SEPOND
SOUTHEASTERN POND MANAGEMENT

June 9, 2023

Mr. Gary Hasenfus
P.O. Box 97
Lake Lure, NC 28746

Dear Mr. Hasenfus:

Enclosed, please find the Management Plan we recently completed for Lake Lure.

Lake Lure is presently functioning as a dynamic, slightly bass-crowded fishery. As such, our management recommendations center primarily on reducing the total number of adult predators (largemouth bass), introducing supplemental forage (threadfin shad) and improving the conditions for the production of forage through enhancing the amount of structure for fish habitat:

- Largemouth bass (14" and less) should be harvested, up to a total of ~14,400 pounds per year.
- Continue stocking shad on an annual basis.
- Continue adding structure to enhance fish habitat.
- Conduct an electrofishing balance assessment (Annual Evaluation) roughly three years from this date.

Mr. Hasenfus, we are always available to discuss these recommendations or answer any other questions you might have.

Good fishing,

Mike Rigdon
205-288-5664
mrigdon@sepond.com

SEPOND
SOUTHEASTERN POND MANAGEMENT

Management Plan For

LAKE LURE

35.4342 º N, -82.2303 º W

May 17, 2023

INTRODUCTION

As an integral part of the ongoing management program for Lake Lure, Southeastern Pond Management conducted a comprehensive evaluation of the 720 acre impoundment on May 17, 2023. A representative sample of the fish community was collected by electrofishing to accurately assess the present state of balance. In addition, a water chemistry test was conducted to determine total alkalinity. The degree of aquatic weed infestation was also recorded. Results of the assessments provide the basis for this management plan.

The goal of this management plan is to create and maintain a balanced fish community in Lake Lure. The following evaluation report and management plan details and explains our recommendations with the follow goals in mind:

- Create condition favorable for the consistent production of “quality size” and “trophy size” largemouth bass.
- Create conditions favorable for the consistent production of “quality size” bluegill.
- Generally maintain a high level of water quality as well as an aesthetically pleasing environment for aquatic recreation.

It is important to note that quality fishing will not be accomplished “overnight”. As you read through this plan, bear in mind that the specific activities we have recommended are not one-time inputs, but rather a collection of ongoing management activities that will establish and maintain long-term quality fishing. Proper pond management, like the management of any natural resource, is an ongoing process. Each management input is recommended individually; however, it should be noted that the management program suffers if all activities are not implemented. Feel free to contact us and further discuss management ideas you may have.

Previous evaluations of Lake Lure have resulted in the thoughtful outline of management options in an effort to approach your stated management goals. Our latest findings, as well as results from previously applied management recommendations, are contained within the following pages.

	Quality Size	Trophy Size
LMB	16-20”	20”+
Bluegill	7-10”	10”+

POND ASSESSMENT

At the time of our visit, total water alkalinity in Lake Lure was measured at 8.4 parts per million (ppm). This level of alkalinity is below the minimum recommended threshold of 20 ppm, and represents conditions suitable for effective fertilization. Lake Lure has not been fertilized adequately in the recent past, resulting in a light plankton bloom at the time of our visit. The natural woody fish habitat was noted as showing signs of age and decay. Occasionally adding fresh brush to habitat areas will keep them attractive to fish.

During the evaluation, we did not observe any problematic aquatic vegetation growing along the margins. Aquatic weeds and problems associated with them will be discussed in the Aquatic Weed Identification section of this report.

Bass harvest was reported as limited. This level of harvest has proven inadequate. Harvest, and its importance in structuring fish communities will be discussed in more detail in the Recommended Management Activities section of this report.

FISH COMMUNITY BALANCE

Fish communities in ponds are governed by a predator-prey relationship. The interactions of predator and prey are characterized by a concept we refer to as *balance.* Suitable balance in a fish community is characterized by a healthy distribution of both predator and prey over a wide range of age and size classes. **Predators** are species which rely on fish as their primary food source. **Prey** species rely on sources other than fish.

Classic balance in small impoundments is defined by several parameters, most importantly a suitable ratio (by size and weight) of predator to prey. If one size-class becomes overly abundant or lacking, a condition of imbalance results. By analyzing an electrofishing sample it is possible to determine the state of balance within a given fish community.

In fisheries science, the condition of individual fish is used as another indicator of the overall balance of the fish community. Relative weight (Wr) is an index used to categorize the *condition* of fish within a given population. Calculated Wr values greater than 100 indicate plump, robust fish. Wr values less than 100 suggest that individuals are in less than excellent condition, perhaps the result of some predator: prey Imbalance. Wr values less than 85 would indicate malnourished fish; a sign of intense competition for forage.

Figure 1 depicts balanced populations of predator and prey in a typical sport fish pond. Note that all sizes are well represented; no noticeable gaps are present.

