



Lake Leopold Fish Survey

Submitted to:
Prairie Crossing Homeowners Association
City of Graylake, Illinois

June 2015



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Project Number:
15007-00

**Lake Leopold
Fish Community Assessment
2015**

Prepared For:

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June 2015

EXECUTIVE SUMMARY

This study was conducted for the Prairie Crossing Homeowners Association to provide current biological data of fish composition in Lake Leopold in Grayslake, Illinois. The entire shoreline was electrofished and three locations were seined. The electrofishing was conducted in a counter-clockwise direction around the perimeter of the lake for a total of 79 minutes. There was a total of 192 fish collected during electrofishing effort. The catch was dominated by Largemouth Bass (79%) and Bluegill (18%). The Largemouth Bass catch was comprised of mainly immature fish. The fish were healthy, in good condition and in a few years should reach mature age and increase the reproduction of Largemouth Bass in Lake Leopold. The median length of the Bluegill collected was 6.6 inches. Smaller Bluegills could have been seeking cover in the deeper aquatic plants and may have been present in larger numbers than were collected during the survey. With the mature size fish present, the Bluegill population appears to be in good condition. The Illinois State listed threatened fish known to inhabit Lake Leopold were all collected. Banded Killifish and Blackchin Shiner were collected by both seining and electrofishing and Iowa Darter was collected by seining only. Overall, Lake Leopold has a good population of Largemouth Bass and Bluegill. The presence of the threatened fish species also indicate the lake has good water quality and healthy aquatic plants. Recommendations to improve the fishing at the lake and to maintain the water quality include:

- Stocking predator species such as Channel Catfish to increase species diversity and provide opportunities for anglers.

- Harvesting some of the Largemouth Bass under 12 inches to avoid possible disease or stunting
- Conducting a fish survey every three to five years to ensure the fishery is meeting expectations.
- Reducing stormwater inputs with the use of buffer strips, limiting lawn fertilizers, and using alternatives to winter de-icing.
- Maintain native aquatic plants for fish cover and habitat.

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1.0 INTRODUCTION

1.1 Purpose

Deuchler Environmental (DEI) was contracted by the Prairie Crossing Homeowners Association to provide current biological data of fish composition in Lake Leopold. No previous fish sampling had been conducted on Lake Leopold and the Prairie Crossing Homeowners Association was looking for management recommendations.

1.2 Sample Location Description

Lake Leopold is a 22 acre lake located in the Village of Grayslake, Illinois. It has a maximum depth of 15 feet with an average depth of 6.5 feet. The lake was constructed to receive stormwater when the Prairie Crossing Development was created. A map depicting the three seine locations is included as **Figure 1**. The objective of the seining was to confirm the presence of the Illinois State listed threatened fish that have been known to exist in Lake Leopold. The fish are the state threatened include the Banded Killifish, Blackchin Shiner, and Iowa Darter. In addition to the seining, the entire shoreline of Lake Leopold, including the perimeter of the island, was electrofished (**Figure 2**).

2.0 MATERIALS AND METHODS

2.1 Sampling Plan

DEI boat electrofished the shoreline of Lake Leopold as well as sampled three locations using a seine to emphasize the collection of small fish and the threatened and endangered fish species present in Lake Leopold. All game fish collected during the electrofishing were identified, measured, and weighed. All nongame species collected during electrofishing and all fish collected during seining were identified and counted. All fish were released back into Lake Leopold. Sampling was conducted on May 20, 2015.

2.2 Gear Types

The fish sampling was conducted using two standard sampling gears: electrofishing and shoreline seining. In an attempt to minimize the bias created from electrofishing, increase species diversity, and sample for the state listed fishes, shoreline seining was also conducted.

2.2.1 Electrofishing

Electrofishing is a standard gear type for sampling lakes and rivers used by various government research agencies, including the Illinois Department of Natural Resources and Illinois Natural History Survey. Electrofishing is a shallow water gear that targets all sizes and species of fish, though it is somewhat biased towards collecting larger individuals.

