

MEMORANDUM
Comfort Lake-Forest Lake Watershed District

To: Board of Managers **Date:** December 8, 2022
From: Mike Kinney
Subject: Aquatic Invasive Species Program Yearend Presentation

Background/Discussion

Garrett Miller, AIS Program Coordinator, has prerecorded a brief presentation on the CLFLWD's Aquatic Invasive Species Program. This presentation will focus primarily on the program's highlights from the 2022 year and some plans for 2023. The recorded presentation can be found at the following link: [2022 AIS and WCI Yearend Presentation](#)



2022 AIS Program Yearend Summary

Comfort Lake–Forest Lake Watershed District

Lake Management Districts:

Bone Lake District

- Moody Lake
- Bone Lake

Little Comfort Lake District

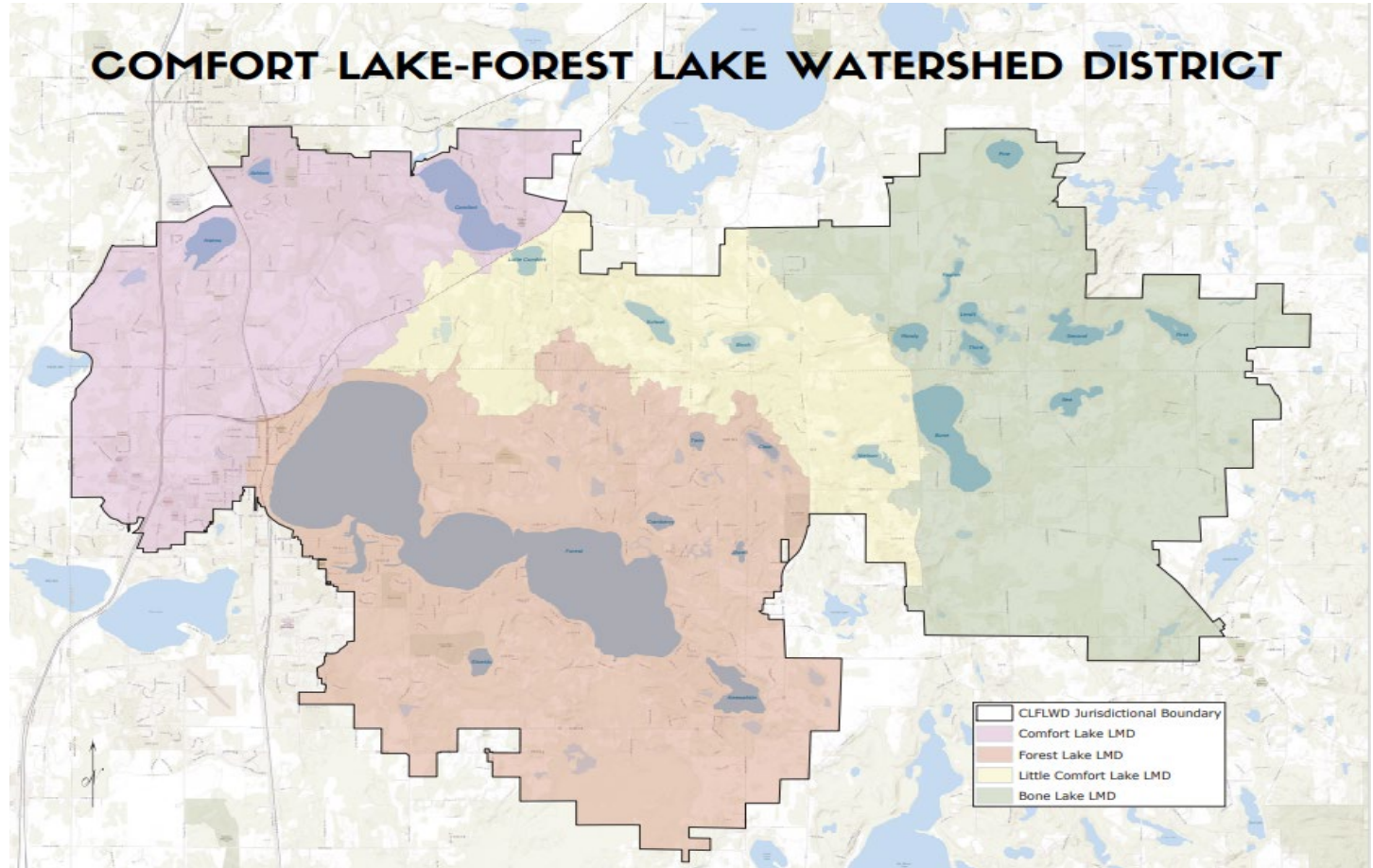
- Little Comfort Lake

Forest Lake District

- Shields Lake
- Lake Keewahtin
- Forest Lake

Comfort Lake District

- Comfort Lake



Comfort Lake-Forest Lake Watershed District

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AIS Budget Summary



Lake	Funding Sources		Estimated Yearend Expense Totals			Balance**	Littoral Acreage	Expense/Littoral Acre
	CLFLWD Local	Grants/Cont.	Blue Water Science	Contractor/ Other	EOR			
District-Wide*	\$5,000					\$5,000		
Moody	\$3,400	\$0	(\$3,100)	\$0		\$300	22	\$140.91
Bone	\$9,000	\$7,000	(\$4,700)	(\$13,391)		(\$2,091)	124	\$145.89
Little Comfort	\$0	\$0	\$0	\$0		\$0	16	\$0.00
Shields	\$8,300	\$1,500	(\$3,100)	(\$5,901)		\$799	22	\$409.16
Keewahtin	\$1,500	\$0	\$0	(\$800)		\$700	67	\$11.94
Forest	\$74,000	\$38,841	(\$12,200)	(\$70,335)		\$30,306	1,531	\$53.91
Comfort	\$10,000	\$5,500	(\$6,800)	(\$14,092)		(\$5,392)	90	\$232.13
Total	\$111,200	\$52,841	(\$29,900)	(\$104,519)		\$29,622		

