April 30, 2019

North Brandon Shores HOA
P.O. Box 2165
Brandon, MS 39043

Enclosed, please find your copy of the Management Plan we recently completed for North Brandon Shores Lake.

North Brandon Shores Lake is presently functioning as a dynamic, balanced fishery. As such, our management recommendations center primarily on reducing the total number of adult predators (largemouth bass and crappie) and improving the conditions for the production of forage through enhancing the pond's fertility level:

- Maintain the current fertilization regime.
- Intensify the current supplemental feeding regime.
- Largemouth bass (16" and less) should be harvested at 20 per angler per day
- Harvest crappie at 50 per angler per day.
- Harvest bluegill at 10 per angler per day.
- Apply herbicide to control aquatic weeds.
- Conduct an electrofishing balance assessment (Annual Evaluation) roughly one year from this date.

Overall, I am very pleased with the fishery. Please note that the harvest rate for bass has increased. I encourage all residents who live on the water to install fish feeders for the bluegill. We sampled many large redear and bluegill. A feeding program will further enhance the growth of the bluegill. The fertilizing program is the heart of the management and will allow for an adequate forage base for the crappie and bass.

My biggest concern with the lake is the amount of sediment that inflows during periods of rain. It is evident that many portions of the lake are more shallow due to sediment loading. Some of these areas have become so shallow that they do not hold many fish. Please make every effort to enforce erosion control measures in the subdivision.

We are always available to discuss these recommendations or answer any other questions you might have.

Good fishing,

Scott Kirk
Fisheries Biologist, MS

Management Plan
For
North Brandon Shores Lake

April 22, 2019

Introduction

As an integral part of the ongoing management program for North Brandon Shores Lake, Southeastern Pond Management conducted a comprehensive evaluation of the 65 acre impoundment on April 22, 2019. 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 these assessments, plus consultation with Brian Davidson, provide the basis for this management plan.

The goal of this management plan is to create and maintain a balanced fish community with the potential for trophy largemouth bass in North Brandon Shores Lake. The following evaluation report and management plan details and explains our recommendations with the following goals in mind:

- Create conditions favorable for the consistent production of "quality size" and "trophy size" largemouth bass (Table 1).
- Create conditions favorable for the consistent production of "quality size" bluegill (Table 1).
- Generally maintain a high level of water quality as well as an aesthetically pleasing environment for aquatic recreation.

Table 1.

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

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 North Brandon Shores Lake have resulted in the thoughtful outline of management options in an effort to approach your stated management goals. Our latest findings, as well as management recommendations, result from our most recent visit and are contained within the following pages.

Electrofishing equipment was used to collect a fish sample from North Brandon Shores Lake, April 2019.

Lake Assessment

At the time of our visit, total water alkalinity in North Brandon Shores Lake was measured at **23.1** parts per million (ppm). This level of alkalinity is above the minimum recommended threshold of 20 ppm, and represents conditions suitable for effective fertilization. North Brandon Shores Lake has been fertilized adequately in the recent past.

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

During the evaluation, we observed a light infestation of alligator weed, smartweed and water primrose growing along the margins. Descriptions of these plants may be found in the Aquatic Weed Identification section of this report.

North Brandon Shores Lake appeared to have a moderate plankton bloom at the time of our visit, the result of consistent fertilization.

North Brandon Shores Lake, April 2019.

Fish Community Balance

Ponds and the animals they support are governed by a predator-prey relationship. The interactions of predator and prey are characterized by a concept we refer to as *balance*. By definition, 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. In order to assess the relative balance of a fish community, the species functioning as predators and the species functioning as prey must be defined. **Predators** are species which rely on other fish as their primary food source. **Prey** species rely on sources other than fish for their food source.

Classic balance in small impoundments is defined by several parameters, not the least of which involves a suitable ratio (by weight) of predator to prey. Further, the key to maintaining balance in a sport fish pond is a healthy size distribution of both predator and 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 entire 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.