A 16' Alumacraft boat equipped with a Smith-Root 5.0 Generator Powered Pulsator (GPP) electrofisher system was used to sample the perimeter of Lake Leopold including the perimeter of the island. The electrode array consisted of the aluminum boat hull as the cathode and 6 droppers suspended from two retractable booms as the anode. Each

anode dropper is 3/8" woven steel cable that has a length of three feet. The booms extend eight feet in front of the bow of the boat. The electrofishing sampling crew consisted of a boat operator and a crew member responsible for netting the stunned fish (**Photo 1**). Electrofishing was conducted in a clockwise direction around the lake with a total pedal time of 159 minutes. A concerted effort was made to net every stunned fish. The electrofishing boat maneuvered along the shoreline out to the aquatic plant edge. The catch was placed into a 75 gallon stock tank that was aerated with oxygen. After 20 to 50 minutes of electrofishing, the fish were measured to the nearest millimeter, weighed to the nearest gram, and analyzed for anomalies before being released back into Lake Leopold.

Photo 1. Boat Electrofishing



2.2.2 Seining

A straight seine was used to conduct the shoreline seining. The seine was 25 feet in length and four feet tall with 3/16 inch mesh. The seine was attached to two wooden handles. Two seine hauls were conducted at each site comprising a total distance of approximately 75 feet (**Photo 2**). All fish collected were identified, counted, and released back into Lake Leopold. While approaching these sites, small fish were observed in the deeper water where some aquatic plants were present. These areas were too deep to be sampled by seining.

Photo 2. Shoreline Seining



3.0 RESULTS

Abundance of fish species provides an overview of the total number of each species present in the survey area. The study yielded a total of 202 individual fish representing five families and seven species (**Table 1**).

Seining sampled three areas around the lake. Location 1 was along the west side of the lake and north of the island, near the fishing pier (**Photo 3**). The bottom substrate was a mix of sand and muck. White Water Lily, cattails, filamentous algae and green algae (*Chara* sp.) were present. This site yielded two Bluegill, two Banded Killifish, and one Iowa Darter. Location 2 was along the east shoreline near a park area. Sampling occurred just south of the seawall area (**Photo 4**). The bottom substrate consisted of muck and there was filamentous algae, green algae (*Chara* sp.), white water lily, and cattails present. This location produced two Bluegills. Location 3 was along the southeast shoreline just south of the beach area (**Photo 5**). The bottom consisted of a mix of sand and muck with cattails and White Water Lily present. This area produced one Largemouth Bass and two Blackchin Shiners. The Blackchin Shiner, Banded Killifish, and Iowa Darter are listed as threatened in Illinois. Schools of shiners were observed among the aquatic plants in areas too deep to seine. It is likely that these were Blackchin Shiners.

Photo 3. Seine Location 1.



Photo 4. Seine Location 2.



Photo 5. Seine Location 3.



There was a total of 192 fish collected during the 79 minute electrofishing effort. The catch was dominated by Largemouth Bass (79%) and Bluegill (18%). A proportional stock density (PSD) is used to evaluate the condition of the fishery. The index compares the number of fish longer than a species specific quality size to the number of fish longer than a species specific stock size. This produces a value that can be used to compare samples among different years and different lakes. The PSD value represents the percent of sexually mature fish in the sample and the sample is assumed to be representative of the population. A balanced population has a PSD value between 40% and 60%. A relative stock density (RSD) was used for larger fish to show the proportion of mature fish.

The PSD for Largemouth Bass uses a stock size of eight inches and a quality size of 12 inches. A PSD was calculated to be eight, well below the management goal indicating more immature fish than mature fish. A RSD for fish greater than 13 inches was three, for fish greater than 14 inches was two and for fish greater than 15 inches was two. There

were three fish collected over 17 inches with the largest being 20.3 inches (**Photo 6**). **Figure 3** shows the length distribution of Largemouth Bass collected in 2015. A 93% of the catch was between nine inches and 11 inches. These year classes of fish will grow to maturity within the next few years and increase the natural reproduction of Lake Leopold. With such a large number of fish just below the 12 inch size, a relative weight (W_r) was calculated to assess the condition of the fish and to see if there was indication of stunting of the Largemouth Bass. Relative weights should be between 85 and 104 for fish in good condition (Murphy and Willis 1996). The median W_r for fish in the six to eleven inch size range was 86 indicating the fish are in good condition and stunting doesn't appear to be a problem. The Largemouth Bass were collected at a rate of 1.92 fish per minute. The Illinois Department of Natural Resources (IDNR) recommends a management goal for Largemouth Bass of 1.0 fish per minute. With a 79% of the catch consisting of Largemouth Bass, they could be having an impact on the forage and juvenile fish.

