

LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES



**OFFICE OF FISHERIES
INLAND FISHERIES SECTION**

PART VI -B

WATERBODY MANAGEMENT PLAN SERIES

CHICOT LAKE

**WATERBODY EVALUATION &
RECOMMENDATIONS**

CHRONOLOGY

DOCUMENT SCHEDULED TO BE UPDATED ANNUALLY

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WATERBODY EVALUATION

STRATEGY STATEMENT

Recreational

Largemouth bass (LMB) are managed to provide anglers with the greatest opportunity to catch largemouth bass of greater than average size. Frequent introductions of Florida largemouth bass (FLMB) into the population provide the basis for incorporating certain genetic traits that are more likely to produce large bass. Sunfish and crappie are managed to provide a sustainable population while providing anglers the opportunity to catch or harvest numbers of fish.

Commercial

No commercial fishery exists in Chicot Lake.

Species of special concern

No threatened or endangered species have been observed in Chicot Lake.

EXISTING HARVEST REGULATIONS

Recreational

Removal of Quality Largemouth Bass Lake Designation

April 20, 2014: The 14 – 17 inch protective slot limit for bass was removed. From this date forward, statewide harvest regulations for black bass (10 per day creel and no minimum length limit) are in effect for Chicot Lake.

Statewide regulations for all other fish species; the recreational fishing regulations may be viewed at the link below:

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

SPECIES EVALUATION

Recreational

Chicot Lake was designated as a Louisiana Quality Bass Lake in April 1991, with implementation of the statewide Black Bass Management Plan. The designation was limited to seven Louisiana water bodies that had the potential to consistently produce largemouth bass in the “quality to memorable” size range of 5 to 8 lbs. Chicot Lake was selected based on the following criteria:

1. Successful introduction of Florida largemouth bass genome.
2. Habitat with stable, relatively clear, and productive waters with an abundance of LMB forage.
3. No incompatible gear conflicts (webbing).
4. Long term Louisiana Department of Wildlife and Fisheries (LDWF) regulatory control.
5. Angler understanding and support of associated regulations.

Quality bass in Louisiana are the product of 1) suitable habitat with abundant and suitable

forage, 2) adequate longevity to fulfill growth potential. Introduction of Florida largemouth bass can increase opportunities for anglers to catch quality-, preferred-, and memorable-size bass. Black bass regulations consisting of a 14"-17" protected slot limit with an 8 fish daily creel, of which only 4 fish may be harvested over 17" TL was imposed for Chicot Lake when the management plan was implemented. This protected slot regulation remained in effect from 1991 until April 2014. Statewide regulations on largemouth bass have been in effect since that time.

In 2010, LDWF began a three year LMB population assessment (2010 – 2012) in Chicot Lake. Additionally, a creel survey of anglers was also conducted in 2010. A summary of results of the population assessment is found in [Appendix I](#).

Electrofishing is the most commonly used sampling technique to assess largemouth bass relative abundance (catch per unit effort = CPUE) and size distribution. Data collected during spring and fall electrofishing are used to describe population trends, age composition, growth rate, mortality rate and the genetic composition of a LMB population.

Largemouth bass relative abundance, size distribution and relative weight –

The CPUE of largemouth bass collected from Chicot Lake by electrofishing from 1991 to 2014 indicate annual variability over time (Figures 1&2). CPUE was declining from 2009 – 2013 in all indicated size groups, but exhibited an increase in 2014. This increase in CPUE may be due to improved visibility due to the reduction in submerged aquatic vegetation. Electrofishing sampling is conducted during night time hours. Sample time for each station is approximately 900 seconds of actual shocking time. The number of sample sites is determined by the total acres of a waterbody. In the case of Chicot Lake, four samples are conducted each spring and fall season. The four sample sites at Chicot Lake represent different habitats such as grass- line, shoreline, heavy timber, etc. As indicated in Figure 1, abundance of stock-size bass was indicated to be lowest in 2001. The sharp decline in CPUE for stock-size bass is likely related to the drought years of 1999 and 2000. The lake level fell to two feet below pool and remained for several months. Low survival of stock-size and quality-size largemouth bass due to predation is suspected. However, the water level returned to pool (46.2 ft. MSL) in 2001. Sample CPUE began a slow upward trend after 2001. Normal water levels once again provided the availability of shallow water escapement and nursery habitat for young-of-the-year (YOY) and substock-size bass. CPUE for Chicot Lake stock-size largemouth bass peaked in 2004, 2009 and 2014.

Figures 3 and 4 depict CPUE for largemouth bass by size class. CPUE for the three size classes is indicated to be variable over time, with the lowest CPUE for fish up to 14" TL in 2001. CPUE for bass greater than 17" TL generally increased from 1993 – 2009. Declines are noted in 2010 and 2013 with an increase in 2014. Linear forecast trend lines for bass in the protected slot (14 – 17") and above the slot (>17") have shown a stable population from 1991 – 2014.

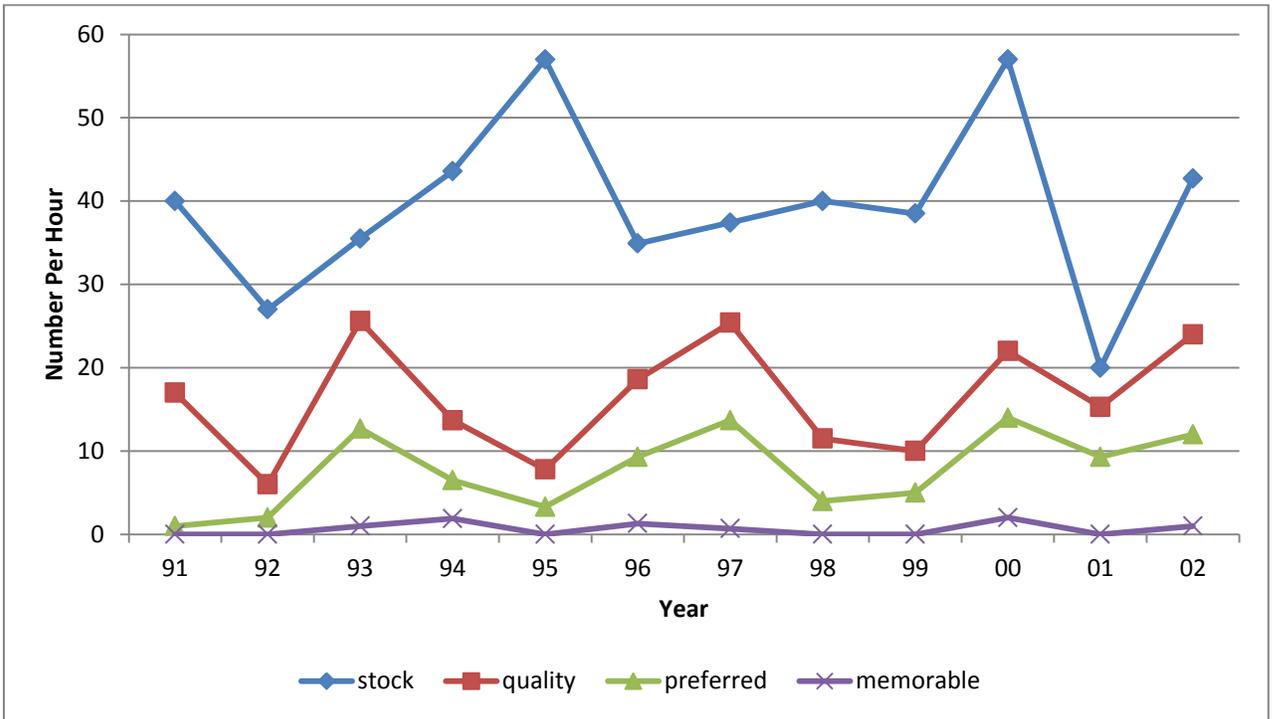


Figure 1. Spring electrofishing CPUE for stock-, quality-, preferred-, and memorable-size groups of Chicot Lake largemouth bass during the period 1991-2002.

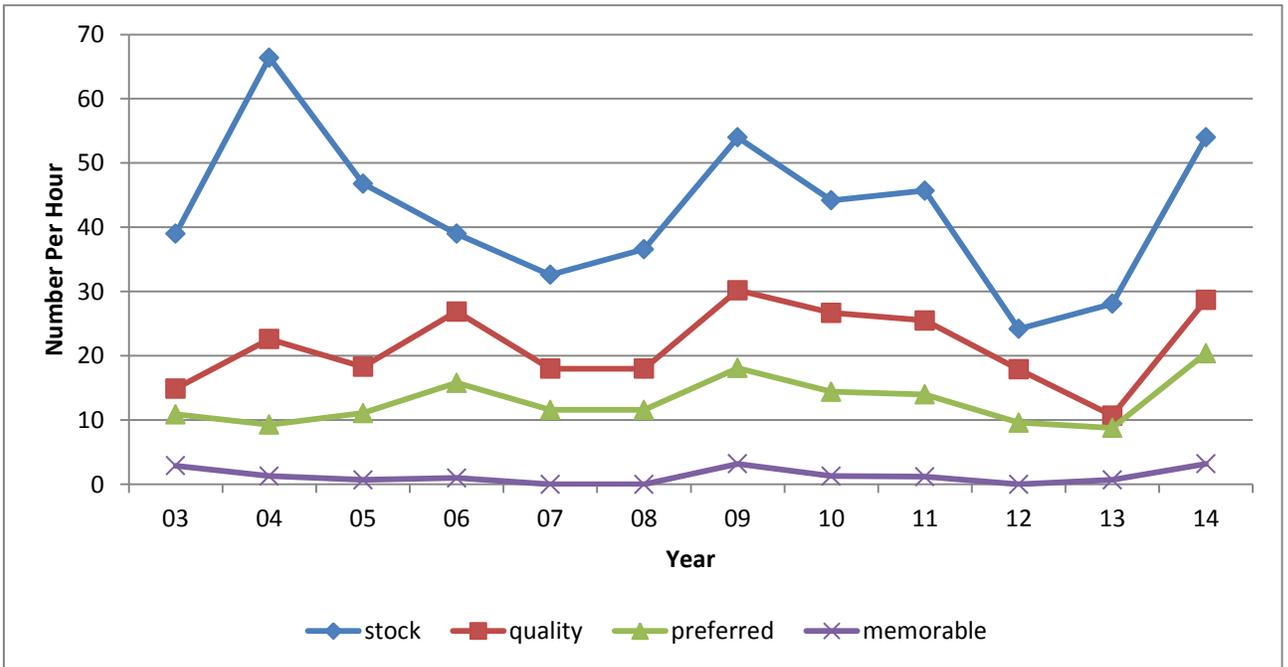


Figure 2. Spring electrofishing CPUE for stock-, quality-, preferred-, and memorable-size groups of Chicot Lake largemouth bass during the period 2003-2014.

