



2022 LFA Report


LFA System Year Two Analysis and Results

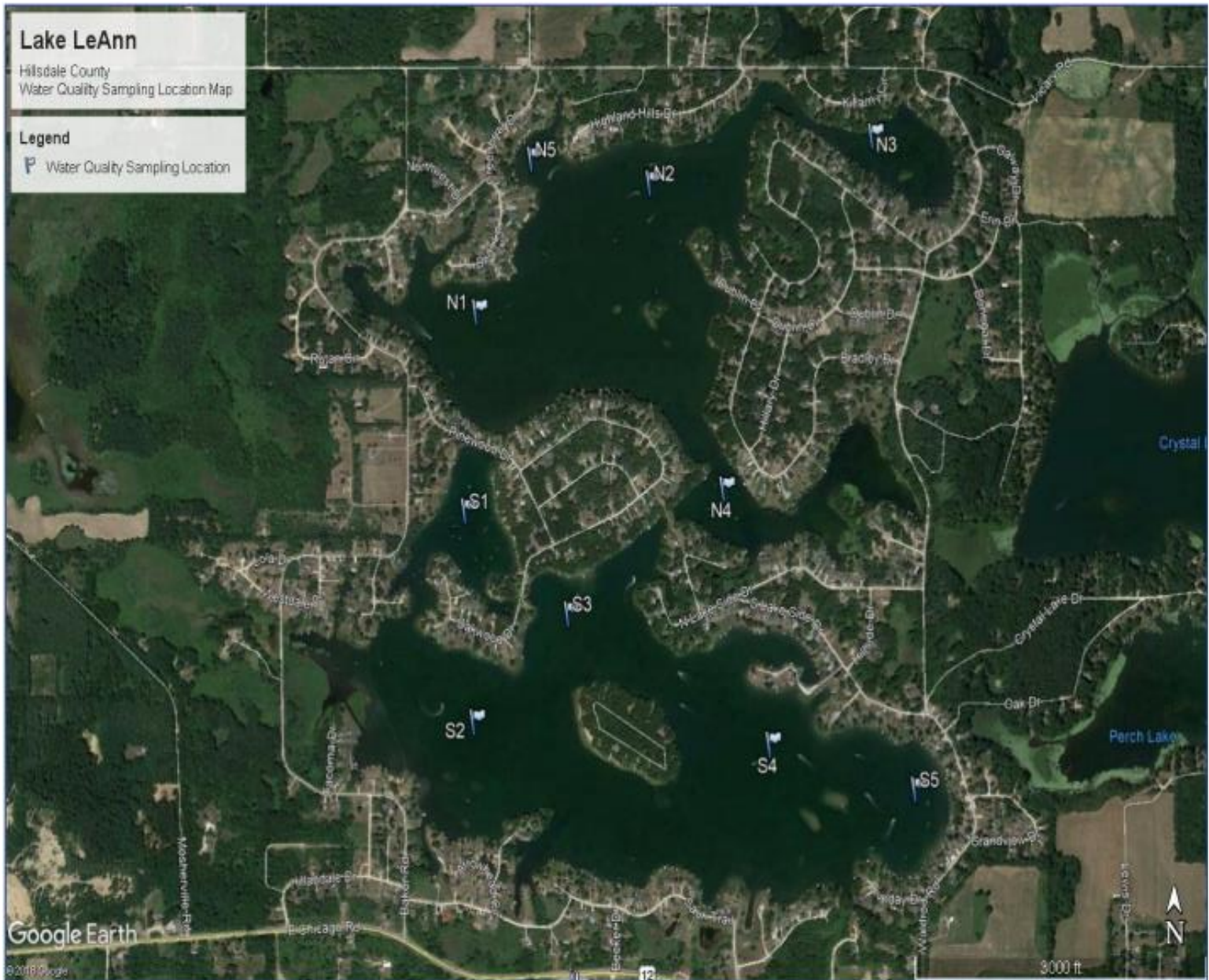
- ❖ Dissolved Oxygen (DO)
- ❖ Total Phosphorous (TP)
- ❖ Total Inorganic Nitrogen (TIN)
- ❖ Water Clarity (Secchi Disk)
- ❖ Cyanobacteria (Blue Green Algae)
- ❖ Muck Reduction

Lake LeAnn

Hillsdale County
Water Quality Sampling Location Map

Legend

 Water Quality Sampling Location



EXECUTIVE SUMMARY

1. We are seeing positive improvement trends on a year over year basis with some of the key initiatives.
2. Since the installation of the LFA system, LLPOA has drastically reduced the amount of chemicals used to treat the lakes. In 2021 we spent \$73,090, in 2022 we spent \$23,445 on weed control chemicals. This is a reduction of \$49,645 spent on vegetation chemicals.
3. EGLE sampling events 2021 vs 2022 would indicate that Chlorophyll-a is on the decline. In September of 2021 EGLE was out and identified 12 locations and in 2022 only 6 locations were identified.

