INTRODUCTION

The Pike Chain of Lakes is comprised of six lake basins located near the Town of Iron River in Bayfield County, Wisconsin (Figure 1). The chain includes nearly 900 acres of surface water, and forms the headwaters of a drainage system that leads to the White River which flows through the Bad River Indian Reservation on its way to Lake Superior. All lakes within the chain are considered Areas of Special Natural Resource Interest (ASNRI) as outstanding or exceptional resource waters per Section 281.15 of Wisconsin Statutes.

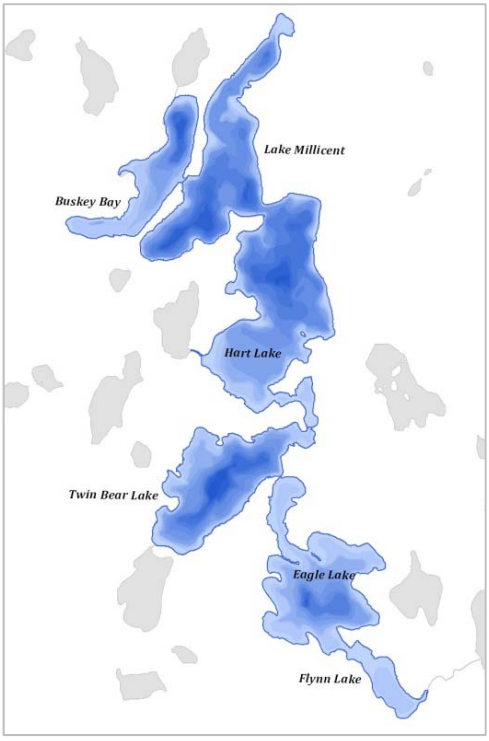

Figure 1. Pike Chain of Lakes, Bayfield County, WI.

Eurasian water milfoil (*Myriophyllum spicatum*, EWM) was first documented in the Pike Chain of Lakes in 2004, with plants being discovered first in the channel between Twin Bear and Hart Lake. With the help of the Wisconsin Department of Natural Resources (WDNR) and Bayfield County, an Aquatic Invasive Species Rapid Response Grant was awarded to fund a six acre 2,4-D treatment in the Hart Lake channel and small sections of Twin Bear and Hart Lake in June 2005. A second herbicide treatment, funded by the Iron River Pike Chain of Lakes Association (IRPCLA), was conducted in June 2006 of approximately eight to ten acres targeting small colonies along the northwest shore of Twin Bear and colonies in Hart Lake including the Hart Lake channel.

In February 2007, the IRPCLA partnered with Onterra, LLC to complete seven grant applications in hopes of receiving partial funding for the development of a lake management plan for the Pike Chain of Lakes. In April 2007, the Iron River Lakes Association was notified that they were successful and would receive over $49,000 in funds. The Pike Chain of Lakes Comprehensive Management Plan was completed in December of 2008. Within the management plan, several management goals were developed by an IRPCLA planning committee and Onterra staff in order to continue managing the ecosystem in a responsible and ecologically sound manner. Among these defined goals was Management Goal 4, which called for the control of aquatic invasive species within the Pike Chain of Lakes. Consistent with the content of this goal, the IRPCLA pursued an Aquatic Invasive Species - Controlling Established Infestations grant (ACEI) through the WDNR. A grant application was submitted in February 2009 which proposed a five year aquatic invasive species control project. The project was approved and funded later that April. A January 2014 ACEI-061-09 Summary Report details the monitoring and control actions taken during the five year project (Cibulka et al. 2014). Overall, it is believed that the efforts were successful in maintaining a relatively low level of EWM within the chain lakes during this time period.

In measuring success in controlling EWM and also to monitor the native plant community, surveys from 2005/2007 were compared with similar data collected in 2013. Specifically, whole-lake point-intercept surveys were completed according to WDNR protocol (Hauxwell et al. 2010). At the first notice of locating EWM in the Hart Lake / Twin Bear Lake channel, WDNR staff completed the point-intercept surveys on these lakes in 2005. Onterra completed point-intercept surveys on the remaining lakes in 2007 during the management planning project. Community mapping surveys were completed in 2007 and 2013 to map emergent and floating-leaf vegetation communities within the lake. This allowed for the identification of incidental species that were not found during the point-intercept survey, as well as for an assessment in the difference between these valuable communities before and after active management on the system (herbicide treatments to control EWM). An EWM peak biomass survey was completed each late summer to map the density and extent of EWM colonies during their peak growth period. Point-based EWM locations were described as *Single or Few Plants, Clumps of Plants* or as a *Small Plant Colony*. Polygon-based distinctions included *Highly Scattered* and *Scattered* for lightly dense areas, with *Dominant*¸ *Highly Dominant* and *Surface Matted* used to describe denser EWM colonies where distinct colony margins could be delineated.

