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FISH SURVEY REPORT

Spring Lake

Prepared For:

Raintree Plantation POA

9796 E Vista Dr

Hillsboro, MO 63050

Locations:
Indiana
Illinois | Kentucky
Tennessee | Missouri

AQUATIC CONTROL Est. 1966

Introduction

A survey of the fish community and other physical, biological, and chemical factors directly affecting the fish community was completed at Spring Lake on May 7, 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

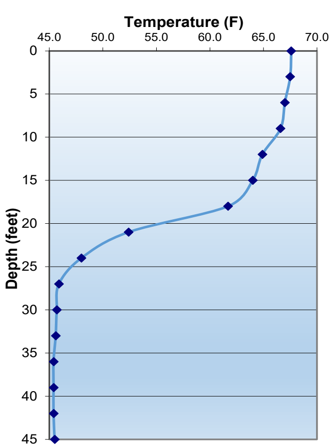
When managing an aquatic ecosystem the quality of water should always be considered first. If a lake or pond is perfectly constructed with abundant food and habitat, but has poor water quality, the fishery will ultimately suffer and never reach it's full potential. Although oxygen is typically not a 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	50.8	-
Temperature (F)	67.6	-
Dissolved Oxygen (ppm)	9.18	5.0+
pH	8.15	6-9
Alkalinity (ppm)	150	20+
Total Hardness (ppm)	162	20+
Total Phosphorus (ppm)	0.01	0.01-0.09
Total Nitrogen (ppm)	0.76	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 21 feet. The temperature profile has decreasing temperature with increasing depth (Figure 1).

The nitrogen to phosphorus ratio is approximately 76:1 at the surface. Overall, water quality parameters indicate this waterbody appears to be capable of supporting a healthy fish population.



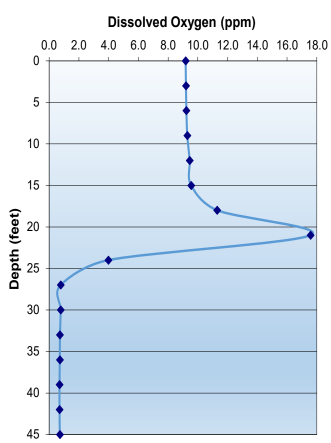
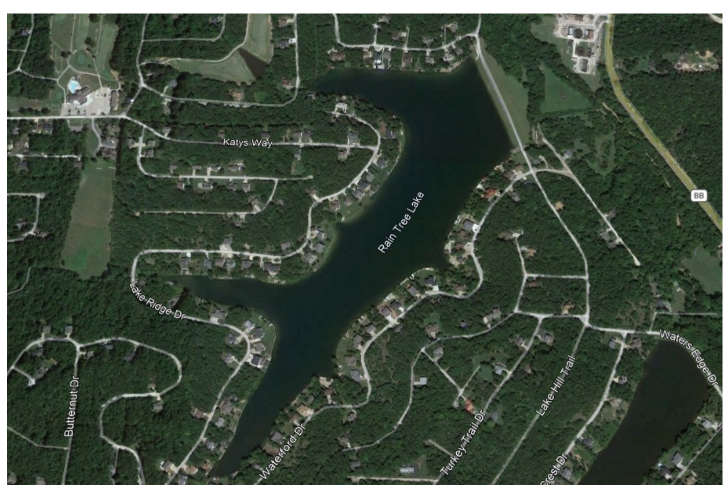


Figure 1. Temperature and Dissolved Oxygen profiles.



Spring 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 60 minutes of shocking.

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 237 fish weighing 193.91 pounds and representing seven species was collected from Spring 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.

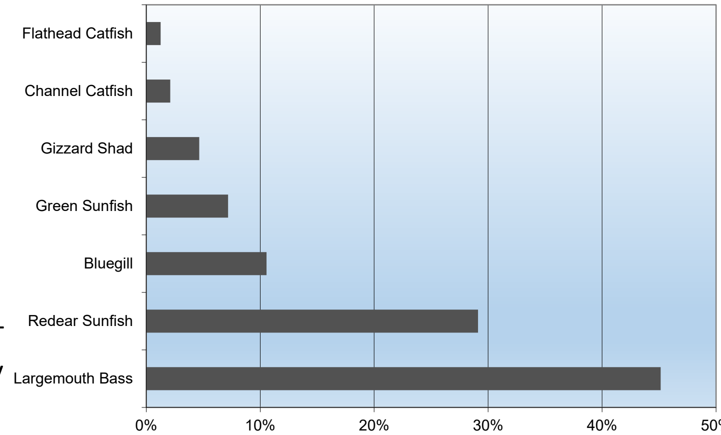


Figure 2. Relative abundance of species collected.