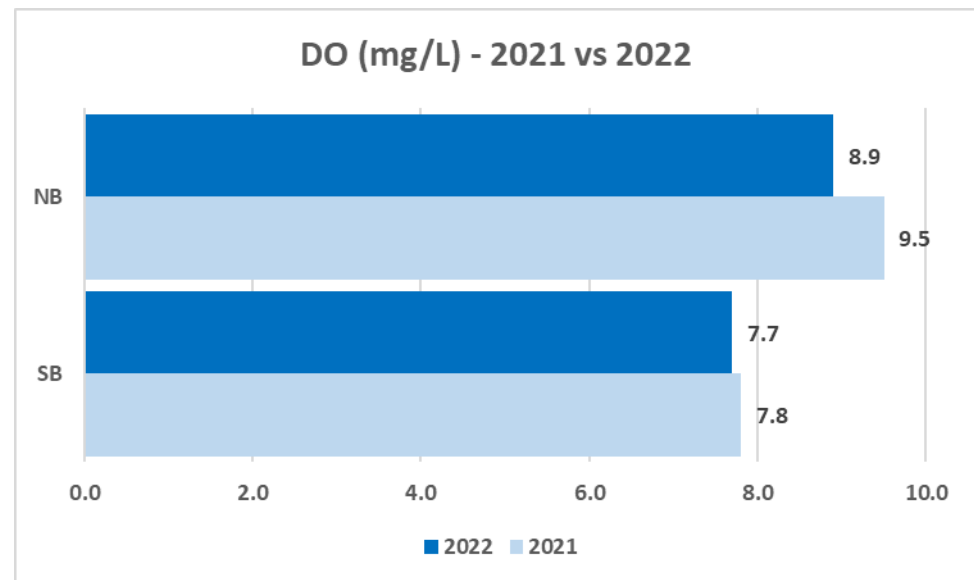
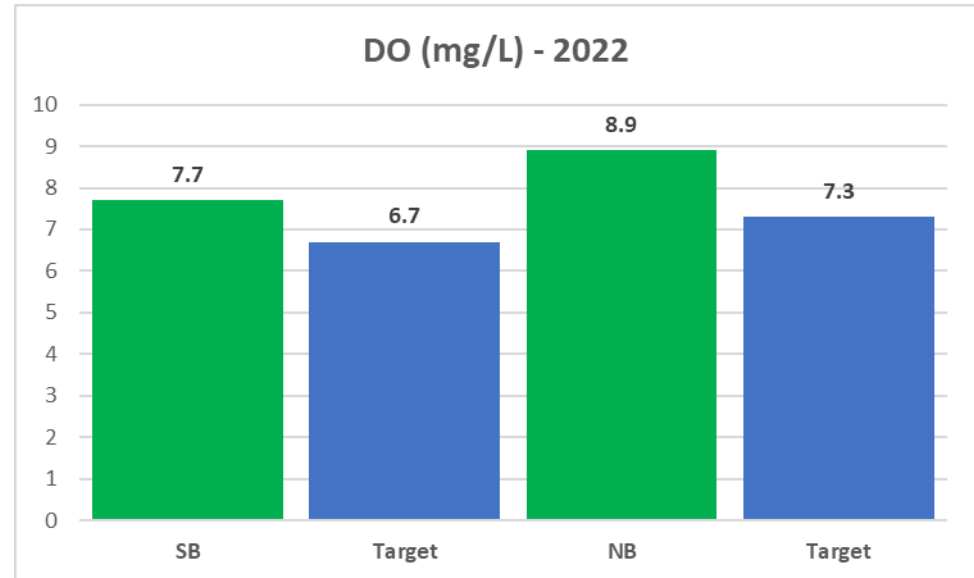
Dissolved Oxygen (DO)

TARGET:

SB / Maintain a Dissolved Oxygen (DO) minimum level of 4 mg/L at depths within 3 feet of bottom of the deepest diffuser and not less than 6mg/L in the first year and 6.7mg/L thereafter, at all other depths in waters at least 6 feet deep.

NB / Maintain a Dissolved Oxygen (DO) minimum level of 4 mg/L at depths within 3 feet of bottom of the deepest diffuser and not less than 6mg/L in the first year and 7.3mg/L thereafter, at all other depths in waters at least 6 feet deep.

- The LFA System did achieve the Dissolved Oxygen (DO) goal for both lakes
 - In our year over year comparison, we achieved our goal in both years, but in 2022 our DO readings were on average about 3% less than 2021 for both basins.
 - This year's data sets were taken in May, July, & September.
 - Our North Basin started out in May with a 9.7 average reading and finished in September with a 9.3 average reading. The July data set was the drag with a 7.8 average reading
 - Our South Basin started out with a 10.4 average reading and then started to decline in July and September with 5.5 and 7.2 average readings respectfully.

