UNIVERSITY of ARKANSAS AT PINE BLUFF
1873

School of Agriculture, Fisheries and Human Sciences

Sherwood Lake

5/25/23

Greetings,

It was a pleasure to visit your lake. Below is a list of recommended action items followed by a summary of our visit and recommendations. Additional details are located in the later pages. These are only recommendations and you are free to apply or disregard them as you please.

Management Goal

IMPROVE LARGEMOUTH BASS AND CRAPPIE FISHERY

Recommended Action Items

Completed	Action	Priority
	Install 20+ large brush pile / artificial habitat sites	HIGH
	Stock 10 loads of threadfin shad in spring 2024	MED
	Stock 25,000 2-3 inch bluegill in fall 2023 or spring 2024	MED
	Implement 25 / day limit on bluegill <8 inches in length	HIGH
	Release all bluegill larger than 8 inches in length	HIGH
	Implement 15 / day limit on bass <14 inches in length	HIGH
	Release all bass larger than 14 inches in length	HIGH
	Harvest all crappie caught	MED
	Harvest catfish as desired, restock when catch rates are low	LOW

Priority Level Explanation:

OPT: Actions not necessarily recommended in this situation, but reasonable options to consider.
LOW: Actions not necessary to the success of the lake, but a potential benefit if you are willing to proceed with them.
MED: Actions that are strongly encouraged, but not critically important to the success of the lake.
HIGH: Critically important actions needed to achieve the stated goals of the lake.

Summary of Recommendations

- **Largemouth bass abundance was moderately high and condition was moderately poor.** We sampled 74 largemouth bass at a rate of 92 fish per hour (moderately high). The largest fish was 23.3 inches. The average relative weight was 87 (moderately poor). All largemouth bass were released. (Table 2, Figures 3-5, pages 5 and 7)
- **Bluegill abundance was very low and condition was very good.** We sampled 28 bluegill at a rate of 35 per hour (very low). The largest fish was 8.3 inches. The average relative weight was 108 (very good). All bluegills were released. (Table 2, Figures 6-8, pages 5 and 8)
- **Redear sunfish abundance was very low and condition was very poor.** We sampled 18 redear sunfish at a rate of 22 fish per hour (very low). The largest fish was 10.4 inches. The average relative weight was 75 (very poor). All redear were released. (Table 2, page 5)
- **Black crappie abundance was low and condition was moderate.** We sampled 7 black crappie at a rate of 9 per hour (low). The largest fish was 8.0 inches. The average relative weight was 91 (moderate). All black crappie were released. (Table 2, page 5)
- **Summary of the fishery.** The fishery is in a decent, balanced condition but is operating on a habitat and forage species deficit to achieve your goals of better largemouth bass and crappie size. The actual bluegill abundance is higher than our data suggests; we observed several small to moderate sized bluegill evading the electrical field before being fully stunned, not uncommon in clear water. Still, condition data from sampled bluegill and largemouth suggests that there is indeed a shortage of bluegill smaller than about 6 inches in length. Habitat improvements, forage fish stocking, and length-based harvest of largemouth bass and crappie can improve condition of both largemouth bass and crappie over the next few years.
- **Install 20+ large, complex piles of cover in 6-14 feet of water.** A combination of large rocks, tree roots, trunks and limbs in concentrated areas will create diverse cover for all species of fish. Generally, the more diverse (mixture of large diameter limbs with large open spaces to small diameter limbs with small open spaces) the better. Also, opt for fewer large complex piles rather than numerous small (e.g. a few Christmas trees stacked together) piles. Try to build them so that the brush will top out about 2-3 feet below the surface of the water when the lake is at full volume. Habitat around boat docks/piers can be very effective as it combines cover and shade. A map of potentially effective habitat sites is available in Figure 9 page 9. More information on page 10.
- **Stock 10 loads of threadfin shad in spring 2024.** Threadfin shad are a small to intermediate-sized schooling open-water filter feeder of plankton that will feed intermediate to large largemouth bass, crappie and catfish. They require fertile water with healthy plankton blooms to persist but can still benefit infertile waters with annual restocking.
- **Stock 25,000 2-3 inch bluegill in fall 2023 or spring 2024.** Bluegill spawn multiple times during the summer and are the primary forage of all sizes of largemouth bass in most southern lakes. They can also provide excellent sportfishing in lakes managed to grow large bluegill.
- **Implement a 25 fish per day harvest limit on bluegill less than 8 inches in length.** Bluegill spawn prolifically. If allowed to do so unchecked by largemouth bass predation or angler harvest, they will become stunted at very small sizes. Managing the largemouth bass population and harvesting a moderate rate of bluegills by fishing, netting, or trapping will increase the average