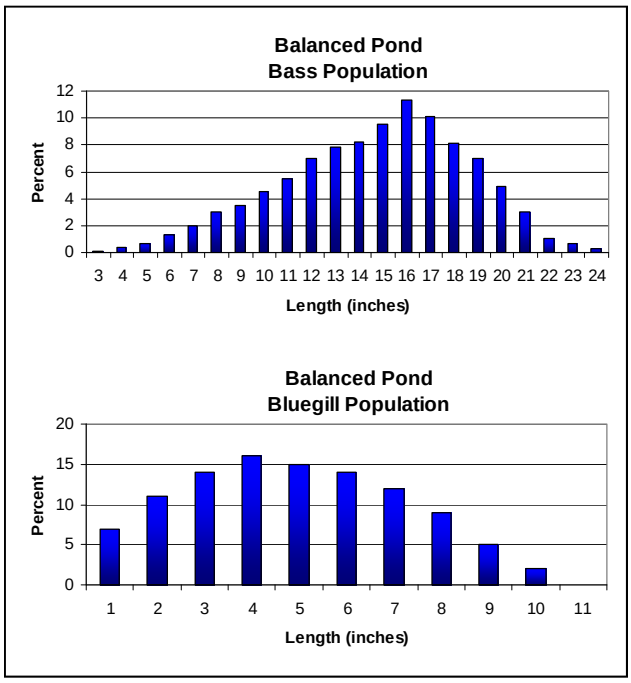


Figure 1. Length distribution of bass and bluegill in a typical balanced pond.

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.

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

Fishery Assessment

The fishery in North Brandon Shores Lake was sampled with standard boat-mounted electrofishing equipment. The sample contained largemouth bass, bluegill, crappie, threadfin shad, catfish, and redear sunfish (shellcracker). Currently, largemouth bass and crappie are functioning as the primary predators in North Brandon Shores Lake. The bluegill, shad and shellcracker are the prey.

Threadfin shad have become an important component of the forage base in North Brandon Shores Lake. We observed several different size groups, indicating a healthy population. Maintaining a healthy shad population will be important for North Brandon Shores Lake to continue producing quality and trophy size bass.

Largemouth bass ranging in size from 8 to 23 inches in total length were collected in moderate abundance. The length distribution of largemouth bass (Figure 2) reveals the presence of bass over a wide range of size classes. This represents little change from the previous year.

The average relative weight of adult bass in our most recent sample additionally reflects little change over last year. This year's average relative weight was 98, as compared to last year, 97 (Figure 4).

Largemouth bass 16 inches and smaller represent the primary targets for harvest over the coming months. We harvested zero pounds of bass during the evaluation.

Bluegill and shellcracker were collected ranging in size from 2 to 10 inches in total length. Figure 3 depicts the length distribution of the bluegill population. Of note, a good number of intermediate (3-5") bluegill and other forage was collected. Further, mature adult bluegill were relatively abundant in the sample.

Crappie were abundant with fish ranging from 6 to 15 inches. There are at least three different year classes of crappie at present.

Overall, we characterize the fish community in North Brandon Shores Lake as balanced. A more detailed explanation of balanced ponds in general, and North Brandon Shores Lake in particular is located in the Current State of Balance section of this report.

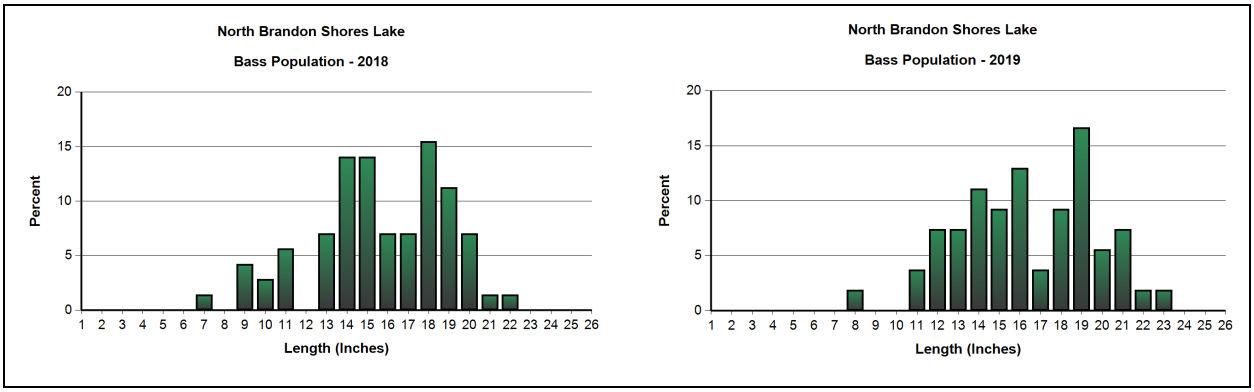


Figure 2. Comparison of the length distribution of bass collected in North Brandon Shores Lake in April 2018 and April 2019.