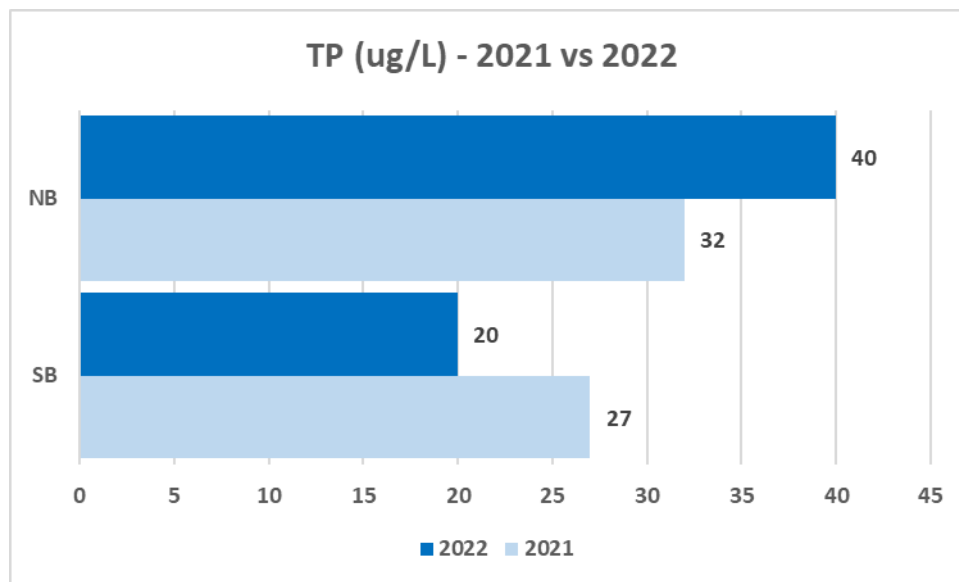
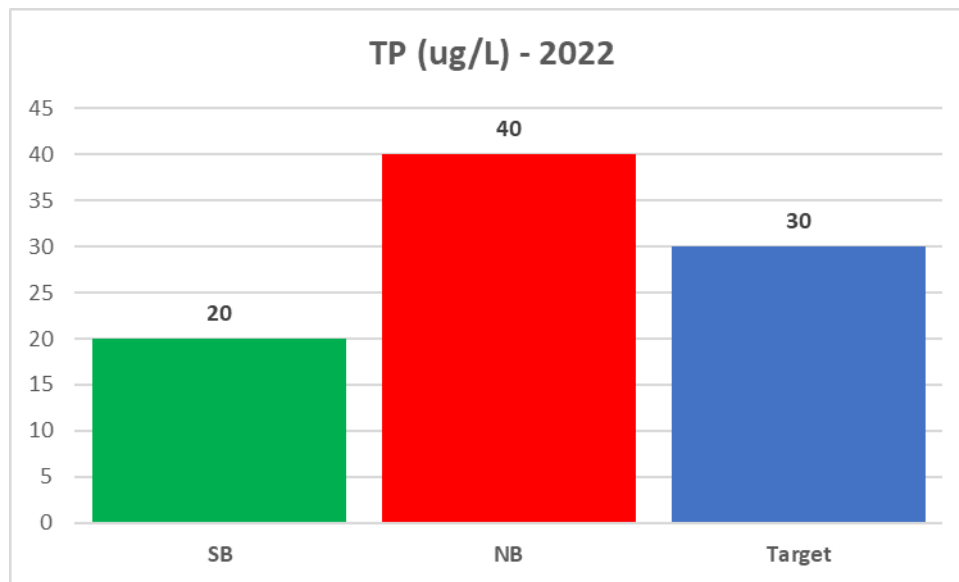


Total Phosphorous (TP)

TARGET:

Total Phosphorous (TP) maintained at ≤ 40 ug/L in the North Basin and ≤ 39 ug/L in the South Basin in the first year. ≤ 30 ug/L thereafter in both basins.

- The LFA System did achieve the Total Phosphorous (TP) target outlined in our agreement for the South Basin. The North Basin did not achieve the 30 ug/L target.
- Our target for 2022 was to be below 30 ug/L for both lakes.
- Our May and July readings were on target for the North Basin, the September reading of 61 ug/L caused the North Basin to fall short of the target.
- The North Basin (TP) increased year over year due to the higher September readings, which caused the average to exceed our goal.
- Please note that the September readings may have been skewed by the 43,664,094 gallons that the South Basin dumped into the North Basin under the direction of the Hillsdale Count Drain Commissioner to lower the water levels due to recent heavy rain events.