Photo 6. Largemouth Bass



The PSD for Bluegill uses a stock size of three inches and a quality size of six inches.

The PSD was calculated to be 76, above the management goal of 40 to 60. This indicates

the Bluegill population is dominated by mature size fish (**Photo 7**). The median size of the Bluegills collected was 6.6 inches and ranged in size from 2.2 inches to 7.9 inches (**Figure 4**). There were areas of abundant vegetation around Lake Leopold which provide refuge sites for the smaller fish to escape predators. Smaller Bluegills could have been seeking cover in the deeper aquatic plants and may have been present in larger numbers than were collected during the survey. Generally lakes with few predator species have an abundance of small size Bluegills. With the mature size fish present, the Bluegill population is sustaining and natural reproduction should enhance the current population.

Photo 7. Bluegill



There were two Black Crappie collected during the survey (**Photo 8**). They ranged in size from 8.3 up to 9.0 inches. Both fish collected were of mature size. No juvenile Black Crappie were collected or observed. A dead Crappie was noted during DEI's survey. This is not unusual as Crappie tend to get bacterial infections that cause die-offs as a result of stress incurred from spawning.

Photo 8. Black Crappie



Other non-game species collected include Central Mudminnow, Blackchin Shiner, Banded Killifish, and Iowa Darter. None of these species were collected in large numbers but were present in the lake and add to the diversity. The Blackchin Shiner are known to persist in well vegetated lakes (Becker 1983). It is believed that the range is limited to Lake or Cook Counties in Illinois (Smith 1979). The Iowa Darter and Banded Killifish also prefer clear, well vegetated lakes (Smith 1979).

There were no Common Carp or Yellow Bass collected during the survey. Common Carp disrupt the bottom sediments creating turbid water and re-suspending nutrients that can lead to algae blooms. Yellow Bass have the capacity to impact nesting species like Largemouth Bass, Bluegill, and Crappie by preying on eggs, fry and small fingerlings.

4.0 DISCUSSION

Largemouth Bass was the most commonly collected fish species. The Largemouth Bass catch was comprised of mainly immature fish. The fish were healthy, in good condition, and in a few years should reach mature age and increase the natural reproduction of Largemouth Bass in Lake Leopold. It is recommended to harvest some of the Largemouth Bass that are under 12 inches in length to prevent any possible problems of disease and possible stunting. Harvesting some of the Largemouth Bass will also reduce the predation on the smaller young of year and juvenile fish.

A majority of the Bluegill collected were above six inches, which is generally a size when anglers tend to start keeping them, indicating that angler harvest was low. Black Crappie generally have a minimum size limit of eight inches. Both Black Crappie collected were above eight inches. Although in low numbers, Black Crappie was another fish present for anglers to pursue. It was likely that more Black Crappie were present in Lake Leopold as they tend to inhabit deeper water once spawning is completed in lake systems.

The Illinois State listed threatened fish known to inhabit Lake Leopold were all collected. Banded Killifish and Blackchin Shiner were collected by both seining and electrofishing and Iowa Darter was collected by seining only. These species require clear, well vegetated lakes with good water quality. Their presence indicates that Lake Leopold was maintaining good lake health.

The fish population in Lake Leopold was dominated by Largemouth Bass and not diverse. If the goal is to make this lake more attractive to anglers, it is recommended to

harvest some of the Largemouth Bass and stock another top predator such as Channel Catfish to increase the species diversity and offer anglers more options.

It is also recommended to maintain a quality native aquatic plant population within the lake and control any exotic plants, such as Eurasian Watermilfoil and Curlyleaf Pondweed, if they make their way into the lake. Signs should be posted to discourage residents from releasing any fish or plants into the lake. Lake Leopold is a clear, well-vegetated lake. The current aquatic plant coverage seemed adequate and there appeared to be good species diversity, although no formal aquatic plant sampling was conducted.

The threatened fish species prefer lakes such as Lake Leopold. To maintain the quality of the lake it is recommended to control the stormwater run-off. There were several stormwater inlets emptying directly into the lake. Stormwater brings detrimental nutrients such as phosphorus and chloride into the lake. Creating buffer strips, limiting lawn fertilizer containing phosphorus, and using chloride alternatives for winter de-icing will help maintain the quality of Lake Leopold.

