

2012

FISH POPULATION SURVEY

INDIAN LAKE

INTRODUCTION

Beginning August 29, 2012, a two day fish population survey was conducted on Indian Lake by Aquatic Environment Consultants, Inc. The purpose of this survey was to collect data on the lake, identify problems with the lake and develop a management plan for the lake. Data that related to water quality and the fish population was collected.

MANAGEMENT GOAL

Indian Lake is a lake with an established fish population that has reached the carrying capacity for the water body. Our goal is to manage the fish population in such a way as to improve the largemouth bass population and populations of other desirable species in the lake. Improvements are to be made in the growth rates, sizes, numbers and reproductive potential of each species. Water quality management is another concern that needs to be addressed and future management goals should be established.

FISH POPULATION MANAGEMENT

Freshwater lakes have fish populations that are composed of fish that fall into one of two categories. They are classified as either a predator or forage fish. The predator fish feed on the forage fish. In a "balanced" population, predator fish will prevent the forage fish from overpopulating. Also, there are about three to four pounds of forage fish for every pound of predator fish in a "balanced" population. In most fish populations, the predator fish are removed much faster than the forage fish and the population quickly shifts to one that is "out of balance". Certain predator species work better with certain forage species. In general, a forage fish works well with a predator that shares the same habitat. The spawning period for the forage fish should be shortly after the spawning period for the predator. The reason for this delay is that the young of the year predators will have a supply of newly hatched forage fish that are small enough for the predators to eat. If the forage fish hatch before the predator, the forage is too large for the predator fish to eat when they hatch. A good example of this relationship is that of the largemouth bass and bluegill. Bluegills spawn after the largemouth bass, share the same habitat and provide good forage for the young of the year largemouth bass.

The first goal in the management of the fish population in any water body is to match the proper predator fish with the proper forage fish. Once this is accomplished, the object is to manage the forage fish population to produce large numbers of young fish on which the predators can feed. The predator fish must also be maintained in large enough numbers to prevent the forage fish from overpopulating. As the forage fish overpopulate, they stunt out, their reproduction decreases and the fish population of the entire water body deteriorates. The opposite can also be the case where the predator fish numbers are too high for the available forage base causing overcrowding of the predator fish resulting in stunted growth and poor weights.

FISH POPULATION SURVEY METHOD

Fish populations were sampled using a variety of sampling equipment. Each piece of equipment is employed to sample certain species of fish and certain types of habitat. A seine measuring 50'x6' was used to sample the shoreline in an effort to obtain a sample of smaller sunfish, perch and bass. An electrofishing boat equipped with a 4000 watt VVP electrofishing unit was used to sample the lake for the predator fish and adult forage 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>
Smallmouth Bass	<i>Micropterus dolomieu</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>
Rock Bass	<i>Ambloplites rupestris</i>
Brown Bullhead	<i>Ameiurus nebulosus</i>
White Sucker	<i>Catostomus commersoni</i>
Red Breast Sunfish	<i>Lepomis auritus</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. Largemouth bass prefer softer non-spiny forage such as small sunfish, golden shiners. While they will eat other species such as yellow perch, they are not a preferred forage species due to their rough spiny texture. Yellow perch are normally found in a larger range of habitat than what is preferred by the largemouth bass. 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 Indian Lake is composed of a variety of sizes. Largemouth bass were sampled in almost every inch class up to 20 inches. Fish in the 14 to 17 inch ranges were found in good numbers (see figure 1). 2012 reproduction sampled during the seine sample was good. These young bass were healthy but growing at a slower than normal rate for Pennsylvania lakes. They ranged in size from 2 to 3 inches. The slower growth rate is a result of many factors including the physical location (watershed) and lower nutrient load of Indian Lake.

Smallmouth Bass

The smallmouth bass is usually found in rocky locations in lakes and streams. They prefer clear, rocky lakes with a minimum depth of 25 to 30 feet and temperatures in the summer no less than 60°F and no more than 80°F. In streams, this bass prefers a good percentage of riffles flowing over gravel, boulders or bedrock. Smallmouth bass prefer a slightly different food supply than largemouth bass. The first food for smallmouth consists of minute crustaceans, and later it graduates into insect larvae, crayfish and fish. Several smallmouth bass were found during the survey. These fish were sampled in a variety of sizes from 5 to 15 inches. They appear to be healthy and growing at a good rate.

