



## **2020 West Vadnais Lake Carp Management Report**

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Prepared for: Vadnais Lakes Area Water Management Organization and  
Ramsey Washington Metro Watershed District

Prepared by:

Carp Solutions, LLC  
CarpSolutionsMN.com

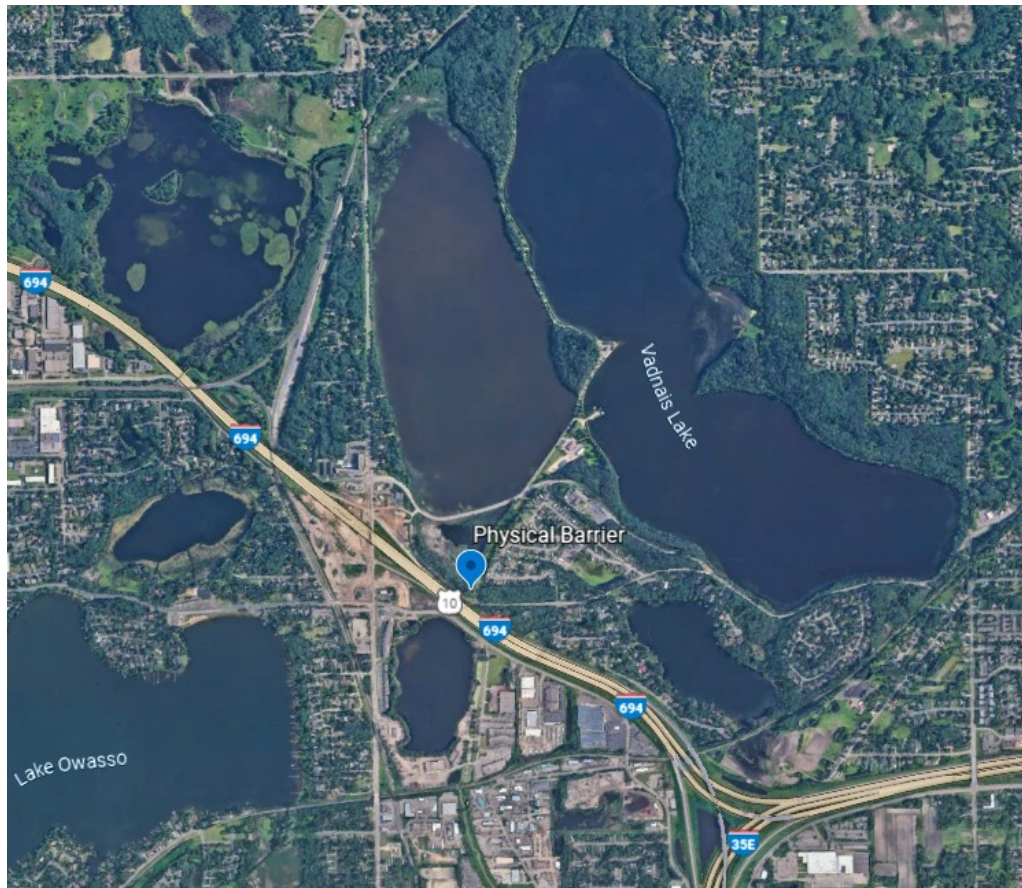
### **Summary**

Before the start of the 2020 season, the carp management plan for West Vadnais was to install an electric barrier in the outlet channel of the lake, mark 100 carp with Passive Integrated Transponder (PIT) tags in the lake, place a PIT antenna near the barrier, and conduct carp removals at the barrier in the spring. The combination of marking carp with PIT tags and removing carp at the barrier while checking for PIT tags would allow for a mark-recapture population estimate to be calculated. Additionally, the PIT antenna at the outlet and potentially at other locations on connected water bodies would show carp seasonal migration patterns, potentially leading to the construction of other barriers and spring removal at those barriers. Unfortunately, the COVID-19 pandemic forced a change in those plans. The electric barrier system became unavailable, so a simple ABS pipe physical barrier was installed instead. The installation of PIT antennas was postponed, with the possibility of continuing the effort in 2021. As the lake warmed up and the carp became active in the shallows of the lake, three electrofishing surveys were conducted in late April to mark carp. A total of 120 carp were caught in these surveys. Because one of them in a later survey was a recapture from a previous survey, only 119 carp were marked with a PIT tag and released. No significant aggregation of carp was seen at the barrier throughout the spring, so no migration removal was attempted. Instead, it was decided to use two box nets to examine the feasibility of removing carp using the box net method while also fulfilling the objective of obtaining a robust carp population and biomass density estimate. Over the course of seven removal attempts between 7/30 and 10/8, 356 carp were removed. A total of 21 marked carp were recaptured during these removals. Based on these recaptures, 18% of the carp population in West Vadnais was removed. The population is estimated to be around 1,950 carp, with a corresponding biomass density of 26 kg/ha.

