2020 Pleasant Lake Carp Management Interim Report

November 19, 2020

Prepared for: Vadnais Lake Area Watershed Management Organization

Attn: Dawn Tanner

Prepared by:
Carp Solutions, LLC
CarpSolutionsMN.com

Summary

Carp Solutions was contracted on a two-year carp management project to tag and monitor carp movement between Pleasant and Deep Lakes. The year one (2019) task was to electrofish Pleasant Lake to estimate the carp population and biomass density and to mark and release carp with a PIT tag for movement monitoring. During the surveys, 78 carp were captured and marked with a tag. Year two (2020) included the installation of the PIT system, the location of which is shown in Figure 3, for tracking the carp movement. The antenna was installed on March 20, 2020 and monitored monthly for movement and functionality. The reader for the antenna was removed on October 29 due to low solar power and anticipated lack of carp movement during the winter. The reader will be reinstalled in February 2021 to run through June 2021. The purpose of this report is to summarize year one electrofishing results and year two carp movement between March 20 and October 29, 2020.

Results

Electrofishing

In 2019, Carp Solutions conducted electrofishing surveys on Pleasant Lake to develop an abundance and biomass estimate following the methods described in Bajer and Sorenson 2012. All fish collected during the surveys were also tagged with a passive integrated transponder (PIT) tag that could later be used to monitor carp movement within the system (year 2). A total of four surveys were completed in 2019 on July 22, August 2, August 12, and October 31. During each of the surveys, the shoreline around the entire lake was sampled. The final survey on October 31 was an attempt to tag additional carp in the late season and was not included in the surveys used for estimating carp abundance; no carp were captured during that event presumably due to cold weather and carp moving offshore for the winter. In the first three surveys, a total of 83 carp were captured. Two of these carp were accidentally killed with the outboard propeller and three more were recaptures from previous surveys. Therefore, a total of 78 carp were measured, implanted with a PIT tag, and released. Table 1 summarizes the data

and carp population estimates from the three surveys. The catch-per-unit-effort (CPUE; carp captured per hour of shocking) was calculated from each survey and used to determine the abundance and biomass density estimates. The catch during each survey can vary based on the weather and carp behavior, among other variables, which is why it is important to have multiple sampling days. Averaging the biomass data from the three surveys, the carp population in Pleasant Lake is estimated to be 13,400 carp equating to a biomass density estimate of 273 kilograms per hectare of lake. It is important to realize, however, that boat electrofishing estimates, while practical and inexpensive, are not as reliable as those generated using mark-recapture methods.

All carp captured were also measured and they ranged from 636 mm (25 inches) to 905 mm (36 inches) and had an overall average length of 769 mm (30 inches). The distribution of lengths can be seen in Figure 1. Other species seen during the surveys included: yellow perch, bluegill, pumpkinseed sunfish, green sunfish, northern pike, bowfin, smallmouth bass, walleye, black crappie, bigmouth buffalo, redhorse sucker, and muskellunge.

Table 1. Daily totals from 3 electrofishing surveys. Each transect completed was 20 minutes of shocking time, total catch per day, catch per unit effort is per hour and the daily average length in millimeters.

Date	Transects	Catch	CPUE	Average Length (mm)	Est. Avg. Weight (kg)	Abundance Estimate	Biomass Density Estimate kg/ha
7/22/2019	9	21	7	754	5.36	10047	192.9
8/2/2019	9	35	12	772	5.71	16179	330.9
8/12/2019	8	27	10	778	5.84	14153	296.3
Average	8.7	28	10	768	5.63	13460	273.4
Total	26	83					

