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FISH SURVEY REPORT

Greens Lake

Prepared For:

Woodland Lakes HOA

12 Woodland Lks

Sullivan, MO 63080

Locations:
Indiana
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Tennessee | Missouri

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Introduction

A survey of the fish community and other physical, biological, and chemical factors directly affecting the fish community was completed at Greens Lake on May 6, 2026. The major objectives of this survey and report are:

1. To provide a current status report on the fish community of the lake.
2. To compare the current characteristics of the fish community with established indices.
3. To provide recommendations for management strategies to enhance or sustain the sport fish community.

Water Chemistry

When managing an aquatic ecosystem the quality of water should always be considered first. If a lake or pond is perfectly constructed with abundant food and habitat, but has poor water quality, the fishery will ultimately suffer and never reach it's full potential. Although oxygen is typically not a year-round issue there are certain situations that can cause oxygen to drop to detrimental levels. If parameters such as pH or alkalinity are too low or too high it can put tremendous stress on the organisms living in it or even create a toxic environment all together. Other important parameters to consider are nitrogen and phosphorus levels. Nitrogen and phosphorus are two major nutrients that drive the plant growth in an aquatic ecosystem. If the ratio of nitrogen to phosphorus is below 17:1 there is potential for blue-green algae to become abundant. These species of algae can create a stressful environment for fish due to disruption of the food web.

Table 1. Selected lake and water quality parameters.

	Surface	Ideal Range
Acres	5.9	-
Temperature (F)	63.9	-
Dissolved Oxygen (ppm)	9.00	5.0+
pH	8.19	6-9
Alkalinity (ppm)	110	20+
Total Hardness (ppm)	116	20+
Total Phosphorus (ppm)	0	0.01-0.09
Total Nitrogen (ppm)	0.71	1.0-10.0

The results of selected physio-chemical parameters from this waterbody are presented in Table 1. Dissolved oxygen, pH, alkalinity, and hardness levels were all in acceptable ranges. The lake had sufficient oxygen (>5.0 ppm) down to 9 feet. The temperature profile shows a thermocline between 9-12 feet (Figure 1).

The nitrogen to phosphorus ratio could not be calculated because phosphorus concentrations were below the analytical detection limit. Overall, water quality parameters indicate this waterbody appears to be capable of supporting a healthy fish population.

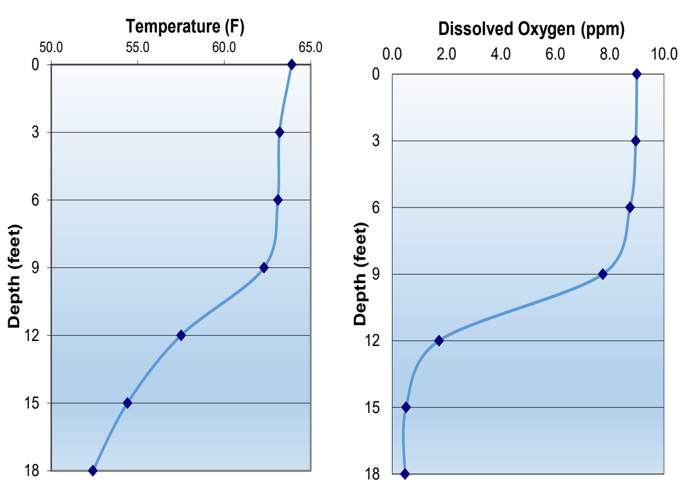


Figure 1. Temperature and Dissolved Oxygen profiles.

Greens Lake

Fish Collection

Fish sampling was done with the use of an electrofishing boat. Electrofishing is simply the use of electricity to capture fish for the evaluation of population status. Electrofishing equipment used in this survey consisted of a 16-foot aluminum boat equipped with a Midwest Lake Electrofishing Systems Infinity Box powered by a 6500-watt portable generator and two booms mounted with Wisconsin style rings. Electrofishing was done around the entirety of the shoreline and totaled 20 minutes of shocking.

