LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES

OFFICE OF FISHERIES
INLAND FISHERIES SECTION

PART VI -B

WATERBODY MANAGEMENT PLAN SERIES

BLACK BAYOU RESERVOIR

WATERBODY EVALUATION &
RECOMMENDATIONS

CHRONOLOGY

DOCUMENT SCHEDULED TO BE UPDATED EVERY THREE YEARS

January 2015 – Prepared by:
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STRATEGY STATEMENT

Recreational

Sportfish species are managed to provide a sustainable population while providing anglers the opportunity to catch or harvest numbers of fish adequate to maintain angler interest and efforts. Bass anglers are afforded the opportunity to catch an occasional preferred, memorable, or trophy-sized fish through the introduction of Florida largemouth bass.

Commercial

Catfish are managed to provide a sustainable population while providing anglers and commercial fishers the opportunity to harvest desirable numbers of fish. Commercial fishing is only allowed using slat traps, wire nets, and hoop nets during a special season from November 1 through the end of February each year.

Species of Special Concern

No threatened or endangered fish species are found in this waterbody.

EXISTING HARVEST REGULATIONS

Recreational

Black Bayou Reservoir has a 10 fish daily creel limit with no minimum length limit for black bass. This regulation went into effect on April 20, 2014. Previously, black bass were managed with a 14 inch to 17 inch protected slot limit since 1991 (8 fish daily creel with no more than 4 fish over the slot limit). Statewide regulations apply for all other fish species. Recreational fishing regulations may be viewed at the following link:
http://www.wlf.louisiana.gov/fishing/regulations

Commercial

The use of gill nets, trammel nets, and fish seines was prohibited in Black Bayou Reservoir in September 2002 by the Louisiana Wildlife and Fisheries Commission. Commercial fishing gears allowed include slat trap, wire net, or hoop nets during a special season from November 1 through the end of February.

The statewide commercial fishing regulations may be viewed at the link below:
http://www.wlf.louisiana.gov/fishing/regulations

Parish Regulations

There are no additional regulations by the parish or the Cypress Black Bayou Recreation and Water Conservation District specific to fishing.

SPECIES EVALUATION

Recreational

Black Bayou Reservoir has been sampled with various types of gear over the years. Biomass (rotenone) sampling was one of the primary sampling methods utilized by the Louisiana Department of Wildlife and Fisheries (LDWF) from 1983 through 1990 in an effort to estimate standing crop of all fish in the lake. Electrofishing was initiated in 1990 to collect information specifically on largemouth bass and crappie (*Pomoxis spp*.) populations. Largemouth bass and crappie are targeted as species indicative of the overall health of fish populations due to their high position in the food chain. Forage samples are conducted in conjunction with fall electrofishing samples. Gill net sampling was initiated in 1990 to sample commercial fish species (e.g., catfish, common carp, and freshwater drum) and to evaluate the susceptibility of gamefish to gill nets.

Largemouth bass

Biomass estimates-

Biomass (rotenone) sampling was the primary method used to sample the fisheries in Black Bayou Reservoir until 1990. Figure 1 includes the standing crop estimates of largemouth bass in pounds per acre from 1983 until 1990. There was no significant change in the standing crop of largemouth bass on Black Bayou Reservoir during the period. The overall mean standing crop was 10.0 pounds per acre, and the yearly samples ranged from 7.3 to 11.49 pounds per acre.

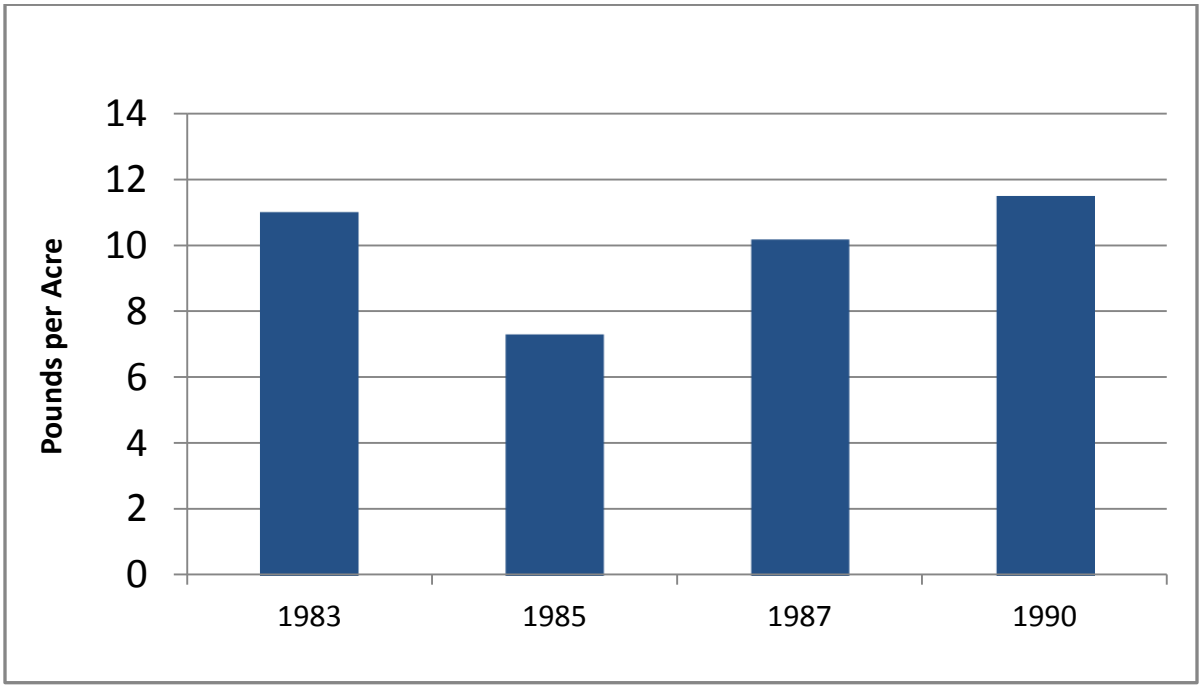

Figure 1. Annual estimates in pounds per acre of largemouth bass collected during biomass (rotenone) sampling in Black Bayou Reservoir, LA from 1983 to 1990.

Catch per unit effort and size distribution-

Electrofishing has been the primary sampling technique utilized on Black Bayou Reservoir in recent years. Electrofishing is the best indicator of largemouth bass abundance and size distribution, with the exception of large fish (i.e.,> 5 lbs.). Sampling with gill nets provides better assessment of large bass and other large-bodied fish species (e.g., bowfin or common carp). Results from spring electrofishing samples for stock-size [total length (TL) ≥ 8 inches], quality-size (≥ 12 inches TL), and preferred-size (≥ 15 inches TL) largemouth bass from 1990 – 2012 are presented in Figure 2. The data collected during this time period indicated an increase in catch-per-unit-effort (CPUE) of all size classes of bass in Black Bayou Reservoir.

