

# **LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES**



**OFFICE OF FISHERIES  
INLAND FISHERIES SECTION**

**PART VI -B**

**WATERBODY MANAGEMENT PLAN SERIES**

## **CROOKED CREEK RESERVOIR**

**WATERBODY EVALUATION &  
RECOMMENDATIONS**

# **CHRONOLOGY**

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# WATERBODY EVALUATION

## STRATEGY STATEMENT

### Recreational

Sportfish species are managed to provide a sustainable population while providing anglers with the opportunity to catch or harvest numbers of fish adequate to maintain angler interest and efforts. Anglers are also afforded the opportunity to catch quality sized largemouth bass through the introduction of Florida largemouth bass. Frequent introductions of Florida largemouth bass provide the foundation for quality and memorable bass through the incorporation of genetic material into the bass population.

### Commercial

A commercial fishery does not exist on Crooked Creek Reservoir.

### Species of special concern

No threatened or endangered species have been observed in Crooked Creek Reservoir.

## EXISTING HARVEST REGULATIONS

### Recreational

Statewide regulations for all fish species, the 2013 recreational fishing regulations may be viewed at the link: <http://www.wlf.louisiana.gov/fishing/regulations>

### Commercial

Commercial Fishing is prohibited; however, the 2013 commercial fishing regulations may be viewed at the link: <http://www.wlf.louisiana.gov/fishing/regulations>

### Species of Special Concern

NA

## SPECIES EVALUATION

### Recreational

Largemouth bass (*Micropterus salmoides*) are targeted for evaluation since they are a species indicative of the overall fish population due to their high position in the food chain and because they are highly sought after by anglers. Electrofishing is the best indicator of largemouth bass abundance and size distribution, with the exception of large fish. Sampling with gill nets determines the status of large bass and other large fish species.

### *Largemouth Bass-*

#### Abundance and relative weight-

The index used to measure relative abundance over time is that of catch-per-unit-of-effort (CPUE) based on the number of bass sampled per hour of electrofishing time/effort. The CPUE for largemouth bass collected from Crooked Creek Reservoir from 2002 to 2012 indicates a wide degree of variability in some years (e.g., 2004 compared to 2010 - Figure 1). Electrofishing sampling is conducted during day time hours on this waterbody. The number of sample sites is determined by the total acres of a water-body. Three sites are sampled on Crooked Creek Reservoir, each representing different habitat types such as aquatic vegetation edges, shoreline, and timber. As indicated in Figure 1, the abundance of all size groups of bass was lowest in 2002 and 2004. The highest total CPUE was in the 2010 sample. The low CPUE could be related to extremely low conductivity levels, which limit the effectiveness of electrofishing gear. Another factor affecting sampling on Crooked Creek is the abundance of dense submerged vegetation. The introduction of triploid grass carp (TGC) will reduce submerged vegetation and improve efficiency of electrofishing sampling efforts.