** Remaining Balance

EOR AIS Program Management Costs		
Month of Services	Invoice #	Expense
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		
	Running Total	\$ -

Budget Notes

*District-wide budget line items include General Program Mgmt (includes EOR time), Comprehensive Plan & Policy Development, AIS Prevention at Boat Launch Sites, AIS Rapid Response
 ** Remaining balance after expenditures



Moody Lake

2022 Yearend Summary

Winter Aeration System

- The District continued operation of aeration system in winter months (2021-2022) to increase dissolved oxygen and reduce winterkills. This was the seventh winter the District ran the aerator.
- Oxygen levels were monitored throughout winter and were found to be at healthy levels for the whole season.
- The winter aerator was activated for the season on January 5th, 2022 and remained active until March 29th. Following deactivation, staff retrieved the floating ice signs and placed them in storage for the season.
- In mid-November of 2022, staff submitted a public notice to the Forest Lake Times and the Chisago County Press for inclusion in two issues of their papers for the month of December. These public notices serve to inform Moody Lake visitors that the winter aeration system will be active starting on or after January 1st and to use caution when on the ice.

Curly-leaf Pondweed (CLP)

- The 2022 budget contained \$3,400 for Moody Lake AIS Management. Blue Water Science conducted a point intercept survey on April 21st and did not find sufficient CLP growth to warrant a treatment. For reference, the District treated 3.11 acres in 2020 and 7.81 acres in 2019.
- Report:
 - BWS: Delineation and Assessment Report (Summary distributed in December, full report in January 2023).

Fish Survey (same as 2022)

- District staff previously reached out to the DNR Hinckley Area fisheries office to coordinate timing of fish surveys in future years. They indicated that Moody Lake is not surveyed on a regular basis. The last fish survey on Moody Lake was performed in 2012 and the next survey was tentatively scheduled for 2021 but never occurred. Staff will again follow up with the Hinckley office in the spring of 2023 to determine if the survey will happen or not.

Moody Lake AIS Prevention and Management



		Revenues		Expenses		Annual Balance	Timeline (2022-2023)										
		CLFLWD	Grants	BWS	Other		April	May	June	July	August	September	October	November	December	January	February
		\$ 3,400	\$ -	\$ (3,100)	\$ -	\$ 300											
Curly-Leaf Pondweed	Work Task	CLFLWD	Grants	BWS	Other	Total Expense											
	Surveys-Report			\$ (3,100)		\$ (3,100)											
	Permitting/Public Notice Management	\$ 3,400				\$ -											
						\$ -											
	Total	\$ 3,400		\$ (3,100)	\$ -	\$ (3,100)											
Aeration System	Work Task	CLFLWD*	Grants	BWS	Other	Total Expense											
	Permitting					\$ -											
	Setup - Public Notice					\$ -											
	Operation/Inspections - Electricity					\$ -											
	Total	\$ -	\$ -	\$ -	\$ -	\$ -											
2022 General Program Management																	

Figures in italics are cost estimates/haven't been invoiced yet

*Aeration system dollars removed because not under AIS Program in budget (under 3010 - Operations and Maintenance)

2021 Work	Status Summary
Aeration system	Deactivated on march 29, 2021.
Curly-leaf pondweed	Blue Water Science did not find sufficient CLP to warrant treatment this year on Moody Lake.

2022 Work	Status Summary
Aeration system	Ran from January 5th until March 29th.
Curly-leaf pondweed	No CLP treatment needed in 2022.

Moody Lake Water Quality Goals & Measured Averages					
	2020 Goal	2030 Goal	2040 Goal	5-Year Avg (2017-2021)	Long-Term Trend
Water quality rating at or above	C	C	C	C-	N/A
Mean summer phosphorus concentration below (µg/L)	60	40	40	67	Significantly Improving (-73%) since 2005
Mean summer secchi depth at or above (ft)	3.3	4.6	4.6	3.2	Improving since 2005

- Improving or declining trends means that the water quality parameter is consistently increasing or decreasing from year to year over the time period, but NOT in a statistically significant way.
- Significantly improving or significantly declining means that the water quality parameter is consistently increasing or decreasing from year to year over the time period, AND in a statistically significant way. The percent change in the parameter over the entire time period is reported for statistically significant trends.
- A scientific trend analysis of District lake water quality is available in the District's Draft 2021 Water Monitoring Report available at https://www.cflwd.org/documents/2021_Monitoring_Report_FINAL.pdf

DNR Lake Classification: Natural Environment



Bone Lake

2022 Yearend Summary

Curly-leaf Pondweed (CLP)

- **Delineation:** On May 6th, Blue Water Science (BWS) conducted a curly-leaf pondweed delineation on Bone Lake and did not find enough CLP to warrant a treatment.
- **Treatment:** No treatment occurred in 2022. For reference, 4.38 acres were treated in 2021, 5.14 acres in 2020, 3.88 acres in 2019, no treatment in 2018, 3.9 acres in 2017, no treatment in 2017, and 2.45 acres in 2015.
- **Assessment:** On June 10th, BWS conducted a CLP assessment survey and found there was some late season growth ranging from light to heavy around the perimeter of the lake.
- **Report:**
 - BWS: Delineation and Assessment Report (Full report distributed in December).

Eurasian Watermilfoil (EWM)

- **Delineation:** On June 10th, Blue Water Science performed an EWM delineation and found mostly light growth of EWM around the perimeter of the lake.
- **Treatment:** As was the case in 2021, the 2022 budget did not contain funding for Eurasian watermilfoil treatment.
- **Assessment:** BWS performed an assessment survey on September 15th and found EWM abundances and distribution had decreased from the June 10th survey. At that time, primarily sparse light growth was observed on the north end of the lake.
- **Report:**
 - BWS: Delineation and Assessment Report (Full report distributed in December).

