

LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES



OFFICE OF FISHERIES INLAND FISHERIES SECTION

PART VI -B

WATERBODY MANAGEMENT PLAN SERIES

BLACK/CLEAR LAKE

WATERBODY EVALUATION & RECOMMENDATIONS

CHRONOLOGY

DOCUMENT SCHEDULED TO BE UPDATED EVERY THREE YEARS

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WATERBODY EVALUATION

STRATEGY STATEMENT

Recreational

Sportfish species are managed to provide a sustainable population while providing anglers the opportunity to catch or harvest adequate numbers of fish to maintain angler interest and effort. Bass anglers are afforded the opportunity to catch trophy fish through the introduction of Florida largemouth bass.

Commercial

The physical characteristics of Black/Clear Lake do not support adequate numbers of commercial fish species to support a commercial fishery.

Species of Special Concern

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

EXISTING HARVEST REGULATIONS

Recreational

Statewide regulations for all species. Recreational fishing regulations may be viewed at the link below: <http://www.wlf.louisiana.gov/fishing/regulations>

Commercial

Statewide regulations on all species. Commercial fishing regulations may be viewed at the link below: <http://www.wlf.louisiana.gov/fishing/regulations>

Special Gear Restrictions

R.S. 56: 410.7 Black Lake, Clear Lake, and Prairie Lake; marking of nets required; permitted and prohibited fishing gear; penalties

A. No person shall set or use any net for the taking of recreational or commercial fish in Black Lake, Clear Lake, or Prairie Lake unless it has been marked with a waterproof tag with the name and address of the fisherman and his fishing license number. Violation of this provision shall be punishable by a twenty-five dollar fine payable to the Northwest Game and Fish Preserve Commission.

B. No person shall use a gill net or trammel net or leaded gill net which has less than a minimum of three and one-half inch bar and seven inches stretch. Violation of this provision shall be punishable by a twenty-five dollar fine payable to the Northwest Game and Fish Preserve Commission.

C. Repealed by Acts 2012, No. 133, §1.

Acts 1995, No. 550, §1; Acts 2003, No. 1227, §1; Acts 2012, No. 133, §1.

SPECIAL YO-YO and TROTLINE REGULATIONS (Authority note: Promulgated in accordance with R.S. 56:326.3 and 56:6(32). HISTORICAL NOTE: Promulgated by the Department of Wildlife and Fisheries, Wildlife and Fisheries Commission, LR 39 (September 2013).

Black Lake, Clear Lake, Prairie Lake (Natchitoches Parish)

Yo-Yo Restrictions

- The placement of any artificial object to anchor a yo-yo or trigger device is prohibited.
- No more than 50 yo-yos or trigger devices allowed per person.
- Each yo-yo or trigger device must be clearly tagged with the name, address and telephone number of the owner/user.
- All fish or any other animals caught or hooked must be immediately removed from the device.
- Each yo-yo or trigger device must be re-baited at least once every 24 hours.
- Except for an object used strictly in the construction of a pier, boathouse, seawall, or dock, no object which is driven into the lake bottom, a stump, tree, or the shoreline shall be used to anchor a yo-yo or trigger device. "Object" means rebar or other metal material, cane, PVC tubing, construction material, or any other type of material.

Trotline Restrictions

- All trotlines must be marked, tagged, and dated with the owner/user's name, address, phone number and date of placement. The trotline must be marked on each end with a floating object that is readily visible.
- No person is allowed to set more than three trotlines with a maximum of 50 hooks per trotline.
- All trotlines must have an 8-foot cotton leader on each end of the trotline to insure that if the trotline is left unattended, the cotton leader will deteriorate and the line will sink.
- All trotlines must be attended daily while in service.

SPECIES EVALUATION

Recreational Species

Largemouth Bass

Angler harvest and effort-

A creel census survey was conducted at Black-Clear Lake from January to December 2010. This survey was designed to determine angler effort and catch rates for various fish species, chiefly largemouth bass. Annual largemouth bass angler information is summarized in Table 1.

Table 1. Largemouth bass angler information collected during the 2010 creel survey at Black-Clear Lake, LA from January to December.

Current regulation: 10 fish daily of any size				
YEAR	NUMBER OF LARGEMOUTH BASS ANGLERS	MEAN NUMBER OF ANGLERS IN PARTY	MEAN TRIP LENGTH (HOURS)	MEAN ONE-WAY DISTANCE TRAVELED (MILES)
2010	8,101	1.58	4.26	35

Table 2. Largemouth bass catch information collected during the 2010 creel survey conducted at Black-Clear Lake, LA from January - December.

Current regulation: 10 fish daily of any size	
NUMBER OF BASS CAUGHT	21,745
NUMBER OF BASS HARVESTED	10,059 (46% of catch)
NUMBER OF BASS RELEASED	11,686 (54% of catch)
POUNDS OF BASS HARVESTED	12,573
AVERAGE WEIGHT PER LM BASS (POUNDS)	1.49

Table 3.

Largemouth bass catch rates from the 2010 creel survey conducted at Black-Clear Lake, LA from January - December.

Current regulation: 10 fish daily of any size	
LM BASS CAUGHT PER TRIP	2.44
LM BASS HARVESTED PER TRIP	1.32
LM BASS CAUGHT PER HOUR	0.53
LM BASS HARVESTED PER HOUR	0.39

The total length (TL) of fish harvested by anglers was recorded during this survey. Total length (inches) of largemouth bass harvested by largemouth bass anglers are presented in Figure 1.

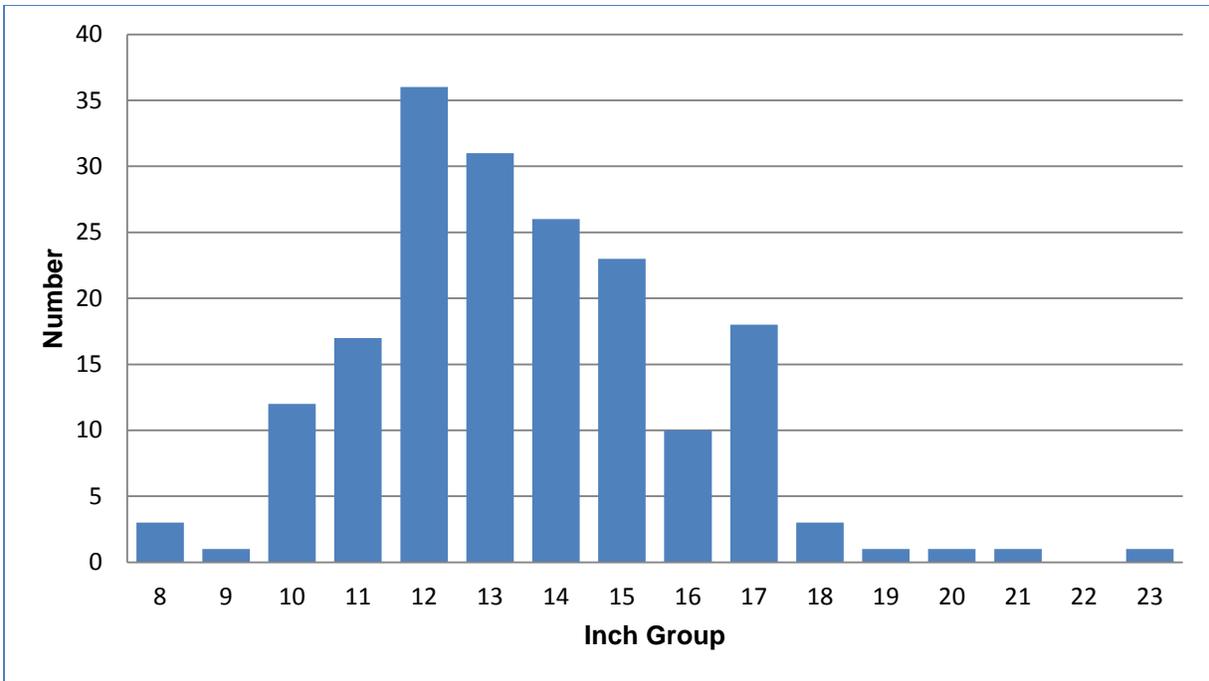


Figure 1. The length distribution of largemouth bass harvested by bass anglers during a creel survey conducted at Black-Clear Lake, LA in 2010.

Information presented in Figure 1 suggests that the majority of bass caught by bass anglers were between 12 and 15 inches.