As previously mentioned, herbicide treatments have been completed on the Pike Chain of Lakes since 2005 in an effort to control EWM. Figure 2 displays the treatment history in terms of acreage of EWM in the Pike Chain of Lakes. All treatments were completed using granular 2,4-D at varying dosages.

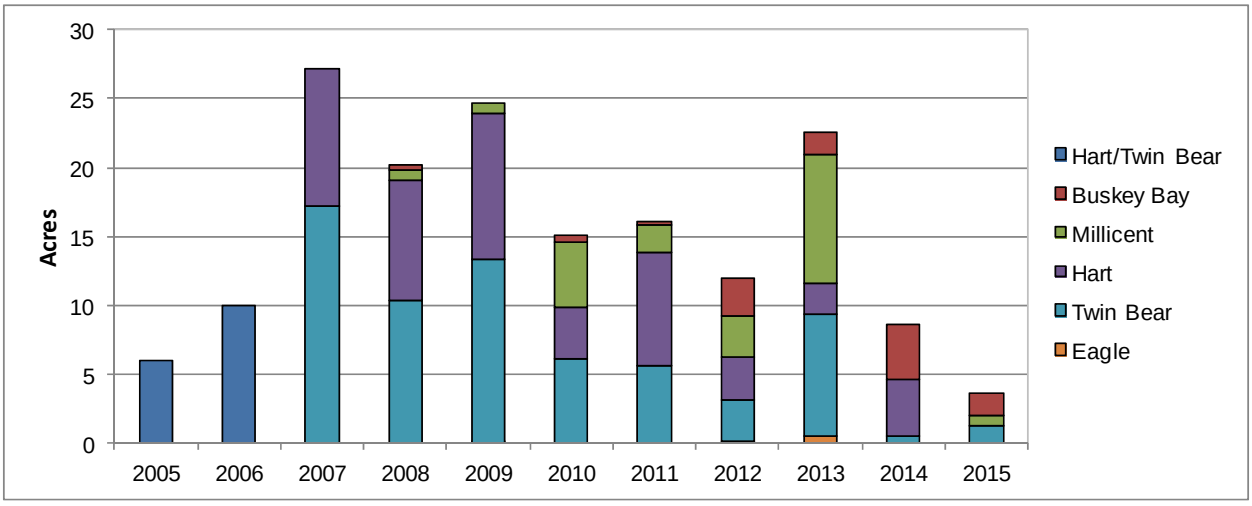

Figure 2. Pike Chain of Lakes annual Eurasian water milfoil treatment history, 2005-2015. Chart includes acreage of Eurasian water milfoil treated with granular 2,4-D.

Herbicides that target submersed plant species are directly applied to the water, either as a liquid or an encapsulated granular formulation. Factors such as water depth, water flow, treatment area size, and plant density work to reduce herbicide concentration within aquatic systems. Understanding concentration and exposure times are important considerations for aquatic herbicides. Successful control of the target plant is achieved when it is exposed to a lethal concentration of the herbicide for a specific duration of time. Much information has been gathered in recent years on the environmental fate of herbicides after application and the

effectiveness of treatments on target plant colonies. This research couples quantitative aquatic plant monitoring with field-collected herbicide concentration data to evaluate efficacy and selectivity of control strategies implemented on a subset of Wisconsin lakes and flowages. Based on their findings, lake managers have adopted two main treatment strategies; 1) whole-lake treatments, and 2). spot treatments.

Whole-lake treatments are those where the herbicide is applied to specific sites, but when the herbicide reaches equilibrium within the entire volume of water (entire lake, lake basin, or within the epilimnion of the lake or lake basin); it is at a concentration that is sufficient to cause mortality to the target plant within that entire lake or basin. The application rate of a whole-lake treatment is dictated by the volume of water in which the herbicide will reach equilibrium. The depth of the thermocline, or depth where warmer surface water meets colder, deeper water, impacts this calculation as well. At the thermocline, the difference in water density is believed to prevent herbicide from mixing into this lower layer of water. Because exposure time is longer, target herbicide levels for whole-lake treatments are significantly less than for spot treatments.

Spot treatments are a type of control strategy where the herbicide is applied to a specific area (treatment site) such that when it dissipates, its concentrations are insufficient to cause significant impacts outside of that area. Spot treatments typically rely on a short exposure time (often hours) to cause mortality and therefore are applied at a much higher herbicide concentration than whole-lake treatments. This has been the strategy historically used on most Wisconsin lakes; between 2005 and 2015, the treatments completed in the Pike Chain of Lakes would all be considered spot treatments.

