

LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES



**OFFICE OF FISHERIES
INLAND FISHERIES DIVISION**

PART VI -B

WATERBODY MANAGEMENT PLAN SERIES

BLACK RIVER-COCODRIE LAKE COMPLEX

**WATERBODY EVALUATION &
RECOMMENDATIONS**

CHRONOLOGY

DOCUMENT SCHEDULED TO BE UPDATED EVERY FOUR YEARS

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WATERBODY EVALUATION

STRATEGY STATEMENT

Recreational

Sportfish species, primarily largemouth bass (LMB) and crappie, are managed in the Black River-Cocodrie Lake Complex (hereinafter Lake Complex) to provide a sustainable population while providing anglers the opportunity to catch or harvest adequate numbers of fish to maintain angler interest and efforts.

Commercial

Commercial fishing is minimal in the Lake Complex. The fisheries habitat in this waterbody does not support high numbers of commercial species. A strategy directed specifically to the commercial fishery is not applied.

Species of Special Concern

No threatened or endangered fish species are known to inhabit this waterbody.

EXISTING HARVEST REGULATIONS

Recreational

This water body is managed under statewide regulations for all fish species. The Louisiana Department of Wildlife and Fisheries (LDWF) recreational fishing regulations may be viewed at the link below:

<http://www.wlf.louisiana.gov/fishing/regulations>

Commercial

The LDWF commercial fishing regulations may be viewed at the link below:

<http://www.wlf.louisiana.gov/fishing/regulations>

SPECIES EVALUATION

Recreational

Largemouth bass (LMB) populations are targeted for assessment because they are a species indicative of the overall health of the fish population due to their high position in the food chain. Electrofishing is the most efficient sampling method for collecting largemouth bass to evaluate abundance and size distribution, with the exception of large bass. Gill net sampling is generally the preferred method to determine the status of large bass and other large fish species.

Relative abundance, length distribution and size structure indices

Electrofishing has been used to collect largemouth bass population data in the Lake Complex since the spring of 2002. Springtime electrofishing results are used as an indicator of largemouth bass relative abundance. The relative abundance or catch-per-unit-effort (CPUE) from spring electrofishing results indicates that the LMB population is highly variable in the Lake Complex for the period 2002 through 2012 (Figure 1). This variation may be due to fluctuating water levels and conditions rather than the actual LMB population abundance. The Lake Complex is prone to high water levels and increased turbidity during the springtime. These water conditions impact electrofishing efficiency and may bias results.

Future electrofishing sampling in the spring will consider water levels and clarity to determine the appropriate timing of sampling. The mean CPUE for stock-, quality-, and preferred-size class LMB by year is shown in Figures 2 and 3.

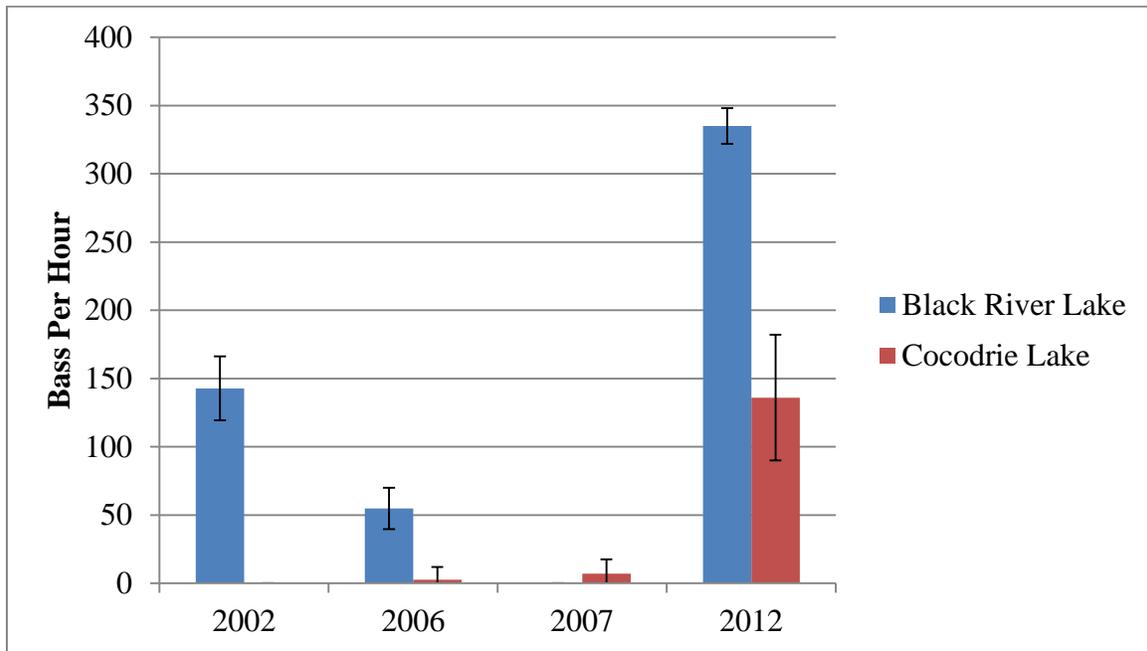


Figure 1. The mean CPUE (\pm SE) for largemouth bass collected during spring electrofishing from Black River-Cocodrie Lake Complex, Louisiana from 2002-2012.

