Commission Managed Impoundments Program

Beginning in the late 1950's through the early 1970's the Florida Fish and Wildlife Conservation Commission (formally the Florida Game & Fresh Water Fish Commission) constructed a series of six man-made impoundments in Northwest Florida. These impoundments were constructed for the sole purpose of providing additional freshwater fishing opportunities to anglers in the northwest panhandle region where lakes are few in number. Five of these lakes, Lake Stone (Escambia County), Bear Lake (Santa Rosa County), Hurricane and Karick lakes (Okaloosa County), and Lake Victor (Holmes County), are currently part of a liming and fertilization program designed to increase sportfish numbers and weight. The sixth lake, Juniper Lake (665 acres) in Walton County, is currently not involved in this program because dense stands of timber just below the surface of the water throughout the lake restrict the boating access needed to disperse lime and fertilizer in an effective manner. Additionally, the size of Juniper Lake makes these practices cost and time prohibitive. Each lake is designated as a Fish Management Area meaning they are part of an intensive, ongoing fisheries management program designed for maximum fish production and angling opportunities. Creel surveys conducted by commission biologists on these lakes has estimated an average angling effort in excess of 200 hours/acre since the mid-1980's, and in excess of 300 hours/acre on several lakes in certain years. This compares to an average effort of 40 to 50 hours/acre for other lakes located throughout Florida. The liming and fertilization program is crucial for maintaining sport fish populations that can support the extremely high amount of fishing hours on these lakes.

Liming and Fertilization

Increasing Productivity: The liming and fertilization of these lakes works on the same principles as those used by farmers growing crops in a field and by homeowners growing vegetables or flowers in a home garden. Lime added to the acidic soils increases the availability of phosphorus to the crops and raises the pH of the soil to a level that is optimum for crop growth. Fertilizer is added to soils to provide nutrients needed to increase crop growth and production. In the case of the Commission Managed Impoundment lakes we lime and fertilize to increase the yield of sportfish numbers and weight.

A majority of lakes in the northwest panhandle region of Florida contain naturally acidic bottom soils and waters with pH levels below what is desirable for sportfish production. Acidic soils tie up important nutrients, primarily phosphorus, which is important in the production of the phytoplankton. Most lakes in this region of the state have very low naturally occurring levels of phosphorus even after lime is applied. Phytoplankton are microscopic one-celled green algae that are the major source of food for microscopic "bugs" called zooplankton, and are the beginning of the food chain. An increase in phytoplankton abundance is called a "bloom" and results in the green water color many anglers observe during periods from March - October. Increased phytoplankton abundance results in a greater amount of zooplankton that are available. These "bugs" are the main source of food for aquatic animals such as insects, juvenile sportfish, and many types of baitfish such as shiners, minnows, and threadfin shad. Insects are an important source of food for larger bream while larger predatory fish such as adult largemouth bass eat juvenile bream and baitfish. When the level of these green phytoplankton blooms is increased it leads to greater amounts of food available in the food chain and to fish. This results in greater numbers, growth rates, and survival of fish in the lake.

Lake Liming: The addition of lime to these lakes increases the pH of the bottom soils and the availability of phosphorus in the system. This leads to increased phytoplankton blooms and to greater food in the food chain. An additional benefit of liming is raising the pH of naturally acidic water to levels that promote better growth, health, and survival of sportfish and to prevent wide daily swings of pH levels. Production and health of sportfish such as largemouth bass, bream, and black crappie among others is best at pH ranges between 6.0 and 9.0. Biologists apply agricultural (dolomite) lime to the lakes at the rate of 1 to 2 tons/acre to maintain these conditions. Typically the results of an application will last from 3 to 5 years, depending upon rainfall totals and the amount of water flowing out of the lake, before limestone needs to be re-applied.