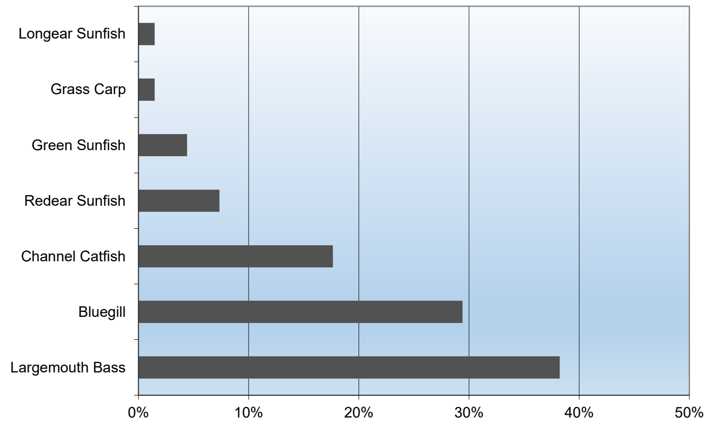


Figure 2. Relative abundance of species collected.

All fish collected were placed in water filled containers aboard the sampling boat for processing. Each fish collected was measured to the nearest half-inch. Five fish in each half-inch group were weighed to determine average and relative weights. Relative weight is a condition factor used to determine the overall plumpness of an individual fish. Relative weight values from 90-100 indicate good condition while anything under 90 is considered in poor condition. It can be assumed that fish with higher relative weights are finding enough food and are growing at a higher rate than fish with a lower relative weight.

A total of 68 fish weighing 53.84 pounds and representing seven species was collected from Greens Lake. The relative abundance of these species can be found in figure 2 and a full data table can be found at the end of this report. The data collected are adequate for management implications; however, there will be unanswered questions regarding aspects of the fish population and other related factors of the biological community in the lake. All fish numbers used in the report are based on the samples collected and should not be interpreted to be absolute or estimated numbers of fish in the lake.

Largemouth Bass caught during survey.

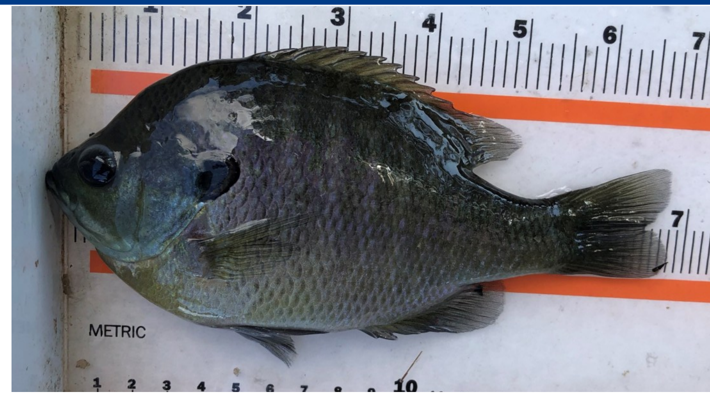
Channel Catfish caught during survey.

Predator-Prey Relationship

Even the most diverse systems can be broken down into predator-prey relationships. Often times the Largemouth Bass-Bluegill relationship is the most important. Bluegill are a great prey item for Largemouth Bass because they spawn multiple times a year and are continually creating food for Largemouth Bass. Managing for one species typically involves influencing both and as one of these populations change the other typically changes with it. In a balanced state both Largemouth Bass and Bluegill can experience proper growth rates.

Greens Lake—Bluegill

Bluegill were collected at a rate of 60 fish per hour during the survey, indicating a moderate forage population that is below the level needed to support the existing Largemouth Bass population. Approximately 75% of sampled Bluegill measured between 3–6 inches, with the majority of Bluegill found being in the 5.5 inch size class. Approximately 20% exceeded 6 inches in length, indicating that some Bluegill are successfully recruiting into larger size classes. Average Bluegill relative weight was 99, suggesting body condition is near ideal but overall forage abundance remains limited.