With the ACEI-061-09 Summary Report, it was stated that the five year efforts of the IRPCLA were successful in that EWM was held to a low abundance throughout the chain lakes and reduced in littoral frequency of occurrence in Twin Bear, where it was most prevalent during the start of the project. Figure 3 displays the occurrence of EWM in the chain lakes before and after the project. A reoccurring theme in the Pike Chain of Lakes is that the EWM colonies are located often sparsely along the steep slopes of these relatively deep lakes. Therefore, small but dense colonies were often targeted for treatment. During the course of this project, many advances were made in the field of AIS management, particularly with information being gathered on herbicide dissipation within treatment areas and the related efficacy on the target plants. AIS managers currently believe that a spot treatment must be larger in size in order to hold an ample concentration of herbicide for longer than several hours. In a small spot treatment area, the herbicide may dissipate rapidly to the point where herbicide concentration rates do not remain high enough to cause full mortality to the target plant. Instead, a small reduction in plant biomass or only "seasonal" control may be seen instead of longer term (several seasons worth) control. It is believed that in the Pike Chain of Lakes, larger spot treatment areas may have seen good, longer-term success while in relatively small treatment areas, success for one or two seasons may have been more common. Of course, the terms large and small are used here in relative scales – other factors such as water flow and a treatment area's position in the lake (in an isolated bay, in open water, along shore, etc.) play a role in herbicide dissipation from any site.

This information is important to digest if a proper AIS control strategy is to be outlined for the Pike Chain of Lakes; specifically, if longer-term success is to be achieved.

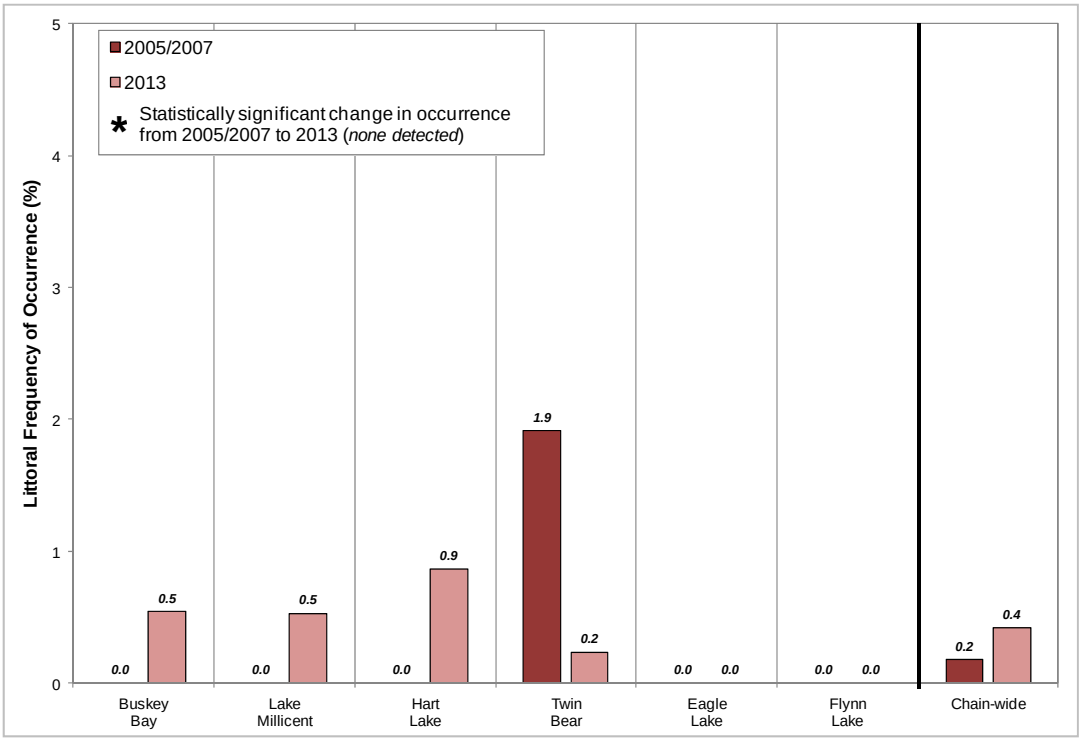

Figure 3. Pike Chain of Lakes Eurasian water milfoil littoral frequency of occurrence. Created using data from 2005/2007 and 2013 point-intercept surveys. Note that in 2007, when the project began, EWM was known to exist only in the Hart Lake channel and Twin Bear Lake.