Rough Fish Management

- **Fish Barriers:**
 - Maintained and managed stop logs in the two fish barriers located at the inlet and outlet of the lake

Zebra Mussels

- **Brief Background:** On May 28, 2019, six juvenile zebra mussels were discovered near the Bone Lake public access dock. Shortly following this discovery an eradication attempt was conducted where the public access was closed for 10 days while the area was treated with EarthTec copper sulfate. After the treatment was completed, the MN Department of Natural Resources (DNR) performed several veliger tows (veligers are microscopic zebra mussel larvae) which found them in high enough densities to suggest a reproductive colony exists somewhere in the lake.
- **Sampler Plates:** Again in 2022, several Bone Lake residents volunteered to host a sampler plate on their property while others were asked to inspect their docks at the end of the season and report findings to staff. To date, no zebra mussels have been found in Bone Lake since their initial discovery.
- **Veliger Tow:** On July 28th, District and WCD staff conducted a veliger tow on Bone Lake. For

comparison, this effort used the same protocol and sampling locations as the DNR's 2019 survey. Samples were then submitted to the DNR's labs for analysis where their lab personal found no veligers. While it can't be said conclusively that Bone Lake is zebra mussel free, these results are encouraging. To strengthen our understanding of zebra mussels in Bone Lake post treatment, District staff anticipate performing another veliger tow in 2023, with a focus on new locations in the lake.

- DNR Diving Survey: On August 23rd, the DNR performed a diving survey for zebra mussels in high priority areas of the lake. During their visit, no zebra mussels were found. The DNR is currently working on a report documenting the initial infestation and following surveys that have occurred on Bone since 2019.
- Blue Water Science: On September 30th, Blue Water Science performed a diving survey at some high priority areas of the lake. During their survey they found no zebra mussels.

Watercraft Inspections (brief overview; see full report for more detail)

- Hours: Inspectors performed 579 inspection hours on Bone Lake. Based on funding allocations, this year's goal was 500 hours.
- Surveys: 1007 inspection surveys were performed on Bone Lake.
- Reports:
 - Chisago County: 2022 AIS Prevention Report (Expected in early 2023)
 - CLFLWD: 2022 Watercraft Inspection Program Report

Bone Lake AIS Prevention and Management



		Revenues		Expenses		Annual Balance	Timeline (2022-2023)											
		CLFLWD	Grants/Other	BWS	Other		April	May	June	July	August	Sept	Oct	Nov	December	January	February	
		\$ 9,000	\$ 7,000	\$ (4,700)	\$ (13,391)	\$ (2,091)												
Curly-Leaf Pondweed (CLP)	Work Task	CLFLWD	Grants/Other	BWS*	Other	Total Expense												
	Surveys-Report		\$ 1,500	\$ (1,900)		\$ (1,900)	BWS			BWS								
	Permitting/Public Notice	\$ 1,100				\$ -	WD											
	Management				\$ -	\$ -	Lake Mgmt Inc.											
	Total	\$ 1,100	\$ 1,500	\$ (1,900)	\$ -	\$ (1,900)												
Eurasian Watermilfoil (EWM)	Work Task	CLFLWD	Grants/Other	BWS	Other	Total Expense												
	Surveys-Report	\$ 1,900		\$ (1,900)		\$ (1,900)	BWS			BWS								
	Coordination/Mgmt Assistance					\$ -	WD											
	Total	\$ 1,900	\$ -	\$ (1,900)	\$ -	\$ (1,900)												
Rough Fish Management	Work Task	CLFLWD	Grants/Other	BWS	Other	Total Expense												
	Spawning Observations	\$ -				\$ -	WD											
	Harvest					\$ -	TBD											
	Total	\$ -	\$ -	\$ -	\$ -	\$ -												
Zebra Mussels (ZM)	Work Task	CLFLWD	Grants/Other	BWS	Other	Total Expense												
	Samplers			\$ (900.00)		\$ (900.00)	WD											
	Total	\$ -	\$ -	\$ (900.00)	\$ -	\$ (900.00)												
Watercraft Inspections*	Work Task	CLFLWD	Grants/Other	BWS	Other	Total Expense												
	Inspection Hours	\$ 6,000	\$ 5,500		\$ (13,391)	\$ (13,391)	WD/Chisago Co.											
	Total	\$ 6,000	\$ 5,500	\$ -	\$ (13,391)	\$ (13,391)												
2022 General Program Management							WD/EOR											

Figures in italics are cost estimates/haven't been invoiced yet

*Planned watercraft inspection funding sources include:

- CLFLWD levy: \$6,000 (1 access)
- Washington County AIS Prevention grant rec. award: \$1,000 (same as last year)
- Bone Lake Association: \$3000
- City of Scandia: \$1,000
- Scandia Lions Club: \$500

2021 Work	Status Summary
CLP surveys and management	4.38 acres of CLP was treated on May 26th. This year the treatment had full lake control.
EWM surveys and coordination	EWM was mostly observed as light growth this year.
Zebra mussel early detection	Two surveys were performed this year and both found no signs of zebra mussels
Carp management	Continued operation of fish barrier per O&M.
Watercraft inspections	This year 747 inspections were performed over the course of 542.5 hours.

