FISH SURVEY REPORT

Twin Lakes

Prepared For:

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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 Twin Lakes on October 25, 2023. 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	4.76	-
Temperature (F)	60.7	-
Dissolved Oxygen (ppm)	15.35	5.0+
pH	8.2	6-9
Alkalinity (ppm)	82	20+
Total Hardness (ppm)	144	20+
Total Phosphorus (ppm)	0.14	0.01-0.09
Total Nitrogen (ppm)	2.94	1.0-10.0

The results of selected physio-chemical parameters from Twin Lakes are presented in Table 1. Dissolved oxygen, pH, alkalinity, and hardness levels were all in acceptable ranges. The lake had sufficient oxygen down to approximately 6 feet deep. It appeared the lake was in the process of mixing with the fall turnover (Figure 1). The phosphorus content was over the ideal range. This indicates there is potential for abundant blue-green algae growth during warmer months of the year. Overall, water quality parameters indicate Twin Lakes appears to be capable of supporting a healthy fish population.

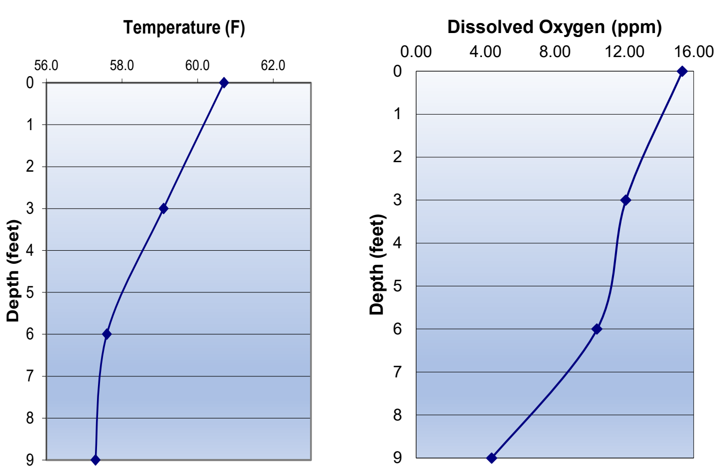
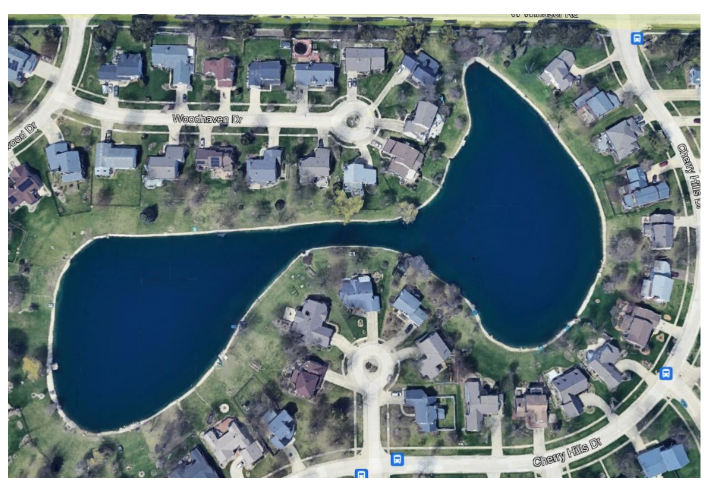


Figure 1. Temperature and Dissolved Oxygen profiles.



Twin Lakes

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 35 minutes of shocking.

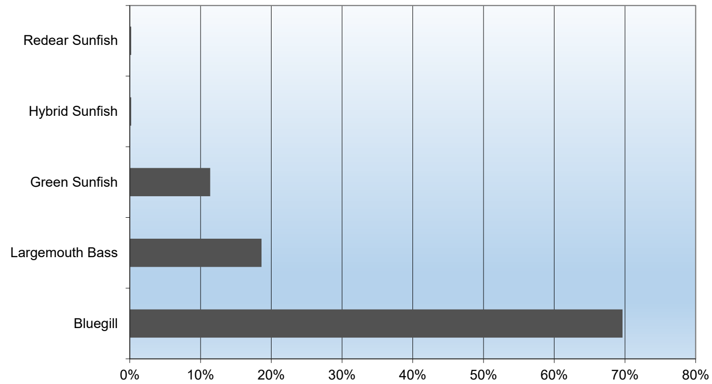


Figure 2. Relative abundance of species collected.

