

LAKE CHEROKEE

Survey Results and Management Recommendations

01-2020

LOCHOW RANCH
POND AND LAKE MANAGEMENT

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Introduction

Thank you for giving Lochow Ranch Pond and Lake Management Services the opportunity to manage your fishery resources this year. We are pleased to report the results of our annual survey and an overview of management recommendations for the coming year. As always, the goals of our recommendations are to manage for a well-balanced fishery.

General Lake Observations

At the time of the survey, the lake was approximately 10 inches low. While the shallow waters above Silvey Bridge remain heavily vegetated, overall growth remains well under control with large areas of open water remaining above the bridge throughout the growing season. Open water predominates below the bridge with growth being kept under control with spot treatments. Cover continues to consist of aging timber along with docks, vegetation, riprap and growing amounts of artificial and natural cover that have been added to the lake by the fishing club.

Vegetation Chart

SPECIES	TYPE
Chara	Algae
Filamentous Algae	Algae
Southern Naiad	Submerged
Coontail	Submerged
Variable-leaf Watermilfoil	Submerged
American Pondweed	Submerged
Variable-leaf Pondweed	Submerged
Hydrilla	Submerged
Cow-lily	Emergent
White Waterlily	Emergent
Lizard's Tail	Emergent
Cattails	Emergent
Southern Wild Rice	Emergent
Maiden Cane	Emergent
Waterwillow	Emergent
Slender Spikerush	Emergent
Rushes	Emergent
Smartweed	Emergent
American Lotus	Emergent
Arrowhead	Emergent
Pennywort	Emergent
Waterprimrose	Emergent
Pickerelweed	Emergent
Buttonbush	Emergent
Weeping willow	Emergent
Bald Cypress	Emergent
Elephant Ear	Emergent
Parrotfeather	Emergent
Alligatorweed	Emergent

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Survey Results

Electro-fishing surveys are one of the most effective lake-management tools available today. This type of sampling is an accurate way to determine the species and amounts of fish in a lake. With the information gathered during our electro-fishing survey, we calculate the relative abundance and condition of all species. We also determine the overall health of the largemouth bass fishery by taking length and weight measurements on a sample of fish. While this sampling method does not measure and analyze every fish in your pond or lake, it is the best way to get an accurate snapshot of how the fishery as a whole is doing.

Largemouth Bass

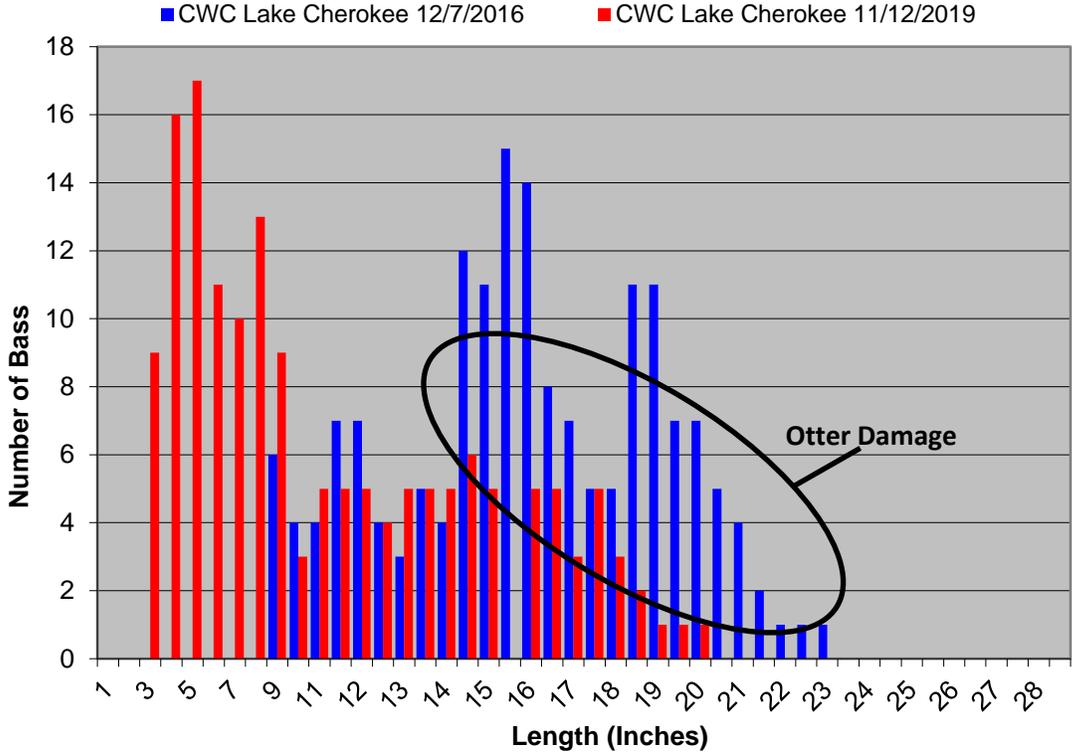
Because largemouth bass are the most popular sport fish in Lake Cherokee, much of our management effort is geared toward quickly growing these bass to their greatest potential. When managed properly, bass in lakes managed by Lochow Ranch Pond and Lake Management grow, on average, 2 pounds per year. We have seen some bass grow up to 4 pounds in a single year. Bass have incredible appetites and require 10 pounds of live forage (fish) to grow 1 pound. For this reason, adequate forage diversity is important to maintain a healthy bass population. Not only are the number of forage species and number of individual fish important, but the size of the available forage is also important. This being said, we are well aware that various fishermen target a variety of sportfish throughout the lake and so management efforts will also take into account those species.