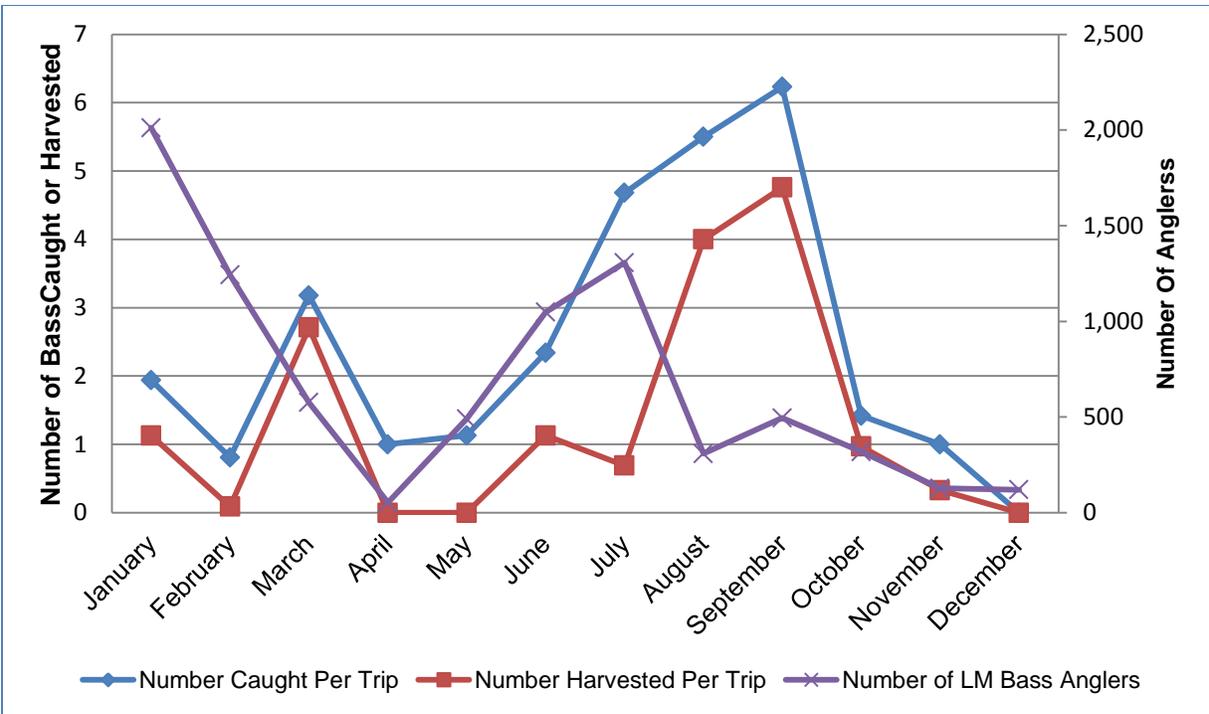


Figure 2. Monthly values for number of largemouth bass anglers, number of largemouth bass caught and number of largemouth bass harvested during a creel survey at Black-Clear Lake, LA from January to December 2010.

Data in Figure 2 indicated that more largemouth bass anglers fished the lake in January (2,012 anglers) followed by July (1,307 anglers). The greatest number of largemouth bass caught per trip (6.23) and the highest monthly harvest per trip (4.76) occurred in September of that year.

Relative abundance and relative weight-

Electrofisher sampling is used to measure largemouth bass relative abundance and relative weight (W_r). One measurement of abundance is the catch per unit of effort (CPUE) for a given species during such sampling. The CPUE for selected years and selected size classes of largemouth bass collected during spring electrofisher sampling is depicted in Figure 3.

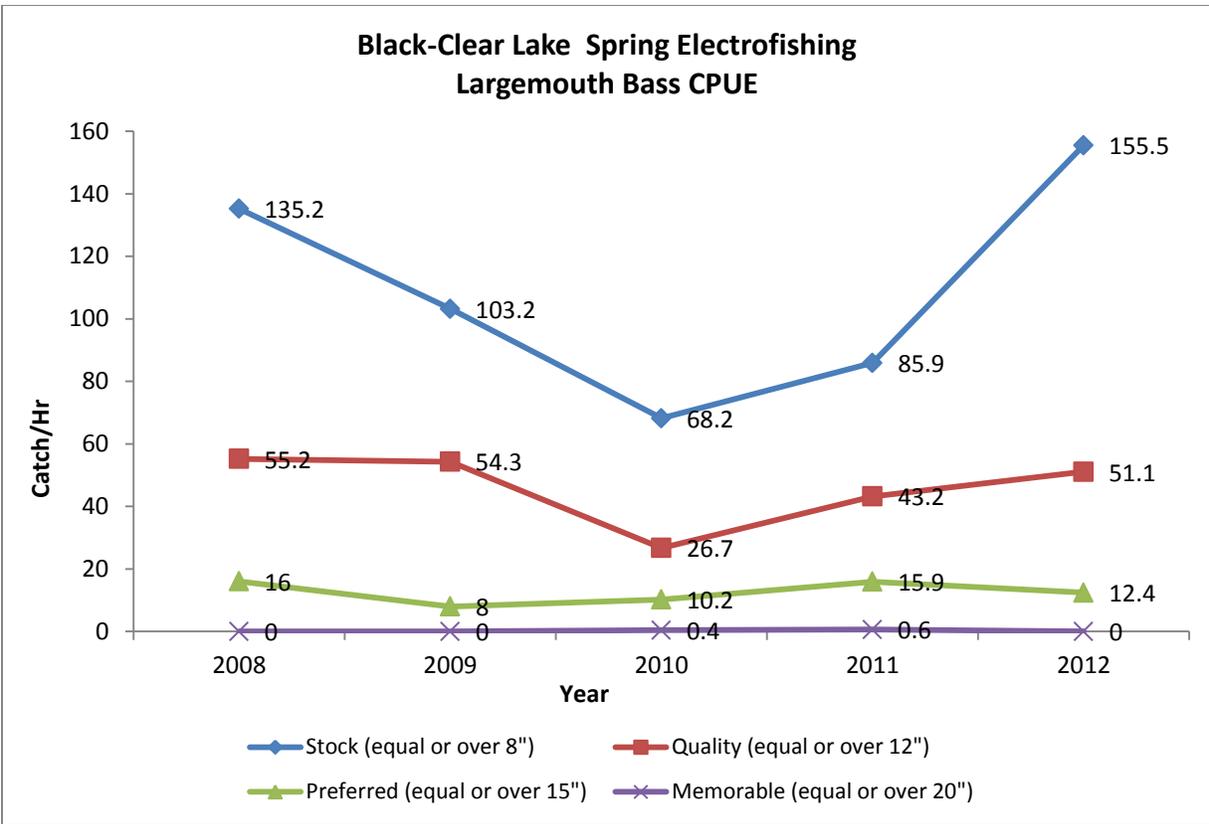


Figure 3. Spring electrofishing CPUE for LMB of stock-, quality-, preferred-, and memorable-size fish sampled in 2008-2012.

The CPUE values shown in Figure 3 reveal fluctuations in the number of largemouth bass from the selected size groups that were collected over the period of time. It is noteworthy that in 2009, high water levels were recorded during the sampling season. Such water levels disperse largemouth bass into shallow water areas that are inaccessible to survey crews and likely resulted in lower catch rates for that season. Also, aquatic vegetation levels were high during the survey period in 2010. These conditions restricted both access by survey crews and visibility during the surveys, resulting in lower catch rates. Overall, the CPUE values for largemouth bass over time indicate a stable population within the lake.

Proportional stock density (PSD) (Anderson 1976) and relative stock density (RSD) (Gablehouse 1984) are indices used to numerically describe length distribution (frequency) data. These indices can provide not only an understanding of the size structure of the bass population for biologists but can also help anglers form expectations as to what type of angling experience they may expect from a given waterbody. 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). The formula for largemouth bass PSD is given as:

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

Stock size fish are the fish in a population that would be considered to be of “catchable” size. 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. For example, the chart below indicates a PSD of 33 for largemouth bass at Black-Clear Lake in 2012. The number indicates that 33% of the bass stock (fish over 8 inches) in the sample was at least 12 inches or longer.