### **Physical Barrier at lake outlet**

On April 8th, Carp Solutions and Ramsey Washington Metro Watershed District (RWMWD) staff installed a physical barrier at the outlet of West Vadnais lake (see map in

Figure 1). This physical barrier was constructed in a similar fashion to other barriers previously used in the Owasso subwatershed. Wood boards with holes drilled at regular intervals were used to space out ABS and galvanized metal pipes that were pounded 2 feet into the sediment. This barrier was extended up onto shore so that carp could not move around it during high water periods. A picture of this completed barrier appears in Figure 2. RWMWD staff cleared the barrier of debris to allow the water to flow freely and checked for aggregations of carp throughout the spring. No significant aggregations were noticed throughout the spring, so removal of carp at the barrier was not attempted by Carp Solutions.



**Figure 1: Location of the physical barrier at the outlet of West Vadnais Lake**



**Figure 2: Picture of the physical barrier at the outlet of West Vadnais**

### **Electrofishing surveys and marking of carp**

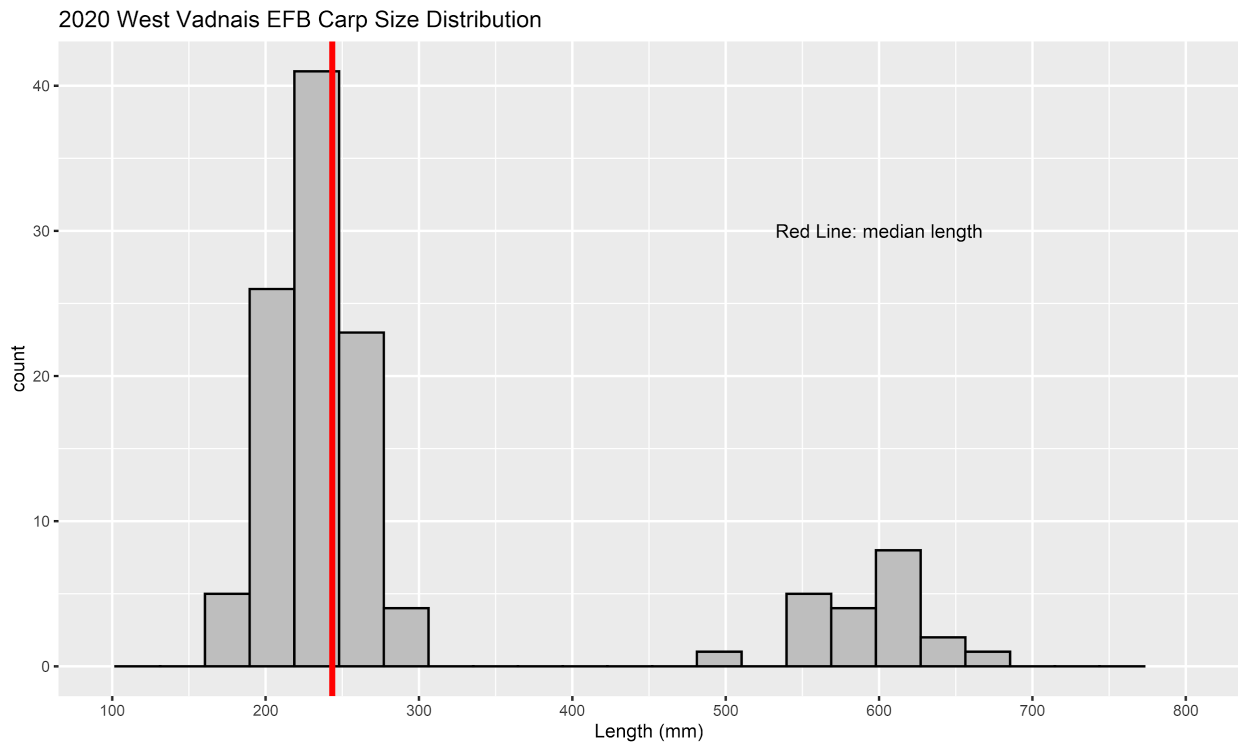
On 4/16, an electrofishing survey consisting of four 20 minute transects was conducted on West Vadnais. No carp were caught, and it was decided to wait until the water warmed slightly. By 4/22, the water had warmed to 10° C, and another survey was conducted. In this survey, and the following two surveys on 4/27 and 4/30, six 20 minute transects were completed. Because the objective was to mark carp and not to use the catch-per-unit-effort (CPUE) data alone to calculate a population estimate, the areas surveyed were not randomly selected, but instead likely areas for carp were selected and successful areas were focused on more heavily. In all three surveys, the water lily rhizomes on the north and south ends of the lake were the most successful. Only a few carp were caught among the trees on the east and west sides of the lake. All captured carp were measured, marked with a left pelvic fin clip and PIT tag, and released. Between the three days, 120 carp were caught. One of the carp caught on 4/30 was a recapture from 4/27. In total, 119 unique carp were marked with a fin clip and PIT tag.