The first graph shows the number of bass sampled in each inch class. This information is important because it allows us to determine whether the bass population is well balanced or stunted at certain sizes.

The second graph shows the relative weight of the sampled bass. These data are found by comparing the weight of the sampled bass to the weight of a healthy, well-fed bass of the same length. These data are significant because they show the relative health of the sampled fish as a percentage. With this information, we can determine which sizes of bass lack forage or are overpopulated. These two graphs are shown for all lakes that were surveyed and in which bass were weighed and measured.

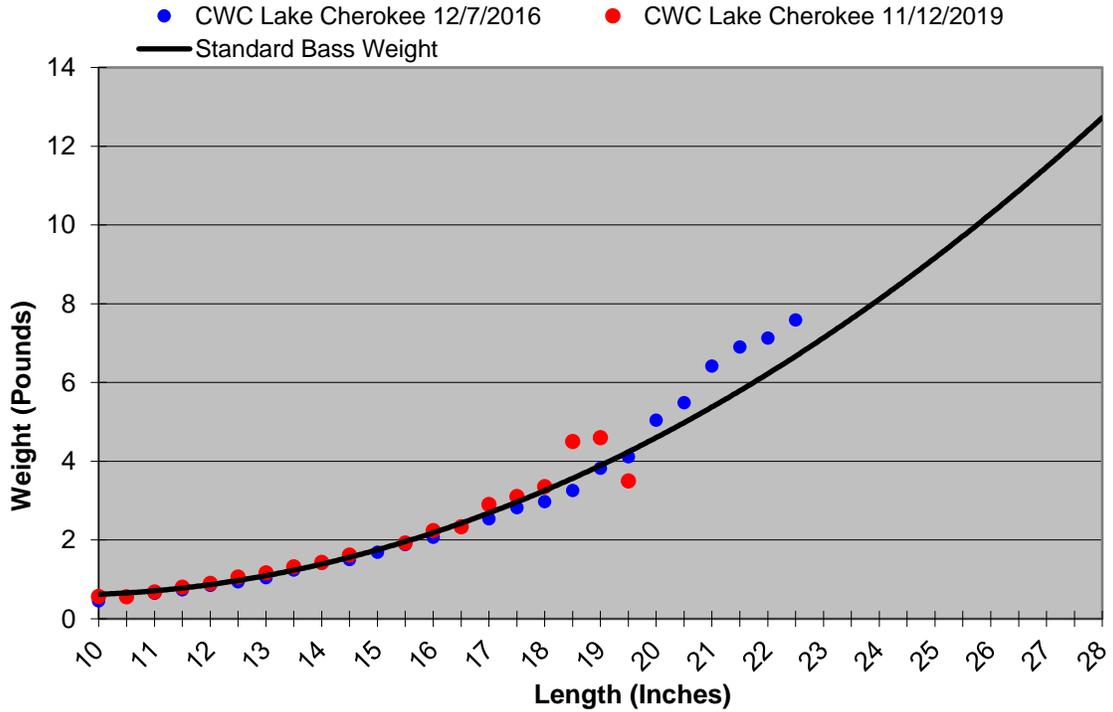
Length Distribution

Bass Distribution by Length



Relative Weight

Bass Relative Weight



Forage

Keep in mind that when managing a pond or lake for largemouth bass and other sportfish, we are actually managing for the forage those sportfish will eat, to provide the greatest amount of forage possible with the greatest range of sizes. Sportfish should eat the largest meal they can and will expend less energy when chasing one large forage fish than when chasing many small forage fish. The energy saved is converted directly to growth. The following charts show the types of forage fish found along with comparative sizes and relative abundance. A brief description of the key species appears below this table.