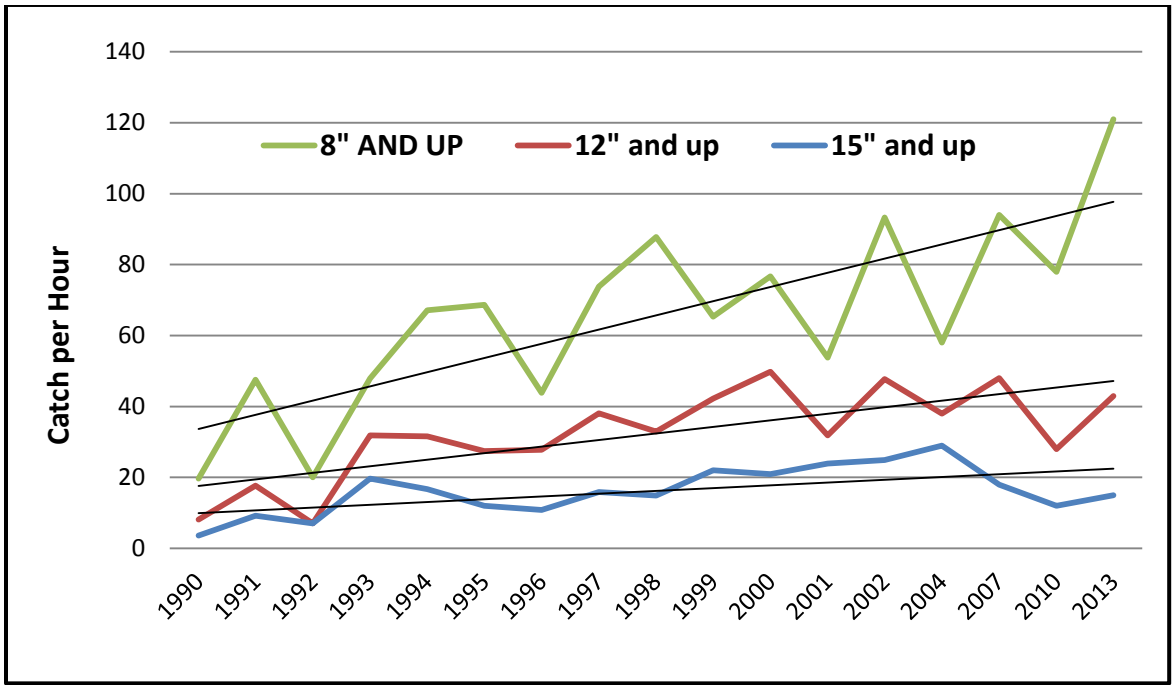

Figure 2. The CPUE for stock- (≥8" TL), quality- (≥12" TL) and preferred-size (≥15" TL) largemouth bass on Black Bayou Reservoir, LA collected during spring electrofishing from 1990-2013.

The CPUE for stock, quality, and preferred-size largemouth bass from fall electrofishing sampling are shown in Figure 3. Results indicated no change in CPUE of quality-size bass. The CPUE of stock-size bass increased slightly, but was decreasing over time until 2013. Black Bayou Reservoir was drawn down for the first time since impoundment in 2010 and remained low due to an extended drought until January 2012. The marked increase in stock-size largemouth bass CPUE suggests an increase in spawning activity and recruitment during 2013 in response to the prolonged drawdown and drought.

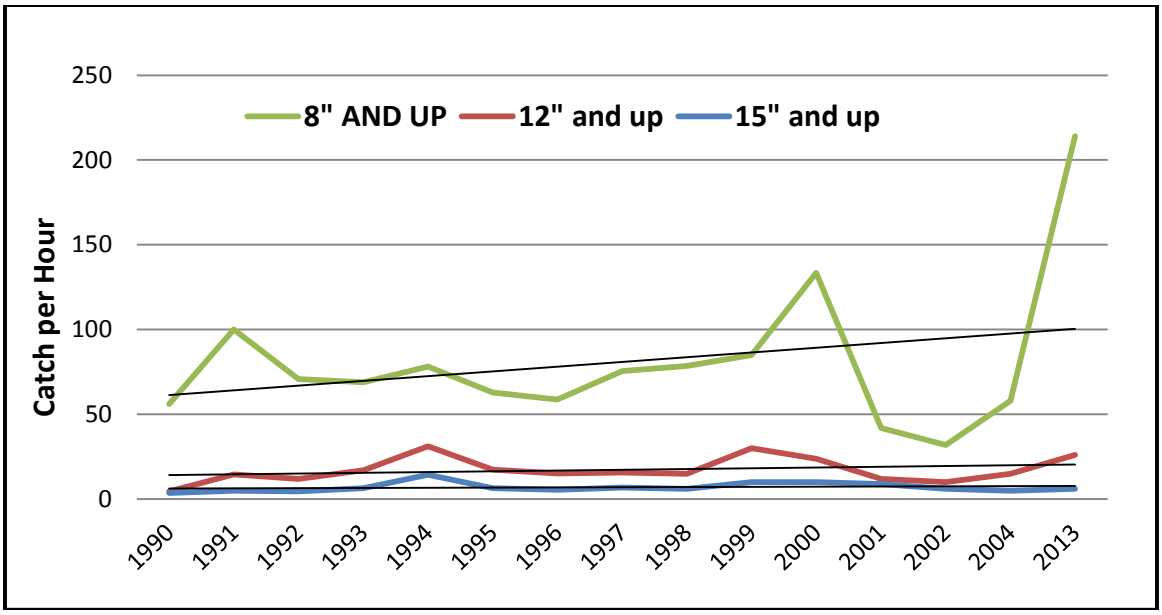

Figure 3. The CPUE for stock- (≥8" TL), quality- (≥12' TL) and preferred-size largemouth bass from Black Bayou Reservoir, LA collected during fall electrofishing from 1990-2013.

Proportional stock density (PSD) and relative stock density (RSD) are indices used to numerically describe length-distribution data. Proportional stock density compares the number of bass of quality-size (≥12 inches TL) to the number of bass of stock-size (≥ 8 inches TL). The PSD is expressed as a percentage. A fish population with a high PSD consists mainly of larger individuals, whereas a population with a low PSD consists mainly of smaller fish. Relative stock density compares the number of bass of a given size range to the number of bass of stock-size. A common calculation used in fisheries management is for RSD-Preferred (RSD-$_P$). This value compares the number of largemouth bass ≥ 15 inches TL to the number of stock-size largemouth bass in the population. This is also commonly called RSD-$_{15}$ values. Ideal PSD and RSD-$_P$ values for a balanced largemouth bass population range from 40-70 and 10-40, respectively. Spring electrofishing samples indicated that the Black Bayou Reservoir largemouth bass population falls within the preferred range most years for both statistics (Figures 4 & 5).