and maximum size of bluegills. Release all bluegills larger than 8 inches in length as they will serve as breeding stock for the population and provide the most angling satisfaction. More information on pages 10-11.

- **Implement a 15 fish per day harvest limit on largemouth bass less than 14 inches in length.** Harvest is necessary to maintain satisfying growth and size of largemouth bass. If harvest is ignored, largemouth bass will likely overpopulate resulting in stunting in the 11-14 inch size range. Encourage your membership to harvest largemouth bass. Focus harvest on fish shorter than 14 inches, and especially target the skinniest individuals. Release all largemouth bass larger than 14 inches. More information on pages 10-11.
- **Harvest all crappie caught.** A fertile lake with ample forage and cover can produce massive numbers of crappie. To keep them from stunting at small sizes, you must harvest them regularly. Black crappie can reproduce at 5-7 inches in length so aggressively harvesting fish larger than 8 inches should not significantly harm the spawning stock. More information on pages 10-11.
- **If catfish are harvested, expect to restock them periodically to maintain their abundance.** Catfish tend to have difficulty maintaining their population in small lakes with largemouth bass and a lack of proper spawning habitat. As a result, it is common to require periodic restocking of catfish. Without largemouth bass, the catfish may be able to maintain their numbers. If the lake is catch and release only, expect to restock catfish in 8-10 years as they begin dying out from old age. Otherwise, monitor catfish catch rates and begin restocking when catch rates start to become unsatisfactory.

Lake Description

Table 1: Physical and water chemistry parameters.

Parameter	Observed	Acceptable	Ideal
Area (acres)	97	*	*
Volume (acre-ft)	N/A	*	*
Average Depth (ft)	N/A	> 4	> 4
Maximum Depth (ft)	N/A	< 12**	< 12**
pH	8.5	5.5 – 10.0	6.5 – 9.0
Alkalinity (mg/L $CaCO_3$)	175	> 20	50 – 150
Hardness (mg/L $CaCO_3$)	179	> 20	50 – 150
Secchi Depth (inches)	N/A	18 – 36	18 – 24
Nitrate-Nitrogen (mg/L NO_3-N)	N/A	< 90	< 10
Phosphate-Phosphorous (mg/L PO_4-P)	0.075	< 0.1	0.025-0.100
Color Code	Needs Attention	Acceptable	Ideal

* There is no "ideal" area or volume for a fishing lake.

** Less than 12 feet deep maximum depth is recommended for fishing lakes in Arkansas but this is only a general rule of thumb; there are many acceptable exceptions.

Sampling Results

Table 2: Total fishes sampled from electrofishing survey.

Species	Count	CPUE	Average Wr	PSD	PSD-P
Largemouth bass	74	92	87	54	3
Bluegill	28	35	108	29	10
Redear sunfish	18	22	75	71	35
Black crappie	7	9	91	50	0
Longear sunfish	2	2			
Green sunfish	1	1			
Channel catfish	1	1			

Electrofishing is widely accepted in the scientific community as an effective, safe, and rapid fishery assessment tool so long as biases and limitations with the technique are understood. For example, water chemistry plays a significant role in how well electricity can flow from the boat to the fish resulting in differences in collection efficiency between water bodies. Weather conditions, water depth and clarity, habitat type and density can significantly influence fish capture efficiency. Additionally, not all fish species are equally susceptible to capture by electrofishing due to their habitat preferences, lifestyle, physiology, and more. As a result, it is not uncommon for electrofishing reports to seemingly over-represent species you have almost never seen in your lake (such as small minnows and shiners) and under-represent species you know for a fact live in the lake (such as catfish or crappie). For our purposes, electrofishing is most often used to collect enough specimens to get reliable estimates of size distribution and condition of targeted species, not so much their abundance or overall population estimates. We then match the sometimes narrow scope of electrofishing data on this particular lake to the collective trends observed throughout the discipline to keep results found here in context and only a part of the comprehensive fishery assessment.

