

LAKE RAMSEY

Survey Results and Management Recommendations

8-30-2010

LOCHOW RANCH
POND AND LAKE MANAGEMENT
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Introduction

We are pleased to present you with preliminary recommendations based upon our fisheries and vegetation survey of your property and our discussions. Our recommendations are based on the survey results while incorporating the goals that have discussed for this property. We are recommending management strategies that will help us best achieve these goals.

As stated in previous conversations, Lochow Ranch Pond and Lake Management is providing general information needed to begin managing your water resources. Please remember that these are general recommendations and the slot sizes, stocking rates, harvest suggestions, feeding rates, and other parameters will change year by year. If you decide to manage the fishery in-house, we will be happy to provide any of the products, services, or advice necessary to make your management successful.

In addition to our per-trip work, our company offers a complete yearly lake-management program that includes, but is not limited to, an electro-fishing survey, annual reports, and monthly updates while covering all labor and mileage costs associated with vegetation control and other lake-management services.

General Lake Observations

This lake was measured using satellite maps at approximately 360 acres at full water level. The new side is approximately 150 acres, the old side is close to 200 acres, and the small area measures about 10 acres. At the time of the survey, the lake was approximately 4 inches low. The average water depth was approximately 5.5 on the old side and 12 to 13 feet on the new side and the maximum depth was approximately 21 feet. The visible structure is small amounts of fallen timber, dock pilings and vegetation. The chart below summarizes the types of aquatic vegetation found during the survey. The primary drainage structure is an overflow structure with no bottom drain. The water visibility was 12 inches with a very dark green color. Overall use for this lake is relatively high for an HOA lake.

Vegetation Chart 2010

SPECIES	TYPE
Hydrilla (50%)	Submerged
Southern Naiad (25%)	Submerged
Slender Pondweed (25%)	Submerged
Spiny Naiad (1%)	Submerged
Nitella(1%)	Submerged
Filamentous Algae (1%)	Submerged
Eelgrass (1%)	Submerged

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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 number one freshwater sport fish in the southern U.S., most of our management 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

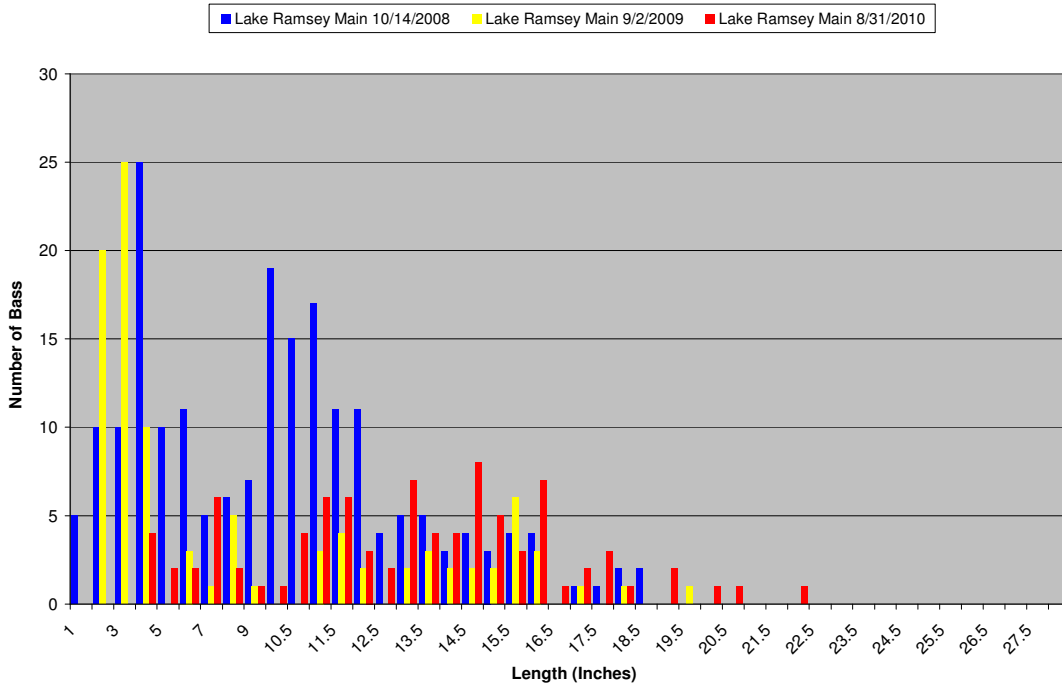
diversity is important to maintain a healthy bass population. Not only are the number of forage species and number of individual fish important, but the size of the available forage is also important.