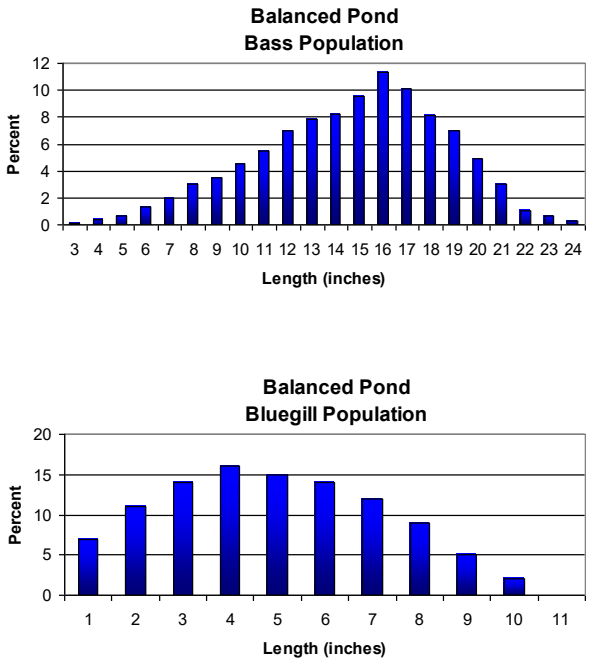


Figure 1. Length distribution of bass and bluegill in a typical balanced pond.

Predator and prey fish are measured and weighed to analyze the overall balance of the fish community.

FISHERY ASSESSMENT

The fishery in Lake Lure was sampled with standard boat-mounted electrofishing equipment. The sample contained largemouth bass, smallmouth bass, yellow perch, crappie, bluegill, longear sunfish, spotted sucker, gizzard shad, and redear sunfish (shellcracker). Currently, largemouth bass, smallmouth bass, crappie, and yellow perch are functioning as the primary predators in Lake Lure. The bluegill, gizzard shad, sucker, and sunfish are the prey.

Threadfin shad have become an important component of the forage base in Lake Lure. We observed a few different schools on the depth finder, indicating a healthy population. Maintaining a healthy shad population will be important for Lake Lure to continue producing quality and trophy size bass.

Bluegill and shellcracker were collected ranging in size from 2 to 12 inches in total length. Figure 2 depicts the length distribution of the bluegill population. Of note, a moderate amount of intermediate (3-5") bluegill and other forage was collected.

Largemouth bass ranging in size from 4 to 22 inches in total length were collected in moderate abundance. The length distribution of largemouth bass (Figure 3) reveals the presence of bass over a wide range of size classes. This represents a slight improvement from 2018, most likely the result of an established threadfin shad population. The larger bass collected from Lake Lure were individually tagged with an identification number so their growth can be monitored (refer to the Tagged Fish Data section of the report).

The average relative weight of adult bass in our most recent sample additionally reflects little change over 2018. This year's average relative weight was 86, as compared to 2018, 89 (Figure 4). However, the average relative weight of bass measuring 10"-16" is considerably higher than from 2018. This is most likely due to their preference for threadfin shad at that size, Largemouth bass 14 inches and smaller represent the primary targets for harvest over the coming months.

Overall, we characterize the fish community in Lake Lure as bass-crowded. A more detailed explanation of bass-crowded ponds in general, and Lake Lure in particular is located in the Current State of Balance section of this report.

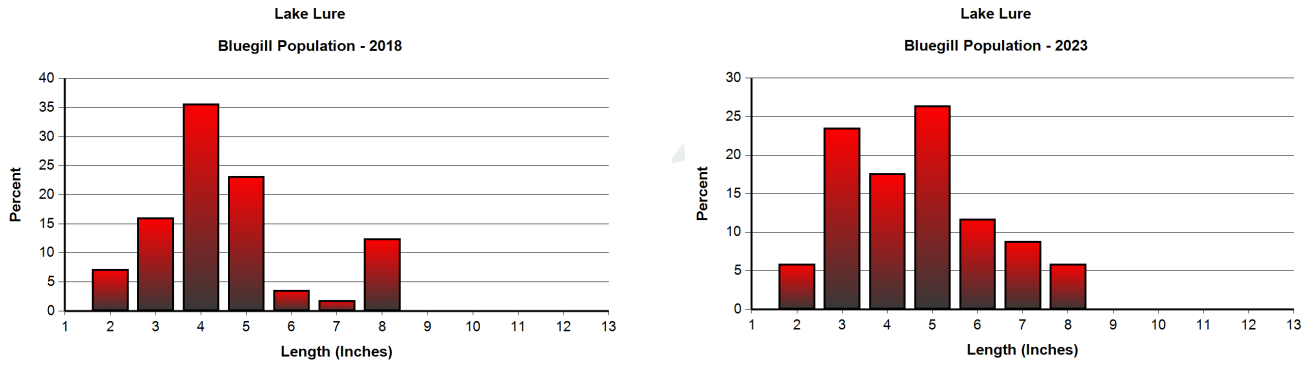


Figure 2. Comparison of the length distribution of bluegill collected from Lake Lure in May 2018 and May 2023.

