Aquatic Environmental
SERVICES, INC.

September 15, 2002

RE: Providence Lake Management Report

Dear Homeowners:

Aquatic Environmental Services, Inc. conducted an electrofishing survey on August 15, 2002 on Providence Lake. The fish analysis was performed using an electroshock boat that stuns most fish species but has very low mortality. The fish analysis and water quality analysis determines the current status of the fishery.

The analysis provides a "snapshot" of the current fish populations, species composition, predator to prey balance and individual bass conditions. From this data a report is generated describing current conditions of the fishery. Based on current fish populations management recommendations are made for future management of the pond to achieve your fishing goals.

Methods

Electrofishing is the most scientifically advanced method of analyzing fish populations in freshwater lakes and ponds in the southeastern United States. A 4-stroke engine emitting little if any pollutants into the water powered the boat. The electroshock boat has its limitations, in that the effective shocking range is a 10-foot area around the front of the boat to a depth of 6 feet. It is biased toward elongated species such as largemouth bass due to higher conductivity. It also shocks large fish better than small fish, and is not as efficient shocking catfish species.

All habitat types found in the lake were sampled including open water, shallow points, wood structure, shallow coves and deeper dropoffs. By sampling all habitats all species should be collected excluding catfish. The water visibility, water conductivity and water temperature was sufficient for the capture of fish.

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Water Quality Results

Table 1. Water quality analysis performed at 1:00 p.m. on August 15, 2002.

Parameter	Result
Conditions	84°
Water Temperature	86
pH	8.1
Dissolved Oxygen	6.9 mg/l
Visibility	42”
Hardness	6 mg/l
Alkalinity	8 mg/l
Fecal Coliform	50 cfu/100 mls.

The general descriptions for each parameter are found on the last page. The results fall within a normal expected range. The hardness and alkalinity levels are low like most Georgia lakes. I recommend the application of 4 tons/acre of agricultural lime if a fertilization program is initiated. This should increase the alkalinity levels above 20ppm for the next few years. When this occurs the daily pH swing is lessened keeping the pH in the preferred range for a longer portion of the day. This in turn allows easier phytoplankton formation when fertilizing the pond. The pH and dissolved oxygen level was good for this time of day.

The visibility was too clear for maximum fish production. To increase the phytoplankton production to boost fish production a fertilizer program could begin. However due to the large flow rate the pond receives and low fishing pressure, I do not feel a fertilization program is suited for the lake.

The fecal coliform is the best analysis to determine the potential for health-related problems that may occur when coming in contact with the lake water. The fecal coliform analysis does not test for all potential pathogens, but rather serves as an indicator test. It tests for the presence of E.coli. Elevated levels could be attributed to many sources. Some of the more common are leaking sewer lines or septic systems, animal waste in the watershed or excessive waterfowl use.

The GA EPD sets a standard of 200 cfu/100mls for recreational use lakes meaning lakes used for swimming and/or fishing. The standard is based on a monthly average above this level for a minimum of four samples. With a direct sewage leak you would see readings from 1,000 to 100,000 colonies/100 ml. The results of the fecal coliform analysis was a low level indicating the water is safe should anyone go swimming or come in contact with the water while fishing in the lakes.

Electrofishing Results

The lake has the presence of redbreast sunfish Lepomis auritus, Warmouth Lepomis gulosus, bluegill *Lepomis macrochirus,* white crappie *Poxomis annularis* and largemouth bass *Micropterus salmoides*. Although not shocked the lake also may have a population of channel catfish *Ictalurus punctatus* and bullhead catfish *Ameiurus nebulosus.*

Crappie compete with both bass and bluegill for food. They are discouraged due to competition and for potential "takeover". The crappie reproduce sooner than most bass meaning the largemouth bass fingerlings born the same year can not control the numbers the way they can bluegill born throughout the summer. What may result is a lake with many small crappie and reduced bass growth rates.

