

Lake Cornelia System Fisheries Assessment

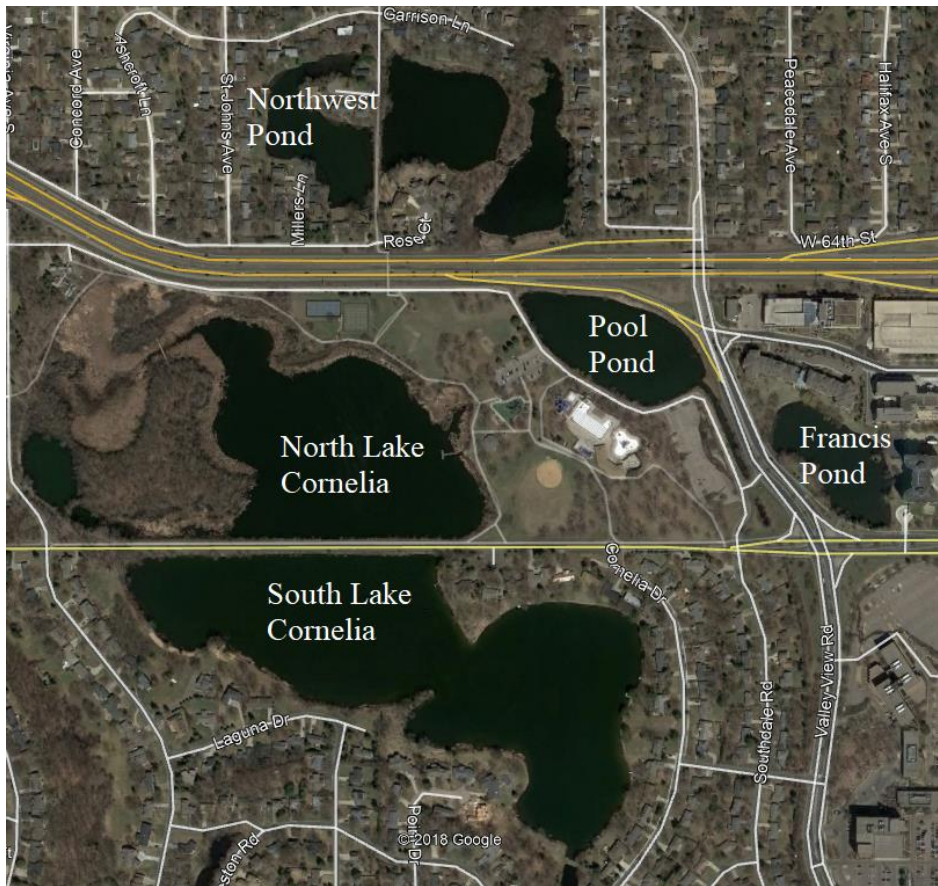
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Prepared For: Nine Mile Creek Watershed District
October 9, 2018

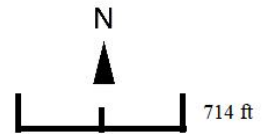


Survey Details

During the summer of 2018, the Riley-Purgatory-Bluff Creek Watershed District (RPBCWD) assisted Nine Mile Creek Watershed District in conducting a fish assessment of Normandale Lake, Lake Cornelia, and ponds connected to Cornelia. The fish surveys were based on research and methodology established by the University of Minnesota (UMN) in the Riley Chain of Lakes Carp Management Plan drafted in 2014 (Bajer, 2014), and the Purgatory Creek Carp Management Plan drafted in 2015 (Sorensen, 2015). Common carp populations within both lakes were of specific concern due to the negative impacts large populations can cause within lakes in MN. Adult carp populations were monitored by conducting, three, 20-minute electrofishing transects per lake, three times between late July and October. If the total biomass estimate of carp is above 100kg/h in a lake, significant water quality degradation can occur. Young of the year (YOY) carp are monitored by placing five, 24-hour small mesh fyke net sets per lake between July and September. If YOY carp were captured during this event, it meant successful recruitment occurred, which can lead to a larger future carp population. Bluegill abundance was also important to assess because they can keep a carp population under control by consuming carp eggs during the spawn. In the case of both sampling techniques, all other fish species were enumerated and summarized. The following document is an overall summary of the fish assessment results on the Lake Cornelia system.



LAKE CORNELIA SYSTEM



Fyke Netting

District staff completed fyke net surveys on Lake Cornelia and Pool Pond on July 27th, 2018 and July 24th respectively. In Lake Cornelia, three nets were set in both the upper and lower sections of the Lake. Due to the small size of Pool Pond, only four nets were set. The fyke net results for Cornelia can be seen in Table 2 and 3. Table 1 contains results for Pool Pond.

