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VERMILLION LAKES
BARRON COUNTY

2019 AQUATIC PLANT MANAGEMENT IMPLEMENTATION SUMMARY REPORT WDNR WBIC: LOWER VERMILLION 2098200; UPPER VERMILLION 2098800

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VERMILLION LAKES ASSOCIATION
CUMBERLAND, WI 54829

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PREPARED FOR THE VERMILLION LAKES ASSOCIATION

INTRODUCTION

This report discusses aquatic plant management activities completed by the Vermillion Lakes Association (VLA) and Lake Education and Planning Services (LEAPS) during the 2019 season and discusses Eurasian watermilfoil (EWM) and curly-leaf pondweed (CLP) management planning and implementation for 2020. In the spring of 2018, the Vermillion Lakes Association (VLA) was awarded a 3-yr AIS Control grant to manage CLP and EWM in both Lower (LVer) and Upper (UVer) Vermillion lakes. Chemical management of CLP and EWM in LVer; and CLP harvesting in UVer was included in the grant.

The following list of education and management actions were completed in 2019.

- 2019 EWM and CLP Management Planning and Implementation
- 2019 CLP Bed-Mapping and Fall EWM Fall Bed-Mapping
- 2019 Clean Boats Clean Waters
- 2019 AIS Education and Monitoring
- 2019 Citizen Lake Monitoring Network Water Quality Testing

Each of these actions will be summarized in the following sections of this report.

PROPOSED LVER EWM CHEMICAL TREATMENT

In the grant that covers 2018, 2019, and 2020 it was set up that LEAPS and VLA volunteers would complete fall EWM bedmapping in 2018 and again in 2020, with ERS completing it in 2019. On October 15th, 2018, the lake's littoral zone was searched for EWM by LEAPS accompanied by a VLA volunteer. Four areas covering 0.53 acre where EWM formed small beds were mapped. Outside of these areas, four additional plants were found and rake-removed including on is the East Basin near an area that has supported EWM growth in the past (Figures 1&2). This total represented a 0.22 acre increase over the 0.31 acres found in 2017, but a decrease in the number of outside plants from 12 in 2017 to only 4 in 2018.

Figure 1: 2018 fall EWM survey results – West Basin

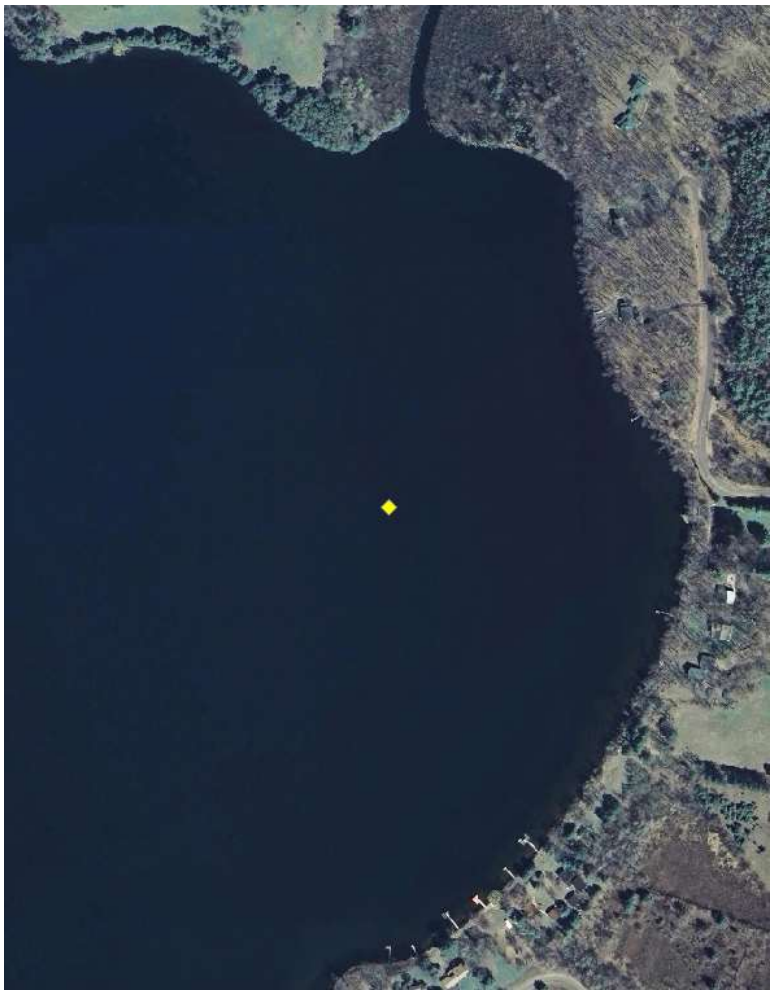


Figure 2: 2018 fall EWM survey results – East Basin

This led to a 2019 preliminary EWM treatment proposal covering 1.2 acres (Table 1).

Table 1: 2019 EWM chemical treatment proposal

Treatment Characteristics				Eurasian Watermilfoil Control DMA 4/ Shredder Amine 4 (liquid 2,4-D)			Eurasian Watermilfoil Control Sculpin G (granular 2,4-D)		
Treatment Site	Acreage	Mean Depth (feet)	Volume (acre-feet)	Treatment a.i. ppm	Gallons	gal/acre-ft	Treatment a.i. ppm	pounds*	lbs/acre-ft
EBCLP-19/EWM-19	0.67	8.0	5.36				3.0	263.2	49.1
WBNSHR-19	0.18	5.0	0.90	4.0	2.6	2.84			
WBSSHR-19	0.26	4.0	1.04	4.0	3.0	2.84			
WBCENTER-19	0.10	4.0	0.40				4.0	26.2	65.4
Total	***1.21***		***7.70***		***5.5***			***289.3***	
	EWM - 1.21 acres								

2018 PROPOSED LVER CLP CHEMICAL TREATMENT

CLP management was included in the 2018-20 ACEI grant based on bed mapping last completed in the spring of 2016 (Figure 3). In 2018, three beds of CLP totaling 2.65 acres were chemically treated. In 2019, these three areas were retreated as it is stated in the APM Plan for Lower Vermillion Lake that areas of CLP that are chemically treated, should be done so for a minimum of three years, unless there is a complete

absence of CLP found during pre-treatment survey work. This was not the case in 2018 or in 2019. Four areas of CLP totaling 2.62 acres were proposed for chemical treatment (Table 2).