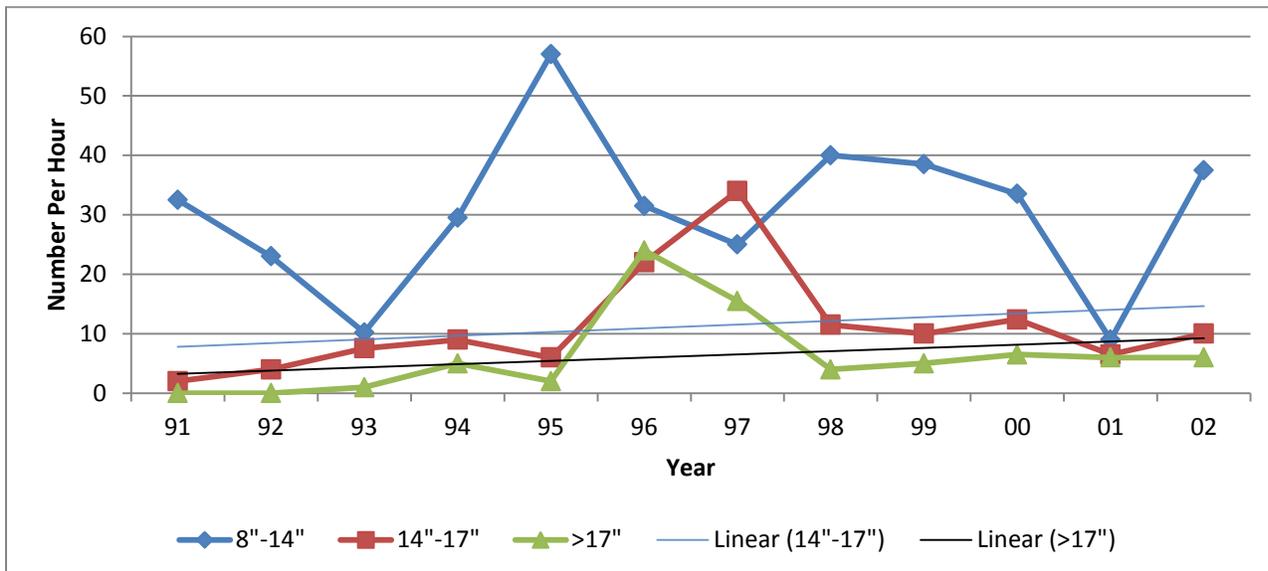


Figure 3. CPUE for three size classes of largemouth bass (8 – 14 inches, 14 – 17 inches, and fish > 17 inches TL) collected in Chicot Lake, Louisiana for the period 1991 – 2002.

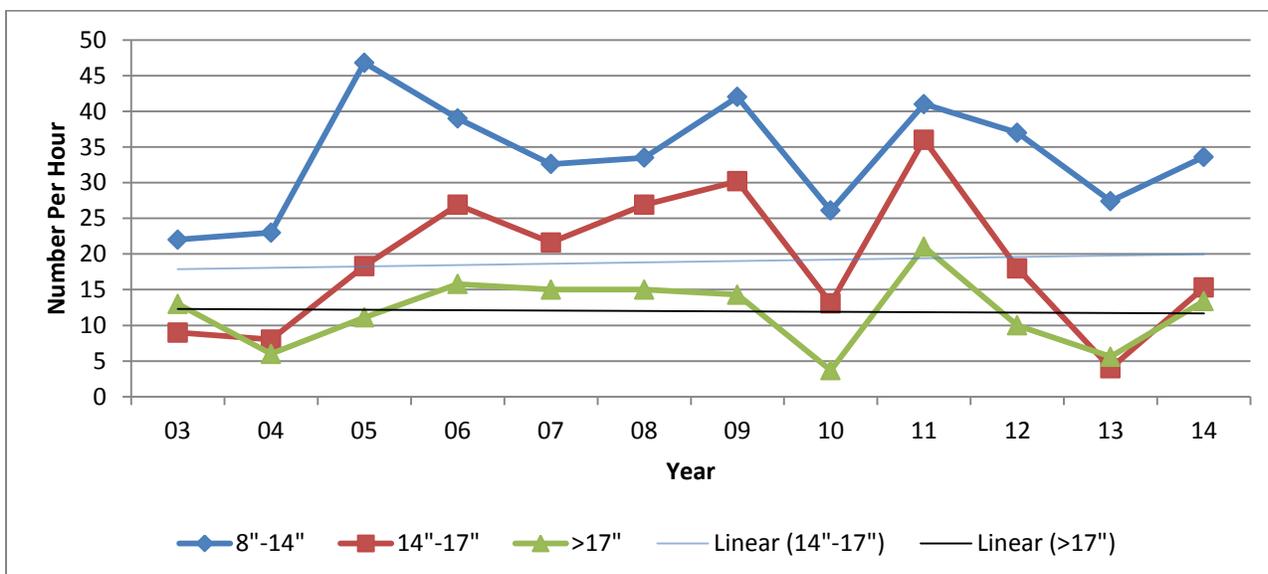


Figure 4. CPUE for three size classes of largemouth bass (8 – 14 inches, 14 – 17 inches, and fish > 17 inches TL) collected in Chicot Lake, Louisiana for the period 2003 – 2014.

Sampling CPUE for bass between 8 and 13 inches has been variable. Interference to sampling from the overabundant growth of hydrilla is attributed as a partial cause. The first observance of hydrilla in Chicot Lake was in 1996. Drawdowns were conducted in 1996 and 1997 to control the invasive species. Drawdowns were also conducted in 2003, 2005, 2008, 2010, 2011, 2012, 2013 and 2014. The sharp decline in CPUE for 2001 is related to the drought of 1999 and 2000. The lake level was significantly lower than normal resulting in low largemouth bass recruitment. CPUE increased from 2005 through 2011 in all inch groups. This trend may be the combined result of increased recruitment and reduced aquatic

vegetation. In 2012 and 2013, sampling CPUE decreased again, likely due to a heavy infestation of common salvinia. In 2014, CPUE increased in all inch groups.

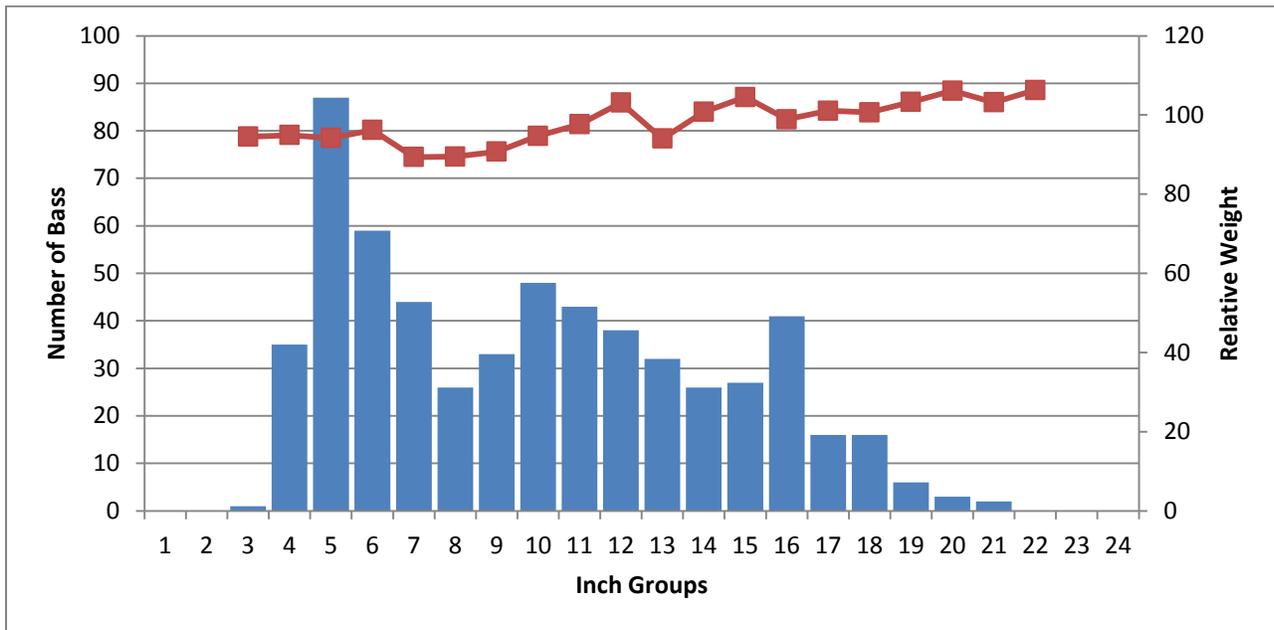


Figure 5. Chicot Lake largemouth bass size distribution and relative weight by inch group for 2010 – 2013. N=583.

Size distribution in inch groups for largemouth bass from 2010 – 2013 is shown in Figure 5. The bass population ranged from 3-21 inches TL during this time period. Strong representation is noted in the 4-16 inch size groups.

Relative weight (W_r) is a measure of fish “plumpness” and is the ratio of fish weight to that of a determined standard. The relative weight (W_r) is calculated by dividing the weight of individual fish by the standard weight for fish of the same length, and multiplying the quotient by 100. Largemouth bass relative weights below 80 may indicate a potential problem with forage availability. Relative weights for Chicot Lake largemouth bass average near 98 in all size groups. The value indicates a healthy bass population with abundant and available forage.

Largemouth bass age, growth and mortality

Figure 4 displays the results of largemouth bass age determination for inch groups analyzed. Otoliths were utilized for age determination. Figure 5 depicts an average of all bass for each inch group collected through the period 1991 – 2007. Largemouth bass were growing past 17 inches in 3-5 years.

Largemouth Bass Population Assessment

A largemouth bass population assessment study was conducted from 2010 – 2012. The study included intensive sampling and an access point creel survey in 2010 to describe angler participation and habits. The purpose of the study was to obtain accurate estimates of length distribution, age composition, and growth and mortality rates of the largemouth bass population. This information was used to determine if alternative regulations would have a desired effect on the population. It was determined that any length or creel restrictions would

have had an insignificant effect on the population. A summary of the report prepared by West et al. (2013) is found in Appendix I.

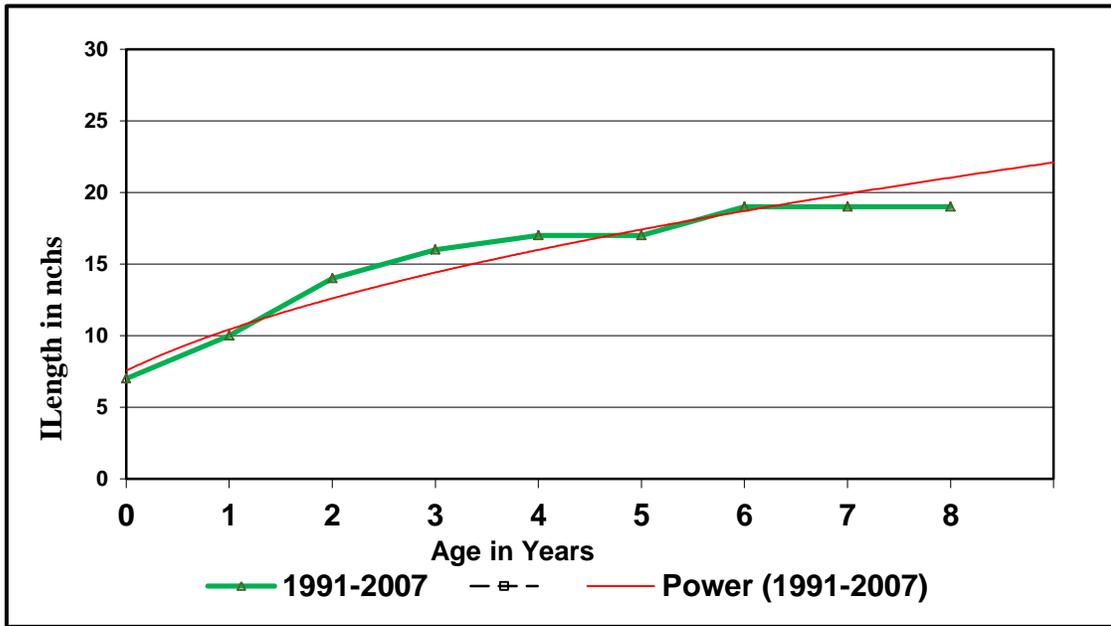


Figure 6. The observed and predicted (power) growth of largemouth bass length at age from Chicot Lake, LA, 1991 – 2007. Total N = 335, N (age 1) = 6, N (age 2) = 153, N (age 3) = 70, N (age 4) = 36, N (age 5) = 6, N (age 6) = 7, N (age 7) = 5 and N (age 8) = 2.