Bluegill

Bluegill in Greens Lake appear to be suffering from high levels of predation from Largemouth Bass. This high level of predation has created an imbalance size distribution within the Bluegill population. Overabundant and stunted Largemouth Bass feed heavily on the smallest individuals. During the survey there were more Largemouth Bass caught than Bluegill. This will always result in slow growing predators. The Bluegill population needs to be much higher in abundance than Largemouth Bass. If this ratio can be fixed, the pond will be pushed more towards a balanced state.

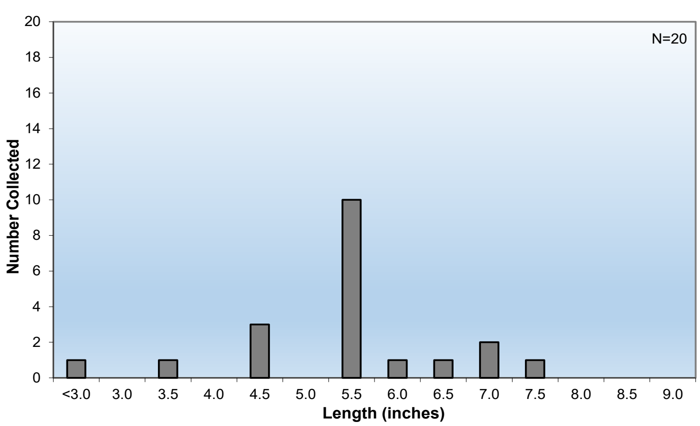


Figure 3. Length frequency distribution of Bluegill

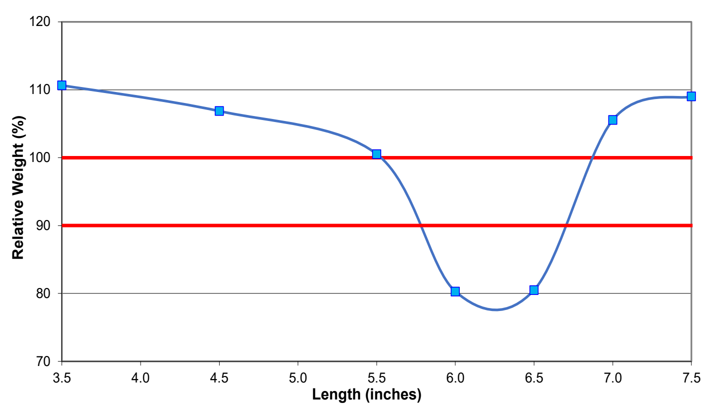


Figure 4. Bluegill relative weights

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Predator-Prey Relationship

Largemouth Bass are an opportunistic predator that will eat just about any species of fish they can catch. To keep a Largemouth Bass growing properly there needs to be several different sizes of forage available. This allows the bass to continually find the optimal size of prey as it continues to grow. When the optimal size of prey is available the fish can conserve energy, resulting in a higher growth rate. If the prey is too small a Largemouth Bass could potentially spend more energy chasing a meal than it gains by eating it. This results in skinny and slow growing fish. Managing a forage base to create a variety of sizes is key to creating a healthy and balanced Largemouth Bass population.

Largemouth Bass

Greens Lake—Largemouth Bass

Largemouth Bass were collected at a rate of 78 fish per hour during the electrofishing survey, indicating an abundant predator population and increased competition among individuals. Relative weights averaged 88 for Largemouth Bass between 8–12 inches, 83 between 12–16 inches, and 91 for Largemouth Bass greater than 16 inches, demonstrating that available forage resources were insufficient to maintain desirable body condition across much of the population.

Approximately 38% of sampled Largemouth Bass exceeded a relative weight of 90, while none exceeded a relative weight of 100, suggesting very few were maintaining good body condition. Additionally, 4% of sampled Largemouth Bass exceeded 18 inches in length, indicating limited recruitment into quality-size fish.

Both Largemouth Bass and Channel Catfish appear to be overabundant in the lake. Given the small number of Bluegill present it will be difficult for either species to grow well.