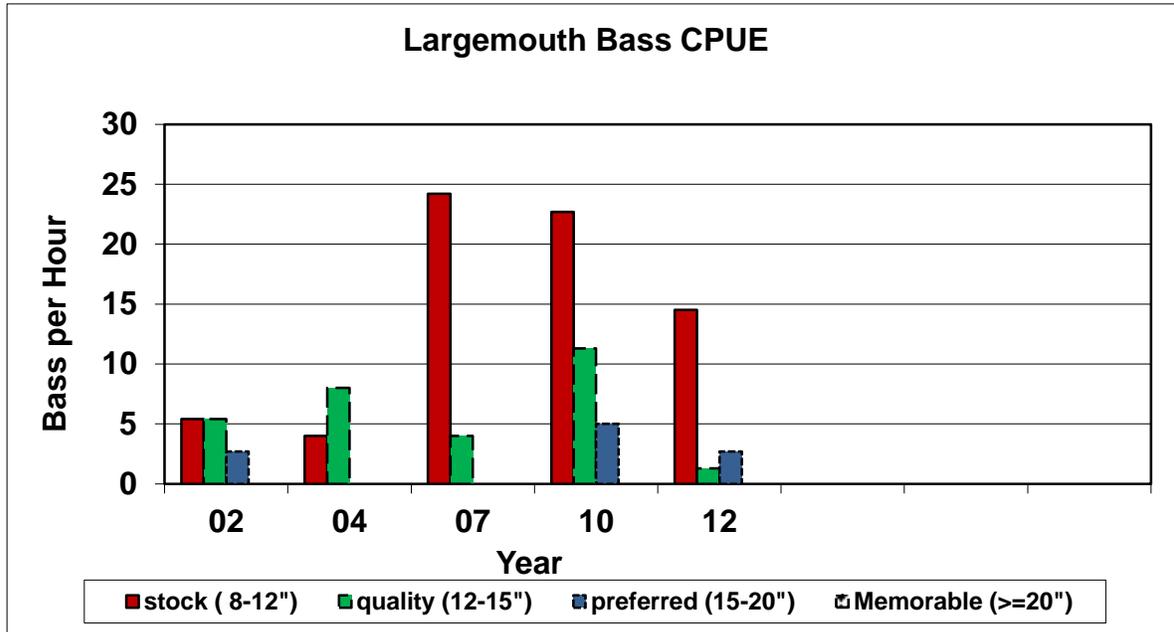


Figure 1. Spring Electrofishing Catch-Per-Unit-of-Effort (CPUE: number per hour) for largemouth bass of stock-, quality-, preferred-, and memorable-size fish captured at Crooked Creek Reservoir, LA, for years 2002 - 2012.

Forage-

Sunfish and gizzard shad have been identified as primary bass forage in Crooked Creek Reservoir. During fall electrofishing, a 900-second sample is used to determine forage abundance. However, there is a difference between forage abundance and availability. Measurements of largemouth bass body condition are recorded to determine utilization of available forage. Relative weight ( $W_r$ ) is a measure of fish “plumpness” and is the ratio of the fish weight to that of a determined standard weight for healthy fish. Largemouth bass  $W_r$  below 80 may indicate a potential problem with forage availability, while  $W_r$  near or above 100 indicates a healthy bass population. Crooked Creek Reservoir is often heavily infested with submersed aquatic plants. High densities of submersed aquatic plants usually favor prey species which utilize cover to elude predators. Despite the abundance of prey cover and visual barriers, the relative weights for Crooked Creek Reservoir largemouth bass average near 92 across all size groups (Figure 2). Few largemouth bass were collected in some years due to the heavy infestations of submersed aquatic plants. For example, the number of fish sampled in 2002 was only six bass. In other years, the sample size ranged from 20 – 33 largemouth bass.

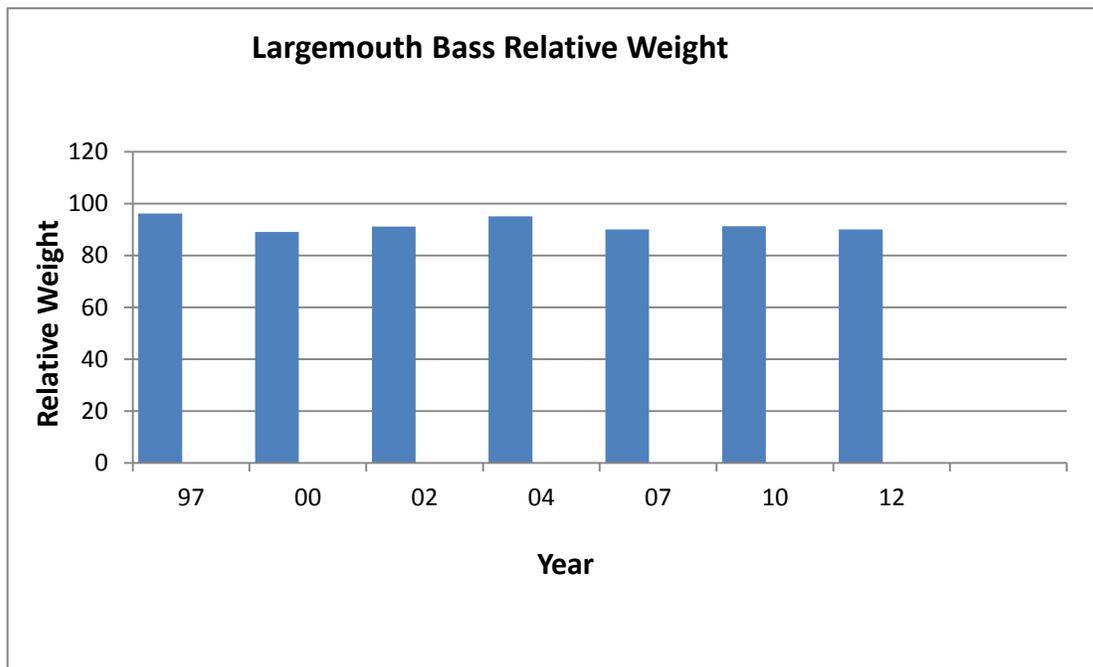


Figure 2. The average relative weights ( $W_r$ ) of largemouth bass collected in fall electrofishing samples from Crooked Creek Reservoir, LA, for the years 1997 – 2012.