Both Lake Cornelia and Pool Pond experienced a partial winter kill over the 2017-2018 winter season. Evidence of the winterkill was highlighted by the fyke net catch results, including limited year classes present of all fish species, specifically game fish, and lack of diversity of commonly found fish species for the region. Based on the results, it appears that South Cornelia had a more severe winterkill. Only black bullheads, golden shiners, goldfish, and three bluegill sunfish were found. More Centrarchid species were found in North Cornelia, including pumpkinseed sunfish, black crappie, green sunfish, and bluegills. The diversity of the Pool Pond fish population was similar to what was seen in North Cornelia, although the overall number of fish captured increased. Overall, 27 painted turtles and 21 snapping turtles were captured in the fyke nets on Cornelia. Goldfish were captured in low numbers on both North and South Cornelia. During the survey. One YOY carp was captured in North Cornelia and 14 were captured in Pool Pond which indicates that some recruitment occurred in the system in 2018.



Figure 1 – Large snapping turtle from North Cornelia fyke nets.

Table 1: Pool Pond Lake Fyke Net Results

Species	Number of fish caught in each category (inches)									Total	Fish/Net
	0-5	6-8	9-11	12-14	15-19	20-24	25-29	30+			
<i>black bullhead</i>	115	20								135	33.8
<i>bluegill sunfish</i>	18									18	4.5
<i>common carp</i>	14									14	3.5
<i>golden shiner</i>	28	1								29	7.3
<i>green sunfish</i>	316	6								322	80.5
<i>hybrid sunfish</i>	31	2								33	8.3
<i>pumpkinseed</i>	246									246	61.5

Table 2: South Cornelia Lake Fyke Net Results

Species	Number of fish caught in each category (inches)									Total	Fish/Net
	0-5	6-8	9-11	12-14	15-19	20-24	25-29	30+			
<i>black bullhead</i>	75	82	1							159	53
<i>bluegill sunfish</i>	1	2								3	1
<i>goldfish</i>	16									16	5.3
<i>golden shiner</i>	16	1								17	5.7
<i>painted turtle</i>										11	3.7
<i>snapping turtle</i>										10	3.3

Table 3: North Cornelia Lake Fyke Net Results

Species	Number of fish caught in each category (inches)									Fish/Net
	0-5	6-8	9-11	12-14	15-19	20-24	25-29	30+	Total	
<i>black bullhead</i>	148	161	1						676	225.3
<i>black crappie</i>		2							2	0.67
<i>bluegill sunfish</i>	31								31	10.3
<i>common carp</i>	1								1	0.33
<i>goldfish</i>	9								9	3
<i>golden shiner</i>	63	23							90	30
<i>green sunfish</i>	20								20	6.7
<i>hybrid sunfish</i>	12								12	4
<i>pumpkinseed</i>	12								12	4
<i>painted turtle</i>									16	5.3
<i>snapping turtle</i>									11	3.7

Electrofishing

Boat electrofishing was conducted across three dates on Lake Cornelia. During two of the surveys all fish captured were identified and measured. The third survey targeted carp only. Each of the ponds were electrofished one time in which all species were identified and measured. The common carp population estimates were developed based on research conducted on shallow and deep lakes within the RPBCWD and may not accurately reflect actual population estimates for stormwater ponds. Additionally, only one sampling event was conducted on each pond which is lower than the three sampling events recommended. Fish captured via electrofishing mirrored that which was captured within the fyke nets for each waterbody. No large fish were captured due to the recent winterkill. Below is a brief description of what native fish were found across the electrofishing surveys:

- Pool Pond - pumpkinseed sunfish, green sunfish, and golden shiners were the most abundant native fish (Exhibit 1).
- Lake Cornelia – black bullheads were the most abundant native species; very limited game species captured (Exhibit 2 - South; Exhibit 3 - North).
- Northwest Pond – black bullheads were the most abundant native fish captured with no gamefish captured (Exhibit 4).
- Francis (East) Pond – fathead minnows and golden shiners were the most abundant native fish with only four sunfish captured (Exhibit 5).

Non-native fish species captured during the electrofishing surveys included both goldfish (*Carassius auratus*) and common carp. Similar to common carp, goldfish swim along the bottom of lakes and rivers, uprooting vegetation, disturbing sediment and releasing nutrients that trigger excess algal growth. They feed broadly, eating algae, small invertebrates, plant material, and fish eggs. Within the Lake Cornelia system goldfish were found in large numbers (989 fish captured; Table 4). They were the most abundant fish species captured and have an established breeding population. Most of the goldfish captured were YOY or one year old, however, fully-grown fish up to 365 mm (14.4 in) were captured. For a maximum potential size reference, the world's longest goldfish measured 474



Figure 2 – Goldfish from Northwest Pond.

mm (18.7in; Guinness Book of World Records). The Northwest pond had the highest catch rate of goldfish at 468 fish/hour which may be the main source for Lake Cornelia (combined 400 fish/hour).