Forage Chart

FORAGE SPECIES RELATIVE ABUNDANCE					
Species	Fry	Small	Medium	Large	Jumbo
Bluegill	Occasional	Occasional	Common	Common	
Redear Sunfish		Occasional	Common	Abundant	
Redbreast Sunfish		Occasional	Common	Common	
Warmouth			Occasional	Occasional	
Longear Sunfish		Occasional	Occasional		
Spotted Sunfish		Occasional	Occasional		
Green Sunfish			Occasional	Occasional	
Gizzard Shad				Occasional	Occasional
Threadfin Shad			Occasional	Occasional	
Silversides			Common	Common	

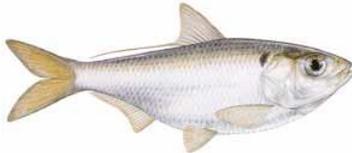
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Brook Silverside



Silversides are observed in a wide range of freshwater systems throughout Texas though they are not typically intentionally introduced in private lakes. Brook exhibit an inshore-offshore diurnal migration, are schooling selective planktivores feeding on zooplankton and crustaceans. They can reach reproductive maturity as yearlings, females lay up to 2,000 eggs in shallow water in vegetation.

Threadfin Shad



Threadfin Shad are very important constituents of forage fish populations in private lakes. They form dense schools in open water areas of lakes which are often not utilized by other species of forage fish. Threadfin Shad are planktivores, filter feeding almost exclusively on phytoplankton. They can reach sexual maturity as yearlings, grow up to eight inches in length and can live up to three years; females can produce up to 22,000 eggs during a spawning event.

Gizzard Shad



Gizzard Shad are closely related to Threadfin Shad but occupy a different niche and can in some cases be detrimental to fisheries. Gizzard Shad can live up to six years and can grow to over 20 inches in length, as they mature their feeding behavior transitions from primarily filter feeding on phytoplankton and zooplankton to deposit feeding on detritus. This can disturb spawning sites of beneficial species and increase turbidity. For these reasons Gizzard Shad are not often intentionally introduced to private lakes; however Gizzard Shad at low densities can be controlled by a well-established Largemouth Bass population.

Bluegill



Bluegills are the quintessential forage fish species in the southeastern United States and are foundation of Largemouth Bass fisheries. Bluegills feed on insects, crustaceans, zooplankton and small fish. Bluegill can reach sexual maturity as yearlings; mature females can spawn up to five times each year producing up to 25,000 eggs during a spawning event. The reproductive prowess and advanced predator avoidance behavior allows Bluegill to almost always establish resident populations when stocked at appropriate densities.

Redear Sunfish



Redear Sunfish are often stocked in private lakes along with Bluegill to help reduce the prevalence of aquatic parasites. Redear Sunfish can reach sexual maturity as yearlings but have modest fecundity; females can produce up to 10,000 eggs during a spawning event. Unlike other sunfish redear primarily feed on gastropods and bivalves. Many species of snails serve as an intermediate host in the life cycle of aquatic parasites that infect fish, when redear consume these snails it interrupts the cycle and thus reduces the parasite load.

Redbreast Sunfish



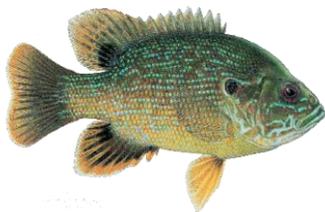
Redbreast Sunfish are native to the east coast of the United States although they have been introduced to most of Texas. At one time Redbreast Sunfish were reared in hatcheries in the hill country and as a result are common in the surrounding areas. They mature more slowly compared to Bluegill and have lower fecundity; females can produce up to 10,000 eggs during a spawning event. Redbreast Sunfish feed primarily on aquatic insects and crustaceans.

Longear Sunfish



Longear Sunfish can be observed throughout the state though they are not reared in hatcheries or introduced to private lakes. Longear are typically observed in private lakes that have creeks or rivers with the drainage and are introduced during flooding events. Longear feed on a variety of invertebrates but show preference for surface feeding on both aquatic and terrestrial insects.