For more detailed discussion of the proportion of sizes greater than 12 inches, we may look at relative stock density (RSD). The RSD may be used to discuss the proportions of the “catchable” fish population that belong to any length group of interest. Typically, RSD values are used to discuss three size groups of largemouth bass. Those groups are preferred (≥ 15 ”), memorable (≥ 20 ”) and trophy (≥ 25 ”). In the case of Black-Clear Lake, the largemouth bass RSD values for preferred, memorable and trophy sizes during 2012 were 8, 0 and 0, respectively. These values suggest that of the fish sampled, 8% of the “catchable” size largemouth bass were over 15 inches but less than 20 inches in length while no fish were recorded that were longer than 20 inches. Consequently, 92% of the “catchable” largemouth bass sampled were between 8 and 11.99 inches in length. The formula for RSD (preferred) is given as:

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

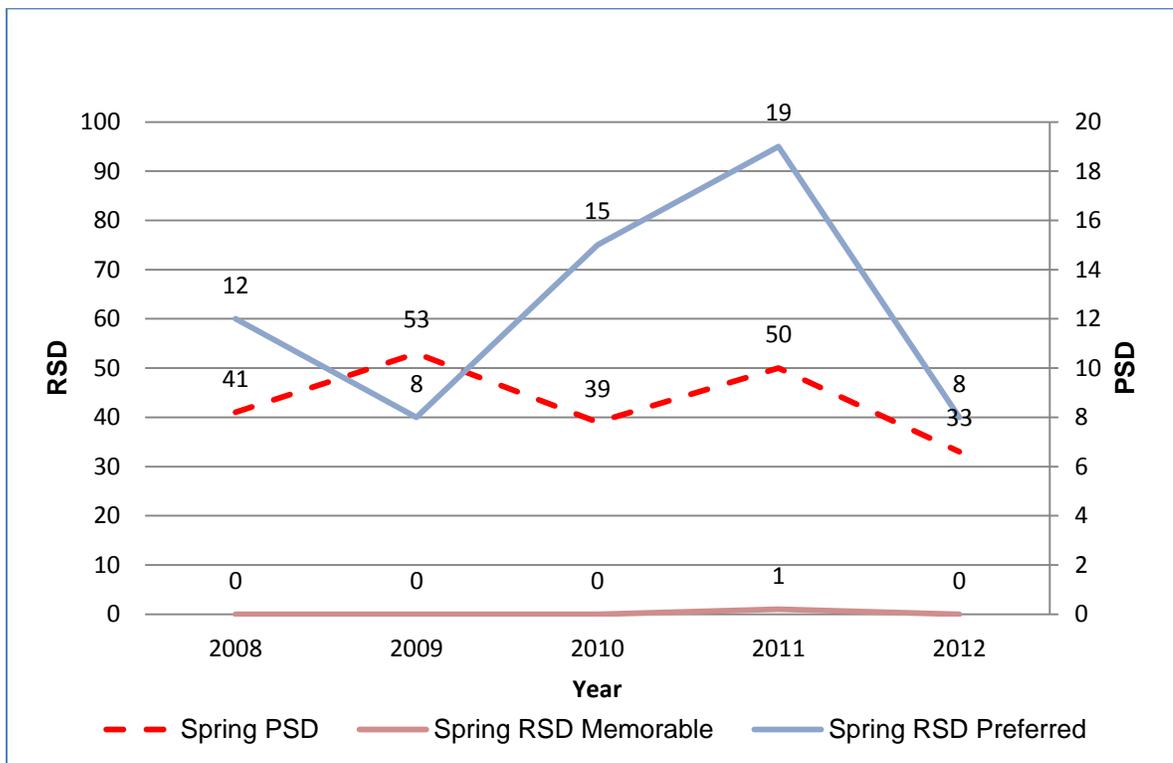


Figure 4. The relative stock densities and proportional stock densities of largemouth bass collected during spring electrofishing sampling at Black-Clear Lake, LA from 2008-2012.

Gablehouse (1984) offered that in a balanced fish population a PSD for largemouth bass should fall within the range of 40 – 70. PSD values for largemouth bass collected from Black-Clear Lake (Fig. 3) range from 33 – 53 with the lower value of 33 being found during the most recent sampling effort. The average PSD value for years 2008 – 2012 was 43.2.

Furthermore, Gablehouse (1984) reports that recommended RSD values for selected size groups of largemouth bass in a balanced population as; RSD-preferred = 10 – 40 and RSD memorable = 0 – 10. No RSD value for trophy-sized largemouth bass was offered by Gablehouse (1984) in his example of a “balanced” population. When comparing RSD values for Black-Clear Lake (Fig. 4) to the model for a balanced population, it appears that this population of largemouth bass is weighted toward smaller individuals. The average RSD-preferred from 2008 – 2012 was 12.4 compared to the optimal 10 – 40 range. The average RSD-memorable was 0.2 which is also very near the lower end value of the optimal 0 – 10 range.

Further insight into the size structure of the bass population at Black-Clear Lake may be gained by examining the size distribution values noted during spring electrofisher sampling. Those values are presented in Figure 5.

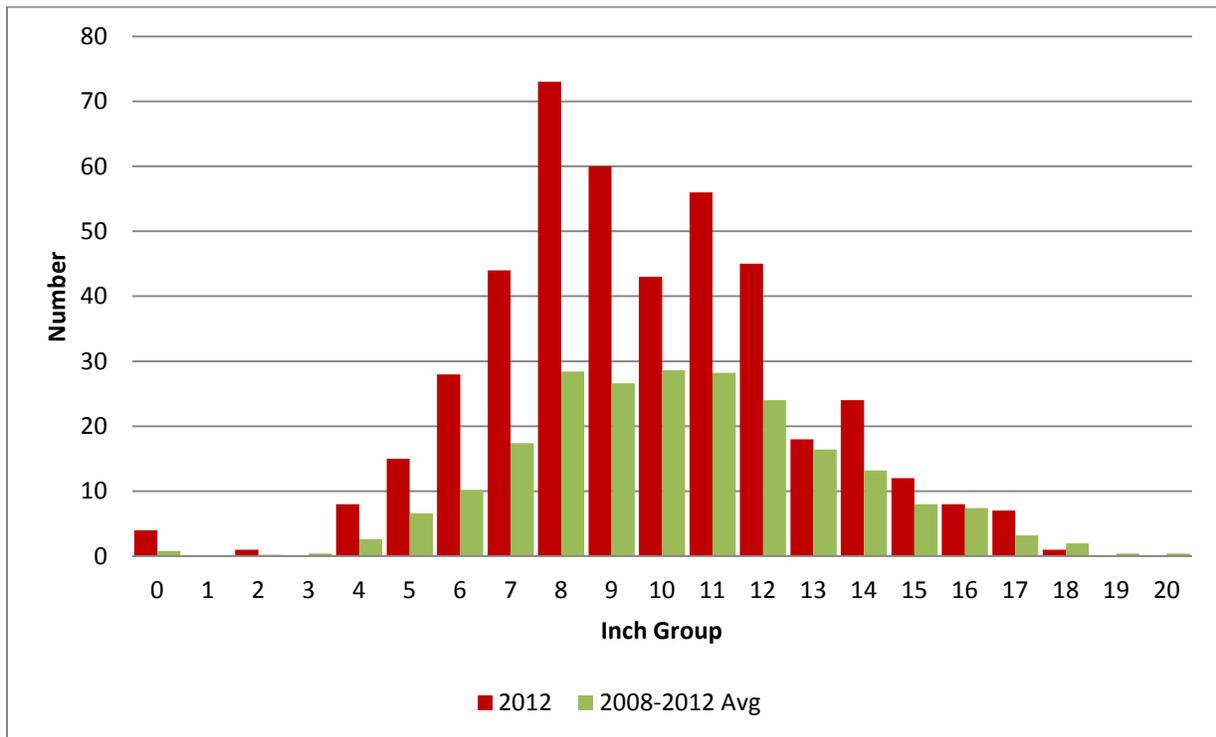


Figure 5. The length distribution of largemouth bass collected during spring electrofishing at Black-Clear Lake from 2008 – 2012 (n = 447).

The length distribution (inch groups) depicted in Figure 5 indicates a normally distributed largemouth bass population. It is also important to note, that across most inch groups, the 2012 distribution values are above the recent five year average.

While electrofisher sampling is a valuable tool in fish population assessment, it does have some limitations. Electrofishing is a shallow water technique and is usually effective in depths of five to six feet. Larger individuals of the largemouth bass population may be under sampled while electrofishing in shallow waters. Electrofishing sampling is dependent upon sufficient visibility to allow capture of stunned fish by the sampling crew. Muddy water or dense vegetative coverage hampers efficiency. When considering electrofisher sampling data it is possible that actual population numbers and size structure may differ from sample data. The true value of such sampling is in tracking trends over time. In the case of Black-Clear Lake, the long term trend appears to be that largemouth bass are present in sufficient numbers both overall and within each size class to not only sustain the population but provide significant angling opportunity.

Relative weight (W_r) is an index used to describe the overall “plumpness” or condition factor of fish. This value is used to indicate fish health as a function of their ability to maximize their weight per inch of length. Relative weight 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. Neumann et al. (2012) recommends a desired mean W_r range of 95-105 and suggests that lower values may indicate problems with prey availability. The W_r values for Black-Clear Lake largemouth bass are given in Figure 6.