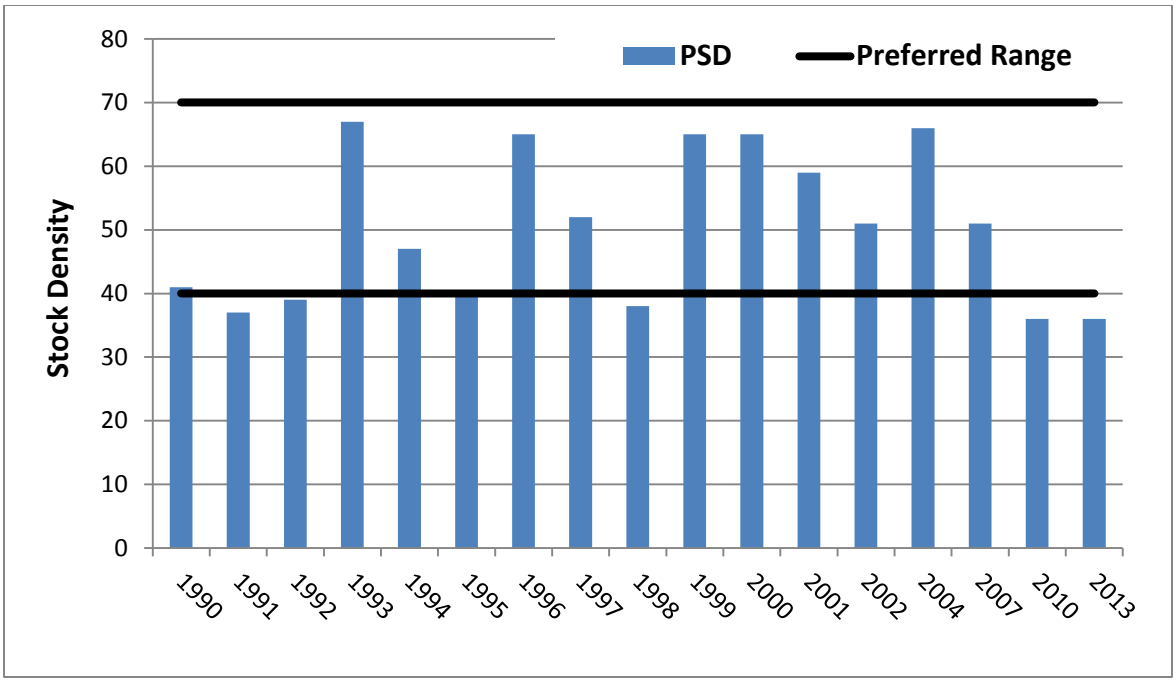

Figure 4. The PSD size-structure indices for largemouth bass collected on Black Bayou Reservoir, LA, during spring electrofishing from 1990 to 2013.

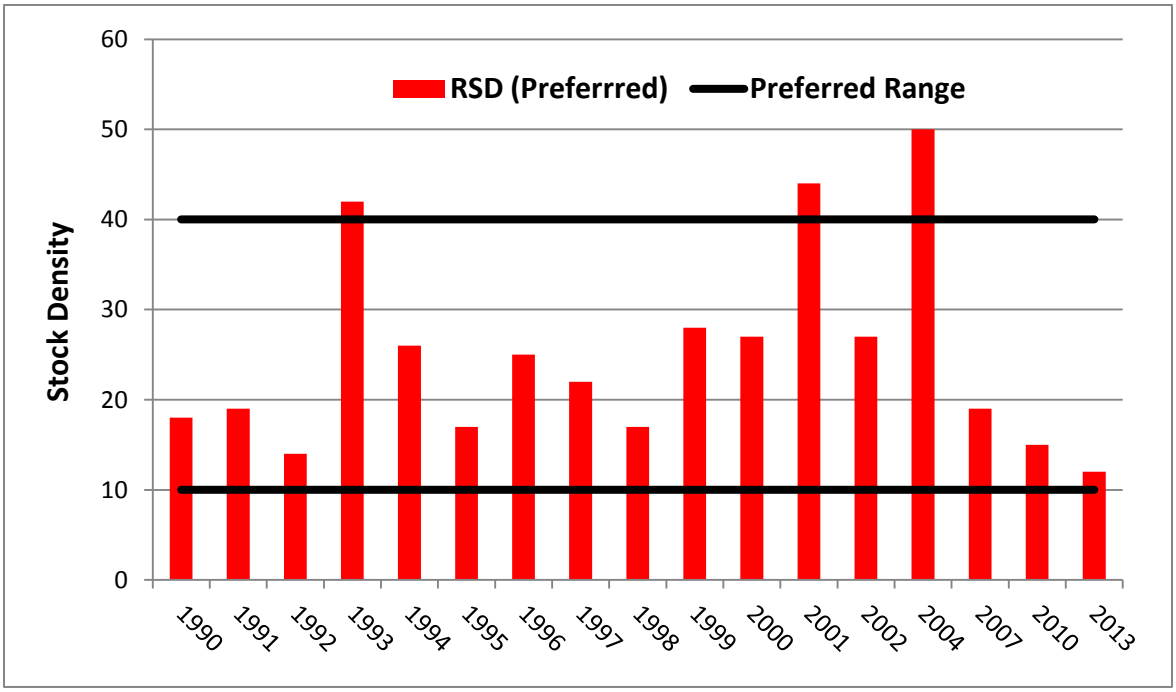

Figure 5. The RSD_{-p} size-structure indices for largemouth bass collected on Black Bayou Reservoir, LA, during spring electrofishing from 1990 to 2013.

Largemouth bass size-structure indices for fish collected during fall electrofishing are shown in Figures 6 and 7. Most years, the results fall below or within the lower portion of the desired ranges. Sampling results indicated that bass smaller than 12 inches TL were the most abundant which suggests successful recruitment.