Green Sunfish



Green Sunfish are commonly observed throughout Texas, they have larger mouths when compared to other sunfish species and are higher level predators feeding on small fish and invertebrates. Because small fish constitute such a large portion of their diet they are considered to be undesirable as they compete with desirable sportfish for resources. At low densities Green Sunfish can be controlled by a well-established Largemouth Bass population however all should be harvested when collected. Green Sunfish can be especially detrimental when establishing new fisheries and their presence may require radical management practices before beneficial species can be stocked.

Warmouth Sunfish



Warmouth Sunfish are similar to Green Sunfish in terms of their morphology/ feeding behavior and wide distribution in Texas. Warmouth Sunfish are higher level predators feeding on small fish, crustaceans and gastropods. Because small fish constitute such a large portion of their diet they are considered to be undesirable as they compete with desirable sportfish for resources. At low densities Warmouth Sunfish can be controlled by a well-established Largemouth Bass population however all should be harvested when collected.

Other Species

When managing sportfish, the bass and forage fish are not the only important items. Other species can have a positive or negative impact on one another. In most cases, occasional occurrences of certain species do not greatly affect target species though large populations of any one fish will impact the lake community as a whole. The chart below indicates species presence and relative size abundance of each.

Other Species Chart

FORAGE SPECIES RELATIVE ABUNDANCE					
Species	Fry	Small	Medium	Large	Jumbo
Crappie			Occasional	Occasional	Occasional
Bowfin			Occasional	Common	
Chain Pickerel			Occasional	Occasional	
Spotted Gar			Occasional	Occasional	
Lake Chubsucker		Occasional	Occasional		
Spotted Sucker			Occasional	Occasional	
Redhorse		Occasional	Occasional		
Channel Catfish				Occasional	

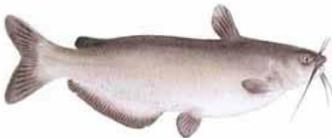
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Crappies



There are two species of crappie that can be observed in Texas, White Crappie and Black Crappie; both species are common throughout most of the state. They are differentiated most definitively by counting the number of dorsal spines (white 5-6, black 7-8). Crappies are demersal preferring deeper structure in open water; they exhibit a vertical migration pattern foraging near the surface at night feeding on small fish (with a strong preference for shad), aquatic insects and zooplankton. Crappie and Largemouth Bass can coexist quite harmoniously with proper management. Special considerations should be made to habitat and forage fish diversity, especially Golden Shiners and Threadfin Shad.

Channel Catfish



Channel Catfish are among the most pursued recreational fish in the southeastern United States and are reared in aquaculture facilities as a food fish. They are opportunistic omnivores feeding benthically on crustaceans, gastropods, aquatic insects, detritus and small fish. In private lakes they will easily train to eat pelleted feed and can grow over two pounds in a year. In generalized fisheries Channel Catfish can be stocked to diversify angling opportunities however they should be avoided if trophy level management is being considered. Due to their feeding behavior they have the potential to cause turbidity issues and disturb spawning sites of beneficial species. Channel Catfish are cavity spawners and do not often reproduce in private lakes, adding tires or buckets to encourage reproduction is strongly not recommended.

Gars



There are four species of gar that can be observed in Texas, (Spotted Gar, Longnose Gar, Alligator Gar and Shortnose Gar). Gar are considered living fossils with records dating back to the Cretaceous Period. Gars are very long lived (some species well over 25 years) they grow quickly in early life stages. Gars are ambush predators that often feed on fish near the surface, shad are a preferred food source for most gar. Gar can breathe air with adaptations in their swim bladder and have highly vascularized fins that can take in air, allowing gar to tolerate extremely low dissolved oxygen conditions. Their longevity and resilience makes them hard to eradicate from private lakes although their densities can be considerably reduced with routine electrofishing surveys.

Bowfin



Bowfin are considered living fossils with records dating back to the Jurassic Period, they are the only extant member of an ancient order. They are relatively long lived and can grow to over 40 inches. Like gars Bowfin can be capable of bimodal respiration and can tolerate very low dissolved oxygen. Bowfins are ambush predators feeding primarily on fish and crustaceans. Their longevity and resilience makes them hard to eradicate from private lakes although their densities can be considerably reduced with routine electrofishing surveys.

Pickerels



There are two species of pickerel that can be observed in Texas, Chain Pickerel and Redfin/Grass Pickerel (are subspecies). The Chain Pickerel is restricted to the easternmost regions of Texas and can grow much larger compared to the other species of pickerels, up to 40 inches and ten pounds. Redfin and Grass Pickerels grow to around 16 inches and 2.5 pounds. Pickerels are ambush predators feeding on fish, crustaceans and aquatic insects. At low densities pickerels can be controlled by a well-established Largemouth Bass population however all should be harvested when collected.

