (A-09, H-09, K-09, S-09, T-09 and V-09) were dropped altogether because it was decided volunteer hand-removal and monitoring would be the appropriate course of action in these areas. Finally, one small site (W-09) was added to address a pioneer infestation in Eagle Lake. The extents of the remaining four treatment areas remained the same. After all treatment area revisions resulting from the spring survey, 11.5 acres were added to the final permit bringing the grand total to 21.8 acres (Map 2).

EWM Reconnaissance Survey and Second Treatment – 06/16/09

Following the May pretreatment survey, volunteers expressed concern that the survey was completed too early in the season and that all EWM was not fully visible at that time. As a result, the association members believed that certain areas of the chain that contained significant amounts of EWM the past summer would not be treated even though the plants would likely appear in those areas in a few weeks. During the May field visit, Onterra surveyors confirmed numerous areas with EWM, both within and without the focus areas provided by the volunteers and the areas inspected the summer before by Onterra staff. Knowing that the IRALA volunteers have an excellent understanding of the EWM within the chain, Onterra volunteered to visit the lake again and remap any areas where the IRALA volunteers located EWM. Further, the WDNR agreed to allow a second treatment in new areas if verified by Onterra. On June 16, 2009, Onterra ecologists once again visited the Pike Chain of Lakes and marked 3 areas containing sufficient EWM to warrant the second treatment event. All three of these areas were visited during the May pretreatment survey with no EWM found in them at that time. One site (X-09, Map 2) was a new occurrence of EWM that would be difficult to harvest by hand, so it was decided that this location be treated with herbicide. Two additional sites (V-09 and Y-09, Map 2) were originally slated for treatment, but were dropped because no EWM was spotted in the mid-May survey. It was apparent that the growth had occurred since the May survey as V-09 is quite shallow with the bottom clearly visible and Y-09 was searched thoroughly with a submersible video camera. The three additional sites totaled 5.2 acres and were the week of June 22nd.

Post Treatment & Peak biomass EWM Survey – 09/03/09

During this survey, all treatment areas were visited to determine the efficacy of the chemical application. At this time of year the EWM is at peak growth, so the plants have nearly reached the surface, making viewing the plant optimal. All point-intercept sample locations were also revisited and data were collected in the same manner as during the pretreatment survey. Native

plant occurrences were also documented at the sub-sample locations during this survey for comparison with future summer surveys.

As outlined within the Pike Chain of Lakes Aquatic Invasive Species Control and Prevention Project Plan (February 2009), success of the herbicide treatments would be evaluated in multiple ways. First is a qualitative assessment in which a successful treatment on a particular site would include a reduction of EWM density as demonstrated by a decrease in density rating (e.g. highly dominant to dominant). In terms of a treatment as a whole, at least 75% of the acreage treated that year would decrease by one level of density as described above for an individual site.

Quantitatively, a successful treatment on a specific site would include a significant reduction in EWM frequency following the treatments as exhibited by at least a 50% decrease in EWM frequency based upon the sub-sampling. In other words, if the EWM frequency of occurrence before the treatment was 80%, the post treatment frequency would need to be 40% or lower for the treatment to be considered a success for that particular site. Evaluation of the treatment-wide effectiveness would follow the same criteria based upon pooled sub-sample data from all treatment sites. Further, there would be a noticeable decrease in rake fullness ratings within the fullness categories of 2 and 3. Preferably, there would be no rake tows exhibiting a fullness of 2 or 3 during the post treatment surveys.

During this field survey, a peak biomass EWM survey was conducted to provide an accurate account of all EWM locations within the lake to aid in coordinating the 2010 management actions. These recommendations are provided within this section.

Millicent Lake

Site B-09 EWM density did not change substantially within this site after the treatment (Maps 1 and 2). The surrounding area has been closely monitored by volunteers, and substantial hand-removal has occurred. Due to the concern of the growing scattered colony in this shallow bay, this treatment area has been recommended for treatment again in 2010 and has also been expanded (Maps 2 and 3, B-10).

Site C-09 A large clump of EWM with a dominant density rating was spotted in the 2008 peak biomass survey at this site (Map 1). Following the 2009 treatment this site holds several plants of scattered density, which have extended past the treatment boundaries. To address the spreading EWM in this site, the treatment area has been increased slightly and recommended for treatment in 2010 (Map 3, C-10).

Hart Lake

Site D-09 Similar to Site B-09, there have been intensive hand-removal of EWM at this site, as well as a chemical treatment (Map 6). Unfortunately following the hand-removal and chemical treatment the density of EWM has changed little within the treatment boundary. This site is recommended for re-treatment in 2010 (Map 4, D-10)

Site E-09 EWM was not decreased within this site following treatment. In fact the site, previously containing scattered plants, was observed as having dominant EWM growth in late 2009 (Maps 1 and 2). It was observed that the colony had also expanded in size as well. The treatment area has been expanded to cover the new growth, and it is recommended for treatment again in 2010 (Map 4, E-10).

Site F-09 In 2008 this site consisted of a small colony that was mapped by volunteers outside of a conditional treatment area (Map 1). Following the herbicide treatment, there was no EWM observed within the treatment boundary. The only EWM sighting occurred outside of the treatment area, but within the previous conditional treatment area (Map 2). This site will be monitored for potential EWM growth in 2010, though at this time the EWM clump is too small to justify a chemical treatment.

Site G-09 The herbicide treatment appears to have been successful at this site, reducing a scattered zone of EWM to a small colony. To reduce the density of this colony further, it is recommended that a much smaller section (0.2 acres) of this site receive treatment again in 2010 (Map 4, G-10).

Site I-09 Previously, EWM density was observed as several scattered clumps in this site (Map 1). The post treatment survey revealed a single scattered clump still existed within the treatment area. Several dominant colonies were observed outside of the treatment boundary as well as smaller scattered clumps. Consequently, it is recommended that this site be expanded to include the scattered plants and treated again in 2010 (Map 4, I-10).

Site J-09 EWM density was greatly reduced in this site following the herbicide treatment. The 2009 treatment area (2.7 acres in size) held scattered plants as well as a few small colonies (Map 1). Only one small clump remains in addition to scattered plants very close to the shoreline along the southern edge of the treatment area. Because the plants near the shoreline of the site are small but fairly numerous, it is recommended that the southern section of J-09 be treated again in 2010. This proposed treatment area (J-10) is 0.2 acres in size and covers a lake depth averaging 3 feet (Map 4). The small clump observed in the summer post treatment survey was observed in the northernmost part of J-09. It is recommended that this small area be treated separately from J-10, and be named as H-10 (Map 4, J-10 and H-10).

Site L-09 At this site the treatment was effective in reducing a small colony of EWM. In fact, no plants were spotted in the 2009 post treatment survey (Map 2). This site is not recommended for an additional treatment at this time.

Site M-09 This location, one of the largest areas treated in 2009, connects Hart Lake to Twin Bear Lake. Prior to the 2009 treatment, there was a band of scattered EWM covering the northern section of M-09 while sporadic plants were seen in the southern region of the site. In the post treatment survey there were no EWM plants spotted. On the other hand, there was an abundance of native plants observed by Onterra ecologists. This site is not proposed for retreatment at this time.

Site X-09 Following the first treatment, this location was assessed in mid June on a reconnaissance survey and treated the week of June 22nd. Numerous clumps of plants were spotted within the site. After the treatment, several clumps as well as a few single plants still existed in September. It is recommended that X-09 be combined with I-09 for a 2010 treatment (Map 4, I-10)

Site Y-09 Like X-09, this location was not slated for the original treatment but EWM growth in early June prompted action in the form of an herbicide application in late June. The EWM density was reduced from a few small plants and one colony to one small colony after the treatment. For 2010 it is recommended that this site be closely monitored, but not treated.

Twin Bear Lake

Site N-09 The area surrounding boat landings are often critical sites in terms of EWM introduction and monitoring. This site has been treated several years in a row now, and the directed attention to this treatment area seems to have been met with success. During the 2009 peak biomass survey the area was searched for signs of EWM, with none being found. With the previously scattered EWM plants nowhere to be found, this site is not recommended for retreatment in 2010. (Map 3).