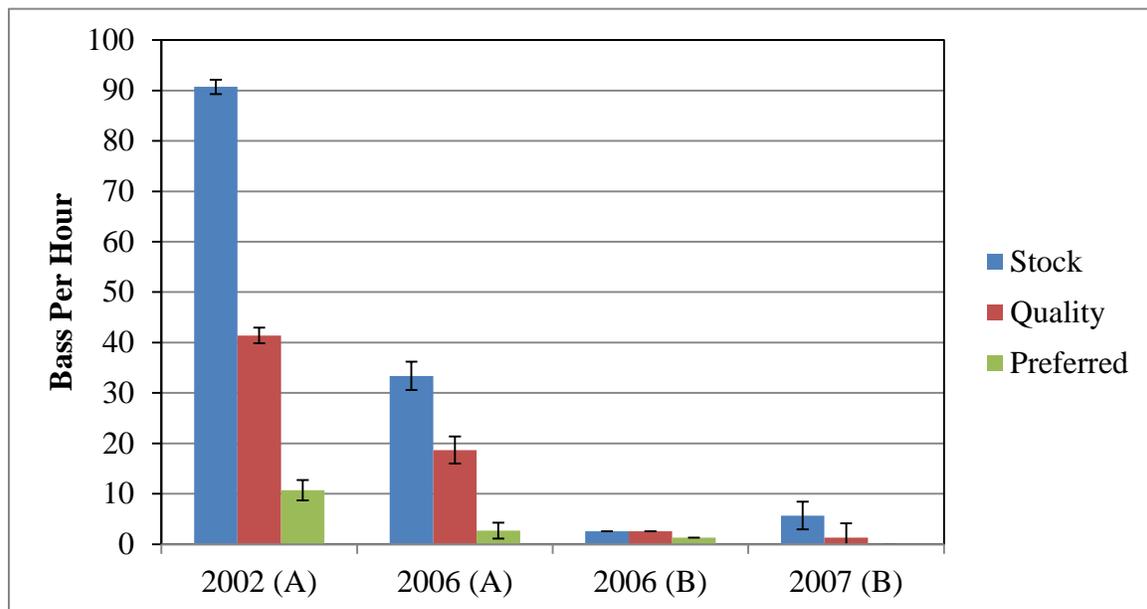


Figure 2. The mean CPUE (\pm SE) for stock-, quality-, and preferred-size classes of largemouth bass collected from Black River Lake (A) and Cocodrie Lake (B) Complex, Louisiana during spring electrofishing from 2002 – 2012.

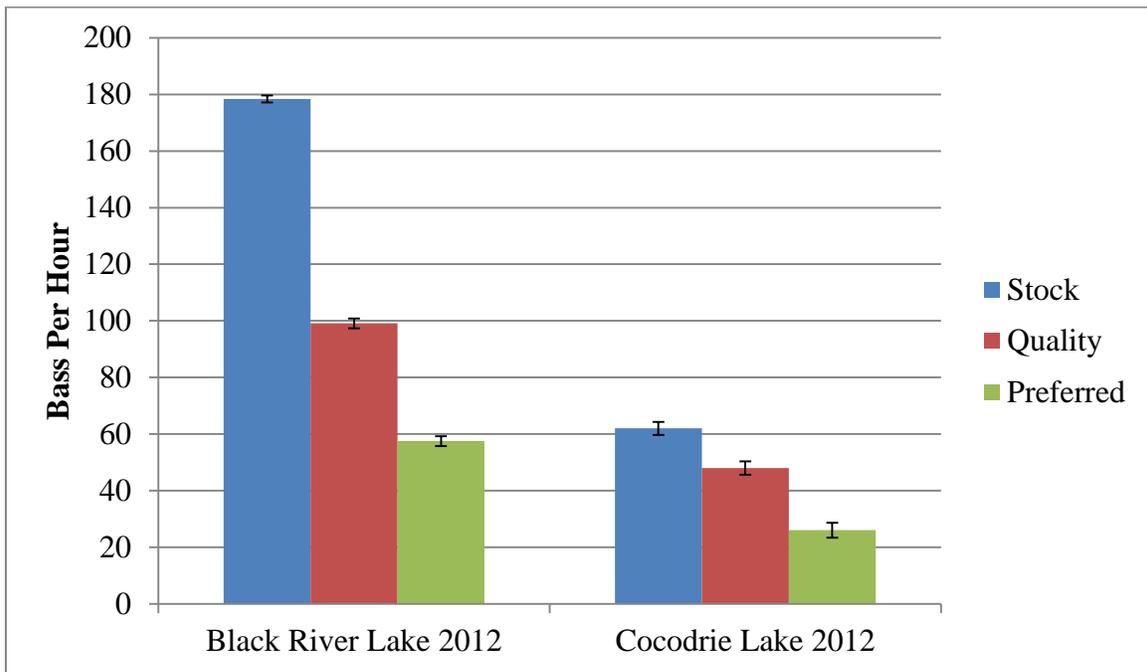


Figure 3. The mean CPUE (\pm SE) for stock-, quality-, and preferred-size classes of largemouth bass collected from Black River Lake and Cocodrie Lake, Louisiana during spring electrofishing of 2012.