White Bass



White Bass are not often observed in private lakes unless there is a major river system within the lakes drainage or if unfiltered river water is pumped directly into the water body. White Bass are rover predators often schooling together feeding on small fish and aquatic insects, shad are a preferred food source. If managing a water body for Largemouth Bass is a priority then all White Bass should be harvested when collected.

Blue Catfish

Suckers



There are around 13 species belonging to the Catostomidae family often referred to as suckers that can be observed in Texas waterbodies. Suckers have protrusible subterminal mouths and feed almost exclusively on the bottom eating detritus and invertebrates. This feeding behavior can disturb spawning sites of beneficial species and can lead to chronic turbidity.

Fisheries Discussion

Overall the lake is in average condition. Fish densities appear to be a bit lower compared to historic survey data. Populations of large fish in particular are generally low, indicating the lakes are likely visited on a regular basis by otters. Generally, predator control, modified bag limits, crappie/Channel Catfish/Florida bass stockings, and boosting forage through supplemental fish food and habitat will serve to boost forage production and sportfish to improve fishermen experience. Supplemental forage stockings may also be employed to further boost the forage base by maintaining alternative forage populations like threadfin shad.

During the electrofishing survey 159 Largemouth Bass were collected, on average the bass were three percent above target weights when compared to standard weights. The largest bass measured 19 inches and weighed 4.6 pounds. Most bass measured less than 12 inches in length. Electrofishing results indicate that the bass population has shifted dramatically since our last survey and that it no longer contains a high proportion of large bass. Based our observations we are making throughout the state, we believe that otters are the most likely cause of this shift. Predator control along with reduced angler harvest will seek to bring back those larger fish.

In addition to moderating bass harvest, harvest of other predatory species should be maintained to minimize their impact on Largemouth Bass. This year saw a rise in bowfin and pickerel populations which should be mitigated in order to maintain a strong bass population.

The forage fish population was above average consisting of a wide variety of species with good numbers of forage in the 3-6 inch range. The predominate forage was bluegill and redbreast sunfish though Redear were present in good densities. Threadfin shad are notoriously difficult to survey though sampling did suggest that populations were down this year. Because of the sheer size of Lake Cherokee threadfin shad populations will generally rise and fall based on a variety of environmental conditions that we cannot reasonably adjust. This being said, helping the bass population to shift to larger fish would certainly help take some predation pressure off the shad. The simplest way to increase the productivity of Lake Cherokee is for individual shareholders to install fish feeders and to feed fish with a high quality fish feed to boost the production of bluegill and redbreast sunfish. As a reminder Warmouth and Green Sunfish persist in the lake and should be harvested when caught as they compete with sportfish for available forage.

Fish feeding is a very cost effective and safe way to boost bluegill production in particular. Feeding quality high-protein pelleted feed to the current population of bluegills will not only help them grow faster, but also encourage much higher reproductive success. Research has shown that feeding a high-protein pelleted fish food can increase production in a small lake by 800 percent or more. When using pelleted feed, it is important to be consistent with amounts and timing of applied feed for fish to maximize growth rates. Because of this, automatic fish feeders are generally preferred. Supplemental feeding should always be done with quality feed. While this feed does cost more per pound than bargain products managers can expect to get more growth per dollar from that quality feed. Lochow Ranch Pond and lake management manufactures a 46-percent protein feed specially formulated for accelerated fish growth in intensively managed lakes. This is a proprietary pellet offering a custom-blended high-protein feed specifically engineered for maximum growth rates in private waters. While maximal feeding rates for a lake of this size are not reasonable to attain, the more feeders there are the more forage you will be able to sustain. Feed purchased by the pallet and stored in a dry location will keep for 7 to 8 months. It cost roughly 1/20 as much to grow bluegill on feed as opposed to purchasing those fish from a hatchery.

A water sample was taken during our survey and indicates that water quality is as good as it has ever been on a consistent basis. The reason for this better water quality is likely related to better liming practices in ag production in the Lake Cherokee watershed.

Over the last few years damage that river otters do to managed fisheries is on the rise or at least becoming increasingly apparent across the state. Otters consume an average of up to 14 pounds of fish daily. Otters target large fish as these fish offer otters a better return on their fishing efforts than do small fish. In lake after lake, we are seeing decreasing bass populations but especially observing decreasing populations of bass over 18". The lack of large bass in this year's electrofishing survey indicates that otter predation is quite substantial on Lake Cherokee. The average bass in our 2019 survey weighed 1.92 pounds while this year's

average was around 0.5 pounds. Otter predation should be mitigated through every available means. Efforts include active and passive trapping and hunting. Reducing otter predation will be key to achieving good populations of large bass.