Site O-09 During the post treatment survey EWM was spotted in the southern portion of O-09, the largest 2009 treatment area (4.2 acres). The plants were few and they were found scattered in a relatively small area. This small area has been the target of volunteer EWM hand-removal during summer 2009 (Map 6). The entire 2009 treatment area will remain under surveillance by both Onterra and volunteers, while the small southern section of O-09 is recommended for herbicide treatment in 2010 (Map 4, O-10)

Site P-09 At this site in 2008, EWM was found in various densities. A relatively large scattered area was discovered in the northernmost section of the treatment area, while a small dominant colony was spotted in the middle area and scattered plants were observed in the bottom portion of the site (Map 1). Only one plant was spotted in late 2009 (Map 2). This single plant does not warrant a herbicide treatment for 2010.

Site Q-09 Several small clumps of plants were effectively treated in the 2009 herbicide application. The site held both a scattered and a dominant colony in 2008 (Map 1). There were no sightings of EWM in the 2009 Peak Biomass survey (Map 2). As a result, this treatment area is not recommended for retreatment in 2010.

Site R-09 This large site in northern Twin Bear lake held several dominant colonies in 2008 (Map 1). The area responded well to the treatment, with only a single plant being observed within the treatment borders in 2009. However scattered EWM plants were observed outside of the treatment boundary to the southwest in an area where volunteer hand-removal has occurred (Maps 2 and 6). It is recommended that R-10 cover this new growth for the 2010 herbicide treatment (Map 4).

Site U-09 Like many other treatment areas located in Twin Bear Lake, a successful treatment was seen at this location. EWM density was reduced from scattered plants in 2008 to no visible EWM in 2009 (Maps 1 and 2). As a result it is recommended that this site be monitored, and not chemically treated, in 2010.

Eagle Lake

Site W-09 A successful treatment was observed in the only Eagle Lake 2009 treatment area. There was no sign of EWM within the boundaries of the treatment area (Map 2). Within a previous year's treatment area there were several sightings of EWM by volunteers (Map 6). However these locations were searched extensively by Onterra ecologists during the 2009 peak biomass survey, with no confirmed EWM plants in these locations. It is likely that similar looking plant species (such as Northern water milfoil or *Utricularia sp.*) were misidentified as EWM as this is somewhat common. This entire area will remain monitored by both Onterra and volunteers.

Site V-09 This was the third site identified in the reconnaissance survey and addressed in the follow-up treatment. Numerous small plants were seen in mid June within this shallow site, but following a dose of 100 lbs/acre there was no EWM spotted in the post treatment survey. As a result, this site will be watched closely in 2010 but not treated at this time.

CONCLUSIONS AND RECOMMENDATIONS

It is difficult to analyze the Pike Chain treatment areas in a quantitative fashion using current accepted protocol. Following several years of chemical treatment and hand-removal, the infestation in the Pike Chain is sparse. Between the three surveys that were completed around the two 2009 chemical treatments (2009 pretreatment, 2009 reconnaissance survey and 2009 post treatment) there were very few points in which EWM was pulled up on a sampling rake. EWM was identified at 4 of 124 point-intercept locations in the pretreatment survey (3.2%) and only once out of 124 locations in the post treatment survey (0.8%). Although this equates to a 75% decrease in EWM frequency of occurrence ((0.8-3.2) / 3.2 x 100%) the result is not statistically significant because of the low EWM frequency of occurrence in each survey. Simply speaking, EWM was found too infrequently to analyze the treatments statistically.

Nine of the twenty 2009 sites are proposed for treatment again in 2010, while eight of the sites have been removed as candidate treatment areas. It is important to note that these locations will continue to be monitored in 2010 for new EWM growth by both Onterra and local volunteers. One site (A-10) has been added in an area which has been watched closely the past two years. Treatment area J-09 has been split into two new smaller areas (J-10 and H-10), which brings the total treatment site count to 11 for 2010 (Maps 3 and 4).

Native Plants

Although it is never the intent of the treatments to impact native species, it is important to remember that these non-target impacts can only be considered in the context of the areas treated and not on a *lake-wide* basis. In other words, the impact of the treatments on a non-target species in the treatment areas cannot be extrapolated to the entire population of that plant within the lake, unless the plant species is only found in locations where there is EWM. The same cannot be said for EWM, because by targeting nearly all EWM within the lake, it is intentionally being impacted on a lake-wide basis. One may claim that an impact to non-target natives may leave a 'hole' where pioneer infestations of EWM can take hold. The herbicide used in 2009 (2,4-D) is broad-leaf (dicot) specific and as long as a particular treatment site is not dominated by broad-leaf natives, native monocots, of which most aquatic plants are, will provide ample competition to compete against the non-native threat.

As previously stated, the timing of the awarded grant did not allow for a summer pretreatment point-intercept survey in which native species could be quantitatively assessed. Native plant frequencies were however monitored within the treatment area locations after the spring 2009 herbicide treatment (Figure 1). The native species found during this survey included eight dicots and 17 monocot / macroalgae species. Again, 2,4-D is a herbicide which is effective only against dicot species. While possible changes in the native species populations are unable to be determined at this time, the summer 2009 data will be utilized in future treatments that are to occur on the Pike Chain of Lakes.

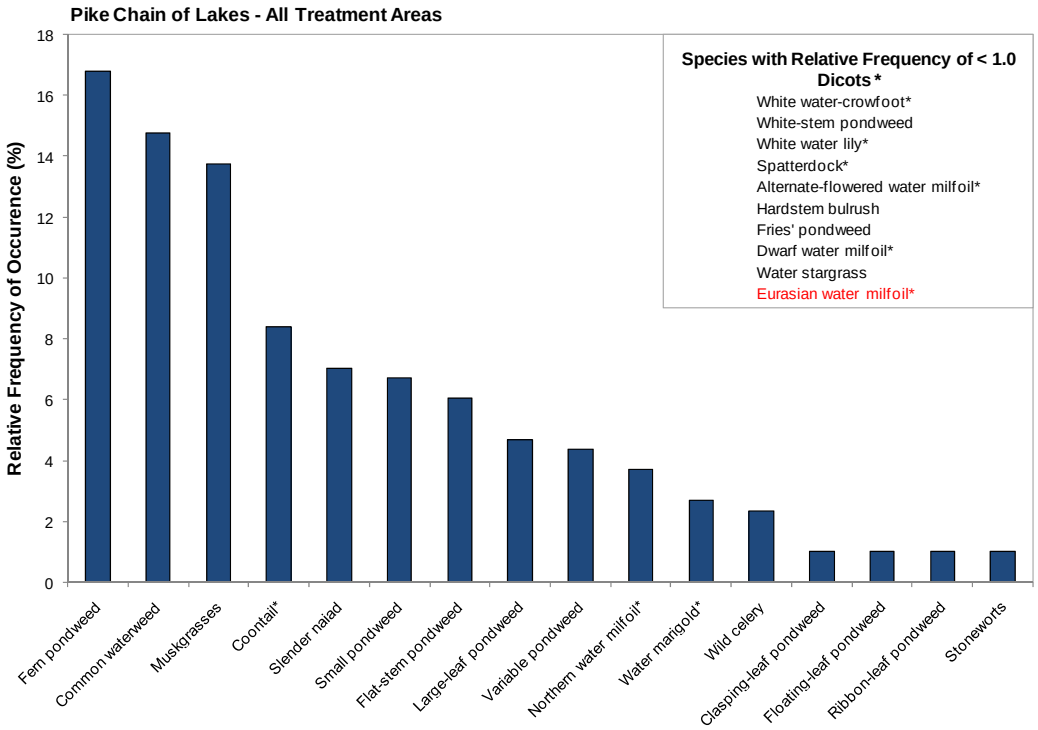


Figure 1. Native and non-native plant relative percent occurrence at summer 2009 point-intercept survey locations. Dicot species are indicated by an asterisk, and exotic species are indicated with red font.