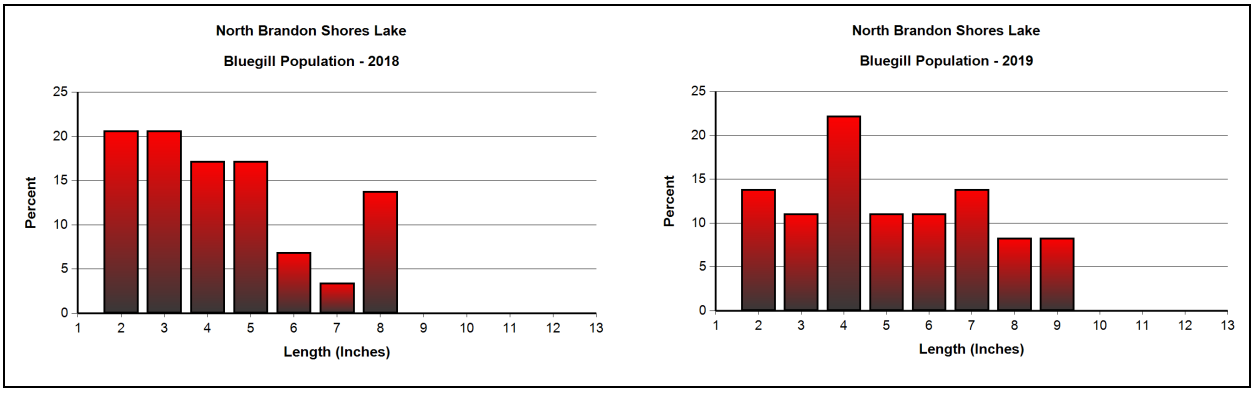


Figure 3. Comparison of the length distribution of bluegill collected from North Brandon Shores Lake in April 2018 and April 2019.

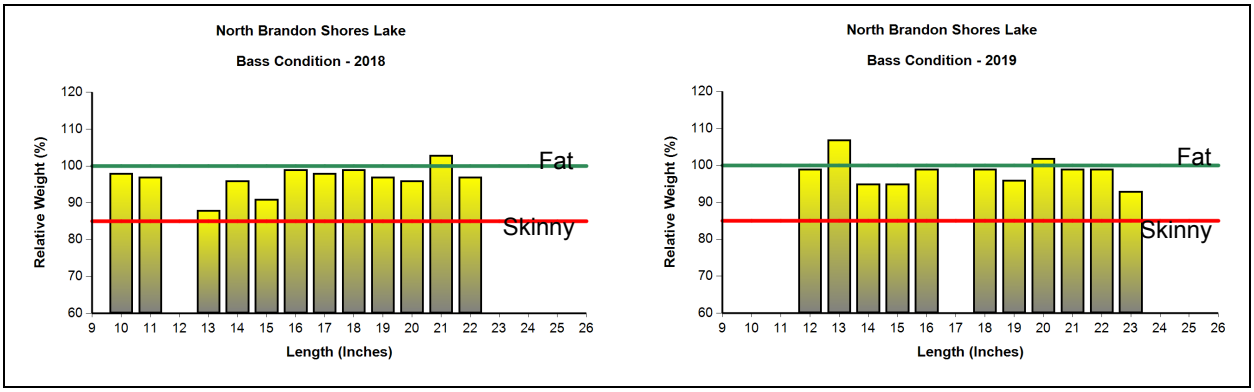


Figure 4. Relative weight distribution of adult largemouth bass collected from North Brandon Shores Lake in April 2018 and April 2019.

Balance

Most pond management activities are centered on creating or maintaining a balanced fish community. A balanced sport fish pond is preferred by most anglers because it provides quality bass and bluegill, both in terms of number and size. A balanced fish community is characterized by a wide size distribution of bass, bluegill and other forage species; adequate reproduction of all species is present.