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.

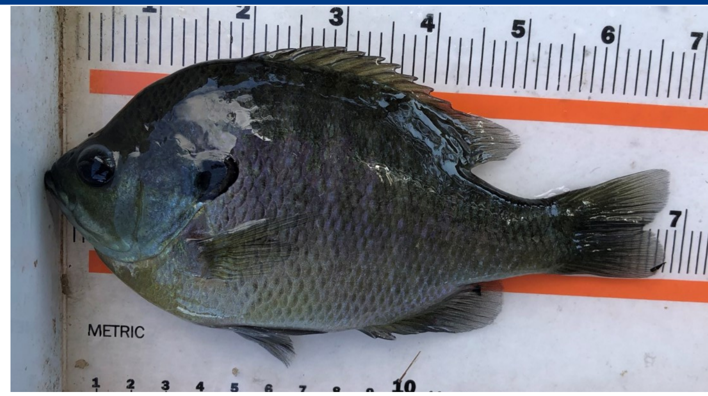
A total of 537 fish weighing 89.9 pounds and representing five species was collected from Twin Lakes. The relative abundance of these species can be found in figure 2 and a full data table can be found at the end of this report. The data collected are adequate for management implications; however, there 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.

Largest Largemouth Bass caught during survey.

Largest Hybrid Sunfish 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.


Bluegill

Twin Lakes—Bluegill

Bluegill ranged in size from less than 3.0 to 4.0 inches (Figure 3). Approximately 99% of Bluegill collected were 3.0 inches or less, indicating reproduction did occur in 2023. The survey did not find any quality Bluegill. This led to a proportional stock density (PSD) of 0, which is well below the desired range of 20-40 for Bluegill (proportion of quality fish within a population). The relative weight values of Bluegill collected at Twin Lakes could only be calculated for the 4.0 inch fish as these were the only adults collected in the survey. The average relative weight percentage for these fish was 118% (Figure 4).

No matter what goal there is for the Twin Lakes fishery, Bluegill and other forage fish will need to become better established. This will improve the catch rate of Bluegill and other panfish, but will also help with the catch rate and quality of Largemouth Bass. A lack of habitat and heavy predation are likely the two leading causes for the depletion of the Bluegill population. Improvements in these two areas will improve the fishery as a whole and will allow more Bluegill to survive long enough to recruit into the adult population. The population found in the survey consisted almost entirely of young fish, so there must be some small number of larger adult Bluegill present. In a balanced system, Bluegill need to be filled out in all size classes and should outnumber their predators. If less than 3.0 inch Bluegill are omitted, more Largemouth Bass would have been collected than Bluegill. This must change drastically in order for either population to thrive in the pond.