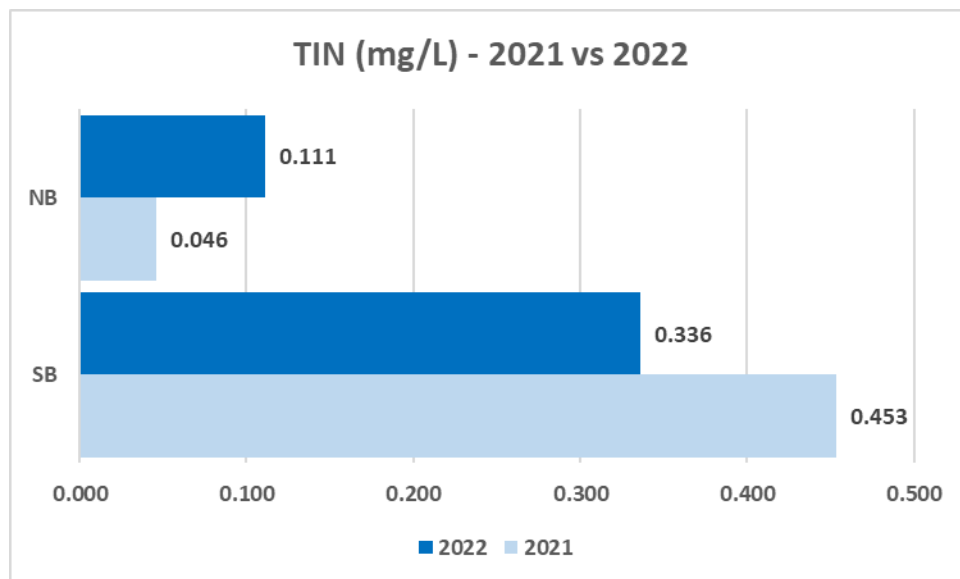
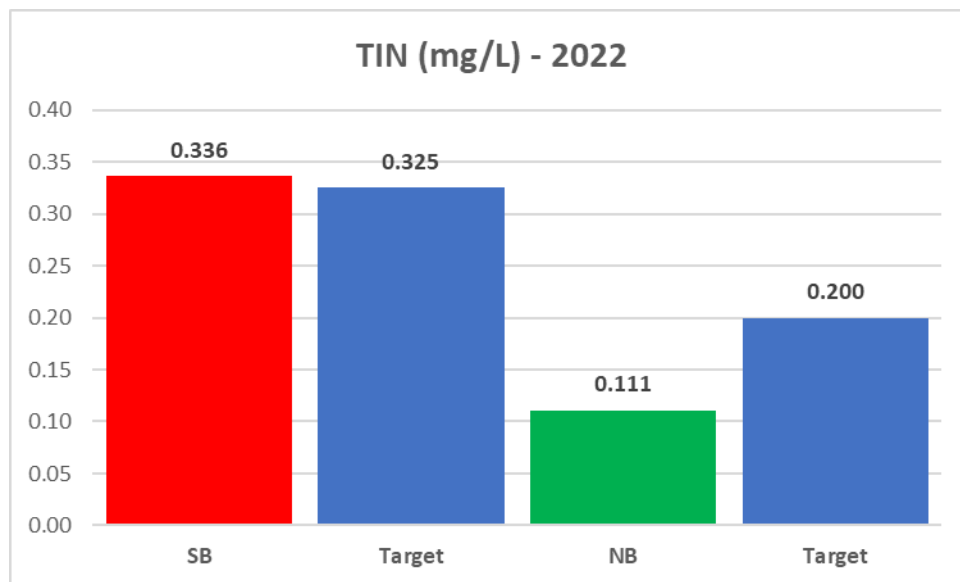
Total Inorganic Nitrogen (TIN)

TARGET:

SB/ Total Inorganic Nitrogen (TIN) maintained at <0.200-0.350 mg/L in the first year and <0.180-0.325 mg/L thereafter.

NB/ Total Inorganic Nitrogen (TIN) maintained at less than 0.057-0.220 mg/L in the first year and ≤ 0.050-0.200 mg/L thereafter.

- The LFA System did achieve the Total Inorganic Nitrogen (TIN) target outlined in our agreement for our North Basin.
- The South Basin did not achieve the TIN target. This was mostly impacted by our September reading of .484 mg/L. The prior two readings were in the .254 & .270 mg/L range.
- Our year over year comparison would indicate that TIN in our North Basin is increasing vs 2021 while South Basin improved significantly. The increase could be a direct result of external loading from lawn fertilizer, and CSA loading
- Similar to the TP data sets “We are working on mitigating the loading from the CSAs with the neighboring property owners and also will continue to test upstream of the lakes to help identify excessive (TP) sources”. In addition, all members must practice Best Management Practices for fertilizing lawns, burning leaves and septic maintenance for us to significantly reduce the nutrient loading.

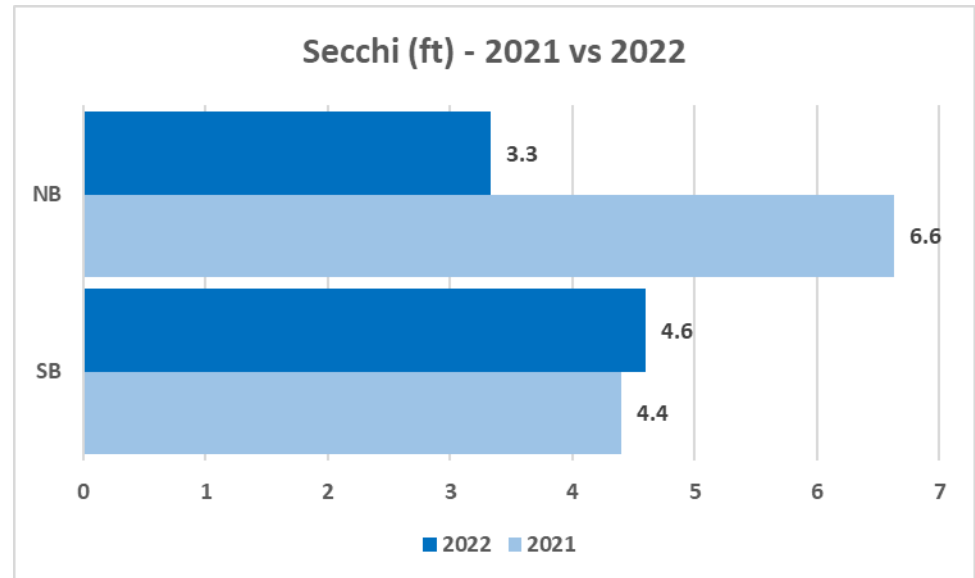


Water Clarity (Secchi Disk)

TARGET:

Water clarity (Secchi Disk) will be an increase of at least 2 feet over baseline by the third year with a minimum of 5" increase per year.