There was an extremely low population of the intermediate size classes of bluegill captured. There were zero bluegill captured between 3 and 6 inches. The bigger 7-10 inch bream were healthy due to the lack of competition for food amongst the surviving bluegill.

A total of 3760 seconds of active shock time occurred with a total catch of 35 largemouth bass. There were 8 bass 4-8 inches that are probably true yearling bass. We captured 22 8-12 inch bass and 3 bass were 12-14 inches and 2 larger 18 inch bass were captured. This indicates the "stunted" size class as the 8-12 inch bass that needs to be harvested. The bass this length could be 4 years or older.

An additional pond assessment is a relative weight index (RW) conducted on adult bass. A relative weight index is a comparison of a standard weight of a bass at a given length compared to the actual weight of the collected bass at the same length. It determines the "plumpness" of individuals, and values over 85% indicate that the bass has a good forage base. When relative weights are below this level the food source is limited for bass. In this case a good harvest plan will result in the bass left in the pond having more food in which to grow.

The pond is bass heavy. This simply means there are too many bass in the pond. The 8-12 inch bass had a relative weight index average of **78%**. The two larger bass averaged 105 %. What is happening to the bass is simply a situation where there is a limited "ideal" food supply. The lake has the presence of few intermediate 3 to 6-inch bluegill the larger bass need for forage. Bass feed efficiently on bream 1/3 their length, but much more energy is used when capturing several small two-inch fish to equal a four-inch fish. What energy the bass has left goes into reproduction. What is sacrificed is weight gain.

Management Recommendations

It is the goal in most lakes to have a balanced condition. This does not mean a true equilibrium, but a satisfactory relationship between the predator (bass) and prey (bluegill) populations. When balanced, the prey are reproducing at high numbers providing forage for the predator, and the predator has the proper numbers to limit the number of prey. As a result, the pond produces catchable size bass and bluegill. This balance can be skewed through management to benefit larger bream species of large bass. General lake management advice and explanations can be printed out or viewed at www.lakework.com. The articles *Pond Management 10, Do It Yourself Hawg Pond,* and *Proper Pond Stocking* provide the background knowledge to better understand the specific recommendations made below.

Harvest

One of the best ways to maintain a balanced pond is by limiting the number of predator mouths. In order to catch more larger bass, the lake needs to have a good percentage of the 8-12 inch bass removed so the others can grow. I recommend removing a total of **250** bass this year. Return larger bass longer than 14 inches in length as well as bass less than 8 inches. I suggest making up a sign out sheet for fish caught and removed. The remaining bass will have more food allowing more bluegill to survive to an intermediate size thus allowing better forage for the bass.

More important than the bass harvest is the removal of crappie. They are most easily captured in the spring when in the shallow water. By removing all caught the population can be maintained in a lower population. These fish compete with bass for food and contribute to low RW of the bass. They are great to eat so homeowners feel free to filet some and help out the lake at the same time. At this time remove few bream since they are low in numbers due to the bass heavy environment.

Stocking

Since channel catfish do not reproduce in a bass lake they are in low numbers. Channel catfish are easily managed, grow quickly, and the easiest fish for kids to catch. To make much of a difference the lake will need to be stocked with 50/acre. This means a minimum of 650 need to be stocked. I suggest a size of 7-9 inch to survive bass predation. Catfish this size can be delivered to the pond for $0.65 each ($422). The fish can be delivered any time of the year, and would really help increase the enjoyment of the pond.

If fishing becomes more of a priority, next year stock threadfin shad to take the pond to the next level in quality bass management. They run about $1,000 per load where a load consists of 3,000 to 5,000. Once established they provide a great source of food for bass. They also seem to increase the top water bite since they are open water fish. The one negative is that they compete with bluegill so the bluegill fishing may not be as good.

Weeds/Algae

The pond is vastly improved over last year. The very invasive weed, bladderwort is still present in a few areas. It has been treated with appropriate herbicides when noticed. The grass carp have made the largest difference by eating the weeds and algae on a continuous basis. The fish barrier has helped maintain the grass carp population. They may need to be restocked in low numbers in 2 or more years.