2015 TREATMENT STRATEGY DEVELOPMENT

During an August 20, 2014 peak biomass survey, EWM colonies were found to increase in their extent from that which was observed in 2013. In all, 1.8 acres of EWM was mapped with polygon based methods, an increase from the 0.4 acres mapped in 2013. Numerous *Single or Few Plants, Clumps* and *Small Plant Colonies* were mapped throughout the chain lakes as well (Maps 1-6). It was during this time that a single plant was found in Flynn Lake, representing the first established plant discovered in this lake. Consistent with the treatment strategy outlined in ACEI-061-09, the IRPCLA approved a 2015 preliminary strategy that included 4.2 acres to be treated with granular 2,4-D at a rate of 4.0 acid equivalent (a.e.). A one-year, AIS-Established Population Control grant was obtained by the IRPCLA to partially finance the treatment and associated monitoring. In addition to the prescribed herbicide application, 4.5 acres of EWM were slated for hand-removal by IRPCLA volunteers (Map s 1-6).

2015 TREATMENT & MONITORING

On May 18, 2015, Onterra staff visited the Pike Chain of Lakes with IRPCLA President Al Bochler to survey the preliminary herbicide treatment areas. The air temperature was 50°F and the skies overcast, with only a light breeze. The water was incredibly clear, with temperatures at

55-56°F near the surface. EWM plants were observed to display recent, green growth in all proposed treatment areas. A pre-treatment survey narrative is provided in Table 1.

Table 1. Pike Chain of Lakes pre-treatment survey results, May 2015.

Treatment Area	2015 Pre-Treatment Observation	Final Acreage
A-15	Site was observed to contain much EWM. Area extents were verified with submerged video camera and no alterations to the treatment strategy were recommended	1.5
B-15	Even with excellent viewing conditions, few EWM plants were observed in this area. It was recommended the site be removed from the herbicide treatment plan and targeted for volunteer hand-pulling instead.	0 (*removed*)
C-15	Site was observed to contain much EWM. Area extents were verified with submerged video camera and no alterations to the treatment strategy were recommended	0.8
D-15	Site was expanded to encompass a new substantial small plant colony that was located outside of the pre-existing treatment area. It was recommended that the site be increased from 0.6 to 0.8 acres, with no change in average depth.	0.8
K-15	This site was not included in the preliminary treatment strategy; however, upon inspection of the site at the request of Al Bochler, substantial EWM growth and expansion was observed. A 0.5 acre treatment area was fixed over the observed colonies and included in the final treatment strategy.	0.5

The observations and calculations stemming from the 2015 pre-treatment survey resulted in 3.6 acres of water to be treated with 2,4-D. Sites E-15, F-15, G-15, H-15, I-15, and J-15 were all proposed for hand-removal. These sites were verified for presence of EWM plants and included within the final EWM control strategy.

The Pike Chain of Lakes herbicide treatment was completed by Northern Aquatic Services on June 11, 2015. The applicator reported wind speeds of 0-3 mph and air and water temperatures of 67°F at the time of treatment. Granular 2,4-D (Sculpin G®) was applied to the treatment areas as prescribed, though 40 lbs of herbicide was also applied to an additional 0.15 area near the Buskey Bay – Millicent channel, which the applicator estimated to amount to a 4.0 ppm ae treatment area concentration. This treatment area was determined by the applicator the day of the treatment and was approved by WDNR staff.

To monitor the EWM population from a pre-treatment (summer 2014) to a post treatment (summer 2015) period, quantitative or qualitative monitoring can be completed. Quantitative monitoring involves comparing number data (or quantities) such as plant frequency of occurrence before and after the control strategy is implemented. This has been completed in the past by placing a 20 meter grid of sampling points over treatment areas, and sampling aquatic vegetation at those points with a rake. Due to the small amount of annual treatment acreage, no quantitative analysis was able to be conducted on the Pike Chain of Lakes during a number of treatment years. With a small treatment area, the amount of sampling points placed in that area are often small so the chances of sampling EWM is also small. Additionally, at even a 20 meter

spacing, the number of sampling points in a 1-2 acre treatment area are not numerous enough to determine a statistical difference in the pre and post treatment populations.

Qualitative monitoring is completed by comparing visual data such as EWM colony density ratings before and after the treatments. This is completed through collection of point and polygon data and assigning densities to plant beds using the scales previously mentioned on Page 2 of this report. Qualitative data may then be compared pre and post treatment to determine efficacy. A successful treatment (herbicide or hand-removal methods) on a given mapped colony would include a reduction of EWM density as demonstrated by a decrease in one density rating on a 5-tiered density rating scale. In other words, *Dominant* colonies would be reduced to *Scattered, Scattered* to *Highly Scattered*, etc. In terms of a treatment as a whole (lake-wide and chain-wide), at least 75% of the acreage treated that year would decrease by one level of density for an individual site.