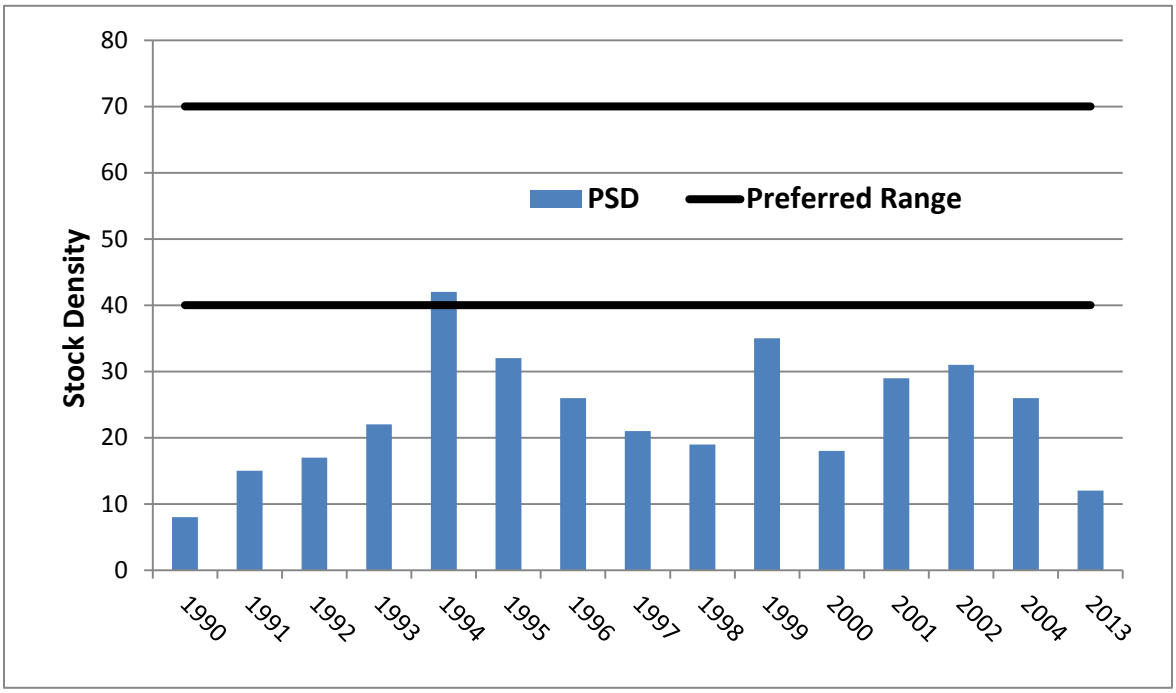

Figure 6. The PSD size-structure indices for largemouth bass collected on Black Bayou Reservoir, LA, during fall electrofishing from 1990 to 2013.

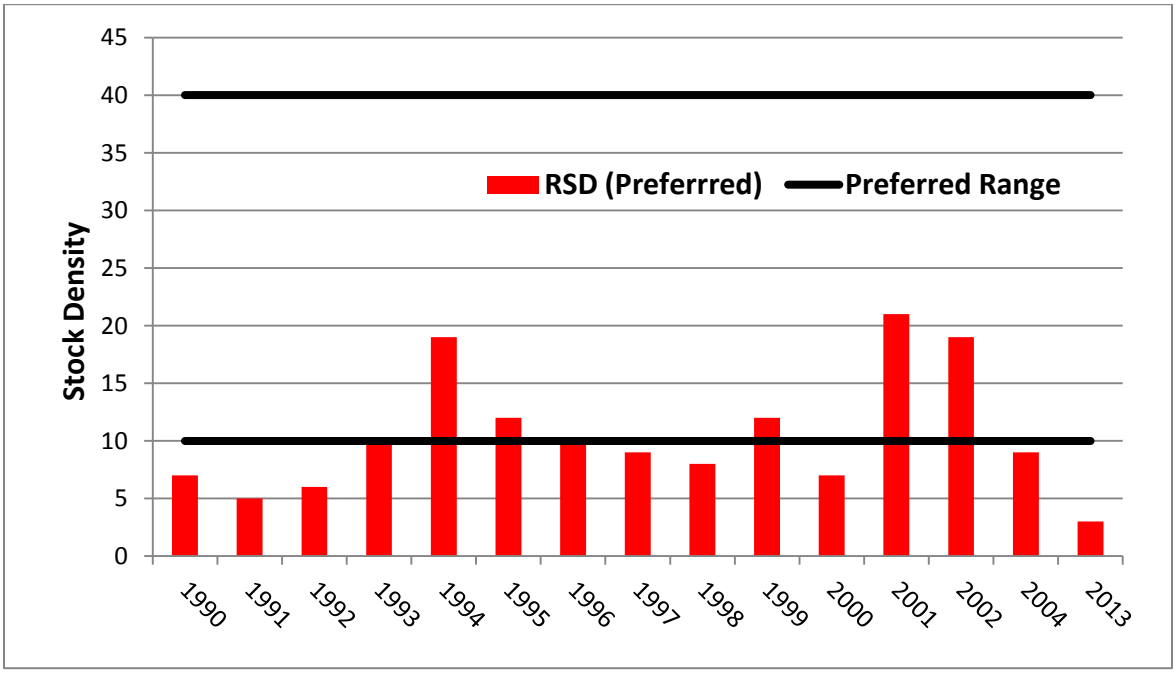

Figure 7. The RSD_{-p} size-structure indices for largemouth bass collected on Black Bayou Reservoir, LA, during fall electrofishing from 1990 to 2013.

Slot Limit Evaluation

A 14 inch - 17 inch protective slot limit was implemented in 1991 as part of LDWF's Louisiana Black Bass Fishery Management Plan. Black Bayou Reservoir was designated as

a lake with "trophy potential." Therefore, the protective slot limit regulation was implemented. To further support this goal of raising larger bass, LDWF began stocking Florida largemouth bass in the lake in the same year.

Stock density indexes can also be used to evaluate the success of targeted management strategies such as promoting "big bass" (Willis et al. 1993). If a fishery is successfully managed for "big bass," then PSD values should fall within the range of 50-80 and RSD-P values should fall within the range of 30-60 (Murphy and Willis 1996). However, the stock density indexes from spring samples are below the desired range most years or within the lower limits of the range. Fall stock density indexes fall below the desired ranges in all years sampled.

Cross Lake, located in nearby Caddo Parish, had a similar protective slot limit in place. The stock density indexes on Cross Lake were typically near the maximum of the desired ranges. Yet, LDWF conducted a largemouth bass stock assessment and comprehensive evaluation of the effectiveness of the slot limit regulation from 2010-2012 on Cross Lake and it was determined that the regulation was ineffective due to angler reluctance to harvest fish. The Cypress-Black Bayou Recreation and Water Conservation District reviewed the findings of the Cross Lake assessment and requested that the slot limit be removed from Black Bayou Reservoir. Anecdotal information suggests the same angler harvest trends on Black Bayou Reservoir and the stock density indexes indicate the slot limit was not producing the desired results.

Electrofishing CPUE's provide additional data that indicated the slot limit was not effective. Since implementation of the regulation and introduction of Florida largemouth bass (1991), no increase was observed in the CPUE's of quality or preferred-size bass. A slight increase in CPUE of stock-size bass was observed over the period, which could indicate an increase in smaller size fish as anglers were likely not harvesting adequate numbers of bass below the slot limit.