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

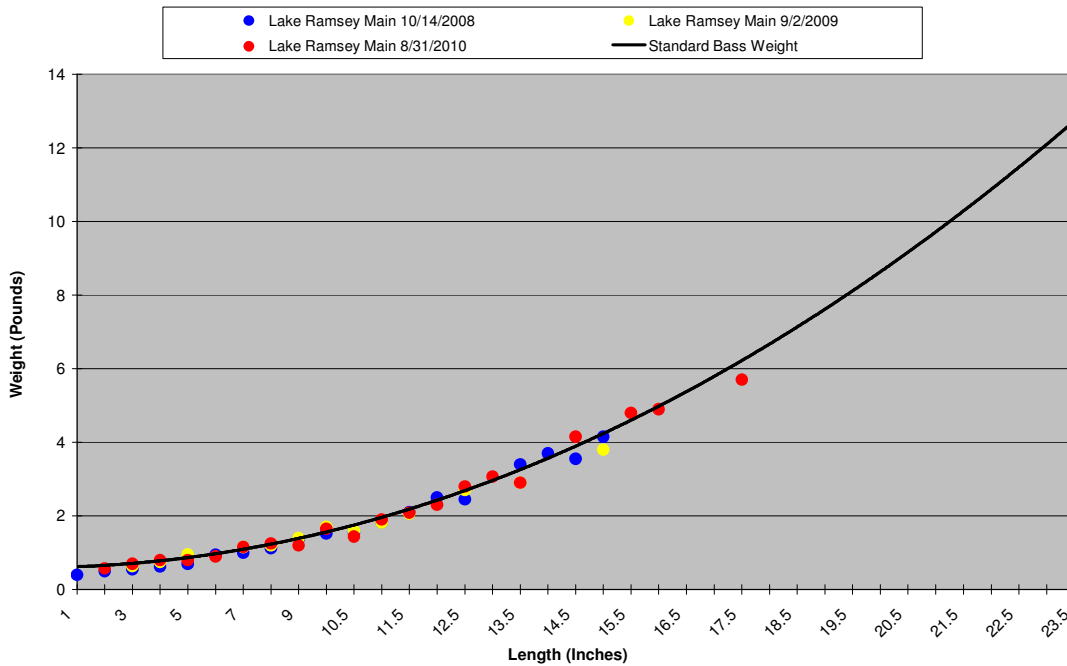
Bass Distribution by Length



Relative Weight

Bass Relative Weight

Relative weight (Wr) is a comparison of sampled bass weights to state average bass weights.



Forage

Keep in mind that when managing a pond or lake for largemouth bass, we are actually managing for the forage fish the bass will eat to provide the greatest amount of forage possible with the greatest range of sizes. Bass 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 and comparative sizes.

Forage Chart

FORAGE SPECIES RELATIVE ABUNDANCE					
Species	Fry	Small	Medium	Large	Jumbo
Coppernose Bluegill	Occasional	Occasional	Common	Common	Occasional
Native Bluegill	Common	Common	Common	Common	Common
Redear Sunfish	Common	Common	Common	Common	Occasional
Longear Sunfish				Occasional	
Green Sunfish				Occasional	
Warmouth Sunfish				Occasional	
Threadfin Shad		Abundant	Abundant	Abundant	
Gizzard Shad		Abundant	Abundant	Common	Common
Silverside Minnow		Common	Common	Common	

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Coppernose Bluegill



Coppernose bluegills are the backbone of the largemouth bass fishery. They are important as bass forage because they reproduce several times during the warm months; this provides a constant supply of different-size forage year-round for the bass.

Coppernose bluegills frequent ponds and lakes with docks, logs, and weeds that provide shelter for these fish. Large bluegills stay in deep water during the day and move to near-shore areas in mornings and evenings to feed. Bluegills feed on natural foods, especially small crustaceans, insects, and plant material. On high-

protein fish feed they can grow to 2 pounds in just two years. They are spunky, spectacular fighters when hooked. Their flesh is delicious, making them one of the most sought-after sunfish. They are originally from the southeastern U.S., very close to the original range of the Florida largemouth bass.