Figure 1: Areas sampled during electrofishing survey.

There are many metrics used by fisheries specialists to characterize the condition of a fishery. Below are explanations of the metrics used in this report. It often takes a combination of several metrics to describe the true nature of a fish population.

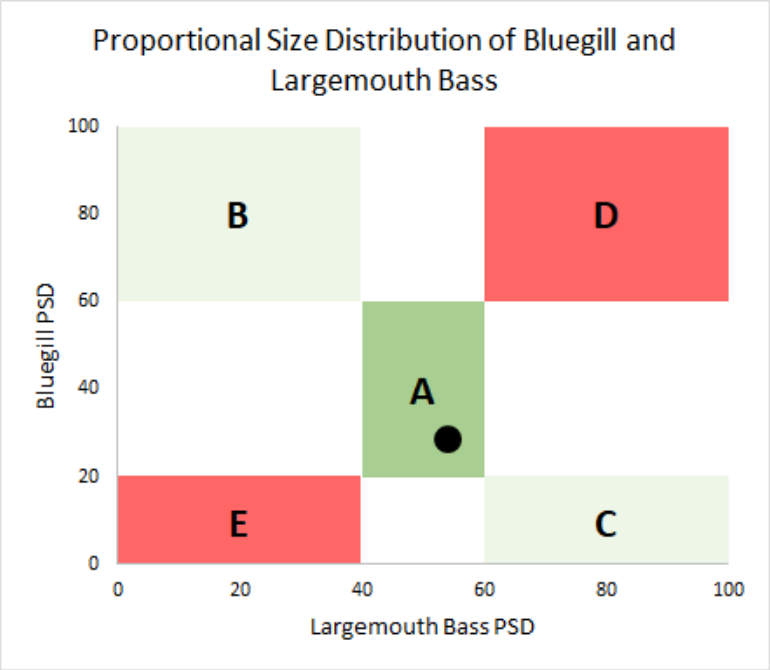


Figure 2: Fishing is generally good for both species when the black dot is within square A. If the dot is within square B, bluegill are large and largemouth are small. Increasing largemouth harvest can balance this condition. If the dot is within square C, bluegill are small and largemouth are large. Reducing largemouth harvest can balance this condition. If the dot is within square D, there are very few small individuals of both species and a collapse of the fishery may be imminent; restocking may be necessary. If the dot is within square E, there are very few large individuals of both species likely due to environmental problems like poor water chemistry, excessive vegetation, or excessive turbidity. Consultation with a pond fisheries specialist will be necessary to correct this condition. This graph does not always tell the whole story; fish condition and abundance should be evaluated and considered as well.

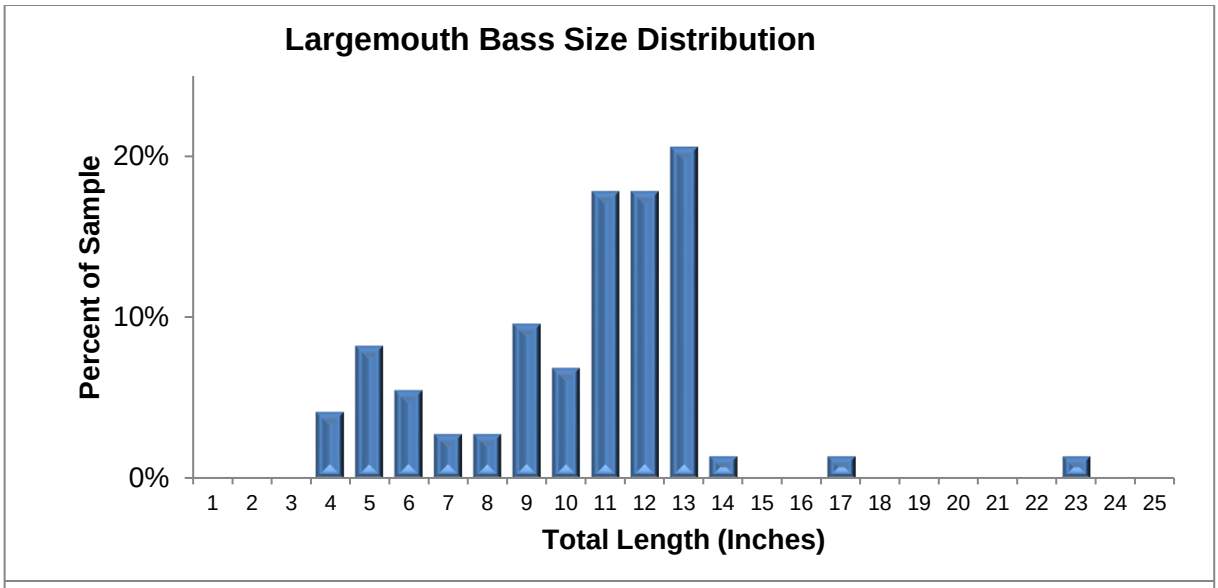
CPUE: **C**atch **P**er **U**nit **E**ffort basically means the number of fish caught per hour of sampling. A largemouth CPUE between about 20 and 60 usually corresponds to good largemouth condition.