Crappie-

Size structure and relative abundance -

While both species of crappie are found in Crooked Creek Reservoir, the black crappie is far more abundant than the white crappie. Electrofishing samples, taken in the spring and fall from 2004 - 2012 (Figure 3), show crappie size distribution ranging from 2 - 12 inches total length (TL). Though overall numbers are relatively low, a good size distribution is generally represented over time.

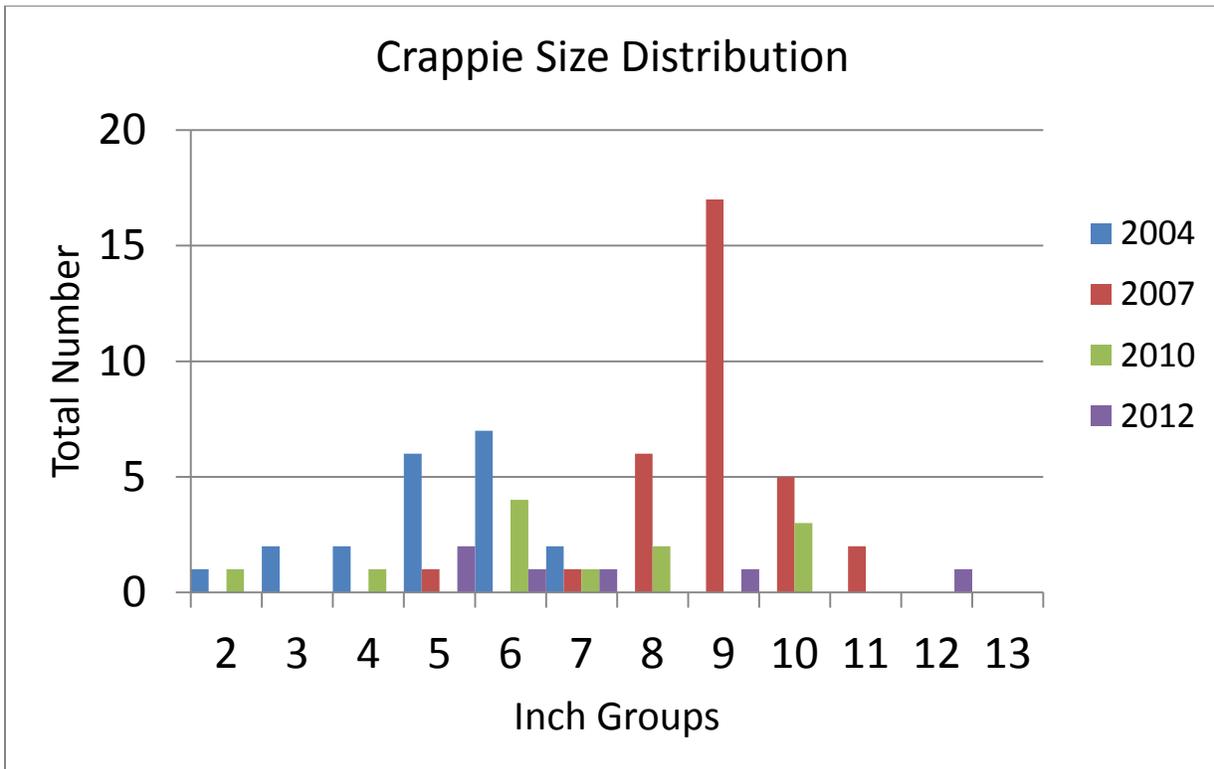


Figure 3. The size distribution of crappie over time captured in electrofishing samples on Crooked Creek Reservoir, LA during the years 2004 - 2012.

