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Pond  
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Management

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Lake  
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Systems

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Habitat  
Management

Stream  
Surveys

Fish  
Elimination

Water  
Quality  
Management

**2015**

# **FISH POPULATION SURVEY**

# **NORTH ARROWHEAD LAKE**

## FISH POPULATION SURVEY METHOD

Fish populations were sampled using an electrofishing boat equipped with a 4000 watt VVP electrofishing unit. The electrofishing boat was used to sample the lake for the various species of fish. Electrofishing took place along the shoreline and was used to sample around the structure found in the lake.

## FISHES PRESENT

Common Name	Scientific Name
Largemouth Bass	<i>Micropterus salmoides</i>
Chain Pickerel	<i>Esox niger</i>
Bluegill	<i>Lepomis macrochirus</i>
Pumpkinseed	<i>Lepomis gibbosus</i>
Yellow Perch	<i>Perca flavescens</i>
Black Crappie	<i>Pomoxis nigromaculatus</i>
Golden Shiner	<i>Notemigonus crysoleucas</i>
Common Carp	<i>Cyprinus carpio</i>
Brown Trout	<i>Salmo Trutta</i>
Channel Catfish	<i>Ictalurus punctatus</i>

### Largemouth Bass

The largemouth bass is one of the main predators in the fish population. The majority of this fish's diet is composed of smaller forage fish in the lake. It feeds well on small sunfish, golden shiners and other shoreline forage fish. The largemouth thrives best in shallow, weedy lakes or in river backwaters. Largemouth bass prefer weedy habitats not only because their food supply is available in those areas, but also because aquatic plants and sunken debris furnish protection. The largemouth bass population in North Arrowhead Lake is composed of a variety of sizes. Largemouth bass were sampled in many inch classes up to 17 inches. Largemouth bass of all sizes were found in less than desirable numbers. Reproduction from 2015 was poor. The young bass sampled were healthy and growing at a good rate. They ranged in size from 3 to 5 inches.

### Chain Pickerel

Chain pickerel are usually found where larger species of pike are either rare or absent. Chain pickerel grow rather quickly and can reach 14 inches in 3 years. It takes about 6 years to attain a length of 20 inches and if one survives to the maximum of 10 years, should be 36 inches long and weigh approximately 9 pounds. Only a few chain pickerel were sampled during the survey. The ones sampled were larger adults. The 2015 chain pickerel reproduction was also poor.

## **Bluegill**

The bluegill is a species of sunfish that prefers quiet, weedy waters where it can hide and feed. In the daytime, the smaller fish are close to shore in coves and under docks. The larger bluegills prefer the adjacent deeper waters in the daytime but move into shallow areas in the morning and evening to feed. Bluegills also work well in a predator-prey relationship with largemouth bass. Bluegills spawn after the bass, which gives the young of the year bass a good supply of food for growth their first year. Bluegills tend to spawn more often during the summer than pumpkinseeds, resulting in a larger food supply for the young bass. The bluegill population appears to be healthy and reproduction is good.

## **Pumpkinseed**

The pumpkinseed is a species of sunfish that inhabits standing water with soft bottoms covered with sunken plant material. It prefers weed patches, docks and logs for cover, and is most often found in these locations. These sunfish are a species that work well in a predator-prey relationship with the largemouth bass. Pumpkinseeds spawn after the bass, which gives the young of the year bass a good supply of food for growth that first year. The pumpkinseed population appears to be very healthy with a good growth rate. The pumpkinseed population is comparable in size to that of the bluegill. Pumpkinseeds are reproducing at an acceptable rate. Most of the larger pumpkinseeds sampled during the survey were 6-7 inches.

## **Yellow Perch**

This is the most widely distributed member of the perch family. The perch is at home in small and large lakes alike, and though found in rivers it is considered primarily a lake fish. Lakes with cool, clean, water and ample amounts of sandy or rocky bottoms make better perch lakes. The yellow perch works well as a forage fish with chain pickerel and walleye. They do not work as well with largemouth bass since they prefer a slightly different habitat. Fewer yellow perch were sampled than what was found in the 2012 survey.

## **Black Crappie**

The black crappie is a popular freshwater panfish found throughout the United States. The black crappie likes quiet waters and prefers more vegetated areas than the white crappie. The black crappie is strictly carnivorous, feeding on small fishes, aquatic insects, and crustaceans. A good number of black crappie were sampled during the survey. Most of the crappies were sampled in the 8 to 11 inch ranges. They are reproducing well since numerous small black crappies were sampled in the 3 to 4 inch range.

## **Golden Shiner**

The golden shiner is a fish found in relatively clear, weedy lakes and quiet streams. Although schools may be found in open water, they are not often far from weed beds.

Golden shiners are a good forage fish for largemouth bass and walleye. A large bass can eat an adult shiner easier than it can eat an adult sunfish. A desirable number of young of the year shiners were sampled during the survey. These small shiners were mostly 1 to 3 inches in length. Fewer large golden shiners were sampled than what was observed in 2012. This is not a concern as it is mostly likely the result of sampling variability.