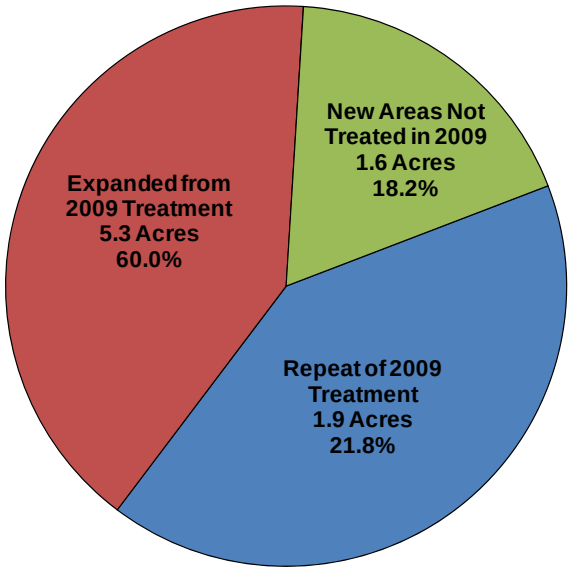


Figure 2. Common acreage comparison between 2009 treatment and proposed treatment for 2010.

As indicated on Map 1, approximately 27 (21.8 acres for the first treatment, 5.2 acres for the second treatment) acres of EWM were treated during 2009 in the Pike Chain of Lakes. Because many of the individual treatments were very successful (particularly in Hart and Twin Bear Lakes), the overall acreage treated in 2010 has decreased substantially from that treated in 2009. 1.9 acres, or 40.7% of the 2010 treatments, are located in areas being common to areas treated during May 2009 (Figure 2). Approximately 41.1% of the proposed 2010 treatment acreage is comprised by expanded areas of EWM during the 2009 growing season. While a 41.1% expansion in 2009-treated areas may seem to be quite a bit, the percentage is misleading as it is actually an increase of only 5.3 acres. The remaining 1.6 acres (18.2%) to be treated in 2010 are located in areas that are isolated from 2009 treatment sites (Figure 2). These areas have been watched diligently by both Onterra and the IRALA volunteers in past surveys, and have grown to the point where chemical treatment is necessary. A total of 8.5 acres are proposed for treatment in 2010 (Maps 3 and 4).

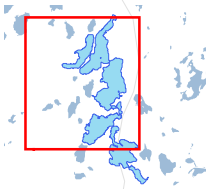
As previously mentioned, the success of the EWM treatment is usually evaluated in two ways, qualitatively and quantitatively. Due to the small amount of quantitative EWM data that was collected a statistical evaluation is not the most appropriate way of describing the 2009 herbicide treatments. On the other hand, from observations made in the summer 2009 post treatment survey, 15 of the 20 treatment areas were reduced by at least one density rating and in terms of acreage 86.3% (23.3 of 27 acres) of the total treatment acreage experienced a reduction in EWM density. The density reduction seen following the herbicide application surpasses the 75% benchmark that has been established as the qualitative success criteria for the 2009 treatments.

In 2010, 8.5 acres located within 11 treatment areas are proposed for treatment in three of the Pike Chain of Lakes, A-10, B-10, C-10, D-10, E-10, G-10, H-10, I-10, J-10, O-10, and R-10 (Maps 3 and 4). These sites will be assessed in a pretreatment survey, similar to that which was done in May of 2009 at the treatment areas. However the 2010 survey will be scheduled for late May to early June, as opposed to mid May. As ice-off occurs later in the northern regions of Wisconsin, aquatic plants begin growing later in the year than in lakes located further south. It was observed last year by Onterra ecologists that EWM colonies had only begun sprouting from the lake bottom in mid-May. In fact during the EWM reconnaissance survey in mid June it was discovered that areas that were void of EWM in May had significant growth that warranted herbicide treatment. By scheduling the pretreatment survey in early June, followed by the herbicide application in the second week of June, EWM will be visible for accurate treatment

area delineation. Native plant species should not experience substantial growth at this point in time, so any possible effects from the herbicide will again be minimal.

In 2009 all treatment areas were treated at rates below Navigate's (granular 2,4-D) maximum dose rate of 200 lbs/acre (Map 1). All sites were treated at 150 lbs/acre, with great results seen from this dose rate in most sites. All sites are recommended to be treated at 150 lbs/acre, with the exception of D-10 and E-10. These two treatment areas are located along a steeply sloping shoreline and based upon 2009 peak biomass surveys, the EWM extends outwards in fairly deep water at both of these locations. As EWM density reductions were not seen at these two 2009 treatment areas, it is recommended that they be treated at a slightly higher dose, 175 lbs/acre, in 2010.

Where applicable, volunteers should be utilized to both monitor and combat EWM on the Pike Chain of Lakes. The well-coordinated volunteer program has produced much data on the extent of the invasive plant in this system. This streamlined process of using volunteers and professionals to track EWM and treatment effectiveness has led to much success in the 2009 season.



Extent of large map shown in red.

2009 Final Treatment Areas - 150 - lbs/acre				
Site	Lake	Conditional Permit Acres	Final Permit Acres	Ave Depth (feet)
A-09	Busky Bay Lake	0.2	Dropped	
	Sub Total	***0.2***	***0.0***	
B-09	Millicent Lake	0.1	0.1	8
C-09	Millicent Lake	0.5	0.7	7
	Sub Total	***0.6***	***0.8***	
Site	Lake	Conditional Permit Acres	Final Permit Acres	Ave Depth (feet)
D-09	Hart Lake	0.1	0.2	8
E-09	Hart Lake	0.3	0.2	8
F-09	Hart Lake	1.9	0.2	7
G-09	Hart Lake	0.8	0.6	9
H-09	Hart Lake	0.9	Dropped	
I-09	Hart Lake	1.0	0.5	6
J-09	Hart Lake	4.6	2.7	8
K-09	Hart Lake	0.1	Dropped	
L-09	Hart Lake	0.1	0.1	7
	Sub Total	***9.5***	***4.5***	
Site	Lake	Conditional Permit Acres	Final Permit Acres	Ave Depth (feet)
M-09	Hart Lake Channel	4.8	3.2	6
	Sub Total	***4.8***	***3.2***	
Site	Lake	Conditional Permit Acres	Final Permit Acres	Ave Depth (feet)
N-09	Twin Bear Lake	4.0	3.0	9
O-09	Twin Bear Lake	4.8	4.2	8
P-09	Twin Bear Lake	2.2	2.2	8
Q-09	Twin Bear Lake	0.4	0.5	6
R-09	Twin Bear Lake	3.8	3.1	9
S-09	Twin Bear Lake	0.1	Dropped	
T-09	Twin Bear Lake	0.1	Dropped	
U-09	Twin Bear Lake	0.2	0.2	7
	Sub Total	***15.5***	***13.2***	
Site	Lake	Conditional Permit Acres	Final Permit Acres	Ave Depth (feet)
V-09	Eagle Lake	2.3	Dropped	
W-09	Eagle Lake		0.1	6
	Sub Total	***2.3***	***0.1***	
	Grand Total	**32.9**	**21.8**	

2009 Conditional Second Treatment

Treatment Areas - 100lbs/acre			
Site	Lake	Acres	Ave Depth
V-09	Eagle Lake	2.3	3 feet
	Sub Total	***2.3***	
Site	Lake	Acres	
Treatment Areas - 150lbs/acre			
Site	Lake	Acres	Ave Depth
X-09	Hart Lake	1.7	8 feet
Y-09	Hart Lake	1.2	8 feet
	Sub Total	***2.9***	
	Grand Total	**5.2**	

1,750

Feet

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Sources:
Roads & Hydro: WDNR
Aquatic Plants: Onterra, 2009
Map date: March 26, 2010
File Name: Map1_Pkchn_T2009and2008PB.mxd

Legend

- 2009 Proposed Treatment Area
- 2009 Final Treatment Area
- 2009 Follow-up Treatment Area

EWM Survey Results (June 2008)