As mentioned previously, our recent electrofishing sample from North Brandon Shores Lake contained a healthy distribution of bass across many different size groups. Additionally, the majority of the bass were in good condition with relative weights ranging from 93 to 107. Bass in all inch length groups were in good to excellent condition, indicating an abundant forage base for all length groups of bass.

The presence of intermediate size (3-5") prey is critically important in sport fish ponds. These individuals are the size preferred by the more abundant, younger bass in a typical population. A high relative abundance of intermediate size prey is often an indication of a balanced pond.

When a state of balance exists, intermediate size prey are among the most abundant segment of the overall fish community. Under these conditions, bass typically grow quickly, and are capable of reaching their full growth potential.

During our electrofishing sample, we observed a healthy forage base, particularly the distribution of intermediate sized prey. In order to maintain the predatory:prey balance and the continued growth of bass in North Brandon Shores Lake, it will be necessary to ensure that conditions for the production of forage such as fertilization, supplemental feeding and selective bass harvest are sustained or even enhanced.

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, a bass-crowded condition is the likely result. This usually leads to a low quality bass fishery.

Strategies to improve the quality of the bass and bluegill fishing are discussed in the Recommended Management Activities section of the report.

A balanced pond supports an abundance of bass, bluegill and other forage species of all sizes.

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 density relative to the entire fish community. Some predator species may prove to be beneficial to certain management goals at moderate densities; however, most species negatively affect management goals to some degree. Generally, the more fish species present in a pond, 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 every individual caught will increase the availability of prey for largemouth bass. 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, typically reduces the negative effects of additional predators.

Competing predator species can be introduced in a number of ways. A pond can be contaminated with different fish species by a feeder stream, especially if the pond basin is not poisoned before stocking. Occasionally, adjacent waters flood and connect a pond introducing different species. For example, oxbow lakes are often flooded on a regular basis by an adjacent stream or river. This greatly reduces the effectiveness of many management practices. Many times, competing predator fish are brought in from other waters by fishermen themselves. Several competing predator fish found in small impoundments are listed below:

Black and/or white crappie are commonly introduced by fishermen in ponds, however they are not a desired predator species in small impoundments less than 50 acres. Not only do crappie compete with adult bass for food, but also with juveniles because they typically spawn before bass. Furthermore, their reproduction is often highly erratic. Maintaining balance with an abundant crappie population can be difficult in small impoundments.

Catfish are often stocked with bass and bluegill to add angling opportunity. Unfortunately, catfish are also direct competitors of largemouth bass and can have an impact on the forage community if they are allowed to reach large sizes. Catfish recruitment is usually low in ponds with an established bass population. Therefore, a small population of catfish can be sustained in small impoundments if an abundant forage base is maintained.

Crappie

Channel Catfish

Spotted bass caught from public waters are often mistaken for largemouth bass and introduced in sport fish ponds. Spotted bass compete fiercely with largemouth bass in small impoundments. Not only do the adults compete for food, but spotted bass typically spawn earlier, thus giving the fry a survival advantage. Often this early advantage allows spotted bass to dominate the bass population in smaller systems. Once spotted bass become established, targeting spotted bass when harvesting becomes an ongoing management practice.

Spotted Bass

Gar

Bowfin

Green Sunfish

Other predator species, such as **gar, pickerel, bowfin**, etc., are often 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 difficult to remove with angling. They do not seem to become as abundant as crappie or spotted bass in a bass/ bluegill pond, but have a negative impact 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.

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 re-evaluated annually. Harvesting largemouth bass can be accomplished by the following methods:

(1) 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.

(2) 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.

A measuring device should be kept handy to determine the correct size bass to harvest.

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.