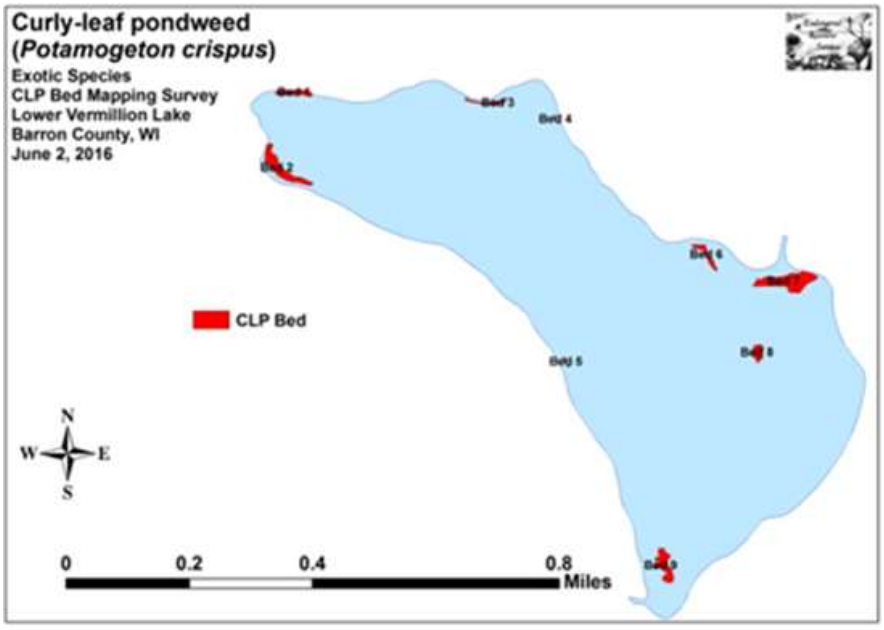


Figure 3: 2016 CLP bed mapping results

Table 2: 2019 CLP chemical treatment proposal

Lower Vermillion Lake 2019 FINAL CLP-EWM Chemical Treatment Proposal (05-19-2019 LEAPS)						
Treatment Characteristics				CLP Control		
				Aquathol K (liquid endothall)		
Treatment Site	Acreage	Mean Depth (feet)	Volume (acre-feet)	Treatment a.i. ppm	Gallons	gallons/acre-ft
EBCLP-19	0.61	8.0	4.88	4.0	12.7	2.60
NSWBCLP-19	0.56	5.0	2.80	2.5	4.7	1.67
SSWBCLP-19	1.15	4.0	4.60	2.5	7.7	1.67
NSHRCLP-19	0.30	5.0	1.50	2.5	2.5	1.67
Total	***2.62***		***13.78***		***27.6***	

In the 2019 CLP and EWM chemical treatment proposals, the areas to be chemically treated overlap or are contained within each other. In the west basin along the north shore, 0.18 acres of EWM is included in the proposal to chemically treat 0.56 acres of CLP. In the west basin along the south shore, 0.26 acres of EWM is contained in 1.15 acres of CLP to be chemically treated. In the east basin, the area to be treated for CLP and EWM are the same at 0.67 acres. Where the CLP and EWM treatments overlap, the acreage is not increased however two different herbicides are applied - 2.4D to EWM and endothall to CLP.

One area of CLP along the north shore totaling 0.30 acres is just being treated with endothall; and one area of EWM in the west basin totaling 0.10 acres is just being treated with 2,4D. The final 2019 chemical treatment map for both CLP and EWM is in Figure 4.

Figure 4: 2019 CLP (purple) and EWM (red/orange) chemical treatment areas

2019 PRE-TREATMENT SURVEY

In 2019 Endangered Resource Services (ERS) completed both a pre and post-chemical treatment survey using points generated based on the size and shape of the proposed treatment areas provided by LEAPS. The 86 point sampling grid at 12m resolution approximated to 28-pts/acre (Figure5). Although this was almost triple the 4-10 pts/acre required by WDNR protocol for pre/post treatment surveys, the high number of points was requested due to the narrowness of the treatment area and the difficulty in getting enough points in the target depths.

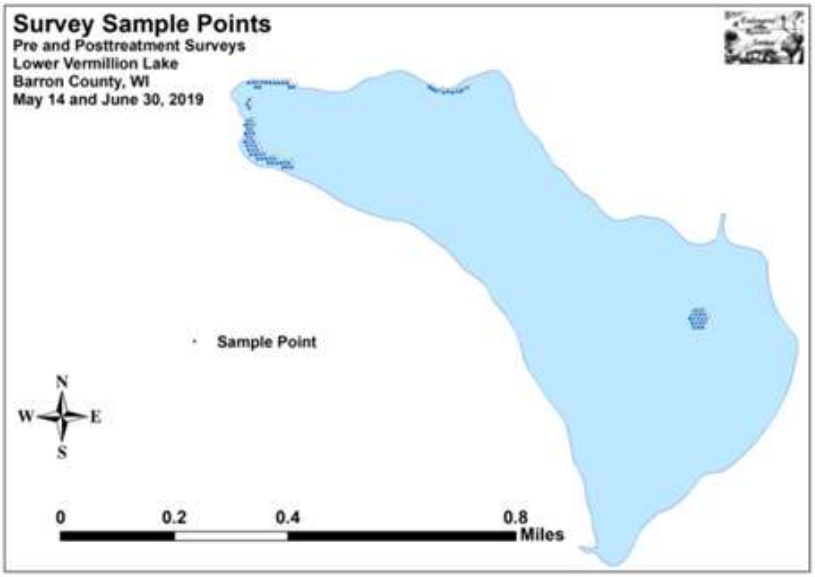


Figure 5: 2019 86-pt pre/post-chemical treatment point-intercept survey

During the pre-treatment survey completed on May 15, 2019, all points occurred in areas between 1.0ft and 12.5ft of water. The mean depth for all plants was 5.4ft during both surveys; however, the median depth declined slightly from 5.5ft pretreatment to 5.3ft posttreatment. Most EWM was established over sand and gravel, while CLP reached its highest densities over areas with at least some organic muck. The littoral zone was essentially unchanged at 12.0ft pretreatment and 12.5ft posttreatment. Within this zone, plants covered the majority of the bottom as the frequency of occurrence was 93.0% for each survey.

Initial expectations were to treat five areas totaling approximately 2.78 acres. Although EWM was only found in the rake at a single point during the pretreatment survey, scattered plants were observed throughout the majority of the proposed treatment areas. Similarly, CLP was scattered throughout the proposed treatment areas. Because of this, it was decided to continue with the treatment as planned.

2018 CHEMICAL TREATMENT OF CLP AND EWM IN LOWER VERMILLION LAKE

Chemical treatment was conducted by Northern Aquatic Services (Dresser, WI) on May 30th. The reported water temperature at the time of treatment was 59°F, with an air temperature of 70°F. Winds were out of the north at 0-2 mph. Since no changes were made to the preliminary treatment plan, Tables 1&2 reflect the details of the 2019 spring CLP and EWM chemical treatments in LVer. Liquid herbicides (2,4D and endothall) were used in the western bay by the boat landing. Granular 2,4D was used for EWM in the east basin. Liquid endothall was used in the east basin for CLP management. At the time of application coontail, CLP, EWM, algae, and white waterlily were present. The treatment was completed between 9:00 and 11:30am.