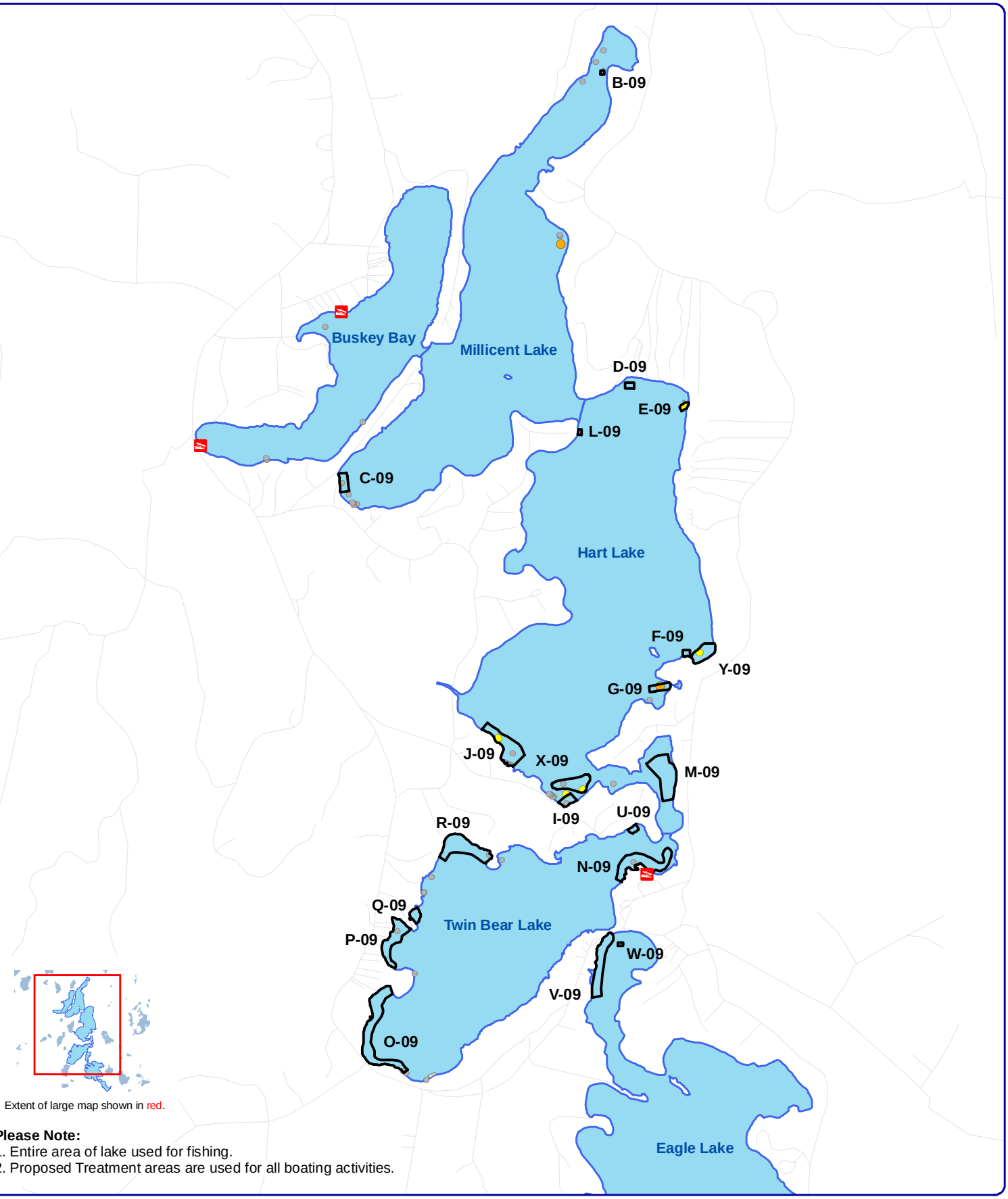
- Single or Few Plants
- Plants Pulled
- Clumps of Plants
- Scattered
- Dominant
- Highly Dominant

Map 1

Pike Chain of Lakes

Bayfield County, Wisconsin

2008 EWM Densities and 2009 Treatment Areas



Extent of large map shown in red.

Please Note:
1. Entire area of lake used for fishing.
2. Proposed Treatment areas are used for all boating activities.

N
W E
S

1,750

Feet

Onterra LLC
Lake Management Planning
135 South Broadway Suite C
De Pere, WI 54115
920.338.8860
www.onterra-eco.com

Sources:
Roads & Hydro: WDNR
Aquatic Plants: Onterra, 2009
Map date: March 26, 2010
File Name: Map2_Pkchn_T2009andPB.mxd

EWM Survey Results (Sept 2009)
- Highly Scattered
- Scattered
- Dominant
- Highly Dominant *(none found)*
- Surface Matting *(none found)*

EWM Survey Results (Sept 2009)
- Single or Few Plants
- Plants Pulled
- Clump of Plants
- 2009 Final Treatment Area
- Public Boat Landing

Map 2
Pike Chain of Lakes
Bayfield County, Wisconsin
2009 EWM Densities and Treatment Areas

2010 Proposed Treatment Areas - 150 lbs/acre			
Site	**Lake**	**Acres**	**Ave Depth**
A-10	Millicent	0.88	9 feet
B-10	Millicent	2.21	5 feet
C-10	Millicent	0.88	7 feet
	Sub Total	***3.97***	
Site	**Lake**	**Acres**	**Ave Depth**
G-10	Hart	0.18	10 feet
H-10	Hart	0.28	6 feet
I-10	Hart	2.48	5 feet
J-10	Hart	0.23	3 feet
	Sub Total	***3.17***	
Site	**Lake**	**Acres**	**Ave Depth**
O-10	Twin Bear	0.24	6 feet
R-10	Twin Bear	0.51	6 feet
	Sub Total	***0.75***	

2010 Proposed Treatment Areas - 175 lbs/acre			
Site	**Lake**	**Acres**	**Ave Depth**
D-10	Hart	0.21	8 feet
E-10	Hart	0.40	8 feet
	Sub Total	***0.61***	
	Grand Total	**8.50**	

Buskey Bay

Millicent Lake

Hart Lake

Extent of large map shown in red.

Please Note:
1. Entire area of lake used for fishing.
2. Proposed Treatment areas are used for all boating activities.

N W E S

850

Feet

Onterra LLC
Lake Management Planning
135 South Broadway Suite C
De Pere, WI 54115
920.338.8860
www.onterra-eco.com

Sources:
Roads & Hydro: WDNR
Aquatic Plants: Onterra, 2009
Map date: March 5, 2010
File Name:
Map3_Buskey_Millicent_T2010_EWM_Cond1.mxd

EWM Survey Results (Sept 2009)
- Highly Scattered
- Scattered
- Dominant
- Highly Dominant *(none found)*
- Surface Matting *(none found)*

EWM Survey Results (Sept 2009)
- Single or Few Plants
- Clump of Plants
- Small Plant Colony

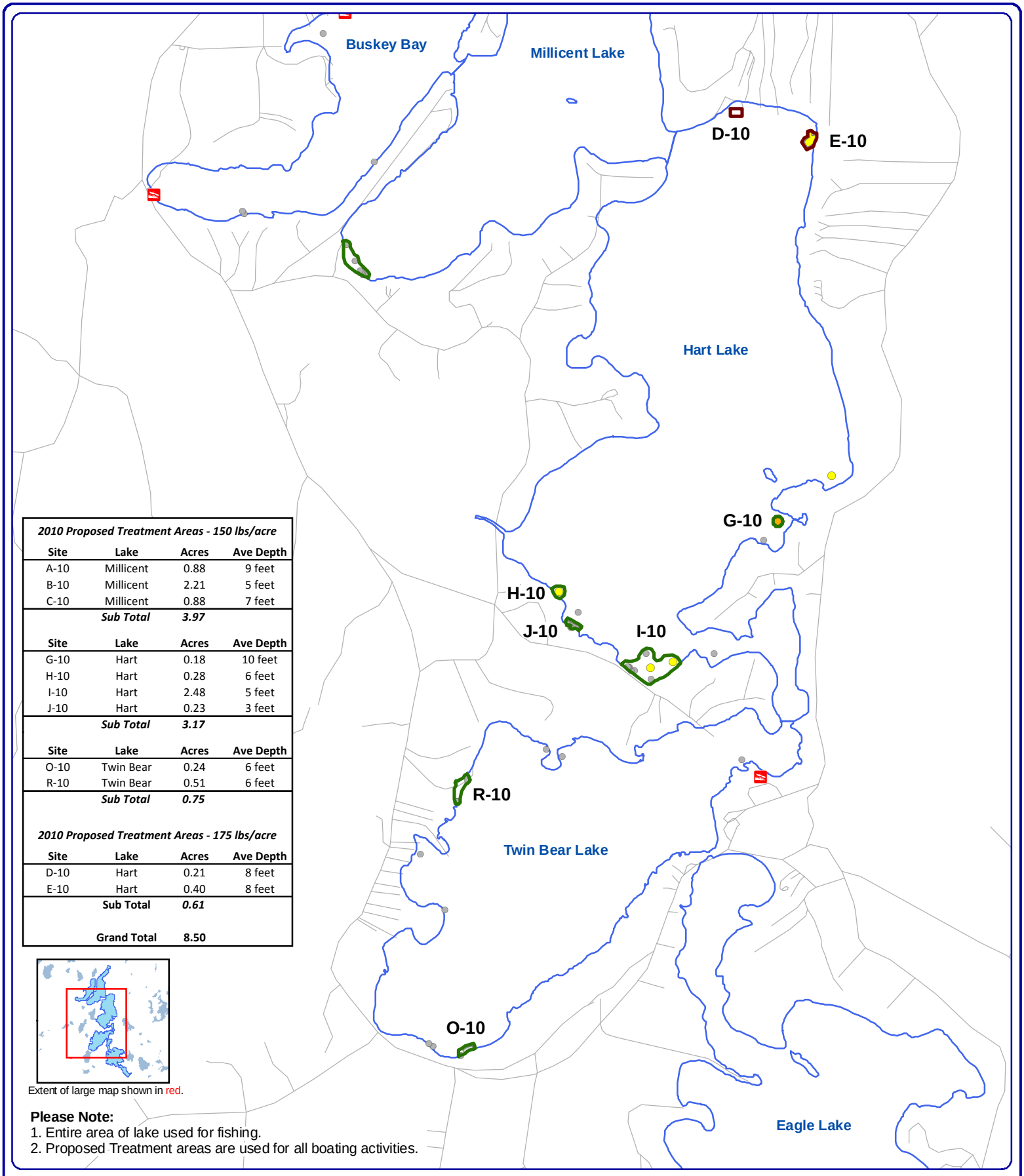
2010 Proposed Herbicide Treatment Area
- 150 lbs/acre
- 175 lbs/acre