Proportional stock density (PSD) and relative stock density (RSD) are indices used to numerically describe length-frequency data. Proportional stock density compares the number of fish of quality size (greater than 12 inches for largemouth bass) to the number of bass of stock size (8 inches in length). PSD is expressed as a percent. A fish population with a high PSD consists mainly of larger individuals, whereas a population with a low PSD consists mainly of smaller fish. For example, Figure 4 below indicates a PSD of 56 for 2012 (A). The number indicates that 56% of the LMB stocks (fish over 8 inches) in the sample were at least 12 inches or longer. Individual lakes vary widely in their ability to support populations of bass. PSD values between 40 and 60 are considered to be satisfactory.

$$\text{PSD} = \frac{\text{Number of bass} > 12 \text{ inches}}{\text{Number of bass} > 8 \text{ inches}} \times 100$$

Relative stock density (RSD) is the proportion of largemouth bass in a stock (fish over 8 inches) that are 15 inches or longer.

$$\text{RSD} = \frac{\text{Number of bass} > 15 \text{ inches}}{\text{Number of bass} > 8 \text{ inches}} \times 100$$

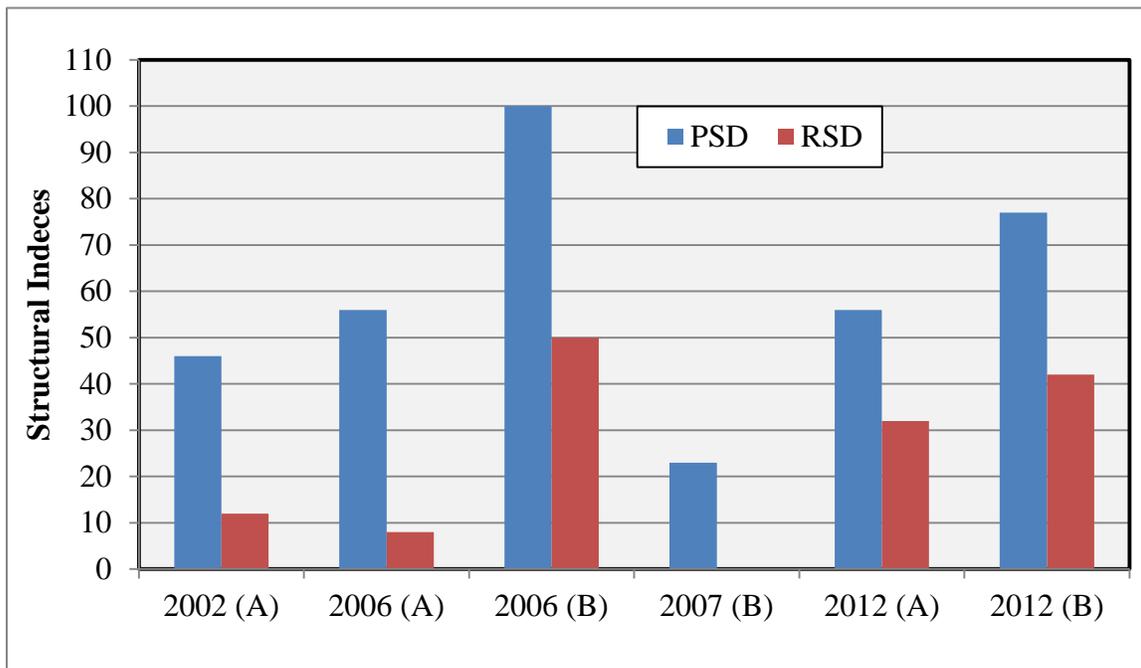


Figure 4. PSD and RSD-p for largemouth bass collected from Black River Lake (A) and Cocodrie Lake (B) Complex, Louisiana during spring electrofishing from 2002 – 2012.

Results indicate PSD and RSD values have fluctuated widely from 2002-2012, even though most of the values fall within the satisfactory range. As previously discussed the variance is likely the result of variable sampling conditions.

Largemouth bass age and growth

Age and growth data were collected from 36 LMB in Black River Lake and 19 LMB in Cocodrie Lake in 2006. The results of these samples are listed in Table 1 below. However, due to the small number of LMB additional sampling is needed to determine growth and mortality rates.

Table 1. Largemouth bass growth rates in 2006 for Black River and Cocodrie Lake Complex, Louisiana (n = 36 and 19, respectively).

AGE	Black River Lake Average Length (inches) 2006 (N=36)	Cocodrie Lake Average Length (inches) 2006 (N=19)
0	6.4	7.0
1	11.6	12.2
2	14.0	14.4
3	17.0	13.2
4	-	17.4
5	-	-
6	-	19.9

Largemouth bass genetics

Florida largemouth bass stocking has been minimal in the Black River-Cocodrie Lake Complex. However in 2006, genetic testing was conducted and 15.8% of the bass in

Cocodrie Lake had Florida alleles (Table 2).

Table 2. Largemouth bass genetic testing results from Black River and Cocodrie Lake Complex, Louisiana for 2006 (n = 55).