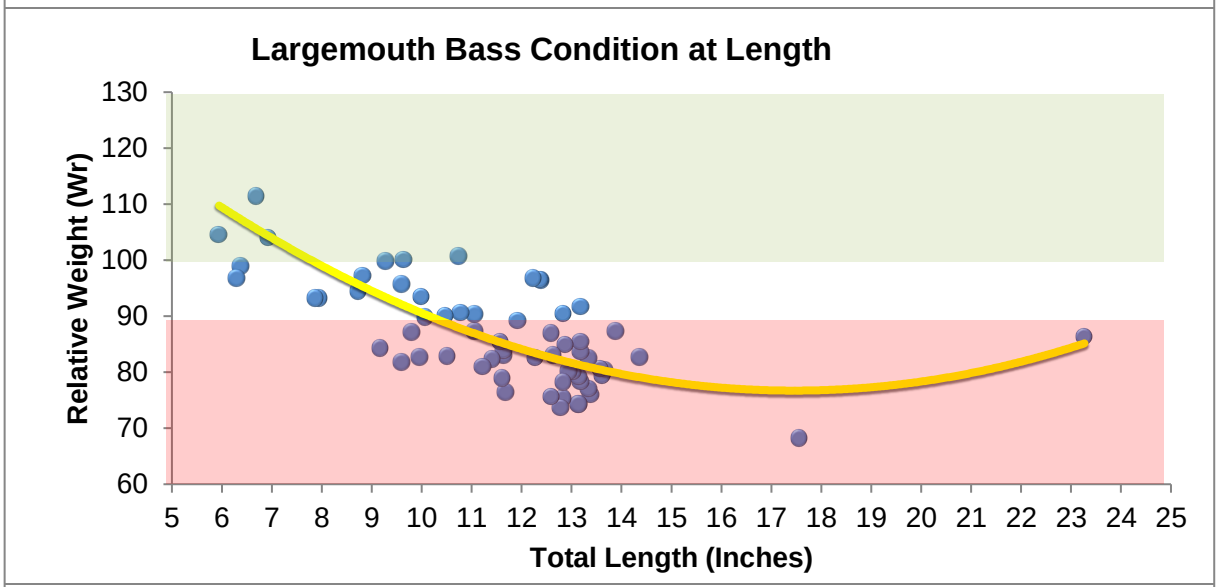
Wr: **R**elative **W**eight is a measure of condition based on comparing the weight of a fish to the **standard weight** established for that species and length. The **standard weight** represents how heavy a healthy, quickly growing fish of that species should be at a given length. A relative weight of 100 represents a fish that is plump and healthy. Fish with relative weights below 90, and especially below 85, are skinny and probably not growing as quickly as they could be.