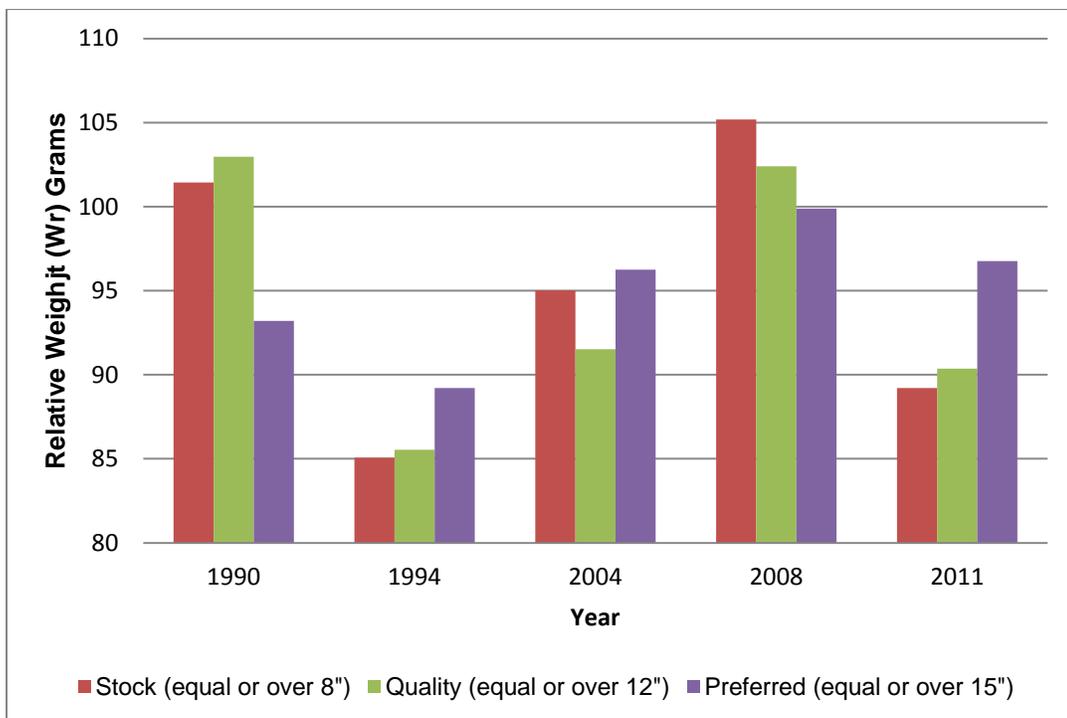


Figure 6. The W_r 's for selected largemouth bass size groups collected during fall electrofishing at Black-Clear Lake, LA in 1990, 1994, 2004, 2008 and 2011.

The data depicted in Figure 6 reveal that the average Wr for stock, quality, and preferred LMB were 95.2, 94.6, and 95.1, respectively. Each of these values is at the lower end of the desired range of 95 – 105 and indicates that largemouth bass of all three size groups are likely foraging below optimum efficiency. Figure 5 also indicates that largemouth bass Wr varies significantly from year to year. Stock-size Wr ranged from 85.01 to 105.2, quality-size Wr ranged from 85.5 to 103 and preferred-size Wr ranged from 89.2 to 99.9.

Forage

Sunfish and shad are the primary bass forage species in Black/Clear Lake. Forage availability is measured through shoreline seine sampling and indirectly through measurement of largemouth bass body condition or relative weight.

Largemouth Bass Genetics

Florida bass have been stocked into Black/Clear Lake to increase potential for presence of large bass. Stocking was initiated in 1988. Sample results in 1990 did not indicate Florida genetic influence in the bass population. However, analysis of 135 bass in Fall 2001 indicated 11% Florida bass influence (i.e., bass were identified as being either hybrid Florida largemouth bass or pure Florida-strain largemouth bass). Genetic sampling of 128 bass in 2012 indicated 20.3% Florida bass influence. Genetic analysis results are shown in Table 4.

Table 4. Results of genetic testing of the largemouth bass population in Black/Clear Lake, LA from 1990 – 2012.

Year	Number	Northern	Florida	Hybrid	Total Florida Influence
1990	35	100%	0%	0%	0%
2001	135	89%	0%	11%	11%
2008	88	89%	1%	10%	11%
2010	124	88%	0.8%	11.2%	12%
2011	139	82%	3.7%	14.3	18.0%
2012	128	79.7%	3.1%	17.2%	20.3%

Largemouth Bass Age & Growth

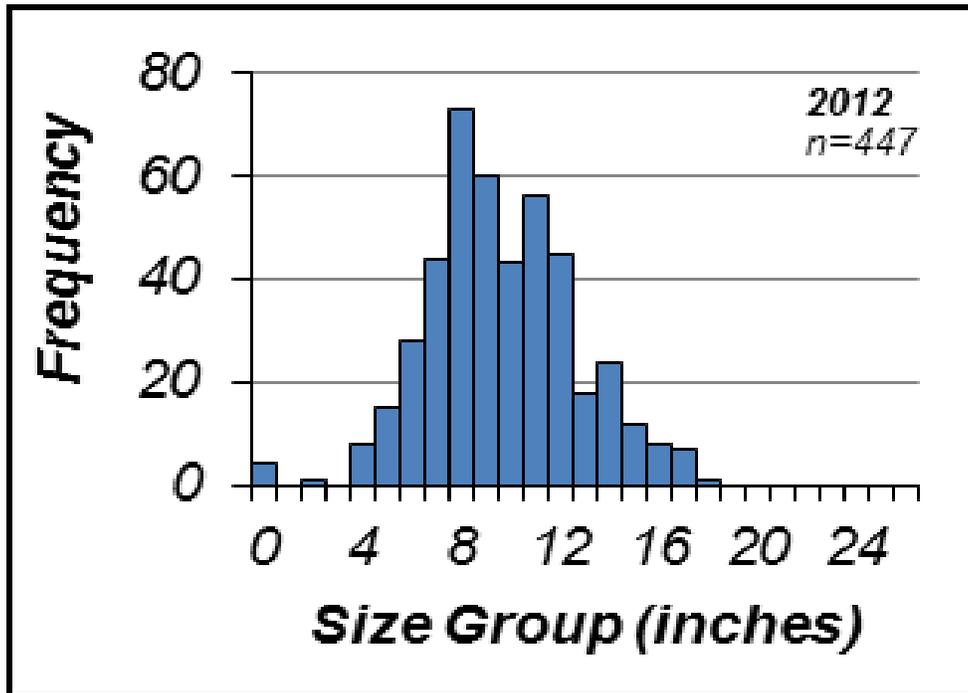
Black-Clear Lake was selected as one of several lakes to be included in a largemouth bass age and growth study. The study was conducted over the period 2010-2012. The study report is presented as follows.

LOUISIANA LARGEMOUTH BASS PROJECT
Black-Clear 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 Black-Clear 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. Black-Clear anglers were also surveyed to determine their collective influence on the LMB population.

Electrofishing gear was used by fisheries biologist to collect LMB from Black-Clear Lake each spring. Length and weight measurements were recorded for each fish and ear bones (called otoliths) were removed from approximately 37% 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 rate and longevity. Angler surveys were conducted during the sample period to document fishing effort, angler catch rate and harvest rates.

Figure 7 illustrates that Black-Clear Lake supports a healthy bass population with some LMB reaching 22 inches. Good representation of fish in the 8 to 16 inch range was observed for each year. It is important to note that spring sampling typically does not include fingerling size bass. However, the recurring presence of small (age-1) bass indicates that successful reproduction is occurring annually.