While the coppernose and native bluegills are similar, coppernose are known for growing much larger than both the native and hybrid bluegills and also for bearing more offspring in a spawning season.

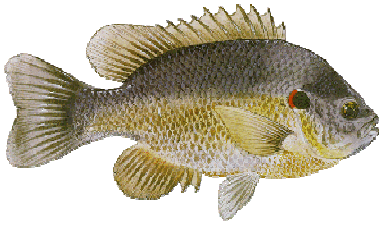
Native Bluegill



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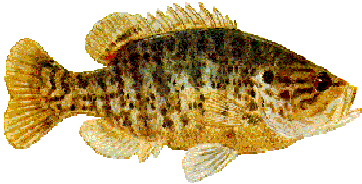
Native bluegills frequent ponds and lakes with docks, logs, and weeds that provide shelter for these fish. Large bluegills stay in deep water during the day and move to near-shore areas in mornings and evenings to feed. Bluegills feed on many natural foods, especially small crustaceans, insects, and plant material. On high-protein fish feed, they can grow to 2 pounds in only a few years. They are spunky, spectacular fighters when hooked. Their flesh is delicious, making them one of the most sought-after sunfish.

Redear Sunfish



Redear sunfish spawning habits are similar to those of the bluegill although this species does not have as long a prolonged spawning period. The redear prefer feeding on aquatic snails; hence, the name “shellcracker” is often associated with this species. Redear are stocked not only as sport fish, but also to solve worm infestations commonly found in sport fish. Redear eat the snails that are a host to a part of the life cycle of worms found in fish flesh and in doing so promote a healthy fish population.

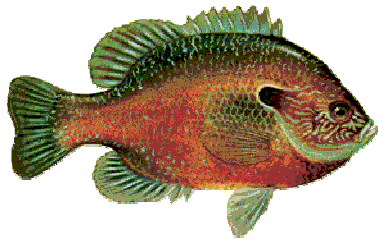
Warmouth Sunfish



Warmouth sunfish, being closely related to the green sunfish, share many similarities. They are native to Texas and are found throughout the southern U.S. They especially like to find cover in rock piles where they can hide and wait for food. They can survive in polluted, low-oxygenated waters where other sunfish cannot.

Several characteristics make the warmouth an undesirable species in lakes. First, warmouth have larger mouths than most other sunfish, which allows them to not only compete with largemouth bass for food, but also to eat bass spawn. Second, because they are bottom feeders like catfish, their flesh can have a strong, unsavory flavor. Warmouth have the ability to cross with other sunfish, including bluegills, which means their undesirable characteristics can “pollute” bluegill populations. While small populations do not raise management concerns, abundant populations may require severe management action to preserve the bass population.

Longear Sunfish



Longear sunfish get their name from the fact that they have an elongated opercle (ear) flap. Although they are native to Texas, they are not extremely common in small ponds and lakes in the southern U.S. Longear sunfish are fairly colorful, with bright orange bodies and turquoise markings on their head and fins. As with other sunfish, they are found near vegetation and structures that protect them from predation. Longear are rarely longer than 6 inches.

Threadfin Shad



Threadfin shad are one of the most important forage species in many lakes in the south. Threadfin grow quickly, spawn early in their life cycle and reproduce prolifically which makes them great forage for bass. Threadfin school in open water and swim slowly, which makes them easy prey for bass. They tend to do best in fertile (green) water because they feed on the phytoplankton that causes the water to look green.

Gizzard Shad



Gizzard shad are closely related to threadfin shad, but grow much larger. Adult gizzard shad can grow to more than 14 inches and can weigh more than 2 pounds. Unless the existing bass population averages more than 5 pounds, we do not recommend gizzard shad because they can harm the bluegill and threadfin populations by competing for zooplankton (small microscopic animals such as protozoan). Because gizzard shad grow larger than other species, they have an advantage when feeding. Often when present in lakes that do not have adequate bass populations, gizzard shad will overpopulate and become the dominate species.

Silverside Minnow



Silverside minnows are also known as glass minnows or inland silversides. They are very common in southern rivers, creeks, and even large public reservoirs. Normally not intentionally stocked, they can be introduced by flooding or stocked with other species.