Bluegill

The bluegill is a species of sunfish that prefer quiet, weedy waters where they 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. Bass feed well on this fish and they supply a large amount of food for the young of the year 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. Large numbers of one to three inch bluegills were sampled along the shoreline. Three to four inch bluegills were found in lower than desired numbers. The reason for these lower than desirable numbers of intermediate bluegills is that the 2 to 3 inch bluegills are being consumed by the bass before they reach the 3 to 4 inch range. Most of the larger bluegills sampled during the survey were 6-8 inches.

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. Bass feed well on these fish and they supply an abundance of food for the young of the year 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 healthy with a good growth rate. The pumpkinseed population is comparable in size to that of the bluegill. One to three inch pumpkinseeds were sampled in large numbers during the seine survey at all locations along the shoreline. Most of the larger pumpkinseeds sampled during the survey were 6-8 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. While largemouth bass, bluegills and pumpkinseeds prefer muddy lake bottoms, yellow perch like lakes with cool, clean, water and ample amounts of sandy or rocky areas. Yellow perch will often school in deep open water. The yellow perch works well as a forage fish with walleye. Both walleye and yellow perch are members of the Percidae family of fishes and share similar habitat. They do not work as well as forage for largemouth bass since they prefer a slightly different habitat. Yellow perch spawn before the bass. Therefore young of the year yellow perch are too large for the young of the year bass to consume. Yellow perch in a variety of sizes were sampled during the survey. Large numbers of yellow perch were sampled in the 2 to 6 inch ranges and represent a substantial forage base that is not being utilized by the predator fish populations.

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. Most of the black crappie sampled during the survey were 8 to 13 inches in size.

Golden shiners

The golden shiner is a fish found in relatively clear, weedy ponds, lakes and quiet streams. Although schools may be found in open waters, they are not often far from weed beds. Golden shiners are a good forage fish for largemouth bass. Golden shiners are numerous in the lake. These fish are spawning well as evidenced by large numbers of 2 to four 3 shiners observed during our seine survey. These small shiners are an important food supply for small bass.

Rock Bass

The rock bass is a species of sunfish that prefers large areas of rocks and stones. It spawns similar to that of other sunfish. Many rock bass were sampled during the survey in rocky areas around the lake. Most of the rock bass sampled during the survey were 6 inch to 8 inch long.

Brown Bullhead

Brown bullheads are a medium size slender-bodied catfish. Bullheads are an omnivorous feeder and will feed on anything from plant material to fish. Being a bottom feeder, however, a major portion of its diet is composed of insect larvae and mollusks. Bullheads were present in the survey sample ranging in size from 7 to 11 inches. The population appears healthy and not a real concern in the management of the lake.

White Sucker

The white sucker is quite tolerant of a great variety of conditions. It prefers large streams and the deeper water of impoundments. White suckers feed on a variety of foods, including aquatic insect larvae, crustaceans, mollusks, and algae. Only one white sucker was sampled during the survey.

Red Breast Sunfish

The red breast sunfish is one of the brightest colored sunfish. Although it is found in lakes and ponds, it reaches greatest numbers in the rivers in the eastern United States. It is commonly found in association with smallmouth bass and rock bass. Only one red breast sunfish was sampled during the survey and is not impacting the overall management of the fish population.

FISH MANAGEMENT INDIAN LAKE

Results of the 2012 fish population survey indicate that the quality of the fish population in Indian Lake is in good condition when compared to similar lakes in Pennsylvania. There is good reproduction from the largemouth bass, indicating that there is available habitat for largemouth bass to successfully spawn. As you can see in figure 1, largemouth bass are found in the sample in a range of sizes up to 19 inches. Largemouth bass are found in high numbers between the sizes of 14 and 17 inches. As figure 2 indicates, largemouth bass in Indian Lake are close to normal weight for their length when compared to the standard. Some bass are slightly under weight while others are slightly over the standard. In a fish population with a strong forage base the average weight will be above the standard. The reason most of the catchable size bass are not robust is because there is not large amounts of easily attainable preferred forage. Since desirable size forage sunfish (3-4 inch) are found in lower than desirable numbers, the bass are most likely feeding on the less preferred yellow perch.