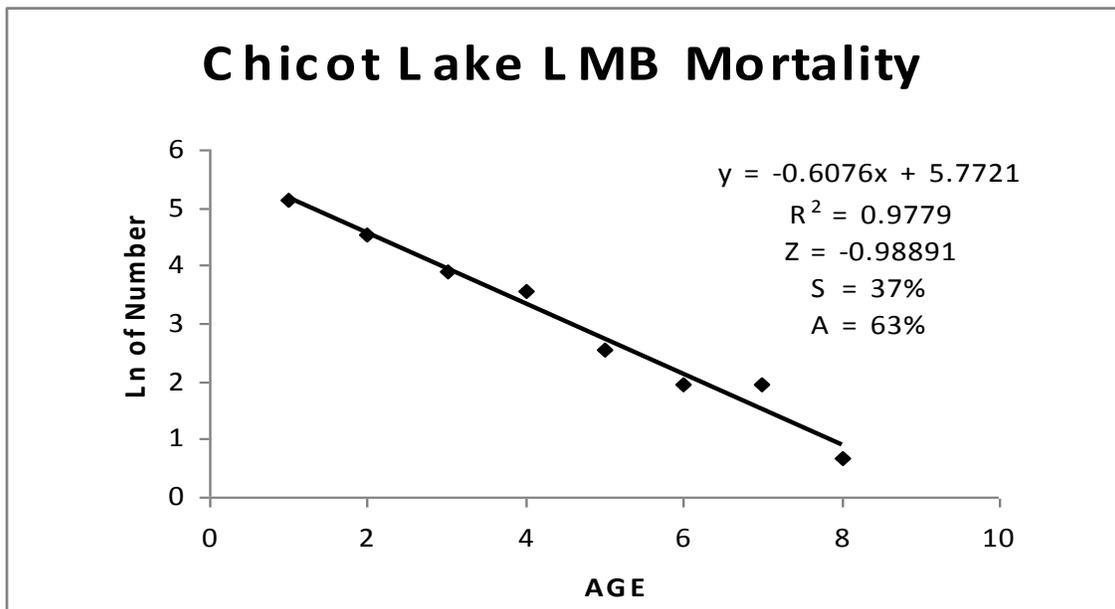


Figure 7. The mortality estimate for Chicot Lake largemouth bass for the combined years 1990 – 2007. R^2 = the fit of the correlation variables; Z = slope of the descending catch curve; S = survival estimate; A = annual total mortality estimate. $N = 385$.

A total of 385 largemouth bass from Chicot Lake have been aged (Figure 5). Six bass less

than 1 year old have been omitted from this mortality analysis (Figure 7). An attempt was made to collect at least 10 fish from each inch group during standardized electrofishing samples. Eighty three percent (83%) of all bass analyzed ranged from 1 to 3 years old. It has been determined that the annual mortality rate of bass from Chicot Lake is relatively high at 63%.

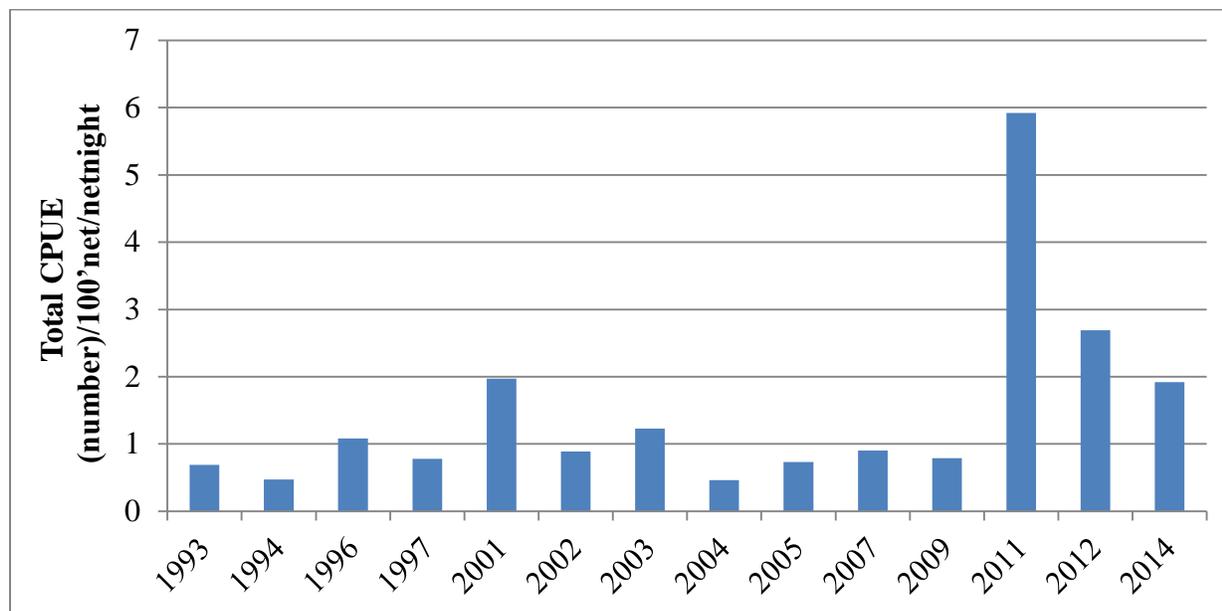


Figure 8. The CPUE for largemouth bass collected from Chicot Lake, LA in gill net samples from 1993 – 2014.

An increase is noted for number of largemouth bass caught per 100 yard/ net night throughout the years sampled. A significant increase occurred in 2011 (total CPUE - 5.92). Largemouth bass captured in gill nets typically exceed 17 inches TL.

Largemouth bass genetics and stocking

The majority of largemouth bass collected for genome determination are taken during the fall standardized electrofishing samples. Some larger sized bass (≥ 20 inches) were collected by gill net samples during the winter months. Ten bass per inch group were used for growth and genetic analysis. Total length and weight is recorded for each specimen. Otoliths and livers are removed for age/growth and genetic analysis. In the years prior to 2008, LMB age were determined in Louisiana State University age and growth lab and in the District 6 office by staff biologist. Otoliths are now sent to the LDWF Office of Fisheries age and growth lab in Baton Rouge for age determination. Liver tissues are sent to the LSU genetics lab for electrophoresis analysis. A three year largemouth bass stock assessment study was conducted between 2010 and 2012. In 2010, 2011 and 2012, 141, 156 and 128 LMB otoliths were collected, respectively. Genetic results over the three year assessment period showed the Florida bass genome to be incorporated into the population at a proportion ranging from 30 – 39%, overall (Table 1).

Florida largemouth bass have been stocked in Chicot Lake from 1988 – 2014. The greatest number of Florida bass fingerlings were stocked in 1988 and the fewest number of bass stocked was in 1996. Total number of Florida largemouth bass stocked in Chicot Lake is 2,393,520 (Table 1).

Table 1. Largemouth bass stockings and genetic results (percent of number sampled) for Chicot Lake Reservoir, LA, 1988 – 2015.

YEAR	NUMBER STOCKED	GENETICS SAMPLE SIZE	NATIVE LMB	FLORIDA LMB	F _x Hybrids	TOTAL FLORIDA INFLUENCE
1988	342,668					
1989	150,000					
1990	127,564	37	82%	02%	16%	18%
1991	132,619					
1992	107,221					
1993	80,595					
1994	85,250	52	56%	19%	25%	44%
1995	153,475	51	56%	15%	29%	44%
1996	18,792					
1997	19,178	152	54%	15%	31%	46%
1998	55,800	35	83%	0%	17%	17%
1999	152,872	33	58%	6%	36%	42%
2000	87,891					
2001	89,568	29	52%	3%	45%	48%
2002	73,322					
2003	83,989					
2004	80,748	33	76%	16%	8%	24%
2005	84,310					
2006	82,425					
2007	84,192	57	44%	2%	54%	56%
2009	86,241	51	56%	38%	6%	42%
2010	75,529	141	62%	11%	27%	39%
2011	72,331	156	70%	8%	22%	30%
2012	66,940	128	70%	6%	24%	30%
2013	17,232					
2014	*252,474					
2015	12,944					
TOTAL	2,423,696					

*In 2014, Florida largemouth bass fry were stocked along with the 28,074 fingerlings

Forage

Sunfish, gizzard shad, silversides and golden shiners have been identified as primary forage species for Chicot Lake largemouth bass. During fall electrofishing, a 450 second sample is conducted to determine forage abundance. Shoreline seine sampling was conducted each summer from 2000 – 2012 to determine young-of-the-year production. However, there is a difference between forage abundance and availability. In conditions of aquatic vegetation overabundance, abundant forage may not be available for predation. Measurements of largemouth bass body condition are recorded to determine utilization of forage.

Table 2. The percent by number of forage species ≤ 5 inches TL collected during electrofishing samples from 2000 – 2012 in Chicot Lake, Louisiana.

Forage – Electrofishing Samples							
Year	Bluegill	Redear Sunfish	Longear Sunfish	Silversides	Gizzard Shad	Golden Shiner	Warmouth
2000	69.0%			2.8%		1.4%	
2001	55.2%				1.1%	2.6%	6.9%
2002	44.0%			7.1%			2.4%
2003	74.4%	0.6%		1.9%			5.7%
2004	39.2%	0.8%			4.2%		2.5%
2005	84.2%	1.0%					0.5%
2006	89.9%			0.6%			0.6%
2007	84.0%	1.4%					2.1%
2008	65.7%	3.2%		7.1%		5.5%	4.0%
2009	56.5%		0.5%	24.4%			1.9%
2011	65.9%	2.4%		3.7%			1.2%
2012	73.6%	3.2%	0.5%	9.4%			1.9%

During fall electrofishing samples, a separate sample is collected to determine forage abundance. In Chicot Lake, bluegill make up the majority of forage available for predator fish such as largemouth bass and crappie.

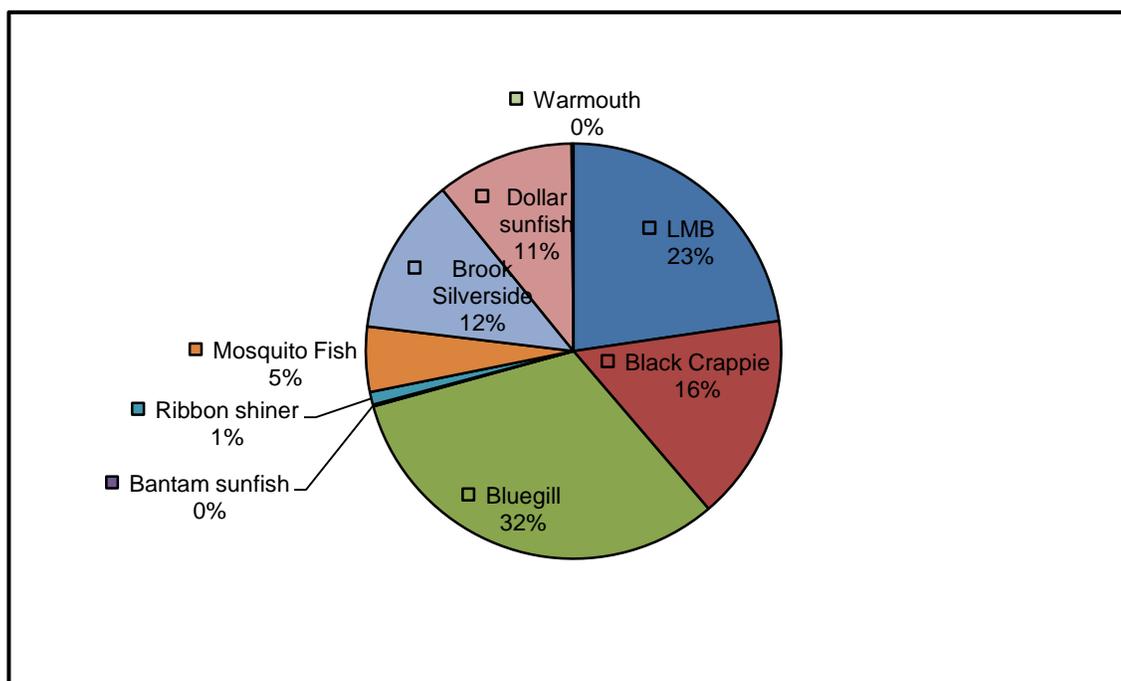


Figure 9. The percent by number of forage species collected in haul seines from Chicot Lake, Louisiana for 2003.