Silversides are fair forage for smaller bass but because they do not grow larger than about 6 inches, they do not provide much for larger bass.

Other Species

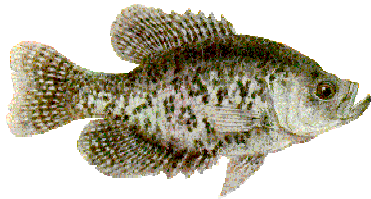
When managing for largemouth bass, the bass and forage fish are not the only important items. Other species can have a positive or negative impact depending on types of certain fish, abundance of certain fish and combination of certain fish. In most cases, occasional occurrences of other species in lakes do not effect the management greatly. Only when certain species are extremely abundant are drastic management actions required to ensure the success of the bass fishery.

Other Species Chart

OTHER SPECIES RELATIVE ABUNDANCE					
<i>Species</i>	<i>Fry</i>	<i>Small</i>	<i>Medium</i>	<i>Large</i>	<i>Jumbo</i>
Crappie		Occasional	Occasional	Occasional	
Channel Cat			Occasional	Occasional	
Grass Carp				Abundant	

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Crappie



We do not recommend crappie in lakes smaller than 25 acres because crappie often spawn earlier than largemouth bass, which gives them a competitive advantage over small bass. With an early start, numerous crappie will survive and easily overpopulate and then become stunted when they are overpopulated without enough food to support the population. In larger lakes and in small lakes with intensive management; however, crappie can be both fun to catch and delicious to eat. The black crappie and white crappie are easily

confused with one another but can often be distinguished by the distinct vertical bars on white crappie. These bars are plainly visible on the side of the fish. The best way to differentiate the two species is by counting the dorsal fin spines. White crappies have a maximum of six hard spines while the black crappie has seven or more.

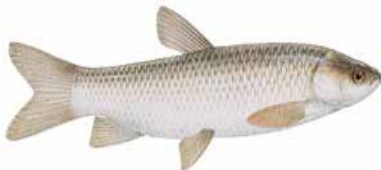
Channel Catfish



Channel catfish are one of the most sought-after fish in the southern U.S., behind only bass and crappie. Channel cats are easy to catch on trotlines as well as on rod and reel. They eat a wide variety of baits including liver, worms, shrimp, chicken, cheese, and stink bait. They have an appetizing flavor when cooked.

Catfish can compete heavily with other sport fish if not managed properly. If allowed to spawn and take over, the entire predator fish population suffers and the result is stunted fish. Excessive numbers of catfish can cause nutrient recycling because of the constant agitation of sediments by the fish.

Grass Carp



In Texas, grass carp must be certified as triploid — sterile and unable to reproduce. Their feeding habits make them perfect for vegetation control. Reportedly they can consume up to 300 percent of their body weight per day in plant material. While it can take 1 to 2 years to notice their benefits, in many situations grass carp can be a long-

term approach to controlling aquatic weeds and can help reduce the use of herbicide.

Fisheries Discussion

The results of the fisheries survey show a lake in above-average condition. The forage species (bluegill, redear, gizzard shad, and threadfin shad) were present in good or great numbers in most size classes. The bass were on average close to target weights (4% below) and overall the best we have seen to date. We use target weights (W_t) to determine the health of the individual inch classes of bass. Our goal is for all bass to be 10-20% over target weight.

When compared to other lakes with similar size and use the lake is in good shape overall but the fish growth rates appear to be quite low. All necessary fish are present for sport fish growth but much more harvest is necessary to increase the average size of the bass and crappie.

We recommend adding more brush piles (large piles in water 3-8 feet deep) to promote increased harvest rates. If increased harvest is not accomplished before the vegetation is eliminated the fishing will be affected negatively in the future.

Crappies are present in good numbers and seem to be in perfect health. Increased harvest of this fish will result in increased size long term in the crappie population.

Channel catfish numbers seem to be close to appropriate for a lake this size at this time. We recommend that they be examined more closely this spring to determine current status (electro fishing in the spring provides more accurate results for catfish and crappie). While not causing harm presently, the catfish seem to be contributing to nutrient recycling in the lake. As the lake ages and nutrients continue to accumulate nutrient recycling will become less desirable. We recommend managing the amount of catfish by allowing unlimited harvest regardless of size at this time. Catfish are very cheap and can be stocked in the future if needed and this manner of replenishment is preferred to natural reproduction which can cause problems with over population.