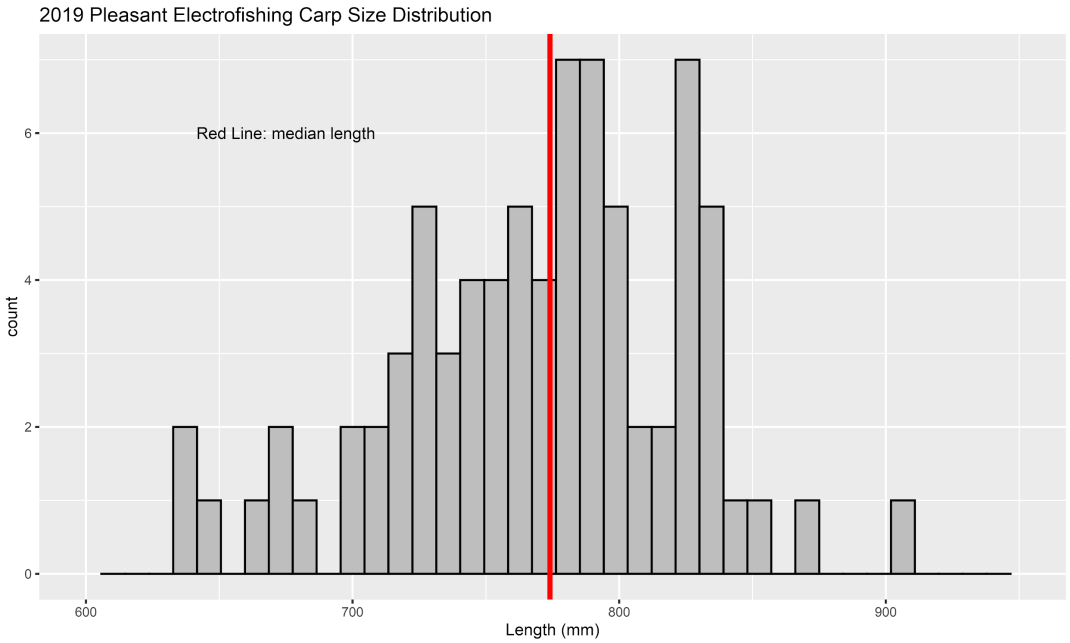

Figure 1. Pleasant Lake size distribution from carp captured during 2019 electrofishing surveys. Median length: 774 mm

PIT System

A PIT system, including a solar array, antenna, and data logger was installed between Deep and Wilkinson Lakes on March 20, 2020 (Figure 2 and 3). The first tagged carp was detected on March 30. Two small pulses of movement occurred in early and late April with up to 2 unique PIT tagged carp detected by the antenna daily. A peak of movement occurred between May 11 and May 29, 2020, when up to 42 PIT tagged carp were detected per day (Fig. 4). Overall, 55 of the 78 carp that were PIT tagged in 2019 were detected at the antenna, which suggests that 71% of carp population attempted the migration. This number is conservative because some tag loss might have occurred among the tagged carp (it is not unusual to see 10-20% tag loss). Overall, our data shows that the majority of carp from Pleasant Lake migrate upstream to spawn in a synchronized fashion.

A closer analysis of individual carp detections by the antenna revealed that the same carp attempted the migration multiple times (crossed the antenna during multiple distinct periods). Many carp that attempted the migration in early April were also detected in late April and then in May (Fig. 6) (i.e. many carp were detected in all three of the migration pulses). The periods of time without movement in early April and early May correspond to unseasonably cold weather periods. This suggests that some carp begin the migration early but then possibly return to the lake during periods of colder weather only to attempt the migration later with a larger group of carp. Overall, most individual carp were detected by the antenna on multiple days during each migration pulse (Fig. 5 and 6), which suggests that carp move through the stream relatively slowly.

No carp were detected after May 29. The antenna experienced periodical power issues from a lack of solar energy in June (due to heavy foliage) and in October. The antenna was also accidentally powered off from June 19 to July 29. Due to insufficient energy to charge the

batteries, and the lack of carp movement late in the year, the PIT reader was removed on October 29 for the winter.