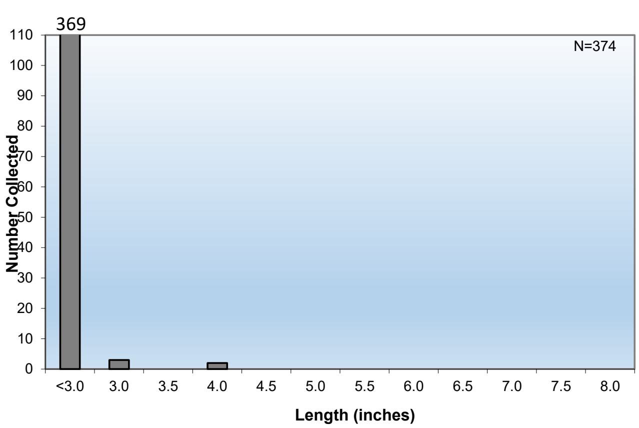


Figure 3. Length frequency distribution of Bluegill

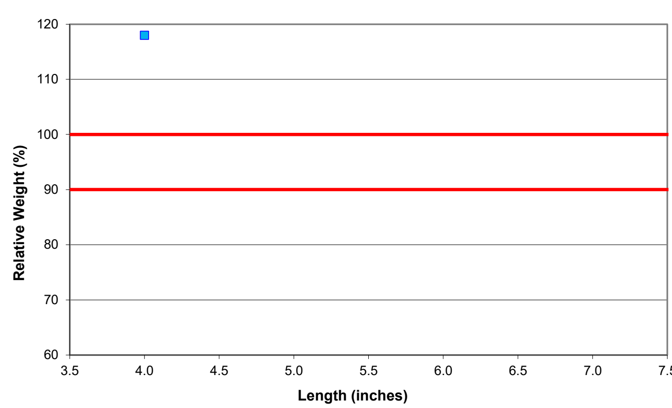


Figure 4. Bluegill relative weights

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.

Twin Lakes—Largemouth Bass

A total of 100 Largemouth Bass ranging in size from 3.5 to 14.5 inches was collected (Figure 5). Very few individuals were found under 8.0 inches. This indicates that there is a high level of cannibalism occurring. The majority of Largemouth Bass sampled were between 11.5 to 13.5 inches. This led to a PSD of 65 for Largemouth Bass, which is above the desired range of 40-60. Relative weights ranged from 69 to 108 (Figure 6). The majority of relative weights fell below the 90 mark. This is an indicator that most Largemouth Bass are not finding enough food.

Largemouth Bass

Largemouth Bass appear to be overabundant at this time. The catch rate of 172/hr is very high. Balanced fisheries typically have a catch rate of 60-70/hr. Relative weights decrease as body length increases. As Largemouth Bass are growing, the small forage available is becoming less and less efficient for them to eat. Larger fish need larger prey to eat. This all indicates competition is the biggest limiting factor in their slow growth. The forage base has been decimated by the high level of competition and needs pressure taken off it. If competition can be reduced, improvements in the Largemouth Bass population will follow. Currently the distribution graph shows heavy crowding between 11.5 to 13.5 inches. A more even distribution will lead to better growth and some individuals will transition into larger size classes.

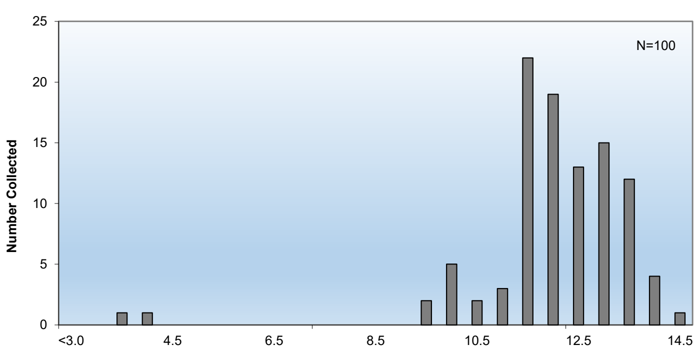


Figure 5. Length frequency distribution of Largemouth Bass

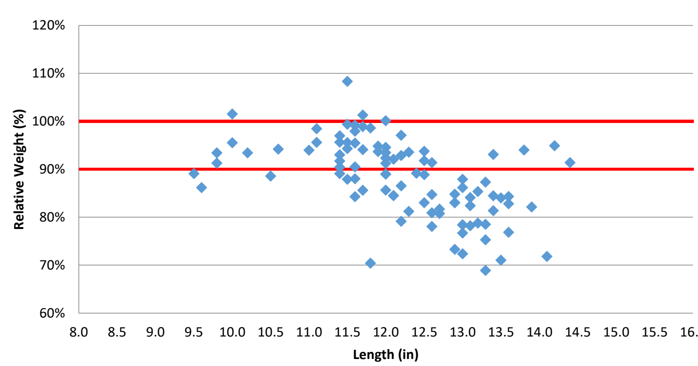


Figure 6. Largemouth Bass relative weights

Harvest

Example of Stunted Largemouth Bass

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.