FISHERY ASSESSMENT

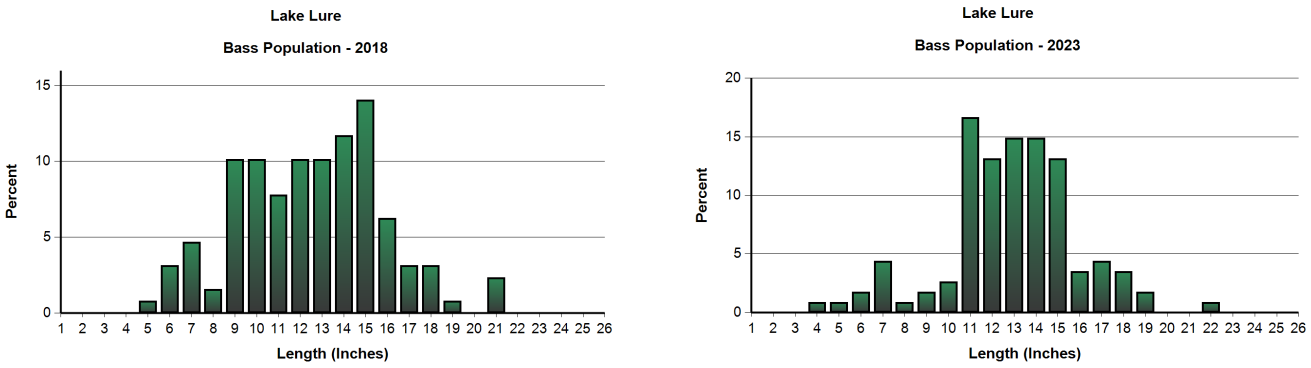


Figure 3. Comparison of the length distribution of bass collected in Lake Lure in May 2018 and May 2023.

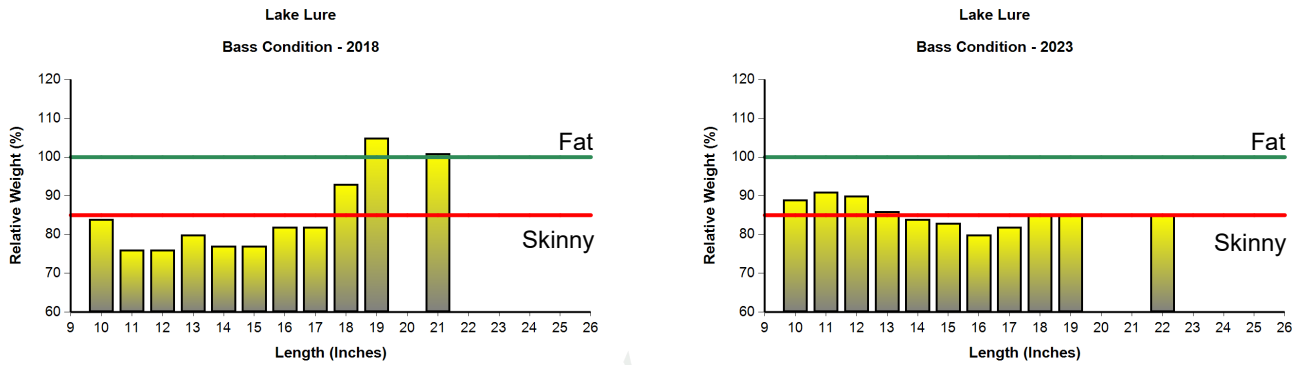


Figure 4. Relative weight distribution of adult largemouth bass collected from Lake Lure in May 2018 and May 2023.

TAGGED FISH DATA

Length, Weight, and Condition of Tagged Bass in Lake Lure May 17, 2023

Tag #	Length (in)	Weight (lbs)	Wr
22621	15.1	1.5	81 %
22620	15.5	1.6	77 %
22619	15.9	1.8	83 %
22618	18.3	2.7	78 %
22617	18.7	3.2	87 %
22616	17.1	2.3	84 %
22615	15.3	1.6	84 %
22614	16.4	1.9	77 %
22613	18.1	2.8	84 %
22612	15.0	1.7	90 %
22611	15.0	1.6	84 %
22610	18.4	3.1	89 %
22609	21.6	5.0	85 %
22608	16.9	2.2	84 %
22607	14.5	1.6	96 %
22606	19.3	3.3	82 %
22605	17.7	2.7	89 %
22604	16.8	1.9	74 %
22603	15.2	1.6	84 %
22602	17.0	2.5	91 %
22601	16.3	1.9	81 %

AGE

Along with available forage and genetics, age is a very important factor to consider when managing a largemouth bass population. A common assumption among pond owners is to look at a small bass and assume that it's a young fish. In reality it could be an older fish that has spent most of its life "stunted" or stuck in a certain size range due to lack of forage.

During our evaluation of Lake Lure we harvested several bass which we aged. These fish were aged using the otolith method. Otoliths, or ear bones, are one way to age fish much the same way one can age a tree by counting the growth rings in a cross-section of a stump. Each year of growth creates a new ring. The diagram below illustrates the growth rings from a bass known to be five years old.

Table 1 shows the bass sampled from Lake Lure. Table 2 shows the average size for each age class collected in 2023. Table 3 shows the average size for each age class collected in 2018. Table 4 shows the average size for each age class collected in 2011. As you can see, most of bass (10 to 14 inches) are 2 to 6 years old. This reflects little change from the last study done in 2018. When growing at a satisfactory rate, bass 13" to 15" should only be 2 years old maximum. This slow growth rate indicates a lack of available forage. Increased harvest of small bass and supplemental stocking of threadfin shad will be increase the growth rates of bass in all size classes.