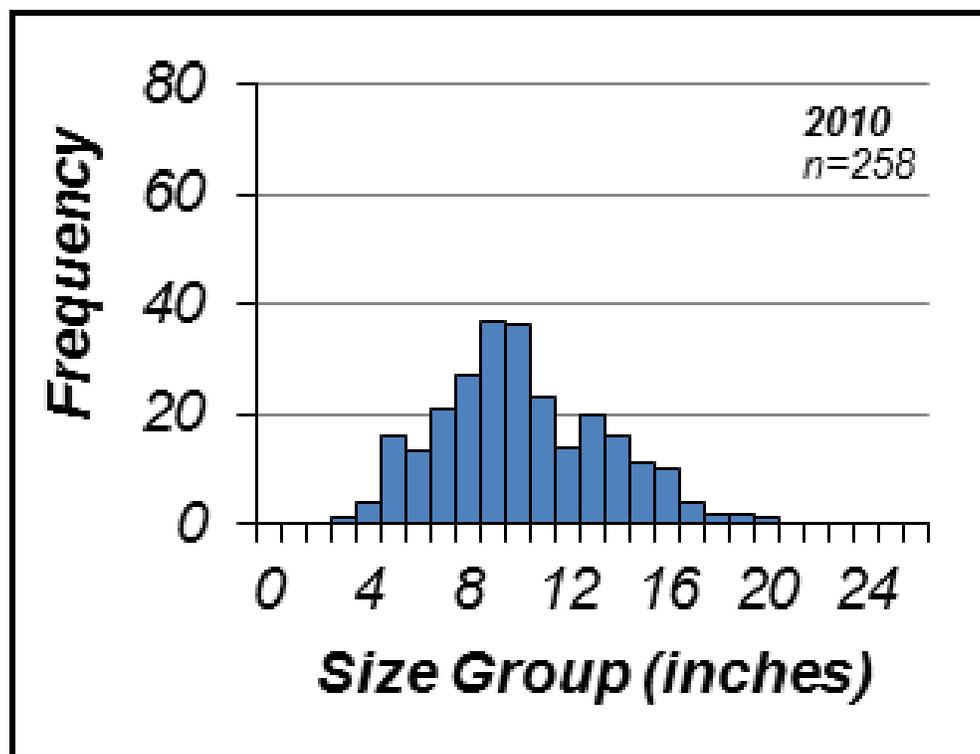
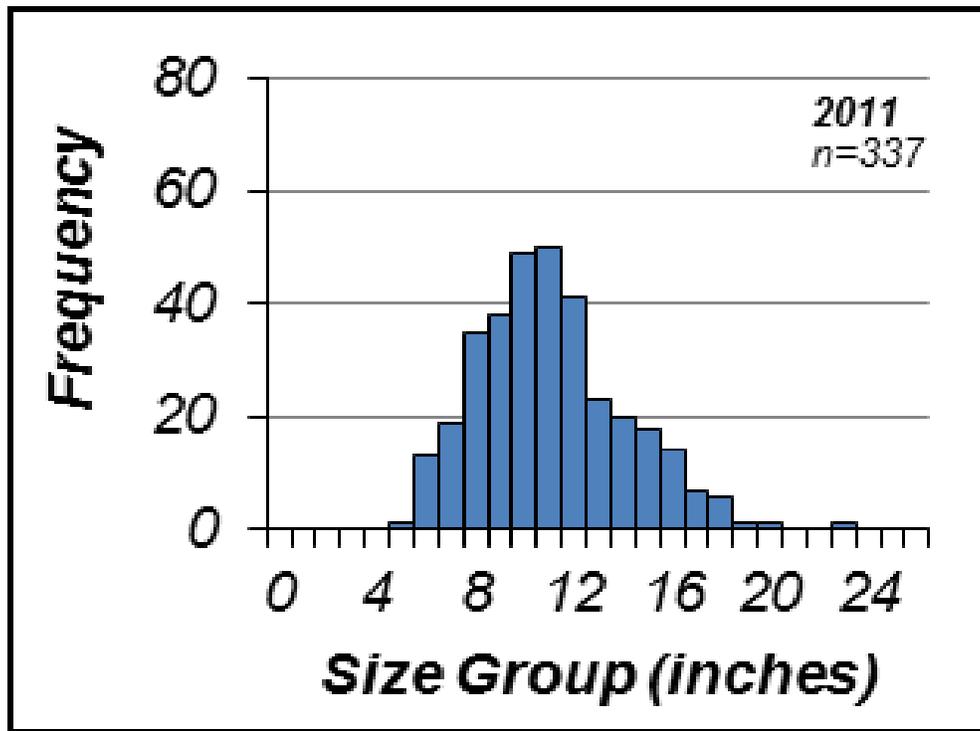


Figure 7. Annual length distributions of largemouth bass collected from Black-Clear Lake during spring electrofishing surveys in 2010-2012. Sample sizes (n) are presented in each graphic.

Age structure of the complete electrofishing sample (2010-2012) is shown in Figure 8. The majority of the age 8+ fish were females. While bass up to 8 years old were found, only a small percentage of Black-Clear Lake LMB were determined to be 5 years of age or older. Average length at age for Black-Clear bass is provided in Table 5. Growth is rapid through age 5, but then slows to only an inch or less per year.

Body condition for Black-Clear 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 Black-Clear 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 Black-Clear Lake LMB recruitment variability are the drought conditions of 2010/2011 and an abundance of larger predatory fish.

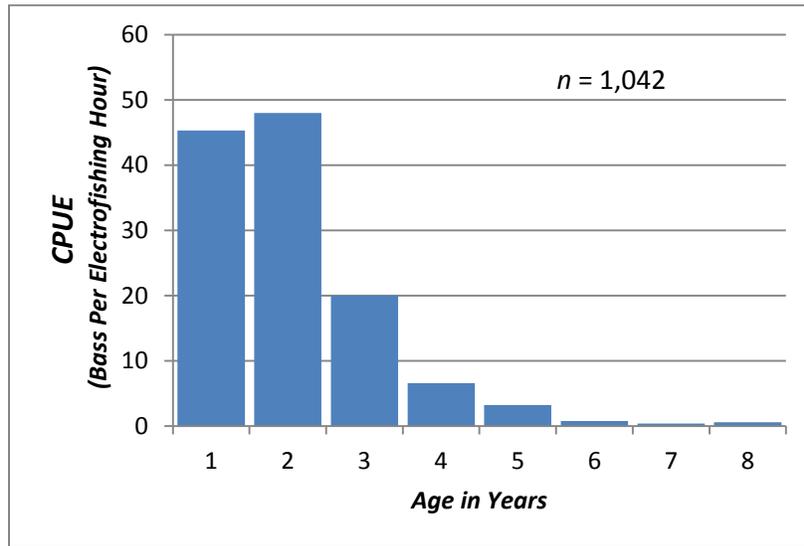


Figure 8. The age structure of largemouth bass from Black-Clear Lake, LA, 2010 – 2012.

Table 5. Length at age of Black-Clear Lake largemouth bass.

Age	Length in Inches
1.0	7.2
2.0	11.0
3.0	13.8
4.0	15.7
5.0	17.1
6.0	18.1
7.0	18.9
8.0	19.4

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 Black-Clear Lake LMB is 56% per year. At that rate, if you start with 100 age-1 Black-Clear bass, only 3 will remain by age 5.

The results of this study suggest that the Black-Clear Lake LMB population has a total mortality that is more influenced by natural factors than by fishing related mortalities (36 and 20%, respectively). The fishing mortality rate for Black-Clear Lake LMB is 20% per year. This rate comes from two sources; 1) harvest and 2) post release mortality. Creel survey results suggest that Black-Clear Lake anglers voluntarily release slightly more than half (54%) of the legal sized bass that they harvest.

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 Black-Clear 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 Black-Clear Lake. The population was more influenced by natural factors than fishing related mortalities. The Black-Clear Lake LMB fishery is currently managed with no size restrictions and a ten fish per day harvest limit. The dynamics of the Black-Clear Lake LMB population and the current characteristics of Black-Clear Lake anglers are such that size restrictive regulations would have a relatively insignificant effect on the population.

Crappie

The 2010 creel survey data show that 6,738 crappie anglers comprised 42% of all anglers during the survey period. Furthermore, crappie anglers contributed 39.4% of all angling effort hours on Black-Clear Lake. Crappie anglers caught 1.14 crappies per hour of angling effort with an average catch of 5.28 crappies per trip. A total of 43,310 crappies were caught by crappie anglers with the total weight caught amounting to 26,258 pounds for the year. The average weight of all crappies caught was 0.63 pounds.

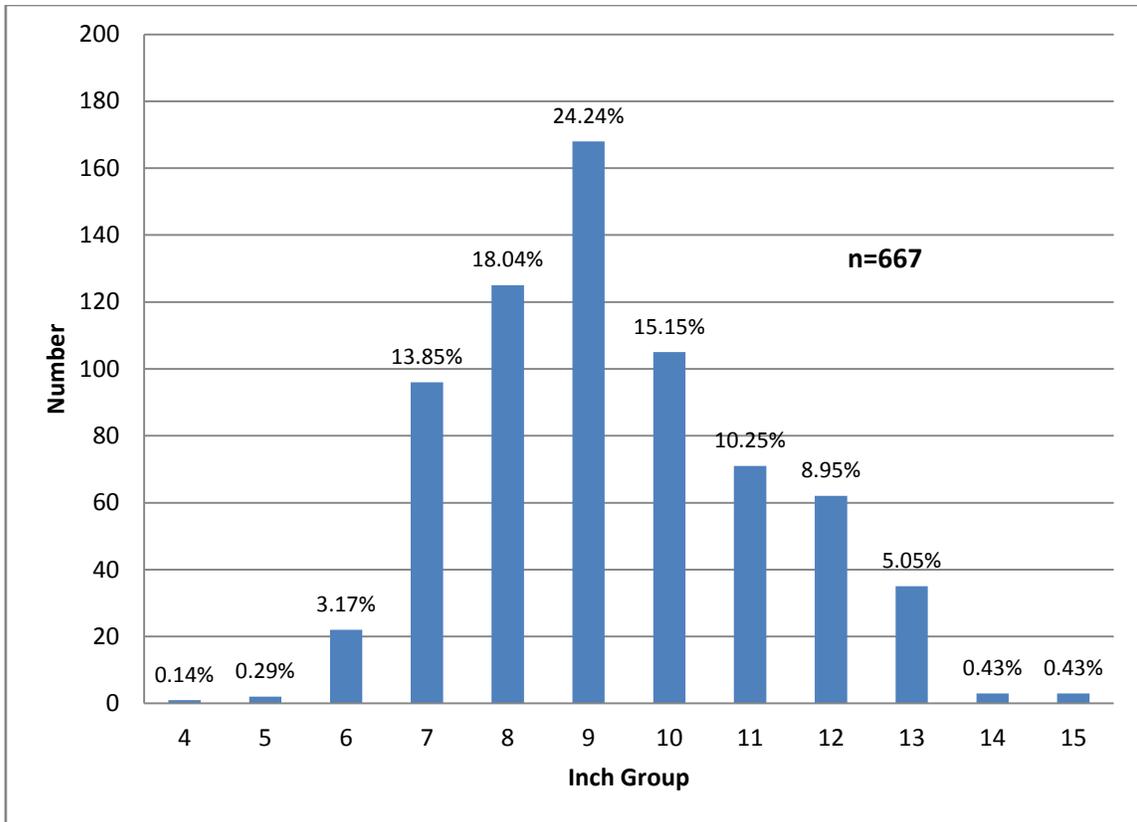


Figure 9. Length distribution of crappies harvested by crappie anglers at Black-Clear Lake, LA during creel surveys conducted from January - December 2010.