Vegetation Discussion

Our visit this year found the lake with very little topped out vegetation but had floating mats on the shorelines (and docks) facing the wind. Most of this was pondweed and naiad with very little rooted plants in the mats. As with last year, this could be treated with targeted application of herbicide. Carp were seen in limited numbers throughout the lake. It was mentioned that a protective grate had been removed and as carp always move with current we recommend replacing the grate as soon as possible.

In addition to the floating mats we found vegetation growing to 12' deep but not of the type seen previously. Hydrilla (one of the most invasive of all aquatic plants) was found throughout the lake and especially dominant in the new section of the lake. None was seen last year but with its incredibly fast growth rates it is now outcompeting the other species that are in the lake. We suspect that it was brought in by a contaminated boat or trailer sometime in the last year to eighteen months. We presume that it will continue to take over areas that are currently thick with other species of plants. Fishing will likely improve over the short term but because it can grow in much deeper water and is much thicker than the existing plants it will cause problems for boaters long term.

Because of the seriousness of this plant we recommend a springtime application of a contact herbicide or systemic herbicide to reduce or eliminate the amount of plants and combine with an additional stocking of grass carp (depends on option chosen). Stocking additional carp can at some point cause issues relating to the complete elimination of vegetation and associated possible muddying of the water.

Any large scale treatment on this lake will be fairly expensive due the estimated 10 foot average depth and the water volume that comes with it. If considering whole lake treatments such as SONAR we recommend completing a full bathymetric study to verify the average depth as every ½' average depth difference would equal \$10,000-15,000 in the Sonar treatment cost. No matter the treatment chosen, Lake Ramsey has

joined the list of large HOA lakes that will require a chemical budget that is appropriate to its surface acreage to ensure that it remains usable in the future.

Treatment Options (Based on 2010 pricing)

Option #1-Treat one-third of the lake with a 3 ppm concentration of Aquathol K Liquid to equalize at 1 ppm across the entire lake. Given the 400 surface acres and 10 foot average depth this would require a lot of product. This should be done when the water is still cool, around 60 degrees, in late-March or early-April. This would be applied through sub-surface injection in the part of the lake that has the highest population of Hydrilla. Later in the season you would possibly need to do typical clean up treatments of the Naiads and Pondweeds.

Estimated cost \$195,000.00

Option #2-Treat the entire lake with Sonar for the above species excluding chara and nitella. This treatment has the benefit of not needing additional grass carp and will kill all plants except the chara and nitella. The downside of this treatment is that killing all the plants will have a negative effect on fishing and will require frequent harvest of small bass to keep the fishery in balance.

Estimated cost \$255,000.00

Option #3-Treat shoreline vegetation with straight contact herbicides such as Reward, Reward/Nautique, or Aquathol on an as needed basis, this option could be risky if the entire lake decides to blow up mid-season.

Estimated cost \$500.00 per acre

Option #4-Stock grass carp at a high density (3000 fish) and monitor the vegetation frequently. This is by far the least expensive and most unpredictable of all the options. It can be combined with option #3 to keep the weeds in check in areas such as individual boat docks or boat lanes. This can eventually lead to problems with too many carp stirring up the bottom and raiding game fish nests. These issues would need to be addressed at that time.

Estimated cost \$7.35 per fish (includes permitting fee)

Please note that it is unlawful to transport hydrilla with a boat or trailer to other lakes. Because of this we recommend setting up a high pressure wash station to help clean tubers from boats and trailers. In addition, we recommend limiting boat traffic into the lake to reduce the chance becoming contaminated with a plant that is not eaten by grass carp.

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. A description of all recommended management activities appears below the table.

Please note that we recommend at least one electrofishing survey per year with 2-3 visits per year over the next two years to monitor the effectiveness of the stocking and identify any possible problems that are related to the vegetation control.