2015 TREATMENT RESULTS

During the summer of 2015, IRPCLA President Al Bochler noted during correspondence a "concerning" amount of EWM being located within the chain, both by himself and IRPCLA members. During Onterra's peak-biomass mapping on August 25, 2015, the entire littoral zone of all six lakes, including herbicide and hand-harvesting sites, were assessed. Maps 1-6 shows the results of this survey. The resurgence described in Mr. Bochler's summer 2015 correspondence was also observed by Onterra staff. In all, 7.5 acres of highly colonized EWM was observed within the chain lakes (Figure 4). As seen in Figure 4, the 7.5 acres represents the largest amount of colonized EWM mapped in the chain since EWM had first been discovered. However, to complete this picture, the 2015 data on Maps 1-6 indicate that many *Clumps* and *Small Plant Colonies* were located within the chain's littoral zone as well. Though these occurrences do not represent true, continuous colonies, their number and distribution around the littoral zones of Buskey Bay, Millicent and Hart Lakes (and the northern shoreline of Twin Bear) raises concern.

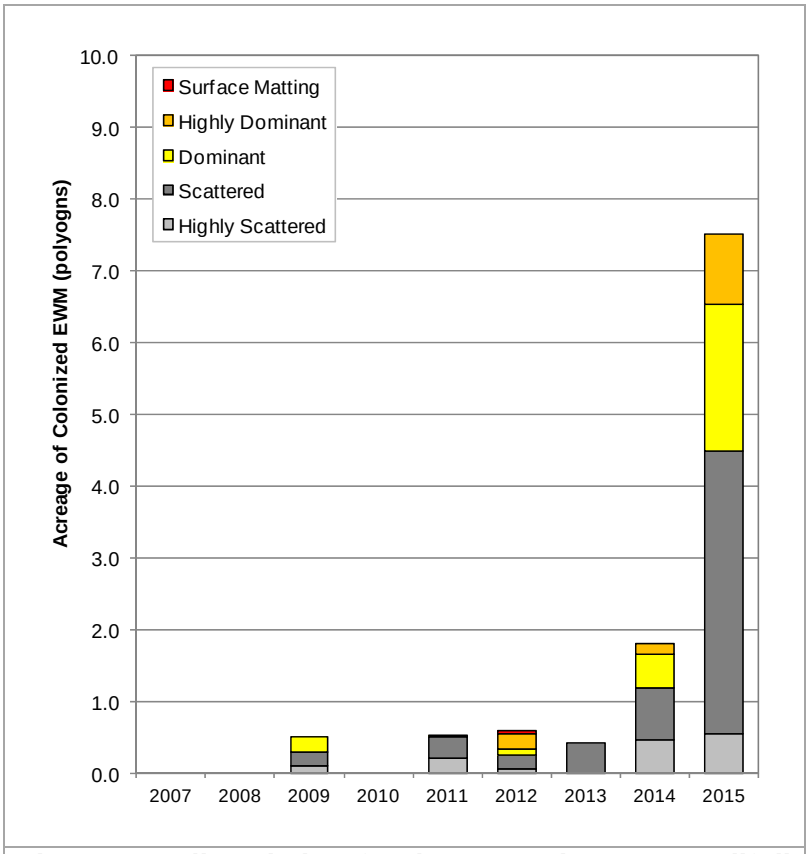

Figure 4. Pike Chain of Lakes Eurasian water milfoil acreage, 2007-2015. Created using data from late-summer EWM peak biomass surveys.

Despite the unfortunate scenario building around the non-treated areas of the lake, the 2015 treatment areas appeared to hold a limited amount of EWM. A breakdown of each treatment area is presented below in Table 2. In total, EWM was reduced by at least one qualitative density rating in three of the four treatment areas, while the fourth site failed to meet expectations by demonstrating only a small decrease in observed EWM. This does meet the qualitative success criteria outlined in the ACEI-091-06 report. However, it should be noted that at this time it is not certain if the observed reduction is to be realized for the 2015 season only, or if this reduction will be apparent in 2016 an onward.

Table 2. Pike Chain of Lakes August 2015 survey results and success criteria evaluation.