Habitat management consists in manipulating cover to promote the proper balance between forage and predatory fish. Cover in the form of vegetation remained well under control at the time of the survey, though continued spot treatments will be in order next year to ensure that growth remains in check. At this point in time submersed vegetation growth remains in check and so we do not recommend additional grass carp stockings be conducted this winter. Stockings will be reconsidered next year depending on the level of growth that is experienced. Non-living cover remains substantial, though we do recommend that fishermen continue to add to the lake over time. Artificial cover provides a more snag-resistant target for young fishermen and would remain a great option around individual docks. Large scale installations will likely be best achieved with natural cover.

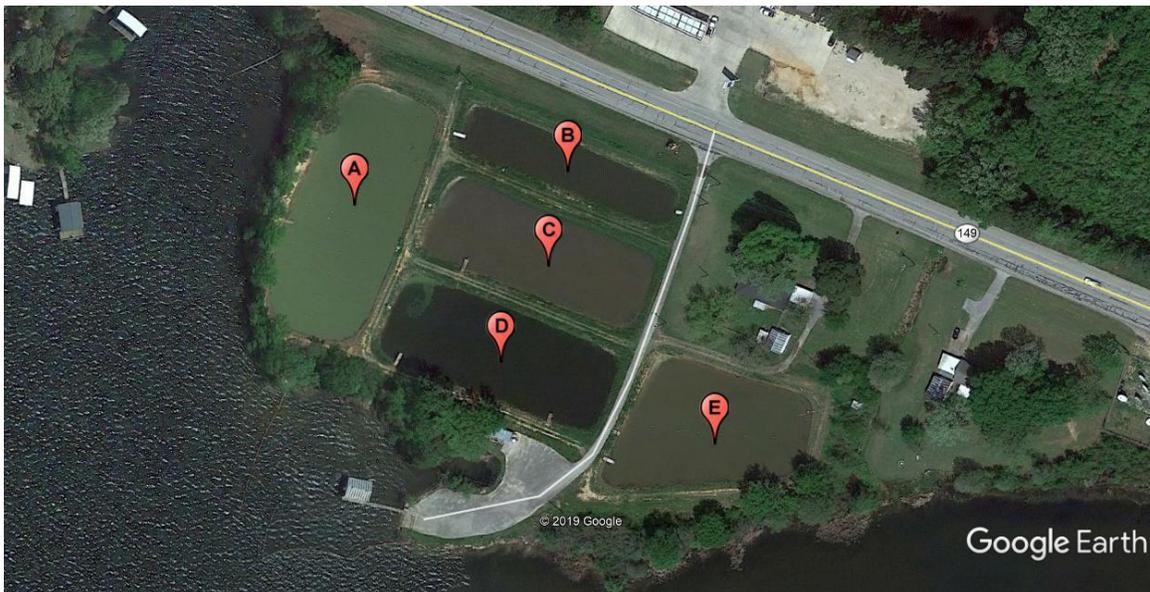
Management Recommendations

Our recommendations are summarized and listed in priority of importance in the following table. Management activities marked with an asterisk are of utmost importance and should be addressed before any other management occurs.

Bag Limit/Day	Stock	Other Recommendations
5 Largemouth up to 13"	Florida Fingerlings	Install fish feeders
1 Largemouth over 16"	Crappie	Apply quality feed
15 Channel Catfish over 12"	Channel Catfish	Trap otters
No limit sunfish over 8"		Add cover
		Spot treatments for vegetation

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Forage Pond Recommendations



Continue to employ established aquaculture practices to maximize yields in the forage ponds. We could certainly take these efforts a step further with surface aeration but this would not be a minor investment. Please let us know if you are experiencing difficulties in managing these ponds and we will be happy to help you solve any problems you encounter. Pond specific rearing recommendations appear below.

Pond	Rear
A,E	Florida Fingerlings
C	Black Crappie
B	Channel Catfish
D	Threadfin Shad

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Conclusion

Thank you for choosing Lochow Ranch Pond and Lake Management. We strive to provide the best service and advice to manage your fishery to its full potential. We hope that you will follow our plan and run the course with our long-term trophy-growing strategies. If so, you will have a quality, well-balanced fishery that continues to add value to your shareholders' investment.