Figure 9 clearly shows that sunfish (bluegill and dollar sunfish) make up the largest percentage of Chicot Lake forage. Silversides and shiners are also numerous.

Table 3. Total number of all fish species less than 5 inches total length captured by seine hauls from Chicot Lake, LA, 2000 – 2009.

Forage – Seine Samples			Catch by Species			
Year	Bluegill	Silversides	Golden Shiner	Mosquito Fish	Redear Sunfish	Longear Sunfish
2000	1066	160	30	13	10	70
2001	240	92	43	48	22	70
2002	543	158	123	49	13	61
2003	227	87	0	36	0	77
2004	531	176	1	0	2	40
2008	218	73	6	2	0	5
2009	1278	9	1	3	2	20

Shoreline seine samples are conducted in the summer months, June – August. All samples were conducted at night from one-half hour after sunset until one – half hour before sunrise. One quadrant haul, using a 25 foot / six foot seine, was conducted at each sampling station. A total of three samples were taken each year at the three boat ramps, one per ramp. The quadrant haul was conducted by anchoring one end of the seine at the shoreline and the other stretched perpendicular to the shoreline. The distal end will then swing around back to the shoreline, keeping the lead line tight and on the bottom. After the seine haul is completed, all fish from the seine is placed in a plastic bag, properly marked, and placed on ice. Fish specimens are sorted to species, and by length.

Crappie

Chicot Lake 2000 Frame Net Catch

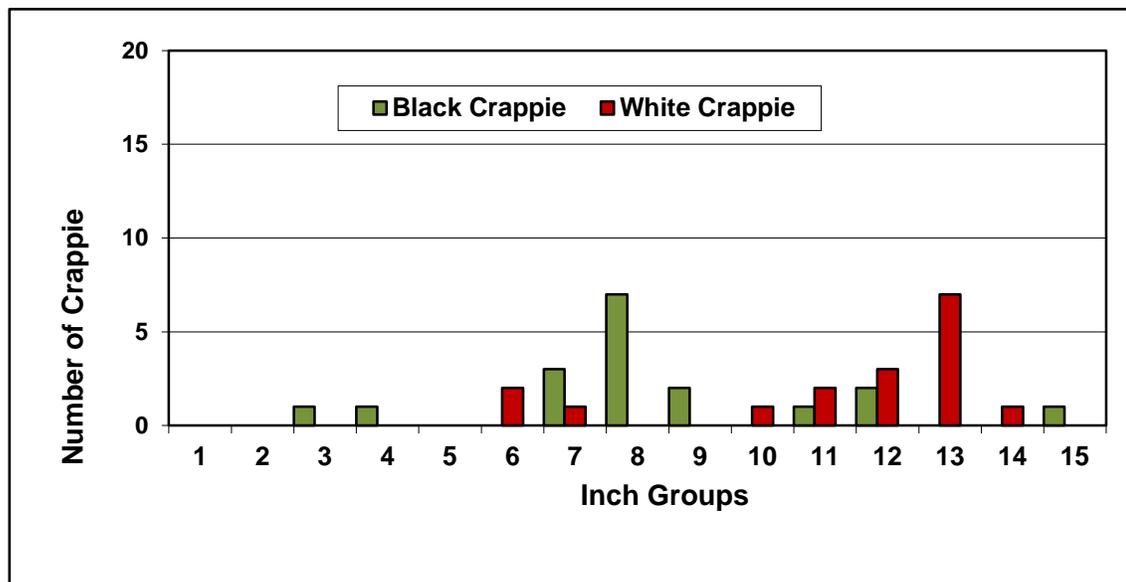


Figure 10. Size distribution (inch groups) of black crappie and white crappie captured in frame nets from Chicot Lake, LA, 2000.

Chicot Lake 2002 Frame Net Catch

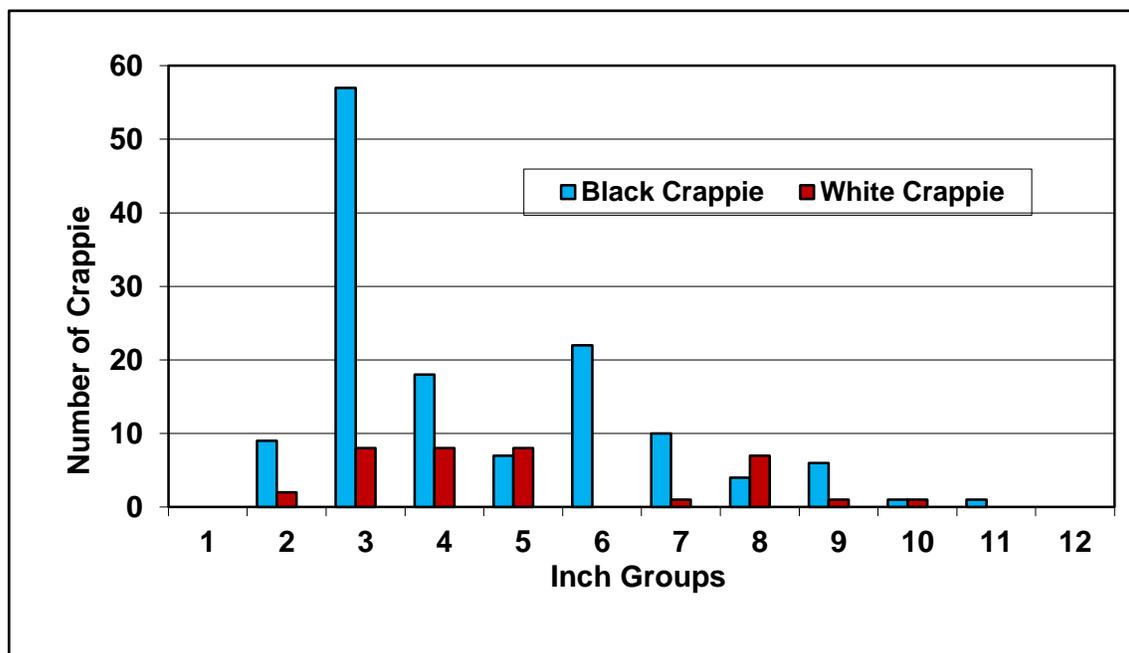


Figure 11. Size distribution (inch groups) of black crappie and white crappie captured in frame nets from Chicot Lake, LA, 2002.

Frame nets produced low catch rates overall in 2000 (Figure 10), but a significant number of white crappie in the 11-13 inch groups were included in the samples. In 2002 (Figure 11), catch rates of crappie were significantly higher which indicates good recruitment occurred in 2001 and 2002 following the drought. The Chicot Lake crappie population consists mainly of black crappie.

Except for 2008, crappie populations (Figures 12, 13, and 14) have shown increased abundance of larger fish in the last few years. In 2006 and 2009, six and seven inch crappies were prevalent, as well as 10-12 inch fish. In 2008, the numbers decreased, possibly due to fish kills resulting from Hurricane Gustav. Sampling was conducted two months after the storm. The 2014 lead net results showed that black crappie was represented by 6-12 inch fish, with the 8 inch size class being most abundant (Figure 15). White crappie ranged from 7 to 15 inches, with 13 inch crappie being slightly more abundant than the other sizes.

Chicot Lake 2006 Lead Net Catch

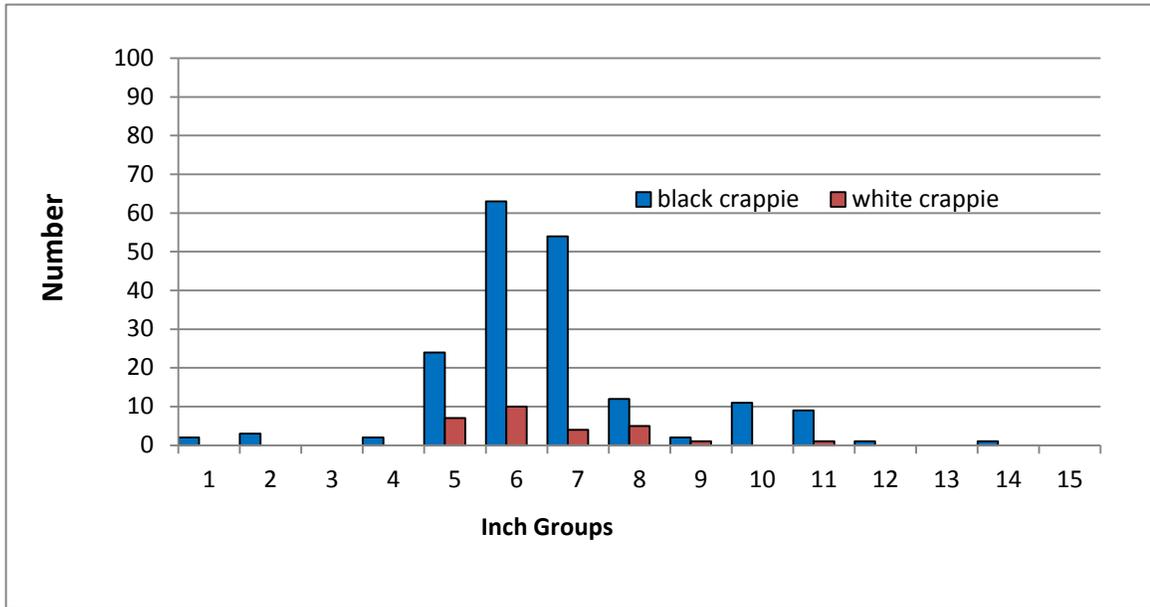


Figure 12. Total number and size by inch group of black crappie and white crappie captured in lead nets in Chicot Lake, 2006.

Chicot Lake 2008 Lead Net Catch

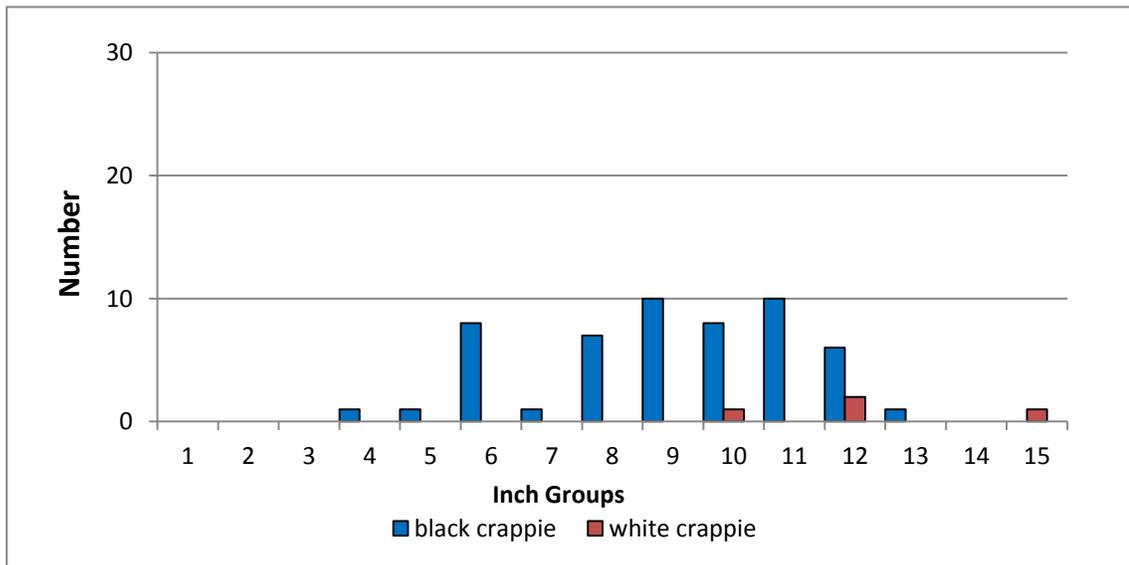


Figure 13. Total number and size by inch group of black crappie and white crappie captured in lead nets in Chicot Lake, 2008.