Lake Fertilization: One of the most important yet most misunderstood management activities is the Lake Fertilization Program. Application of fertilizer to these lakes is meant to increase naturally low phosphorus levels that are important to the production of phytoplankton blooms. This allows biologists to increase the amount of food available in the food chain, which ultimately leads to a larger and healthier sportfish population. Since the start of the fertilization program in the mid-1980's, biologists have been able to **increase** sportfish populations in these lakes **3 to 5 times** by number and weight over populations prior to fertilization. The increase in sportfish production is important due to the high amount of fishing pressure these lakes receive each year. This high level of fishing pressure is a reflection of both the importance of these lakes to area fishermen, and the success of the fertilization program in maintaining sportfish populations under this level of fishing pressure. Beginning in 2000, commission biologists began refining the fertilization program to reduce nutrient inputs and the level of phytoplankton production in the lakes while maintaining high levels of sportfish production and sufficient control of submersed vegetation. Phytoplankton blooms are measured in part by determining water clarity through the use of a device called a secchi disk. The secchi disk is lowered slowly into the water until it disappears from sight. The point at which the disk is no longer visible is the measure of the clarity of the water. As a bloom is reduced the lake water becomes clearer and the point at which the secchi disk is no longer visible becomes greater. The current goal is to maintain a secchi disk reading of 36 to 42 inches, applying fertilizer only when clarity exceeds this level. Clarity readings are monitored on a weekly basis during the fertilization season to maintain phytoplankton blooms at this level. Additional laboratory tests measuring the levels of nutrients and phytoplankton are conducted monthly in cooperation with the Florida Lakewatch Program administered by the University of Florida. Prior to 2000, phytoplankton blooms were maintained to achieve water clarity of 18 to 24 inches. The reduction of these blooms to current levels has resulted in a 50% or greater reduction of nutrient inputs. Biologists believe that current goal of maintaining water clarity between 36 and 42 inches is sufficient to maintain a high level of sportfish production and submersed vegetation control while providing a more pleasing environment for anglers. Currently, fertilization begins in the spring when water temperatures reach 65 degrees and continue into the fall until water temperatures again drop below 65 degrees. When needed, Commission personnel apply a water-soluble fertilizer to maintain adequate phytoplankton blooms.

There are many environmental factors that can and do influence the response of blooms to fertilizer applications. Rainfall, wind, water temperature, sunlight duration and intensity, and many chemical characteristics of the lake water are just a few of the outside influences that can affect the response of phytoplankton to the addition of nutrients through fertilization. For example, rainfall can wash additional nutrients from surrounding lands into the lake and cause blooms to be greater than those anticipated through fertilization. Heavy rainfall can cause large amounts of water to flow

through the lake and reduce blooms below desired levels by flushing nutrients from the lake before they can be used. Strong winds can stir-up bottom muds, releasing nutrients previously tied-up in this mud and causing an increased level of phytoplankton. Biologists attempt to combat these outside influences by making small applications of fertilizer when water clarity levels indicate the need for nutrient input, and repeating them more frequently if needed. This practice helps to limit the response of phytoplankton blooms to fertilization and keep them within acceptable levels. Infrequently, unanticipated environmental events in combination with fertilization practices will cause phytoplankton blooms to temporarily exceed desired levels. Typically, these excessive blooms are short-lived and return to desired levels in a short period of time. The management of phytoplankton blooms in lake systems is a practice that is both a science and an art form.

Controlling Nuisance Vegetation: A second and equally important benefit of the fertilization program is the control of nuisance submersed aquatic vegetation through the shading properties of phytoplankton blooms. These blooms prevent sunlight from reaching the bottom of the lake, which prevents submersed aquatic plants from taking root, and growing. Prior to the start of the fertilization program, each of these lakes was plagued by dense growth of submersed aquatic vegetation that often expanded into waters up to 10 feet in depth. Dense growth of vegetation severely limited access by anglers to fishing areas by fouling hooks and trolling motor props. Feeding success of largemouth bass was severely reduced due this heavy and widespread vegetation and had a negative impact on both bass and bream populations. Biologists were forced to use large amounts of herbicides and frequent lake drawdowns in an attempt to control this vegetation. Both methods provide only temporary relief, and the frequent drawdowns had the further disadvantage of restricting access to bank and boat anglers on a regular basis. Grass carp consume specific types of vegetation and are useful only in limited situations. A well-managed program of fertilization along with limited herbicide and grass carp use has proven to be most effective in controlling nuisance submersed vegetation.

For additional information

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Fertilization and Liming on Commission Managed Impoundments

FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

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