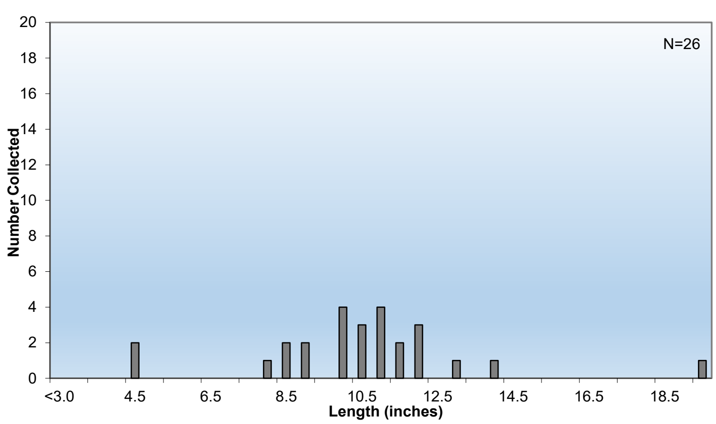


Figure 5. Length frequency distribution of Largemouth Bass

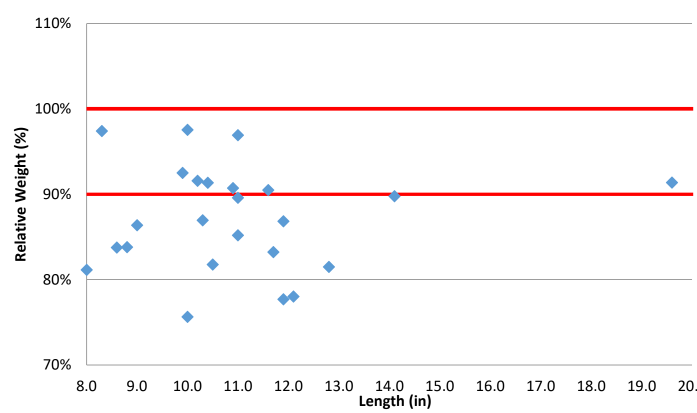


Figure 6. Largemouth Bass relative weights

Harvest

Harvesting fish is often one of the most important and under utilized management practices in a pond or lake. Harvesting, or culling, fish is simply the act of intentionally removing fish from a specific population to decrease competition among the remaining individuals. The culture of catch and release bass fishing started in the 1970's and still has a strong hold on fisherman today. There is a misconception that taking a fish out of a system will be detrimental to the population and if released someone could catch that fish again after it has "grown up." The reality is in some situations there is too much competition and the next time that fish is caught it could be the exact same size a year later. By removing that fish, and others, it leaves more food available for the remaining individuals to continue to grow each and every year.

Example of Stunted Largemouth Bass

Ponds and lakes can both become overrun with predators or prey. Each scenario presents a different set of problems. In a predator (Largemouth Bass) dominant system prey populations are decimated and the lack of food results in slow or stunted growth. In a prey (Bluegill) dominated system spawning and recruitment success of other species can be negatively impacted due to egg predation or direct competition with young-of-year fish, along with slow growth within the population.

Fixing these issues requires targeted annual harvest. In an unbalanced system generally only one species requires a heavy amount of the harvest, while in a balanced system fish should be removed from most populations to maintain a continuous level of growth.

Harvest of Channel Catfish and Largemouth Bass is recommended. Without harvest of these species it will be more difficult for the Bluegill population to rebound.

Harvest of Bluegill should be suspended at this time. Any Bluegill present in the pond will be valuable in terms of reproduction.