Supplemental Feeding

Feeding the bluegill floating fish food creates healthier bluegill that reproduce at higher rates thus increasing the carrying capacity. This means even more bass food and a larger prey item the bigger bass will need for forage. This is one of the easiest methods to increase the capacity of the pond because it jumps ahead two levels in the food chain. The placement of a couple of feeders in the pond will provide a great food source on a continuous basis. The feeders also concentrate bluegill for easier fishing especially for kids. As a rule of thumb you should feed just enough to be eaten in fifteen minutes.

Supplemental feeding is also critical to increase the growth rates of stocked catfish. Any interested lakeowner can now view the Stren Feeder line at www.lakework.com. These feeders are without question the best feeder on the market for the price. They are easy to setup, require basically no maintenance and make a large difference in the fish populations in the immediate area. Please call to place an order.

Habitat Improvements

The lake has some structure and cover for the fish. This is not required like some people think, but cover provides areas that concentrate fish. This provides places for fisherman to cast and increases their success. If cover is to be placed in the lake call for suggestions.

Conclusion

I hope this helps explain the why and how of the pond management plan. For improved potential for large bass remove a percentage of the stunted bass and all crappie caught. This allows remaining bass to have more forage for growth. Supplemental feeding and catfish stocking will increases the lake's enjoyment. Feel free to call with any questions you may have.

Sincerely,
Aquatic Environmental

Greg Grimes
President

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Water Quality Parameter Descriptions

Dissolved Oxygen

Dissolved oxygen (DO) is a measure of the amount of oxygen available to aquatic organisms, and is reported as mg/l or percent saturation. Percent saturation is a representation of how much oxygen is dissolved in the water relative to the amount of oxygen that can be held at a specific temperature. Colder water can hold more oxygen than warm water. Dissolved oxygen fluctuates daily with it being at its lowest levels in the early morning hours. DO does not pose a problem for most fish until levels fall below 3 mg/l. A dissolved oxygen profile shows how stratification affects DO levels as depth changes.

pH

The pH measures the concentration of the hydrogen ions present in the water, and is usually thought of as the measurement of acidic or alkaline conditions. A pH of 7 is neutral with lower values being acidic and higher values being alkaline. Most organisms in a lake prosper when the pH is maintained between 6.5 and 9. The pH cycles daily due to a complex interaction of alkalinity, hardness, carbon dioxide, and photosynthesis and respiration. The lake is more acidic in the mornings, and varies with depth. When pH levels are out of the desired range for long periods, detrimental affects may occur.

Hardness

Hardness is a measure of the quantity of divalent ions in water. Generally in Georgia, calcium and magnesium carbonate account for the majority of the hardness. Hardness levels affect the toxicity of some algaecides, limit phytoplankton formation, and play a role in fish growth. Levels below 20 mg/l should be increased with the addition of 2-4 tons per acre of agricultural lime.

Alkalinity

Alkalinity is defined as the quantity of base present in water. The most common bases include carbonates, bicarbonates, hydroxides, and phosphates. Total alkalinity is closely related to hardness with both being reported as mg/l $CaCO_3$. Alkalinity basically determines the buffering capacity of a lake. A good buffering capacity will absorb introductions of acids and bases with less change in pH levels. Good alkalinity reduces the magnitude of daily pH swings making available more phosphorus for phytoplankton formation resulting in a lake that has an increased carrying capacity.

Visibility

Visibility is measured with the use of a secchi disc. The white/black disc 20-cm in diameter is lowered vertically through the water until it can no longer be seen. Suspended particles reduce this visibility level. Therefore, in the absence of turbidity from silt or mud the secchi disc serves as an international standard to indicate phytoplankton abundance. The desired range to maximize fish production is between 18 and 24 inches.

Temperature

The temperature affects many other parameters making it critical to determine and report. It is also a major factor in the reproduction strategies of many fish species. When measured as a depth profile it indicates the possibility of year around trout habitat.