Map 3

Pike Chain of Lakes

Bayfield County, Wisconsin

2010 Proposed EWM Treatment Areas



2010 Proposed Treatment Areas - 150 lbs/acre			
Site	**Lake**	**Acres**	**Ave Depth**
A-10	Millicent	0.88	9 feet
B-10	Millicent	2.21	5 feet
C-10	Millicent	0.88	7 feet
	Sub Total	***3.97***	
Site	**Lake**	**Acres**	**Ave Depth**
G-10	Hart	0.18	10 feet
H-10	Hart	0.28	6 feet
I-10	Hart	2.48	5 feet
J-10	Hart	0.23	3 feet
	Sub Total	***3.17***	
Site	**Lake**	**Acres**	**Ave Depth**
O-10	Twin Bear	0.24	6 feet
R-10	Twin Bear	0.51	6 feet
	Sub Total	***0.75***	

2010 Proposed Treatment Areas - 175 lbs/acre			
Site	**Lake**	**Acres**	**Ave Depth**
D-10	Hart	0.21	8 feet
E-10	Hart	0.40	8 feet
	Sub Total	***0.61***	
	Grand Total	**8.50**	

Extent of large map shown in red.

Please Note:
1. Entire area of lake used for fishing.
2. Proposed Treatment areas are used for all boating activities.

N W E S

1,250

Feet

Onterra LLC
Lake Management Planning
135 South Broadway Suite C
De Pere, WI 54115
920.338.8860
www.onterra-eco.com

Sources:
Roads & Hydro: WDNR
Aquatic Plants: Onterra, 2009
Map date: March 5, 2010
File Name:
Map4_Hart_TB_T2010_EWM_Cond1.mxd

EWM Survey Results (Sept 2009)
- Highly Scattered
- Scattered
- Dominant
- Highly Dominant *(none found)*
- Surface Matting *(none found)*

EWM Survey Results (Sept 2009)
- Single or Few Plants
- Clump of Plants
- Small Plant Colony

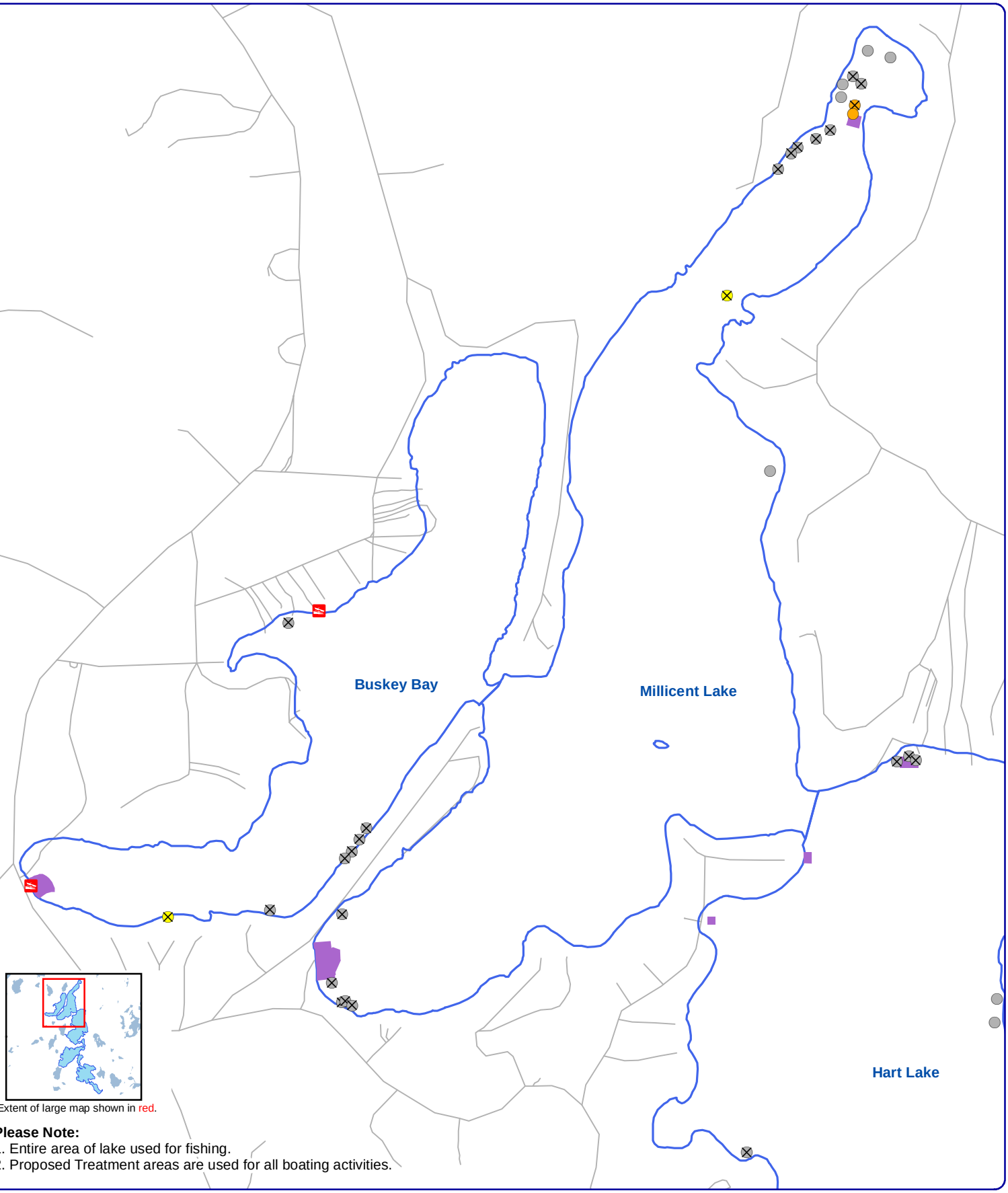
2010 Proposed Herbicide Treatment Area
- 150 lbs/acre
- 175 lbs/acre

Map 4

Pike Chain of Lakes

Bayfield County, Wisconsin

2010 Proposed EWM Treatment Areas



Extent of large map shown in red.

Please Note:
1. Entire area of lake used for fishing.
2. Proposed Treatment areas are used for all boating activities.