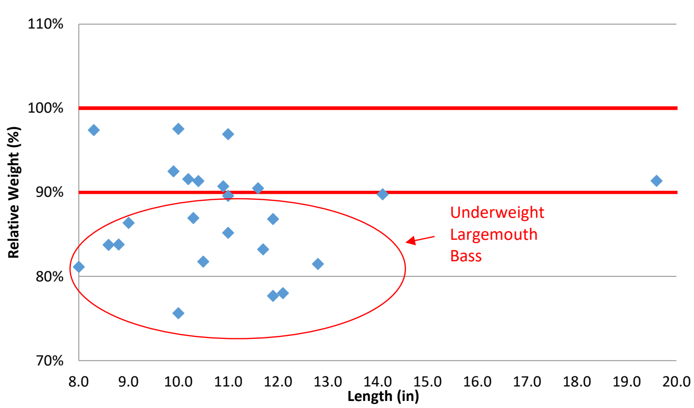


Figure 7. Largemouth Bass relative weights

Structure and Habitat

Structure and habitat are an extremely important factor to consider no matter what body of water is being managed. Just like anything else, the amount of structure in a lake should be kept in moderation. Too much or too little can lead to predictable scenarios. When very little or no structure is available Largemouth Bass spend too much time roaming around looking for food instead of saving energy and waiting near a piece of structure for food to swim by. The other end of the spectrum allows so many places for Bluegill or other prey species to hide that Largemouth Bass can't efficiently catch their prey. In both scenarios Largemouth Bass tend to have low relative weights even with proper harvest rates in place. In most cases roughly 20% of the shoreline containing structure is sufficient. This number can vary depending on the complexity of the cover.

Adding structure to a pond can be beneficial in a variety of ways. It can be a great way to increase the survival of small juvenile fish. This provides a forage base with a wide range of sizes available for your predators. Another benefit of adding structure to a pond is that they attract fish. Strategically placing structure can give you places that you can reliably catch fish.

Fish structure can take many different forms . Aquatic vegetation, brush piles, Christmas trees, and a variety of man-made structures can all be utilized by fish. All of these different structure types have different benefits that make them good management options. Aquatic vegetation

Pickerelweed

Largemouth Bass utilizing a Mossback Root Wad Kit

grows on its own but can be hard to manage at times. Brush piles and Christmas trees are often free, but will break down over time and need to be replaced. Manufactured structure can be costly initially, but will last a lifetime. Variety is important when assessing structure in a body of water. Adding structures of varied complexity and in varied depth can help to provide habitat to a variety of fish at different stages of life.

Approximately 5% of the shoreline contained fish habitat at the time of the survey. Simple woody cover and docks provided limited structural habitat. Spawning habitat also appeared inadequate, resulting in overall habitat availability well below desirable levels.

Complex habitat is critical for the survival of young and developing forage fish. Improvements in habitat will help create a broader and more stable forage base. Increasing structure is ideally done using a mix of woody and artificial habitat. Habitat improvements should focus on increasing the amount and distribution of available structure throughout the lake. These improvements should improve forage survival, strengthen year-class production, enhance predator efficiency, and increase the overall stability of the fish community.

Supplemental Forage Stocking

Stocking supplemental forage is a great pond management tool capable of significantly altering a fishery in a short period of time when done correctly. If a prey base, such as the Bluegill population, is being heavily predated on temporary forage stockings can be used to bolster the current population. Supplementing the Bluegill population is the most beneficial stocking. Rebounding this population will solve the major food source problem for predators. Other common species used are Fathead Minnows and Golden Shiners. Fathead Minnows are great for initial stockings in a pond due to their small size, while the larger Golden Shiners are better for an already established pond. Both of these species rarely produce a self sustaining population and will need to be stocked annually to have the greatest impact on the fishery.

Recommendation:

Stock 5,000 3-4” Bluegill, 2,000 3-4” Redear, and 75 pounds of Golden Shiners annually for 3 years

Bluegill Stocking

Golden Shiner

Texas Hunter fish feeder

Supplemental Fish Food

Using a fish feeder with a high protein feed is an excellent way to push the limits of a pond in regards to fish production. By adding a huge additional food source to the pond the carrying capacity is being raised. Often the immediate effect of this management tool is growing really large Bluegill. While having large Bluegill is great there are additional benefits that work their way up the food chain. Larger Bluegill produce more and larger eggs while spawning. This is important because larger eggs have a much higher survival rate. The more offspring the Bluegill are producing each time they spawn results in a much larger forage base for Largemouth Bass to take advantage of. Even when managing for a balanced fishery using a fish feeder is always a great idea, but when looking for trophy Largemouth Bass or trophy Bluegill it is a must.