Figure 9 shows that crappie harvested by crappie anglers ranged from 7 – 12 inches and 9 inch crappies were most commonly harvested.

Crappies were assessed by means of leadnet sampling from 2009 – 2011. Data from that sampling effort is presented in Figure 10 and Figure 11.

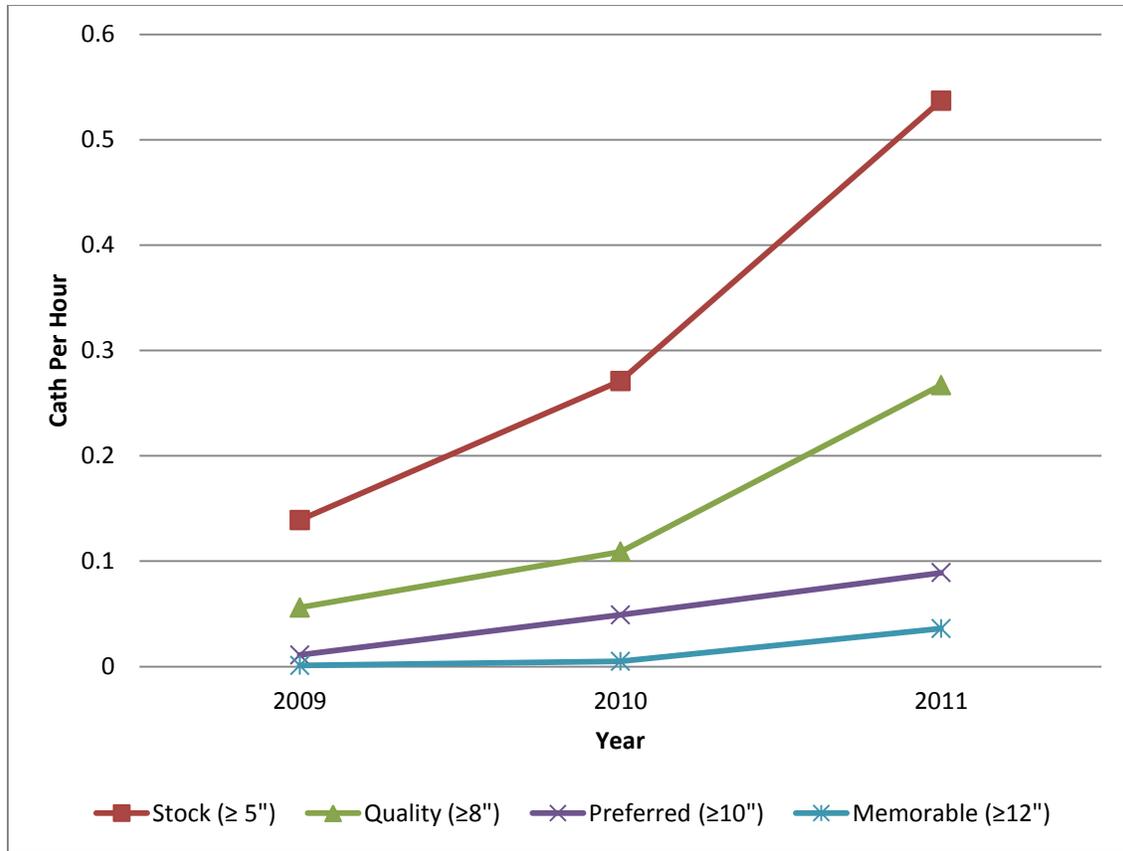


Figure 10. The CPUE for crappies of stock-, quality-, preferred-, and memorable- size collected during leadnet sampling from 2009 – 2011 at Black-Clear Lake, LA.

The catch per unit effort values depicted in Figure 10 indicate increasing abundance of crappies across all size groups during the study period. Additionally the mean sample catch per hour for all crappies collected in 2009, 2010 and 2011 were 0.1, 0.3 and 0.5 respectively.

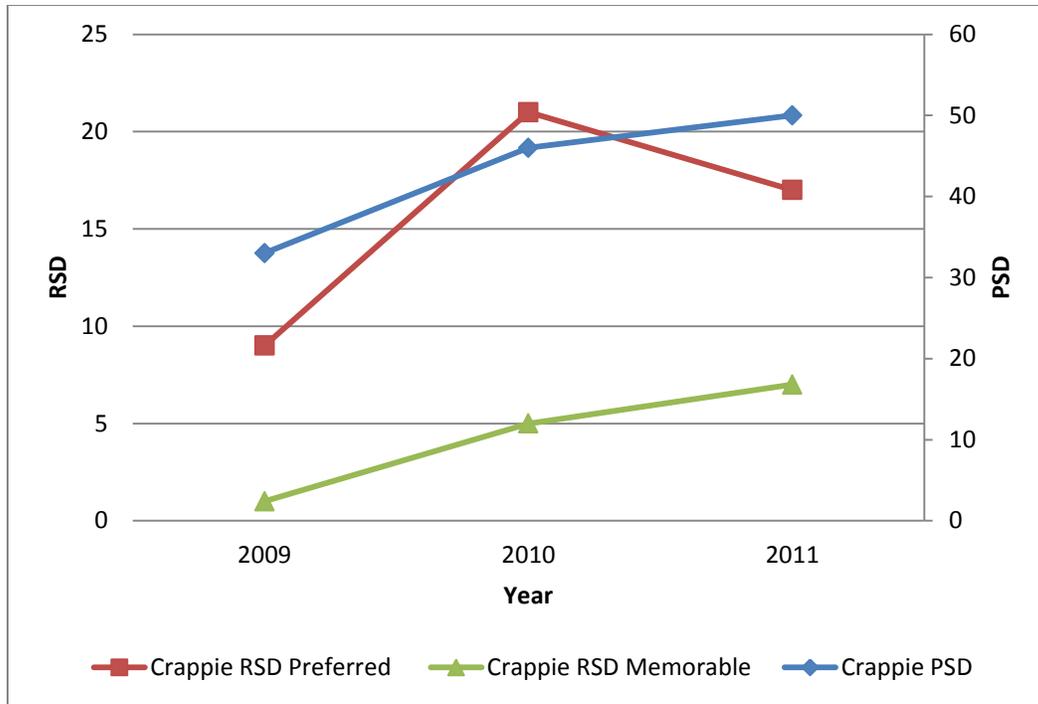


Figure 11. The relative stock densities and proportional stock densities of crappies collected during leadnet sampling at Black-Clear Lake, LA from 2009-2011.

Gablehouse, JR (1984) suggests a RSD Preferred value for crappie as >10 and a PSD value between 40 and 70. The values listed for crappie in Figure 11 are within those recommended ranges.

Bluegill

Eight hundred and twelve bluegill anglers were recorded during creel surveys conducted in 2010. Those anglers fished 7,087 hours, harvested 13,214 bluegills that totaled 1,903 pounds. Bluegill anglers caught 15 bluegills per trip at the rate of 3 fish per hour.

Bluegill and other sunfish are monitored by means of leadnet sampling. Recent leadnet sampling information appears in Table 6.

Table 6. Mean sample catch per hour of selected species captured by leadnet sampling at Black-Clear Lake, LA from 2009 – 2011.

Mean Catch Per Hour			
Species	2009	2010	2011
Bluegill	0.13868	0.303	0.54167
Redear Sunfish	0.24183	0.56195	0.73333
Redspotted Sunfish	0.06332	0.10471	0.16458

Commercial Species

Commercial species present in Black-Clear Lake include carp, catfish, drum and gar species. These species are monitored by means of monofilament gillnet sampling. Gillnet sampling indicates fluctuations in the abundance of commercial species over time. Possible explanations for these fluctuations include natural flood pulse or drought periods, hydrologic changes resulting from the Red River Navigation Project and changes in aquatic vegetation coverage.

Channel catfish catch per unit of effort during gillnet sampling has decreased slightly in recent years while such values for blue catfish have increased. Flathead catfish CPUE values have decreased dramatically over the last two decades. CPUE values for all three species of catfish are shown in Figure 11.