N
W E
S

850
Feet

Onterra LLC
Lake Management Planning
135 South Broadway Suite C
De Pere, WI 54115
920.338.8860
www.onterra-eco.com

Sources:
Roads & Hydro: WDNR
Aquatic Plants: Onterra, 2009
Map date: March 5, 2010
File Name: Map5_Buskey_Millicent_FocusAreas.mxd

Legend

- 2008 & 2009 Treatment Areas
- Boatlandings

2009 Volunteer EWM Findings
- Single or Few Plants
- Single or Few Plants Hand Removed
- Clumps of Plants Hand Removed
- Small Plant Colony,
- Small Plant Colony Hand Removed

Map 5

Pike Chain of Lakes

Bayfield County, Wisconsin

2010 EWM Pretreatment Focus Areas

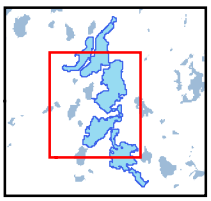
Buskey Bay

Millicent Lake

Hart Lake

Twin Bear Lake

Eagle Lake



Extent of large map shown in red.

Please Note:
1. Entire area of lake used for fishing.
2. Proposed Treatment areas are used for all boating activities.

N
W E
S

1,250
Feet

Onterra LLC
Lake Management Planning
135 South Broadway Suite C
De Pere, WI 54115
920.338.8860
www.onterra-eco.com

Sources:
Roads & Hydro: WDNR
Aquatic Plants: Onterra, 2009
Map date: March 5, 2010
File Name: Map6_Hart_TB_T2010_FocusAreas.mxd

Legend

- 2008 & 2009 Treatment Areas
- Boatlandings

2009 Volunteer EWM Findings

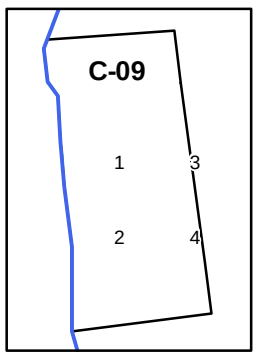
- Single or Few Plants
- Single or Few Plants Hand Removed
- Clumps of Plants Hand Removed
- Small Plant Colony,
- Small Plant Colony Hand Removed

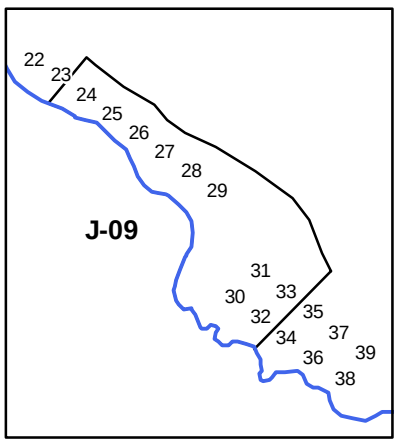
Map 6

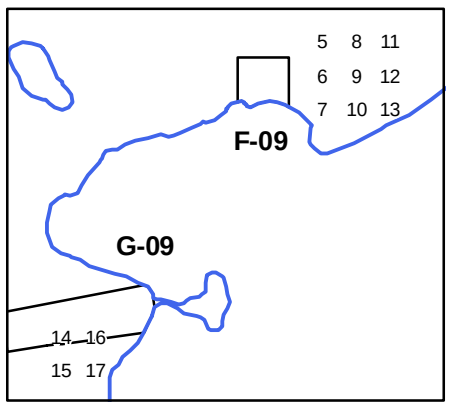
Pike Chain of Lakes

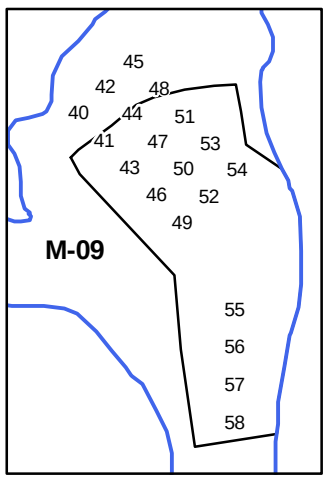
Bayfield County, Wisconsin

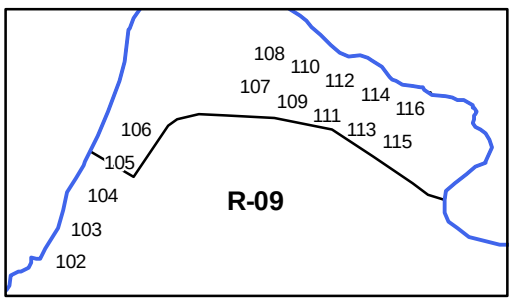
2010 EWM Pretreatment Focus Areas

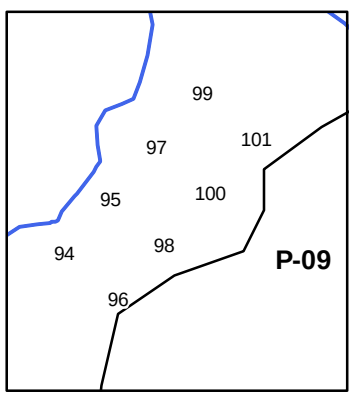


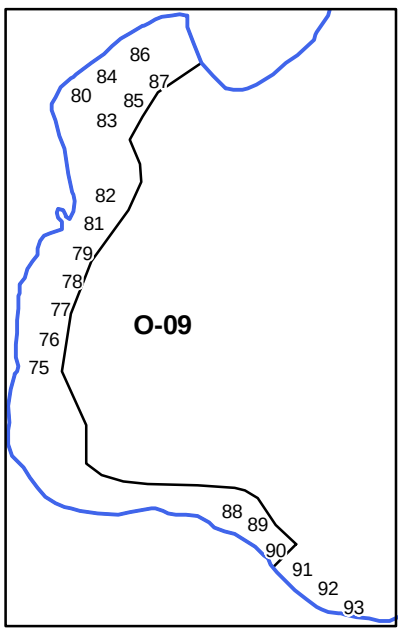


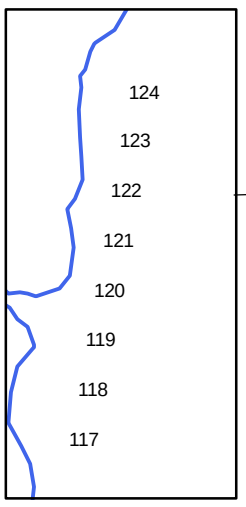


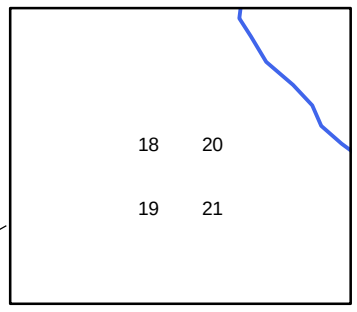


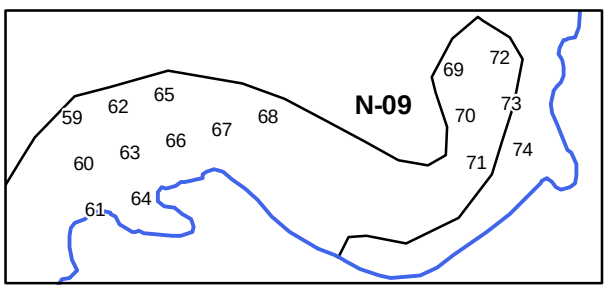




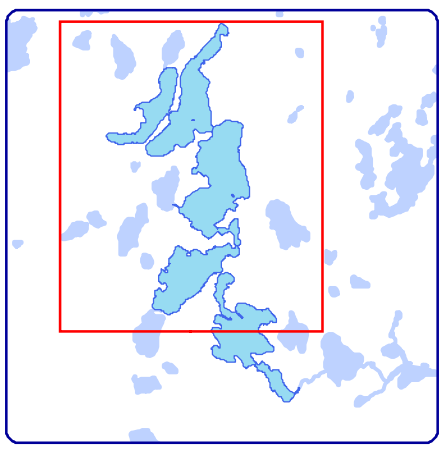








Busky Bay Lake
Lake Millicent
Hart Lake
Hart Lake Channel
Twin Bear Lake
Eagle Lake
A-09
B-09
C-09
D-09
E-09
F-09
G-09
I-09
J-09
K-09
L-09
M-09
N-09
O-09
P-09
Q-09
R-09
S-09
T-09
U-09
V-09



Extent of large map shown in red.