Overall, the large pulse of carp movement in late May, and especially the high percentage of the tagged carp from Pleasant Lake detected by the antenna indicates that spring migration trapping could be a highly effective carp management tool in this system.

Figure 2. A solar array and work box for a PIT system. The data logger is located inside of the workbox and the antenna is placed in the water.

Figure 3. Map of the PIT antenna location relative to Pleasant Lake. The antenna is located between Deep Lake (SW of antenna) and Wilkinson Lake (NE of antenna).

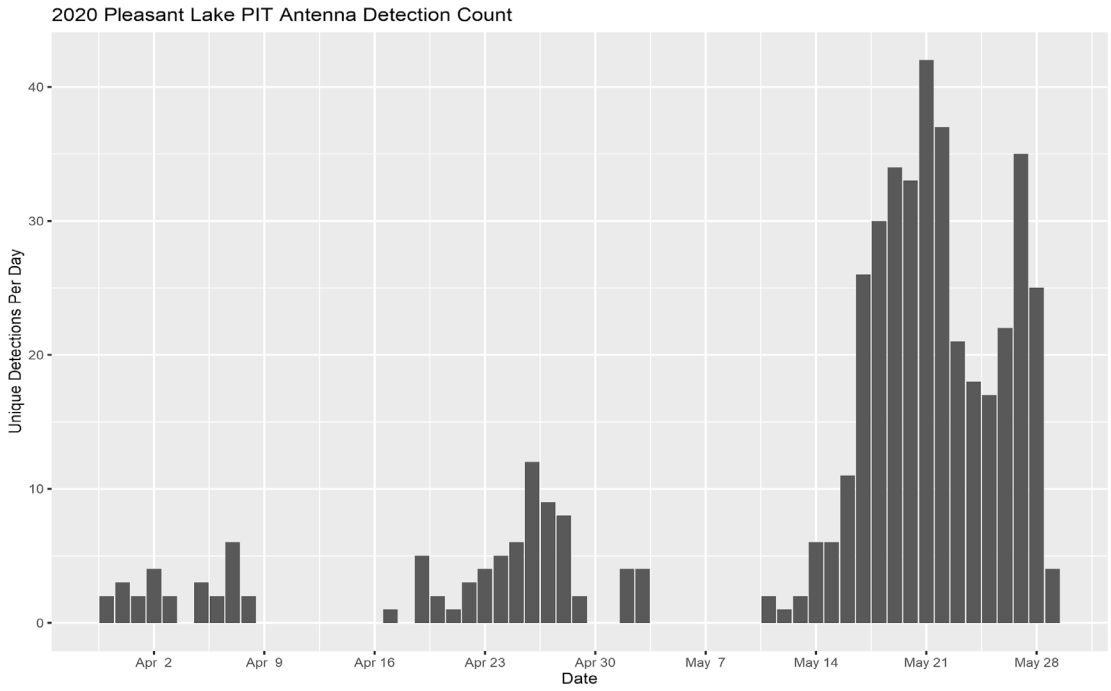

Figure 4. Number of unique tag detections by date

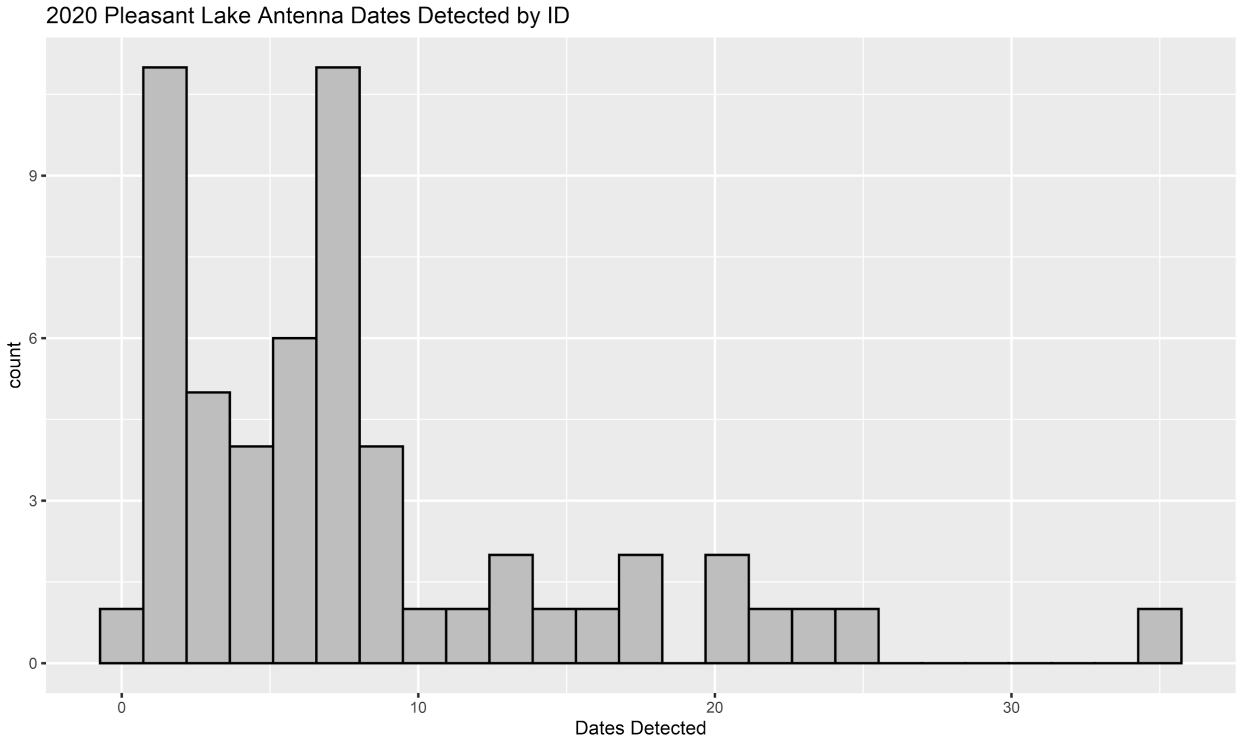

Figure 5: Number of dates that each unique tagged carp was detected at the antenna.