Bone Lake Water Quality Goals & Measured Averages					
	2020 Goal	2030 Goal	2040 Goal	5-Year Avg (2017-2021)	Long-Term Trend
Water quality rating at or above	C	B	B	B-	N/A
Mean summer phosphorus concentration below (µg/L)	40	30	30	27.4	Significantly Improving (-50%) since 2012
Mean summer secchi depth at or above (ft)	4	7	7	5.9	Significantly Improving (102%) since 2012

- Goals shown in green are currently being met according to their latest 5-year average
- Improving or declining trends means that the water quality parameter is consistently increasing or decreasing from year to year over the time period, but NOT in a statistically significant way.
- Significantly improving or significantly declining means that the water quality parameter is consistently increasing or decreasing from year to year over the time period, AND in a statistically significant way. The percent change in the parameter over the entire time period is reported for statistically significant trends.
- A scientific trend analysis of District lake water quality is available in the District's Draft 2021 Water Monitoring Report available at https://www.clflwd.org/documents/2021_Monitoring_Report_FINAL.pdf

DNR Lake Classification: Recreational Development

2022 Work	Status Summary
CLP surveys and management	No CLP treatment needed in 2022.
EWM surveys and coordination	Mostly light growth found along the perimeter of the lake
Zebra mussel early detection	A zebra mussel veliger tow occurred in July. Analysis of the samples found no veligers.
Common carp management	Continued operation of fish barrier per O&M.
Watercraft inspections	In 2022, there were 1007 watercraft inspection surveys conducted over the course of 579 hours.



Little Comfort Lake

2022 Yearend Report

Curly-leaf Pondweed (CLP)

- The 2022 budget did not contain funding for curly-leaf management in Little Comfort Lake. On August 2nd, District staff conducted a meandering survey for CLP and found several locations with light growth. Given the sparse growth in the lake, no removal was deemed necessary for 2022.

Eurasian Watermilfoil (EWM)

- Eurasian watermilfoil was first discovered in Little Comfort Lake in 2021 by the MN Department of Natural Resources Invasive Species Program.
- During the August 2nd survey, District staff found several locations of very light EWM growth.
- In 2023, District staff will assess the feasibility of hand pulling EWM from Little Comfort Lake.

Little Comfort Lake AIS Prevention and Management



		Revenues		Expenses		Annual Balance	Timeline (2022-2023)										
		CLFLWD	Grants	BWS	Other		April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
		\$ -	\$ -	\$ -	\$ -	\$ -											
Curly-Leaf Pondweed (CLP)	Work Task	CLFLWD	Grants	BWS	Other	Total Expense											
	Survey					\$ -		WD									
	Summary					\$ -		WD									
	Total	\$ -	\$ -	\$ -	\$ -	\$ -											
Zebra Mussels (ZM)	Work Task	CLFLWD	Grants	BWS	Other	Total Expense											
	Samplers					\$ -		WD									
	Total	\$ -	\$ -	\$ -	\$ -	\$ -											
2022 General Program Management							WD/EOR										

2021 Work	Status Summary
CLP survey	Staff conducted a survey on July 22nd.
Zebra mussel early detection	No volunteer was found in 2021.

Little Comfort Lake Water Quality Goals & Measured Averages					
	2020 Goal	2030 Goal	2040 Goal	5-Year Avg (2017-2021)	Long-Term Trend
Water quality rating at or above	C	C	B	C+	N/A
Mean summer phosphorus concentration below (µg/L)	40	40	30	44	Improving since 2012
Mean summer secchi depth at or above (ft)	5	7	7	5.2	Declining since 2012

2022 Work	Status Summary
CLP survey	Staff performed an early detection survey on August 2nd.

- Goals shown in green are currently being met according to their latest 5-year average
- Improving or declining trends means that the water quality parameter is consistently increasing or decreasing from year to year over the time period, but NOT in a statistically significant way.
- Significantly improving or significantly declining means that the water quality parameter is consistently increasing or decreasing from year to year over the time period, AND in a statistically significant way. The percent change in the parameter over the entire time period is reported for statistically significant trends.
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DNR Lake Classification: General Development



Shields Lake

2022 Yearend Summary

Rough Fish Management

- Carp Removal

- Brief Background (Same as 2021): A common carp removal was attempted during the Fall of 2019 and yielded less carp than expected. In total, only 71 carp were removed that amounted to roughly 1,006lbs of biomass. According to WSB's "Shields Lake: 2019 Carp Removal Project Report" there were between 364 and 630 individual carp that need to be removed from the lake to reach management goals. To achieve these goals, the CLFLWD hired WSB again in 2020 to attempt another removal. To avoid disturbing lake bottom sediment after the District performed an alum treatment during the Fall of 2019, WSB and District staff sought removal strategies that were outside the main body of Shields Lake. Temporary barriers were installed at the outlet of lake near the mouth of a shallow pond that eyewitnesses claimed was used for spawning. Ultimately, the plan failed to capture any carp.
- Electrofishing in 2022: To achieve a higher level of confidence in Shield Lake's common carp population estimates, District staff contracted with WSB again to perform electrofishing attempts in 2022. WSB and District staff visited the lake on 3 separate dates, June 21st, October 14th, and October 20th. During those visits, only 7 carp were removed from Shields Lake, which totaled roughly 3.62 kg/ha of biomass removed from the basin.
- Discussion and Results:

District staff have long suspected the actual carp population to be less than what past population estimates have predicted. This skepticism was due to observations made by staff and project partners and concerns about data skewing. Specifically, the majority of carp removed from the basin since 2018 have been captured near a specific downed tree on the eastern shoreline. Capturing fish primarily in one location can cause the CPUE (capture per unit effort) population estimate to overestimate the number of fish in a basin. Furthermore, studies have shown smaller basins, like Shields Lake, are inherently more prone to overestimations while using the CPUE method.

Results of the three electrofishing attempts in 2022 were used to calculate an updated CPUE population estimate, which now suggests there are between 39.9 ± 26.3 kg/ha of carp biomass remaining in the lake. This estimate puts Shields Lake below the District's adopted management threshold of 100 kg/ha, which is accepted by scientists as the level where carp biomass has minimal impact on water quality. Conservatively, WSB has recommended future management activities be decided with the upper limits of this estimate in-mind.