Treatment Area	Summer 2015 Observation	Annual Qualitative Success Criteria Met?
A-15	Previously held *Scattered* and *Dominant* colonies, with several *Clumps.* No EWM observed within treatment area during August 2015 surveys. Full reduction of EWM within site.	Yes
B-15	Site removed during pre-treatment survey. Was observed to hold two *Scattered* colonies in August 2014, one of these colonies remained in August 2015 along with a *Small Plant Colony*	n/a (not treated)
C-15	During August 2014 survey was found to hold *Highly Dominant* colony, stretching the length of treatment site. No EWM observed within treatment area during August 2015 survey. Full reduction of EWM within site.	Yes
D-15	Previously held a large, *Dominant* colony along with scattered *Single or Few Plants* and a *Small Plant Colony.* Following treatment, no EWM was observed within the treatment area. Full reduction of EWM within site.	Yes
K-15	During August 2014 survey was found to hold a *Small Plant Colony* and other *Clump / Single or Few Plant* occurrences. Site was observed to have increased in density and areal extent during a pre-treatment survey visit to two large *Small Plant Colonies.* Following the treatment, a *Small Plant Colony* and *Clump* Still remained within the site. This demonstrates a limited reduction of EWM within the treatment area	No

Hand-removal efforts were planned to be completed during 2015 by a professional diver, Scott Mitchen, who has a residence on the Pike Chain of Lakes. Mr. Mitchen and IRPCLA President Al Bochler reported over 140 hours of hand pulling in 2014. Unfortunately during the summer of 2015 Mr. Mitchen fell and sustained three broken ribs, which forced him out of diving. Three other experienced and certified divers, John Westmen, Scott Bochler and Logan Neveaux, stepped up to the task of hand removing EWM in the Pike Chain of Lakes. Additionally, a group of about 12 volunteers joined in EWM monitoring and removal in 2015.

Paid divers logged 81 hours and 2,550 lbs of EWM removed from the various hand-removal locations and additional colonies spotted during 2015. Volunteers put in roughly 200 hours worth of time also, removing an estimated 4,000 lbs of EWM from the Pike Chain of Lakes.

FUTURE TREATMENT STRATEGY

While EWM was observed to meet the 75% chain-wide reduction level, the increase in EWM throughout non-treated areas of the chain has come to be quite concerning for the IRPCLA, Onterra, WDNR, and other Pike Chain of Lakes' stakeholders. It is believed that the original threshold strategy outlined in the ACEI-061-09 Summary Report was satisfactory at reducing the densest EWM colonies in the chain in early 2015, but the rebounding of EWM elsewhere was unexpected and presents an interesting dilemma for continued management.

On October 15, 2015, several IRPCLA board members and Onterra ecologist Dan Cibulka met with WDNR Water Resources Management Specialist Pamela Toshner at the WDNR Spooner office. WDNR Water Resources Management Specialists' Scott Provost and Scott Van Egeren joined the meeting through teleconference. The attendees discussed EWM management strategies and funding opportunities for the IRPCLA to explore. The history of EWM management on the Pike Chain of Lakes was examined as was the IRPCLA's current management strategy; specifically, continuing spot treatments on the chain. If this same strategy was to be utilized, it would result in a 27.5 acre spot treatment to occur in Hart Lake. Of course, a spot treatment of that magnitude would result in herbicide mixing into the lake and maintaining a concentration that could impact plants on a lake-wide scale. The committee then discussed a concept that has been used on other Wisconsin lakes; a whole-lake treatment strategy.

This treatment strategy would be planned such that the whole-lake concentration of herbicide would reach relatively low concentrations, but hold for a longer period of time than a spot treatment scenario. With a whole-lake strategy, the IRPCLA understands that all EWM within the whole-treatment lakes would be targeted and thus a better chance of lake-wide success could be had. Additionally, the potential for native impacts on a lake-wide scale could occur with this strategy; therefore, it becomes vital that proper planning and monitoring of the native aquatic plant community is completed to detect any impacts that could occur.

If a whole-lake treatment is to be completed, the aforementioned aquatic plant monitoring must dictate the timing of the treatment. A treatment to this scale would require monitoring through a lake-wide point-intercept survey, like those completed on the chain in 2013. Because the point-intercept survey needs to be completed during the mid-late summer growing season (August), these surveys would be completed a year prior to the treatment, the year of the treatment, and then the year after the treatment to assess the full impacts of the treatment on native and non-native plants in the chain lakes. All six lakes would be scheduled for this monitoring regime.