Legend

\# EWM Point-Intercept Location

2009 Treatment Area

Public Access

Appendix A

Pike Chain of Lakes

Bayfield County, Wisconsin

2009 Point-Intercept Monitoring Locations

1,250

Feet

N
W
E
S

Sources:
Roads & Hydro: WDNR
Aquatic Plant Survey: Onterra, 2009
Map date: December 11, 2009

Onterra LLC
Lake Management Planning
135 South Broadway Suite C
De Pere, WI 54115
920.338.8860
www.onterra-eco.com

Point Number	Longitude (Degrees)	Latitude (Degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Myriophyllum spicatum	Potamogeton crispus	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Megalodonta beckii	Myriophyllum alterniflorum	Myriophyllum sibiricum	Myriophyllum tenellum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton epihydrus	Potamogeton friesii	Potamogeton gramineus	Potamogeton natans	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Ranunculus aquatilis	Schoenoplectus acutus	Vallisneria americana
1	-91.375735	46.522760	3	S	P					1																							
2	-91.375730	46.522580	3	S	P						1		1														1			1				
3	-91.375474	46.522763	17			Too Deep																											
4	-91.375469	46.522583	13		R					1							1																
5	-91.356742	46.516841	16		R																						1						
6	-91.356737	46.516661	10		R				1	1																							
7	-91.356733	46.516481	4	S	P					1														1									
8	-91.356481	46.516844				Too Deep																											
9	-91.356477	46.516664	10	S	P					1																							
10	-91.356472	46.516484	4	S	P	No Vegetation																											
11	-91.356220	46.516847	14		R						1																						
12	-91.356216	46.516667	10		R				1		1																		1	1			
13	-91.356211	46.516487	4	S	P	No Vegetation																											
14	-91.358717	46.515245	10		R					1							1							1									
15	-91.358712	46.515065	10		R					1																	1						
16	-91.358456	46.515248	7	M	P										1												1						
17	-91.358451	46.515068	7	M	P		1				1				1												1						
18	-91.362846	46.512366	15		R													1												1			
19	-91.362842	46.512186	12		R												1	1															
20	-91.362586	46.512369	10	M	P																							3					
21	-91.362581	46.512189	9	M	P												1	1											1				
22	-91.368168	46.513910	5	M	P					1							1												1				
23	-91.367989	46.513823	6	M	P					1							1																
24	-91.367776	46.513719	5	M	P					1																							
25	-91.367563	46.513616	5	M	P																					2			1				
26	-91.367350	46.513512	6	M	P												1																
27	-91.367137	46.513408	6	M	P					1																1							
28	-91.366924	46.513304	7	M	P					1			1		1		1										1						
29	-91.366711	46.513201	7	R	P	No Vegetation																											
30	-91.366488	46.512614	7	M	P										1														1				
31	-91.366329	46.512756	7	M	P										1																		
32	-91.366281	46.512504	7	M	P	No Vegetation																											
33	-91.366122	46.512647	8	M	P				1						3												1						
34	-91.366075	46.512394	6	M	P	No Vegetation																											
35	-91.365916	46.512537	7	M	P												1																
36	-91.365868	46.512284	6	M	P					2																							
37	-91.365709	46.512427	7	M	P	No Vegetation																											
38	-91.365662	46.512174	6	M	P					1														1									
39	-91.365503	46.512317	7	M	P												1																
40	-91.359178	46.512729	3	M	P						1																1		1				
41	-91.358996	46.512600	4	M	P						1								1		1								1	1			
42	-91.358991	46.512854	4	M	P						1																		2	1			
43	-91.358814	46.512471	4	M	P				1		1										1								1	1			
44	-91.358809	46.512725	4	M	P				1		1										1		1						1	1			
45	-91.358804	46.512980	4	M	P				1	1	2										1								1				
46	-91.358632	46.512342	4	M	P						1																		1	1			
47	-91.358627	46.512597	5	M	P				1		1																		1	2			
48	-91.358622	46.512851	4	M	P				1		1										1									1			
49	-91.358450	46.512213	5	M	P				1		1										1								1	2			
50	-91.358445	46.512468	5	M	P						1										1						1		1	1			
51	-91.358440	46.512722	5	M	P				1		2										1									1			
52	-91.358263	46.512339	5	M	P						1										1						1		1				
53	-91.358258	46.512593	5	M	P				1		1																		1				
54	-91.358076	46.512464	5	M	P						1										1								3				1
55	-91.358073	46.511801	5	M	P						1																		3				
56	-91.358069	46.511622	5	M	P				2		1										1									1			
57	-91.358064	46.511442	5	M	P																								1				
58	-91.358060	46.511262	6	M	P					1							1												1				
59	-91.360257	46.509002	13		R																						1						

Point Number	Longitude (Degrees)	Latitude (Degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Myriophyllum spicatum	Potamogeton crispus	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Megalodonta beckii	Myriophyllum alterniflorum	Myriophyllum sibiricum	Myriophyllum tenellum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton epihydrus	Potamogeton friesii	Potamogeton gramineus	Potamogeton natans	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Ranunculus aquatilis	Schoenoplectus acutus	Vallisneria americana
60	-91.360188	46.508828	3	S	P					1				1		1																	
61	-91.360119	46.508655				UNREACHABLE																											
62	-91.360005	46.509049	10		R						1																1		2				
63	-91.359936	46.508876	3	S	P																												
64	-91.359867	46.508702	2	S	P														1					1								1	1
65	-91.359754	46.509097	7	M	P				1		1																		3				
66	-91.359685	46.508924	5	M	P						1		1				1					1							2				
67	-91.359434	46.508971	6	M	P						1											1							2				
68	-91.359182	46.509019	7	M	P						1																		2				
69	-91.358177	46.509210	5	M	P	No Vegetation																											
70	-91.358108	46.509036	5	M	P						1											1							1				
71	-91.358039	46.508862	4	M	P								1																3				
72	-91.357926	46.509257	3	M	P								1				1											1	1	1				
73	-91.357857	46.509084	3	M	P					1																				1			1
74	-91.357787	46.508910	3	M	P					1							1							1					1				
75	-91.373948	46.502049	8	R	P	No Vegetation																											
76	-91.373858	46.502218	8	R	P	No Vegetation																											
77	-91.373768	46.502387	9	M	P					2							1							1			1						
78	-91.373678	46.502556	9	M	P				1	1	1													1			1		1				
79	-91.373589	46.502725	7	M	P				1	1	1	1												1					1				
80	-91.373535	46.503640	4	S	P					1																					1		
81	-91.373499	46.502894	14		R						1						1										1				1		
82	-91.373409	46.503063	12		R				1		1																						
83	-91.373368	46.503502	9	M	P					1	1																						
84	-91.373335	46.503755	4	S	P												1																
85	-91.373168	46.503617	12		R	No Vegetation																											
86	-91.373135	46.503871	3	S	P	No Vegetation																											
87	-91.372968	46.503733	8	S	P					1	1																1						
88	-91.372272	46.501228	6	R	P	No Vegetation																											
89	-91.372066	46.501117	7	M	P					2																	1		1				
90	-91.371860	46.501007	6	M	P					1																	1		1				
91	-91.371654	46.500897	5	S	P					2							1							1			1		1				
92	-91.371447	46.500787	5	S	P					1																			1				
93	-91.371241	46.500677	3	S	P					1	1						1																
94	-91.372916	46.505745	5	S	P	No Vegetation																											
95	-91.372750	46.505883	5	M	P						1																		2				1
96	-91.372716	46.505630	7	M	P				1	1					1																		1
97	-91.372583	46.506022	2	S	P					1																							
99	-91.372549	46.505768	8	M	P				1						2																		
99	-91.372416	46.506160	5	M	P				1	1					1		1																
100	-91.372382	46.505907	8	M	P				2		1																						
101	-91.372216	46.506045	7	M	P				1		1				1												1						
102	-91.370369	46.508382	8	M	P				1	3			2																1				
103	-91.370257	46.508544	5	S	P	No Vegetation																											
104	-91.370145	46.508707	5	M	P								1		3									1					1				
105	-91.370033	46.508869	4	R	P					1							1											1					
106	-91.369921	46.509032	7	S	P	No Vegetation																							1	1			
107	-91.369055	46.509246	5	M	P	No Vegetation																											
108	-91.368962	46.509414	6	M	P																								3				
109	-91.368812	46.509182	7	M	P					2																							
110	-91.368719	46.509350	5	M	P				1	1	1										1									1			
111	-91.368568	46.509118	7	M	P					2																							
112	-91.368475	46.509286	6	M	P																								3				
113	-91.368325	46.509053	5	M	P																												
114	-91.368232	46.509221	4	R	P	No Vegetation																											
115	-91.368081	46.508989	7	M	P																												
116	-91.367988	46.509157	4	R	P	No Vegetation																											
117	-91.361674	46.504318	3	M	P						1																		3				1
118	-91.361634	46.504496	3	M	P				1		1		1								1				1				3				1

