Aquatic Environmental

November 29, 2003

Providence Lake Annual Report

Dear Lakeowners:

Aquatic Environmental Services, Inc. conducted an electrofishing survey on Providence Lake on September 27, 2003**.** We performed the fish analysis using an electroshock boat that stuns most fish species but has very low mortality. Along with this service was a water quality analysis performed October 13, 2003.

The data collected was analyzed and provides insight into the proper future management of the pond to achieve your fishing goals. The data generates a report describing current conditions of the fishery. Based on the current fish populations, management recommendations are made to help improve the fishery.

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.

We sampled all habitat types found in the lake including open water, shallow points, wood structure, shallow coves and deeper dropoffs. By sampling all habitats all species should be collected. The water visibility and water temperature was sufficient for the capture of fish although limited number of fish were captured due to the warmer water.

Results

Water Quality Results

Table 1. Water quality analysis performed at 12:30 p.m. on October 13, 2003.

Parameter	Result
Condition	Sunny, 78^{o}
Water Temperature	74 ^{o}
pH	7.1
Dissolved Oxygen	7.8 mg/l
Visibility	38 inches
Hardness	8 mg/l
Alkalinity	6 mg/l
Fecal coliform	1 cfu/100 ml

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The water quality parameters descriptions sheet contains the general information about each parameter. The results fall within a normal expected range. The hardness and alkalinity levels are low as are most in Georgia. If the lake was managed exclusively for fishing recommendations would be for the application of 4 tons of lime per acre is to bring the alkalinity above 20 mg/l. This is important if a fertilization program is initiated. When alkalinity is above 20 mg/l the daily pH swing is lessened keeping the pH in the preferred range for a longer portion of the day. This results in a more productive environment for fish and phytoplankton formation.

The pH and dissolved oxygen level was good for this time of day. The visibility was clear which is desired for most neighborhood lakes. Due to the high flow rate and low fishing pressure of the lake, I do not suggest a fertilization program. A feeding program is better suited to maximize fish production.

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

We captured 15 bluegill *Lepomis macrochirus* of various sizes. There was one 3-4 inch, three 4-5 inch, three 5-7 inch and eight 7-9 inch bluegill. This higher abundance of large bluegill versus the relative lower occurrence of intermediate size bluegill indicates a bass crowded environment.

Also shocked were 7 redear (shellcrakcer) *Lepomis microlophus* with all over six inches. These species are beneficial since they usually grow larger than bluegill. They occupy a slightly different niche in the food chain since they can also fed upon mollusk, snail and mussels. This may serve as host to parasites so eliminating snails by having shellcracker is an additional benefit.

Also captured were redbreast sunfish *Lepomis auritus* that probably became established in the pond from the creek system. They are also a bream species that should pose no management threat. Warmouth *Lepomis gulosus* were also captured. They have hinged

jaws and compete with bass for food but all relatively low in occurrence and also pose no threat to the proper management of the pond. The pond is much easier to mange without the presence of undesirable species.

The white crappie *Poxomis annularis* is a desired species for many but can cause management problems if not controlled with harvest. 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.

We managed to net up 27 largemouth bass *Micropterus salmoides* from the pond. There was only one bass captured over 13 inches. Most of the bass fell between 8 and 12 inches and a few true yearling bass 4-8 inches were captured. This indicates the size that is stunted and needs to be harvested.

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 90% indicate that the bass are fairly healthy with an adequate forage base.

When relative weights are below this level, the food source is limited for bass. The bass simply have a limited "ideal" food supply. The lake has the presence of few intermediate 3 to 5-inch bluegill the adult bass need for forage. Bass feed efficiently on bream 1/3 their length, but use much more energy while capturing several small two-inch fish to equal a four-inch fish. What energy the bass has left goes into reproduction, and weight gain is sacrificed. In this case, a good harvest plan will result in the bass left in the pond having more food in which to grow. Goals should be set for an average RW of 100% when managing for quality bass fishing.

The relative weight average was slightly lower than last year at 75%. I'm sure there are several large bass in the pond but percentage wise they are low in numbers. These larger bass should be fairly healthy since they can consume the smaller bass and larger bluegill. The harvest of these smaller bass is critical to increase the chances of catching quality size bass.

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. Take the time to read and

understand the general lake management advice and explanations found on www.lakework.com. The articles *Pond Management 101, Do It Yourself Hawg Pond, Successful Pond Stocking*, and *Do Your Fish Need a Physical Exam* should all provide some useful information.

Goals

It is the goal of most neighborhood ponds to have a well balanced pond. When managing for a balanced pond harvest is a critical component. Proper fish stocking and water quality management is critical to maintaining an enjoyable pond for years to come.

Harvest

Goals should be set for the removal of about 400 bass. This is an increase of the 250 recommended last year. In order to improve the size of the bass the removal of the smaller bass is necessary. Continue to return bass longer than 14 inches and remove the smaller 8-12 inch bass. It may be difficult to monitor, but make up a logbook to keep track of harvest. This will free up food for the remaining bass allowing them to grow. It will also allow a higher survival of the bream. Return all bream captured at this time. The returned bluegill and redear although big will spawn helping to replenish the smaller bream population.