Year	Lake	% Northern	% Florida	% Hybrid	% Florida Influence
2006	Black River Lake	100 (n=36)	0	0	0
	Cocodrie lake	84.2 (n=19)	0	15.8 (n=3)	15.8

Forage

Primary forage for largemouth bass in the Lake Complex is shad (*Dorosoma spp.*) and sunfish (*Lepomis spp.*). Forage availability is measured by relative abundance of forage fishes captured by shoreline seine sampling (Figure 5) and by electrofishing sampling (Figure 6).

Forage availability is also measured indirectly through measurement of LMB body condition or relative weight. Relative weight (W_r) is the ratio of a fish's weight to the weight of a "standard" fish of the same length. The 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 relative weights below 80 indicate a potential problem with forage availability. Relative weights ranged from 83 to 108 for 1999- 2012 and suggest the presence of sufficient forage each year (Figures 7 and 8).

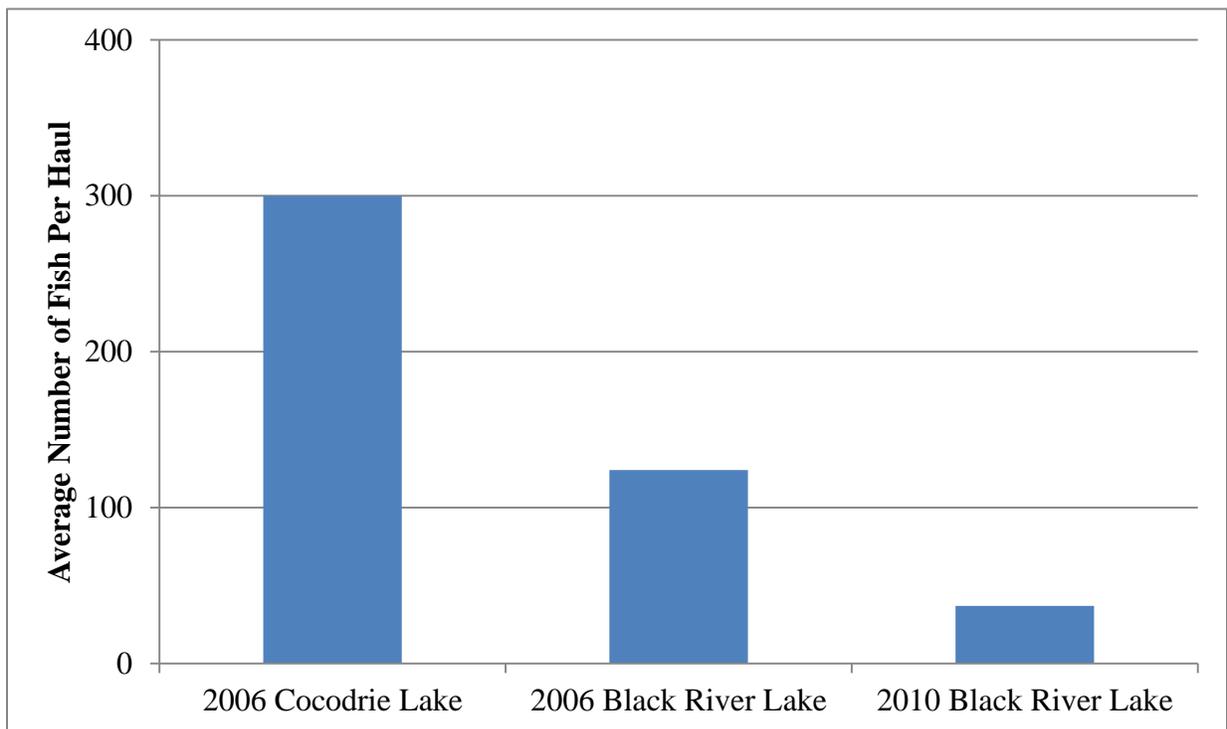


Figure 5. The CPUE (average number of fish per seine haul) of all species collected from shoreline seining for Black River and Cocodrie Lake Complex, LA, for 2006 and 2010.

