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Forest Lake Carp Assessment 2023

Prepared for the Comfort Lake Forest Lake Watershed District

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Introduction

In 2023 WSB was commissioned to complete an assessment of the population of Common carp (*Cyprinus carpio*), in Forest Lake located in the Comfort Lake Forest Lake Watershed District (CLFLWD), Forest Lake, Minnesota. The Minnesota Department of Natural Resources (MN DNR) standard fishery surveys confirm the presence of common carp, but the density of the population and potential impact to in-lake water quality is unknown. The watershed district coordinated an alum treatment on Forest Lake in the Fall of 2023 and are interested to know what the potential impact the carp population is having on both water quality in the basin and potential impacts to the executed alum treatment.

This report includes results from the survey in relation to lake water quality and recommendations for monitoring the carp population in the future. Although this method does not directly describe the effects carp will have on an alum treatment, the potential effect a carp population is having on water quality will be extrapolated to assume a similar impact to an alum treatment.

Methods & Results

In 2023, a permit was acquired from the MN DNR to complete three (3) visits to the lake with an electrofishing boat to survey the carp population. To complete an estimate of the carp population, WSB scientists use a boat electrofishing unit to capture carp and estimate the abundance using a catch per unit effort (CPUE) model. This estimate gives managers a better idea about the severity (low-medium-high) by which these fish are impacting the ecological integrity of the lake and can manage resources accordingly.

Forest Lake was visited on three dates separated by at least one week to fit the carp CPUE model of estimation. These dates were September 6, September 20, and October 4, 2023. Three transects were traversed on each date and lasted 19 or 20 minutes each and carp that were seen were netted. Length and weight were recorded along with time spent fishing to fit the data to a model of estimation.

The results of the 2023 CPUE estimate on Forest Lake is 50.9 +/- 6.5 lbs/acre. This population estimate for carp can be compared to the threshold value that scientists have assigned where carp are known to be damaging to a system, this threshold value is 89.9 lbs/acre (Table 1).

Date 2023	Transect	# Carp Captured	Length (in)	CPUE by Date	2023 CPUE	CPUE Threshold Value
Sept. 6	1	0	-	41.8	**50.9 ± 6.5 lbs/acre**	89.9 lbs/acre
	2	0	-			
	3	1	30.0			
Sept. 20	1	1	27.8	54.2		
		1	28			
	2	0	-			
	3	0	-			
Oct. 4	1	0	-	56.7		
	2	0	-			
	3	1	25.5			
		1	23			

Discussion

The 2023 population estimate for Forest Lake is below the threshold value and considered to be in a low to moderate range. This is an indication that there is not an extreme overabundance of carp that would heavily impact water quality or alum treatment at this time.

Forest Lake has a maximum depth of 37 feet and is 2,271 acres in total with nearly 70% of the lake considered littoral area (<15 ft deep). This littoral zone is especially suited for vegetation and the high percentage may impact carp success in-lake as this area is used for both spawning and feeding in the growing season of June-September. An open connection to a shallow and heavily vegetated bay in the northern most lobe of Forest Lake may provide habitat for successful recruitment in some years. Besides habitat, successful recruitment of young carp depends on the ability of young carp to escape predation. Forest Lake supports a variety of predator species including bluegill that are known to predate on carp eggs and larvae.

The length samples collected in the 2023 survey suggest that carp recruitment is infrequent because of the small range of lengths collected and that predation pressure is high enough to control the carp population. To bolster confidence in this hypothesis, MN DNR fisheries survey data was reviewed by desktop for all years sampled and combined with data from WSB's 2023 electrofishing survey (Figure 1). This data also suggests that recruitment may be infrequent since no carp were sampled under 12 inches in all surveys in all survey years.

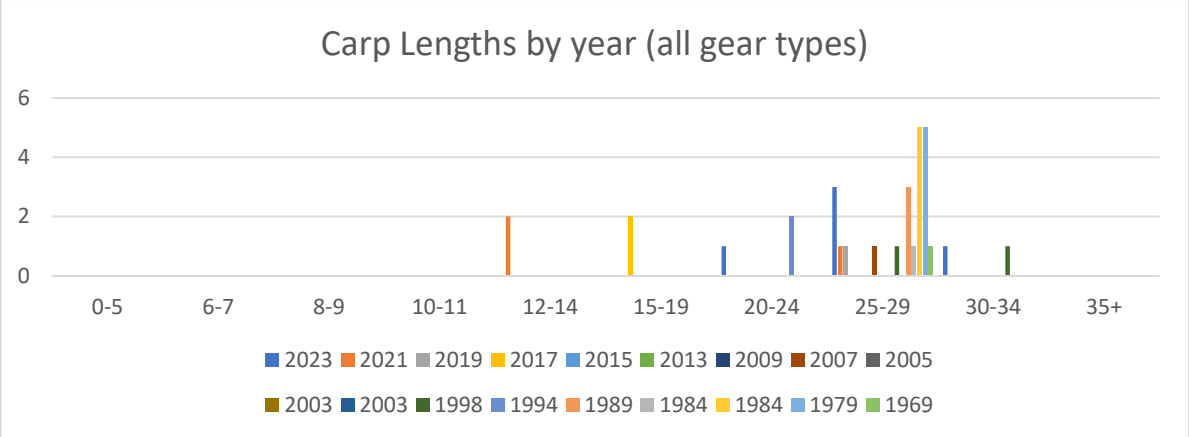

Figure 1 - Carp lengths (in) by Year, MN DNR survey data (Gill Net, Trap Net) combined with WSB's 2023 electrofishing data.

A CPUE estimate provides managers with a snapshot of the population of carp within a lake or system at the time of the survey. It is recommended to repeat this type of survey in 1-3 years to monitor for changes. Because carp are present in the system, the estimated biomass estimate at this time may change as the population of carp may boom in some years when conditions are right. Low water years such as the one experienced in 2023, may create the right conditions by exposing a greater percentage of the lake to littoral area. Conversely, high water years may provide passage through inlets or outlets for carp to recruit from nearby basins.

If future monitoring suggests carp are successful at recruiting young fish to the system, management activities may be considered to maintain or lower carp abundance to reduce the chance of a large increase to the population. Monitoring the population with boat electrofishing to target adults and/or regular fall trap net surveys to target the presence of young fish would capture changes in the carp population and size structure to guide management in the future.