Chicot Lake 2009 Lead Net Catch

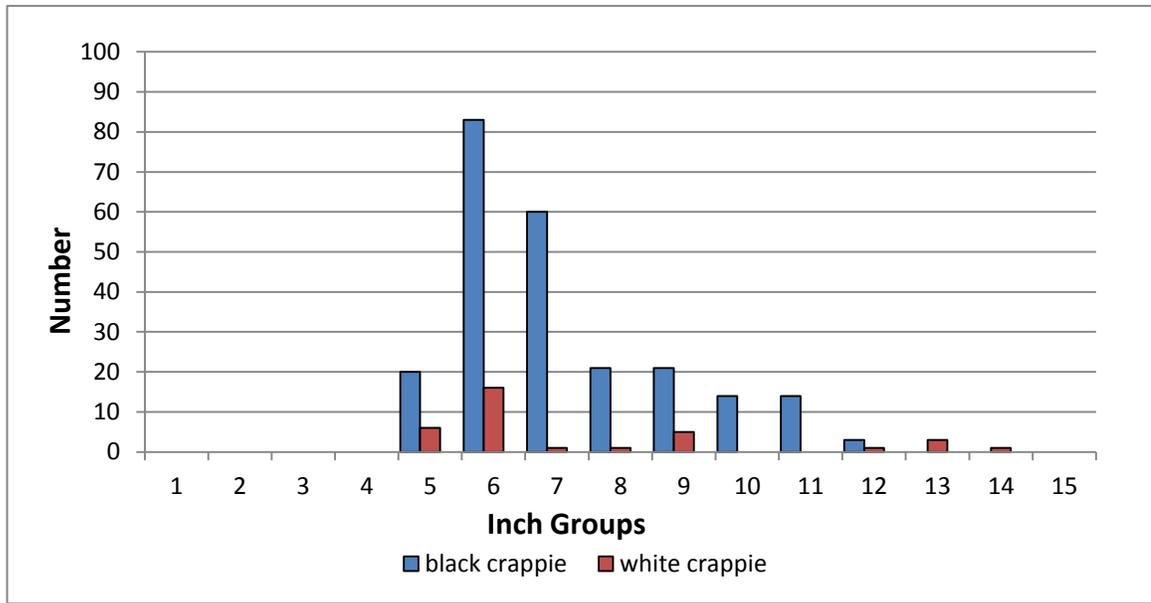


Figure 14. Total number and size by inch group of black crappie and white crappie captured in lead nets in Chicot Lake, 2009

Chicot Lake 2014 Lead Net Catch

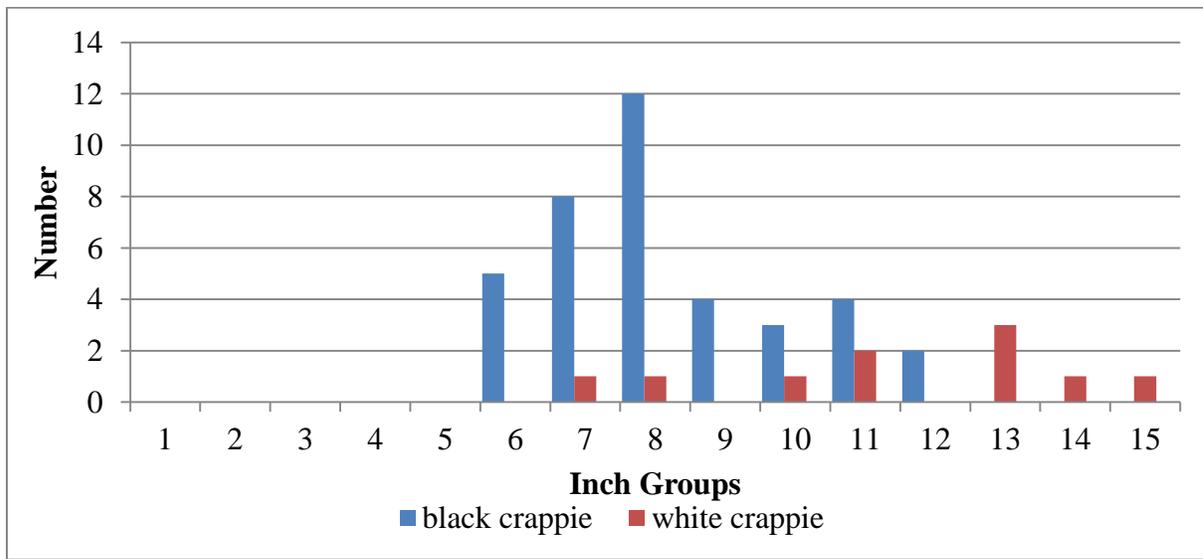


Figure 15. Total number and size by inch group of black crappie and white crappie captured in lead nets in Chicot Lake, 2014.

Figure 16 depicts the mortality and survival estimates from a sample of 50 black crappie captured from Chicot Lake, La. from the 2006 and 2008 lead net samples. The ages of these fish are from 2-4 years old. It has been determined that approximately 62% of crappie in these age groups will perish, with a corresponding 38% survival rate.

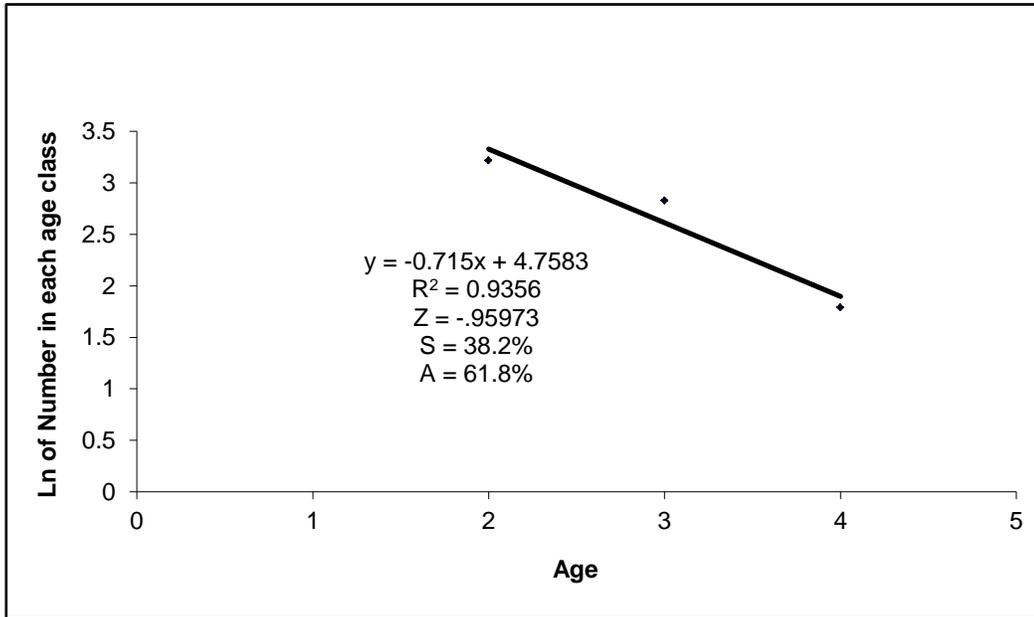


Figure 16. Black crappie mortality and survival estimates for Chicot Lake, LA, from data collected in 2006 and 2008 lead net samples. R^2 = the fit of the correlation variables; Z = slope of the descending catch curve; S = survival estimate; A = annual total mortality estimate. $N = 50$.

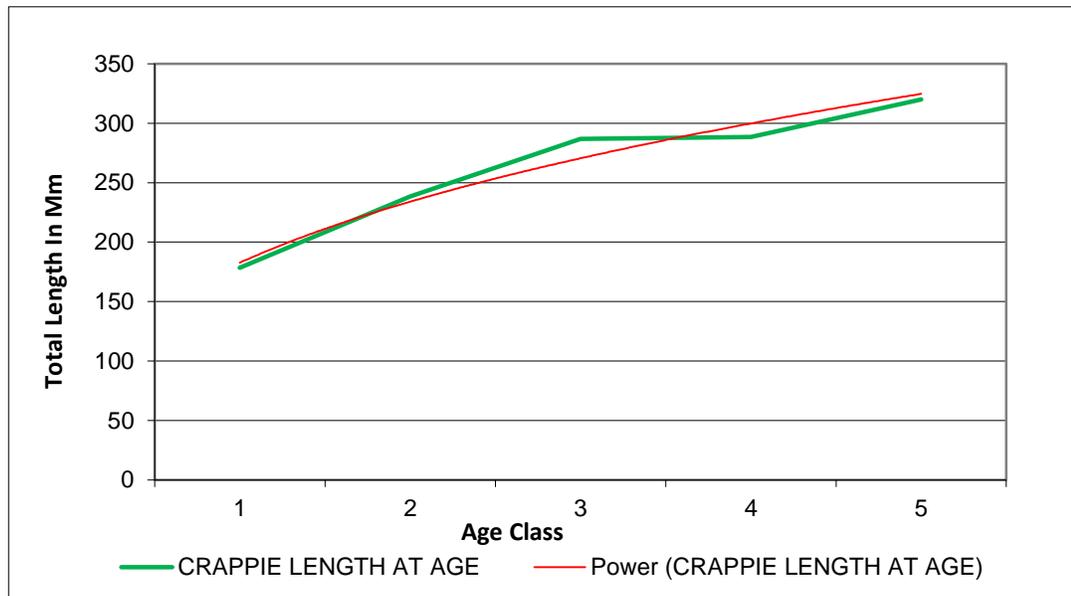


Figure 17. Observed and predicted (power) growth of black crappie length at age from data collected in 2006 and 2008 lead net samples from Chicot Lake, LA. $N=65$.

Figure 17 includes data from a sample of Chicot Lake black crappies ($n=65$). Black crappies reach 7'' of length at age 1, 9.4'' at age 2, 11.2'' at age 3, 11.4'' at age 4 and 12.5'' at age 5. Crappie growth is rapid during the first three years of life, and then slows at the onset of

sexual maturity.