CPUE for crappies sampled from Crooked Creek Reservoir by electrofishing samples between the years 1997-2012, indicates annual variability (Figure 4). In the years 1997, 2000 and 2002, there were few captured. Crappie CPUE increased in 2007 and in 2010, but declined in 2012. Overall, crappie catch rates in electrofishing samples are relatively low. However, anecdotal information from local anglers indicates otherwise. Good catches are reported, particularly during the spawning season. Frame net sampling was conducted in 2000. Sample size was low. Lead net sampling is scheduled 2014.

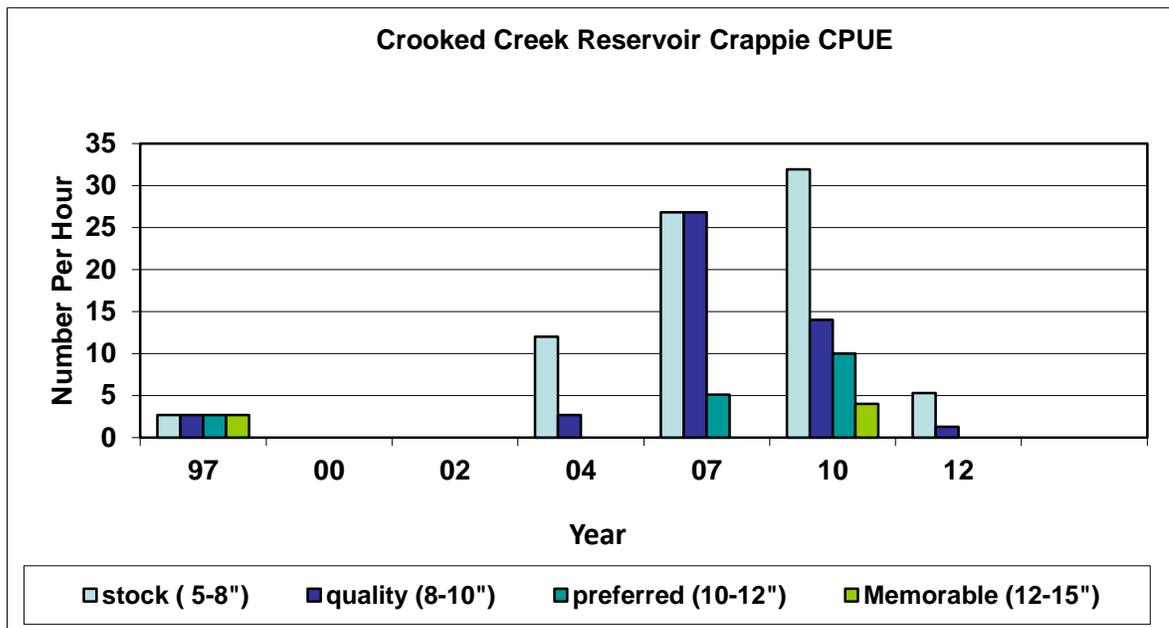


Figure 4. The CPUE (number per hour) by size class for crappies of stock-, quality-, preferred-, and memorable-size fish captured at Crooked Creek Reservoir, LA, during the years from 1997-2012.

Sunfish-

Electrofishing is the primary sampling gear used in Crooked Creek Reservoir for sunfish. Electrofishing results are not reliable to determine sunfish relative abundance.