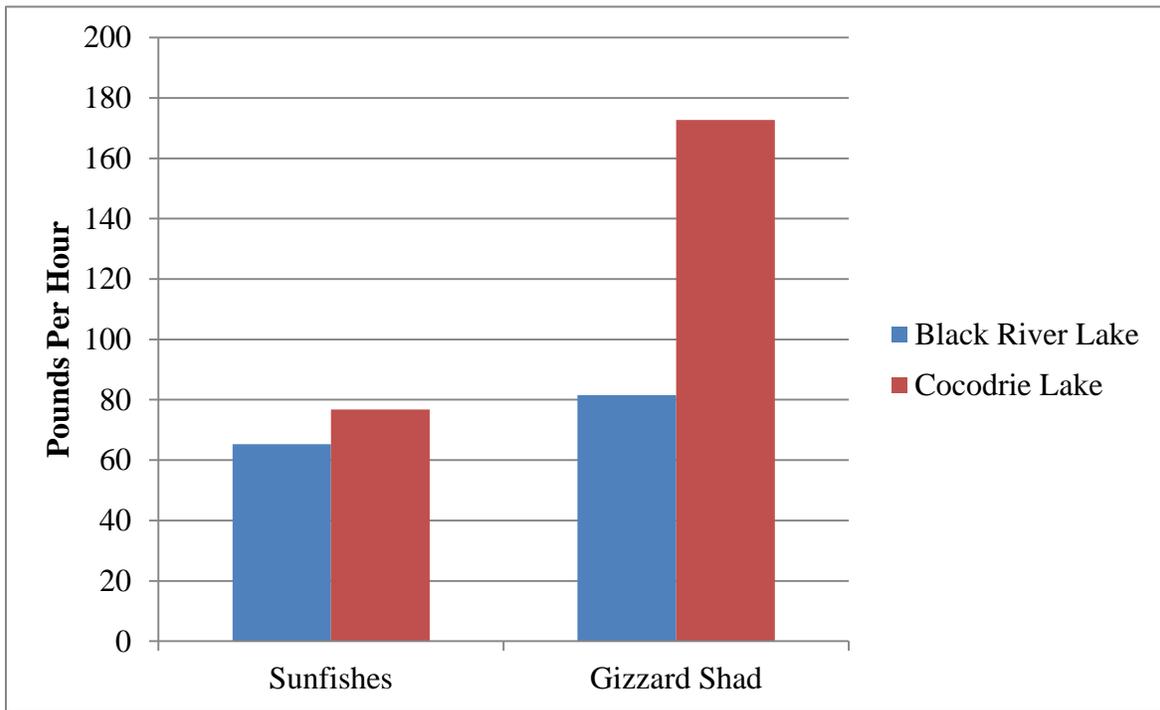


Figure 6. The CPUE (pounds per hour) of forage species found in Black River and Cocodrie Lake Complex, Louisiana for 2012.

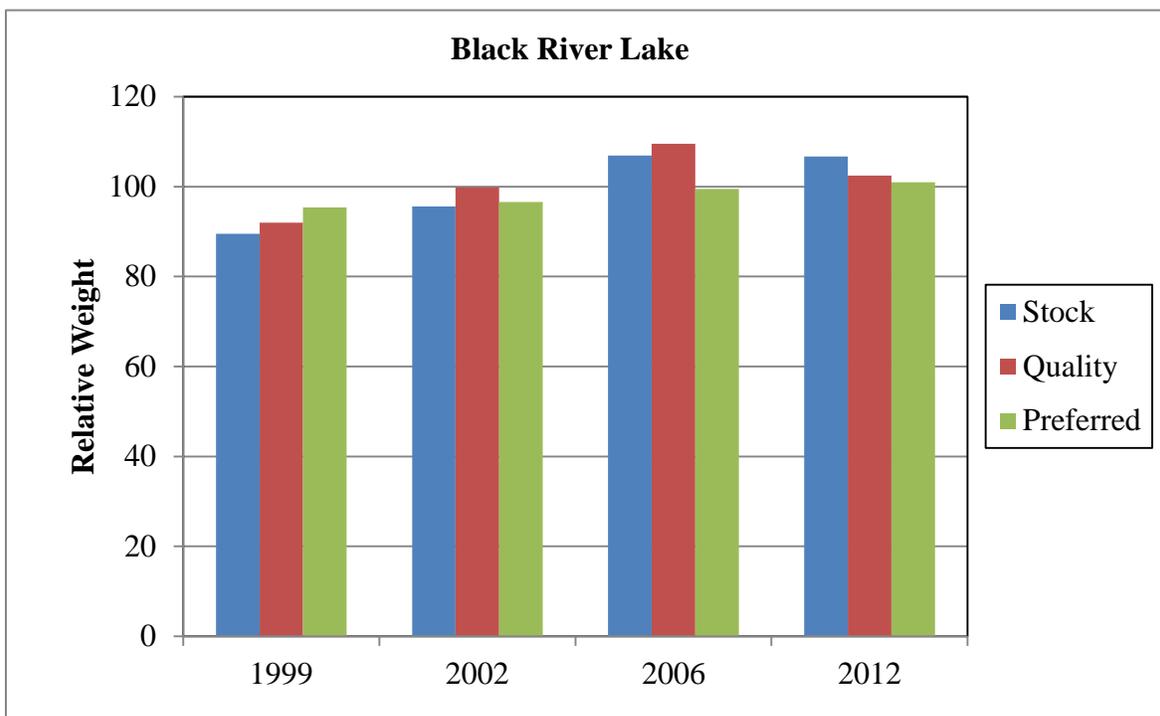


Figure 7. Relative weight values for stock, quality, and preferred-size classes of largemouth bass collected during fall electrofishing for Black River Lake, Louisiana from 1999 – 2012.