Table 4: Lake Cornelia System Goldfish Electrofishing Results

Species	Number of goldfish caught in each category (inches)					
	0-5	6-8	9-11	12-14	Total	Fish/Hour
North Cornelia	227	2	52	2	310	221
Northwest Pond	155	92	3		250	468
Pool Pond	39	2			41	123
South Cornelia	283	3	90	12	388	194
Francis Pond					0	0
Total	704	99	145	14	989	198

Adult (>300 mm) common carp populations within the Lake Cornelia system were found in relatively low numbers, which is likely a result of the recent winterkill (Table 5). That said, Francis (East) Pond had a very high concentration of carp at 23 fish, or a biomass estimate of 219.5 kg/h. The biomass estimate is significantly higher than the 100 kg/h threshold and can result in degraded water quality. No carp were captured in Northwest Pond or North Cornelia. Similar to migration patterns seen within the RPBCWD, fish in the Cornelia system appear to be migrating to the furthest waterbody upstream to spawn. Francis (East) Pond is one of the furthest upstream ponds along with the two ponds not surveyed north of Lake Cornelia and just east of Northwest Pond. Francis (East) Pond appeared to have depths which may allow carp to overwinter, however this was based on only a visual observation. Carp often spawn in the most upstream sections of a system and return to the larger and deeper waterbodies to overwinter.

Table 5: 2018 Common Carp Biomass Estimates for Normandale Lake

Lake	# of Fish	Fish per Hour	Density per Hectare	Average Weight (kg)	Carp Biomass (kg/h)	Threshold (kg/h)
Francis (East) Pond	23	60	285.64	0.77	219.50	100
Pool Pond	1	3	17.17	1.45	24.86	100
NW Pond	0	0	0	0	0	100
North Cornelia	0	0	0	0	0	100
South Cornelia	4	2	12.46	1.51	18.82	100

Summary

Overall the fish sampled in the Lake Cornelia system were small in size and species richness was limited. This is most likely a result of the 2017-2018 winterkill and past winterkills that have occurred. The low number of bluegill and other Centrarchid species captured from the surveys reflect a limited population that may not be able to control common carp and goldfish recruitment effectively. The frequency of winterkills and the availability of connected shallow waterbodies that winterkill which act as YOY nurseries, are most likely preventing bluegills from effectively controlling carp and goldfish within the system. This is highlighted by the number of yoy common carp captured in Pool Pond via fyke nets, the large number of carp captured in Francis (East) Pond, and the very large number of goldfish captured in Northwest Pond. The 2018 survey suggests that Francis (East) Pond is currently the main source of carp

for the Lake Cornelia system, however it is uncertain whether carp migrated to and were trapped in the pond, or if they are overwintering in the pond. The two ponds directly east of Northwest Pond may be another source carp population or be acting as a nursery, however they were not sampled in 2018. Due to the limited number of Cetrarchid species captured, carp will be able to freely reproduce in Francis (East) Pond and distribute throughout the Cornelia system.

It is apparent that goldfish have established breeding populations in most waterbodies within the Lake Cornelia system. The highest concentration of goldfish did occur in the very shallow Northwest Pond. With the high numbers of goldfish in the system, along with their ability to survive in extremely low oxygen conditions, goldfish may be degrading water quality more than carp at this time. Winterkill frequency is most likely the main control of carp and goldfish populations in the Cornelia system.

References:

- Sorensen, P., P. Bajer, and M. Headrick. 2015. Development and implementation of a sustainable strategy to control common carp in the Purgatory Chain of Lakes. Prepared for Riley Purgatory Bluff Creek Watershed District. University of Minnesota, Saint Paul, MN. Accessed online from: http://rpbcwd.org/files/6414/9382/4422/SorensenBajerandHeadrick2015_Development_of_carp_control_in_the_Purgatory_Creek_Chain_of_Lakes.pdf
- Bajer, P.G., M. Headrick, B.D. Miller, and P.W. Sorensen. 2014. Development and implementation of a sustainable strategy to control common carp in Riley Creek Chain of Lakes. Prepared for Riley Purgatory Bluff Creek Watershed District. University of Minnesota, Saint Paul, MN. Accessed online from: http://rpbcwd.org/files/3414/3561/7194/Carp_management_report_2014.pdf