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.

Twin Lakes currently has an overabundant Largemouth Bass Population, as indicated by the low relative weights (Figure 6). Anglers should be encouraged to harvest as many Largemouth Bass as possible for the next two to three years. Over time this should result in seeing larger and healthier Largemouth Bass. Additionally, thinning the Largemouth Bass population will likely result in better spawning and recruitment success in Bluegill, helping reestablish their population.

As harvest becomes effective and other management strategies are followed some Largemouth Bass may begin to look thicker and healthier. These individuals can be released, but these individuals will be rare for the next 2 years or so. If anglers cannot reach the harvest needed, electrofishing removals are a great alternative that has a higher impact in a shorter amount of time.

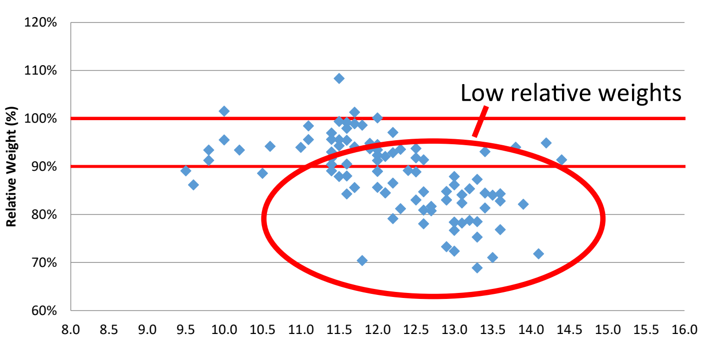


Figure 6. Largemouth Bass Relative Weights

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.

Twin Lakes is extremely lacking in cover. With a large predator base and small forage base, forage species will be heavily preyed upon at younger ages with nowhere to hide and protect themselves. This can be fixed through introducing natural or artificial structure in shallow near shore areas. Adding structure will also allow for both Largemouth Bass and Bluegill to conserve energy, as they can associate with structure and not have to roam as often. Having cover with smaller openings will allow for smaller individuals to escape the predation by bigger predatory species such as Largemouth Bass.

Shoreline plants can also be beneficial as shallow complex habitat and stabilizing the shoreline. Only native species should be considered.

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 8,000 3-5 inch Bluegill, 2,000 3-4 inch Redear Sunfish, and 100 lbs of Golden Shiners in Fall 2024 after Largemouth Bass population has been reduced.

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 1-2 Texas Hunter Fish Feeders with AC Trophy Pond feed, but only after the Bluegill population has been replenished

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.

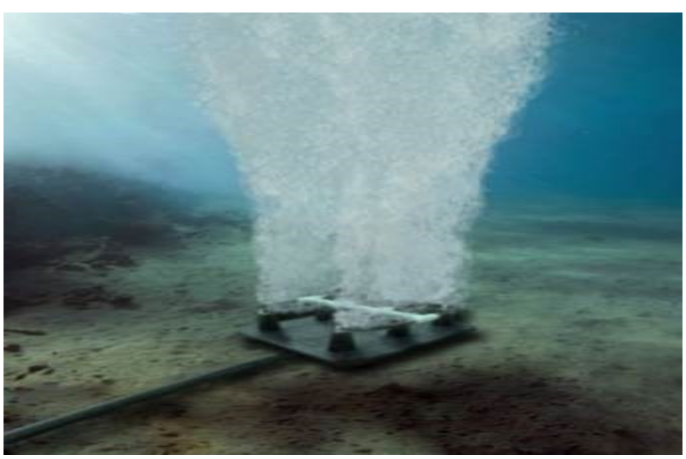
Surface aerator

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

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.