Curly-leaf pondweed (CLP)

- Delineation: On April 21st, Blue Water Science (BWS) conducted a curly-leaf pondweed delineation on Shields Lake and marked 3.27 acres for treatment.
- Treatment: On May 27th, Lake Management Inc. treated all 3.27 acres with Aquathol K at a dose rate of 3.2 gallons per acre.
- Assessment: Blue Water Science performed a treatment assessment on June 7th and found it had whole lake control with no viable CLP found.
- Report: BWS: Delineation and Assessment Report (Summary distributed in December, full report in January 2023).

Shields Lake AIS Prevention and Management



		Revenues		Expenses		Annual Balance	Timeline (2022-2023)											
		CLFLWD	Grants	BWS	Other		April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	
		\$ 8,300	\$ 1,500	\$ (3,100)	\$ (5,901)	\$ 799												
Fish Barrier*	Work Task	CLFLWD	Grants	Staff/EOR	Other	Total Expense												
	Retrofit Project					\$ -												
	Planning/Inspections/Oversight					\$ -												
	Total	\$ -	\$ -	\$ -	\$ -	\$ -												
Zebra Mussels	Work Task	CLFLWD	Grants	BWS	Other	Total Expense												
	Samplers					\$ -	WD											
	Total	\$ -	\$ -	\$ -	\$ -	\$ -												
Curly-Leaf Pondweed	Work Task	CLFLWD	Grants	BWS	Other	Total Expense												
	Surveys-Report		\$ 1,500	\$ (3,100)		\$ (3,100)	BWS											
	Permitting/Public Notice	\$ 3,300				\$ -	WD											
	Management				\$ (1,347)	\$ (1,347)	Lake Mgmt. Inc.											
	Total	\$ 3,300	\$ 1,500	\$ (3,100)	\$ (1,347)	\$ (4,447)												
Rough Fish Management	Work Task	CLFLWD	Grants	BWS	Other	Total Expense												
	Survey	\$ 5,000			\$ (4,554)	\$ (4,554)	Contractor											
	Total	\$ 5,000	\$ -	\$ -	\$ (4,554)	\$ (4,554)												
2022 General Program Management							WD/EOR											

Figures in italics are cost estimates/haven't been invoiced yet

Shields Lake Water Quality Goals & Measured Averages					
	2020 Goal	2030 Goal	2040 Goal	5-Year Avg (2017-2021)	Long-Term Trend
Water quality rating at or above	D	C	C	C-	N/A
Mean summer phosphorus concentration below (µg/L)	100	60	60	120	Significantly improving since 2012 (-83%)
Mean summer secchi depth at or above (ft)	4.26	4.26	4.26	3.8	Improving since 2012

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- A scientific trend analysis of District lake water quality is available in the District's Draft 2021 Water Monitoring Report available at https://www.clflwd.org/documents/2021_Monitoring_Report_FINAL.pdf

DNR Lake Classification: Natural Environment

2021 Work	Status Summary
Zebra mussel early detection	No volunteer was found in 2021.
Curly-leaf pondweed planning	3.17 acres of CLP were treated on May 26th. Results of the treatment were very good, with only a couple light patches left.
Rough fish management	Staff is researching alternative carp removal options for possible future attempts.

2022 Work	Status Summary
Zebra mussel early detection	Staff will monitor the lake for the presence of zebra mussels by checking lake debris and man-made structures.
Fish barrier	Operate per O&M manual.
Curly-leaf pondweed	Full lake control of CLP was achieved this year again
Rough fish management	Three electrofishing attempts were conducted on Shields Lake in 2022. Beyond just removing invasive carp, these three surveys helped strengthen the carp population estimates for the lake.



Lake Keewahtin

2022 Yearend Summary

AIS early detection survey

- District staff performed an AIS early detection survey on July 29th. During this survey, staff looked for new invasive species such as Eurasian watermilfoil, flowering rush, or starry stonewort and monitored the distribution of existing invasive species, purple loosestrife and curly-leaf pondweed.

Curly-leaf pondweed (CLP)

- During the July 29th early detection survey, staff did not observe any CLP in the lake. For comparison, in 2021 staff only found a couple locations in the entire lake with very light growth.

Purple loosestrife

- During the July 29th early detection survey, staff also conducted a purple loosestrife delineation which identified 2.9 acres total for treatment. PLM Lake & Land Management performed an herbicide treatment on August 31st. Following treatment, District staff conducted a treatment assessment on October 6th and found the treatment had good control. However, areas with denser growth will require at least a couple more seasons of treatment to get under control.

Lake Keewahtin AIS Prevention and Management



		Revenues		Expenses		Annual Balance	Timeline (2022-2023)										
		CLFLWD	Grants	BWS	Other		April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
		\$ 1,500	\$ -	\$ -	\$ (800)	\$ 700											
Purple Loosestrife	Work Task	CLFLWD	Grants	BWS	Other	Total Expense											
	Check-Up Assessment	\$ 1,500				\$ -											
	Treatment				\$ (800)	\$ (800)											
	Total	\$ 1,500	\$ -	\$ -	\$ (800)	\$ (800)											
AIS Detection Survey	Work Task	CLFLWD	Grants	BWS	Other	Total Expense											
	Survey																
	Total	\$ -	\$ -	\$ -	\$ -	\$ -											
Zebra Mussels	Work Task	CLFLWD	Grants	BWS	Other	Total Expense											
	Samplers			\$ -		\$ -											
	Total	\$ -	\$ -	\$ -	\$ -	\$ -											
Curly-leaf Pondweed	Work Task	CLFLWD	Grants	BWS	Other	Total Expense											
	Hand pulling					\$ -											
	Total	\$ -	\$ -	\$ -	\$ -	\$ -											
2022 General Program Management																	