Buskey Bay, Millicent, Hart and Twin Bear EWM Management Strategy

Maps 7-9 and Table 3 outline a potential whole-lake treatment strategy for Buskey Bay, Millicent, Hart and Twin Bear Lakes. With the treatment scenario outlined, the calculated epilimnetic 2,4-D concentration (assuming a thermocline at 15 ft) would be roughly 0.3 ppm ae in Buskey Bay, Millicent, Hart and Twin Bear Lakes. This is currently the target concentration that AIS managers aim for in whole lake treatments, based upon field studies of other whole lake treatments. At this concentration, it is anticipated that the herbicide will cause significant mortality to the EWM in the lake and that native plant mortality should be limited, but could also occur.

Table 3. Potential Pike Chain of Lakes 2017 whole lake treatment strategy. Strategy outlined pertains to Buskey Bay, Hart, Millicent and Twin Bear Lakes. Treatment areas may be referenced in Maps 7-9.

Whole Lake Treatment Scenario (*assuming 15 ft thermocline*)						
2017 Preliminary EWM Treatment Areas *Liquid 2,4-D*						
Site	**Lake**	**Proposed Acres**	**Ave. Depth (feet)**	**Volume (ac-ft)**	**2,4-D (ppm ae)**	**DMA IV (gallons)**
A-17	Buskey Bay	0.50	4	2.0	3.75	5.36
B-17	Buskey Bay	3.50	6	21.0	3.75	56.33
C-17	Buskey Bay	3.40	7	23.8	3.75	63.84
D-17	Buskey Bay	3.30	6	19.8	3.75	53.11
E-17	Buskey Bay	1.10	4	4.4	3.75	11.80
	Subtotal	***11.80***		***71.0***		**190.44**
Site	**Lake**	**Proposed Acres**	**Ave. Depth (feet)**	**Volume (ac-ft)**	**2,4-D (ppm ae)**	**DMA IV (gallons)**
F-17	Millicent	1.60	5	8.0	4.0	22.89
G-17	Millicent	2.50	7	17.5	4.0	50.07
H-17	Millicent	0.90	8	7.2	4.0	20.60
I-17	Millicent	1.40	7	9.8	4.0	28.04
J-17	Millicent	4.70	8	37.6	4.0	107.58
K-17	Millicent	6.20	7	43.4	4.0	124.17
L-17	Millicent	0.40	8	3.2	4.0	9.16
M-17	Millicent	2.20	8	17.6	4.0	50.35
N-17	Millicent	1.20	6	7.2	4.0	20.60
O-17	Millicent	1.20	8	9.6	4.0	27.47
P-17	Millicent	0.40	9	3.6	4.0	10.30
Q-17	Millicent	1.10	9	9.9	4.0	28.32
R-17	Millicent	1.60	6	9.6	4.0	27.47
	Subtotal	***25.40***		***184.2***		**527.01**
Site	**Lake**	**Proposed Acres**	**Ave. Depth (feet)**	**Volume (ac-ft)**	**2,4-D (ppm ae)**	**DMA IV (gallons)**
S-17	Hart	1.10	7	7.7	4.00	22.03
T-17	Hart	1.20	8	9.6	4.00	27.47
U-17	Hart	2.40	7	16.8	4.00	48.07
V-17	Hart	1.40	6	8.4	4.00	24.03
W-17	Hart	1.40	7	9.8	4.00	28.04
X-17	Hart	29.40	8	235.2	3.25	546.75
	Subtotal	***36.90***		***287.5***		**696.38**
Site	**Lake**	**Proposed Acres**	**Ave. Depth (feet)**	**Volume (ac-ft)**	**2,4-D (ppm ae)**	**DMA IV (gallons)**
AA-17	Twin Bear	15.20	7	106.4	4.0	304.42
AB-17	Twin Bear	1.40	4	5.6	4.0	16.02
Y-17	Twin Bear	3.40	6	20.4	4.0	58.37
Z-17	Twin Bear	1.80	6	10.8	4.0	30.90
	Subtotal	***21.80***		***143.2***		**409.70**
Grand Total		**95.90**		**685.9**		**1823.5**

Table 3, continued.

Whole Lake Treatment Scenario (*Buskey Bay, Millicent, Hart and Twin Bear Lakes*)					
2017 Preliminary EWM Treatment Areas - Liquid 2,4-D					
Lake	**Proposed Acres**	**Volume (ac-ft)**	**DMA IV (gallons)**	**Epilimnetic Volume @ 15 ft (ac-ft)**	**Epilimnetic 2,4-D Concentration (ppm)**
Buskey Bay	11.80	71.0	190.4	874	0.305
Millicent	25.40	184.2	527.0	2,429	0.303
Hart	36.90	287.5	696.4	3,214	0.303
Twin Bear	21.80	143.2	409.7	1,931	0.297
Subtotal	***11.80***	***71.0***	***1823.5***		