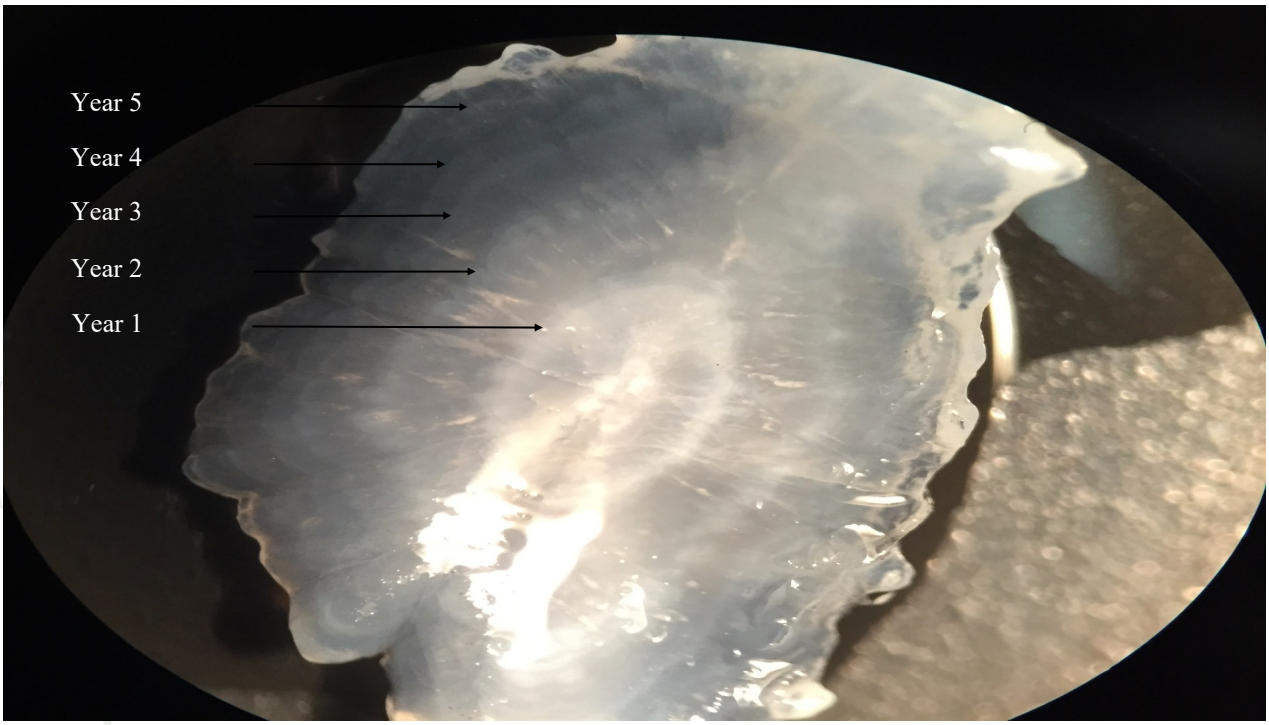


Table 1

Fish	Length (mm)	Length (inches)	Weight (grams)	Weight (lbs)	Age (yrs.)
1	334	13.15	441	0.97	3
2	348	13.70	458	1.01	4
3	335	13.19	462	1.02	4
4	337	13.27	420	0.93	3
5	316	12.44	396	0.87	2
6	274	10.79	265	0.58	1
7	314	12.36	330	0.73	2
8	271	10.67	232	0.51	1
9	324	12.76	461	1.02	3
10	290	11.42	286	0.63	2
11	358	14.09	578	1.27	5
12	268	10.55	228	0.50	1
13	353	13.90	520	1.15	4
14	363	14.29	548	1.21	6
15	245	9.65	184	0.41	1
16	324	12.76	412	0.91	4
17	290	11.42	266	0.59	2
18	313	12.32	344	0.76	2
19	331	13.03	469	1.03	2
20	308	12.13	362	0.80	2
21	336	13.23	486	1.07	4
22	364	14.33	549	1.21	5
23	286	11.26	281	0.62	2
24	293	11.65	323	0.71	1
25	306	12.05	338	0.75	2
26	331	13.03	442	0.97	4
27	364	14.33	613	1.35	5
28	331	13.03	430	0.95	3
29	258	10.16	207	0.46	1
30	253	9.96	197	0.43	1

Table 2. Length-at-age data for sub-sample of 11 to 14 inch largemouth bass collected from lake Lure in May 2023.

Age	Year Class	Number	Mean Length (inches)
1	2022	7	10.48
2	2021	9	12.05
3	2020	4	13.05
4	2019	6	13.30
5	2018	3	14.25
6	2017	1	14.29

Table 3. Length-at-age data for sub-sample of 11 to 14 inch largemouth bass collected from lake Lure in May 2018.

Age	Year Class	Number	Mean Length (inches)
1	2017	7	11.28
2	2016	11	12.54
3	2015	5	13.61
4	2014	5	13.90
5	2013	1	14.41
6	2012	1	14.49

Table 4. Length-at-age data for sub-sample of 11 to 14 inch largemouth bass collected from lake Lure in May 2011.