Sunfish

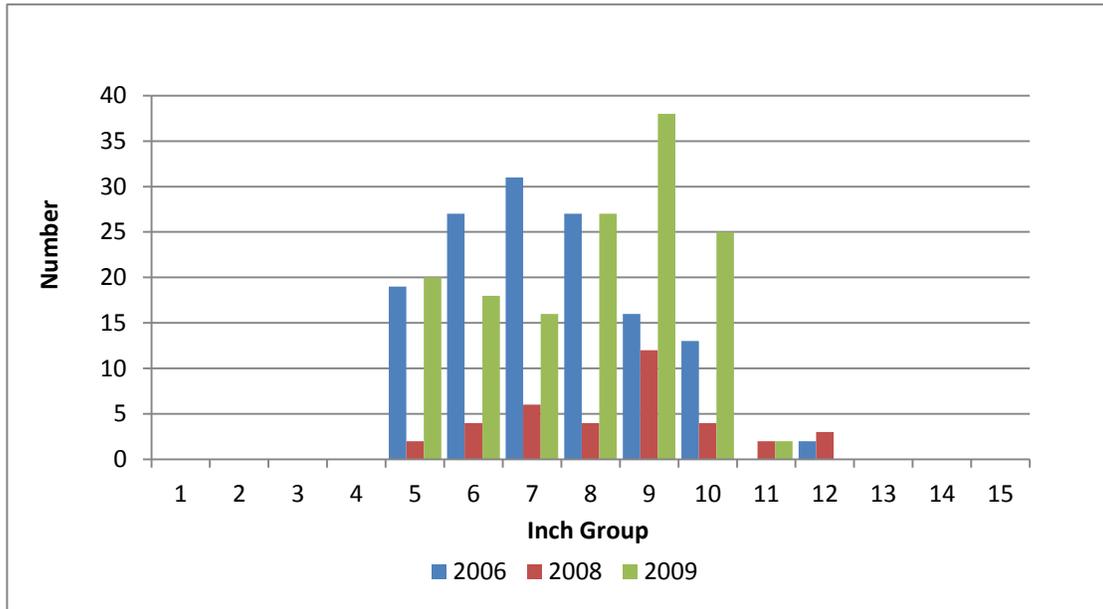


Figure 18. Size structure (inch groups) of redear sunfish captured in lead nets from Chicot Lake, LA during 2006, 2008, and 2009.

Figure 18 depicts the size structure of redear sunfish collected with lead nets from Chicot Lake. Redear sunfish were captured along with crappies and other sunfish species. Large numbers of 7 – 10 inch fish suggest that the redear sunfish population is thriving in Chicot Lake.

Commercial

Commercial fishing is prohibited in Chicot Lake, but due to an overpopulation of buffalo fish, a controlled commercial harvest was conducted in 1967, 1968, 1970 and 1980. Rotenone samples taken by LDWF in 1968 and 1980 averaged 94 and 250 pounds/acre of buffalo fish, respectively (Table 4). The commercial harvest was conducted because excessive abundance of large commercial fish species can limit the production and survival of sport fish. In 1968, 67,897 lbs. were harvested. In 1980, 31,404 lbs. were harvested. No harvest records are available for 1967 or for 1970.

The overabundance of rough species in 1968-1980 may have been due to the influence of water from Bayou Choctaw which enters from the south end of the lake. At the time, Chicot had abundant native submerged vegetation which provided ideal buffalo fish habitat. During the spillway reconstruction period in 1985-1987, all remaining fish in the channel were removed with the use of rotenone.

Table 4. Chicot Lake standing crop estimates from rotenone samples reported in total pounds of fish per acre from 1954 – 1996.

YEAR	GAME SPECIES	NON-GAME SPECIES	TOTAL LBS./ACRE
1954	N/A	N/A	146
1958	N/A	N/A	19
1967	45.4 LBS.	32.6 LBS.	219
1968	100.9 LBS.	106.5 LBS.	230
1969	N/A	N/A	188
1970	N/A	N/A	204
1971	N/A	N/A	301
1975	34.7 LBS.	8.6 LBS.	141
1976	N/A	N/A	434
1977	54.7 LBS.	7.3 LBS.	276
1978	N/A	N/A	362
1980	61.2 LBS.	259.1 LBS.	647
1981	61.9 LBS.	126.5 LBS.	394
1982	N/A	N/A	258
1989	N/A	N/A	50
1990	61.4 LBS.	4.01LBS.	102
1991	26.5 LBS.	0.97 LBS.	69
1994	50.4 LBS.	7.69 LBS.	116
1996	63.6 LBS.	3.67 LBS.	153

Non-game species such as garfish, bowfin, carp and buffalo fish comprised a large percentage of the fish community during the early 1980's. But when the lake was drawn down in 1985 – 1987, non-game fish declined and have not recovered.

Table 4 above depicts a high standing crop of fish taken in biomass (rotenone) samples in the years 1967 through 1982. In these years, numerous predatory species and game fish species dominated the population. From 1989 through 1996, total pounds per acre diminished due to the reconstruction of the spillway from 1985 – 1987. Chicot Lake remained dry and the fish population was depleted. The total pounds per acre of fish in 1989, 1990, 1991, 1994 and 1996 consisted mainly of game species and rough fish (carp, buffalo).

For LDWF standardized gill net sampling, 4-100 yard nets are used. A net set consists of four, 100 yard nets of the following specified mesh sizes: 2.5 inches, 3 inches, 3.5 inches and 4 inches. The minimum number of net sets is determined by the surface area of the impoundment. Gill nets are set within one hour of sunset and retrieved as soon as possible after sunrise. Sampling is conducted between December 1 and February 28. Commercial species such as buffalo, freshwater drum and common carp are shown in Tables 5 and 6. The numbers of these species have remained low since the lake was refilled in 1988.

Table 5. Species captured/year by gill net for Chicot Lake, LA, 1990 - 1996.

SPECIES	YEAR						
	1990	1991	1992	1993	1994	1995	1996
Largemouth Bass	4	13	25	15	19	39	28
Crappie		1	1	1	7	11	20
Common Carp		2	6	2			2
Bullhead	21	1	8	2	2	1	11
Chain Pickerel				1		1	
Bowfin	5	1	19	11	10	23	11
Spotted Gar		1		2		2	5
Gizzard Shad	14	2	34	69	23	60	9

Table 6. Total number of species captured/year by gill net for Chicot Lake, LA. 2000 – 2014.

SPECIES	YEAR										
	2000	2001	2002	2003	2004	2005	2007	2009	2011	2012	2014
Largemouth Bass	19	99	32	59	22	35	43	38	71	134	69
Crappie	3	13	1	5	3	4	13	3	7	2	1
Common Carp	5	4		5	3	3	2		1	15	0
Bullhead	11	3	5	6	4	5	5	5	7	2	3
Bigmouth Buffalo						1	1				0
Freshwater Drum			1								0
Chain Pickerel		1		1							0
Bowfin		10	1	10	13	7	5	24	12	22	12
Spotted Gar	2	5		7	6	3	5	2		1	0
Gizzard Shad	15	49	116	151		110	50	4	4	4	28
Channel Catfish				2	1						0
Grass Carp											2

Creel Surveys

Access point creel surveys are conducted to collect fisheries dependent data including fishing pressure, catch, harvest, success and species targeted.

Table 7. Average number of largemouth bass anglers, time fished, and distanced traveled for Chicot Lake creel surveys conducted from 1989 – 2010.

BASS ANGLERS (89-91 – 14 & 16inch minimum) (14 – 17 inch slot since April 1991)			
Year	Mean # of anglers in party	Mean trip length (hours)	Mean one-way distance traveled to ramp
1989	1.92	3.65	28.39
1990	1.98	4.09	37.87
1991	1.79	4.49	27.04
1992	1.80	3.89	32.38
1996	1.68	3.95	32.73
1998	1.63	4.08	35.36
2002	1.58	4.26	30.89
2006	1.62	4.10	30.69
2010	1.82	3.98	45.00

Bass anglers in Chicot Lake averaged fishing for 4 hours per trip after having driven approximately 32 miles to the ramp where they launched their boat (Table 7). Participation by local largemouth bass fishermen make up the majority of anglers interviewed. These areas include Evangeline, St. Landry, Allen and Avoyelles parishes.

Table 8. Largemouth bass caught, released and harvested per trip per hour on Chicot Lake, LA, from 1989 – 2010.

BASS ANGLERS (89-91 – 14 & 16 inch minimum) (14 - 17 inch slot 1991-2010)				
Year	LMB caught per trip/per hr.	LMB released per trip/per hr.	LMB harvested per trip/per hr.	LMB Av. weight
1989	2.39 / 0.55	2.29 / 0.53	0.10 / 0.02	1.83
1990	1.91 / 0.46	1.89 / 0.46	0.01 / 0.00	2.25
1991	1.34 / 0.29	0.99 / 0.21	0.34 / 0.08	1.19
1992	0.64 / 0.15	0.41 / 0.10	0.24 / 0.05	1.07
1996	1.15 / 0.27	0.87 / 0.21	0.28 / 0.07	2.07
1998	1.03 / 0.25	0.81 / 0.20	0.22 / 0.05	2.14
2002	1.44 / 0.32	1.14 / 0.26	0.30 / 0.06	1.66
2006	0.79 / 0.20	0.63 / 0.17	0.16 / 0.03	2.46
2010	1.10 / 0.26	0.85 / 0.22	0.25 / 0.05	1.38

Catch and release rates by bass anglers in Chicot Lake were higher in 1989 and 1990 when large numbers of sub-stock- and stock-size bass were available (Table 8). The minimum lengths limits imposed (14” in 1989 and 16” in 1990) protected this strong year class. In 1991, a 14” – 17” protected slot limit was implemented and harvest of bass below 14” increased. The average weights for harvested bass were higher after the protected slot limit was imposed. Bass catch rates have remained stable from 1991 - 2010. The number of bass harvested remained relatively low due to legal protection provided by the protected slot regulation.

Table 9. The percent (%) by number of total fish species harvested from Chicot Lake, LA by fishermen per year from 1989 through 2010.

Total Number Harvested by Year										
Species	1989	1990	1991	1992	1996	1998	2002	2006	2010	%
Largemouth bass	1.6	0.07	6.8	8.0	7.2	14.0	11.1	10.0	13.0	8.0
Black Crappie	69.4	76	0.4	62.5	17	32.8	21.6	44.0	26	39.1
White Crappie	0	0	44.1	0.3	0	0.3	1.6	1.8	.005	5.3
Bluegill	16.4	21.4	40.7	23.6	63.6	37.7	53.1	32.6	49	37.6
Redear Sunfish	1.7	1.6	5.2	3.1	9.2	8.6	11.3	7.6	11	6.6
Warmouth	0.1	0.03	1.4	0.3	1.2	0.1	0.8	0.1	.008	0.45
Yellow Bullhead	10.8	0.08	1.3	1.8	1.6	6.5	0.5	3.8	.003	2.9
Orange-spotted sunfish	0	0	0	0	0	0	0	0.1	0	0.01
Spotted sunfish	0	0	0.03	0	0.2	0	0	0	0	0.03
Bowfin	0	0.03	0.04	0.1	0	0	0	0	0	0.02
Green Sunfish	0	0	0.03	0.3	0	0	0	0	0	0.04

Although averaging only 7.3% of the harvest, largemouth bass are one of the most pursued by Chicot Lake fishermen (Table 9). Crappie and bluegill are the most common species pursued throughout all creel years combined.