Flathead Catfish caught during survey.


Largemouth Bass caught during survey.

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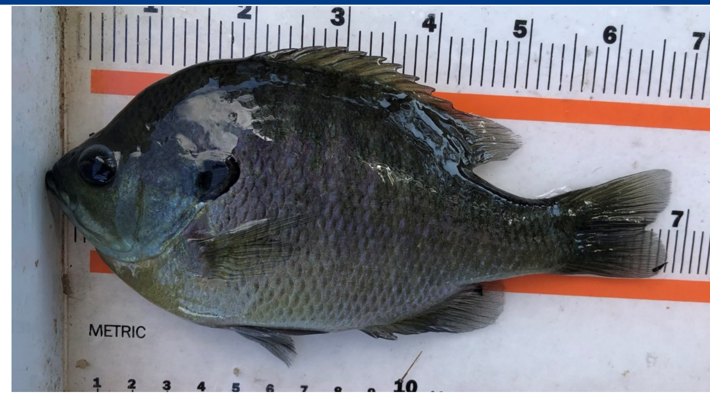
Predator-Prey Relationship

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

Spring Lake—Bluegill

Bluegill were collected at a rate of 25 fish per hour during the survey, indicating very limited forage abundance within the system. Approximately 24% of sampled Bluegill measured between 3–6 inches, suggesting poor representation within an important forage size class supporting intermediate-sized Bass growth. Approximately 16% exceeded 6 inches in length, indicating that only a small portion of the population was successfully recruiting into larger size categories. Average Bluegill relative weight was 102, suggesting that the Bluegill present were maintaining excellent body condition due to limited competition.

The high level of predation has created an imbalance size distribution within the Bluegill population. Overabundant predators are feeding heavily on the smallest individuals. This is occurring to such a high degree that very few juveniles can recruit into the adult population. Improving the Bluegill population will be the highest priority moving forward. Without a robust Bluegill population, the predators in the pond have very little to eat. An ideal Bluegill population has Bluegill present in all size classes up to 8.0 inches or bigger. This allows Largemouth Bass and other predators the proper size of forage needed to grow efficiently.

There is a robust population of adult Redear present in Spring Lake. No individuals were found less than 7.0 inches, indicating they are facing the same predation pressured the Bluegill are.

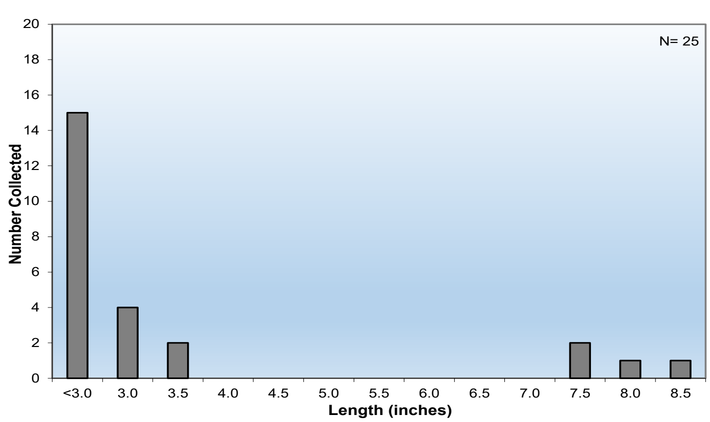


Figure 3. Length frequency distribution of Bluegill

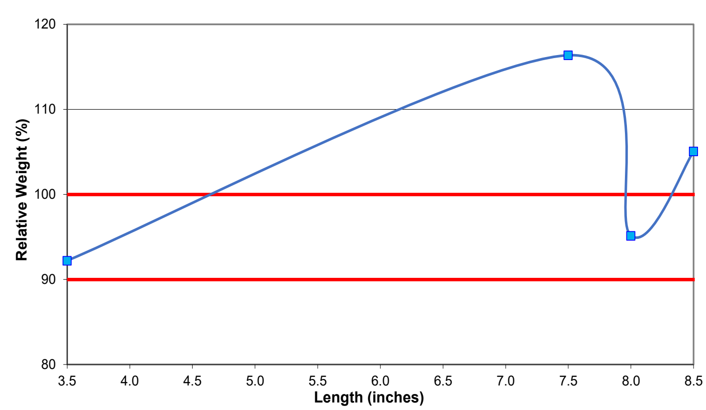


Figure 4. Bluegill relative weights

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.