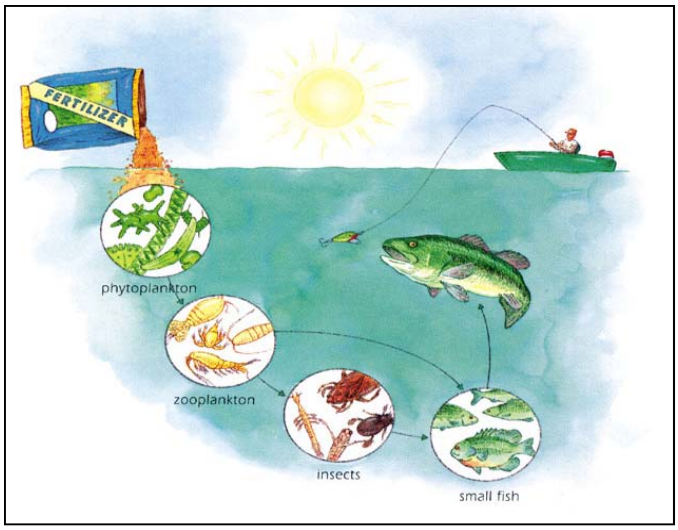
Bass must be harvested at the proper rate each year in order to maintain a balanced fish community in small impoundments.

Fertilization

The concept of *carrying capacity* describes the total weight of fish a pond is capable of producing. A given body of water, subject to varying levels of fertility, has a finite limit, or carrying capacity, in terms of the overall biomass which it can support. Lake fertility limits the number as well as the average and maximum size of fish present.

The limiting nutrient in most freshwater systems, as it relates to plankton production and a generally high level of fertility, is phosphorous. Phosphorous must be added on a regular basis during the growing season in order to stimulate significant plankton growth. Plankton, both plant and animal, are the base of the food chain in ponds. Infertile ponds, those with low alkalinity and relatively little nutrient input, are characterized by low levels of plankton production. In effect, this limits the amount of food available to the small insects and insect larvae which are the next link in the food chain. The *ripple effect* of low fertility is observed far up the food chain, all the way to the primary predators, largemouth bass. In order to create and maintain a high level of plankton production, thus providing conditions most favorable for fish production, fertilizing on a regular basis is required.

Fertilization is the most basic and important element necessary to create an environment conducive to the production and growth of sport fish. Fertilization takes place during the growing season, from March through October. We recommend SportMAX® Water Soluble Pond Fertilizer (10-52-4), applied at a rate of 4-8 pounds per surface acre per application. Fertilizer should be applied according to the Standard Pond Fertilization Schedule:



Food chain of a typical fertilized pond.

SportMAX® Water Soluble Pond Fertilizer can be poured directly into the prop wash of a small motor. A well fertilized pond should have 18 to 24 inches of visibility.

Standard Pond Fertilization Schedule

- Beginning in early March, make three applications at two week intervals.
- Make the next three applications at three week intervals.
- Thereafter, apply once per month or whenever visibility exceeds 18-24 inches.
- Cease fertilization by the end of October.

We offer a convenient **Fertilization Service**, which completely removes the burden and nuisance of fertilizing your lake. Our trained technicians will visit your pond, at prescribed intervals, carefully measuring and recording water visibility and applying the proper dosage of fertilizer. Our visits are conveniently recorded on a small sign, situated on the pond bank. In addition, we regularly check and log total water alkalinity as well as keep an eye out for potentially problematic vegetation.

If you elect to fertilize on your own, **we can supply you with a season's worth of material, prior to the scheduled start of the season**. SportMAX® comes conveniently packaged in heavy duty, water-resistent plastic bags; ideally, it may be stored in a barn or equipment shed sufficient to keep the direct elements away.

SportMAX® is easy to use; proper application involves simply pouring the material directly from the bag into the open water — no mixing… no mess!

Recommended application rates for SportMAX® range from 4 to 8 pounds per acre. Particularly in the early season, the higher rate is often necessary to stimulate a plankton bloom. Generally by the middle part of the season, the lower rate is adequate.

Supplemental Feeding

Feeding bluegill pellet food is a proven management practice used to increase the number of "quality" and "trophy" size bluegill in ponds. Feeding produces unusually large and healthy bluegill and increases their reproductive potential. In addition, feeding concentrates fish for improved catch rates and provides entertainment from watching the fish eat. Given these benefits we recommend intensifying the existing feeding program in your pond.