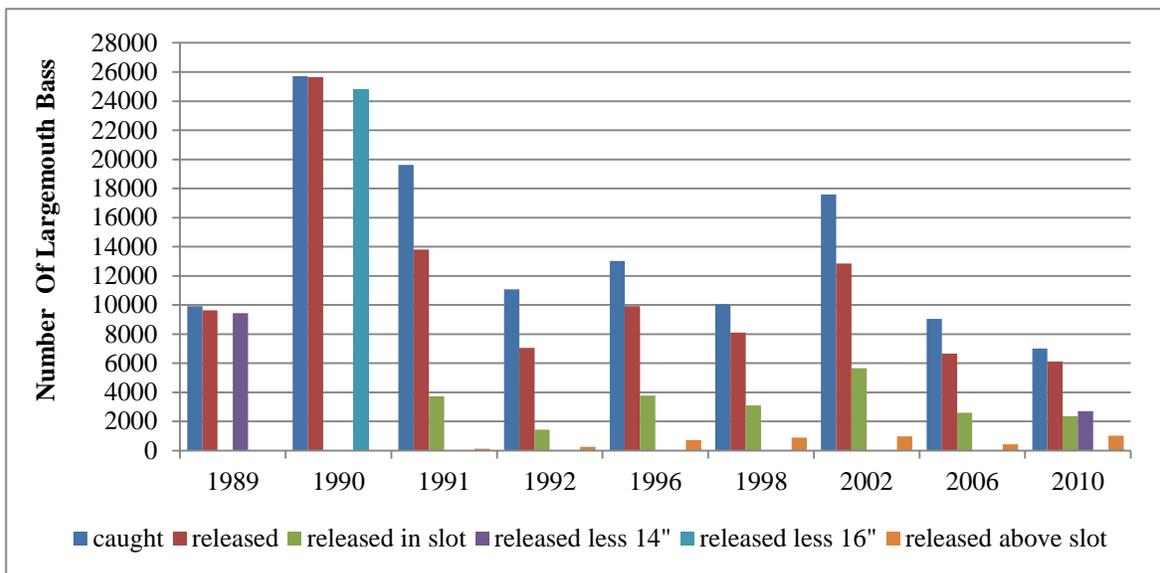


Figure 18. Estimated total number of LMB caught and released in Chicot Lake, LA 1989 – 2010.

Table 10. Angler hours of effort directed by largemouth bass fishermen per acre per year for Chicot Lake, LA for the time period 1989 – 2010.

YEAR	ANGLING HOURS FOR BASS
1989	12.6
1990	78.2
1991	82.8
1992	65.7
1996	40.0
1998	48.5
2002	45.7
2006	41.7
2010	22.2

In 1989, a 14 inch minimum length limit was implemented for largemouth bass. In 1990, the minimum length regulation was increased to 16 inches. In 1991, a protected slot limit of 14 - 17 inches was implemented and remained in effect until 2014. Angler effort was highest in the early 90's, and has declined since. For a protected slot regulation to be effective, sufficient angler effort is necessary (at least 30 angler hours / acre / year). Angling efforts exceeded 30 hours / acre / year in all years but 2010 (Table 10).

During creel surveys, questions were asked of fishermen as they completed their fishing trip (Table 11). One of the questions was; “What do you think about the present bass regulation on Chicot Lake, (14-17 inch slot)?” If the fishermen disagreed with the regulation, they were asked, “If you don't like it, how would you like it changed?”

Table 11. The results of angler opinion surveys taken at boat ramps on Chicot Lake, LA during creel surveys in 1998, 2002, 2006 and 2010.

Chicot Lake Angler Opinion Survey Results								
	Bass Anglers				All Anglers			
Preference	1998 N = 886	2002 N = 494	2006 N = 385	2010 N = 313	1998 N = 1,349	2002 N = 983	2006 N = 749	2010 N = 333
14" min.	6.8 %	16.4 %	7.3 %	22%	5.1 %	11.6 %	4.3 %	9.0%
13" min.	0.2 %	0.0 %	0.0 %	0.0%	0.2 %	0.0 %	0.0 %	0.0%
12" min.	1.0 %	1.6 %	1.3 %	2.0%	0.9 %	1.3 %	1.3 %	0.6%
Other min.	1.9 %	0.6%	1.0 %	2.4%	1.4 %	0.3 %	1.1 %	0.6%
14-17 Slot	75.6%	69.4%	85.5%	68%	65%	67%	78.9%	77%
13-16 Slot	0.0%	0.4%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%
15-19 Slot	0.7%	0.2%	0.0%	0.0%	0.6%	0.1	0.0%	0.0%
Other Slot	3.8 %	1.8 %	1.0%	4.0%	3.3 %	1.0%	0.7 %	0.8%
No length restriction	0.6 %	2.0 %	0.8 %	0.5%	0.4 %	1.4 %	0.7 %	2.0%
No opinion	8.7 %	6.3 %	1.8 %	0.5%	22.6 %	16.4 %	12.1 %	10%
Other	0.5 %	1 %	1.3 %	0%	0.3 %	0.6%	0.9 %	0.0%
Catch & Release	0.2%	0.2%	0.0%	0.6%	0.2%	0.0%	0.0%	0.0%

Sunfish

As reported in Table 12 below, sunfishes make up the greatest percentage of all species harvested in Chicot Lake. Bluegills make up the majority of sunfish harvested in Chicot Lake, followed by redear sunfish. The best opportunity to harvest these sunfish is during the months of May and June when they are spawning.

Table 12. Percentage of common sunfish species harvested by anglers, in Chicot Lake, LA, for the years 1989 – 2006.

List of species sorted by percent of total number harvested										
Species	1989	1990	1991	1992	1996	1998	2002	2006	2010	Average
Bluegill	16.4	21.4	40.7	23.6	63.6	37.7	53.1	32.6	49.0	37.6
Redear Sunfish	1.7	1.6	5.2	3.1	9.2	8.6	11.3	7.6	11.0	6.5
Warmouth	0.1	0.03	1.4	0.3	1.2	0.1	0.8	0.1	.008	0.45
Orange-spotted sunfish	0	0	0	0	0	0	0	0.1	0	0.01
Spotted sunfish	0	0	0.03	0	0.2	0	0	0	0	0.03
Green Sunfish	0	0	0.03	0.3	0	0	0	0	0	0.04

Crappie

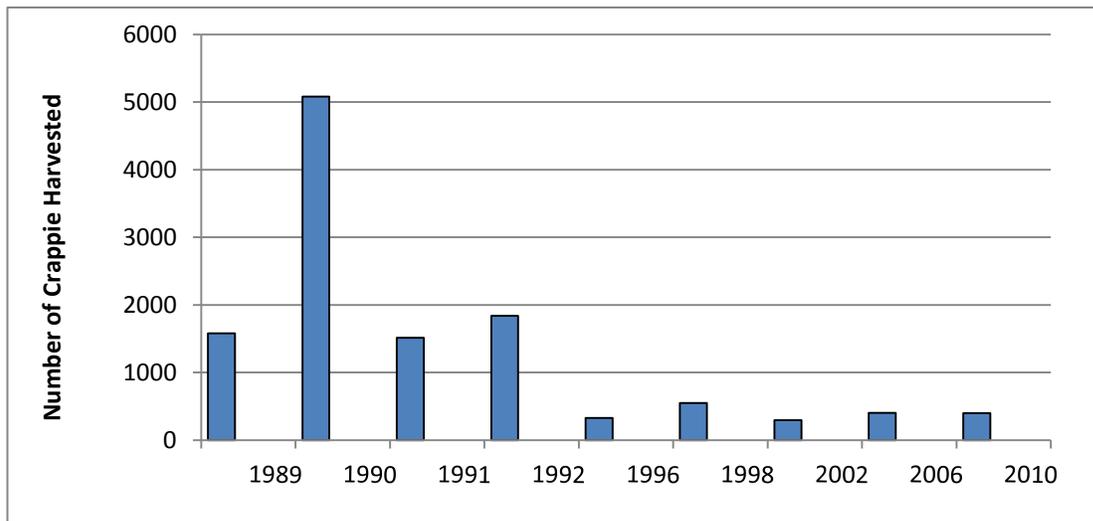


Figure 19. Total estimated number of Crappie harvested by anglers per year on Chicot Lake, LA, 1989 – 2010.

In 1985, it was determined that the original floodgate structure needed to be replaced. The lake was drained to the main channel in late 1985 to allow for the original spillway and floodgate to be demolished. Construction of the new spillway and floodgate began in 1986. For that year, the lake bottom was allowed to dry. The process improved spawning habitat throughout the lake. Spillway construction was completed in 1987. Large numbers of crappie were harvested from Chicot Lake (Figure 19) in the late 80's and early 90's after the renovation and refill in 1988. This circumstance, as well as increased fishing participation due to the excitement of the re-opened lake, best explains the higher than average number of crappie harvested for 1989-1990. Since that time crappie harvest has remained stable.

Table 13. Number of crappie harvested per trip and angler hours per acre of water for Chicot Lake, LA, 1989 – 2010.

Year	Harvested/Trip	Angler hours/acre - Effort
1989	8.7	30.0
1990	7.4	40.2
1991	1.9	26.6
1992	4.9	28.6
1996	1.1	12.6
1998	1.2	16.0
2002	2.4	11.3
2006	2.5	17.1
2010	2.7	10.3

HABITAT EVALUATION

Aquatic Vegetation

Aquatic plants have always played a key role in the management of Chicot Lake. The north end of Chicot Lake is conducive to overabundant plant growth because of its shallow depth. In addition, floating plants such as duckweed (*Lemna minor*), common salvinia (*Salvinia minima*) and water hyacinth (*Eichhornia crassipes*) are common throughout the lake. In 1991, 1996 and 1997, seven foot drawdowns were conducted to control aquatic vegetation. LDWF and the Office of State Parks closed the lake to the public during this time for safety reasons. In 2003, 2005 and 2008, starting in the month of May – July, two foot drawdowns along with herbicide applications helped to retard aquatic vegetation growth. The lake remained open to fishing.

Foliar herbicide applications were made in 2010 and 2011 to duckweed, common salvinia, water hyacinth, pennywort and American lotus in areas used by recreational fishermen. A total of 230 gallons were applied to 270 acres. Herbicides used consisted of diquat dibromide, glyphosate and 2,4-D.

To address the spread of hydrilla growth, Sonar (fluridone) treatments were implemented in 2010 and 2011, mainly on the north end of the lake. Multiple applications of this systemic herbicide have reduced the spread of hydrilla throughout the lake.

In 2012, 335 gallons of foliar herbicides were applied to 742 acres of nuisance aquatic vegetation. To control water hyacinth, alligator weed, primrose and American lotus, 2,4-D was applied at a rate of 0.5 gallons per acre. Diquat dibromide was applied at a rate of 1 gallon per acre to control duckweed and glyphosate was applied at 0.75 gallons per acre to control common salvinia.

In 2013, foliar herbicide applications were made on nuisance plants such as water hyacinth, alligator weed and common salvinia in Chicot Lake. A total of 224 gallons were used to control 596 acres of vegetation. To control water hyacinth and alligator weed, 2,4-D was applied at a rate of 0.5 gallons per acre. 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 was used to control common salvinia. As of 2013, the most abundant aquatic vegetation species was hydrilla

In October 2013, 600 triploid grass carp (TGC) were released in Chicot Lake. Triploid grass carp are sterile and are effective in the control of hydrilla when stocked in appropriate numbers and contained within the water-body. A stocking rate of 3 fish per vegetated acre was selected. To reduce potential for loss through predation, the minimum size for the stocked TGC was 12 inches in length.

A 3 foot drawdown in the fall of 2013 helped to retard aquatic plant growth in Chicot Lake. The control structure was opened on September 11, 2013 to allow dewatering at a rate of 3 inches per day. The control structure was closed on September 19, 2013 when water levels reached three feet below pool stage.

In 2014, foliar herbicide applications were made on nuisance plants such as water hyacinth and common salvinia in Chicot Lake. A total of 41 gallons were used to control 58 acres of vegetation. Diquat (0.75 gal/acre) and glyphosate (0.75 gal/acre) were applied to control common salvinia and water hyacinth.

In May of 2014, an in-water herbicide treatment using granular fluridone was applied near the north fishing pier in Chicot Lake to control hydrilla growth. This growth was hindering fishing opportunities from the pier. Twenty acres of hydrilla were treated near the north fishing pier with 120 pounds of Sonar Q & Sonar PR granular herbicide. Results from this application were minimal, as hydrilla continued to be present after the application.