Finally, it is recommended to have a fish survey completed every three to five years to ensure that the fish population is continuing to meet the expectations of the Prairie Crossing Homeowners Association.

5.0 REFERENCES

Becker, G. C. 1983. Fishes of Wisconsin. University of Wisconsin Press, Madison.

Murphy, B. R., and D. W. Willis, editors. 1996. Fisheries Techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.

Smith, P. W. 1979. The Fishes of Illinois. University of Illinois Press, Urbana, IL.

FIGURES

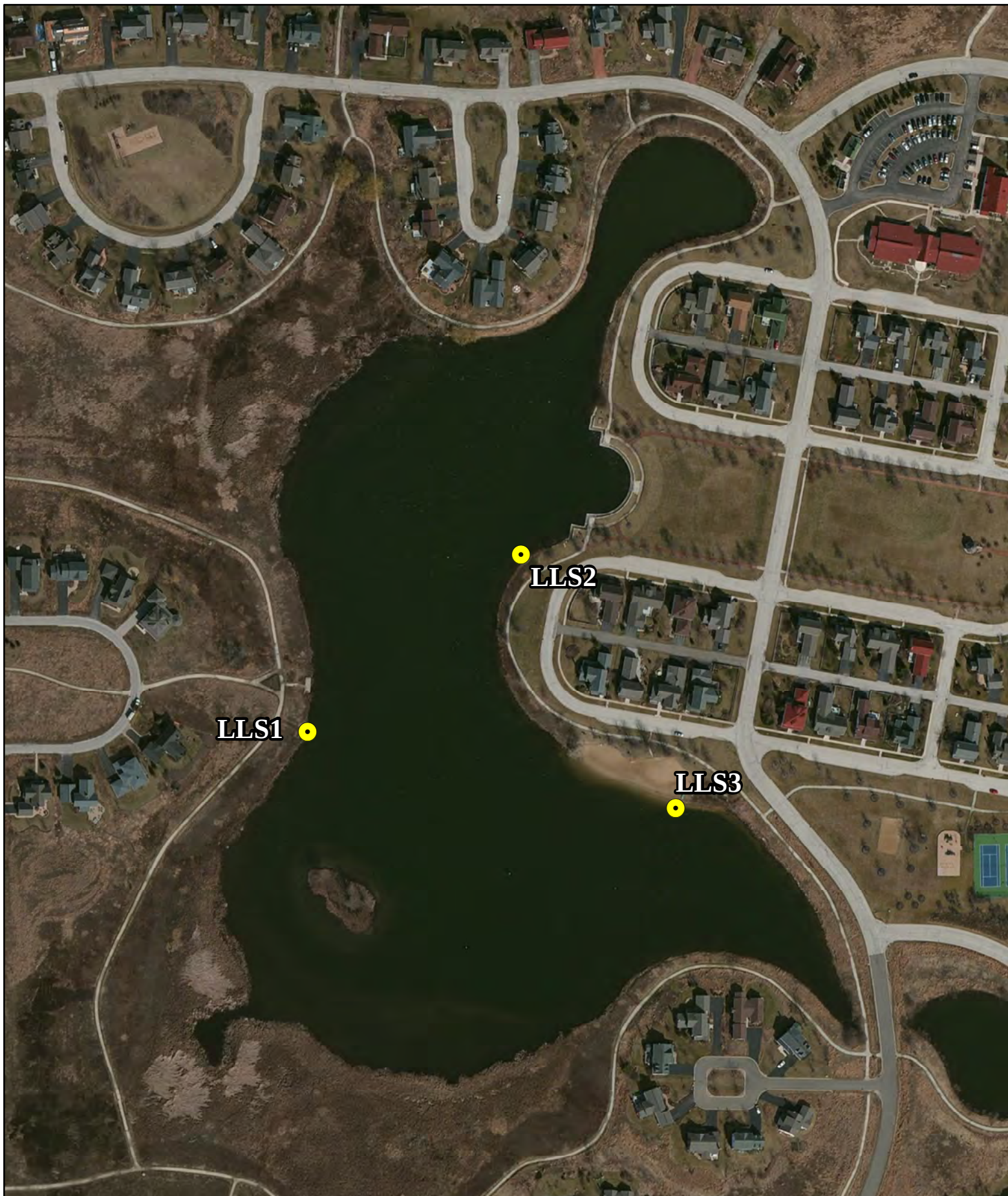


Figure 1
Lake Leopold - Grayslake, IL
Seine Sampling Locations



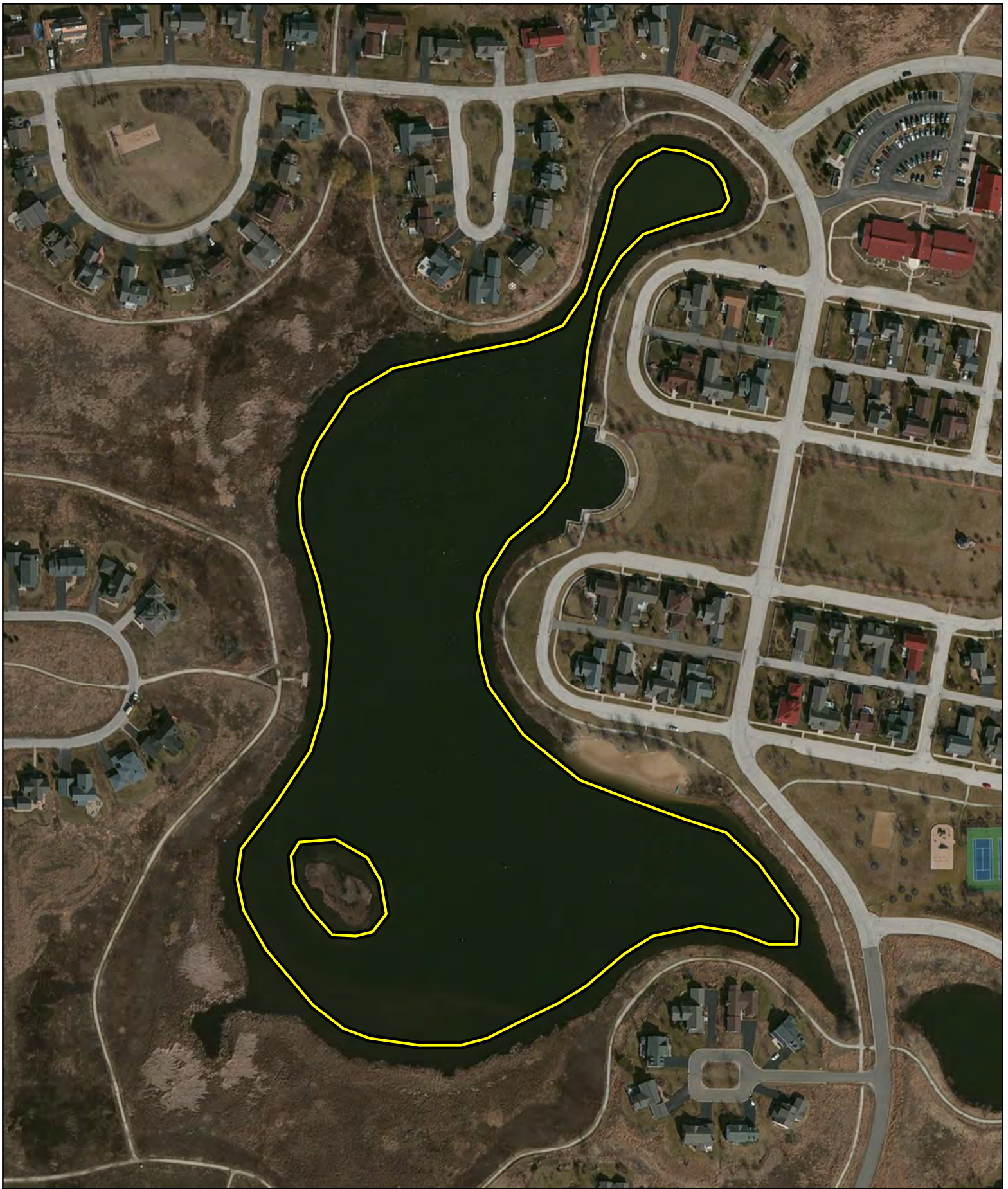


Figure 2
Lake Leopold - Grayslake, IL
Electrofishing Sampling Area



Figure 3. Length Distribution of Largemouth Bass Collected in 2015.