Overall, the condition of the fish population in Indian Lake is good quality. There are plenty of quality largemouth bass to be caught in the lake. However, with some dedicated work and a quality monitoring program, improvements can be made. Two goals that could be the focus of a management program would be to: 1) increase the top end size and physical condition of the largemouth bass 2) Make better use of the forage created by the yellow perch.

If you choose to proceed with these management goals, you need to work on both of them, not just one or the other. Doing one and not the other could cause problems and not benefits.

In order to increase the top end size of the largemouth bass, there needs to be less competition for the available sunfish forage. Since 17 inch bass don't like eating the smaller one to two inch bluegills, there needs to be an increase in the number of the more desirable three to four inch bluegills in the lake. Therefore, you need to remove those bass that are feeding on those one to two inch bluegills. What that means is that fishermen need to target and aggressively remove largemouth bass between 10 and 15

inches in length. As the number of smaller bass decreases, the number of 3 to 4 inch forage sunfish will increase and larger bass have more food to get bigger.

Making better use of the yellow perch population is easier than improving the physical condition of largemouth bass. Stocking a predator fish that is better matched for the yellow perch is what is needed in Indian Lake. Walleye is a fish that we have used very effectively in other lakes in Pennsylvania to better manage yellow perch. Walleye are members of the perch family and share the same habitat. Our recommendation is that you annually stock 2000 to 3000, 6 to 8 inch walleye in the fall of the year. It is important to understand that you should not proceed with the stocking of walleye if you are not going to proceed with the harvesting recommendations on the largemouth bass. Stocking walleye without removing bass from the lake will result in a decrease in both forage populations of yellow perch and bluegills leading to a decrease in size and weight of largemouth bass in the lake.

In review, it is the recommendation of Aquatic Environment Consultants, Inc. that the following steps be taken to improve the fish population of Indian Lake. There should be no harvest of any largemouth bass larger than 15 inches and less than 20 inches. Aggressively harvest largemouth bass that are 10 to 15 inches from the lake. No largemouth bass should be stocked since they are reproducing at a desirable rate. You should annually stock 2000 to 3000, 6-8 inch walleye in the fall of the year. In order to protect these fish from being harvested at a young age, there should be no harvest of walleye less than 20 inches. The fish population should continue to be monitored to study the results of such stockings and to adjust recommendations. Since problems with a fish population can develop rapidly and cause long-term changes in the quality of the fishery, it should be surveyed again in 2015.

WATER QUALITY DATA

Total Alkalinity 23.0 mg/liter

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 greater than 20 mg/liter, there is no need for the addition of lime to the water.

Total Hardness 109.0 mg/liter

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 of about the same numeric value. The hardness of your lake falls within this recommended range and indicates a suitable level for fish production.

pH 7.5

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 is a result of the algae and other plants that are present in the lake. The pH of your water falls within this desirable range, but should be checked from time to time.

WATER QUALITY MANAGEMENT

The water quality parameters that were tested during the survey indicate that there is good water quality for fish production and other recreational activities. 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 Indian Lake should be one of your greatest concerns for the long-term management of the lake.

CONCLUSION

Indian 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 with the fish population. The fish population should be studied on a regular basis to evaluate the results and make adjustments to the management recommendations.

RECOMMENDATIONS TO FOLLOW

- Aggressively harvest largemouth bass from 10 to 15 inches from the lake.
- No harvest of largemouth bass over 15 inches and under 20 inches.
- Stock 2,000 to 3,000, 6 to 8 inch walleye on an annual basis.
- No harvest of walleye under 20 inches.
- No stocking of any largemouth bass.
- Survey the fish population in September 2015.

