

Lake Wapogasset/Bear Trap Lake 2021 Curly-leaf Harvest/Phosphorus Removal Evaluation

CLP/Phosphorus removal Analysis

From May 25 through June 22, 2021, mechanical harvest targeting *Potamogeton crispus*-curly leaf pondweed (CLP) occurred to help reduce phosphorus loading from the decomposition of CLP. Each load of CLP harvest was estimated through random truck weigh-ins and using truck load volumes to estimate each load mass. Also, random samples from the harvest CLP were grabbed with the amount of CLP within the load was estimated by percent. A CLP nutrient analysis conducted in 2010 on Lake Wapogasset and Bear Trap Lake was used to determine the dry mass of the CLP load and amount of phosphorus removed based upon the mean mass of phosphorus in CLP tissue.

The harvest of CLP in Lake Wapogasset and Bear Trap Lake summary is contained in the table below:

Lake	Wet mass plant removed (kg)	Dry mass plants removed (kg)	Dry mass CLP removed (based up % CLP in random samples) (kg)	Phosphorus removed with CLP (kg)	% of total P load (from previous estimated total load)
Bear Trap	47454.9	4318.4	3670.6	12.1	2.76%
Lake Wapogasset	152908.8	13914.7	11827.5	39.0	1.41%

Table 1: Summary of CLP and phosphorus removal, 2021.

The mass of phosphorus removed from both lakes in 2021 is about average (just below) for the years 2017-2021. CLP growth can vary immensely in both lakes. Timing of when the CLP grows to near surface really affects the amount of CLP removed. If large beds mature at the same time, then the logistics of travel with the harvester limits the removal. It appears that in an average year, approximately 14 kg of phosphorus removal from Bear Trap Lake and approximately 46 kg of phosphorus removal from Lake Wapogasset can occur through CLP harvest.

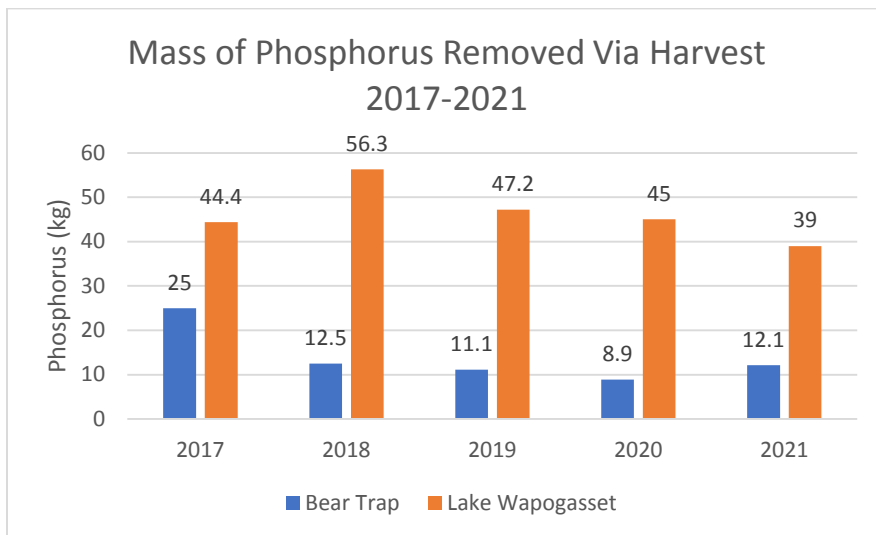


Figure 1: Graph showing annual phosphorus removal via CLP harvest.

Turion Analysis

In October, 2021 twenty sample locations were sampled for turions using a Ponar dredge. At each sample point, two samples of sediment were collected. The number of turions were counted and the density is reported as turions/square meter.

This analysis was conducted to establish baseline turion data that can be used to compare future turion density data to evaluate long-term changes (reduction) in CLP in both lakes. The basis for using this data to evaluate long-term reduction is the method in which CLP reproduces. Turions are produced on mature plants. When the plant dies off (senesce), the turions settle into the sediment and germinate into new plants in the fall/winter. If CLP plants are harvested, some of the turions attached to the plants will be removed as well. If this occurs within a harvest bed during several harvest seasons, it is possible that the turion density could decrease and potentially the CLP plant density could decrease. Measuring plant density within beds after harvest is variable and difficult to time since harvest is occurring continuously. Therefore plant density is not a good representation of long-term progress where turion density can be used.