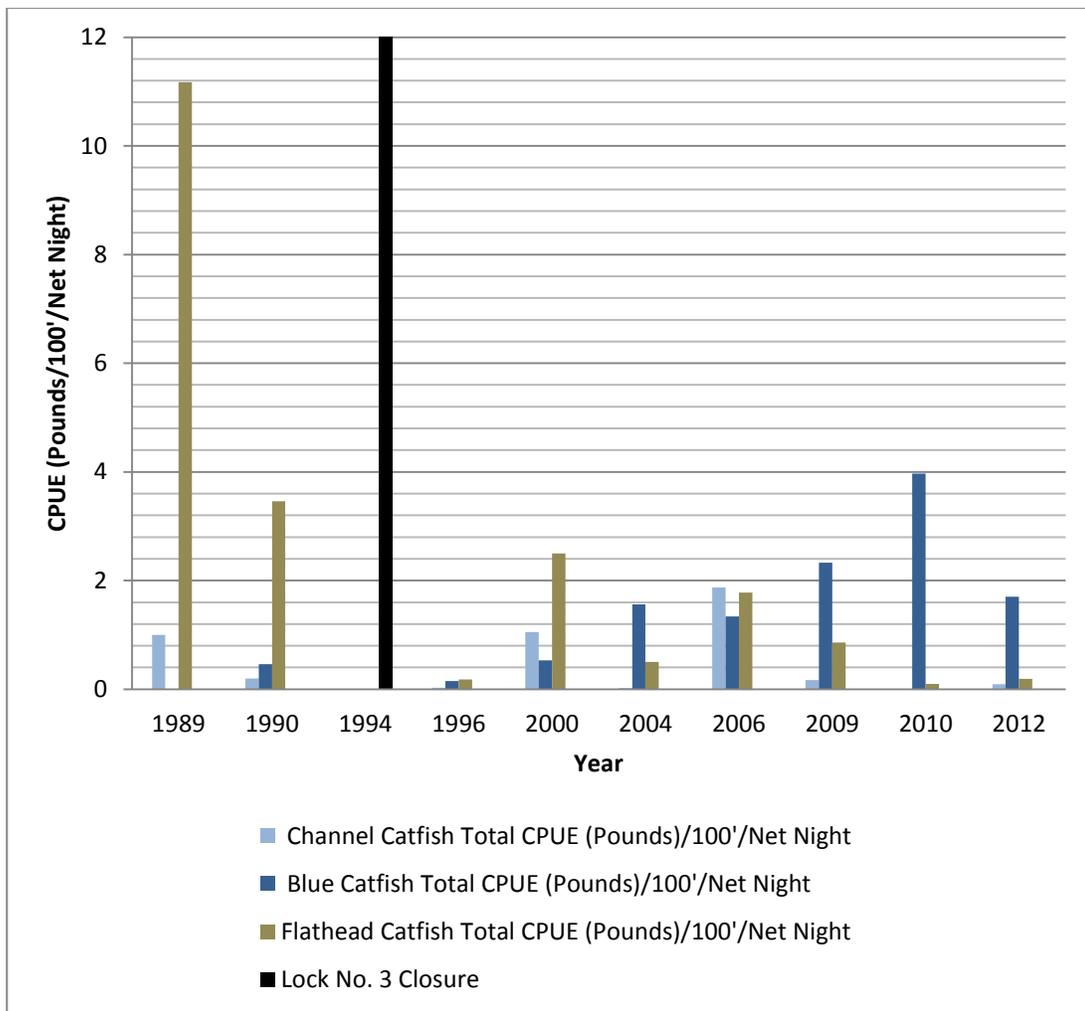


Figure 11. Catch per unit of effort values for catfish species collected during gillnet sampling at Black-Clear Lake, LA from 1989-2012.

In addition to catfish, other traditional commercial species are also monitored by gillnet sampling at Black-Clear Lake. Catch per unit effort values for these species are shown in Table 7.

Table 7. The gillnet CPUE of selected species in pounds per net night by year in Black-Clear Lake, LA from 1989 – 2013.

Species	YEAR									12-13 VS, Average CPUE
	89-90	90-91	96-97	00-01	04-05	06-07	09-10	10-11	12-13	
Common Carp	8	5.82	0.25	0.92	0.76	0	0	0.36	0	-100.00%
Bigmouth Buffalo	0	3.03	0	0	0	0	0	0	0	-100.00%
Smallmouth Buffalo	0	4.23	1.77	0	0	0	0	0	0	-100.00%
Spotted Sucker	20.83	0.15	0.25	1.62	0	0.44	0.85	0	0	-100.00%
Bowfin	0	0	0.19	0	0.19	0	0	0	0	-100.00%
Flathead Catfish	11.17	3.46	11.17	2.5	0.5	1.78	0.86	0.1	0.19	-91.76%
Channel Catfish	1	0.2	1	1.05	0.02	1.87	0.17	0	0.09	-81.72%
Spotted Gar	0	0.37	0	0.04	0	0	1.38	0	0.06	-70.81%
Freshwater Drum	1.5	1.47	2.92	1.16	0.29	0.05	0.38	0.25	0.55	-42.24%
Blue Catfish		0.46		0.53	1.56	1.34	2.33	3.97	1.7	12.96%
Longnose Gar	0	0	0.25	0.92	1.25	0.39	0	0.36	0.67	161.04%
Grass Carp	0	0.27	0.14	0	0	0	0	0	0.98	534.53%
Total	31.16	15.92	5.77	4.66	2.49	0.88	2.61	0.97	2.26	-69.5%

Table 7 reveals that most commercial species have decreased significantly since 1989. The exceptions are blue catfish, longnose gar and grass carp. It should be noted here that grass carp are stocked into the lake as a biological control agent for submerged aquatic vegetation and their abundance is therefore, artificially supported.

HABITAT EVALUATION

Aquatic Vegetation

When Black-Clear Lake was formed by impoundment of Saline Bayou, the majority of the inundated area was comprised of cypress swamp habitat. Over the next 80 years those areas were subject to siltation and deposition of massive amounts of organic matter in the form of decaying leaves and other plant material. Today, the littoral zone of the lake is described as relatively

shallow and eutrophic. Much of the lake is forested with cypress trees. The portion of the lake above the LA 9 Bridge as well as the area immediately below that bridge is densely covered with cypress timber. Most of the cypress timber is of poor quality due to stress resulting from long-term flooding of the root systems.

Black-Clear Lake has been plagued by chronic aquatic vegetation problems for several decades. Initially, problems were related to both floating and submerged native vegetation but exotic plant species have outcompeted problematic native species in recent years.

Hydrilla was first reported in Black Lake in 1993 in the Prairie area. In 1999, a five year management plan was written which called for alternating herbicide applications and drawdowns. The objective of the plan was to significantly reduce the biomass of the hydrilla and to deplete the tuber reserve in the lake bottom. The LDWF effort to control hydrilla in the Prairie region was largely successful. However, during this time period, hydrilla became established in other areas of the lake. By 2003, serious problems were observed above the LA 9 Bridge.

Consecutive fall/winter drawdowns were conducted in 2005/2006 and 2006/2007. The success of these drawdowns was limited. A reduction in hydrilla biomass and improved lake conditions were noted immediately following the drawdown. However, by the following fall hydrilla was again prevalent and spreading. With the drawdown capability of the control structure limited to 4.5 feet, drawdowns alone could not provide desired results.

In an attempt to control excessive vegetation, primarily hydrilla in Black/Clear Lake, an integrated management plan was initiated in 2008. This plan consisted of a minimal summer drawdown of approximately 18 inches followed by a limited herbicide application. This was followed by aquatic vegetation monitoring and updates to the management plan as needed.

On June 9, 2008, three formulations of Sonar were used to treat 3,300 acres of Black Lake. Six boat crews along with numerous support personnel applied 14,520 pounds of Sonar. Two months later, another 960 pounds of Sonar were applied to the same treatment area to boost herbicide concentration and increase control of the hydrilla. The target level of fluridone for these treatments was 45 parts per billion. The total amount of Sonar applied during this treatment was 15,480 pounds at an approximate cost of \$400,000 dollars.

The results of the treatment were excellent. Hydrilla biomass was reduced by 90% in the treatment area. Though the target area was defined as 3,300 acres, the Sonar treatment expanded and provided control to approximately 4,000 acres.

In 2010, a 2,000 acre hydrilla treatment was made in the Prairie area of the lake utilizing 4,260 pounds of Sonar PR along with 3,640 pounds of Sonar Q. The target level of fluridone for these treatments was 45 parts per billion. Good results were noted following this treatment. Anglers expressed satisfaction with the results and reported increased angling opportunities and angler success.

In 2011, a follow up treatment was made in the Prairie area to eliminate regrowth of hydrilla. The follow up treatment was intended to be an early season, low dose application targeted at remaining hydrilla tubers. This treatment used 1,170 pounds of Sonar Q and 648 pounds of

Sonar PR. As of October 1, 2013, the Prairie remains mostly clear of hydrilla with spotty regrowth noted in 2012 and 2013.