Gill Net Sampling

Gill net sampling conducted on Black Bayou Reservoir provides information on fishes that are not effectively sampled with standardized electrofishing techniques. Those include larger size largemouth bass, crappie, and catfish. Figure 8 indicates the number per net night and size distribution of largemouth bass captured in standardized gill net sampling from 1990 - 2014.

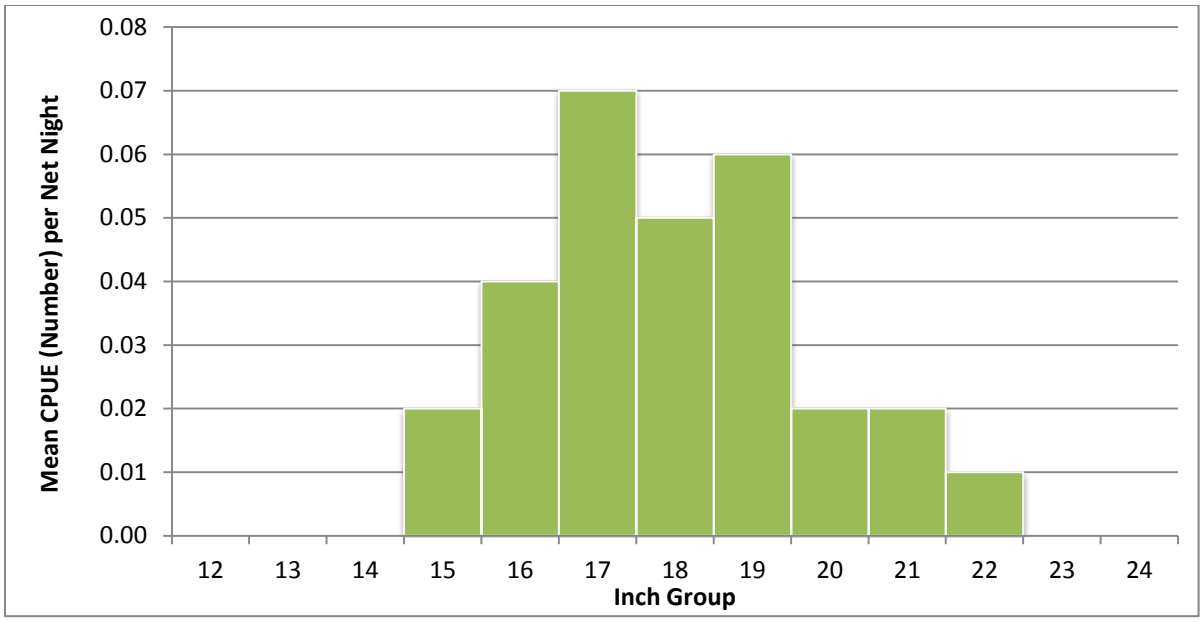

Figure 8. The mean CPUE (number) per inch group per net night (100' net) of largemouth bass collected on Black Bayou Reservoir, LA from standardized gill nets from 1990-2014.

The average length-at-age for Black Bayou Reservoir bass is provided in Table 1. Growth is rapid through age-4, but then slows.

Table 1. Length at age for bass from Black Bayou Reservoir, LA, 2004 (n = 46).

Age	Length in Inches
1.0	6.8
2.0	10.1
3.0	13.4
4.0	16.1
5.0	N/A
6.0	17.2

Largemouth bass genetics

Florida largemouth bass stockings on Black Bayou Reservoir were initiated in 1991 in an effort to offer anglers a chance to catch a fish of greater than average size. To date, 629,077 Florida bass fingerlings have been stocked in Black Bayou Reservoir. A genetic analysis of the largemouth bass population was conducted in 1995, 2001, and 2004 in conjunction with fall electrofishing (Table 2). The latest genetic testing conducted in 2004 indicated a 35% Florida bass introgression.

Table 2. – Largemouth bass genetic analysis from Black Bayou Reservoir, LA, 1995 - 2004.

Year	Number	Northern %	Florida %	Hybrid %
1995	44	84%	7%	9%
2001	23	59%	10%	31%
2004	46	65%	4%	31%

Forage

Forage availability is measured directly through fall forage electrofishing results and indirectly through measurement of largemouth bass body condition or relative weight (Wr). Relative weight is the ratio of a fish's weight to the weight of a ''standard'' fish of the same length. The Wr index is calculated by dividing the weight of a fish by the standard weight for its length, and multiplying the quotient by 100. Largemouth bass Wr below 80 indicate a potential problem with forage availability.

Figure 9 illustrates the Wr for stock-size and larger bass collected during fall electrofishing samples from 1990 – 2012. Relative weight calculations were above 90 indicating that sufficient forage was available for these size groups of largemouth bass during this period.

Figure 9. The Wr's of largemouth bass by size group on Black Bayou Reservoir, LA collected during fall electrofishing from 2002-2013.

Forage samples were collected in conjunction with fall electrofishing from 1990 – 2013. Only fishes $\leq$ 5 inches TL are considered 'forage' for the purpose of evaluating the available forage in the reservoir. Sunfish (*Lepomis spp.*), threadfin shad (*Dorosoma petenense*), largemouth bass (*Micropterus salmoides*), and gizzard shad (*Dorosoma cepedianum*) comprised the majority of the species available as forage. The number per hour of forage species from the 2013 samples are illustrated in Figure 10. The total pounds per hour collected during this sample were 59.95 pounds.