Twin Lakes would be a good candidate for diffused aeration based on the maximum depth being 9 feet.

Summary/Recommendations

At the time of the survey, Twin Lakes was in a severely predator crowded state. Largemouth Bass heavily predate >4.0 Bluegill and Redear Sunfish. Bluegill have heavily accumulated in <4.0 inch size classes, which do not provide adequate calories to adult Largemouth Bass. Thinning the Largemouth Bass population will decrease predation and allow more Bluegill to reach larger size classes. Largemouth Bass harvest will be the most important step to improving the fishery at Twin Lakes. Without a substantial amount of harvest, all other management options will have limited impact. Largemouth Bass harvest should be focused on individuals <14.0 inches in length. If Largemouth Bass are caught in larger sizes but are noticeable skinny, they should also be harvested. If anglers alone cannot provide sufficient harvest, electrofishing removal is available through Aquatic Control.

All stocking effort will be focused on bolstering the forage base. Bluegill are the most important forage species for promoting quality Largemouth Bass. Bluegill reproduce at a high rate and can fill out all forage size categories that a Largemouth Bass needs to grow to quality sizes. Stocking Bluegill in each of the next three falls will give anglers the entire summer to remove bass and increase the chances of survival of the stocked forage. Additionally, stocking Golden Shiners can offer a supplemental food source for Largemouth Bass. This will take predation pressure off of Bluegill and Redear Sunfish and also bolster the forage base at times of year when Bluegill and other forage fish are no longer reproducing.

Increasing the amount of complex habitat can greatly improve survival of young and developing fish. This will help to create a broader and more stable forage base. Increasing structure is ideally done using a mix of non-nuisance vegetation, woody structure, and artificial habitat. Vegetation should be left where tolerable, while brush piles and artificial habitat can be used in other areas of the shoreline. Installing large sections of pea gravel can improve Bluegill and Redear Sunfish spawning. This will help to allow their population to better rebound and help to make a more productive forage base. Adding a fish feeder can also improve Bluegill recruitment. Supplemental fish food helps Bluegill to spawn with larger, healthier eggs with greater survivorship. A fish feeding program should be considered after the Bluegill population has been replenished.

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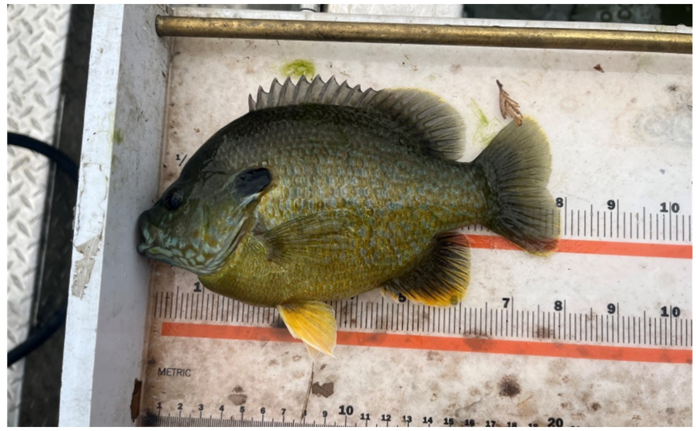
The following recommendations, **listed in order of importance**, will help protect and enhance the fishery in Twin Lakes:

1. Harvest as many Largemouth Bass as possible before Fall 2024
    - Aquatic Control can provide electrofishing removal to assist with this
2. Install 50 Ugly Tree artificial structures around the shoreline
    - Install in clusters of 5 in shallow water
3. Install 2 large pea gravel beds
4. Stock 8,000 3-5” Bluegill, 2,000 3-4” Redear, and 100 lbs of Golden Shiners in the Fall 2024
    - This can be split over 2 years if needed.
5. Install a diffused aeration system
6. Promote native emergent vegetation in non-nuisance areas
7. Conduct a Fisheries analysis survey in 2026.
8. Install 2 Texas Hunter Fish feeders with AC Trophy Pond Feed
    - Start feeding program after Bluegill population has been replenished

Other Species Present

Hybrid Sunfish (Lepomis spp. X Lepomis ssp.)