- The LFA System did not achieve the Water Clarity target as outlined in our agreement for both of our basins.
- Our year over year comparison would also indicate our water clarity is showing improvement in our South Basin while our North Basin is declining.
- There are many factors that impact this reading. We need to also note that these readings are only done 3x a year in May, July, and September. Mother Nature plays a role with the outcome of these data sets.
- See our Lake Managers comments on page 83 of the 2022 Water Quality Report, concerning Best Management Practices (BMP) regarding water clarity/Secchi).

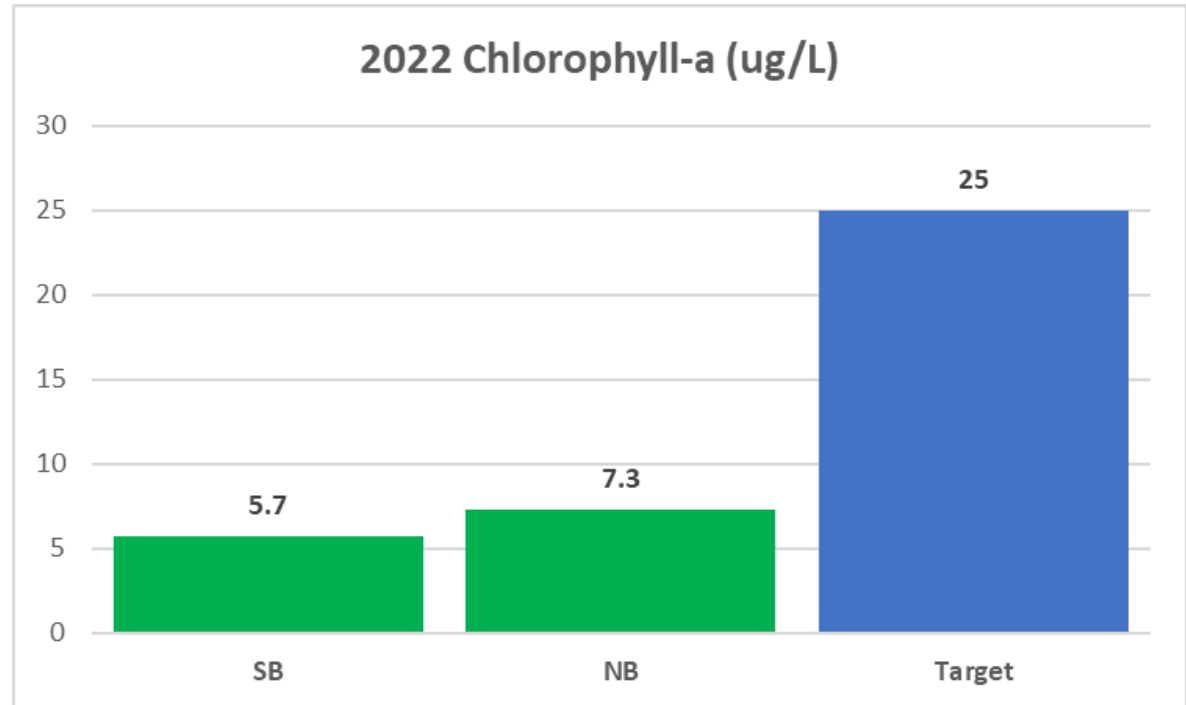


Chlorophyll-a (ug/L)

TARGET:

Chlorophyll-a at a level, using a calibrated in situ fluorimeter, not to exceed 30 ug/L in the first year, 25 ug/L in the second year and below 12 ug/L thereafter.

- The LFA System did achieve the Chlorophyll-a target outlined in our agreement for both of our basins.



Note:

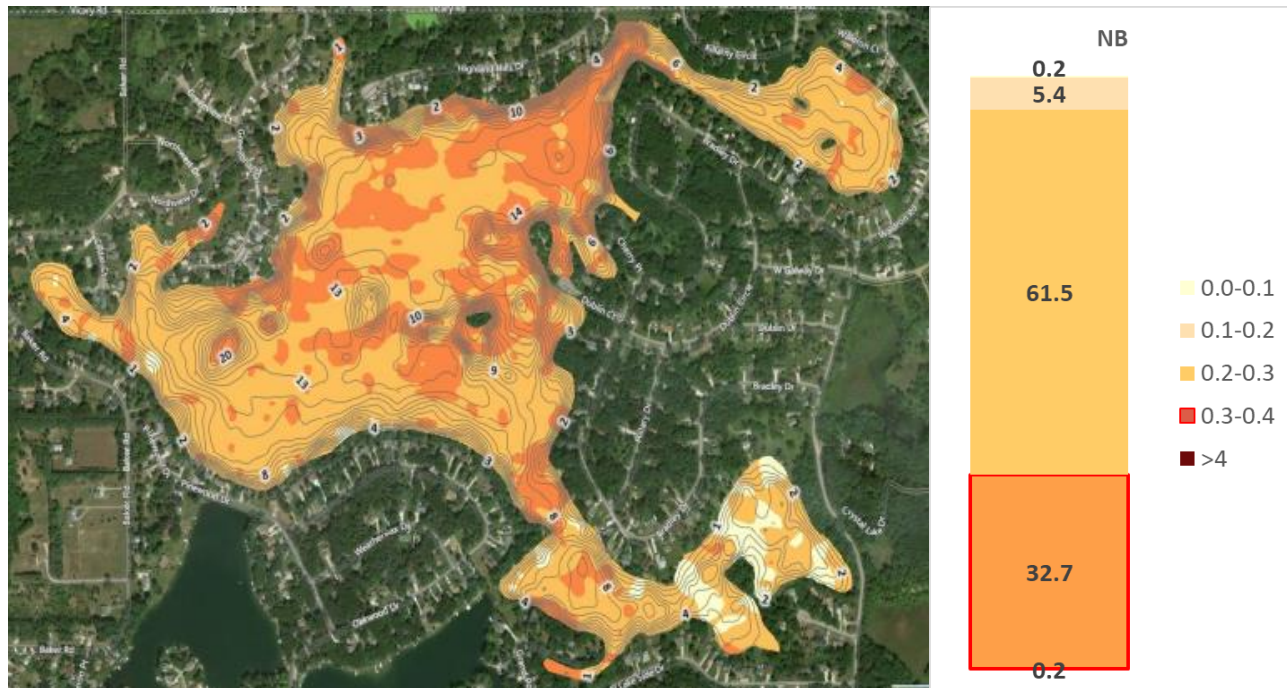
In September of 2021 EGLE was out and identified 12 locations, 6 on NL & 6 on SL, with microcystin concentrations of which 4 were >10ug/L, 3 on NL & 1 on SL.

In September of 2022 EGLE was back out on our lakes and identified 6 locations, 3 on NL & 3 on SL, (50% reduction vs 2021) with microcystin concentrations of which 2 were >10ug/L, 1 on NL & 1 on SL (50% reduction vs 2021) and both were at our boat launches.

Muck Reduction

Table 83. Lake LeAnn north basin relative hardness of the lake bottom by category or hardness and percent cover of each category (relative cover).

	Lake Bottom Relative Hardness Category	# GPS Points in Each Category (Total =7,986)	% Relative Cover of Bottom by Category
SOFT ↓ HARD	0.0-0.1	15	0.2
	0.1-0.2	429	5.4
	0.2-0.3	4910	61.5
	0.3-0.4	2612	32.7
	>0.4	20	0.2



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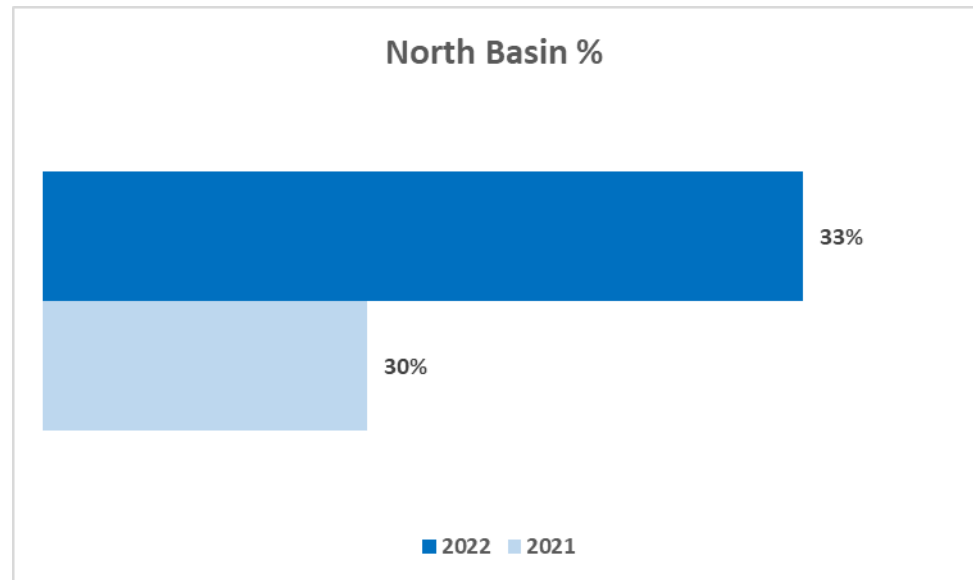
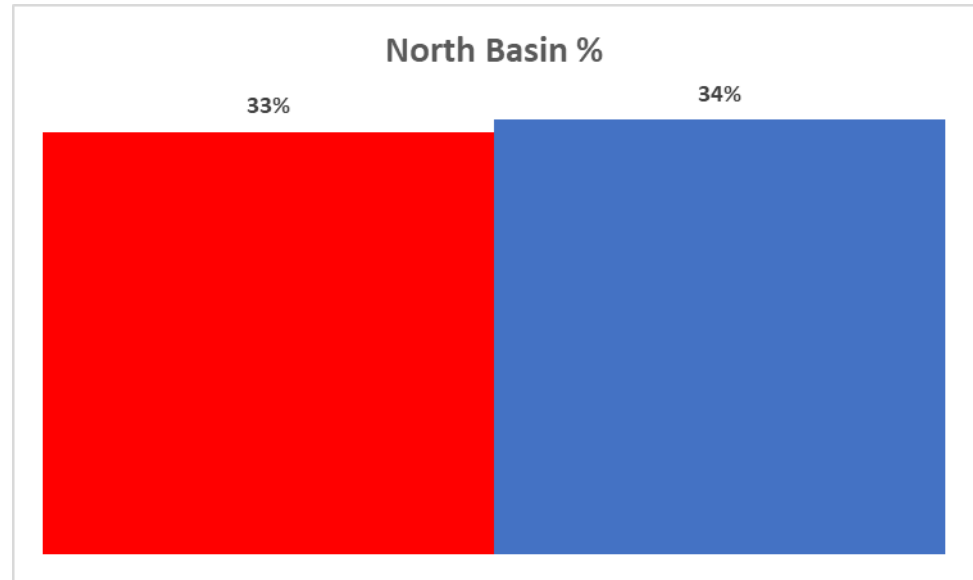
Muck Reduction – North Basin