Recommendation:

Install 2 Texas Hunter fish feeders with AC Trophy Pond Feed

Aeration

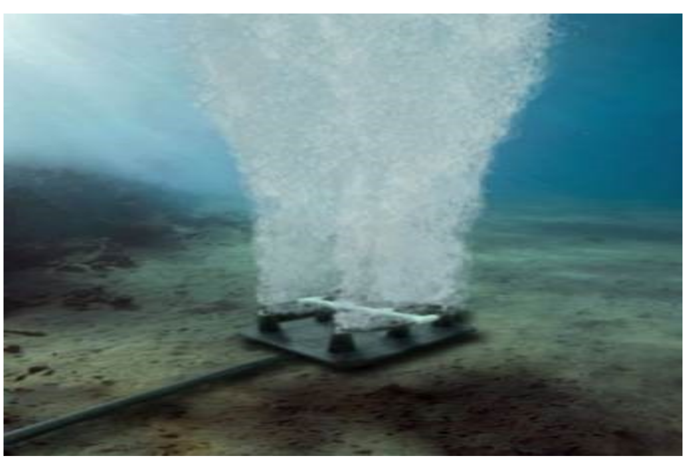
Aeration can be a beneficial addition to most any body of water that is holding fish. Aeration can help to increase the amount of habitat available to fish by increasing the amount of oxygenated water that is available. It can also be a means to reduce the risk of fish kills and reduce oxygen stress on fish. The two main categories of aeration are surface aeration and diffused aeration.

Surface Aeration

Surface aeration refers to aerators that agitate the surface of the water. This agitation helps to increase the amount of oxygen that is dissolved into the water in the surface layers . Surface aeration is often confused with fountain aeration, but differs in multiple ways. In most cases, the primary goal of fountains is aesthetics, where as the primary goal of surface aeration is agitating the maximum amount of water to increase oxygen in the surface layers of a body of water. Surface aerators are good options to improve oxygen levels in bodies of water that have a low average depth or a maximum depth shallower than 8 feet.

Diffused Aeration

Diffused aeration is used as a tool to alter the temperature/oxygen profile of a body of water. Without diffused aeration, bodies of water will begin to layer in a process called "stratification." The top layer of a body of water is called the epilimnion and is characterized by warmer oxygen rich water. Below the epilimnion is the metalimnion/thermocline. This layer separates and prevents mixing of the warm, oxygen rich waters near the surface and the cold, oxygen poor waters on the bottom. The thermocline is characterized by a rapid change in temperature and oxygen. The hypolimnion is the bottom layer that makes contact with the sediment/benthos and is characterized by cold water and little to no oxygen.



Diffused aerator

Surface aerator

Diffused aeration is used to remove or prevent these layers from forming (destratification) by pumping water and oxygen from the bottom of the water column. By removing these layers, diffused aeration creates even oxygen and temperature throughout the water column. This allows fish to use the entire water column as opposed to being limited to the epilimnion. This makes diffused aeration a good tool for increasing the carrying capacity of a pond and reducing the chances for oxygen stress and fish kills.

Diffused aeration can also be used as a tool to break down organic material (muck) that forms on the bottom of ponds and lakes. Introducing oxygen to the bottom sediments allows aerobic bacteria to consume and break down these organics.

Greens Lake would be a good candidate for diffused aeration based on the maximum depth being 18 feet.

Summary/Recommendations

This fishery exhibits characteristics of a predator-heavy system dominated by an overcrowded Largemouth Bass population. Largemouth Bass abundance was high, but body condition remained below desirable levels across most size classes, indicating that predator demand currently exceeds available forage resources. Without reducing Largemouth Bass abundance and increasing forage production, growth into larger size classes is expected to remain limited. Reducing the abundance of smaller Largemouth Bass should be the highest management priority. Decreasing competition within the Largemouth Bass population will improve growth rates, body condition, and increase the likelihood of recruiting fish into larger size classes.