2021 Work	Status Summary
AIS early detection survey	Conducted on June 24th.
Purple loosestrife check-up	Good control this year.
Zebra mussel early detection	Find a volunteer
Curly-leaf pondweed pulling	Removal not warranted

2022 Work	Status Summary
AIS early detection survey	Conducted on July 29th
Purple loosestrife	Treatment performed on August 31st
Curly-leaf pondweed	None found during survey

Lake Keewahtin Water Quality Goals & Measured Averages					
	2020 Goal	2030 Goal	2040 Goal	5-Year Avg (2016-2020)	Long-Term Trend
Water quality rating at or above	A	A	A	A	N/A
Mean summer phosphorus concentration below (µg/L)	20	20	20	15.3	Declining since 2012
Mean summer secchi depth at or above (ft)	10	10	10	12.9	Declining since 2012

- Goals shown in green are currently being met according to their latest 5-year average
- Improving or declining trends means that the water quality parameter is consistently increasing or decreasing from year to year over the time period, but NOT in a statistically significant way.
- Significantly improving or significantly declining means that the water quality parameter is consistently increasing or decreasing from year to year over the time period, AND in a statistically significant way. The percent change in the parameter over the entire time period is reported for statistically significant trends.
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DNR Lake Classification: Recreational Development



Forest Lake

2022 Yearend Summary

Curly-leaf Pondweed (CLP)

- **Delineation:** Blue Water Science (BWS) conducted a curly-leaf pondweed delineation on May 6th and identified 9 areas totaling 103.96 acres for treatment.
- **Treatment:** On May 24th, Lake Management Inc. treated all 103.96 acres of CLP with Diquat.
- **Assessment:** On June 13th, Blue Water Science conducted a treatment assessment and found it to be very effective within delineated areas. However, late season growth in the east basin of Forest Lake occurred after the delineation and therefore went untreated.
- **Reports:**
 - BWS: Delineation and Assessment report (Full report distributed in early-January).

Eurasian Watermilfoil (EWM)

- **Delineation #1:** Blue Water Science conducted an Eurasian watermilfoil delineation on June 13th and found only four locations in the west basin of Forest Lake with light growth. No treatment was recommended by BWS at that time.
- **Delineation #2:** A follow up delineation occurred on August 9th, during which BWS marked a 9.15-acre area for treatment in the west basin of Forest Lake.
- **Treatment:** Working with PLM Lake & Land Management, the Forest Lake Lake Association (FLLA) marked additional areas for treatment which brought the total to 22.3 acres across 9 different sites, all of which were in the west basin besides one in the middle basin.
- **Assessment:** BWS conducted an EWM treatment assessment on October 18th and found no viable EWM remaining within surveyed locations.
- **Reports:**
 - BWS: Delineation and Assessment report (Full report distributed in early-January).

Flowering Rush

- **Delineation 1:** On July 12th, Blue Water Science performed the first delineation of 2022 and found 35 sites with a combined acreage of 0.17.
- **Treatment Round 1:** On July 29th, PLM Lake and Land Management Corp. conducted the season's first herbicide treatment.
- **Flower Cutting:** Due to abnormally high abundances, staff visited the lake frequently throughout the open water season and removed more than 2,487 seed heads. Same as last year, the increase in flowering seed heads is thought to be linked to the low water levels which provided more shallow water habitat and exposed shoreline.
- **Delineation 2:** On August 9th, Blue Water Science found 157 sites with regrowth that totaled 0.57 acres.
- **Treatment Round 2:** Using information from the second delineation survey, PLM performed the 2nd round of herbicide treatment on September 19th.

- Final Assessment: Blue Water Science's final treatment assessment was performed on October 18th and found flowering rush remaining at only 25 sites totaling about 0.29 acres.
- Reports:
 - BWS: Delineation and assessment report (Full report distributed in December).

Zebra Mussels

- Monitoring: Four zebra mussel sampling plates were deployed on Forest Lake this year. Zebra mussels were discovered in Forest Lake in 2015. It is expected that densities will continue to rise over the upcoming years, then potentially crash after reaching a peak.

Purple Loosestrife

- Delineation: Staff performed a purple loosestrife delineation and marked 8 locations for treatment totaling 4.75 acres.
- Treatment: PLM Lake & Land Management performed an herbicide treatment on August 31st.
- Assessment: Staff performed an assessment survey on October 5th and found the treatment had good control within delineated areas. Only light growth was found at that time, primarily in areas that were most heavily infested with purple loosestrife. Overall, staff are observing a decline in purple loosestrife abundance and distribution, but a couple more years of treatment are needed for certain areas of the lake.

Watercraft Inspections (brief overview; see full report for more detail)

- Hours: District inspectors performed 2,071.25 inspection hours on Forest Lake. DNR inspectors performed 380 inspection hours on Forest Lake (at no cost to the District). Inspection hours on Forest Lake totaled 2,451.25. Based on funding allocations, this year's goal was 1,889 hours.
- Surveys: A combined total of 7,056 inspection surveys were performed on Forest Lake (5,860 by District inspectors, 1,196 by DNR inspectors).
- Reports:
 - Chisago County: 2022 AIS Prevention Report (Expected in early 2023)
 - CLFLWD: 2022 Watercraft Inspection Program Report