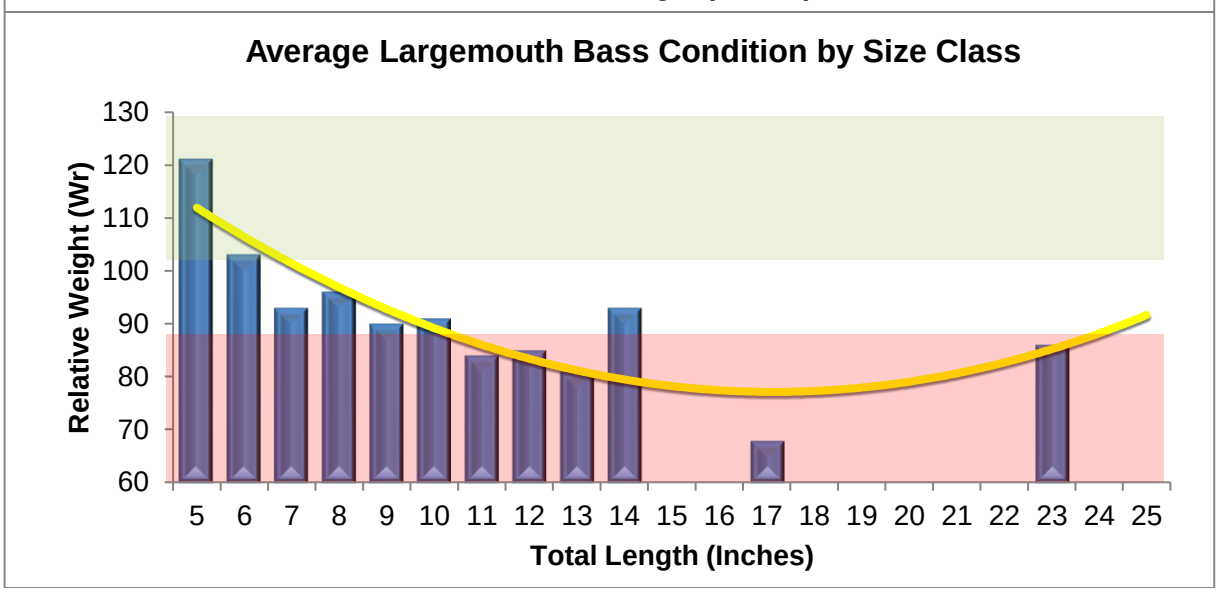
PSD: **P**roportional **S**ize **D**istribution is calculated by the ratio of fish above quality size compared to the number of fish above stock size. Size classes include stock, quality, preferred, memorable, and trophy. A PSD between 40 and 70 for largemouth and between 20 and 60 for bluegill indicates a balanced population.

PSD-P: **P**roportional **S**ize **D**istribution-**P**referred is similar to PSD, except that it is based on the ratio of individuals above preferred size compared to the number of fish above stock size. A PSD-P between 10 and 40 for largemouth and between 5 and 20 for bluegill indicates a balanced population.

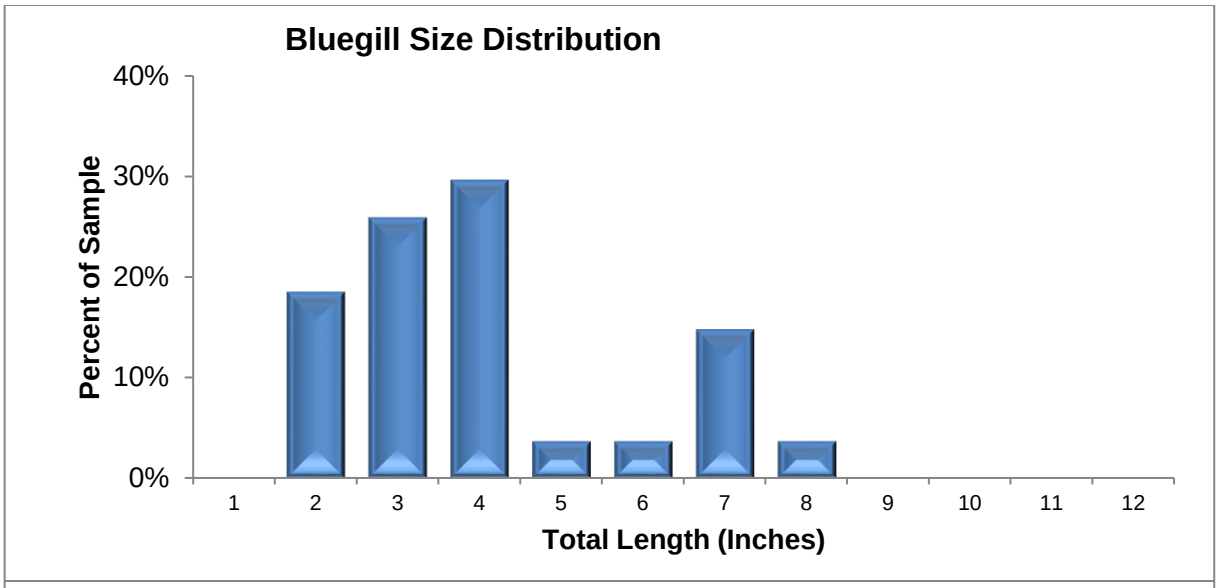
Figures 3-5: Largemouth bass size and condition distributions.