Hydrilla has become problematic in other areas of the lake, particularly in the northern end. The majority of the 1,447 acres of hydrilla found in the lake in October, 2013 was found above LA 9.

To date, 25,671 triploid grass carp (TGC) have been stocked into Black-Clear Lake to provide biological control of submerged aquatic vegetation.

Giant salvinia was found at Black-Clear Lake in 2008. Since that time the plant has been problematic in areas protected from wind and water currents. Herbicide treatment acreage for giant salvinia has increased from 2 acres in 2008 to 62 acres in 2009, 59 acres in 2010, 143 acres in 2011, 737 acres in 2012, and 2,337 acres in 2013.

Substrate

Natural water level fluctuations that controlled leaf litter deposits were altered with the impoundment of Black/Clear Lake. Impoundment greatly modified the former water fluctuation regime that included annual high spring and low fall water levels. The abundant cypress and tupelo trees produce many tons of leaves each year. In low water periods, the soaked leaves are exposed to air and decompose at a normal rate. Without exposure to air during the low water period, leaves decompose much slower and accumulate on the bottom of the lake. Over many years, shallow spawning areas have been covered by a thick layer of organic debris. Since 2000, Black/Clear Lake has been drawn down 5 times. The drawdowns are designed to emulate annual low water periods that historically occurred. The annual low water was a necessary component to the swamp ecosystem that existed before the lake was impounded. The drawdowns were intended to improve spawning substrate and reduce submerged aquatic vegetation. The results of the drawdowns have been successful in temporarily reducing aquatic vegetation, but re-growth has occurred within one year. The resulting reduction in organic leaf litter has provided improved spawning substrate for nesting fish along the perimeter of Black/Clear Lake as indicated by LDWF sampling. Black/Clear Lake drawdowns are now limited due to the Pool elevation of Red River Lock #3. Instead of an 8 foot reduction in water level, only 4.5 feet drawdowns have been possible since 1994 when Red River elevation was raised to 95.0 MSL. With the annual contributions from leaf-fall and senescence of excessive aquatic vegetation coverage, organic accretion is expected to increase.

CONDITION IMBALANCE / PROBLEM

Hydrilla and coontail are problematic submerged aquatic plant species in the lake at this time. Hydrilla is an invasive species that is both beneficial as fish habitat and problematic to fishing and navigation. Reduction of hydrilla in Black-Clear Lake can be accomplished with biological control measures, specifically triploid grass carp. In waterbodies where submerged aquatic vegetation (SAV) is the primary form of complex cover, the use of TGC includes the risk of excessive control. Complex cover is an important component of centrarchid sportfish habitat. Sportfish productivity and angler success are reduced when complex cover is significantly above or below 15-30% area coverage. Efforts to introduce TGC for control of SAV within a desired range have been largely unsuccessful. Results more often include insufficient SAV control or excessive removal of SAV. Such concerns are greatly lessened at Black-Clear due to an abundance of woody complex cover. The use of TGC presents no apparent threat to fisheries habitat in Black-Clear Lake.

Giant salvinia is an invasive floating fern that has been present since 2008 but has only recently developed into a serious problem in some areas of the reservoir. Giant salvinia does cause navigational problems in areas of the reservoir that are sheltered from wave action or water currents.

CORRECTIVE ACTION NEEDED

Annual monitoring of aquatic plant species to identify problems related to these plants. Appropriate use of herbicides, water level manipulation, and biological agents to control vegetation as needed.

RECOMMENDATIONS

1. Aquatic Vegetation Management

Implement an integrated management approach for Black-Clear Lake to control overabundant vegetation. 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 annual surveys to monitor aquatic vegetation and will update recommendations as necessary.

a. Hydrilla

Due to the size of the lake and its watershed, chemical treatments are not recommended for large-scale or long-term control of submerged aquatic vegetation. The cost for such control is prohibitive and the results are short-lived.

Physical control of hydrilla and other submerged aquatic vegetation (SAV) will be accomplished by means of lake drawdowns. Drawdown measures will be considered when coverage of SAV exceeds 60% (8,280 acres) of total waterbody surface area. The recommended drawdown period is July 5 to November 1 of each year in which a drawdown is recommended. This timing should provide sufficient waterbottom desiccation and achieve optimal compromise between vegetation management objectives and major user groups. Creel surveys indicate angler usage as depicted in Figure 12.

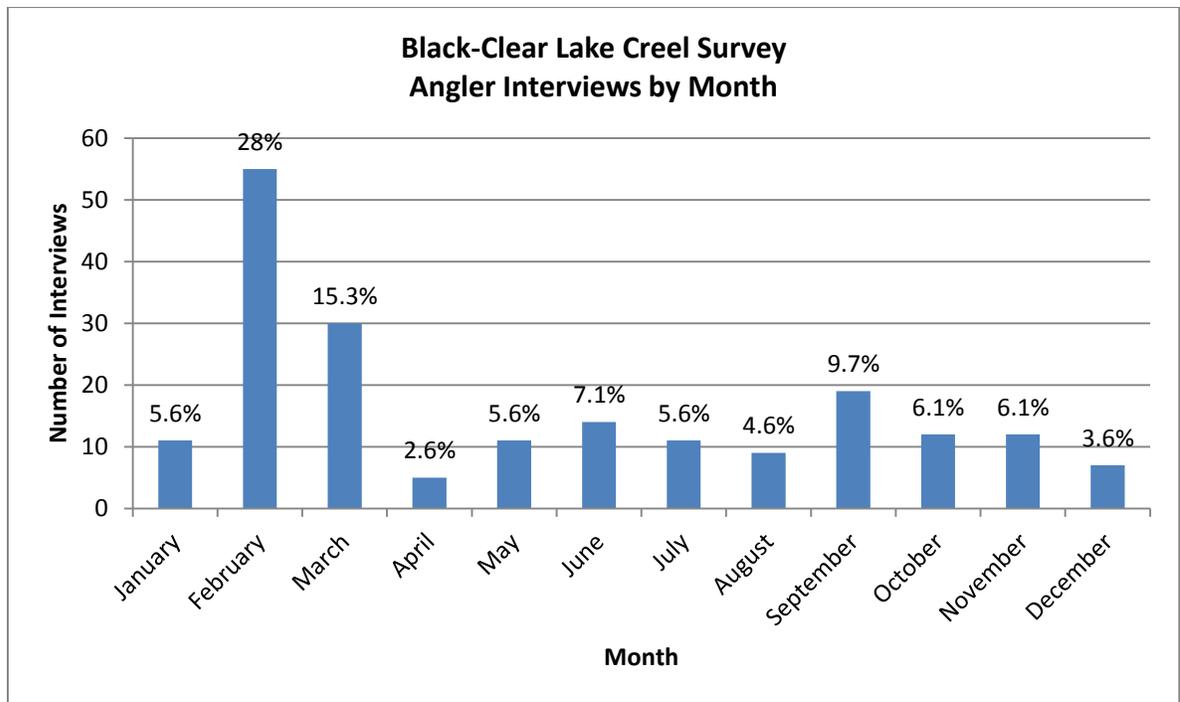


Figure 12. Number of angler interviews by month for creel survey conducted at Black-Clear Lake in year 2010.

The creel survey of 2010 indicates that angler usage drops in July and August while that period of time provides high potential for both effective dewatering of the lake and drying of exposed lake bottom area. Closure of the control structure in early November would offer at least limited opportunity for waterfowl hunters to utilize the lake for their pursuits.

The recommended drawdown rate will be 4 inches per day with a target level of 95' MSL. A minimum of two consecutive drawdowns will be necessary to achieve satisfactory reduction of hydrilla.

Triploid grass carp are a potentially effective option for biological control of hydrilla. Triploid grass carp are currently present in Black-Clear Lake and will be monitored for efficacy in controlling submerged aquatic vegetation.

b. Giant Salvinia

Continue foliar herbicide applications for control of giant salvinia. Giant salvinia will be treated 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 surfactants (12 oz. /acre) from April 1 to October 31. Outside of that time period, diquat at a rate of 0.75 gallons per acre will be used with 0.25 gallons per acre of a non-ionic surfactant.

c. Water Hyacinth

Black-Clear Lake is located within the Louisiana Department of Agriculture & Forestry 2, 4-D waiver area. Between March 15 and September 15 of each year, water hyacinth will be treated with foliar applications of glyphosate (0.75 gal/acre) and Surfac 910 (0.25 gal/acre). Between September 16 and March 14 of each year, water hyacinth will be treated with foliar applications of 2,4-D (0.5 gal/acre) and Surfac 910 (1 pint/acre).

d. Vegetation Surveys

Black-Clear Lake will be surveyed for aquatic vegetation on an annual basis to determine spatial coverage and species composition. These surveys will serve to guide aquatic vegetation control recommendations.

2. Fisheries Management

- a. Black-Clear Lake will be monitored by means of standardized sampling to include spring electrofishing, fall electrofishing, fall electrofishing forage, leadnetting and gillnetting. Such sampling will occur every third year beginning in year 2015.

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