Spring Lake—Largemouth Bass

Largemouth Bass were collected at a rate of 107 fish per hour during the electrofishing survey, indicating an overabundant predator population and elevated competition among individuals. Relative weights averaged 97 for Bass between 8–12 inches, 90 for Bass between 12–16 inches, and 90 for Bass greater than 16 inches, demonstrating that larger Bass were experiencing increasing competition for available forage resources. Approximately 46% of sampled Bass exceeded a relative weight of 90, while 8% exceeded a relative weight of 100, suggesting that body condition was acceptable for a portion of the population but remained below desirable levels overall. Only 1% of sampled

Largemouth Bass

Bass exceeded 18 inches in length, indicating limited recruitment into larger size classes.

Low relative weights seen in Figure 6, along with a spike in abundance for fish 11.0-14.0 inches, indicate Largemouth Bass are stunted and overabundant. Overabundance in the Largemouth Bass population creates a high level of competition between individuals. Over predation can cause adverse effects in the populations of forage species, most importantly Bluegill. This becomes problematic for Largemouth Bass. To grow to optimal sizes, Largemouth Bass need prey in a variety of sizes as they grow. During the survey, more Largemouth Bass were caught than Bluegill by a wide margin. This ratio of predator to prey will always lead to slow growing Largemouth Bass. Management strategies from this point forward will surround the idea of decreasing Largemouth Bass and increasing the Bluegill population.

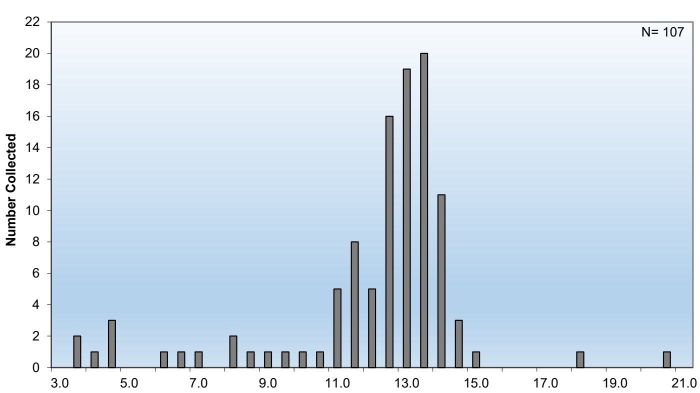


Figure 5. Length frequency distribution of Largemouth Bass

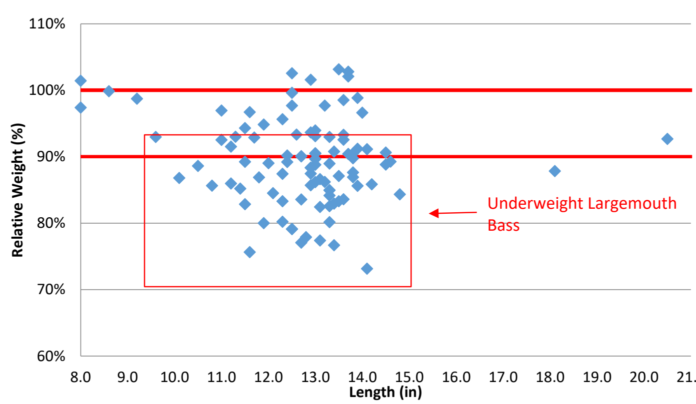


Figure 6. Largemouth Bass relative weights

Predator-Prey Relationship (Gizzard Shad)

Gizzard Shad were also found in Spring Lake. This is another commonly known forage species that can make up a large percentage of a predators diet when available at smaller sizes, but can often come with more negatives than positives. The first issue caused by Gizzard Shad is the reduction in recruitment. Gizzard Shad are a filter feeding species that consume large amounts of phytoplankton and zooplankton. Unfortunately, this is exactly what all larval fish eat as soon as they are hatched. When Gizzard Shad are in large abundances they can compete with these larval fish for food and greatly impact recruitment of species such as Largemouth Bass.