The data from these surveys reveals some interesting characteristics of the carp population in West Vadnais Lake. The catch, average length and estimated average weight (calculated from the length data) are shown in Table 1. The length distribution of carp captured during these electrofishing surveys is shown in Figure 3. Because the length distribution is bimodal, with a large group of carp between 150-300 mm and a smaller group between 500-700, it seems that there are at least two distinct year classes of carp in West Vadnais. The larger, but less common group likely consists of older adults, while the smaller class likely consists of 2-3 year old carp. These different sized groups of carp were not caught evenly throughout the three surveys. Almost all of the large carp were caught in the first survey on 4/22 in the water lily rhizomes in the southwest corner of the lake. Transects in this area during the next two surveys were not as successful and did not capture as many larger carp. This uneven distribution of sizes of carp captured during electrofishing surveys is represented in the boxplot in Figure 4. This uneven distribution of carp catches and sizes affected the population

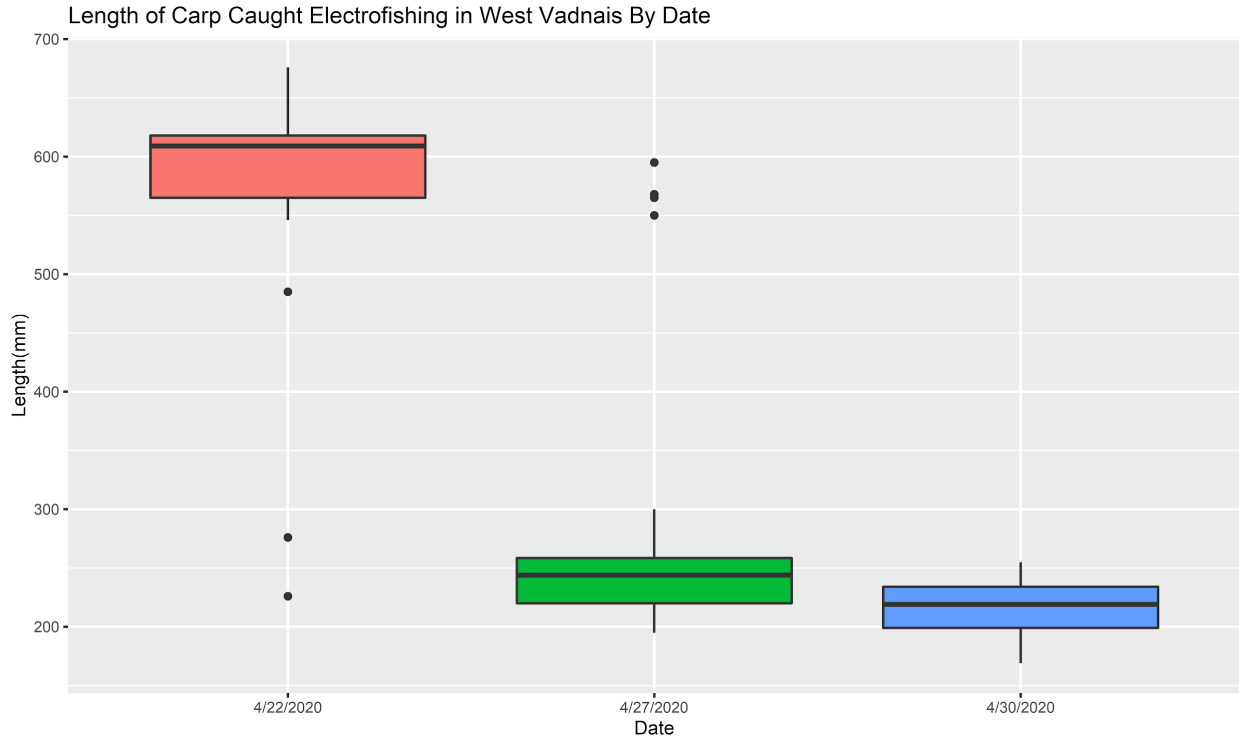
and biomass density estimates, causing the estimates from the three surveys to be very different.