The Bluegill population exhibited good size distribution and nearly ideal body condition; however, overall abundance remains too low to adequately support the existing predator population. Increasing forage production should improve predator growth while helping restore a more balanced predator-prey relationship.

Habitat conditions also remain below desirable levels. Structural habitat was limited to a small amount of simple woody cover and docks, while spawning habitat appeared inadequate. Increasing habitat complexity should improve forage survival, strengthen year-class production, and increase long-term fishery stability.

Supplemental forage stockings should strengthen the prey base available to predators. Bluegill remain the backbone of most pond fisheries due to their ability to reproduce multiple times annually. Golden Shiners can supplement predator diets and reduce predation pressure on Bluegill, while Redear Sunfish provide additional forage benefits and may help suppress parasite abundance.

Installing a Texas Hunter fish feeder and utilizing AC Trophy Pond Feed remains one of the most effective methods for increasing Bluegill growth and reproductive output. Supplemental feeding will improve forage production and provide additional prey resources necessary to improve Largemouth Bass growth and overall fishery balance.

The following recommendations, **listed in order of importance**, will help protect and enhance the fishery in Greens Lake:

1. Harvest any Largemouth Bass less than 14.0 inches
    - Any Channel Catfish caught should also be harvested
2. Install 60 Ugly Tree fish habitats throughout the lake
3. Install 2-3 pea gravel spawning areas
4. Stock 5,000 3-4” Bluegill, 2,000 3-4” Redear, and 75 pounds of Golden Shiners annually for 3 years
5. Install 2 Texas Hunter fish feeders with Ac Trophy Pond Feed
5. Install diffused aeration
6. Conduct a Fisheries analysis survey in 2029.

ALL PROPERTY OWNERS ARE RESPONSIBLE FOR FOLLOWING STATE AND LOCAL REGULATIONS WHEN MANAGING THEIR FISHERY.

Other Species Present

Redear Sunfish (*Lepomis microlophus*)

Redear Sunfish are a member of the Centrarchidae (Sunfish) family. Redear Sunfish are not as fecund (reproductively successful) as Bluegill and rarely become overabundant. They can grow to large sizes and are regularly sought after by pan-fisherman. Redear Sunfish primarily feed on mollusks and invertebrates and have been shown in many cases to reduce levels of parasitism in fish populations.

Redear

Green Sunfish

Green Sunfish *Lepomis Cyanellus*

Green Sunfish are a member of the Centrarchidae (Sunfish) family. Green Sunfish can be aggressive and competitive with Bluegill and other species for food and resources therefore they are generally considered an undesirable species. Green Sunfish look superficially like Bluegill. They can easily be distinguished by their larger mouths and more rounded pectoral fins

Channel Catfish (*Ictalurus punctatus)*

Channel Catfish are members of the Ictaluridae family. Channel Catfish can be problematic to a fishery if overabundant, but in small or moderate abundances, rarely cause problems. They are often desirable sportfish and can be good table fare. Channel Catfish are typically not represented very well in electrofishing surveys, and can often be more abundant than the data shows. Channel Catfish often do not have a high level of natural reproduction in small ponds and some lakes, and therefore need to be stocked if desired in many cases.

Channel Catfish

Other Species Present

Longear Sunfish (*Lepomis megalotis*)
Longear Sunfish is in the Centrarchidae (Sunfish) Family. Longear Sunfish will eat invertebrates, zooplankton, and a variety of small food items. Longear Sunfish can be considered undesirable because they can compete with Bluegill for food resources.

Longear Sunfish

Grass Carp

Grass Carp (*Ctenopharyngoden Idella*)

Grass Carp are in the Cyprinidae (Minnow) family. Grass Carp are an invasive nonnative species that have been introduced to many waters across the United States and cause a variety of problems. Triploid Grass Carp are often stocked in pond and lake ecosystems to help manage aquatic plants. These Triploid Grass Carp on non-reproductive, which eliminates the risk of them becoming overpopulated. Grass Carp are rarely, if ever stocked with the goal of improving the overall fishery.