In an effort to benefit the entire bluegill population, fish food should be applied from at least 1 feeding station for every 5 acres of water. Each feeding station should dispense feed at a rate of 5-10 lbs/day during the growing season (March - October). The daily ration should be divided into 3 short feeding periods, such as: early morning, late morning, and late afternoon. Several short periods are necessary to reduce feed waste because bluegill have small stomachs and will not consume much at once. Most commercial floating catfish fingerling pellets are suitable for feeding bluegill. These types of feeds are readily available on the market; Purina® makes an excellent pellet, under the name, "Game Fish Chow". Game Fish Chow is made up of several different pellet sizes that can be consumed by a wide size range of bluegill.

A good bluegill feed has several different pellet sizes.

For an additional boost to the bluegill population, feeding in the winter is an option. Winter feeding keeps the bluegill plump and healthy during a period when natural food is not readily available. To improve consumption in the cold months, a sinking feed may be used. Sinking feed can be purchased during the winter at most dealers that normally stock fish food. Several feeding periods should be maintained for the winter also. However, the timer on the feeder should be changed in late October to adjust for the shorter day length.

Supplemental feeding attracts bluegill to certain areas so they are easier to catch.

We market Sweeney and Texas Hunter automated game and fish feeders. Simply put, these feeders are the finest of their kind. Sweeney directional feeders are offered in two sizes (AF1100 - 75 pound capacity and AF1300 - 225 pound capacity) and three colors (galvanized, hunter green and camo). Texas Hunter directional feeders are also offered in two sizes (DF125 - 75 pound capacity and DF425 - 225 pound capacity) and they are only available in green. They are powered by rechargeable 12-volt batteries and most models come equipped with a solar charger. Sweeney and Texas Hunter directional feeders may be conveniently mounted on the bank or on piers.

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.

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 (top). Pond dyes temporarily limit sunlight to retard aquatic weed growth (bottom).

Given the present state of vegetation in your pond, chemical control is recommended. This approach involves the use of aquatic-approved herbicides to reduce or eradicate aquatic weeds. We are commercially licensed to apply aquatic-approved herbicides. Our treatments are warranted to control existing weed growth. We cannot, however, warrant against re-growth; the integrated approach to controlling nuisance vegetation is your best insurance against weed problems in the future. The cost and timing of our recommended herbicide treatment are listed in the Recommended Management Activities section of this report.

Color photos, including distinguishing characteristics and growth habits of the aquatic vegetation in your pond, are listed in the following Aquatic Weed Identification section.

Common Name: Alligatorweed

Scientific Name: *Alternathera phyloxeroides*

Distinguishing Characteristics:
Mature leaves approximately 1/2 inch wide and 3-4 inches long. Leaves arranged oppositely along stem. Stems often reddish brown. If present, flowers white.

Growth Habit:
Emersed. Sprawling plant rooted at shoreline. Forms dense, floating mat out into pond.

Management Program Impact:
Low to moderate.

Common Name: Smartweed

Scientific Name: *Polygonum* sp.

Distinguishing Characteristics:
Leaves arranged alternately along stem. Swollen rings occur around stem at the base of every leaf.

Growth Habit:
Emersed.

Management Program Impact:
Low to moderate.

Common Name: Water Primrose

Scientific Name: *Ludwigia* sp.

Distinguishing Characteristics:
Leaves arranged oppositely. Flowers yellow if present.

Growth Habit:
Emersed. Could be sprawling across surface of water or erect in moist areas along the shoreline.

Management Program Impact:
Low to moderate. Favorable in small amounts.

Siltation and Turbidity Control

Siltation, as it relates to small impoundments, is the influx of soil particles from the surrounding watershed. Clay turbidity, or suspended clay particles, is the most common result of siltation in the southeast. Extended periods of heavy siltation can greatly affect the fish community in several ways as well as the overall aesthetic and recreational value of the pond.

Clay turbidity lasting several months during the growing season can greatly reduce the reproductive success of the adult bluegill as well as the survival of bluegill fry. Growth rates of juvenile bass subsequently decline in response to their reduced food supply. Furthermore, periods of poor water clarity undoubtedly reduce the foraging efficiency of all size groups of bass. Initiating or intensifying a supplemental feeding program will compensate for some of the loss in bluegill reproduction and growth caused by the soil turbidity.