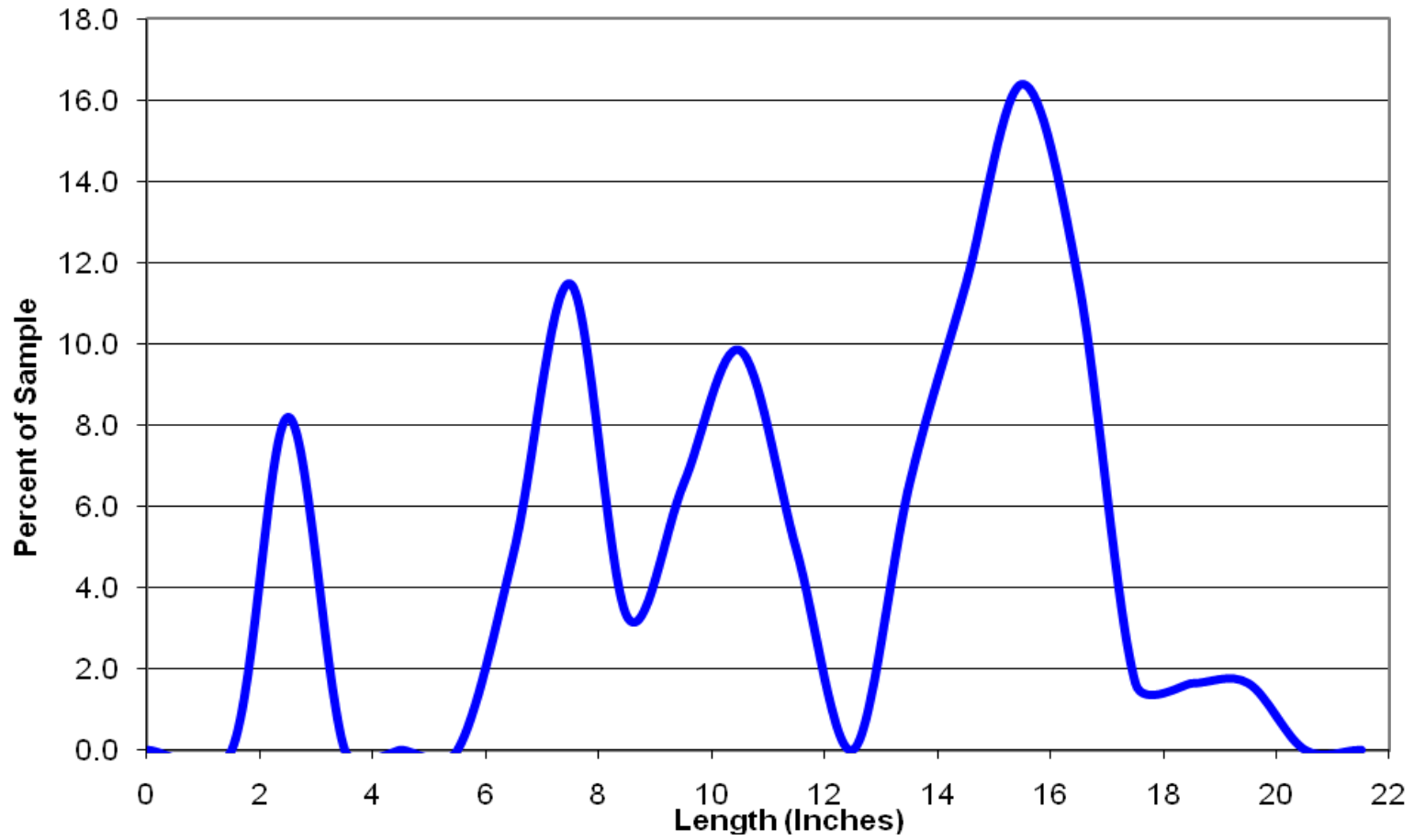
TABLE 1

Survey Data on Indian Lake taken 8-29-12 to 8-30-12

SPECIES	NUMBER SAMPLED	LARGEST FISH	MOST COMMON SIZE
Largemouth Bass	76	19.1"	14"-17"
Smallmouth Bass	33	15"	6"-8"
Bluegill	276	8"	1"-3"
Pumpkinseed	109	8"	1"-3"
Yellow Perch	421	12"	2"-5"
Black Crappie	12	13"	7"-8"
Golden Shiner	48	9"	2"-3"
Rock Bass	11	8"	5"-6"
Brown Bullhead	8	11"	10"-11"
White Sucker	1	15"	
Red Breast Sunfish	1	6"	

Figure 1

2012 Indian Lake Largemouth Bass Sample



**Figure 2: Indian Lake Largemouth Bass
Length/Weight Ratio**