In some lakes Gizzard Shad can reproduce very quickly and grow extremely fast. These may sound like great attributes for a forage fish, but often times Gizzard Shad grow too large for Largemouth Bass to consume. While the juvenile size classes of Gizzard Shad are beneficial as forage, they provide no benefit at adult size classes and can have negative impacts on water quality. Without a large enough predator to consume them these fish will never transfer their biomass up the food chain into a more desirable fish. Due to these issues the Gizzard Shad population should be closely monitored and the following management options should be considered.

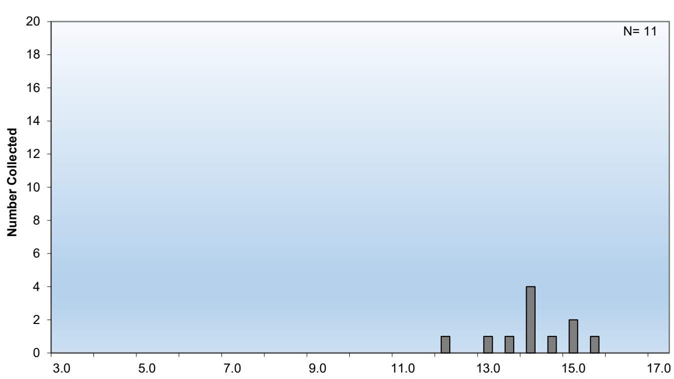


Figure 7. Length frequency distribution of Gizzard Shad

Gizzard Shad

Management Options

There are only a few options when trying to manage Gizzard Shad populations. One method is chemical eradication. This can be very costly on large lakes and results in dead fish throughout the lake. The other method commonly used to manage Gizzard Shad in impoundments is the supplemental stocking of large predators such as Hybrid Striped Bass or Muskellunge. By introducing a large apex predator some of the adult sized Gizzard Shad can then be consumed. This does not always improve the recruitment issue previously discussed, but it does provide an additional angling opportunity to the lake. If the Gizzard Shad population is large enough these stockings can be done with little to no impact on the existing Largemouth Bass fishery.

Spring Lake Gizzard Shad

Gizzards Shad often congregate in large size classes in clear water systems. These large Gizzard Shad are generally unusable as forage and would not support an additional predator at this time. Gizzard Shad are prone to boom and bust cycles, especially in clear water systems like Spring Lake, and should not be viewed as a staple forage fish.

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.

Aggressive harvest of smaller Largemouth Bass is strongly recommended. Significant reductions in Largemouth Bass abundance will be necessary to alleviate competition for food resources and improve the overall balance of the fishery.

Flathead Catfish were also present in the survey. Flathead Catfish are indiscriminate predators and will eat a wide range of other fish, including Bluegill. They consume a tremendous amount of food and are not desirable when trying to manage for an improved forage base. Any Flathead Catfish caught should be removed.

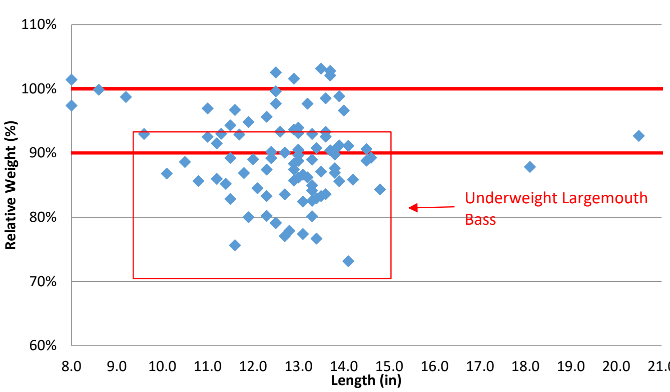


Figure 8. Largemouth Bass relative weights

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 grows on its own but can be hard to manage at times.

Pickerelweed

Largemouth Bass utilizing a Mossback Root Wad Kit

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.