Age	Year Class	Number	Mean Length (inches)
2	2009	7	11.6
3	2008	12	12.2
4	2007	11	12.5
5	2006	1	13.1
6	2005	2	13.9

BASS-CROWDED

Bass-crowded is a condition of imbalance that is common in private ponds and is characterized by large numbers of small, skinny bass, and relatively few but unusually large adult bluegill. In this scenario, bass growth is stunted due primarily to a lack of adequate nutrition. The largemouth bass is such an efficient predator that it will, if not controlled through responsible harvest, severely reduce its own food supply. Under these conditions, bass will perform poorly and will never reach their full growth potential.

Intermediate bluegill (3 to 5 inches) are critically important in sport fish ponds because they are the ideal size forage for young and juvenile bass. A low relative abundance of intermediate size prey is often an indication of a bass-crowded pond. Under these conditions, bass commonly become stunted between 8 and 14 inches. Bass in this size range require an ample supply of 3-5" prey in order to grow past the stunted size and become "quality" and "trophy" adults. When a condition of balance exists, intermediate size prey are among the most abundant segment of the overall fish community. As mentioned previously, our recent electrofishing sample from Lake Lure included moderate numbers of intermediate size bluegill, particularly in the 4 to 5 inch size range.

In bass-crowded populations, despite their overabundance and relatively poor condition, the adult bass spawn each year. Due to the presence of an actively reproducing prey population, these juvenile bass are able to grow quite well in their first year. In order to maintain this rate of growth past 8 to 10 inches however, they require a slightly larger prey item. In bass-crowded ponds, as the availability of slightly larger (3-5") prey is limited by over predation, the individuals bass growth stalls, and the population begins to show characteristics of stunting in these size groups. The numbers of these bass must be reduced through harvest. Inadequate harvest is most often the cause of the bass-crowded condition. Recent bass harvest was reported as "limited" in Lake Lure. In a typical fertilized sport fish pond, **bass harvest is required** in order to prevent overcrowding. The old idea of "throw him back and catch him when he gets bigger" is not a sound approach in small impoundments. If sufficient harvest does not occur, the crowded condition perpetuates itself. This results in a less than quality bass fishery.

Strategies specifically geared toward improving the bass-crowded condition are discussed in the Recommended Management Activities section of this report.

Typical bass from a bass-crowded pond.

COMPETING PREDATOR SPECIES

The presence of predator fish species other than largemouth bass may have an impact on the balance of the fish community. The severity of the impact depends largely on the species present and its relative abundance. Generally, the more species present, the more complicated and less predictable pond management practices become. Once established, it is often difficult to completely remove an undesirable predator from a pond; however, harvesting these species when possible is generally recommended.
In order to maintain a balanced pond with competing species, the bass must become a larger component of the predator community. An additional forage species, such as threadfin shad, may substantially reduce the negative effects of competing predators.

Competing predator species may be introduced in a number of ways. A pond may become contaminated by a feeder stream, especially if the pond basin is not poisoned prior to stocking. Occasionally flood waters bring in unwanted species. Finally, competing predator fish are frequently brought by anglers. Several competing predator fish commonly found in small impoundments are listed below:

Black and/or white crappie are commonly introduced by anglers into ponds, however they are not typically a desired predator species in small impoundments. Crappie compete with juvenile as well as adult bass for food. Furthermore, their reproduction cycles are often highly erratic.

Catfish are often stocked with bass and bluegill to add diversity. However, catfish are also direct competitors of largemouth bass and can have an impact on the forage community once they reach maturity. Catfish reproduction and recruitment is typically low in ponds with established bass populations; bass effectively prey on any catfish reproduction. As a result, a population of catfish may be sustained in small impoundments if an abundant forage base is maintained.

Spotted bass are often mistaken for largemouth bass and may be introduced in sport fish ponds by well-intentioned anglers. Spotted bass compete fiercely with largemouth bass in small impoundments. In addition to competition for forage, spotted bass spawn earlier than largemouth, giving the spotted bass fry a survival advantage. This advantage may adversely effect the largemouth bass population. Once spotted bass become established, targeting spotted bass for harvest becomes an ongoing management practice.

Crappie

Channel Catfish

COMPETING PREDATOR SPECIES

Other predator species, such as gar, pickerel, bowfin, etc., are considered “rough” or “trash” fish. The presence of these fish in a pond usually indicates flooding of an adjacent river or major tributary. They are often challenging to remove with angling, but should be targeted nonetheless.

Other species such as **green sunfish and warmouth** commonly inhabit sport fish ponds. These species typically are introduced by small feeder creeks. Green sunfish, in particular, have the ability to enter ponds without a feeder stream, possibly by way of aquatic birds. Each of these fish can function as predators by eating small bluegill and other forage in ponds. They can also compete with bluegill for food and spawning sites. Fortunately, their impact is usually minimal as they rarely exceed 6 or 7 inches and typically do not become abundant in a pond with an established bass population. However, these species can become problematic if allowed to multiply before a healthy bass population is present.