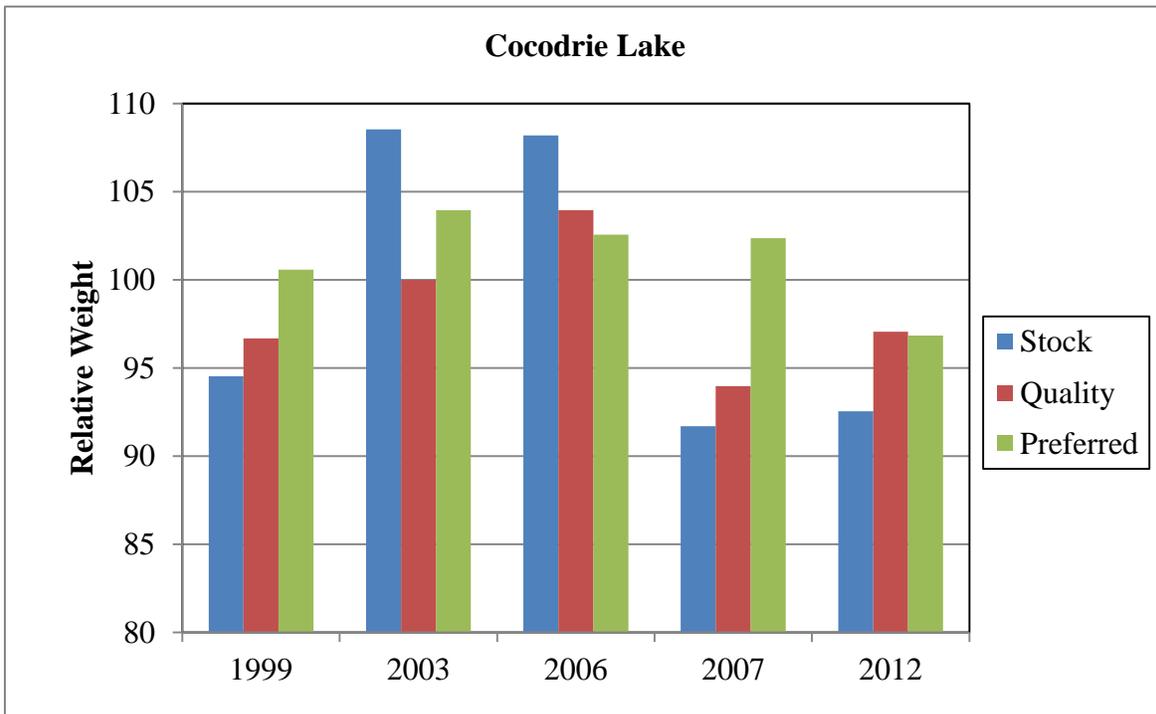


Figure 8. Relative weight values for stock, quality, and preferred-size classes of largemouth bass collected during fall electrofishing for Cocodrie Lake, Louisiana from 1999 – 2012.

Crappie

The Lake Complex supports a good population of both black and white crappies. Black River Lake water is clear and generally supports primarily black crappie, while Cocodrie Lake is more turbid and supports primarily white crappie. Crappie populations are dynamic and greatly influenced by environmental variables such as precipitation and temperature which directly effects recruitment, survival and year class strength. Levels of angler satisfaction are typically proportional to crappie population trends and therefore, also tend to be cyclic in nature.

In 2003, LDWF sampled crappie in Cocodrie Lake with lead nets, frame nets and electrofishing gears. The crappie data set was combined and analyzed for age and growth information. The results are presented in Table 3. The technique of sampling crappie with lead nets has become a standardized sampling method for LDWF. Lead nets were effectively used to sample the crappie population in the Lake Complex in 2006. Results indicate a balanced population consisting of stock-, quality- and preferred-size crappies (Figure 9). Crappie growth rates from the 2006 data sets are compared to the 2003 results in Table 3.

Table 3. Crappie growth rates for Black River-Cocodrie Lake Complex, Louisiana in 2003 and 2006 (n = 352, 154 and 169, respectively).

	Cocodrie Lake - 2003	Black River Lake 2006	Cocodrie Lake 2006
AGE	Average Length (inches) (N= 352)	Average Length (inches) (N=154)	Average Length (inches) (N=169)
0	4.36	8.05	6.94
1	10.30	10.33	9.89
2	10.67	10.96	10.49
3	11.92	12.63	10.91
4	13.48	-	-
5	14.37	-	-
6	-	-	-
7	13.77	-	-