The addition of structure will be a very important step to improving the fishery at Spring Lake. Structure can help to stabilize the forage base by providing cover for young and developing fish that are most vulnerable to predators. It will be difficult to build up a forage base without habitat present.

Structure in Spring Lake should primarily take the form of woody structure and artificial structure. Woody structures such as Christmas trees, brush piles, or lay-downs are a cost-effective means of improving habitat in a small impoundment. Artificial structure should be focused in areas that are used most heavily for fishing. Artificial structure is much less prone to snagging when compared to woody structure. Any habitat added should be very complex with several areas of small spaces for small Bluegill to hide in. The addition of pea gravel spawning areas will also help to promote spawning in Redear and Bluegill.

Summary/Recommendations

The fishery at Spring Lake is defined by an overabundant Largemouth Bass population with high competition for intermediate sized Bluegill. This has led to an imbalance in the system where intermediate sized Bluegill are disproportionately cropped from the population. Very few Bluegill appear to be recruiting into adult size classes due to this high level of predation. Increasing their survivorship and decreasing predatory pressure will help these fish reach larger, more beneficial size classes and improve the quality of the Largemouth Bass. Harvesting Largemouth Bass will be the most essential step moving forward. Without effective harvest, other management techniques will not be as effective. Harvest should focus on any fish under 15.0 inches. Overharvest is very unlikely at this point and is much more easily corrected.

Improving habitat in Spring Lake will be essential for improving the system's balance. The lack of habitat is forcing Largemouth Bass to expend extra energy while looking for food. If habitat improved Largemouth Bass would act more as a sit and wait predator and their relative weights would likely increase. Improved habitat would also protect more of the forage base, allowing the Bluegill population to fill out through more size classes. Habitat can be improved by allowing beneficial vegetation to grow around a portion of the shoreline. Artificial habitat and natural brush piles or Christmas trees are also a great option. Both options should be clustered together to create small sanctuary areas around the lake. Additionally, adding pea gravel to multiple areas of the lake will help as well. If individual lot owners plan to add a beach pea gravel should be used instead of a fine sand.

Supplemental forage stockings should focus on strengthening the prey base available to predators. Given the size of the lake stockings will have to be very large and consistent over multiple years to make a real impact. Improving habitat and harvest is extremely important or these large stockings will not be effective.

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

1. Harvest 1,000 Largemouth Bass less than 15.0 inches each of the next 3 years
2. Create a habitat installation program
    - Create a budget for habitat installation each year
    - Install 2-10 clusters of habitat with a mix of Mossback Habitat and natural brush piles
3. Harvest all Flathead Catfish caught
4. Allow vegetation to grow in low use areas
5. Use current stocking budget towards habitat improvements
6. Conduct a fisheries analysis survey in 2029
    - Depending on harvest and habitat success a large scale forage stocking can be considered
7. Harvest all Green Sunfish caught

***ALL PROPERTY OWNERS ARE RESPONSIBLE FOR FOLLOWING STATE AND LOCAL REGULATIONS WHEN MANAGING**

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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 panfisherman. 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

Flathead Catfish (Pylodictis olivaris)

Flathead Catfish is in the Ictaluridae (Catfish) Family. Flathead Catfish are most commonly found in medium to large river systems, but can also be found in lakes and reservoirs. Flathead Catfish are known as voracious predators that can grow to very large sizes (over 100lbs). They commonly feed on different sunfish species, Gizzard Shad, Bullhead ssp, and other larger species of forage. Flathead Catfish should rarely be stocked in pond ecosystems due to their aggressive feeding behavior.