Both herbicides were applied on the same day with the intent of increasing the efficacy of both herbicides.

2019 POST-TREATMENT SURVEY

On June 30, ERS completed a post-treatment aquatic plant survey. EWM was found at a single point with a rake fullness of 1 during the pretreatment survey. During the posttreatment survey, EWM was located at two points – one along the north shore and one in the west bay south of the boat landing (Figure 6). Several other large towers inter-point in the southwestern corner of the west bay was identified as well. Although each of these plants was chemically burned, they all showed some evidence of regrowth. Because of this, the majority of them were raked out and the VLA and LEAPS notified so they could check back on these locations during manual removal efforts throughout the rest of the summer. Due to the low number of EWM plants found during both surveys, none of our findings demonstrated a statistically significant change.

CLP was present at 17 of 86 sites during the pretreatment survey (19.8% coverage) with four additional visual sightings. Of these, one had a rake fullness rating of 3, nine rated a 2, and the remaining seven were a 1. This produced a mean rake fullness of 1.65 and suggested that 11.6% of the treatment areas had a significant infestation (rake fullness 2 or 3). During the posttreatment survey, CLP was found at just five points (5.8% coverage) all of which rated a 1 (Figure 6). These results demonstrated a moderately significant decline in total CLP distribution and rake fullness 2; and a significant decline in visual sightings (Figure 7). They also demonstrated a highly significant decline in mean rake fullness.

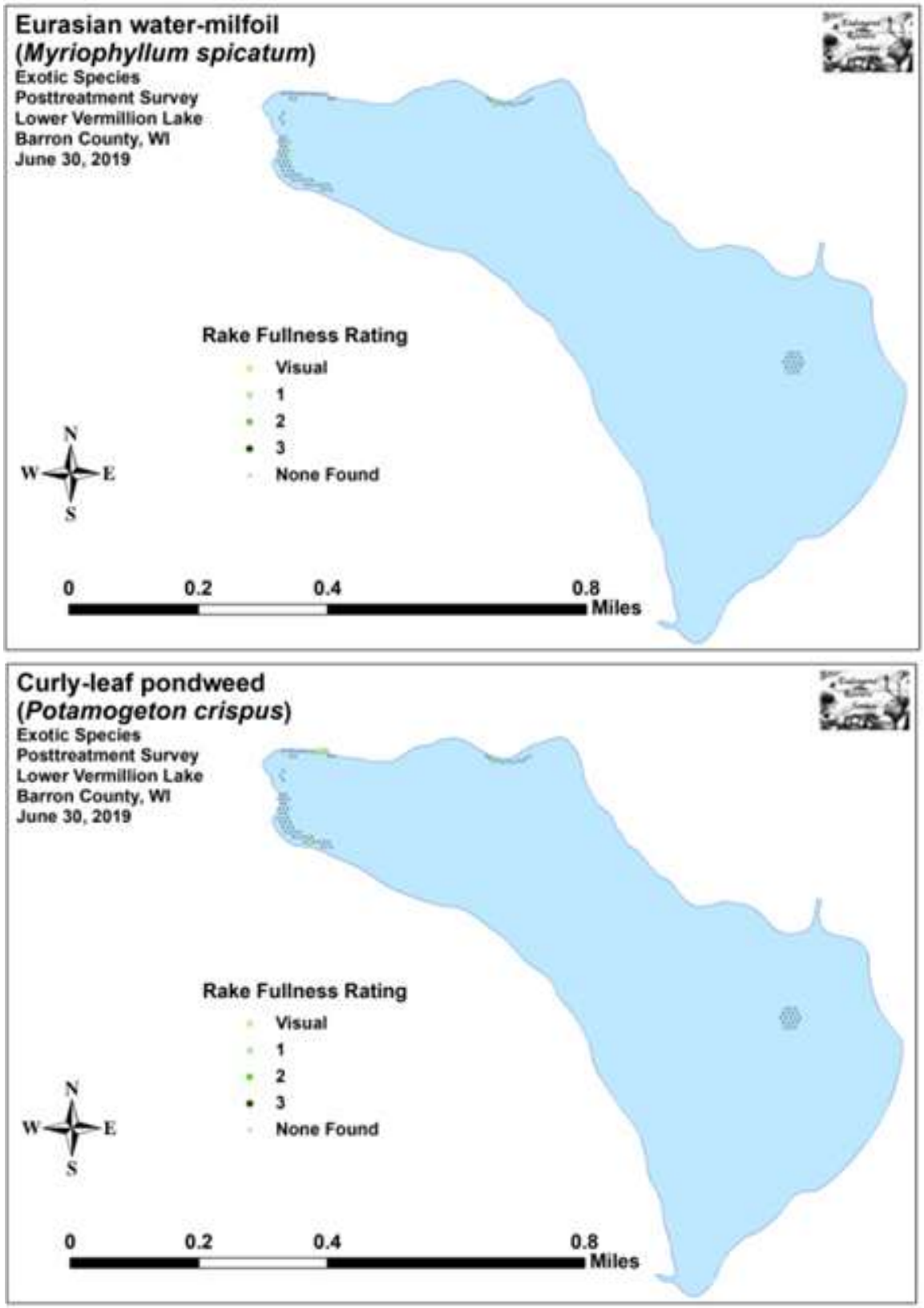


Figure 6: 2019 Post-treatment distribution of EWM (top) and CLP (bottom) in Lower Vermillion Lake