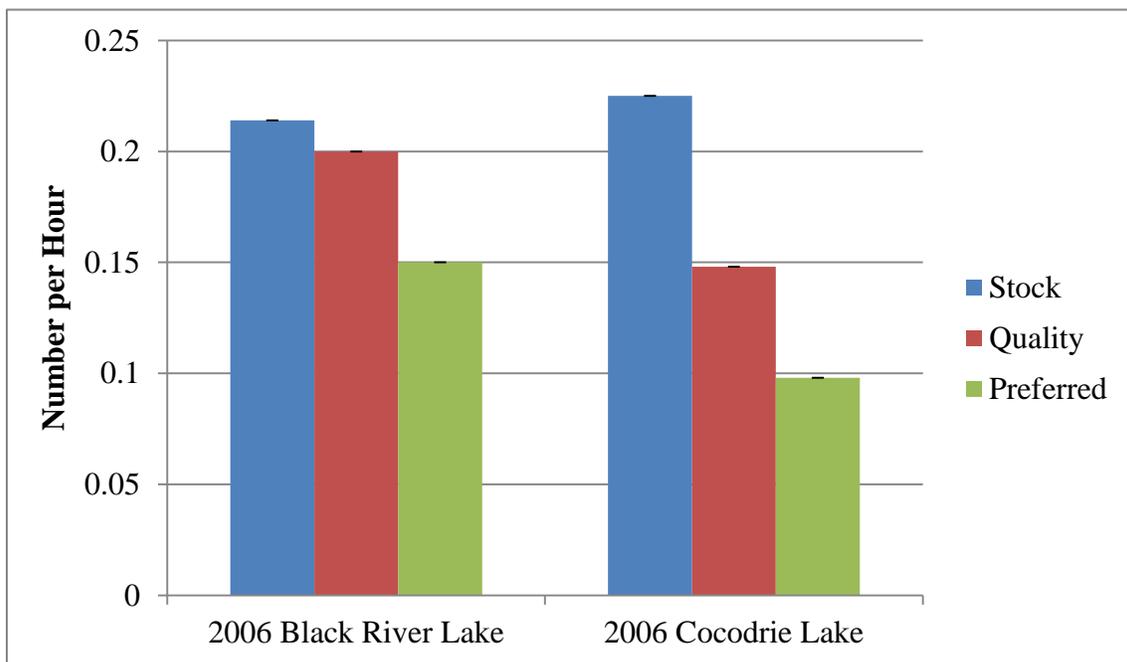


Figure 9. Average CPUE (\pm SE) for stock-, quality-, and preferred-size classes of crappie caught in lead nets from Black River and Cocodrie Lake, Louisiana in 2006.

Commercial

Large rough fish species that comprise a commercial fishery are not found in sufficient numbers to support a viable commercial fishery in the Lake Complex. However, periodic backwater flooding from Cocodrie Bayou provides habitat to support a wide variety of commercial species. Commercial harvest of these species is allowed in accordance with statewide regulations. Wire traps, jug lines, trotlines and rod and reel are used to catch commercial fish. Gill net sampling conducted in 2015 showed species of commercial fish that inhabit the Lake Complex include smallmouth and bigmouth buffalo, blue catfish and freshwater drum (Figure 10).

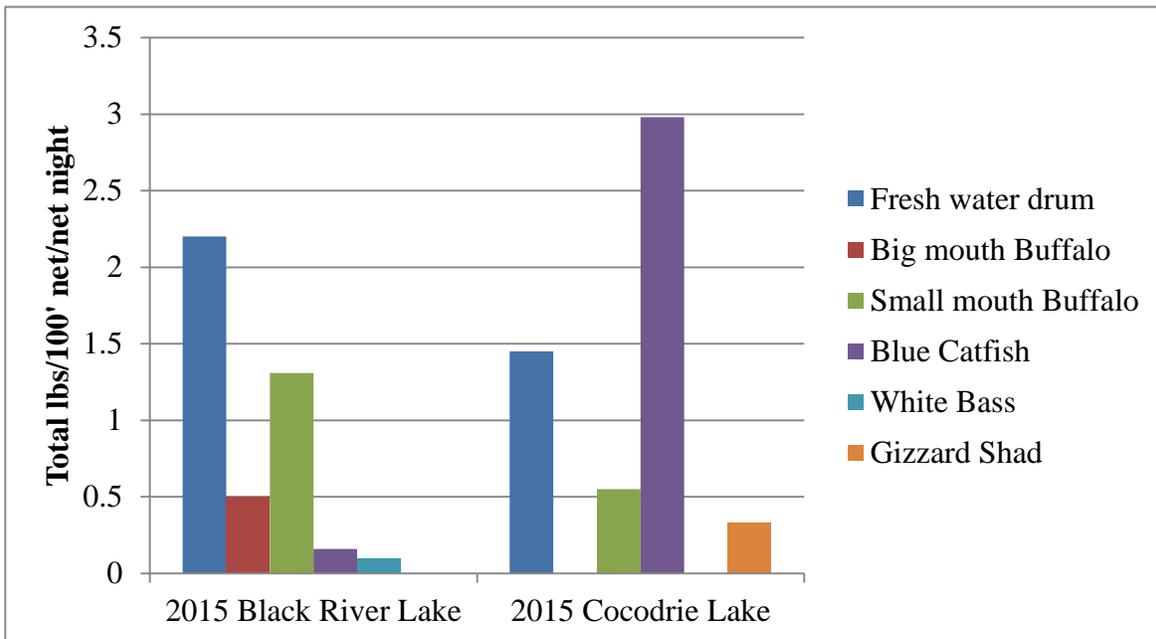


Figure 10. The total CPUE (in pounds per net night) by species for Black River and Cocodrie Lake, Louisiana, collected with standardized gill nets in 2015.

Creel Surveys

Recreational angler surveys were conducted on the Black River-Cocodrie Lake Complex in 2006 and 2007 to gather data on recreational fishing efforts and harvest (Figure 11). Largemouth bass anglers released 77% of their catch in 2006 and 56% of their catch in 2007. While catch and harvest rates were variable, angler participation was similar for the two surveys.