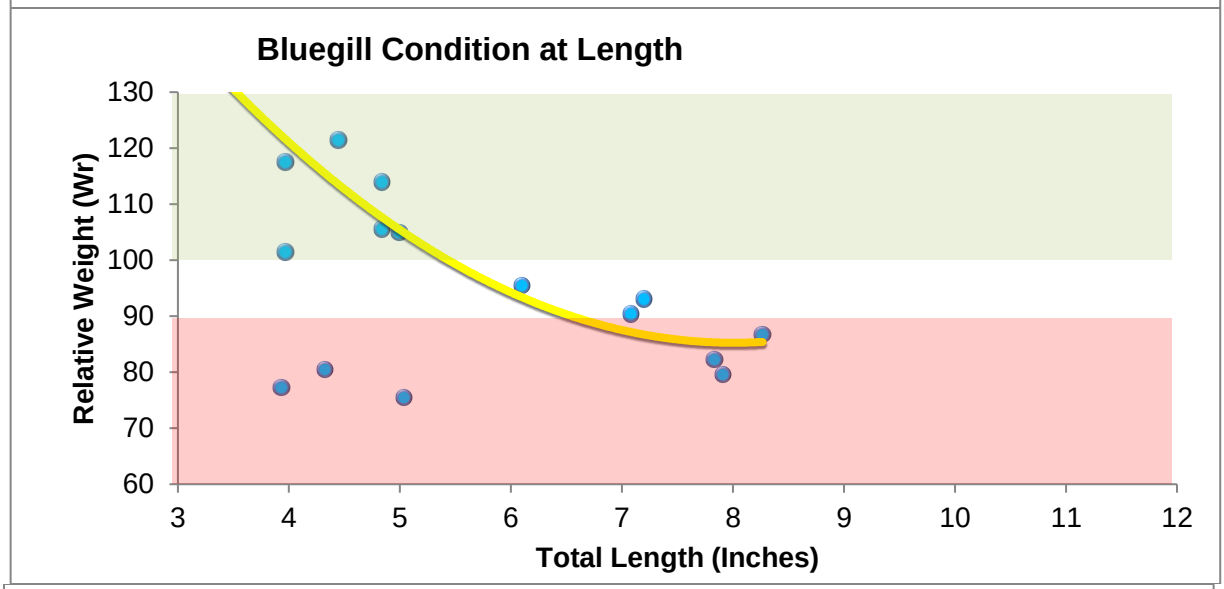






Figures 6-8: Bluegill size and condition distributions.