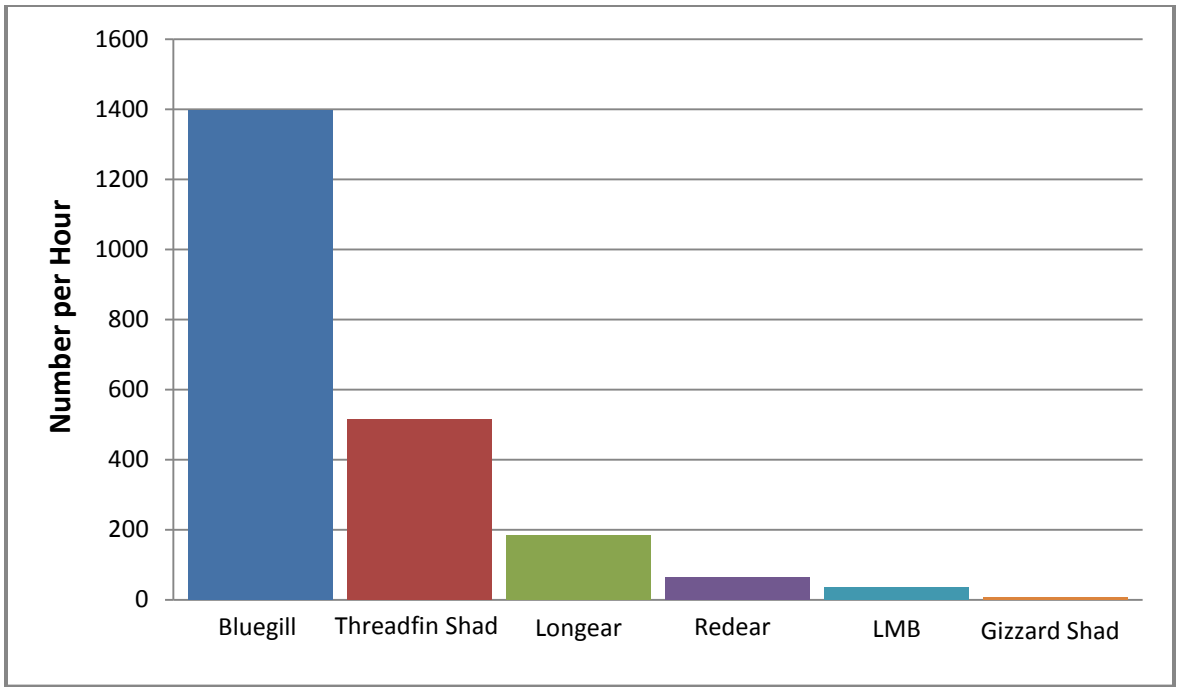

Figure 10. The CPUE (number per hour) for forage fishes ≤ 5 inches TL captured in Black Bayou Reservoir Lake, LA from forage samples taken in 2013.

Crappie

Crappie collected during biomass (rotenone) sampling conducted from 1983 to 1987 consisted of both black crappie (*Pomoxis nigromaculatus*) and white crappie (*Pomoxis annularis*). The annual estimates varied through the period sampled, with an average of 6.2 pounds per acre (Figure 11).

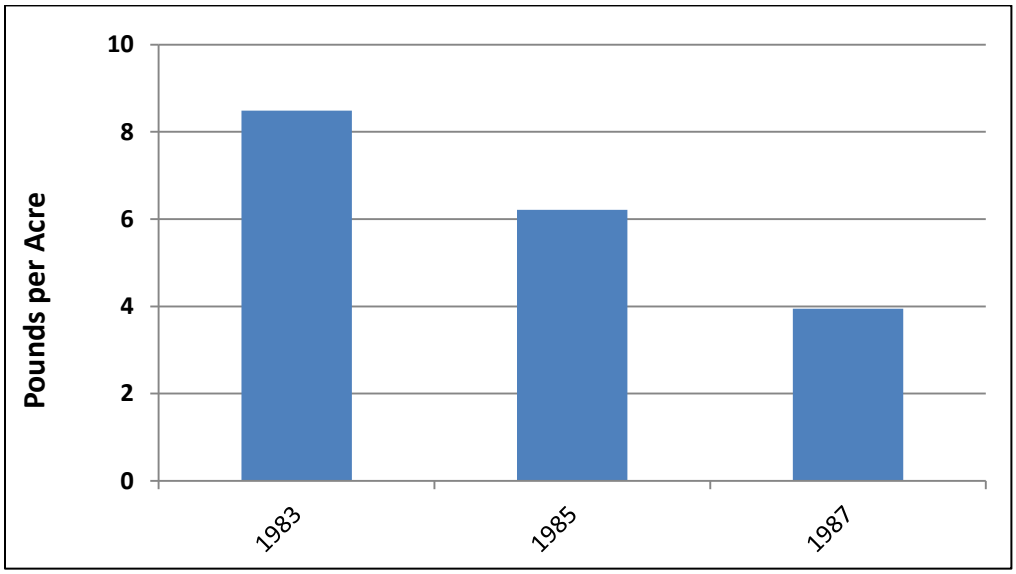

Figure 11. The CPUE in pounds per acre of crappie collected from Black Bayou Reservoir, LA during biomass (rotenone) sampling from 1983 to 1987.

The CPUE of crappie collected during spring electrofishing samples is illustrated in Figure 12. Samples ranged from 0 – 32 crappie collected per hour. This variation can be attributed to the date samples were collected. In most years, crappies spawn in early March on Black

Bayou Reservoir. If sampling occurs after this peak spawning activity, then few crappie are collected while electrofishing.

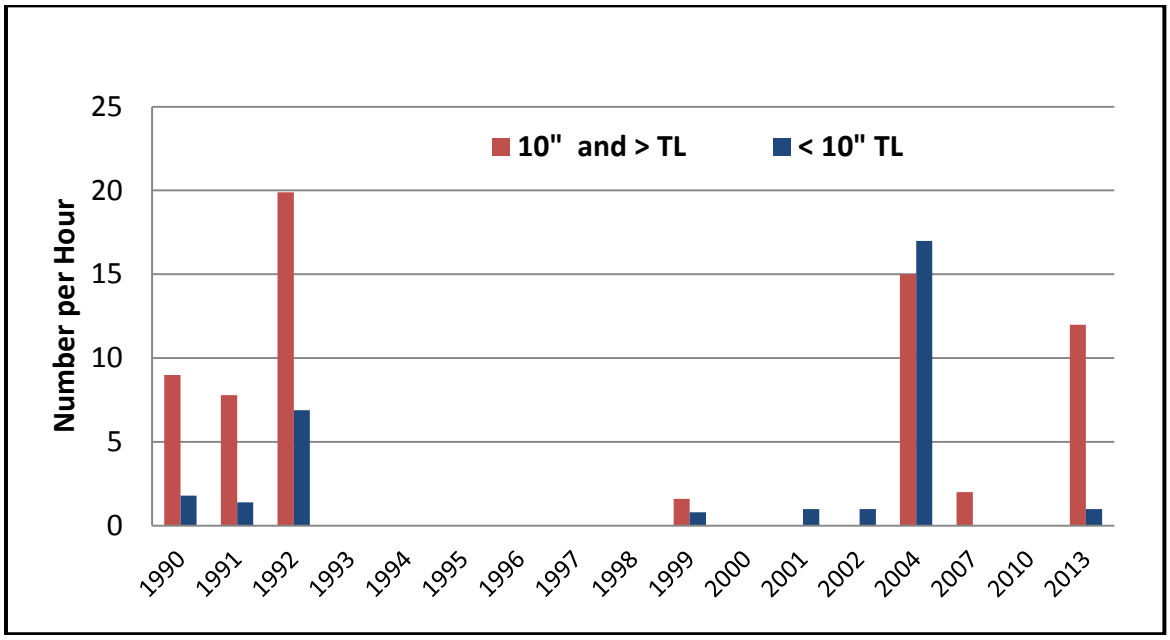

Figure 12. The CPUE of crappie from Black Bayou Reservoir, LA captured during springtime electrofishing from 1990 to 2013. TL = total length.