A 3 foot drawdown in the fall of 2014 has continued to help minimize the submerged aquatic plant growth in Chicot Lake. The control structure was opened on September 2nd, 2014 to allow dewatering at a rate of 3 inches per day. The control structure was closed on September 10th 2014 when water levels reached three feet below pool stage.

In 2015, foliar herbicide applications were made on nuisance plants such as water hyacinth, giant salvinia and common salvinia. A total of 52 gallons were used to control 63 acres of vegetation. 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 was applied to control common/giant salvinia. Water hyacinth and other emergent species were controlled with 2,4-D (0.5 gal/acre) or glyphosate (0.75 gal/acre). Giant salvinia was first discovered in the lake in the fall of 2015.

In May of 2015, Aquathol K herbicide was applied near the north fishing pier in Chicot Lake to control hydrilla growth. This growth was hindering fishing opportunities from the pier. Approximately 10 acres of hydrilla were treated with 45 gallons of Aquathol K herbicide. Results from this application were minimal as hydrilla continued to be present after the application.

The three foot drawdown conducted in the fall of 2015 continued to help minimize the submerged aquatic plant growth. The control structure was opened on September 8, 2015 to allow dewatering at a rate of 3 inches per day. The control structure was closed on September 15, 2015 when water levels reached three feet below pool stage.

Nuisance Aquatic Vegetation Problems:

Plant growth projections on Chicot Lake for summer 2016:

- Hydrilla - up to 150 acres on the north end of the lake
- Other submerged vegetation (coontail, fanwort and naiad) – 350 acres
- Water hyacinth, pennywort & American lotus - up to 125 acres located throughout the lake
- Common salvinia - up to 150 acres located mainly on the south end of the lake
- Giant salvinia – up to 200 acres located mainly on the north end of the lake

Substrate

Chicot Lake receives an annual contribution of leaf litter from a heavy canopy of tupelo and cypress trees. Drawdowns allow for aerobic decomposition of the leaf litter.

Artificial Structure

Reef structures have been placed along the south fishing pier. These structures consist of feed pallets (17x24 inches) that are placed over a single PVC pipe stem (2 inches in diameter). The structures are ballasted with a concrete base. (See photos below). There are nine artificial structures in proximity of the south fishing pier.

CONDITION IMBALANCE / PROBLEM

Aquatic vegetation in Chicot Lake is above the recommended 15 - 30 % range of areal coverage. Fishermen and other user groups at the State Park do not approve of extensive drawdowns due to associated fishing closures and limitations on other forms of water sports. Excess submerged vegetation (primarily hydrilla) and the floating plant giant salvinia is an ongoing problem.

CORRECTIVE ACTION NEEDED

Need to control invasive aquatic vegetation.

Need to provide public information to explain management recommendations, particularly with regard to water fluctuation.

RECOMMENDATIONS

1. Continue the integrated vegetation control plan. The advantage of integrated management is the ability to achieve a combined benefit from several control methods and not be completely dependent on the success of any one approach. LDWF personnel will continue to perform type map surveys and sampling to monitor aquatic vegetation and will update recommendations as necessary.
 - a. Foliar herbicide applications on Chicot Lake will be conducted as needed by LDWF spray crews in areas that are accessible to the public. Herbicides will be applied according to the approved LDWF Aquatic Herbicide Application Procedure for aquatic plant control.
 - b. Water level fluctuation is an important tool for lake management. Drawdowns mimic natural low water periods of the fall and can provide many of the same benefits including aquatic vegetation control and fish population management. In addition, exposure to air is critical for decomposition of organic materials on the lake bottom. The re-flooded habitat is an improved and more productive spawning substrate for nesting fish. Cooler water temperatures in the fall also reduce potential for fish kills. Therefore, annual fall drawdowns three feet below pool stage are recommended for Chicot Lake. The control structure will be opened soon after Labor Day to allow de-watering at a rate of 3-4 inches per day. The target water level is to be maintained until early January of the following year.
 - c. Annual sampling to determine the effects of the 2013 TGC stocking. This includes standardized gill net samples in the winter months as well as vegetative type maps. If necessary after a three year period, the introduction of additional TGC will be considered.
2. Continue standardized sampling to monitor largemouth bass populations following the removal of the protected slot limit and to evaluate the stocking success of Florida strain largemouth bass.

LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES



OFFICE OF FISHERIES
INLAND FISHERIES SECTION
FISHERIES MANAGEMENT SECTION

Chicot Lake Largemouth Bass: Population and Fishery Characteristics with Size Regulation Simulations

TECHNICAL REPORT SERIES

Baton Rouge, Louisiana

2013



LOUISIANA LARGEMOUTH BASS PROJECT Chicot Lake

Every fish population is the product of a unique set of influences, both natural and man-induced. A thorough understanding of those influences and the corresponding population response is essential to good fisheries management. As part of a statewide effort, the Louisiana Department of Wildlife and Fisheries (LDWF) recently completed a study to describe the Chicot Lake largemouth bass (LMB) population. The project included data collection over a three year period from 2010 – 2012. Population dynamics including relative abundance, spawning success, growth, body condition, mortality, and longevity were measured. Chicot Lake anglers were also surveyed to determine their collective influence on the LMB population.

Electrofishing gear was used by fisheries biologist to collect LMB from Chicot Lake each spring. Length and weight measurements were recorded for each fish and ear bones (called otoliths) were removed from approximately 47% of the sampled fish for age and growth analyses. Annual growth rings on the otoliths provide an accurate measurement of fish age. Size and age for all of the sample fish were combined to generate estimates of average growth rate and longevity. Angler surveys were conducted during the sample period to document fishing effort, angler catch rate and harvest rates.

Figure 1 illustrates that Chicot Lake supports a healthy bass population with some LMB reaching 22 inches. Good representation of fish in the 9 to 16 inch range was observed in all three years of the project. It is important to note that spring sampling typically does not include fingerling size bass. However, the recurring presence of small 4 to 8 inch (age-1) bass indicates successful reproduction.

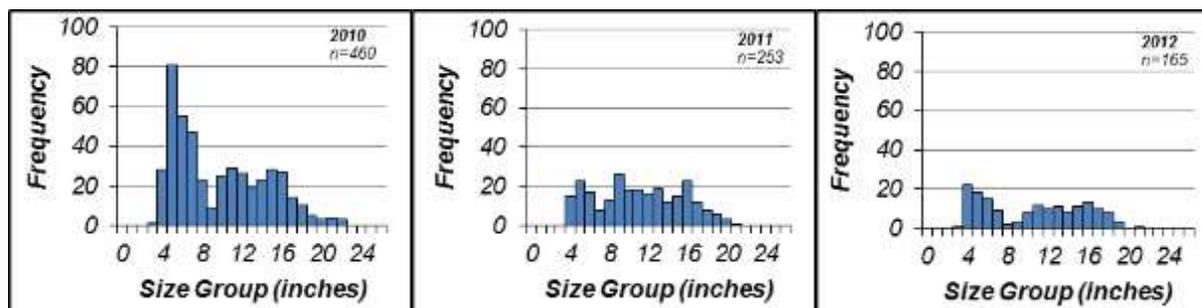


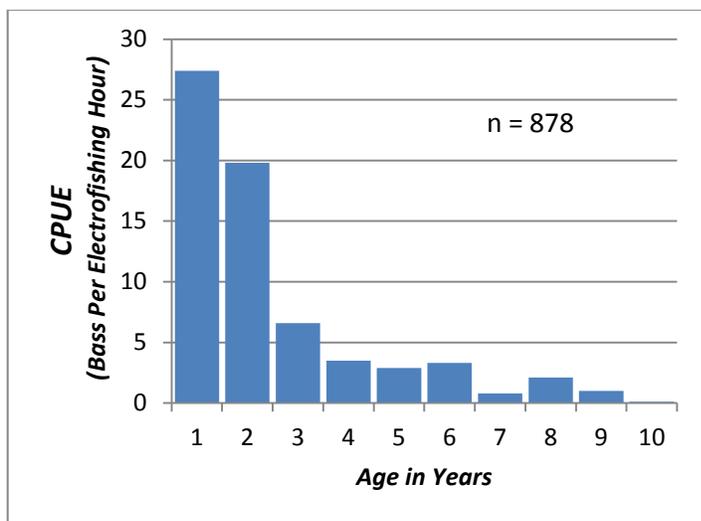
Figure 1. Annual length distributions of largemouth bass collected from Chicot Lake during spring electrofishing surveys in 2010-2012. Sample sizes (n) are presented in each graphic.

Age structure of the complete electrofishing sample (2010-2012) is shown in Figure 2. Forty-seven percent of the total sample were comprised of age-1 and age-2 bass. The majority of the age 8+ fish were females. While bass up to 10 years old were found, only a small percentage of Chicot Lake LMB were 6 years and older. Average length at age for Chicot Lake bass is provided in Table 1. Growth is rapid through age-5, but then slows to only a half inch or less in length per year.

Body condition for Chicot Lake bass can be described as robust. Good physical condition of bass generally is the product of an adequate food supply that is readily available to predation.

Recruitment of age-1 LMB in Chicot Lake is highly variable. Factors that are favorable for stable recruitment include seasonal water fluctuation, quality spawning substrate, and adequate cover for

fingerlings. Possible causes for Chicot Lake LMB recruitment variability are the drought conditions of 2010/2011 and an abundance of larger predatory fish.



Age	Length in Inches
1.0	6.0
2.0	11.3
3.0	14.4
4.0	16.1
5.0	17.2
6.0	17.7
7.0	18.1
8.0	18.3
9.0	18.4
10.0	18.5

Figure 2. The age structure of Chicot Lake Bass.

Table 1. Length at age of Chicot Lake bass.

The rate at which fish die each year is referred to as mortality. Mortality consists of two parts: natural mortality (predation, disease) and fishing mortality (angler harvest and discard mortality). Results of the study indicate that the total mortality rate for Chicot Lake LMB is lower when compared to other recently sampled Louisiana lakes at 34% per year. The following example is provided to illustrate the effect. At 34% mortality, if you start with 100 age-1 Chicot Lake bass, only 19 will remain alive by age 5.

The results of this study suggest that the Chicot Lake LMB population has a total mortality that is much more influenced by natural factors than by fishing related mortalities (35% and 0.03%, respectively). The fishing mortality rate for Chicot Lake LMB is 0.03% per year. This rate comes from two sources; 1) harvest and 2) post release mortality. Creel survey results indicate that half (53%) of the anglers utilizing Chicot Lake describe themselves as bass anglers. The results also suggest that these same bass anglers voluntarily release a much larger percentage of LMB than they harvest (77.2% of legal size fish are released).

SUMMARY

It is important to note that LMB populations and their fisheries are not only influenced by fishing effort, but also by human and environmental factors. The type and degree of human activity within watersheds, riparian zones, and specific waterbodies can affect LMB populations by altering critical habitats. Additional factors influencing LMB populations include aquatic vegetation coverage, water level management, supplemental LMB stocking programs, and habitat improvements. The frequency of floods, drought, and storms can also influence LMB populations. While consideration of these factors are important in effective fisheries management, evaluating how these factors affect the Chicot Lake LMB population/fishery is beyond the scope of this report.

Length distribution, age structure, growth rate, and mortality rate were found to be at levels that provide a stable LMB population in Chicot Lake. The population is much more influenced by natural factors than by fishing related mortalities. The current LMB regulation was implemented to use angler harvest as a management tool to increase abundance of bass larger than 17". Angler harvest is critical for

effectiveness of the regulation, but the results of this project indicate that Chicot Lake LMB harvest is lacking. If Chicot Lake anglers remain hesitant to harvest LMB, the effectiveness of any size regulation as a management tool would be severely limited.