Forest Lake AIS Prevention and Management



		Revenues		Expenses		Annual Balance	Timeline (2022-2023)											
		CLFLWD	Grants/Other	BWS	Other			April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
		\$ 74,000	\$ 38,841	\$ (12,200)	\$ (70,335)	\$ 30,306												
Curly-Leaf Pondweed	Work Task	CLFLWD	Grants/Other	BWS	Other	Total Expense												
	Delin-Report			\$ (2,900)		\$ (2,900)												
	Permitting/Public Notice	\$ 41,356			\$ (58)	\$ (58)												
	Management		\$ 7,714		\$ (19,025)	\$ (19,025)												
	Total	\$ 41,356	\$ 7,714	\$ (2,900)	\$ (19,082)	\$ (21,982)												
Flowering Rush	Work Task	CLFLWD	Grants/Other	BWS	Other	Total Expense												
	Delin-Report			\$ (6,100)		\$ (6,100)												
	Permit/Outreach/Pub. Notice	\$ 11,444	\$ 7,000		\$ (1,014)	\$ (1,014)												
	Management				\$ (3,296)	\$ (3,296)												
	Total	\$ 11,444	\$ 7,000	\$ (6,100)	\$ (4,310)	\$ (10,410)												
Eurasian Watermilfoil	Work Task	CLFLWD	Grants/Other	BWS	Other	Total Expense												
	Surveys-Report	\$ 3,200		\$ (3,200)		\$ (3,200)												
	Coordination/Mgmt Assistance					\$ -												
	Total	\$ 3,200	\$ -	\$ (3,200)	\$ -	\$ (3,200)												
Purple Loosestrife	Work Task	CLFLWD	Grants/Other	BWS	Other	Total Expense												
	Treatment				\$ (1,648)	\$ (1,648)												
	Total	\$ -	\$ -	\$ -	\$ (1,648)	\$ (1,648)												
Watercraft Inspections*	Work Task	CLFLWD	Grants/Other	BWS	Other	Total Expense												
	Inspection Hours	\$ 18,000	\$ 24,127	\$ -	\$ (45,295)	\$ (45,295)												
	Total	\$ 18,000	\$ 24,127	\$ -	\$ (45,295)	\$ (45,295)												
Plant Harvester	Work Task	CLFLWD	Grants/Other	BWS	Other	Total Expense												
	DNR Aquatic Plant Mgmt Permitting					\$ -												
	Harvester Operation					\$ -												
	Total	\$ -	\$ -	\$ -	\$ -	\$ -												
Macrophyte Survey	Work Task	CLFLWD	Grants/Other	BWS	Other	Total Expense												
	Point-Intercept Survey	\$ -	\$ -	\$ -	\$ -	\$ -												
2022 General Program Management																		

Figures in italics are cost estimates/haven't been invoiced yet

*Watercraft inspection funding sources include:

CLFLWD levy: \$18,000 (3 accesses)

Washington County AIS Prevention grant rec. award: \$14,354

Forest Lake Lake Association: No Financial Contribution

City of Forest Lake: \$9,772.82

Forest Lake Water Quality Goals & Measured Averages							
	2020 Goal	2030 Goal	2040 Goal	5-Year Avg (2017-2021)	Long-Term Trend		
Water quality rating at or above	C	C	B	B	Forest- West	Forest- Middle	Forest- East
Mean summer phosphorus concentration below (µg/L)	37	30	30	35.4	Sig. Improving (-38%) since 2012	Declining since 2012	Declining since 2012
Mean summer secchi depth at or above (ft)	5	7	7	6.7	Sig. Improving (+110%) since 2012	Improving since 2012	Significantly improving since 2012 (52%)

- Goals shown in green are currently being met according to their latest 5-year average
- Improving or declining trends means that the water quality parameter is consistently increasing or decreasing from year to year over the time period, but NOT in a statistically significant way.
- Significantly improving or significantly declining means that the water quality parameter is consistently increasing or decreasing from year to year over the time period, AND in a statistically significant way. The percent change in the parameter over the entire time period is reported for statistically significant trends.
- A scientific trend analysis of District lake water quality is available in the District's Draft 2021 Water Monitoring Report available at https://www.clflwd.org/documents/2021_Monitoring_Report_FINAL.pdf

DNR Lake Classification: General Development

2021 Work	Status Summary
CLP surveys & management	120.34 acres of CLP were treated on May 26th with good results. However, a couple patches in Forest Lake 1 and 3 were missed.
EWM surveys & coord.	Some EWM control may have occurred due to the District using Diquat for it's CLP treatment this year. FLA treated light growth patched in the west basin of the lake.
FR surveys & management	The final assessment only found 0.13 acres of FR left in the lake.
Watercraft inspections	7,605 surveys and 2,454.5 hours worked.

2022 Work	Status Summary
CLP surveys & management	The May 24th treatment was very successful within delineated areas.
Watercraft Inspections	In 2022, inspectors performed 7,056 watercraft inspection surveys over the course of 2,071 hours.
EWM surveys & coord.	The FLA contracted LMI to perform a 22.3 acre EWM treatment. No viable EWM was found following the treatment.
FR surveys & management	In 2022, the District performed two rounds of herbicide treatment and extensive seed head monitoring and clipping. At the end of the season, only 25 sites totaling less than 0.29 acres remained in the lake.
ZM population monitoring	4 volunteers helped monitor this year
Purple Loosetrife	The August 31st treatment had good control within delienation areas.



Comfort Lake

2022 Yearend Summary

Curly-leaf Pondweed (CLP)

- **Delineation:** Blue Water Science (BWS) performed a delineation survey on April 19th and found primarily light growth at a few locations that did not warrant treatment.
- **Treatment:** The District did not treat CLP on Comfort Lake in 2022 (same as the last six years).
- **Assessment:** BWS performed assessment survey on June 10th and only found a slight increase in distribution. Despite finding a few more locations, growth remained primarily light throughout the lake.
- **Reports:**
 - BWS: Delineation and Assessment report (Full report distributed in December)