Results from gill net sampling are indicated in Figure 13. Both species of crappie are present in Black Bayou Reservoir. Although overall numbers of crappie collected in gill nets are relatively low, results revealed that larger size crappies are present in the lake.

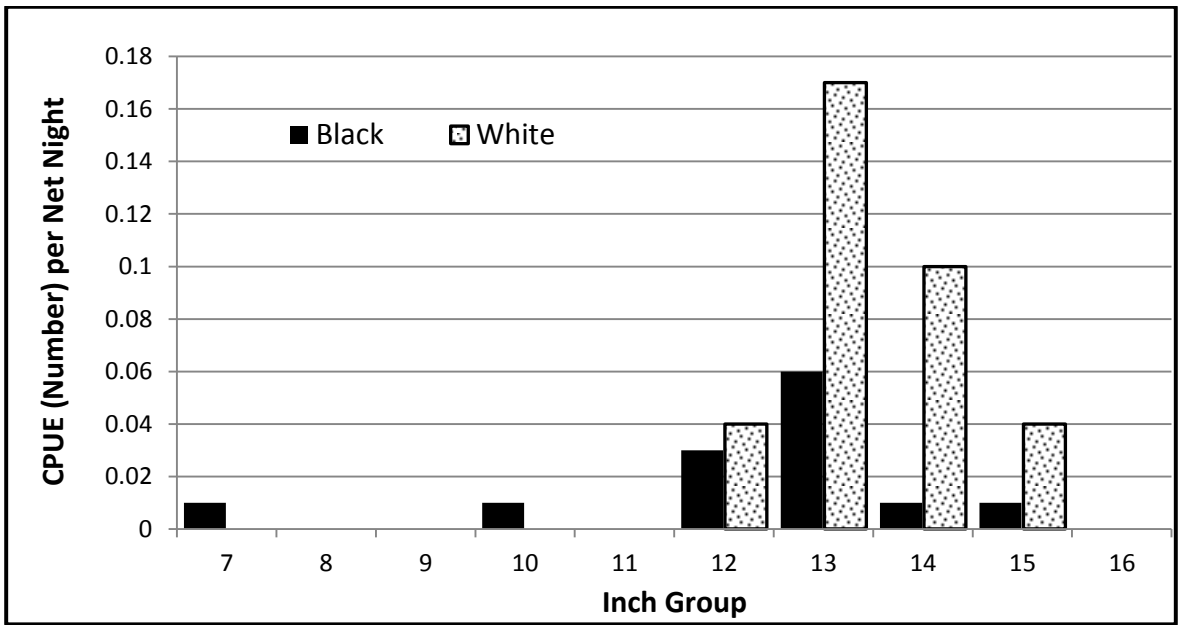

Figure 13. The mean CPUE (number) per net night (per 100' net) of crappie collected on Black Bayou Reservoir, LA during standardized gill net sampling from 1999 - 2014.

In recent years, LDWF has used lead net sampling to collect better information on crappie populations. Sampling with lead nets is scheduled for 2016.

Commercial

Black Bayou Reservoir supports an abundant channel catfish population. Limited commercial fishing is allowed using slat traps, wire nets, and hoop nets during a special season from November 1 through the end of February each year. The Louisiana Wildlife and Fisheries Commission prohibited the use of gill nets, trammel nets and fish seines in Black Bayou Reservoir and Cypress Bayou Reservoir in September 2002.

Biomass sampling-

Historical biomass sampling on Black Bayou Reservoir indicated that channel catfish (*Ictalurus punctatus*) were abundant in 1983 and 1985 (Figure 14).

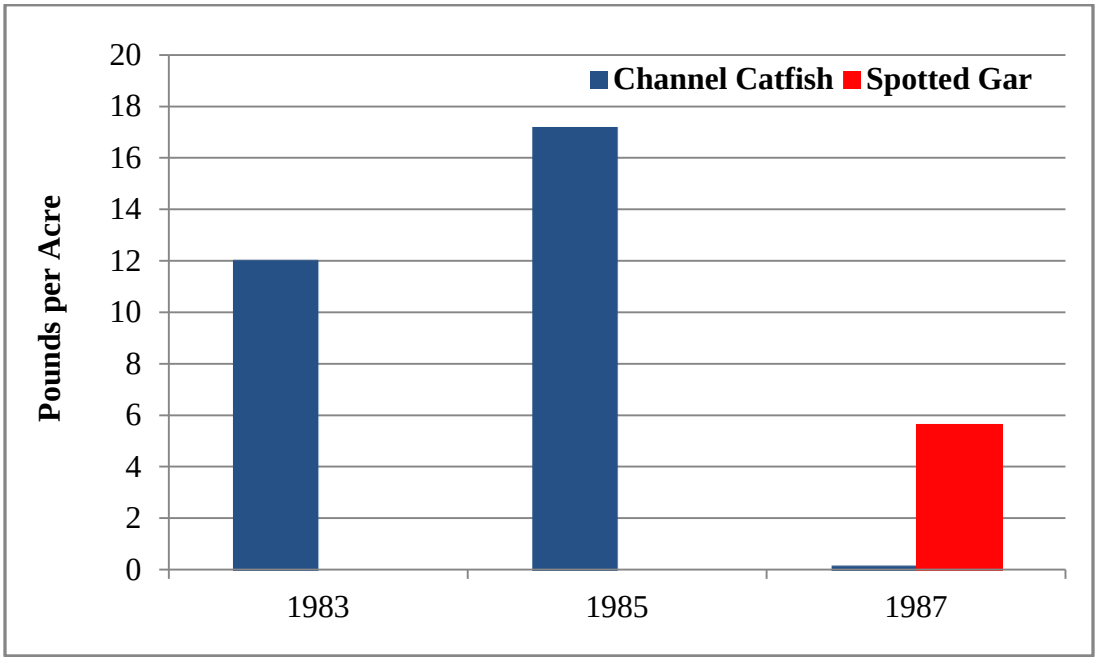

Figure 14. CPUE of commercial fish collected during standardized biomass (rotenone) sampling in Black Bayou Reservoir, LA from 1983 to 1987.

Gill nets-

Standardized sampling with gill nets was conducted in the lake from 1990 – 2014. Channel catfish are abundant in the lake, while blue catfish and flathead catfish are far less common (Figure 15).