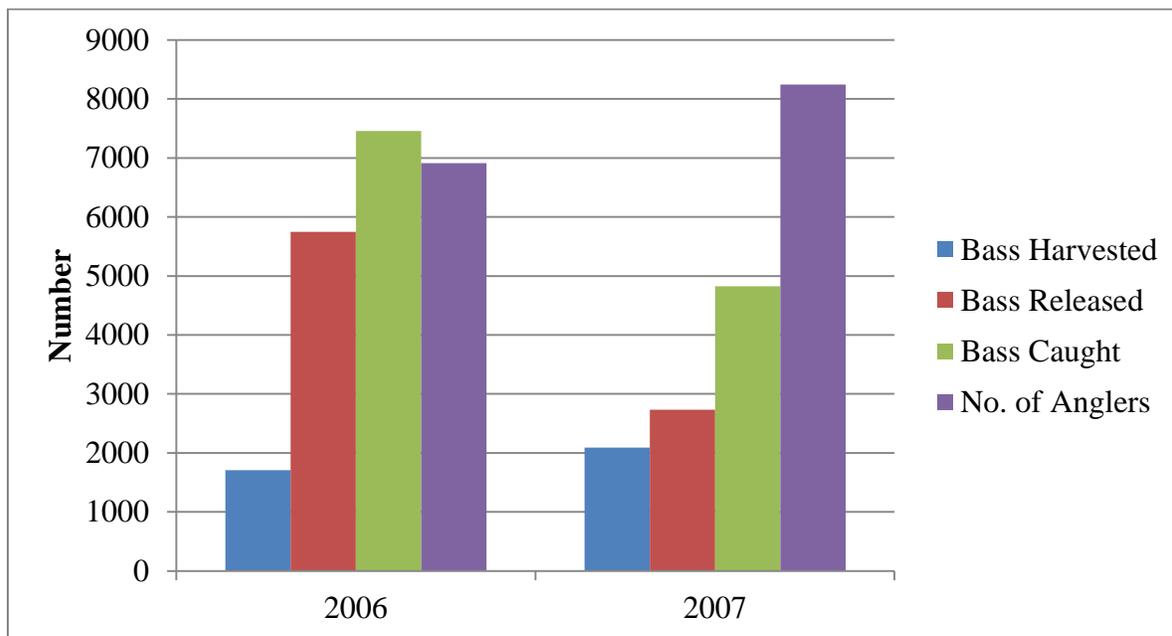


Figure 11. The largemouth bass harvest and angler effort collected during recreational creel surveys on Black River-Cocodrie Lake Complex, Louisiana in 2006 and 2007.

HABITAT EVALUATION

Aquatic Vegetation

Historically, aquatic vegetation has not been a problem in the Lake Complex. Herbicide treatments for nuisance aquatic plants have been conducted in 2008 and 2012. The first record of aquatic vegetation spraying occurred in 2008 when twenty-three acres of mixed alligator weed, common salvinia and water hyacinth were treated. In 2011 there was a fringe of southern naiad in isolated areas of the lake. It was not treated and no control methods were initiated. The following year it was not observed and has not been reported since. In 2012, forty-five acres of alligator weed and water hyacinth were sprayed.

A vegetation survey was conducted on August 6, 2014 and no submersed vegetation was observed. There was a narrow fringe of giant cutgrass along the majority of the shoreline. The shoreline vegetation serves to reduce shoreline erosion from wave action. No vegetation problems are anticipated for 2015. No type maps have been prepared due to a lack of vegetation.

Substrate

Accretion in oxbow lakes is a natural process that normally occurs over time. This process can be accelerated by land use practices that increase erosion and sedimentation. Conversion of bottomland hardwood forests to row crop cultivation has increased the rate and extent of soil erosion in the watershed of the Lake Complex. Bayou Cocodrie is the primary drainage outlet for the majority of Concordia Parish. Cocodrie Lake is directly linked to Bayou Cocodrie through Bayou Cross Cocodrie. During high rainfall events, water draining through Bayou Cocodrie flows into the Lake Complex. This water first enters Cocodrie Lake and then it flows through Workinger Bayou to enter Black River Lake. This provides an ideal situation for sedimentation to occur in the Cocodrie Lake portion of the complex. Though no measurements have been conducted, increased sediment contributions are suspected to be occurring in the Cocodrie Lake portion of the Lake Complex. The potential for ecological alteration due to sedimentation and turbidity in the future remain.

Artificial Structure

LDWF has not placed artificial structure in the Lake Complex. The only manmade structure found in the lake consists of boat docks and piers, located primarily on the Black River Lake side of the complex.

CONDITION IMBALANCE / PROBLEM

Bayou Cocodrie is the primary drainage for Concordia Parish. As a result, the Lake Complex experiences significant water level fluctuations. The inability to control or manipulate water levels limits fisheries management options.

CORRECTIVE ACTION NEEDED

No corrective action is needed at this time.

RECOMMENDATIONS

1. Continue LDWF standardized sampling to assess fisheries populations.
2. LDWF spray crews will continue treating emergent and floating vegetation as needed with either glyphosate (0.75 gal/acre) or diquat (0.75 gal/acre) and an approved surfactant (0.25 gal/acre) in accordance with LDWF Aquatic Herbicide Application Procedures. A mixture of diquat (0.25 gal/acre) and glyphosate (0.75 gal/acre) with Aqua King Plus (0.25 gal/acre) and Air Cover (12 oz/acre) surfactants may be applied to common salvinia. Alligator weed will be controlled with imazapyr (0.5 gal/acre) in undeveloped areas and with imazamox (0.5 gal/acre) near houses and developed shorelines. Turbulence surfactant (0.25 gal/acre) will be used in conjunction with both of these herbicides.
3. Continue aquatic vegetation surveys each summer to monitor for the introduction of exotic vegetation and determine species composition and areal coverage.
4. Continue stocking of hybrid striped bass to utilize available forage and provide additional sport fishing opportunities.