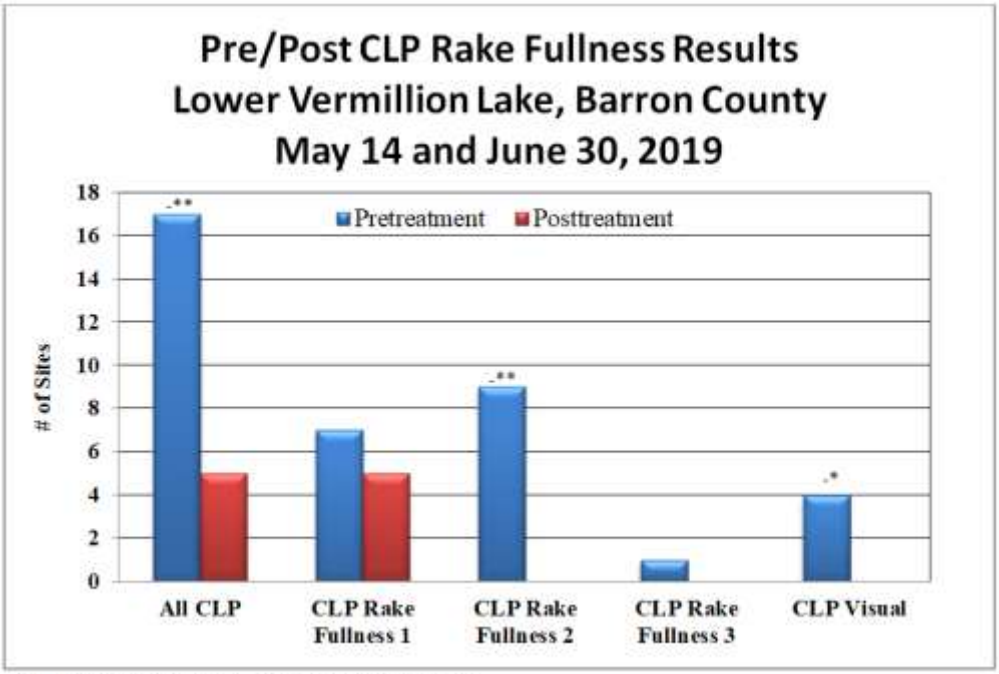


Figure 7: 2019 Pre/Post Changes in CLP distribution and density

2019 PRE AND POST DISTRIBUTION OF NATIVE PLANTS

Table 3 reflects the statistics associated with the 2019 pre and post-treatment aquatic plant surveys. The average number of species per site was down, but values related to the health of the aquatic plant community (SDI, Mean C, FQI, Species Richness) were all the same or better during the post-treatment survey.

Table 3: Pre/Posttreatment Surveys Summary Statistics Lower Vermillion Lake, Barron County 5/14 & 6/30/2019

Summary Statistics:	Pre	Post
Total number of points sampled	86	86
Total number of sites with vegetation	80	80
Total number of sites shallower than the maximum depth of plants	86	86
Freq. of occur. at sites shallower than max. depth of plants (in percent)	93.0	93.0
Simpson Diversity Index	0.75	0.77
Mean Coefficient of Conservatism	6.2	5.8
Floristic Quality Index	22.5	19.9
Maximum depth of plants (ft)	12.0	12.5
Mean depth of plants (ft)	5.4	5.4
Median depth of plants (ft)	5.5	5.3
Average number of all species per site (shallower than max depth)	1.60	1.59
Average number of all species per site (veg. sites only)	1.73	1.71
Average number of native species per site (shallower than max depth)	1.40	1.51
Average number of native species per site (sites with native veg. only)	1.54	1.65
Species Richness	15	14
Mean Rake Fullness (veg. sites only)	1.84	1.54

Diversity within the beds was moderate with a Simpson Index value of 0.75 pretreatment and 0.77 posttreatment. The Floristic Quality Index, another measure of only native species, decreased slightly from 22.5 pretreatment to 19.9 posttreatment. Total richness also declined slightly from 15 species pretreatment to 14 species posttreatment. However, the mean native species richness at sites with native vegetation experienced a non-significant increase from 1.54 species/site pretreatment to 1.65 species/site posttreatment. Total rake fullness saw a moderate significant decline from a low/moderate 1.84 pretreatment to a low 1.54 posttreatment.

Coontail and common waterweed were the two most common native species in both the pre and posttreatment surveys. Present at 59 sites during the pretreatment survey, coontail experience a non-significant decline in distribution to 53 sites posttreatment. It also suffered a moderately significant decline in mean rake fullness from 1.68 pre to 1.36 post.

Common waterweed was present at 27 sites with a mean rake fullness of 1.74 during the pretreatment survey. Posttreatment, there was a non-significant expansion to 34 sites. However, this was accompanied by a significant decline in density to a mean rake fullness of 1.32.

Flat-stem pondweed, a species known to be sensitive to endothall – was the only native species that suffered a significant decline in distribution posttreatment. Conversely, several late-growing species experienced significant expansions – spatterdock saw a moderately significant increase, and wild celery and slender naiad both demonstrated significant increases in distribution.

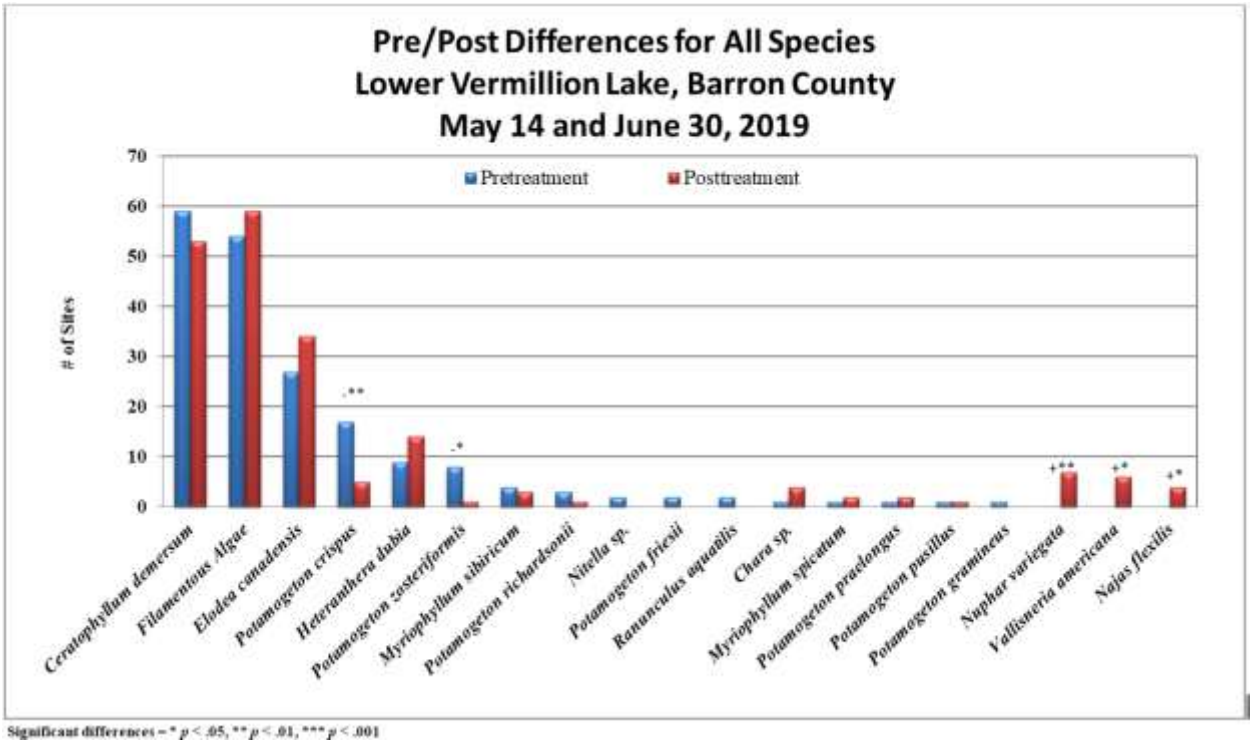


Figure 8: 2019 significant changes in aquatic vegetation from pre to post-treatment

More information about the 2019 pre and post treatment survey results can be found in the 2019 Eurasian water-milfoil and Curly-leaf pondweed Pre/Posttreatment and Fall EWM Bed Mapping Surveys Lower Vermillion Lake – WBIC: 2098200 Barron County, Wisconsin.