Gar

Spotted Bass

Bowfin

Green Sunfish

FISH HARVEST

One of the keys to a balanced fish community, as well as the growth of trophy largemouth bass in your pond, is the selective removal of largemouth bass. Largemouth bass, when present with bluegill as their primary source of forage, produce an annual surplus which must be harvested in order to maintain balance. We generally recommend harvesting the smaller, more abundant size range of bass at a rate of **25 to 35 pounds per acre per year**. Bass harvest rates are designed to reduce the level of predation on the bluegill population as well as increase the growth rate and condition of the remaining bass. Recommended harvest quotas often change in response to population changes and should be reevaluated annually. Harvesting largemouth bass can be accomplished by the following methods:

- Hook and Line Harvest: Largemouth bass of the appropriate size should be removed whenever they are caught up to the harvest goals. A record should be kept of the total number and weight of bass removed during each fishing trip. Larger bass, those presently exceeding the size limit, may be "protected" since these represent the potential trophy bass in the pond.
- Electrofishing Harvest: Selective bass harvest through electrofishing is a particularly effective management tool. This method of harvest may be quite productive if hook-and-line efforts are not adequate. The cost for this service is based on time spent (hourly). We will keep close records of the total number and weight of individuals removed.

One important point is that bluegill and shellcracker harvest is strictly optional in balanced ponds. It is not necessary to harvest a certain weight of bluegill per acre to maintain the predator/prey balance or to prevent bluegill overpopulation. The bass will more than adequately control bluegill numbers. Typically, a generous amount of adult bluegill can be harvested in a well-fertilized, balanced lake. However, over-harvest of bluegill may be a concern, depending on the number of anglers and fishing pressure. We often recommend limiting bluegill harvest to **10 per person per day** in bass-crowded ponds to prevent over-harvest. In severely bass-crowded ponds, we recommend **suspending bluegill harvest** until the population increases through management efforts.

SUPPLEMENTAL FORAGE STOCKING

The harvest of largemouth bass at the proper size and rate can be quite challenging in sport fish lakes, especially if they are not fished extensively. When the annual largemouth bass harvest falls short of the recommended quota, stocking supplemental forage becomes extremely important in efforts to maintain an adequate forage base. An abundance of forage must be available at all times in order to maximize the growth of top-end predators such as largemouth bass. The feeding behavior and movement patterns of adult predators change frequently. Therefore, the presence of a variety of forage types, occupying different habitats within the pond, tends to maximize predator:prey encounters and improves overall foraging efficiency.

In your lake, the introduction of **threadfin shad** *(Dorosoma petenense)* will be highly constructive. The benefits to stocking threadfin shad are numerous. The combination of a relatively small adult size, coupled with their ability to reproduce in large numbers, make threadfin shad a near perfect food for the most abundant size group of largemouth bass. Most often, results of successfully establishing threadfin shad into a lake will be observed in improved growth rates for all size groups of bass. In addition, by partially shifting bass predation from bluegill to shad, more bluegill will reach the important *intermediate* size range. Finally, through subtle interactions lower in the food chain, threadfin shad effectively reduce bass *recruitment*. In other words, fewer bass fingerlings survive to adulthood, thereby reducing the annual bass surplus. The bass that are *recruited* into the adult population will enjoy an increased abundance of prey, which leads to enhanced growth rates and a larger maximum size.

Threadfin shad frequently exhibit a distinctive schooling behavior, most often in open-water areas. In fact, the shad's primary defense against predators is its ability to seek out open water, away from where predators are more likely to be waiting to ambush prey. Once the bass figure out this behavior, the jig is up. Ponds with abundant shad populations frequently enjoy excellent top-water fishing action, oftentimes in or around schools of shad in open water.

Threadfin shad typically have two distinct heavy spawning periods: in the Spring and again in early Fall. Stocking is most often recommended immediately prior to or during a heavy spawning period. Stocking rates are designed to establish a sustainable population of threadfin shad and vary depending on the size of the lake and its state of balance.

Threadfin shad are ideal forage for increasing the growth and condition of largemouth bass. Adults range from 3 to 7 inches.

AQUATIC WEED CONTROL

Aquatic weed growth can be a serious problem in recreational ponds. Weeds use up important nutrients in fertilizers that are intended for fish production, as well as interfere with normal activities such as fishing and swimming. In addition, excessive weed growth detracts from the aesthetic value of a pond, particularly if it is the focal point of a recreational area.

There are three approaches we use to prevent or reduce unwanted aquatic weeds. They can be placed in 3 different categories: chemical control, biological control, and sunlight-limiting control. Often, an integrated approach involving a combination of these tools offers the most effective solution.

Chemical control involves the use of aquatically approved herbicides to reduce or eradicate aquatic weeds. Although chemical control can be costly on large areas, it is usually the best method for a quick response.

The most common form of biological control is stocking grass carp. Grass carp are often introduced into ponds at low stocking densities as a preventive measure before weeds become established. However, once weeds have become established, a higher density of grass carp is needed to control them. Grass carp readily eat a variety of common weeds, do not reproduce, and are fairly inexpensive. Typically, grass carp become less effective when they reach 6 to 7 years old and must be restocked. One drawback to grass carp is their propensity to train on pellet food intended for bluegill; thereby reducing the effectiveness of a supplemental feeding program.

There are also a variety of water colorants or dyes that can be added to ponds before weeds become established that limit sunlight penetration and "shade out" certain types of weeds. A regimented fertilization program is often the most effective form of sunlight-limiting control. Typically, phytoplankton blooms stimulated early in the spring through fertilization can shade out potential weed growth before it becomes a problem.

Herbicide application is typically the quickest form of weed control.