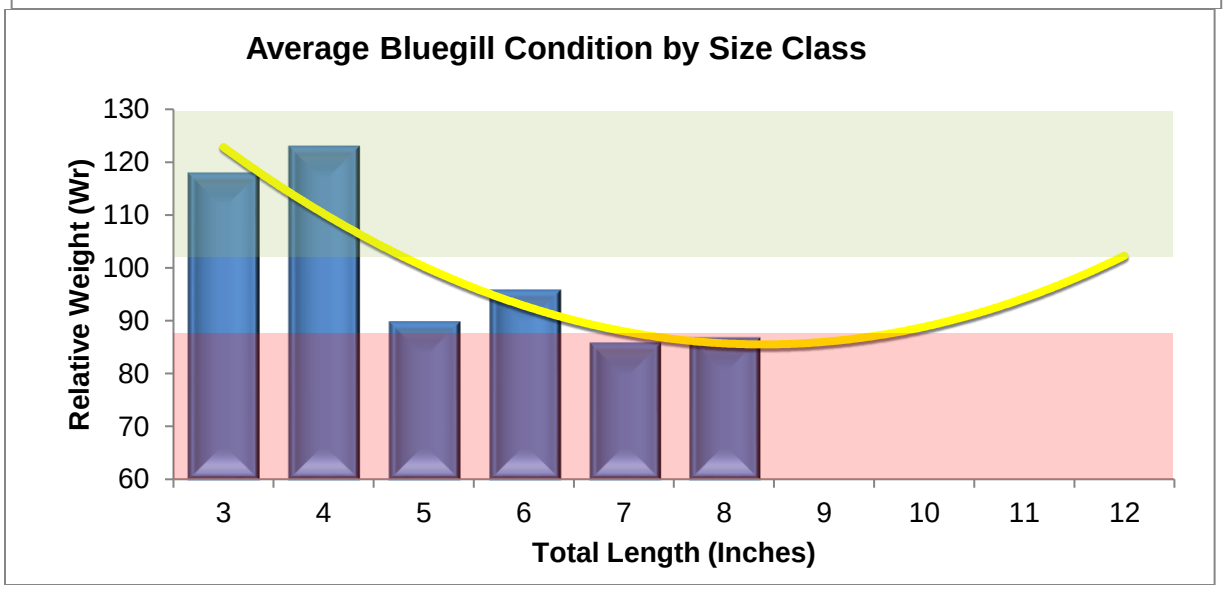


Figure 9: Potential habitat improvement locations.

Additional Information

- **Adding cover can improve fish growth and fishing efficiency.** Different types of cover tend to favor different species based on their cover preference and size. Cover with many small branches or stems that are tightly packed together tend to attract smaller fish that can maneuver through the spaces without getting entangled. Larger fish can only hide around the perimeter and cannot reach the smaller fish within. Cover with few, but large branches or stems with wide open space between the branches favors the larger fish that can conceal themselves without impeding their ability to ambush forage that swims near or within the cover. The location and orientation of the cover can also favor certain species. For example, horizontal cover near the shore such as a fallen tree or a large log tends to attract bluegill, catfish and largemouth bass. Vertical cover, such as sunken Christmas trees or standing timber, in deeper water away from the bank tends to attract crappie. Lakes with a balance of both types of cover in appropriate locations tend to perform the best. Finally, like vegetation, too much cover is as bad as not enough. It is better to have a few very large piles of complex (containing both small, tightly packed and large, loosely packed branches) cover than many small simple piles of cover. A good rule of thumb is to have about two large (10 to 20 feet in diameter) complex piles of cover per acre, located so that the shallowest section is about 3 to 5 feet deep and the deepest section is 6 to 8 feet deep.

  One of the drawbacks of natural woody debris is that it is somewhat temporary. Wood decomposes over time in water, and frequent exposure to air and re-submergence in water speeds the process. Thinner branches break down much faster than large limbs and trunks. For example, Christmas trees may only last a year or so before they are essentially gone. Large tree branches and especially tree trunks/root wads from hardwoods may remain effective for many years, but they are inevitably going to break down. Commercially available artificial fish attractors are often made of plastics or composites that are essentially permanent. These forms of cover are often relatively light (compared to wood) and designed to be easy to assemble, modify and transport. The drawbacks to artificial cover, especially plastic and metal forms, are that they do not encourage algae and microbe growth as well as natural wood does, and they can be very expensive for large habitat projects.

  The type of cover most often lacking in lakes is large woody debris, with large branches suitable for concealing big largemouth bass, catfish and crappie. These forms of cover can be difficult to create because of weight and the difficulty of moving something so large. One simple strategy is to hinge-cut large trees at the edge of the lake so that the top of the tree falls into the lake, but does not completely detach from its base and root system. This will keep the tree top in place and provide an excellent combination of large, open branches and thin, tightly packed branches. Remember to use extreme caution while attempting this procedure and seek experienced assistance if needed, especially with large trees. Also, do not cut large trees if they are growing on the dam or levee. Doing this will kill the root system which will begin to decompose which could then open up holes and leaks through the dam. Another option is to assemble larger piles piece by piece at the lake-side before moving sections by boat to their final destination. The best time to install large piles is before the lake is filled with water. This allows for precise placement and much easier transportation of the heavy trunks and branches.