2019 FALL EWM FALL BED-MAPPING

CLP bed mapping was planned in Lower Vermillion Lake in June 2018, but was not completed due to the fact that very few to no beds of CLP were visible at the surface in the month of June. CLP bed mapping will be completed in 2019.

Fall EWM bed mapping was completed by ERS on October 20, 2019. After covering 13.6 miles of meandering transects within the littoral zone, 24 individual plants and two floating EWM fragments were found. No true beds were identified in the fall survey. This was a significant decline from the 0.31acres that were mapped during the fall survey in 2017.

Closer analysis of the 2019 spring treatment areas and fall EWM distribution showed that, for the most part, the treated areas remained relatively free of EWM throughout the growing season (Figure 9). It also showed that, immediately outside of the treated areas, EWM was still present, but generally occurred as scattered individuals. In the east bay, we noted that EWM continues to stubbornly reappear in the same general area on the northwest corner of the flat we have been finding it at since 2012. Whether this is a reintroduction from anglers motoring over from the landing, or if these are simply surviving plants that take several years to expand and canopy following treatment is unknown. Regardless, the area around Bed 6 will continue to be a high priority search area during bed mapping surveys in the future.

All of the plants found in the fall survey were raked removed to the best of the ability of the surveyors.

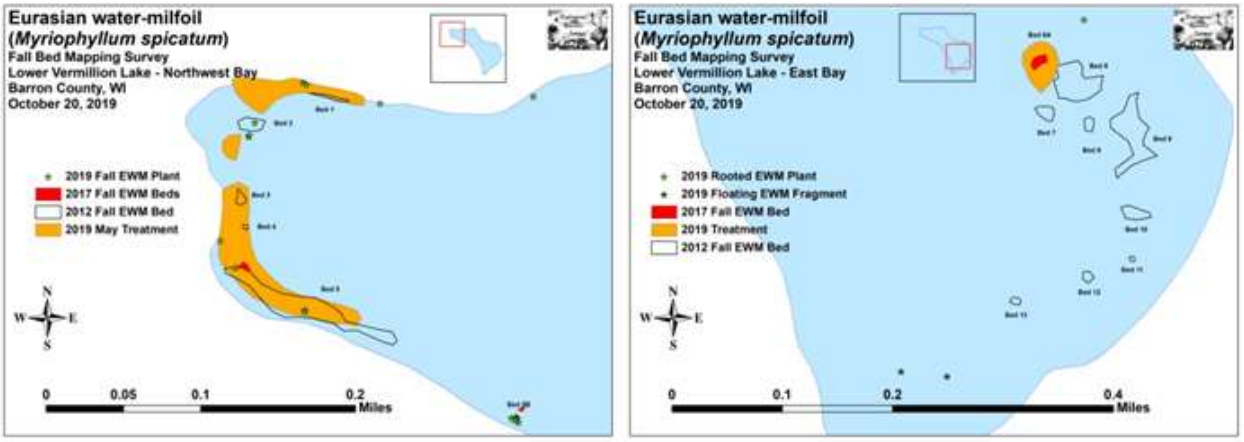


Figure 9: 2019 fall EWM bedmapping close-up of the northwest and east bays

UPPER VERMILLION LAKE

A CLP and native aquatic plant harvesting proposal was put together for Upper Vermillion Lake in 2018. However that proposal was not implemented due to a lack of CLP and native vegetation in general in 2018. The same proposal was submitted for 2019 and this time it was actually implemented at least in part. Three harvesting areas totaling 3.64 acres are proposed for early summer harvest to remove CLP and other nuisance aquatic plant growth. In addition, five navigation lanes from 20-40 feet wide, nearly 3500 feet in length and totaling 2.12 acres is proposed for harvesting (Table 4, Figure 10). TSB Lakefront Restoration out of Chippewa Falls, WI was contracted by the VLA to complete one full day of harvesting in mid-June. While it was not expected that the entire proposed area would be harvested, the goal was to see how efficient harvesting could be, and how much could get done in a day, with the cost of about $2,000.00.

Table 4: 2019 Upper Vermillion CLP and native plant harvesting details

2018 Upper Vermillion Harvesting Plan							
Site	**Length (ft)**	**Width (ft)**	**Acres**	**Navigation Lanes**	**Open Water**	**Target Species**	**When**
MainChannel18	1126	40	1.03	yes	NA	CLP/Native	early June; July
NWNav18	158.5	20	0.07	yes	NA	CLP	early June
Majewski18	251.5	20	0.12	yes	NA	CLP	early June
SWNav18	1491.3	20	0.68	yes	NA	CLP/Native	early June; July
SEBayNav18	468.8	20	0.22	yes	NA	CLP	early June
PubAcc18	NA	NA	1.24	NA	yes	CLP/Native	early June; July
NWShore18	NA	NA	1.88	NA	yes	CLP/Native	early June; July
SEBay18	NA	NA	0.52	NA	yes	CLP/Native	early June; July
TOTALS			**5.76**				

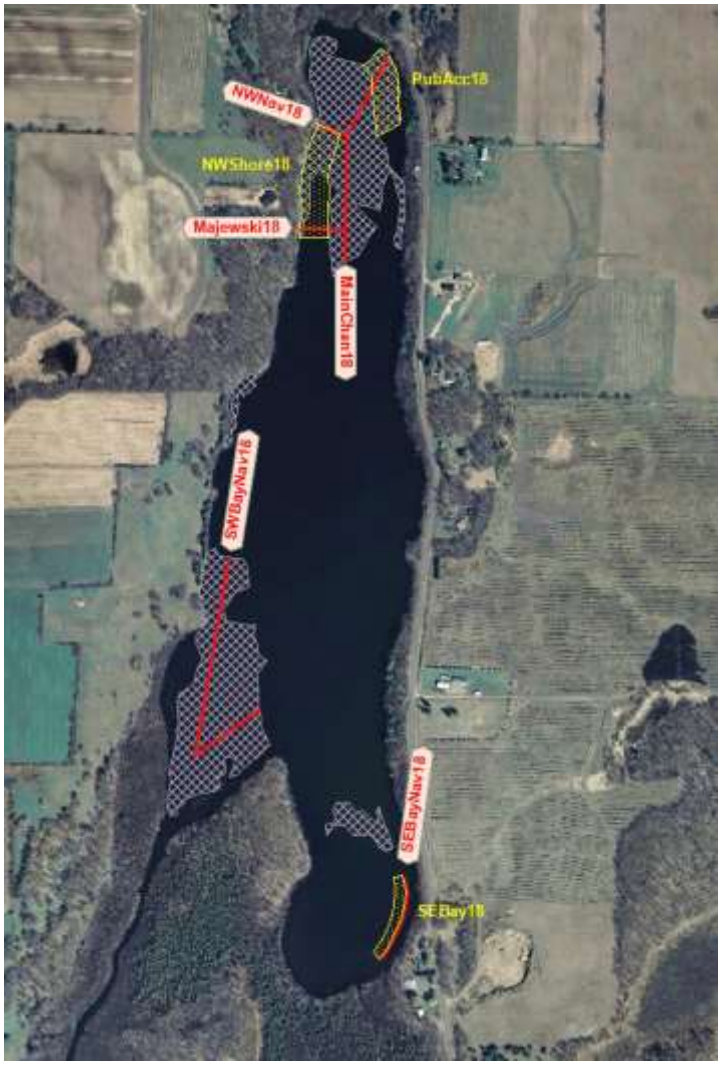


Figure 10: 2019 Upper Vermillion Lake CLP and native aquatic plant harvesting map