**Table 1: Catch, mean length and estimated mean weight, from the three electrofishing surveys.**

Date	Catch	Avg. Length (mm)	Est. Avg. Weight (kg)
4/22/2020	19	564	2.39
4/27/2020	68	258	0.28
4/30/2020	33	217	0.17
Total:	120		
Average:	40	346	0.95



**Figure 3: size distribution of carp caught during spring electrofishing surveys. This histogram clearly shows a bimodal distribution of carp lengths.**



**Figure 4: Comparison of the sizes of carp captured in West Vadnais by electrofishing divided by date. The first survey primarily caught larger carp, while the second caught mostly small ones, and the final one only caught small ones.**

### Box Net Removals

Between 7/21 and 7/27, two 30 by 60 foot box nets were installed on the east side of West Vadnais Lake (see map in Figure 4). These two nets were positioned along the road on the east side of the lake for easy access. The nets were baited with cracked corn. RWMWD staff regularly checked and refilled the bait at both nets throughout the season. Both nets were first set and pulled on 7/30. Only 7 carp were caught in this first removal effort. In order to increase catch, a PIT antenna was installed around the bait at net 2. This antenna, which has a remote data access feature, allowed for lifting the nets when tagged carp were at the bait to catch more carp. Following that, six more attempts were made. Table 2 shows the results of the seven removal attempts, with catch, recapture, and average length of the carp captured. In total, 356 carp were captured and 21 of the 119 marked carp were recaptured. On few occasions, several tagged carp were present at the bait only minutes before the nets were lifted, but no tagged carp were caught in the net. This suggests that either the carp were spooked by us approaching the nets or that the carp aggregations at the bait are more dynamic in time and space – carp come and go in a more fluid fashion and activating the nets needs to be even more precise. Using larger nets might also help to cover larger area around the bait. Finally, some of the tagged carp were small (< 300 mm) and it is possible that they slipped through our nets. We recommend using smaller mesh nets for future removal efforts.

Of the 21 recaptures, all but two were released so that the tags would continue to be useful. One of these recaptures was recaptured again four days after it had been caught before. Including the release of these carp, 337 total carp were removed from West Vadnais in



2020. As shown in Table 3, the catch was relatively similar between the two nets, although more carp were caught in Net 2 (209) compared to Net 1 (147). Out of the 356 carp caught in box nets, 142 were measured. The size distribution of these carp appears in Figure 5. As with the length distribution from electrofishing in Figure 3, at least two distinct year classes are shown. Interestingly, as shown in Figure 6, the younger year class is much larger from the box nets than the electrofishing (200-300 mm from electrofishing vs. 350-500 mm from box netting).