Siltation can also impact the fish community by reducing the production of plankton (the base of the food chain). The frequent intrusion of acidic soil particles from exposed soil in the watershed will likely reduce the alkalinity and the ability of phytoplankton to uptake nutrients. Phytoplankton communities require sunlight to grow, thus extended periods of muddy water may reduce sunlight availability such that phytoplankton production is greatly reduced. Fertilization is typically ineffective under these conditions.

Alluvial fan

Muddy water typically has a lower average concentration of dissolved oxygen compared to water with a phytoplankton bloom. If soil turbidity develops suddenly, as in the case of a heavy rain storm, dissolved oxygen could drop to critically low levels requiring aeration.

Large amounts of silt deposited in the pond bottom, called alluvial fans, greatly increases the potential for aquatic weed problems. Extremely shallow areas resulting from siltation that allow light

Soil turbidity as a result of heavy siltation can affect the fish community and aesthetic quality of ponds.

to penetrate to the bottom regardless of the water clarity, enable weed growth to begin. Aquatic plants once restricted to the margins often form thick mats across silted-in areas.

The first step toward improving the effects of siltation and water turbidity is to determine the source. The most common cause of siltation and muddy water is disturbed or bare areas within the watershed. As rainfall flows over these exposed areas, the material gets transported to and deposited in the pond. The alkalinity of the pond can determine the rate at which the water clarity improves. It takes longer for soil particles to settle in low alkalinity ponds. In some cases, extremely fine soil particles (called Colloidal particles) remain in suspension indefinitely.

Another cause of soil turbidity is catfish or common carp. If present in high enough numbers, these two species can stir up the pond bottom to the extent that the water remains muddy.

The next step toward improving an impacted lake is to stop the siltation or remove the fish causing the muddy water. If possible, grass should be established on any bare soil in the watershed. If this is not immediately possible, such as in an unfinished construction site, silt fences should be constructed and maintained. In cases where the source of the siltation originates on adjoining property, it is generally the adjoining property owner's responsibility to compensate any loss in the recreational value of the affected pond. A representative from the Environmental Protection Agency (EPA) may be contacted to help persuade the property owner or developer to take responsibility.

Depending on the amount of silt that entered the pond, removal of the deposited material may be recommended. Often, a track hoe can be used from the bank to remove material from the margins or areas in the upper end. However, if large areas are affected, it may be necessary to draw the lake down to facilitate access with larger equipment.

If the water clarity does not improve once the source of siltation and/or soil turbidity is controlled, flocculation may be necessary. In the case of acidic clay particles (red clay), they tend to repel each other and will not clump together to form a larger particle that can settle. Flocculants are substances that will bind to clay particles and form bridges between other clay particles. Flocculants have no residual effect, in terms of improving water clarity, and thus should not be used until the source of muddy water is stopped.

Heavy silt deposits should be removed with equipment to deepen lake edges.

Flocculants, such as alum or lime, are often used to clear muddy water.

Several flocculants are available for improving water clarity. Aluminum sulfate, or alum, is the most effective for improving water clarity in muddy ponds. However, alum applications increase the acidity of the water and could lead to fish mortality. Alum should be used carefully in low alkalinity ponds. Gypsum is also an effective flocculant and will not reduce water pH; however it is often ineffective in high alkalinity ponds. In many cases, agricultural limestone will bind to acidic soil particles causing them to settle. Applying lime will also increase alkalinity in lakes thereby increasing the lake's productivity.

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.

Beavers and muskrats can bore in to the side of the dam and weaken its structure. Emergency spillways should be lined with concrete if they receive heavy flow (inset).

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.

Annual electrofishing evaluations determine the effectiveness of management practices.

Summary of Management Recommendations

North Brandon Shores Lake is functioning as a balanced system that has a moderate level of fertility. Several management inputs are necessary to maintain a state of balance as well as increase the total density of sport fish. The management activities we are recommending for North Brandon Shores Lake will center on reducing the total number of adult predators and enhancing the conditions for the production of forage.