The CLP harvest on Upper Vermillion was an eleven hour undertaking on June 7th. TSB Restoration from Chippewa Falls brought in a harvesting machine with a trailer that had a conveyor for moving and dumping vegetation easily. During the project 10 full loads of 99% CLP were harvested and estimated to be 2200 cubic feet. The cut vegetation was moved to farm land approximately 3 miles away. The WDNR does not provide grants for harvesting vegetation, thus the entire cost of the harvesting project was covered by VLA. This endeavor was considered an experiment to not only make an immediate difference but to generate ideas and potential solutions for future lake improvements on Upper Vermillion. The VLA goal is to collaborate with the WDNR to provide direction and financial assistance in the near future. A follow-up survey was completed on Upper Vermillion Lake on June 17th with assistance from LEAPS. It showed a definitive path that was cleared with the harvester from the boat landing to close to the channel/outlet (Figure 11). This was the only area that was harvested in the 11-hr day. Photos of the harvesting day are included in Figure 12.

Figure 11: 2019 CLP harvested area in Upper Vermillion Lake

Figure 12: Photos of the June 17, 2019 CLP harvesting project in Upper Vermillion Lake

2019 CLEAN BOATS, CLEAN WATERS (CBCW)

In 2019, the VLA requested and received a grant to support a CBCW program. The grant required at least 200 hours of time monitoring boats. Between paid and volunteer time, the VLA was able to amass 212 hours meeting the requirement. A total of 82 boats were inspected during this time and 175 people were contacted by watercraft inspectors. All 2019 data is in the WDNR SWIMS database.

2018 AIS EDUCATION AND MONITORING

The VLA sends out at least three newsletters a year (spring, summer, and fall) to everybody on the lake. The newsletter is used to announce events, remind property owners of responsibilities and volunteer requests, and update things like CLP and EWM management, plant survey results, loon watch, water quality and other interesting tidbits.

During the annual VLA Breakfast Meeting held on May 25, 2019 at the home of one of the property owners, biologist/teacher/aquatic plant surveyor Matt Berg from Endangered Resource Services presented. The breakfast was attended by 55 property owners on the two lakes. Matt discussed the importance of aquatic plants, the issues with AIS like CLP and EWM, and many other topics. The presentation was very well received. Matt has been completing aquatic plant surveys on the lakes for nearly a decade and this was the first time he was able to present to the lake group.

Tom Margotto, the president of the VLA, several volunteers, and resource people including a LEAPS employee and Matt Berg completed surveys of the two lakes for AIS multiple times during the summer. At the end of the season, property owners were reminded to inspect their docks and other structures as they were removed from the lakes.

No new AIS were found in the lake. CLP and EWM continue to be in the places it has been found before.

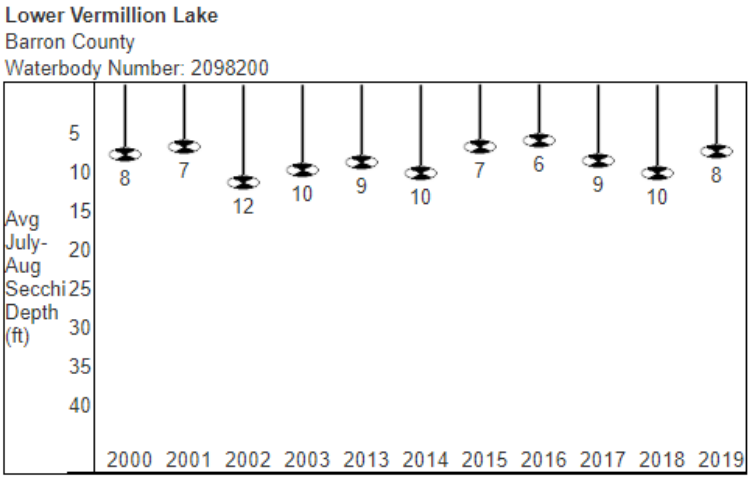
2019 CITIZEN LAKE MONITORING NETWORK (CLMN) WATER QUALITY TESTING – LOWER VERMILLION LAKE

Lower Vermillion Lake - Deep Hole was sampled 13 different days during the 2019 season. Parameters sampled included: water clarity, temperature, dissolved oxygen, total phosphorus, and chlorophyll. The average summer (July-Aug) secchi disk reading for Lower Vermillion Lake - Deep Hole (Barron County, WBIC: 2098200) was 7.75 feet (Figure 13). The average for the Northwest Georegion was 8.6 feet. Typically the summer (July-Aug) water was reported as clear and blue. The deepest Secchi disk reading taken in 2019 was 20.75ft on May 30th. The least or shallowest reading was 6.0ft on August 26th.

Chemistry data was collected on Lower Vermillion Lake - Deep Hole. The average summer Chlorophyll was 11.2 μg/l (compared to a Northwest Georegion summer average of 13.2 μg/l). The summer Total Phosphorus average was 27.4 μg/l. Lakes that have more than 20 μg/l of total phosphorus may experience noticeable algae blooms (Figure 14). This value was slightly higher than the average for natural lakes, however, for the most part water quality in Lower Vermillion Lake was not as good as it was last year when for the first time ever, the lake was listed as oligotrophic, but it was certainly good enough for people to enjoy the lake.

The overall Trophic State Index (based on chlorophyll) for Lower Vermillion Lake - Deep Hole was 53. The TSI suggests that Lower Vermillion Lake - Deep Hole was eutrophic. This TSI usually suggests decreased

clarity, fewer algal species, oxygen-depleted bottom waters during the summer, plant overgrowth evident, warm-water fisheries (pike, perch, bass, etc.) only. These characteristics accurately reflect what is evident in Lower Vermillion Lake.



Past secchi averages in feet (July and August only).