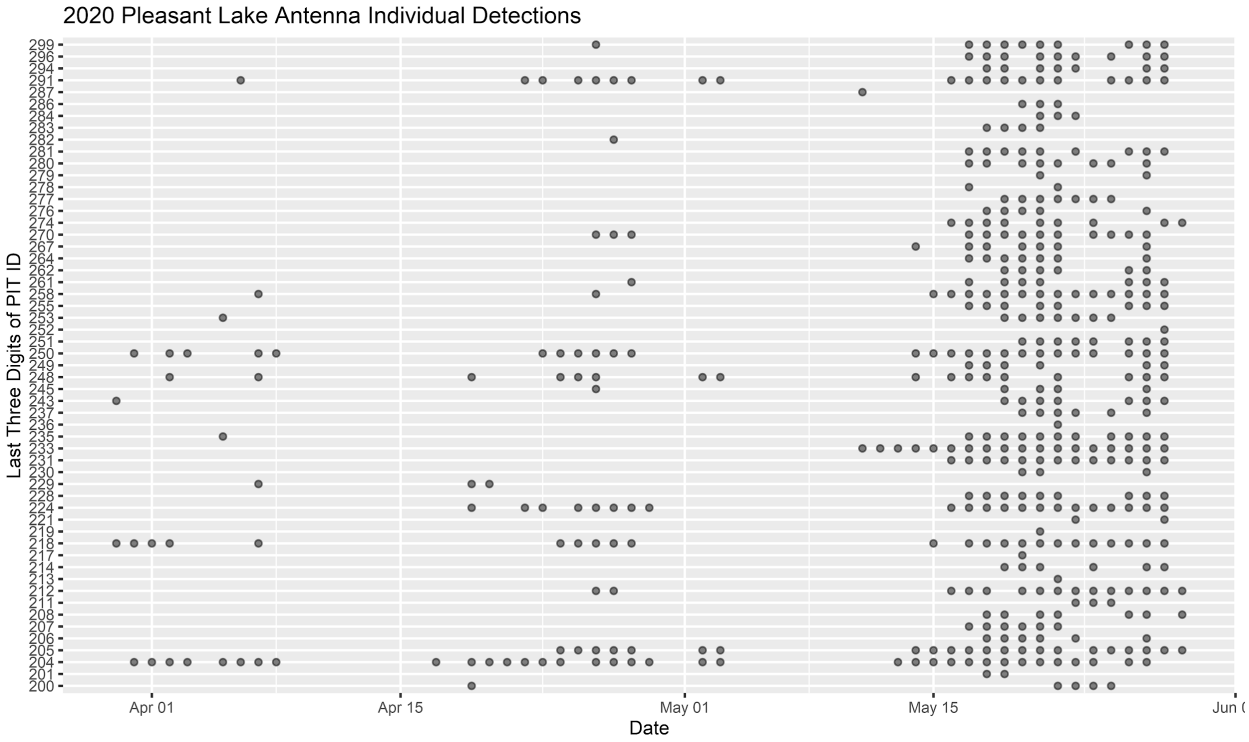

Figure 6: Dates on which each of the 55 tags were detected. Each dot represents a date on which an individual tag was detected. The Y-axis represents the last three digits of the PIT tag ID number. Thus, each horizontal line represents an individual tagged carp.

Management Recommendations

The estimated biomass density is 273 kg/ha in Pleasant Lake, well over the determined ecologically damaging threshold of 100 kg/ha (Bajer et al 2009). Patches of aquatic vegetation in Pleasant Lake suggest that our estimate of carp biomass might be somewhat inflated (boat electrofishing is less accurate than mark-recapture), because at carp biomass in excess of 200 kg/ha, aquatic vegetation is oven very sparse. Nevertheless, removal of carp from the system should allow for greater diversity of aquatic plants; the lake currently appears to be dominated by Eurasian milfoil. Overall, carp removal is recommended in the Pleasant Lake system, especially if it could be conducted using most cost-effective methods. The results of the planned fall seining will indicate the successfulness of this particular removal method. If further removal is needed, our results suggest that stream trapping during spawning migrations might be a good option.

The large percentage of carp that were detected at the antenna indicates that a spring migration removal of carp in between Wilkinson and Pleasant Lakes could be highly effective. To start with, a pilot project could be devised using one of the temporary physical pipe barriers that Carp Solutions has employed elsewhere. Such a physical barrier would be used to temporarily block the carp, which then could be removed using a backpack electrofisher. An additional PIT antenna with remote access capability could be deployed at the barrier to allow consistent remote monitoring of carp activity. The existing barrier at the outlet of Wilkinson Lake could be incorporated into this project as well. Removal at physical barriers using a backpack electrofishing unit has proven to be an effective tactic for removing large numbers of migrating

carp relatively inexpensively. For example, over 700 carp were removed in three days at barriers around Owasso and Wabasso Lake in late May 2020.

Finally, a pilot box netting project in Pleasant Lake could be attempted in the summer to examine the effectiveness of attracting carp to bait and removing these aggregations. But we expect that removal in the stream might be most productive.

References

Bajer, P. G., Sullivan, G., & Sorensen, P. W. (2009). Effects of a rapidly increasing population of common carp on vegetative cover and waterfowl in a recently restored Midwestern shallow lake. *Hydrobiologia*, 632(1), 235-245.

Bajer, P. G., & Sorensen, P. W. (2012). Using boat electrofishing to estimate the abundance of invasive common carp in small Midwestern lakes. *North American Journal of Fisheries Management*, 32(5), 817- 822.