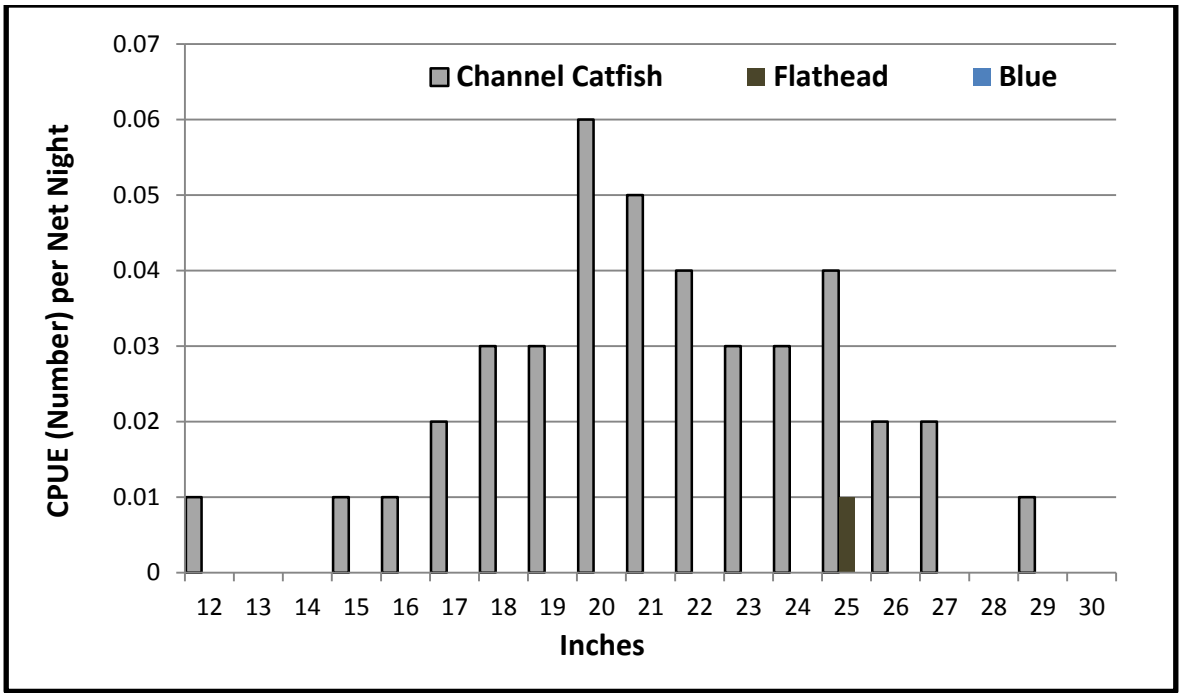

Figure 15. The mean CPUE in number per net night (100' net) per year of channel, flathead, and blue catfish in Black Bayou Reservoir, LA, during standardized gill net sampling from 1990 - 2014.

HABITAT EVALUATION

Aquatic Vegetation

Nuisance aquatic vegetation has been present in Black Bayou Reservoir for many years. However, it is not a major hindrance for recreational boating and fishing access in the majority of the lake. The majority of aquatic vegetation problems are found in the upper end of the lake. The remainder of the lake is generally either free of aquatic vegetation or is limited to a fringe along the shoreline.

In 1998, hydrilla (*Hydrilla verticillata*) was documented in Black Bayou Reservoir. This was of great concern because this plant has the growth potential to render large expanses of water unsuitable for recreation. Fortunately, hydrilla has not expanded on Black Bayou Reservoir to the point of severely impacting recreational activities.

Giant salvinia (*Salvinia molesta*) was first documented in Black Bayou Reservoir in 2007. Foliar herbicide applications have been utilized as needed to help control the plant. While not as problematic as on other area lakes, giant salvinia has become well established in the canal systems and backwater areas near the headwaters of the lake. Subsequently, the plants are flushed into the lake during rain events and form a fringe along the shoreline. This fringe hinders access to boat docks and negatively affects aesthetic quality. Wave action on Black Bayou Reservoir is limited and it does not provide significant control of salvinia. The lake is narrow and much of the shoreline contains bulkheads.

In 2014, giant salvinia coverage remained low following the harsh winter of 2013-14. Salvinia was confined to the nursery areas on the upper portions of the lake until the late fall when rains flushed the plants into the main lake. Four containment booms were deployed near the headwaters of the lake in December to prevent the plants from being flushed into the

lake. Salvinia weevils were stocked in the area above the boom in an effort to control the plant in these nursery areas. All other vegetation remained at minimal levels during 2014.

Substrate

The substrate of Black Bayou Reservoir is composed of mixed wet alluvial lands and poorly drained stiff soils. Organic content is generally low except in the upper reaches of the lake. The majority of the littoral zone of the lake consists of suitable fish spawning substrate for nest building fishes.

Complex Cover

Complex cover in Black Bayou Reservoir is limited. Timber was cleared from the lake during construction. Shoreline cover is limited to man-made structures such as docks and bulkheads, or marginal vegetation such as cutgrass. Some presence of beneficial aquatic vegetation should be encouraged for fisheries production.

CONDITION IMBALANCE / PROBLEM

The most significant problem on Black Bayou Reservoir is the presence of invasive aquatic vegetation, including giant salvinia and hydrilla. These plants pose a formidable threat to the aquatic habitat and recreational activities.

CORRECTIVE ACTION NEEDED

Control invasive aquatic vegetation.

RECOMMENDATIONS

1. Continue an integrated approach to control giant salvinia on Black Bayou Reservoir. LDWF will use aggressive herbicide applications and biological control measures to achieve combined benefits.

2. Routine herbicide applications will be conducted on Black Bayou Reservoir during the growing season. LDWF crews will visit the lake twice per month to survey and treat giant salvinia. Foliar herbicide applications to giant salvinia will be made as needed. Diquat will be used from November 1 through March 31 at a rate of 0.75 gallons per acre mixed with a total of 1 qt. per acre of surfactant being comprised of 1 part Air Cover and 3 parts Aqua King Plus. Outside of that time frame, giant salvinia will be controlled with a mixture of glyphosate (0.75 gal/acre) and diquat (0.25 gal/acre) with Aqua King Plus (0.25 gal/acre) and Air Cover (12 oz. /acre) surfactants.

3. Maintain containment booms and concentrate control efforts near the headwaters of the lake to reduce salvinia in these areas that continually harbor plants.

4. Other aquatic weeds such as alligator weed and primrose will be controlled with imazamox (Clearcast at 0.50 gal/acre) and Turbulence (0.25 gal/acre) surfactant if necessary.

5. Continue scheduled standardized sampling of fish populations to determine status over time.

6. Continue introduction of Florida largemouth bass fingerlings as per the official LDWF Stocking Policy. Florida largemouth bass should be stocked as available.

Literature Cited

Arnoldi, David C. et al. 1990. Louisiana Black Bass Fishery Management Plan. Louisiana Department of Wildlife and Fisheries

Murphy, Brian R. and David W. Willis. 1996. Fisheries Techniques, Second Edition. American Fisheries Society.

Willis, D. W., B. R. Murphy, and C. S. Guy. 1993. Stock density indices: development, use, and limitations. Reviews in Fisheries Science 1:203-222.