Year	Secchi Mean	Secchi Min	Secchi Max	Secchi Count
2000	8.13	5	9.75	4
2001	7.1	5	10.5	5
2002	11.89	10	15	9
2003	10.25	9.5	11	2
2013	9.1	8	9.75	5
2014	10.58	8	14.75	3
2015	7.25	5.25	10.25	3
2016	6.31	3.75	8.5	4
2017	9	7	11.5	3
2018	10.5	6.75	14.75	4
2019	7.75	6	10	4

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Figure 13: 2019 Average summer (July and August) Secchi disk readings at the Deep Hole on Lower Vermillion Lake

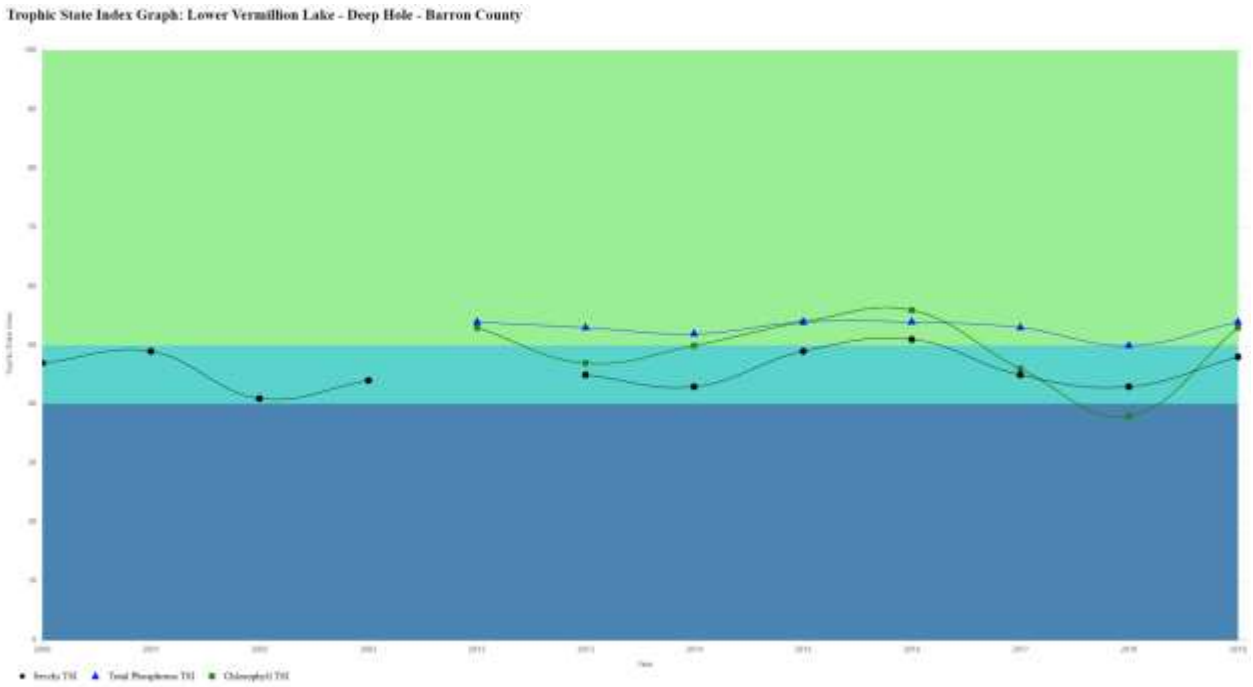


Figure 14: 2019 Summer (July and August) TSI values for total phosphorus and chlorophyll-a at the Deep Hole on Lower Vermillion Lake

Dissovled oxygen and temperature profiles indicate that Vermilliion Lakes is dimictic meaning it has both a spring and fall turnover and stratifies in the summer. Stratification was documented in profiles taken by volunteers May-August. In 2019, a thermocline was established in early May at a depth of about 30 feet. As the summer progressed the thermocline moved up to 15 feet at its lowest, with the waters below that point being mostly devoid of oxtgen. No profiles were collected past August 26th so it is not known exactly when the lake remixed in the fall. As of the middle of September when the last profile was taken, oxygen levels had still not improved (Figure 15).

05/07/2019		
Depth FEET	Temp. DEGREES F	D.O. MG/L
3	55.4	7.3
6	52.7	8.27
9	52.1	8.29
12	50.8	8.25
15	48.6	8.2
18	47.3	8.06
21	46.6	7.73
24	45.4	6.96
27	43.4	3.02
30	42.5	2.66
33	41.3	.88
36	40.7	.62
39	40.5	.45
42	40.3	.36
45	40.1	.31
48	40	.26
51	39.9	.22

05/30/2019		
Depth FEET	Temp. DEGREES F	D.O. MG/L
3	62	7.49
6	59.5	7.81
9	57.7	7.8
12	56.9	7.73
15	56.2	7.58
18	55.3	7.36
21	54.5	7.12
24	53.4	6.63
27	49.8	3.78
30	45.1	1.03
33	43.8	.62
36	42.8	.42
39	42.1	.31
42	41.8	.23
45	41.4	.19
48	41.1	.17
51	41	.15
54	41.1	.12

06/30/2019		
Depth FEET	Temp. DEGREES F	D.O. MG/L
3	77.5	8.06
6	75	8.47
9	73	8.36
12	70.3	7.86
15	66.3	7.55
18	59.7	7.1
21	55.9	4.99
24	53.2	3.53
27	50.7	.73
30	48.4	.47
33	46	.33
36	44.5	.26
39	43.7	.22
42	43.3	.18
45	42.9	.16
48	42.7	.14
51	42.7	.12
54	42.7	.1

07/14/2019		
Depth FEET	Temp. DEGREES F	D.O. MG/L
3	77.6	8.19
6	77.8	8.12
9	77.7	7.98
12	73.6	7.6
15	67.4	8.07
18	60.6	8.48
21	54.9	4.26
24	51.5	.93
27	50	.56
30	48	.34
33	45.6	.26
36	44.5	.21
39	43.8	.18
42	43.5	.15
45	43.2	.13
48	43	.11
51	42.8	.1
54	42.8	.08

07/24/2019		
Depth FEET	Temp. DEGREES F	D.O. MG/L
3	76.3	8.27
6	76.1	8.27
9	75.8	8.22
12	73.9	7.51
15	70.7	6.9
18	62.8	6.04
21	56	1.3
24	52.9	.71
27	50.4	.45
30	47.9	.32
33	45.9	.25
36	45	.21
39	44.6	.18
42	44.3	.16
45	44.1	.15
48	43.9	.12
51	43.7	.1
54	43.6	.09

07/31/2019		
Depth FEET	Temp. DEGREES F	D.O. MG/L
3	74.8	8.4
6	74.6	8.58
9	74.3	8.62
12	73.8	7.94
15	70.2	6.93
18	63.1	4.03
21	56.3	.65
24	53.6	.4
27	50.4	.31
30	48.1	.25
33	46.4	.21
36	45.5	.18
39	44.8	.16
42	44.3	.14
45	44	.13
48	43.9	.11
51	43.8	.1
54	43.7	.08