Lake	Harvest	Stock	Other Recommendations
Lake Ramsey	4000 Bass < 16" Catfish as needed Crappie as needed	Grass Carp (3000)	Add Brush Piles Monitor weed growth 2-3 Consultations/Year Herbicide treatment

Harvest Bass

Harvesting bass is an effective tool for managing the size of both the largemouth bass and its prey. Currently, not enough small forage fish of any species are growing into large adults. This lack of growth is detrimental because it forces a large bass to expend more energy chasing and eating many small fish than it would by eating one large fish. Harvesting bass will reduce competition for food among the remaining sport fish. Harvesting can be done by rod and reel or by electro fishing.

Harvest Catfish

Catfish compete heavily for food with other sport fish. If allowed to spawn and take over, the entire predator fish population suffers and the result is stunted fish. Catfish fisheries are best managed as “put-and-take,” which means the original stock are left alone until their number has been reduced to a point at which it is difficult to catch them.

With the estimated stock of catfish in the tens of thousands we feel there is no danger of overharvest at this time.

Harvest Crappie

We do not often recommend crappie in lakes smaller than 25 acres. Crappie often spawn earlier than largemouth bass, giving crappie a competitive advantage over small bass and allowing the fry crappie to eat the forage that bass require to grow to fingerling size. With the early start, numerous crappie often survive to adulthood and easily overpopulate. Crappie will become stunted when they are overpopulated and forage is inadequate for the population or when not enough predators are present to thin the crappie population. This lake is large enough to sustain a quality crappie population. With continued harvest the crappie will only continue to grow.

We recommend setting up a drop off area to increase the angler harvest in this lake. With a land and water drop off, anglers who do not want to fillet fish would be more likely to harvest fish when fishing. Fishing tournaments should be set up with the possibility of some sort of funding by the HOA to increase participation. If the community is not able to harvest enough fish then an electrofishing crew should be utilized to ensure enough fish are harvested.

Stock Florida Largemouth Bass



Our survey indicates that many of the bass are a native strain. Because native bass rarely grow to be over 7 pounds, we recommend improving the genetics of your bass by adding pure Florida strain bass fingerlings in the early summer (June–July). While we anticipate that some of these fish will be eaten, survivors will grow to spawn next year. These pure Florida bass will cross with the existing native bass to produce the F1 cross known for its hybrid vigor of aggressive feeding and growth. While not necessary immediately, these could be stocked in mass one spring or in smaller amounts over several years.

Treat Vegetation

Aquatic vegetation is definitely the most expensive long-term cost in lake management. When dealing with aquatic vegetation, it is important to remember the word “management,” instead of “eradication.” Water and sunlight grow plants, so aquatic weeds will always be naturally present. We can control and manage the vegetation to the required level. Mechanical control is extremely labor-intensive and does not provide long-term results. Chemical control is the best option for quick results and gives the ability to choose treatment areas and control large crops of weeds. Long-term herbicide costs can be reduced once weeds are under control by stocking grass carp, which can provide some broad spectrum reduction in some species of submerged vegetation.

Add Brush Piles

A sound and affordable management project would be to cut brush and trees, weigh them down with concrete and sink them so that they will be 1 or 2 feet under water. If only branches are to be used, they can be set in buckets of concrete. This structure will provide a dense habitat necessary for younger fish.

This was discussed at length during the visit and many different configurations would be successful (Christmas trees, brush, branches, above water, below buoys, etc)

Costs

Lochow Ranch Pond and Lake Management offers a yearly management program that takes away all inconvenience for the landowner. Once a retainer client, we will come to the property once a month on average to service fish feeders, stock fish, clear ponds, fertilize and complete any other lake management chores including electro-fishing surveys and vegetation control. We recommend 2-3 consulting (at least one being electrofishing) visits per year to ensure unexpected issues related to the grass carp stocking are dealt with promptly. Average cost is 2000.00 per day (electrofishing slightly more) plus travel expenses or mileage. Our current per-trip service rates and product prices mentioned are shown in the following tables.

SERVICE TYPE	RATE
Vegetation control	200.00 hour
Electro fishing	300.00 hour
Consulting	200.00 hour
Other management	200.00 hour
Mileage (one way)	3.25 per mile

ITEM	DISCRIPTION	PRICE
Grass Carp	Large (8"-12")	7.00/fish
Largemouth Bass	Small (1"-4")	1.95/fish

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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 and weed management strategies. If so, you will have a quality, well-balanced, aesthetically pleasing fishery that continues to add value to your property.