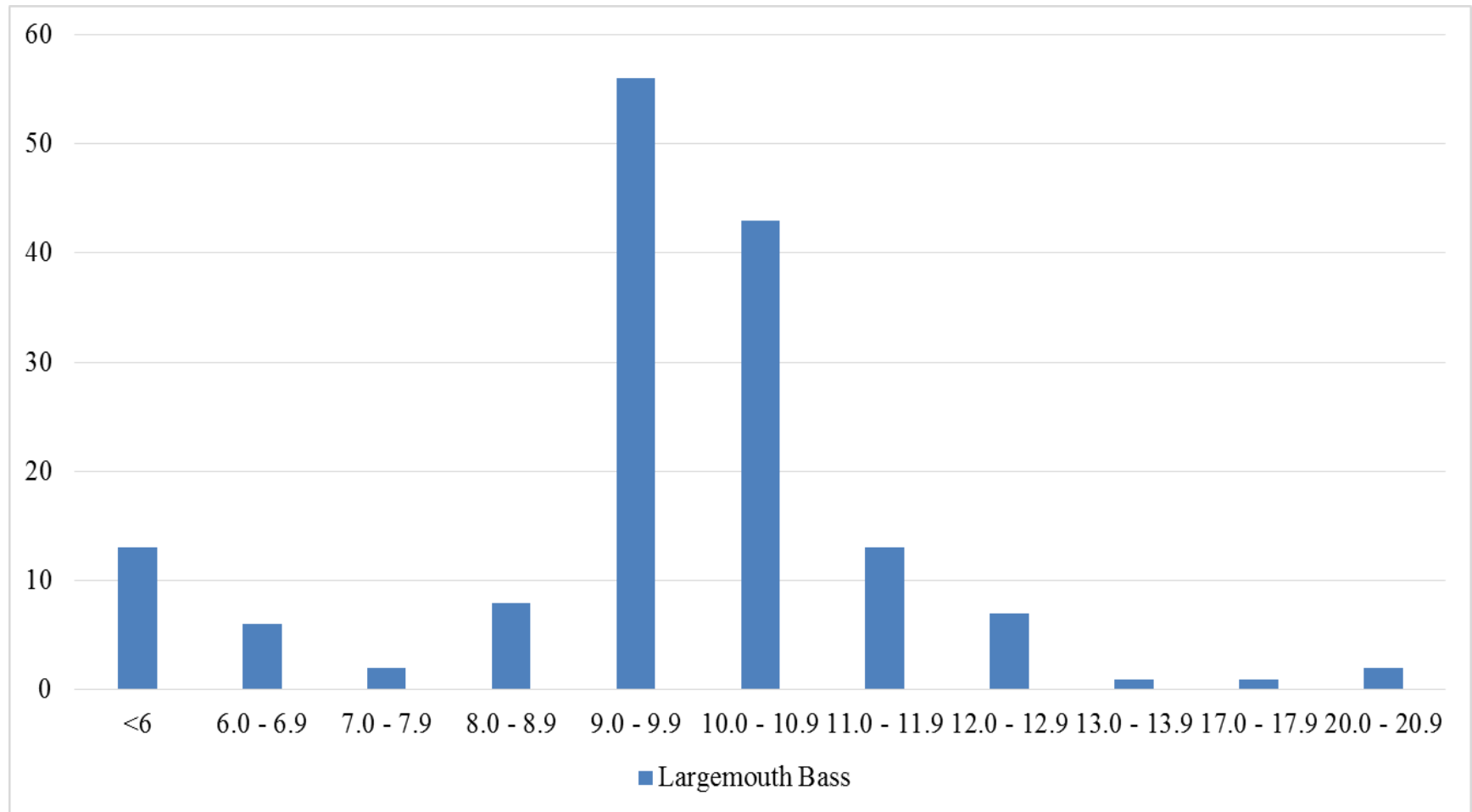
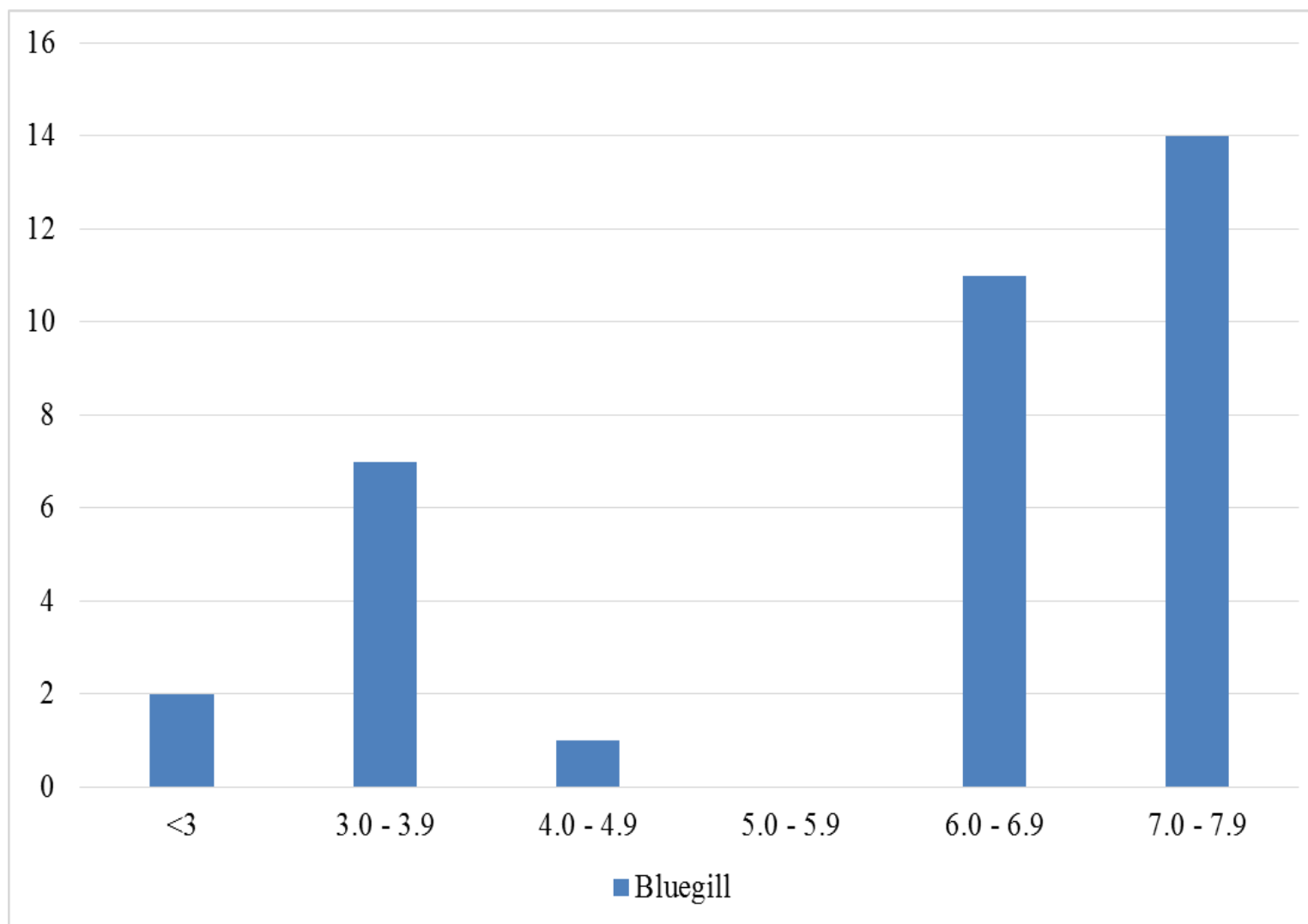


Figure 4. Length Distribution of Bluegill Collected in 2015.



TABLES

Table 1. Total Number of Fish Species Collected.

Family	Common Name	Scientific Name	Total	%
Centrarchidae	Black Crappie	<i>Pomoxis nigromaculatus</i>	2	1.0%
	Bluegill	<i>Lepomis macrochirus</i>	39	19.3%
	Largemouth Bass	<i>Micropterus salmoides</i>	153	75.7%
Cyprinidae	Blackchin Shiner+	<i>Notropis heterodon</i>	3	1.5%
Fundulidae	Banded Killifish+	<i>Fundulus diaphanus</i>	3	1.5%
Percidae	Iowa Darter+^	<i>Etheostoma nigrum</i>	1	0.5%
Umbridae	Central Mudminnow	<i>Umbra limi</i>	1	0.5%
Total			202	100.0%

+ State Threatened

^ collected seining only