Figure 2: Pictures show (left) Ponar sediment sample, (middle) sieve separation of sediment, and (right) turions collected.

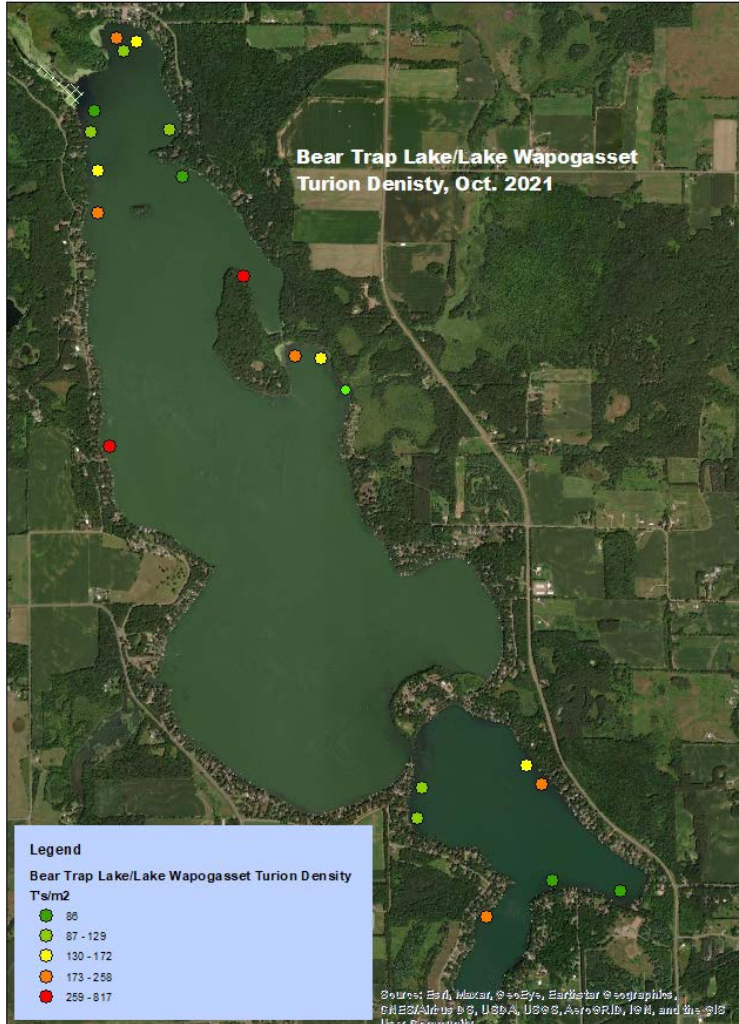


Figure 3: Map shows turion density at each sample site within historically harvested CLP areas.

All sample locations had turions present, with a minimum density of 86 turions/m². The turion density ranged from **86 turions/m² to 617 turions/m²**, with a standard deviation of 192.5 (shows data varies immensely). The mean turion density was **217 turions/m²**. Interestingly, the two sample points with the highest turion density were within beds that have not been harvested consistently. All other areas with lower density have been harvested annually. This may indicate that the harvesting reduces turion density. However, there is no previous turion data available for a valid determination.

Discussion

As stated, the removal of phosphorus from CLP harvest in 2021 was just below the average removed since 2017. The data suggests that in any given year the amount of CLP varies, but is fairly close to the average each year (14 kg from Bear Trap Lake and 46 kg from Lake Wapogasset). This represents between 1+% and 3% of the total phosphorus loads in each of the two lakes.

A baseline turion analysis shows a wide variation in turion density (ranging from 86 to 617 turions/m²). The highest turion densities occurred in areas that have had the least harvest over the past five years. This may indicate that the harvest does reduce turion density. If this is the case, long-term harvest may

lead to reduced CLP growth in the future. More monitoring and data will need to occur to see if this occurs as a trend. Continued turion density monitoring is recommended as it can show long-term changes. Since harvest is maximized each year and locations of harvest change daily, it is difficult to evaluate CLP density before and after harvest. Therefore, load mass totals are a better measure of success with turion density likely the best method to evaluate long-term changes.

References

Aquatic Plant Management Plan: Bear Trap Lake and Lake Wapogasset, Polk County WI. 2015.

Ecological Integrity Service. *Determination of Potential Phosphorus Contribution from Potamogeton crispus-Lake Wapogasset and Bear Trap Lake, Polk County WI.* 2010.