Point Number	Longitude (Degrees)	Latitude (Degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Myriophyllum spicatum	Potamogeton crispus	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Megalodonta beckii	Myriophyllum alterniflorum	Myriophyllum sibiricum	Myriophyllum tenellum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton epihydrus	Potamogeton friesii	Potamogeton gramineus	Potamogeton natans	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Ranunculus aquatilis	Schoenoplectus acutus	Vallisneria americana
119	-91.361594	46.504674	3	M	P				1		1													1					3				
120	-91.361554	46.504852	3	M	P						1										1								2				
121	-91.361514	46.505030	3	M	P					1	1																		1				
122	-91.361474	46.505208	3	M	P						1																		3				
123	-91.361434	46.505385	3	M	P					1										1				1	1				3				
124	-91.361394	46.505563	3	M	P					2										1				1	1				1				

Point Number	Longitude (Degrees)	Latitude (Degrees)	Depth (ft)	Sediment type	Rope (R); Pole (P); Visual (V)	*Myriophyllum spicatum*	*Potamogeton crispus*	Notes
1	-91.375735	46.522760	4	S	P			
2	-91.375730	46.522580	4	S	P	1		
3	-91.375474	46.522763	12		R			
4	-91.375469	46.522583	13		R			
5	-91.356742	46.516841	20		R			
6	-91.356737	46.516661	8	S	P			
7	-91.356733	46.516481	4	S	P			
8	-91.356481	46.516844	19		R			
9	-91.356477	46.516664	11	M	P			
10	-91.356472	46.516484	5	M	P			
11	-91.356220	46.516847	12	M	P			
12	-91.356216	46.516667	10	M	P			
13	-91.356211	46.516487	1	S	V			
14	-91.358717	46.515245	10	M	P			
15	-91.358712	46.515065	10	M	P			
16	-91.358456	46.515248	9	M	P			
17	-91.358451	46.515068	6	R	P			
18	-91.362846	46.512366	17		R			
19	-91.362842	46.512186	13		R			
20	-91.362586	46.512369	10	M	P			
21	-91.362581	46.512189	10	M	P			
22	-91.368168	46.513910	5	M	P			
23	-91.367989	46.513823	5	M	P			
24	-91.367776	46.513719	6	M	P			
25	-91.367563	46.513616	3	S	P			
26	-91.367350	46.513512	7	M	P			
27	-91.367137	46.513408	7	M	P			
28	-91.366924	46.513304	7	M	P			
29	-91.366711	46.513201	5	R	P			
30	-91.366488	46.512614	8	M	P			
31	-91.366329	46.512756	8	M	P			
32	-91.366281	46.512504	7	M	P			
33	-91.366122	46.512647	8	M	P			
34	-91.366075	46.512394	7	M	P			
35	-91.365916	46.512537	7	M	P			
36	-91.365868	46.512284	6	M	P			

Point Number	Longitude (Degrees)	Latitude (Degrees)	Depth (ft)	Sediment type	Rope (R); Pole (P); Visual (V)	*Myriophyllum spicatum*	*Potamogeton crispus*	Notes
37	-91.365709	46.512427	7	M	P			
38	-91.365662	46.512174	4	S	P			
39	-91.365503	46.512317	8	M	P			
40	-91.359178	46.512729	3	M	P			
41	-91.358996	46.512600	5	M	P			
42	-91.358991	46.512854	5	M	P			
43	-91.358814	46.512471	6	M	P			
44	-91.358809	46.512725	6	M	P			
45	-91.358804	46.512980	6	M	P			
46	-91.358632	46.512342	5	M	P			
47	-91.358627	46.512597	7	M	P			
48	-91.358622	46.512851	7	M	P			
49	-91.358450	46.512213	6	M	P			
50	-91.358445	46.512468	7	M	P			
51	-91.358440	46.512722	7	M	P			
52	-91.358263	46.512339	7	M	P			
53	-91.358258	46.512593	7	M	P			
54	-91.358076	46.512464	7	M	P			
55	-91.358073	46.511801	7	M	P			
56	-91.358069	46.511622	5	M	P			
57	-91.358064	46.511442	6	M	P			
58	-91.358060	46.511262	7	M	P	1		
59	-91.360257	46.509002	13		R			
60	-91.360188	46.508828	6	S	P			
61	-91.360119	46.508655	1	S	V			
62	-91.360005	46.509049	12		R			
63	-91.359936	46.508876	3	S	P			
64	-91.359867	46.508702	1	S	V			
65	-91.359754	46.509097	9	M	P			
66	-91.359685	46.508924	7	M	P			
67	-91.359434	46.508971	6	M	P			
68	-91.359182	46.509019	7	M	P			
69	-91.358177	46.509210	6	M	P			
70	-91.358108	46.509036	5	M	P			
71	-91.358039	46.508862	4	M	P			
72	-91.357926	46.509257	5	M	P			

Point Number	Longitude (Degrees)	Latitude (Degrees)	Depth (ft)	Sediment type	Rope (R); Pole (P); Visual (V)	*Myriophyllum spicatum*	*Potamogeton crispus*	Notes
73	-91.357857	46.509084	5	M	P			
74	-91.357787	46.508910	3	M	P			
75	-91.373948	46.502049	6	S	P			
76	-91.373858	46.502218	4	S	P			
77	-91.373768	46.502387	9	M	P			
78	-91.373678	46.502556	10	M	P			
79	-91.373589	46.502725	9	M	P	2		
80	-91.373535	46.503640	4	M	P			
81	-91.373499	46.502894	11	S	P			
82	-91.373409	46.503063	10	M	P	1		
83	-91.373368	46.503502	9	M	P			
84	-91.373335	46.503755	4	M	P			
85	-91.373168	46.503617	13		R			
86	-91.373135	46.503871	3	S	P			
87	-91.372968	46.503733	9	M	P			
88	-91.372272	46.501228	6	S	P			
89	-91.372066	46.501117	8	M	P			
90	-91.371860	46.501007	8	M	P			
91	-91.371654	46.500897	7	M	P			
92	-91.371447	46.500787	8	M	P			
93	-91.371241	46.500677	3	S	P			
94	-91.372916	46.505745	4	S	P			
95	-91.372750	46.505883	5	M	P			
96	-91.372716	46.505630	8	M	P			
97	-91.372583	46.506022	6	S	P			
98	-91.372549	46.505768	8	M	P			
99	-91.372416	46.506160	5	M	P			
100	-91.372382	46.505907	9	M	P			
101	-91.372216	46.506045	7	M	P			
102	-91.370369	46.508382	6	S	P			
103	-91.370257	46.508544	6	M	P			
104	-91.370145	46.508707	4	S	P			
105	-91.370033	46.508869	6	S	P			
106	-91.369921	46.509032	6	M	P			
107	-91.369055	46.509246	6	M	P			
108	-91.368962	46.509414	6	M	P			

Point Number	Longitude (Degrees)	Latitude (Degrees)	Depth (ft)	Sediment type	Rope (R); Pole (P); Visual (V)	*Myriophyllum spicatum*	*Potamogeton crispus*	Notes
109	-91.368812	46.509182	7	M	P			
110	-91.368719	46.509350	6	M	P			
111	-91.368568	46.509118	7	M	P			
112	-91.368475	46.509286	5	R	P			
113	-91.368325	46.509053	7	M	P			
114	-91.368232	46.509221	6	M	P			
115	-91.368081	46.508989	7	M	P			
116	-91.367988	46.509157	4	R	P			
117	-91.361674	46.504318	4	M	P			
118	-91.361634	46.504496	4	M	P			
119	-91.361594	46.504674	4	M	P			
120	-91.361554	46.504852	4	M	P			
121	-91.361514	46.505030	5	M	P			
122	-91.361474	46.505208	4	M	P			
123	-91.361434	46.505385	4	M	P			
124	-91.361394	46.505563	4	M	P			