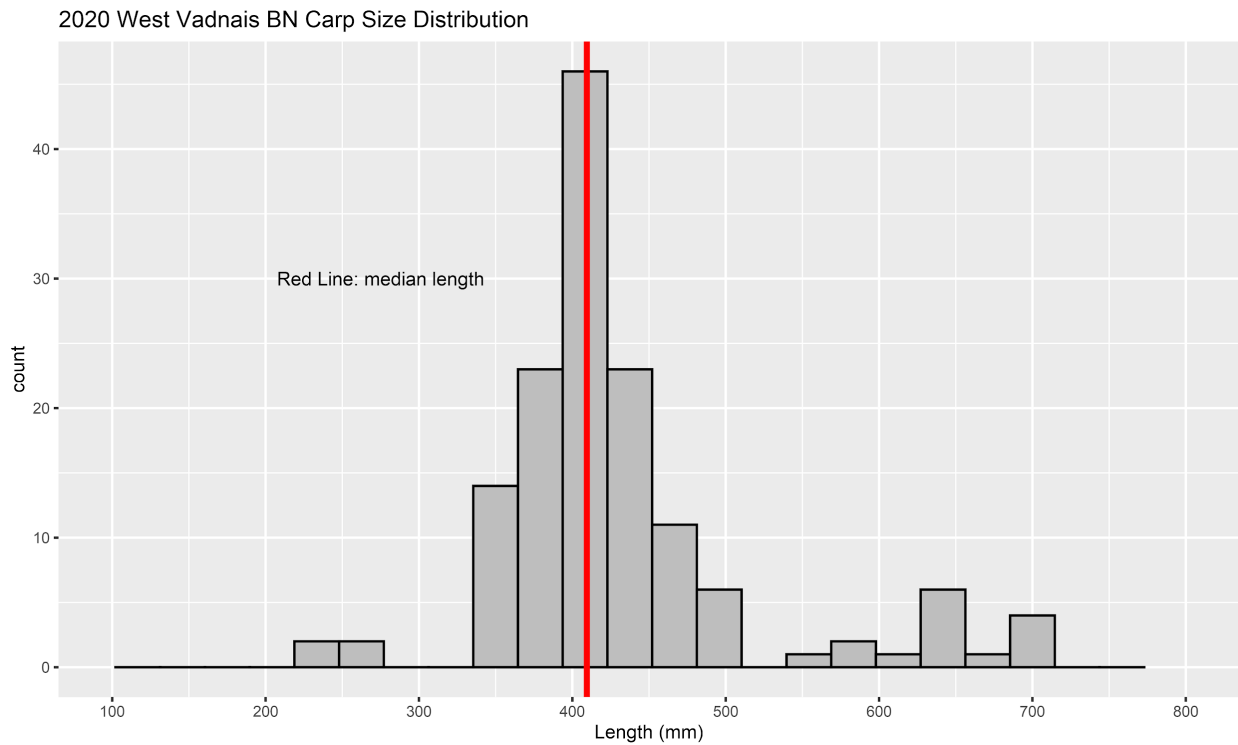
**Figure 4: Map of the two 30 by 60 nets in West Vadnais**

**Table 2: Box netting results by date from West Vadnais Lake. No carp were measured on 9/16**

Date	Catch	Recaptures	Average Length (mm)
7/30/2020	7	0	399
8/7/2020	110	6	398
8/11/2020	13	1	396
8/18/2020	44	1	487
8/28/2020	6	0	438
9/16/2020	152	12	NA
10/8/2020	24	1	429
Total:	356	21	
Average:	51	3	425

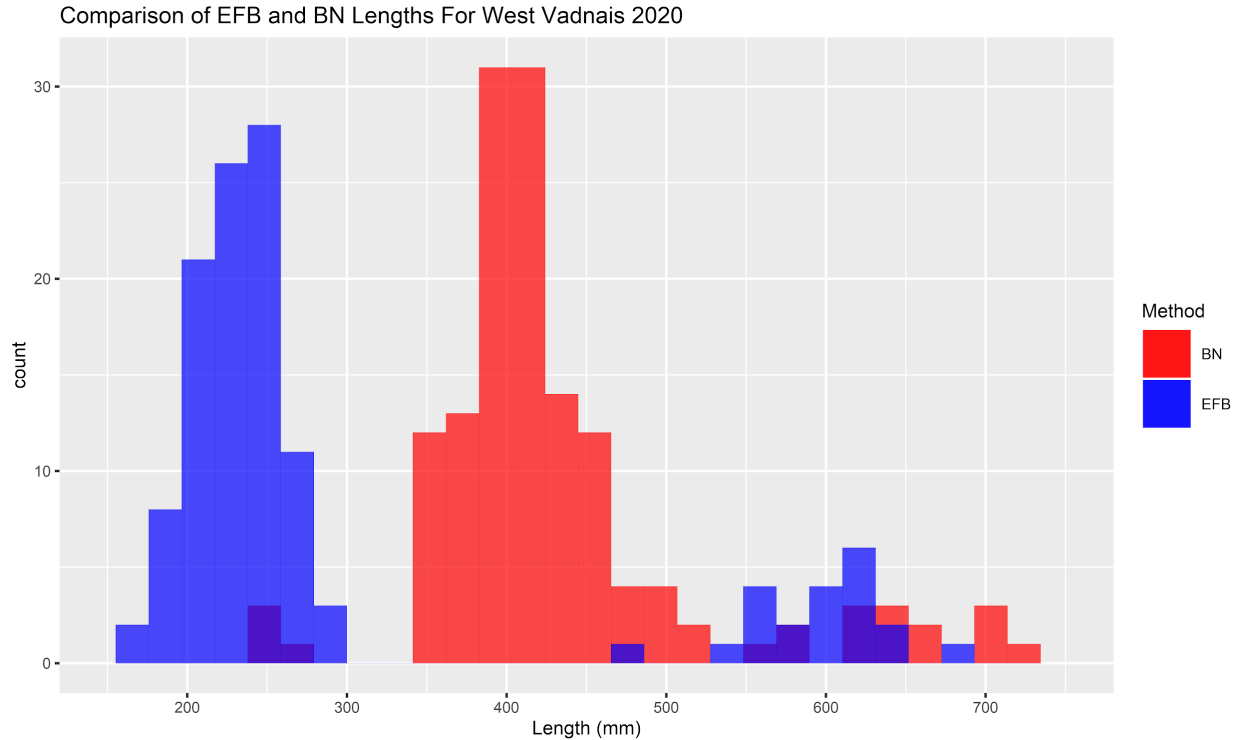
**Table 3: Box Net catch by site (corresponding to the map in Figure 4) and date.**