Hybrid sunfish are members of the Centrarchidae (Sunfish) family, and typically are often a cross between Green Sunfish and Bluegill when stocked from a hatchery. Though this is the most common cross, many different species of sunfish can hybridize if both are present. Hybrid sunfish can be desirable because they can grow to very large sizes quickly, but over time they can cause problems because through generations of reproducing some of the offspring revert back to fish resembling Green Sunfish. Any hybrid sunfish caught should be removed.



Hybrid 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.

Green Sunfish

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 panfisherman. Redear Sunfish primarily feed on mollusks and invertebrates and have been shown in many cases to reduce levels of parasitism in fish populations.

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Fish Collection Tables

SIZE GROUP (IN)	NUMBER	PERCENTAGE	AVERAGE WEIGHT (lbs.)	TOTAL WEIGHT (lbs.)	WS	RELATIVE WEIGHT
BLUEGILL						
<3.0	369	98.66%	0.01	3.69	-	-
3.0	3	0.80%	0.01	0.03	0.02	-
4.0	2	0.53%	0.05	0.10	0.04	118
TOTAL	374			3.82		
LARGEMOUTH BASS						
3.5	1	1.00%	0.01	0.01	0.02	-
4.0	1	1.00%	0.03	0.03	0.03	-
9.5	2	2.00%	0.38	0.76	0.43	89
10.0	5	5.00%	0.47	2.36	0.50	94
10.5	2	2.00%	0.55	1.09	0.59	93
11.0	3	3.00%	0.67	2.00	0.68	98
11.5	22	22.00%	0.75	16.49	0.78	96
12.0	19	19.00%	0.82	15.53	0.90	91
12.5	13	13.00%	0.89	11.52	1.02	87
13.0	15	15.00%	0.94	14.15	1.16	81
13.5	12	12.00%	1.04	12.48	1.31	79
14.0	4	4.00%	1.26	5.04	1.47	86
14.5	1	1.00%	1.47	1.47	1.64	89
TOTAL	100			82.93		
HYBRID BLUEGILL						
8.5	1	100.00%	0.49	0.49		
TOTAL	1			0.49		
RED EAR SUNFISH						
3.0	1	100.00%	0.01	0.01		
TOTAL	1			0.01		
GREEN SUNFISH						
<3.0	34	55.74%	0.01	0.34		
3.0	9	14.75%	0.02	0.18		
3.5	5	8.20%	0.02	0.10		
4.0	3	4.92%	0.05	0.15		
4.5	2	3.28%	0.07	0.14		
5.0	1	1.64%	0.06	0.06		
5.5	1	1.64%	0.11	0.11		
6.0	2	3.28%	0.17	0.34		
6.5	1	1.64%	0.24	0.24		
7.0	2	3.28%	0.32	0.64		
8.0	1	1.64%	0.40	0.40		
TOTAL	61			2.70		

Species	Scientific Name	N	%N	Size Range (in.)	Total weight (lbs.)	%Wt.	N/hr.
Bluegill	*Lepomis macrochirus*	374	69.65%	<3.0-4.0	3.82	4.25%	645
Largemouth Bass	*Micropterus salmoides*	100	18.62%	3.5-14.5	82.90	92.19%	172
Green Sunfish	*Lepomis cyanellus*	61	11.36%	<3.0-8.0	2.70	3.00%	105
Hybrid Sunfish	*Lepomis ssp. X Lepomis ssp.*	1	0.19%	8.5	0.49	0.54%	2
Redear Sunfish	*Lepomis microlophus*	1	0.19%	3.0	0.01	0.01%	2
Total		537			89.92		

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)