### **Common Carp**

The common carp is native to Asia but has been introduced to every part of the world. Numerous carp were sampled during the survey. About the same number of carp were sample in the 2015 survey as what was observed in 2012. The carp are present in such large numbers that they are having a negative impact on the sport fish population. Every effort should be employed to reduce their numbers.

### **Brown Trout and Channel Catfish**

Both of these species were sampled during the survey. The trout are part of a "put and take" fishery. Neither species is having a significant impact of the fish population. No recommendations are being made for the management of these species.

## **FISH MANAGEMENT NORTH ARROWHEAD LAKE**

Results of the 2015 fish population survey indicate that the quality of the sport fish population (largemouth bass, black crappie and bluegills) in North Arrowhead Lake is being significantly impacted by the large numbers of common carp. Largemouth bass are the main sport fish in the lake and their numbers have been negatively impacted by the large amount of carp. One important observation from the 2015 survey is there was a noteworthy increase in the number of 7 to 9 inch bass observed in survey since the last survey. Hopefully this is a trend that will continue. Stocking additional largemouth bass is recommended to help supplement the natural reproduction. Approximately 500, 6-10 inch largemouth bass should be stocking on an annual basis. Stocking should take place during the spring or fall when water temperatures are cooler. Bass stocked during the summer months will have poor survival.

The carp are causing lake sediments to become suspended in the water column. These sediments also impact the reproduction of the forage fish populations. The sport fish population will have difficulty recovering as long as carp occupy a large percentage of the biomass and carrying capacity of the lake. The one positive aspect is that carp reproduction is poor. As long as carp numbers remain high, North Arrowhead Lake will have a poor sport fishery. Therefore, carp numbers need to be significantly reduced. The difficult part of this recommendation is deciding how to accomplish the removal of carp. Ultimately the best method would be to poison the entire fish population and restock with a desired ratio of species. The down side of such a recommendation is that it is expensive and the public perception can be difficult to manage.

Since the reproduction of carp is poor, removing the larger carp is what is necessary to improve the fishery. As adults are removed their numbers will be reduced accordingly.



One possible option that would help is the use of large gill nets. Gill nets are vertical panels of netting normally set in a straight line. Fish are usually caught after they swim into the net and pass only part way through the mesh. When it struggles to free itself, the twine slips behind the gill cover and prevents escape. Most desirable fish species would pass through the nets and the larger carp would be caught. The best time for gill netting to take place would be in the spring of the year when carp are actively moving during their spawning period. If a group of dedicated volunteers could undertake the gill netting, it could be conducted fairly affordably.

It is recommended that you evaluate the different options for carp removal. Aquatic Environment Consultants, Inc. could work with the association to finalize the details of these various options.

## **WATER QUALITY DATA**

### **Total Alkalinity 19.0 mg/liter North Arrowhead Lake**

Total alkalinity refers to the total concentration of bases in water expressed as milligrams per liter of equivalent calcium carbonate. Waters with total alkalinity of less than 20 mg/liter usually have little available carbon dioxide to permit growth of plankton which is the main source of food for bluegills and other forage fish in your lake. Since the alkalinity in your lake is less than 20 mg/liter, the growth of plankton will be limited. This limited growth of plankton will cause the pounds per acre of fish to be less than that of lakes with higher total alkalinity.

### **Total Hardness 39.0 mg/liter North Arrowhead Lake**

The calcium concentration in water is normally expressed as calcium hardness in terms of equivalent calcium carbonate. Desirable levels for total hardness for fish production usually fall in the range of 20 to 300 milligrams per liter. Hardness is not as important as alkalinity but should be about the same numeric value. The hardness of the water in North Arrowhead Lake is greater than 20 mg/liter and in the same range as total alkalinity.

### **pH 6.94 North Arrowhead Lake**

The desirable range for fish production is pH 6.5 to 9.0. Any pH value found in the range pH 4.0 to 6.5 is in the slow growth range. Very little if any reproduction will occur if the pH is in the range of pH 4.0 to 5.0. The acid death point for fish is around pH 4.0 or less. The pH in a lake will vary during the day based on weather conditions. Usually a lake's pH will be higher on a sunny day in the afternoon than it is in the morning. This variation is a result of the photosynthetic processes of phytoplankton and other plants that are present in the lake. The pH of your water falls within the desired range, and should continue to be checked on an annual basis.

## WATER QUALITY MANAGEMENT

The water quality parameters that were tested during the survey indicate that fish can survive in the lake. However, the levels indicate that fish will grow at a slow rate and the carrying capacity for the water body will be reduced. The greatest concern that you should have at this time is preventing nutrients from entering the lake. The faster nutrients enter a lake, the faster it will age, resulting in more management problems. Management of nutrients entering North Arrowhead Lake should be one of your greatest concerns for the long-term management of the lake.