The whole lake treatments completed in Buskey Bay, Millicent, Hart and Twin Bear Lakes would be assessed through not only the point-intercept survey, but also through the qualitative methods that have been used on the Pike Chain of Lakes for a number of years. Success criteria for these two assessment methods are presented below:

- Qualitative Assessment: determination of treatment success will be completed initially through the 2017 and 2016 peak-biomass survey results; 2018 peak-biomass survey results may be used to determine success in the form of longevity. The treatment will be declared successful if the there is an observed decrease of a full density rating in all polygon-based occurrences (e.g. *Dominant* to *Scattered).* For point-based occurrences of EWM, it is anticipated that all EWM mapped within the four lakes would be mapped in either *Single or Few Plant* or *Clump* occurrences; no *Small Plant Colonies* should exist following the treatment.
- Quantitative Assessment: a successful treatment should include a statistically significant reduction in EWM frequency following the treatments as exhibited by a 75% decrease in EWM frequency from the 2016 point-intercept and 2018 point-intercept surveys.

During the year of the treatment, the project would include verification and refinement of treatment plan immediately before control strategies are implemented. This potentially would include refinements of herbicide application areas, assessments of growth stage of aquatic plants, and documentation of thermal stratification parameters that will ultimately influence the final dosing strategy.

With a treatment of this scale, it will be important to monitor the remaining concentration of herbicide in the lake following treatment. Following treatment, IRPCLA volunteers would collect water samples from pre-determined locations, depths and time intervals. These samples would be preserved and sent to the Wisconsin State Lab of Hygiene for 2,4-D analysis. The results would paint a picture of the herbicide movement and concentration in the days and weeks following the treatment. Volunteer-based monitoring of temperature profiles would also be coordinated surrounding the treatment to allow final dosing strategies to accurately represent the herbicide mixing volume of the lake (ie epilimnion).

Eagle and Flynn Lake EWM Management Strategy

The situation in Eagle Lake presents an interesting dilemma; the current extent of EWM within the lake does not quite warrant a whole-lake treatment strategy, yet it is at a level that is above that which can be contained by hand-removal methods. Because the whole-lake treatments in the upper four chain lakes are being completed in 2017, with monitoring taking place in 2016 and 2018, the possibility exists that the EWM in Eagle Lake may reach a point in 2017 where a whole lake treatment is warranted. However, it is impossible to know if this could be the case at this point in time. In Eagle Lake and Flynn Lake, it is recommended for 2016-2018 that continued monitoring of the EWM population occur along with volunteer hand-pulling and professional hand-removal or DASH (Diver Assisted Suction Harvest). All hand removal efforts completed during this time should be focused upon Eagle and Flynn Lakes, as a large-scale treatment would take place in 2017 on the upper four lakes in the chain. Hand removal should not occur in these upper four lakes during 2017 or 2018 because it will be important to truly assess the herbicides efficacy on the EWM populations here.

Funding

The aforementioned treatments and associated monitoring would likely have expenses beyond what the IRPCLA could finance alone. To assist in financing this large project, the IRPCLA would apply for funding through the State of Wisconsin's Surface Water Grants Program in the AIS-Established Population Control grant category. This category offers up to a 75% cost match from the state, and in-kind donated time may be used to offset the grant sponsor's out-of-pocket costs

Timeframe

Although some discussion of the timing of this project and its components are presented above, Table 4 below illustrates many of the components this project would include, with their approximate timeframe. While the herbicide application and some field work have specific times in which they must occur, some components, such as project meetings, can be flexible to meet the needs of the IRPCLA members who would be attending.

Table 4. Potential Pike Chain of Lakes 2016-2018 EWM control project outline.

2016	J	F	M	A	M	J	J	A	S	O	N	D
Submit Grant Application (February 1)												
Kick-off Meeting												
Early Season AIS Survey												
Chain-wide Point Intercept Survey												
Eurasian Water Milfoil Peak Biomass Survey												
Written Project Update												
Data Analysis												

2017	J	F	M	A	M	J	J	A	S	O	N	D
Data Analysis												
Pre-Treatment Survey												
Herbicide Application												
Herbicide Concentration Monitoring												
Early Season AIS Survey												
Chain-wide Point Intercept Survey												
Eurasian Water Milfoil Peak Biomass Survey												
Fall Update Meeting												
Data Analysis												

2018	J	F	M	A	M	J	J	A	S	O	N	D
Kick-off Meeting												
Early Season AIS Survey												
Chain-wide Point Intercept Survey												
Eurasian Water Milfoil Peak Biomass Survey												
Data Analysis												
Project Wrap-Up Meeting												

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