Grass carp are often introduced for long-term control. Pond dyes temporarily limit sunlight to retard aquatic weed growth.

FISH ATTRACTORS

Cover, whether natural or artificial, is attractive to fish for many reasons. Cover attracts many aquatic invertebrates that are consumed by fish, protects fish from other predators, provides ambush locations for predator fish, and provides fish with shade from the sun. For these reasons, fish attractors play an important role in the management of small impoundments.

By concentrating high numbers of bass, fish attractors help anglers meet recommended annual bass harvest goals. To maintain a balance between the predator and prey species within a pond, adequate predator harvest is necessary. Not only do fish attractors enhance the fishing experience by making the fish easier to locate, but the added strategy of locating each attractor creates a whole new dimension to pond fishing.

Any object placed under water has the potential to attract fish. Certain types of cover will attract more fish than others. Generally, objects with a high surface area (i.e., brush piles) will attract more fish than objects with a low surface area (i.e., large rocks). However, cover with a high surface area tends to decompose or deteriorate quicker. A variety of different cover types, whether grouped together or mixed, will attract the most fish in ponds.

When choosing natural cover to be added to ponds, keep in mind that hardwoods such as oaks and hickories last longer than softwoods. Cedar trees are also an excellent choice because their branches are finely divided and they maintain their structure for 3 to 5 years. Osage-orange (Mock-orange or “horse apple”) trees, located in black belt soils, provide exceptionally long-lasting cover. Trees can be weighted using concrete blocks and wire. However, another popular method of sinking trees or limbs is by placing them in a bucket and filling with concrete. These “pickle barrels” offer excellent vertical structure. Small beds of pea gravel can be placed in 2 to 3 feet of water to attract bluegill for spawning.

Many different types of artificial material can provide good, long-lasting cover for fish. Wooden pallets will attract all sizes of fish when tied together in a triangular formation and weighted. Used tires should be tied together in rows and the rows can then be tied together. If tires are used, be sure to drill a large hole at the upper most point on each tire to allow air to escape. Large construction materials such as concrete culverts can be stacked on top of one another. Materials such as car bodies or other motorized appliances should have all potential pollutants removed before sinking.

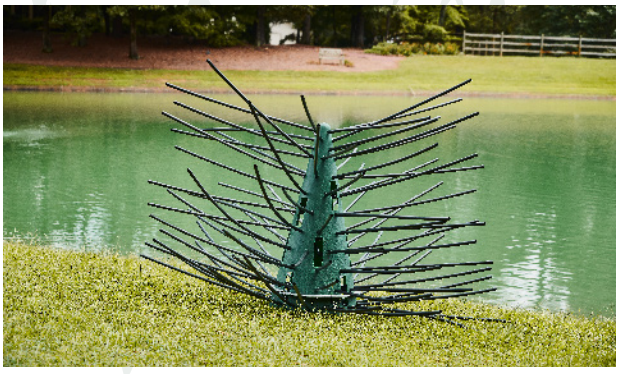
FISH ATTRACTORS

Plastic Honey Hole trees and shrubs are excellent artificial fish attractors. These structures are made of plastic and will last nearly forever. They also have a large surface area providing plenty of cover for baitfish and attracting predators.

The location and size of fish attractors is more important than the type of material used. Most small impoundments develop a thermocline during the warmer months below which oxygen is too low to support fish. To ensure the attractors are where the fish can use them year-round, a high percentage should be placed in water less than 10 feet deep. Fish will utilize cover in deeper water during the colder months. Typically, any sharp change in bottom contour is attractive to fish. Often, bottom structure such as humps, points, ridges, ditches, etc., are formed when building ponds. Cover placed in these areas is usually very productive. However, areas with a relatively flat bottom can be greatly enhanced as well with fish attractors. Placing fish attractors within casting distance of piers is also popular. Keep in mind, it is possible to have too much cover spread out in the bottom of a pond.

If too many fish attractors are put in a lake, catch rates can decline because the fish are spread out instead of concentrated. Extreme amounts of cover can decrease bass foraging ability and growth rates. Generally, fish attractors should be at least a full "cast" away from each other.

Obviously, fish attractors are not useful to anglers unless they can be found. Some attractors may be visible while others may be strategically placed in areas that are hard to find. One popular method of marking off-shore fish attractors is with a physical marker like a floating duck decoy or a metal stake. Physical markers will facilitate the addition of new cover when the attractors deteriorate over time. Triangulating between 2 or 3 spots on the bank is a more inconspicuous method of marking these spots. On larger lakes, a GPS unit can be used to store fish attractor locations. Most hand-held GPS units will allow you to navigate within several feet of a location. These locations along with their coordinates can then be plotted on a map using mapping software.



DAM AND SHORELINE MAINTENANCE

Dam and shoreline maintenance should be addressed periodically to ensure the integrity of the dam and overall recreational value of the pond. The dam should be kept free of trees; roots may eventually tunnel into the dam, creating weak spots. If mature trees are already present, they should not be cut down, as dead and decaying roots are potentially more harmful. Generally, tress less than 4 inches in diameter at breast height do not have roots penetrating the core of the dam and should be removed before they become a threat to the structure of the dam.