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Fish Collection Tables

SIZE GROUP (IN)	NUMBER	PERCENTAGE	AVERAGE WEIGHT (lbs.)	TOTAL WEIGHT (lbs.)	WS	RELATIVE WEIGHT
BLUEGILL						
<3.0	1	5.00%	0.01	0.01	-	-
3.5	1	5.00%	0.03	0.03	0.03	111
4.5	3	15.00%	0.07	0.20	0.06	107
5.5	10	50.00%	0.12	1.22	0.12	101
6.0	1	5.00%	0.13	0.13	0.16	80
6.5	1	5.00%	0.17	0.17	0.21	81
7.0	2	10.00%	0.29	0.57	0.27	106
7.5	1	5.00%	0.37	0.37	0.34	109
TOTAL	20			2.70		
LARGEMOUTH BASS						
4.5	2	7.69%	0.04	0.08	0.04	-
8.0	1	3.85%	0.20	0.20	0.25	81
8.5	2	7.69%	0.27	0.53	0.30	89
9.0	2	7.69%	0.30	0.59	0.36	82
10.0	4	15.38%	0.45	1.81	0.50	90
10.5	3	11.54%	0.49	1.48	0.59	84
11.0	4	15.38%	0.61	2.45	0.68	90
11.5	2	7.69%	0.71	1.42	0.78	90
12.0	3	11.54%	0.72	2.16	0.90	80
13.0	1	3.85%	0.90	0.90	1.16	78
14.0	1	3.85%	1.35	1.35	1.47	92
19.5	1	3.85%	3.93	3.93	4.23	93
TOTAL	26			16.90		
Channel Catfish						
13.0	1	8.33%	0.80	0.80		
13.5	1	8.33%	0.75	0.75		
14.0	1	8.33%	0.80	0.80		
15.0	1	8.33%	1.25	1.25		
16.0	1	8.33%	1.60	1.60		
16.5	1	8.33%	1.54	1.54		
17.0	1	8.33%	1.91	1.91		
17.5	3	25.00%	1.98	5.95		
20.0	2	16.67%	3.14	6.28		
TOTAL	12			20.88		

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Green Sunfish

<3.0	1	33.33%	0.01	0.01
3.5	1	33.33%	0.01	0.01
8.0	1	33.33%	0.36	0.36
TOTAL	3			0.38

Grass Carp

29.5	1	100.00%	11.92	11.92
TOTAL	1			11.92

Redear Sunfish

5.0	1	20.00%	0.09	0.09
5.5	1	20.00%	0.11	0.11
6.5	1	20.00%	0.23	0.23
7.0	2	40.00%	0.25	0.50
TOTAL	5			0.93

Longear Sunfish

5.5	1	100.00%	0.13	0.13
TOTAL	1			0.13

Species	Scientific Name	N	%N	Size Range (in.)	Total weight (lbs.)	%Wt.	N/hr.
Largemouth Bass	*Micropterus salmoides*	26	38.24%	4.5 - 19.5	16.90	31.39%	78
Bluegill	*Lepomis macrochirus*	20	29.41%	<3.0 - 7.5	2.70	5.01%	60
Channel Catfish	*Ictalurus punctatus*	12	17.65%	13.0 - 20.0	20.88	38.78%	36
Redear Sunfish	*Lepomis microlophus*	5	7.35%	5.0 - 7.0	0.93	1.73%	15
Green Sunfish	*Lepomis cyanellus*	3	4.41%	<3.0 - 8.0	0.38	0.71%	9
Grass Carp	*Ctenopharyngodon idella*	1	1.47%	29.5	11.92	22.14%	3
Longear Sunfish	*Lepomis megalotis*	1	1.47%	5.5	0.13	0.24%	3
Total		68			53.84		

N = number of individuals
%N = percent number of a species as compared to the total number of fish collected
%Wt = percent weight of a species as compared to the total weight of all fish collected
N/hr. = catch rate of species (number of fish of a species collected per hour of electrofishing effort)