To maintain a high density of sport fish as well as help control aquatic vegetation, we recommend **continuing an intensive fertilization program** in North Brandon Shores Lake. **SportMax® Water Soluble Pond Fertilizer** (10-52-4) should be applied according to the *Standard Pond Fertilization Schedule.*

For North Brandon Shores Lake, **harvest bass 16 inches and smaller at a rate of 20 bass per angler per day.** 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 North Brandon Shores Lake **to 10 per angler per day;** 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.

We recommend **intensifying the supplemental feeding program** in North Brandon Shores Lake. Fish food should be applied from additional feeding stations at a rate of at least 5 lbs/feeder/day from March through October.

Aquatic weed control will also be an integral part of the management program for North Brandon Shores Lake. Alligator weed, smartweed and water primrose 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 North Brandon Shores Lake, if they should become a problem in the future, is by herbicide application.

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.

SUPPLEMENTAL FEEDING

IMMEDIATELY 2019

Current Status: Awaiting Owner Approval

☐ Approved ☐ Declined ☐ Done

Date Approved: _____

Date Done: _____

COST: $ 850.00 each*

* This price includes a Texas Hunter LM-175 directional fish feeder, solar charger, rechargeable battery, assembly, and installation. An additional delivery charge will be added.

MANAGEMENT ACTIVITY:
Install 10 Texas Hunter DF-125 directional fish feeders
Feed at a rate of 5-10 pounds/day from each feeder

LEVEL 1

HERBICIDE TREATMENT

SUMMER 2019

Current Status: Owner Responsibility

☐ Approved ☐ Declined ☐ Done

Date Approved: _____

Date Done: _____

COST: $ N/A

MANAGEMENT ACTIVITY:
Herbicide treatment to control aquatic weeds

LEVEL 1

FERTILIZATION ROUTE

ANNUALLY 2019

Current Status: Awaiting Owner Approval

☐ Approved ☐ Declined ☐ Done

Date Approved: _____

Date Done: _____

COST: $ 538.00 per application*

* Price subject to change. Cost includes 4 pounds of fertilizer per acre applied by our technicians according to the Standard Pond Fertilization Schedule. Additional fertilizer may be applied to achieve desired results. Cost of additional fertilizer is $1.95 per pound, also subject to change.

MANAGEMENT ACTIVITY:
Continue fertilization program

LEVEL 1

ANNUAL HARVEST

ANNUALLY 2019

Current Status: Owner Responsibility

☐ Approved ☐ Declined ☐ Done

Date Approved: _____

Date Done: _____

COST:
Hook and line: N/A
Electrofishing: $350.00/hour.*

*An additional mileage charge will be added.

MANAGEMENT ACTIVITY:
Harvest bass (16” and less) at 20 per angler per day

LEVEL 1

ANNUAL HARVEST

ANNUALLY
2019

Current Status: Owner Responsibility

☐ Approved ☐ Declined ☐ Done

Date Approved: _____

Date Done: _____

MANAGEMENT ACTIVITY:
Harvest crappie at 50 per angler per day

COST:
Hook and line: N/A

LEVEL 1

BG HARVEST

ANNUALLY
2019

Current Status: Owner Responsibility

☐ Approved ☐ Declined ☐ Done

Date Approved: _____

Date Done: _____

MANAGEMENT ACTIVITY:
Harvest bluegill at 10 per angler per day

COST: N/A

LEVEL 1

ANNUAL EVALUATION

SPRING 2020

Current Status: Awaiting Owner Approval

☐ Approved ☐ Declined ☐ Done

Date Approved: _____

Date Done: _____

MANAGEMENT ACTIVITY:
Annual electrofishing evaluation

COST: $ 850.00*

* This price includes comprehensive written Management Report. An additional mileage charge will be added.

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

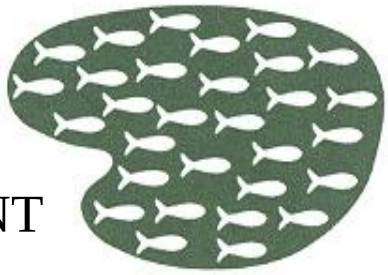
Fertilizer Application Records

Date	Water Color	Water Visibility (in.)	Fertilizer Applied (lbs.)	Comments

Other Records

Date	Comments

SOUTHEASTERN
POND
MANAGEMENT



"Managing Your Liquid Assets"

Southeastern Pond Management

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