Date	Site	
	1	2
7/30/2020	2	5
8/7/2020	1	109
8/11/2020	4	9
8/18/2020	8	36
8/28/2020	5	1
9/16/2020	110	42
10/8/2020	17	7
Total:	147	209
Average:	21	30



**Figure 5: Size distribution of the 142 sampled carp from box netting**





**Figure 6: Overlaid lengths from electrofishing (blue) and box netting (red). This figure shows at least two distinct age classes that grew dramatically from electrofishing in late April until box-netting in late summer.**

### Population and Biomass Density Estimates

From the number of carp marked, recaptured, and caught in box netting, a number of inferences can be made about the carp population. First, the percentage of the population removed can be estimated from the number of recaptures compared to the number marked. Out of the 119 carp marked, 21 were recaptured. This equates to 17.6% of the carp population removed by box netting in 2020. The population estimate from this recapture rate is 1,946 (95% CI: 1,250-2,643). Factoring in the size of the lake and the estimated average weight of the carp, the biomass density of the carp in the lake is 26 kilograms per hectare. Counting the 337 carp that were removed, the population point estimate falls to 1,590 carp and a biomass density of 22 kg/ha.

While these estimates are below the ecological threshold of 100 kg/ha, certain aspects of this population give cause for concern. First, the distinct young year class means that further reproduction in this system could greatly increase the population in this lake or possibly other connected lakes. Second, the rapid growth of this young year class between electrofishing in April and box netting starting in Late July means that the biomass density could increase dramatically because of growth of carp in the lake without any additional reproduction or migration. This rapid growth is shown in Figure 6, with an overlaid histogram showing the differences in distributions between the spring and summer/fall. The young year class grew from around 250 mm to 400 mm. The estimated weight of these carp nearly quadrupled from 0.25 kg to 0.93 kg during this time. This rapid gain in biomass by a group of carp could increase the biomass significantly. Lastly, while examining carp captured in box nets in late summer, we

did observe a handful (<10) of carp that appeared to be age-0. Those carp were ~ 150 mm in length. Thus, it is possible that there is another year class of juvenile carp in West Vadnais Lake. While carp biomass is currently low, it should be monitored in the future.

### **Management Recommendations**

Presence of juvenile/subadult carp in West Vadnais shows that this system could function as a nursery for other lakes, thus we still recommend the installation of the electric deterrence system at the lake's outlet.

The abundance and growth rate of juvenile and subadult carp in West Vadnais should be monitored, possibly using boat electrofishing and reduced (possibly using baited nets) if needed. If baited nets were to be used, more than 2 nets are recommended to target the population more aggressively. Smaller mesh nets should be considered. We expect the biomass to increase given the rapid growth of individual carp observed in 2020.

Other fish species abundance should be assessed. For example, we observed large schools of black bullheads while electrofishing. It is possible that bullheads also contribute to poor water clarity and general lack of vegetation in West Vadnais.

We recommend additional surveys for juvenile carp in adjacent lakes (including Grass Lake) to determine if those systems might also function as carp nurseries. If needed, PIT antennas could be installed between these lakes to monitor carp movement.