TARGET:

Muck reduction in the first 3 years measured by BioBase scan in mid-September with an increase of 0.3-0.4 and >0.4 hardness categories by 2-5%.

- The LFA System did not achieve the North Basin Muck Reduction target outlined in our agreement but did score 97% of the target.

- With the year over year comparison, the LFA system is showing improvement on bottom hardness of +3% vs 2021.



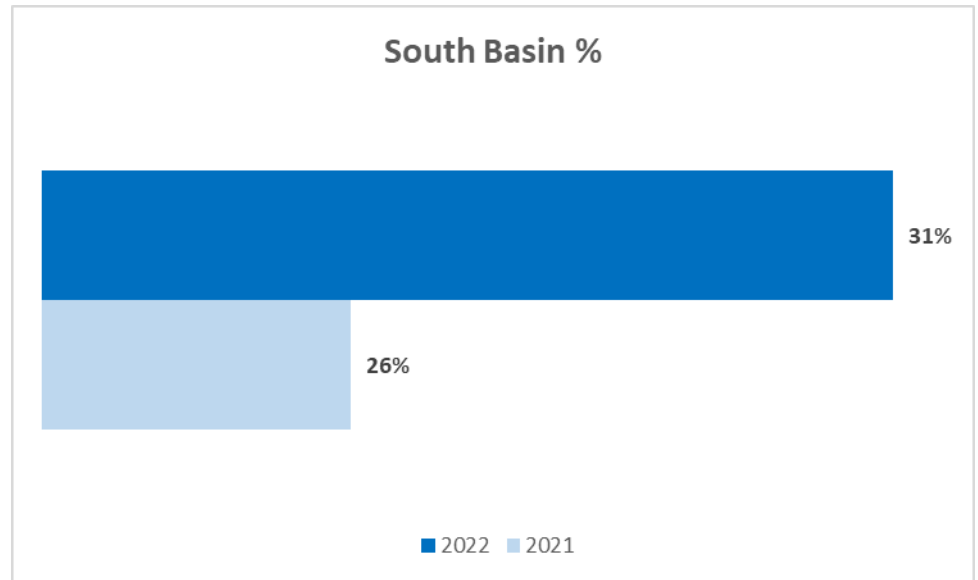
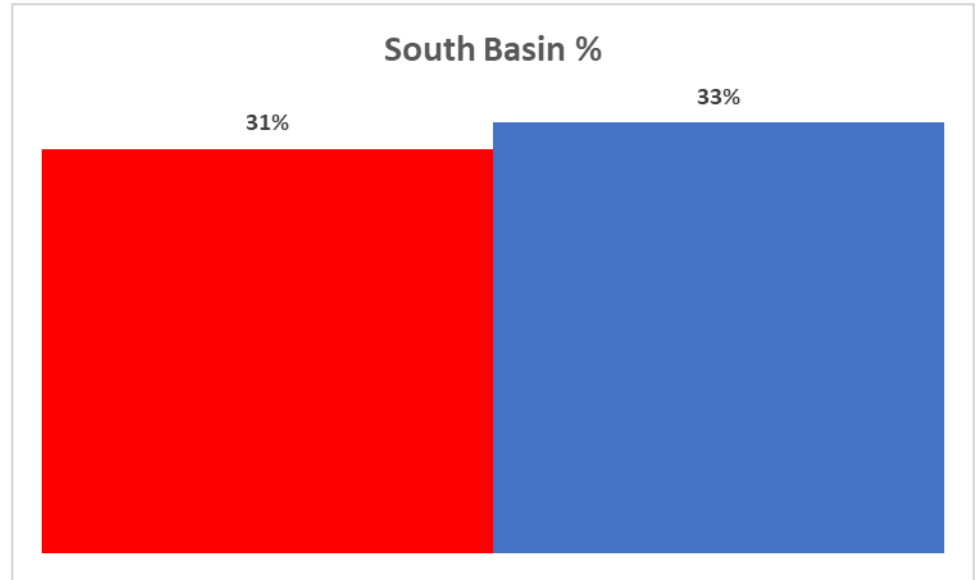
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Muck Reduction – South Basin

TARGET:

Muck reduction in the first 3 years measured by BioBase scan in mid-September an increase of 0.3-0.4 and >0.4 hardness categories by 2-5% per year.