In an effort to prevent erosion the entire dam should be covered with a manageable grass. Large rock is recommended at the waterline along the dam face if there is the potential for erosion from wave action. The spillway should also have some type of erosion prevention. The amount and frequency of water flow should determine the type. The bottom and sides of the spillway should be lined with large rock or concrete if water flows across it often.

For spillways that are used less frequently, well maintained grass provides sufficient erosion protection. Spillways should be checked periodically and any debris should be cleared. Additionally, the shoreline and surrounding watershed should be vegetated to prevent erosion and muddy water. If necessary, livestock should be provided limited access to the pond. Heavier vegetation should be trimmed or treated with herbicide.

Beavers and muskrats can cause aesthetic and structural damage to sport fish lakes. Large rock placed along the waterline of the dam will usually prevent beavers and muskrats from boring in. Trees can be protected by wrapping steel mesh around the base of the tree to a height of about 4 feet. Otters often visit ponds from nearby creeks and can have a significant impact of the fish population. Droppings with scales and fish bones are evidence of otter visits. These nuisance animals should be removed as soon as detected. Techniques include body-gripping traps, snares, foothold traps, and shooting. Permits and licenses may be required.

ANNUAL EVALUATION

In addition to ongoing management, your pond should be checked on a regular basis. Our annual maintenance plan includes an aquatic weed assessment, a water test to determine lime requirement, and an electrofishing balance check to assess the fish community.

Regular electrofishing evaluations are necessary to assess the effectiveness of a management program. Electrofishing allows us to stay on top of the pond's condition in order to make necessary changes in management recommendations.

MANAGEMENT RECOMMENDATIONS

Lake Lure is functioning as a bass-crowded system that has a low level of fertility. Several management inputs are necessary to restore balance as well as increase the total density of sport fish. The management activities we are recommending for Lake Lure will center on reducing the total number of adult predators, introducing supplemental forage, and enhancing the conditions for the production of forage.

For Lake Lure, harvest bass 14 inches and smaller at a rate of 20 pounds per acre per year (14,400 lbs./yr.). The recommended bass harvest rate and size will likely change over the next few years as the fish community responds to management inputs. We recommend limiting bluegill harvest in Lake Lure to a "consumptive" level, meaning ONLY bluegill and shellcracker which are intended for table fare should be removed; the over-harvest of adult bluegill, particularly during the spawning season, may lead to a decrease in the total number of mature, adult bluegill and a corresponding decline in angling catch per unit of effort. Annual electrofishing evaluations will help determine if fish harvest recommendations should be adjusted.

Supplemental forage in the form of threadfin shad should be stocked in order to enhance the growth and condition of the largemouth bass.

Aquatic weed control will also be an integral part of the management program for Lake Lure. During the evaluation we did not observe any problematic aquatic vegetation. However, many aquatic plants have the potential to multiply quickly and should be monitored closely, particularly during the growing season. We feel that the quickest and most efficient way to control aquatic weeds in Lake Lure, if they should become a problem in the future, is by herbicide application. Finally, additional cover in the form of brush or rock piles would increase the catch rates of sport fish in Lake Lure.

The management activities we recommend over the course of the next twelve months are listed in the following pages. In an effort to assist in the prioritization of these management inputs, we have developed a simple color-coding system. You will note this system in the bottom right-hand corner of the respective Management Recommendations to follow:

LEVEL 1	Highest priority. Generally, require immediate attention.
LEVEL 2	Secondary in importance to Level 1. Directed toward achieving your stated management objectives.
LEVEL 3	Increase enjoyment and/or functionality of your pond but have less impact on the overall management program.

ANNUAL HARVEST

ANNUALLY

Current Status: Owner Responsibility

☐ **Approved** ☐ **Declined** ☐ **Done**

Date Approved: _____

Date Done: _____

COST: Hook and line: N/A

MANAGEMENT ACTIVITY:
Harvest ~14,400 pounds of LMB (14" inches and

LEVEL 1

ADD STRUCTURE

SUMMER 2023

Current Status: Owner Responsibility

☐ **Approved** ☐ **Declined** ☐ **Done**

Date Approved: _____

Date Done: _____

COST: N/A

MANAGEMENT ACTIVITY:
Install fish structure/cover

LEVEL 3

THREADFIN SHAD

SPRING 2024

Current Status: Awaiting Owner Approval

☐ **Approved** ☐ **Declined** ☐ **Done**

Date Approved: _____

Date Done: _____

COST: $ 5,000.00

MANAGEMENT ACTIVITY:
Stock 2 loads (~20,000) adult threadfin shad

LEVEL 1

ANNUAL EVALUATION

SPRING 2026

Current Status: Awaiting Owner Approval

☐ **Approved** ☐ **Declined** ☐ **Done**

Date Approved: _____

Date Done: _____

COST: $ 3,000.00*

* This price includes comprehensive written Management Report.

MANAGEMENT ACTIVITY:
Annual electrofishing evaluation

LEVEL 1

Bass Harvest Records

Date	Number Harvested	Total Pounds Harvested	Comments

Bass Harvest Records

Date	Number Harvested	Total Pounds Harvested	Comments

Tagged Fish Data				
Date	Tag Number	Length (In.)	Weight (lbs.)	Comments

Other Records	
Date	Comments