Stocking

If fishing for kids and novice fisherman is a concern you can stock a low density of channel catfish. The channel catfish will not reproduce in the pond making them easy to manage. They will grow quickly with a feeding program. I suggest 1000 being stocked once the lake starts receiving an adequate fishing pressure from homeowners. They will need to be a minimum of 7 inches to survive bass predation. Call for prices and size availability.

Another fish that could be stocked is grass carp. I think their numbers are still good. They may need restocking by 2005. They do a great job in controlling some of the shoreline weeds in the pond. If weeds become more prevalent stock the grass carp at a rate of 5-10/acre. The 11-13 inch triploid grass carp are $8.50 each with discounts for quantity.

Supplemental Feeding

Feeding the bluegill floating fish food creates healthier bluegill that reproduce at higher rates thus increasing the carrying capacity. This is one of the easiest methods to increase the capacity of the pond because it jumps ahead two levels in the food chain versus fertilizing. Since it is not practical to fertilize then feeding is an important option.

Several of my subdivision ponds have enjoyed the placement of feeders on a community dock or individual purchase them for themselves. To maximize the growth of bluegill it is best to have several fed stations setup so that all the bluegill will have access to the food source. 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. It is also important to have this additional food source if catfish are stocked.

The Stren Feeders can be viewed on the website. The two most popular feeders are the ADF-75D (75 lbs.) and the ADF-200D (200 lbs.). The ADF-75D has a much lower profile as shown in the picture. It will cast the food out about 45 feet into the pond. It sells for $380, and is better suited for a dock. The 200D cost $530 and will cast the food out much farther, stands much taller and obviously holds much more food. It has braces that can be stood on for filling the hopper. It makes it simple to feed since it cast the food 45 feet into the pond and you simply fill it up once every three weeks or so. Both feeders come with digital easy to use timers that can be set for several feed times and up to 90 seconds per feeding. It comes with a 4 year warranty if you should have any trouble.

A larger 5 watt solar panel sells for $90 and the 1 watt solar panels are $40. With the 1 watt solar panel the battery may need to be charged every 2-3 months. The feeders run off of a 12 volt rechargeable battery that sells for $22. The shipping cost for the 75D is $30 and $80 for the 200D. The complete suggested feeder with 1 watt solar panel cost for ADF-75D is $472 and the cost for the 200D is $672. I provide all of my customers a 5% discount making the feeders $450 and $635 respectively.

Fertilizing

I suggest not fertilizing at this time. However these are the recommendations should situations change in the future. Fertilizing a pond increases its productivity. When done properly you decrease the visibility down between 18 and 24 inches. This green color is phytoplankton that is consumed by zooplankton that feeds aquatic insects that are fed on by bluegill that go on to fed the bass. The process is easier to do with a water-soluble fertilizer. The water-soluble fertilizer is a 12-52-4 high in phosphorus that is the limiting nutrient in ponds in the southeast. Since it dissolves in the water, it can be simply cast into the pond at a rate of 4 lbs/acre. Applications should continue through the summer until October to maintain the 18 to 24 inch visibility.

Habitat Enhancement

The pond has very little cover for fish. The lack of algae and weeds is beneficial for the fish. Adding a little more cover will provide hiding places for the forage and ambush point for bass. You can do this by adding trees, rocks, or many types of pvc configurations. I suggest falling some trees around the lake in strategic places. The lake is aesthetically pleasing, but it may need to be dredged in the future since there are several shallow areas near the tributaries. Also placing purple martin houses around the lake will help dramatically reduce the insect populations.

I did not see a bad weed/algae problem at this time. The grass carp have done a great job controlling the bladderwort. The lake continues to have some filamentous algae in shallow areas. These small outbreaks were treated three times this year.

Conclusion

The fishing in the lake should be good for numbers of bass and large bream species. Also fishing for crappie in the spring should be good especially in the shallow areas with cover. Harvesting the bass is critical to have a balanced pond. I have also been seeing great results from feeding the bluegill. Stocking grass carp for weed control and catfish for kids fishing may also be explored. Feel free to call with any questions you may have.

Sincerely,
Aquatic Environmental

Greg Grimes
President

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 2-3 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.

Fecal Coliform

Fecal coliform is the measure of the concentration of the bacteria *Escherichia coli,* which is specific to the guts of birds and mammals. The bacteria itself resides in the gut of humans, and is not harmful unless in high numbers. It serves as an indicator of possible sewage contamination because it persists longer than most other harmful pathogens associated with sewage, and it does not prosper or reproduce outside its host animal. Fecal coliform can originate from human or animal sources, and is usually higher after rains. Levels are not of concern unless above 200 colonies per 100 ml of lake water. High levels indicate a sewage leak, animal waste in the watershed, or excessively high numbers of waterfowl utilizing the lake.