Flathead Catfish

Other Species Present

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

Channel Catfish

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Fish Collection Tables

SIZE GROUP (IN)	NUMBER	PERCENTAGE	AVERAGE WEIGHT (lbs.)	TOTAL WEIGHT (lbs.)	WS	RELATIVE WEIGHT
BLUEGILL						
<3.0	15	60.00%	0.01	0.15	-	-
3.0	4	16.00%	0.01	0.04	0.02	-
3.5	2	8.00%	0.03	0.05	0.03	92
7.5	2	8.00%	0.40	0.79	0.34	116
8.0	1	4.00%	0.40	0.40	0.42	95
8.5	1	4.00%	0.54	0.54	0.51	105
TOTAL	25			1.97		
LARGEMOUTH BASS						
3.5	2	1.87%	0.02	0.04	0.02	-
4.0	1	0.93%	0.03	0.03	0.03	-
4.5	3	2.80%	0.04	0.12	0.04	-
6.0	1	0.93%	0.07	0.07	0.10	-
6.5	1	0.93%	0.10	0.10	0.13	-
7.0	1	0.93%	0.14	0.14	0.16	-
8.0	2	1.87%	0.25	0.49	0.25	99
8.5	1	0.93%	0.31	0.31	0.30	104
9.0	1	0.93%	0.38	0.38	0.36	106
9.5	1	0.93%	0.41	0.41	0.43	96
10.0	1	0.93%	0.45	0.45	0.50	90
10.5	1	0.93%	0.52	0.52	0.59	89
11.0	5	4.67%	0.82	4.12	0.68	121
11.5	8	7.48%	0.70	5.59	0.78	89
12.0	5	4.67%	0.77	3.85	0.90	86
12.5	16	14.95%	0.97	15.50	1.02	95
13.0	19	17.76%	1.03	19.54	1.16	89
13.5	20	18.69%	1.16	23.23	1.31	89
14.0	11	10.28%	1.29	14.15	1.47	88
14.5	4	3.74%	1.46	5.85	1.64	89
15.0	1	0.93%	1.48	1.48	1.83	81
18.0	1	0.93%	2.93	2.93	3.28	89
20.5	1	0.93%	4.60	4.60	4.96	93
TOTAL	107			103.90		
Channel Catfish						
20.5	1	20.00%	4.52	4.52		
22.0	1	20.00%	4.88	4.88		
22.5	1	20.00%	5.42	5.42		
23.5	1	20.00%	5.90	5.90		
25.0	1	20.00%	7.55	7.55		
TOTAL	5			28.27		

Redear Sunfish

7.0	1	1.45%	0.25	0.25
7.5	3	4.35%	0.30	0.89
8.0	5	7.25%	0.37	1.84
8.5	12	17.39%	0.43	5.18
9.0	22	31.88%	0.51	11.31
9.5	18	26.09%	0.61	11.05
10.0	7	10.14%	0.62	4.34
10.5	1	1.45%	0.65	0.65
TOTAL	69			35.51

Green Sunfish

<3.0	2	11.76%	0.01	0.02
3.0	1	5.88%	0.01	0.01
3.5	2	11.76%	0.03	0.05
5.0	2	11.76%	0.09	0.17
6.5	1	5.88%	0.19	0.19
7.0	2	11.76%	0.26	0.52
8.0	7	41.18%	0.40	2.80
TOTAL	17			3.76

Gizzard Shad

12.0	1	9.09%	0.83	0.83
13.0	1	9.09%	0.73	0.73
13.5	1	9.09%	0.82	0.82
14.0	4	36.36%	0.93	3.70
14.5	1	9.09%	1.39	1.39
15.0	2	18.18%	1.26	2.51
15.5	1	9.09%	1.40	1.40
TOTAL	11			11.38

Flathead Catfish

18.5	1	33.33%	2.05	2.05
20.5	1	33.33%	3.08	3.08
22.5	1	33.33%	3.99	3.99
TOTAL	3			9.12

Species	Scientific Name	N	%N	Size Range (in.)	Total weight (lbs.)	%Wt.	N/hr.
Largemouth Bass	*Micropterus salmoides*	107	45.15%	3.5 - 20.5	103.90	53.58%	107
Redear	*Lepomis microlophus*	69	29.11%	7.0 - 10.5	35.51	18.31%	69
Bluegill	*Lepomis macrochirus*	25	10.55%	<3.0 - 8.5	1.97	1.02%	25
Green Sunfish	*Lepomis cyanellus*	17	7.17%	<3.0 - 8.0	3.76	1.94%	17
Gizzard Shad	*Dorosoma cepedianum*	11	4.64%	12.0 - 15.5	11.38	5.87%	11
Channel Catfish	*Ictalurus punctatus*	5	2.11%	20.5 - 25.0	28.27	14.58%	5
Flathead Catfish	*Pylodictis olivaris*	3	1.27%	18.5 - 22.5	9.12	4.70%	3
Total		237			193.91		

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)