## CONCLUSION

North Arrowhead Lake is a valuable resource that with proper management can produce exceptional recreational opportunities for years to come. Management guidelines for the fish population should be followed if improvements are going to be made. The fish population should be studied on a regular basis to evaluate the results and make adjustments to the management recommendations.

## RECOMMENDATIONS TO FOLLOW

- Develop a program for removal of large numbers of carp.
- No harvest of largemouth bass or Chain Pickerel from the lake.
- Stock 500, 6-10 inch largemouth bass annually basis during the spring or fall of the year.
- Trout can continue to be stocked for the purposes of "put and take" fishing
- Survey the fish population in September 2018.

**TABLE 1**

Survey Data on North Arrowhead Lake taken 9-1-15

SPECIES	NUMBER SAMPLED	LARGEST FISH	MOST COMMON SIZE
Largemouth Bass	29	17"	8"-9"
Chain Pickerel	3	17"	
Bluegill	47	7"	5"-6"
Pumpkinseed	18	7"	5"-6"
Yellow Perch	22	14"	12"-13"
Black Crappie	24	11"	10"-11"
Golden Shiner	21	7"	1"-3"
Common Carp	117	27"	18"-24"
Brown Trout	8	13"	12"-13"
Channel Catfish	1	19"	

Figure 1 2015 North Arrowhead Lake Largemouth Bass Sample

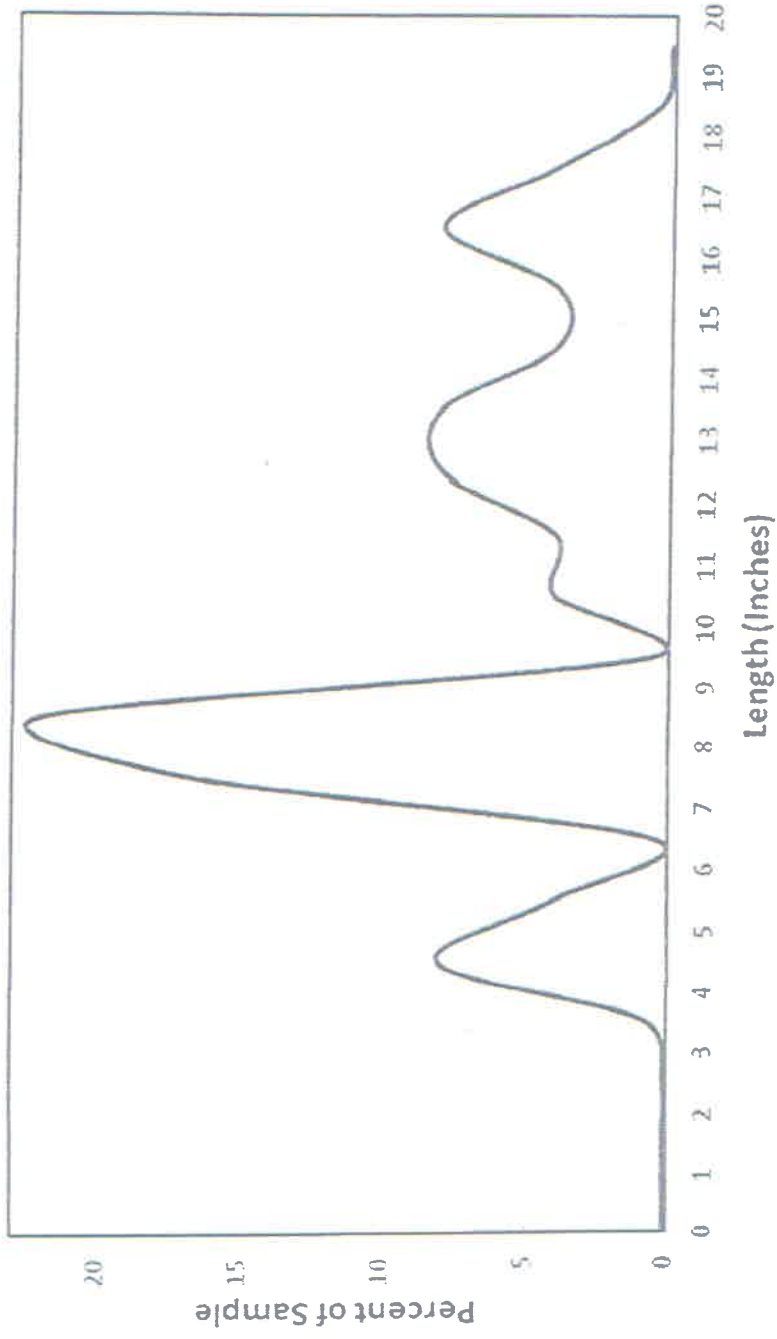


Figure 2 2015 N. Arrowhead Lake Largemouth Bass Length / Weight Ratio