08/26/2019		
Depth FEET	Temp. DEGREES F	D.O. MG/L
3	70.4	7.79
6	70.4	7.79
9	70.4	7.75
12	70.3	7.66
15	70.1	7.29
18	63.5	.6
21	58.1	.52
24	53.6	.43
27	50.8	.29
30	48.5	.24
33	46.9	.19
36	45.8	.17
39	45	.15
42	44.6	.13
45	44.5	.12
48	44.4	.11
51	44.3	.1

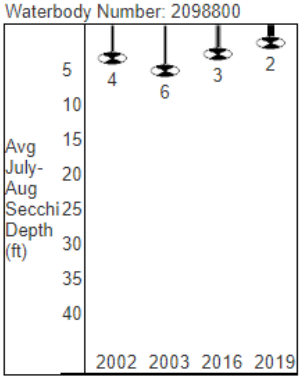
Figure 15: Temperature and Dissolved Oxygen Profiles for Vermillion Lakes in 2019

2019 CITIZEN LAKE MONITORING NETWORK (CLMN) WATER QUALITY TESTING – UPPER VERMILLION LAKE

Upper Vermillion Lake - Center was sampled 5 different days during the 2019 season. Parameters sampled included: water clarity, total phosphorus, and chlorophyll. The average summer (July-Aug) secchi disk reading for Upper Vermillion Lake - Center (Barron County, WBIC: 2098800) was 1.5 feet (Figure 16). The average for the Northwest Georegion was 8.6 feet. The issue with this 2019 reading is that only one Secchi disk reading of water clarity was taken in the summer months of 2019. Only two Secchi readings were taken duing the entire season. The other Secchi disk reading was taken on June 30 and was 2.25 ft. More Secchi disk readings in a season are necessary if these values can be expected to represent what is actually going in in the lake.

Chemistry data was collected on Upper Vermillion Lake - Center. The average summer Chlorophyll was 85.2 µg/l (compared to a Northwest Georegion summer average of 13.2 µg/l). The summer Total Phosphorus average was 132 µg/l. Lakes that have more than 20 µg/l and impoundments that have more than 30 µg/l of total phosphorus may experience noticable algae blooms. Upper Vermillion Lake is considered a hyper-eutrophic lake meaning it is heavily impacted by the presence of algae in the water (Figure 17). The algae limits light penetration needed to sustain a healthy and robust native aquatic plant community. This is currently missing from Upper Vermillion Lake. As recent as just 5-years ago, the lake seemed to be recovering from a less than desireable aquatic plant community. That trends seems to have gone away in 2019.

The overall Trophic State Index (based on chlorophyll) for Upper Vermillion Lake - Center was 68. The TSI suggests that Upper Vermillion Lake - Center was eutrophic. This TSI usually suggests blue-green algae become dominant and algal scums are possible, extensive plant overgrowth problems possible. These characteristics accurately reflect what is evident in Upper Vermillion Lake.



Past secchi averages in feet (July and August only).

Year	Secchi Mean	Secchi Min	Secchi Max	Secchi Count
2002	3.75	1.5	6	6
2003	5.5	5.5	5.5	1
2016	3.25	3	3.5	2
2019	1.5	1.5	1.5	1

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Figure 16: 2019 Average summer (July and August) Secchi disk readings at the Center on Upper Vermillion Lake

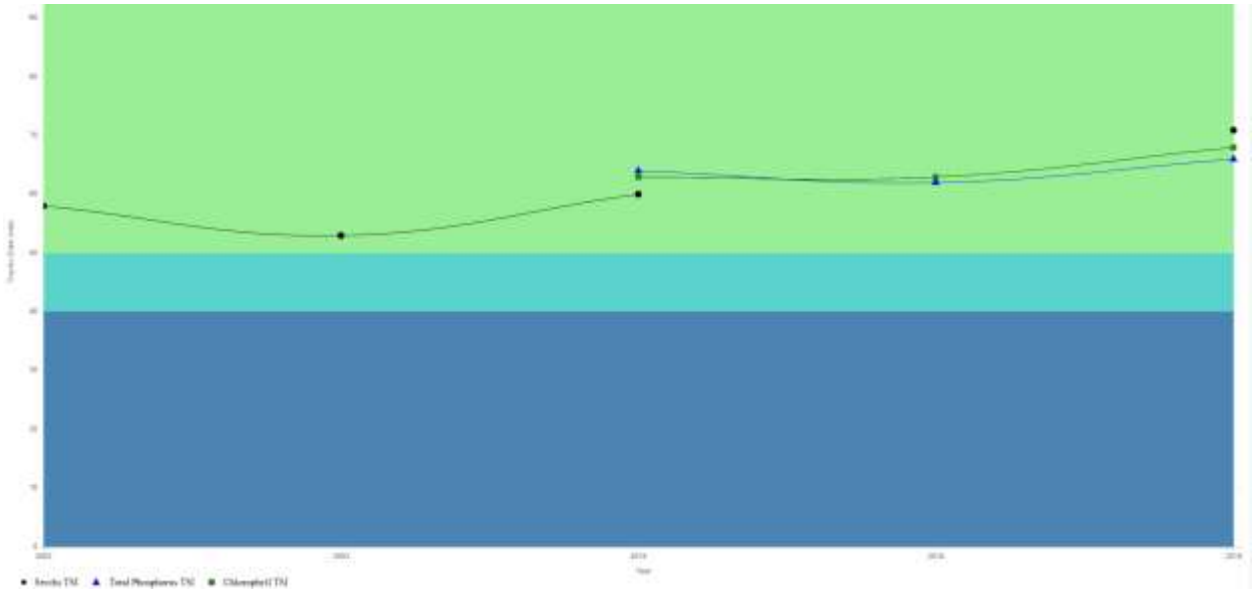

Figure 17: 2019 Summer (July and August) TSI values for total phosphorus and chlorophyll-a at the Deep Hole on Upper Vermillion Lake

Temperature and dissolved oxygen profiles were taken only a couple of times on Upper Vermillion Lake but they showed the lake fully mixed, meaning temperature and oxygen were mostly the same from the surface to the bottom of the lake. This is normal for a body of water like Upper Vermillion Lake that is only 9-ft deep and long and skinny but running the direction of the prevailing winds – north to south.

PLANS FOR 2020

In 2020, it is expected that the VLA will again chemically treat CLP and EWM in Lower Vermillion Lake. At the present time, there are no plans to complete harvesting in Upper Vermillion Lake in 2020. CLP survey work will be completed in Upper Vermillion Lake. 2020 is the last year of the three year ACEI grant that was awarded to the VLA for management of CLP and EWM. Current plans are to resubmit for grant funds in November 2020. Exactly what will be included in that grant application is not known at the present time. The VLA has already been awarded another CBCW grant so watercraft inspection will continue in 2020.