- The LFA System did not achieve the South Basin Muck Reduction target outlined in our agreement but did score **94%** of the target.
- Our South Basin benefited the most on the year over year comparison.
- The LFA system has shown an improvement on bottom hardness of +5% vs 2021.



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IMPORTANT ADDITIONAL NOTES CONCERNING WATER QUALITY

In mid-July of 2022, the Drain Commissioner advised us that the water levels on both our lakes were critically high, and more rain was predicted to fall in the future. The Drain Commissioner needed to relieve 6" of water immediately from both Lakes. This meant that 6" of water from the 280-acre South lake (43,664,094 gal. or about 9% of NL total volume) was released into the 220-acre North Lake.

Unfortunately, at that time EverBlue was in the middle of the July Bio-Blast Treatment, which caused that treatment to be significantly diluted due to the water being relieved from the shallower North Lake. We later authorized an additional make-up Bio-Blast treatment in August to try to make up for the diluted treatment we lost when the lakes were lowered in mid-July.

This action may or may-not have impacted our September LFA water sampling event conducted by RLS.

“As previously stated, RLS encourages the LLPOA to work with its residents to follow lakeshore best management practices (BMP’s) such as proper annual inspection and pumping of septic systems and drain fields, protection of lakeshore emergent vegetation, preventing usage of lawn fertilizers and watering with lake water instead, and public education and outreach. If nutrient loads to the lake are not reduced, the efficacy of the LFA system will be reduced. Additionally, if the 2023 data do not show additional improvements, especially reductions in chlorophyll-a and increases in Secchi transparency, then the LLPOA may have to consider application of a nutrient inactivation method such as Phoslock® to reduce these blooms. Such a solution, however, is not sustainable as it will have to be applied many times through the years. Lastly, consideration should be given to avoiding the use of large wake boats on the lake. The lake is too irregular and shallow and sediment resuspension will continue to occur. This creates less clear water and also drives nutrients locked in the sediments into the water column that are then utilized by algae for increased growth.”













IN CONCLUSION

In our agreement with EBL the targets are either pass or fail, there is not an intermediate grading system.

- DO - In 2021 & 2022 the LFA system did achieve the target.
- TP NB - In 2021 the average was below 0.40 ug/L and the target was met. In 2022 the average was above the 0.30 ug/L target and was missed. The miss was driven by the unusually high average of 0.61 ug/L reading in September while the May and July average readings were 0.27 ug/L & 0.30ug/L respectfully.
- TP SB - In 2021 the target was below 0.39 ug/l and in 2022 the target was below 0.30 ug/L, both were achieved. TP in the SL continues to trend downward.
- TIN NB - In 2021 the average was below the 0.22 mg/L and in 2022 the average was below the 0.20 mg/L, the target was achieved in both years.
- TIN SB - The 2021 target was 0.35 mg/L and in 2022 the target was 0.325 mg/L and the SL missed the target both years.
- Secchi Disk - The target is +5" average over the 2019 baseline for 2021 & 2022 with a +24" over baseline for 2023, NL +8.0' and SL +8.7'. NL achieved the 2021 target, both lakes missed the 2022 target.
- Chlorophyll-a - The 2021 readings were only taken with the in-situ fluorimeter 1x. In 2022 we took 29 readings with the in-situ fluorimeter between both basins, we were never above 25 ug/L.
- Muck Reduction targets of +2% year over year for the first 3 years - Targets were missed in 2021 & 2022 on both lakes.
- In comparing 2021 vs. 2022, we are making positive progress towards increasing our bottom hardness.











2022 LFA Summary

In our agreement with EBL the targets are either pass or fail, there is not an intermediate grading system. i.e. (anything below a 100 is a failure)

Index	Milestones Achieved	2022 LFA Goal Results	Index	Milestones Achieved	2022 LFA Goal Results
North Basin:			South Basin:		
122		Maintain a Dissolved Oxygen (DO)	115		Maintain a Dissolved Oxygen (DO)
75		Total Phosphorous (TP)	150		Total Phosphorous (TP)
180		Total Inorganic Nitrogen (TIN)	97		Total Inorganic Nitrogen (TIN)
49		Water Clarity (Secchi Disk)	61		Water Clarity (Secchi Disk)
342		Cyanobacteria (Blue Green Algae)	439		Cyanobacteria (Blue Green Algae)
97		Muck Reduction	94		Muck Reduction

2021 LFA Summary

In our agreement with EBL the targets are either pass or fail, there is not an intermediate grading system. i.e. (anything below a 100 is a failure)

Milestones Achieved	2021 LFA Goal Results	Milestones Achieved	2021 LFA Goal Results
	North Basin:		South Basin:
	Maintain a Dissolved Oxygen (DO)		Maintain a Dissolved Oxygen (DO)
	Total Phosphorous (TP)		Total Phosphorous (TP)
	Total Inorganic Nitrogen (TIN)		Total Inorganic Nitrogen (TIN)
	Water Clarity (Secchi Disk)		Water Clarity (Secchi Disk)
*	Cyanobacteria (Blue Green Algae)	*	Cyanobacteria (Blue Green Algae)
	Muck Reduction		Muck Reduction

* Measurements were not taken in alignment with the contract