Eurasian Watermilfoil

- **Point Intercept Survey 1:** To meet the requirements of the Comfort Lakes Association's EWM treatment permit, the District contracted Blue Water Science to perform a point intercept survey instead of the usual meandering survey. Results of this survey found light to heavy growth, primarily located along the southern half of the lake's shoreline.
- **Treatment #1:** The District did not treat EWM in 2022. However, the Comfort Lakes Association (CLA) received a grant and permit from the Minnesota DNR to perform a whole lake fluridone treatment. The CLA contracted Lake Management Inc (LMI), who began the 90-day treatment starting on June 22nd. Following the treatment's first dosing on June 22nd, LMI would regularly monitor the herbicide levels in the lake and perform bump applications to maintain a lake-wide concentration level of approximately 4ppb.
- **End of Treatment:** During the week of September 12th, LMI performed the final bump application for the whole lake fluridone treatment, which completed the project. Results of this type of treatment are anticipated to provide Comfort Lake with several years of EWM control.
- **Point Intercept 2:** On September 15th, BWS conducted another point intercept survey to assess the effectiveness of the treatment on EWM and to document the response of the native plant community. Results did show the treatment to be very successful in controlling EWM as no viable stems were found. However, significant negative impacts to the native plant community were also observed. Compared to the previous two point intercept surveys, there was an overall decrease in the number of submerged species, species distribution, and depth of colonization. While BWS and other professionals believe the native plant community will eventually recover, it may take several years for it to return to pre-treatment conditions.
- **Reports:**
 - BWS: Delineation and Assessment report (Full report distributed in December).

Zebra Mussels

- **Monitoring:** Three zebra mussel sampling plates were deployed on Comfort Lake this year. Zebra mussels were first discovered in Comfort Lake in 2017. It is expected that densities will continue to rise over the upcoming years, then potentially crash after reaching a peak.

Watercraft Inspections (brief overview; see full report for more detail)

- **Hours:** Inspectors performed 643.5 inspection hours on Comfort Lake. Based on funding allocations, this year's goal was 523 hours.
- **Surveys:** 893 inspection surveys were performed on Comfort Lake.
- **Reports:**
 - Chisago County: 2022 AIS Prevention Report (Expected in early 2023)
 - CLFLWD: 2022 Watercraft Inspection Program Report

Comfort Lake AIS Prevention and Management



		Revenues		Expenses		Annual Balance	Timeline (2022-2023)											
		CLFLWD	Grants/Other	BWS	Other		April	May	June	July	August	September	October	November	December	January	February	
		\$ 10,000	\$ 5,500	\$ (6,800)	\$ (14,092)	\$ (5,392)												
Curly-Leaf Pondweed	Work Task	CLFLWD	Grants/Other	BWS	Other	Total Expense												
	Surveys-Report			\$ (1,400)		\$ (1,400)	BWS						BWS					
	Permitting/Public Notice Management (N/A)	\$ 2,000				\$ -	WD											
	Total	\$ 2,000	\$ -	\$ (1,400)	\$ -	\$ (1,400)												
Eurasian Watermilfoil	Work Task	CLFLWD	Grants/Other	BWS	Other	Total Expense												
	Surveys-Report	\$ 2,000		\$ (5,400)		\$ (5,400)	BWS						BWS					
	Coordination/Mgmt Assistance					\$ -	WD											
	Total	\$ 2,000	\$ -	\$ (5,400)	\$ -	\$ (5,400)												
Zebra Mussels	Work Task	CLFLWD	Grants/Other	BWS	Other	Total Expense												
	Samplers					\$ -	WD											
	Total	\$ -	\$ -	\$ -	\$ -	\$ -												
Watercraft Inspections*	Work Task	CLFLWD	Grants/Other	BWS	Other	Total Expense												
	Inspection Hours	\$ 6,000	\$ 5,500		\$ (14,092)	\$ (14,092)	WD/Chisago Co.											
	Total	\$ 6,000	\$ 5,500	\$ -	\$ (14,092)	\$ (14,092)												
Macrophyte Survey	Work Task	CLFLWD	Grants/Other	BWS	Other	Total Expense												
	Point-Intercept Survey					\$ -												
	Total	\$ -	\$ -	\$ -	\$ -	\$ -												
2022 General Program Management							WD/EOR											

Figures in italics are cost estimates/haven't been invoiced yet

*Planned watercraft inspection funding sources include:

CLFLWD levy: \$6,000 (1 access)

Chisago County AIS Prevention Funds: \$5,000

Comfort Lake Association: \$500

Wyoming: TBD

2021 Work	Status Summary
CLP surveys & management	Blue Water Science's survey did not find sufficient CLP growth to warrant treatment this year.
EWM surveys & coordination	The CLA performed two treatments and the BWS treatment assessment found EWM growth around the perimeter of the lake.
Zebra mussel monitoring	3 individuals volunteered this year.
Watercraft inspections	This year 825 inspections were performed over the course of 554 hours.

Comfort Lake Water Quality Goals & Measured Averages					
	2020 Goal	2030 Goal	2040 Goal	5-Year Avg (2017-2021)	Long-Term Trend
Water quality rating at or above	C	C	B	B-	N/A
Mean summer phosphorus concentration below (µg/L)	40	30	30	30.9	Improving since 1994
Mean summer secchi depth at or above (ft)	5	7	7	6.3	Significantly Improving (+80%) since 2012

- Goals shown in green are currently being met according to their latest 5-year average
- Improving or declining trends means that the water quality parameter is consistently increasing or decreasing from year to year over the time period, but NOT in a statistically significant way.
- Significantly improving or significantly declining means that the water quality parameter is consistently increasing or decreasing from year to year over the time period, AND in a statistically significant way. The percent change in the parameter over the entire time period is reported for statistically significant trends.
- A scientific trend analysis of District lake water quality is available in the District's Draft 2021 Water Monitoring Report available at https://www.cflwd.org/documents/2021_Monitoring_Report_FINAL.pdf

2022 Work	Status Summary
CLP surveys & management	Blue Water Science did not find enough growth to warrant a treatment.
EWM surveys & coordination	Whole-lake fluridone treatment was conducted by LMI from June 22nd to mid-September
Watercraft inspections	District inspectors performed 893 inspection surveys over the course of 643.5 hours.

DNR Lake Classification: General Development