- **Balance is a commonly used term to describe the equilibrium between largemouth bass and bluegill populations in a lake.** A balanced lake is one where both largemouth bass and bluegill populations have stable reproduction each year and there is a range of sizes from small to large in both species. Essentially, bluegill are providing enough food for the largemouth bass, and the largemouth bass are keeping the bluegill population under control.

Lakes lacking appropriate harvest of largemouth bass often end up overcrowded by largemouth bass. These lakes are full of small hungry largemouth bass and few, but often very large, bluegill. When largemouth bass overpopulate, bluegill are eaten before they can grow more than 2 to 4 inches long. The lucky few bluegill that somehow evade largemouth bass long enough to outgrow their mouths can grow to very large sizes. These lakes are usually very entertaining to fish because the hungry largemouth bass are easy to catch, and the few bluegill that are available are very large. However, if bigger largemouth bass are desired, simply harvest up to 35 pounds of largemouth bass less than 13 inches long per acre per year until average size improves. Once a desirable average size has been achieved, return to the standard harvest rate of about 10 to 15 lbs of largemouth bass per acre per year less than 13 inches.

Lakes lacking enough predators can become overcrowded with bluegill. These lakes are full of 2 to 4 inch bluegill and very few, but often very large, largemouth bass. When bluegill overpopulate, they devour anything they can eat, including recently hatched largemouth bass. The few largemouth bass that do survive grow very slowly because the bluegill are consuming the same food items that small largemouth bass need. The even fewer largemouth bass that somehow get large enough to start eating the stunted bluegill can then grow very quickly because they have an abundant food supply and little competition. These lakes can be enjoyable for largemouth bass enthusiasts who are more interested in the size of fish caught than the number of fish caught. However, beginners and casual anglers may find these lakes frustrating because there are fewer fish to catch and the bigger largemouth bass tend to be more difficult to catch. Returning bluegill crowded lakes to a balance can be challenging, but there are options. A combination of removing every bluegill caught while fishing and one or more of the following methods can help correct bluegill crowding:

1. Reduce the lake volume by half in the late summer to early fall. Allow the lake to refill over winter. This approach concentrates the bluegill so that the largemouth bass can eat them easier. If a built-in lake drain is not available, an example of a home-made lake siphon is provided in Appendix C of the *MP360: Farm Pond Management for Recreational Fishing*.

2. Stock 20 to 30 adult (8 to 14 inches long) largemouth bass per acre. The additional largemouth bass will help reduce the bluegill population.

3. If all else fails, completely drain the lake and kill all of the fish. Restock the lake after it refills at least half way with the appropriate ratios of fish (see *MP360: Farm Pond Management for Recreational Fishing*) and harvest fish as recommended. This is also the best option when the lake is overrun with undesirable species, such as bullhead catfish and green sunfish.

Restoring an unbalanced lake through corrective harvest and supplemental stocking can take years to achieve the desired results. In some cases, the fish populations are too unbalanced to be restored through corrective harvest and supplemental stocking alone. In these cases, draining the lake, killing all of the fish, and restarting from scratch is the best solution. This strategy can create good fishing within 2 to 3 years, depending on the species stocked.

Conclusion

Longear sunfish (*Lepomis megalotis*)

I have included with this report a copy of the following resources:

- ***MP360: Farm Pond Management for Recreational Fishing*.** This is a basic, but comprehensive, pond management guide that elaborates on some of the topics mentioned in this report.
- **Sportfish Suppliers list.** This will help you locate and shop for fish if you choose to stock them.
- **A sample fishing log.** This will help you keep records of fish condition and harvest so that you will know when management changes are needed, or when it is necessary to restock fish.

I hope this information is useful for you. These recommendations are based on applying the current understanding of small impoundment research to your lake. That said, you are free to apply or disregard these recommendations as you please. You are welcome to contact me if you have further questions or thoughts, my information is provided below.

Sincerely,

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Have a good one!