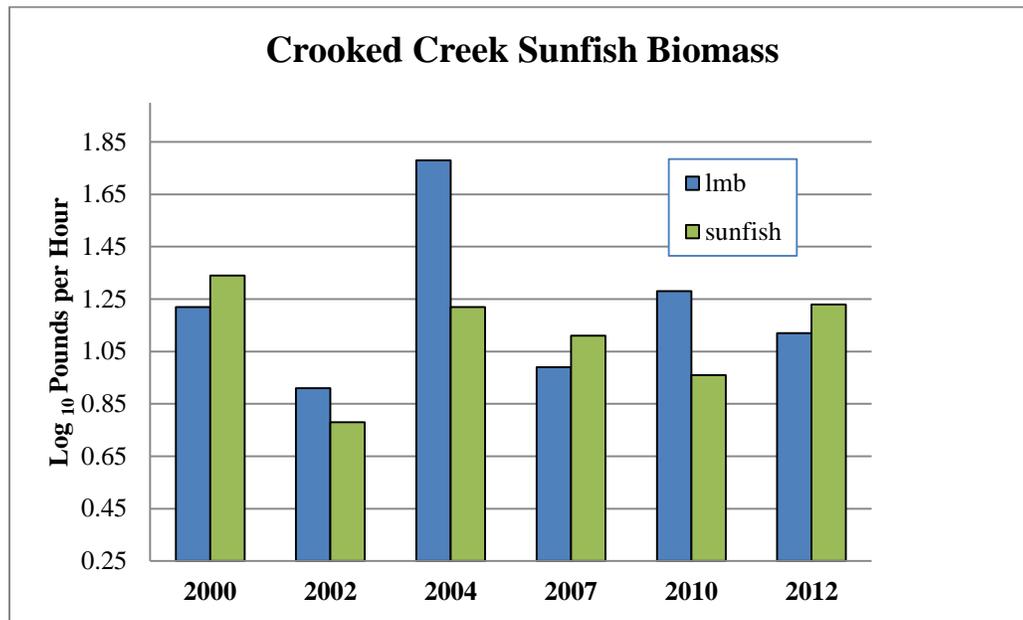


Figure 5. Log<sub>10</sub> transformed CPUE (weight of fish) captured per hour of electrofishing in fall forage samples for Crooked Creek Reservoir, LA, from 2003 – 2011.

The Log<sub>10</sub>-transformed CPUE (weight per hour) for largemouth bass and sunfish results from the forage sampling events is presented in Figure 5. It was appropriate to Log<sub>10</sub> transform the largemouth bass and sunfish data sets due to the considerable variability in sample sizes, and the transformation resulted in a more normally distributed data set for graphic display. Except for a low CPUE in 2002, pounds of sunfish generally remained consistent over time. In 2004, bass CPUE (pounds per hour) exceeded that of sunfish, while in other year's bass and sunfish CPUE in pounds per hour were relatively similar.

The total pounds captured per hour by electrofishing were calculated for fall forage samples (Table 1). The majority of largemouth bass captured were greater than 6 inches TL. Overall, bluegill represent the main forage available to sportfish and other fish predators within Crooked Creek Reservoir. Other available forage includes longear, redear sunfish, and lake chubsuckers.

Table 1. Estimates of pounds per hour by electrofishing for all fish species captured during fall forage samples on Crooked Creek Reservoir, Louisiana.

Species	2000	2002	2004	2010	2012
LMB	16.8	8.19	24.5	19.3	13.2
Bluegill	6.9	4.5	13.5	4.6	7.2
Longear Sunfish	4.8	1.24	1.83	3.2	0
Redear Sunfish	3.7	0	0.18	1.29	8.5
Gizzard shad	0	2.4	1.7	0	0
Black Crappie	1.96	0	2.5	0.03	0
Golden Shiner	0	0	0.44	0	2.11
Warmouth	1.3	0.33	0.95	0	0
Lake chubsucker	0.63	0.30	1.57	0.36	1.18

### Commercial

Commercial fish species and large sport fish in Crooked Creek Reservoir are sampled with entanglement gear. Monofilament gill nets are used to provide the data necessary to estimate size distribution and abundance (Table 2). Sample effort is determined by the surface area of the impoundment. A LDWF standardized gill net sample consists of the combined catch of 100 yard lengths of the following mesh sizes: 2.5 inches, 3 inches, 3.5 inches and 4 inches. Gill nets are set within one hour of sunset and retrieved as soon as possible after sunrise. Sets are restricted to the time period between December 1 and February 28. All fish captured are individually measured in total length to the nearest millimeter. Weights are measured to the nearest gram.

The most common species collected (2003, 2006, and 2013) have been common carp (*Cyprinus carpio*). Largemouth bass captured in gill nets have ranged in size from 16-22 inches TL. Triploid grass carp (TGC) were the most abundant fish captured in 2013. TGC ranged in size from 19 – 36 inches TL.

Table 2. Total number of all fish species captured by gill net per year for Crooked Creek Reservoir, LA for 2003, 2006 and 2013.

<b>Species</b>	<b>2003</b>	<b>2006</b>	<b>2013</b>
LMB	20	2	9
Common Carp	19	12	24
Black Crappie	4	0	2
Channel Catfish	0	1	4
Spotted Garfish	3	0	2
Bowfin	13	3	3
Gizzard Shad	2	0	17
Yellow Bullhead	5	1	1
Blue Catfish	1	0	0
Grass Carp	0	0	58
Total Fish	67	19	120

## Water Quality-

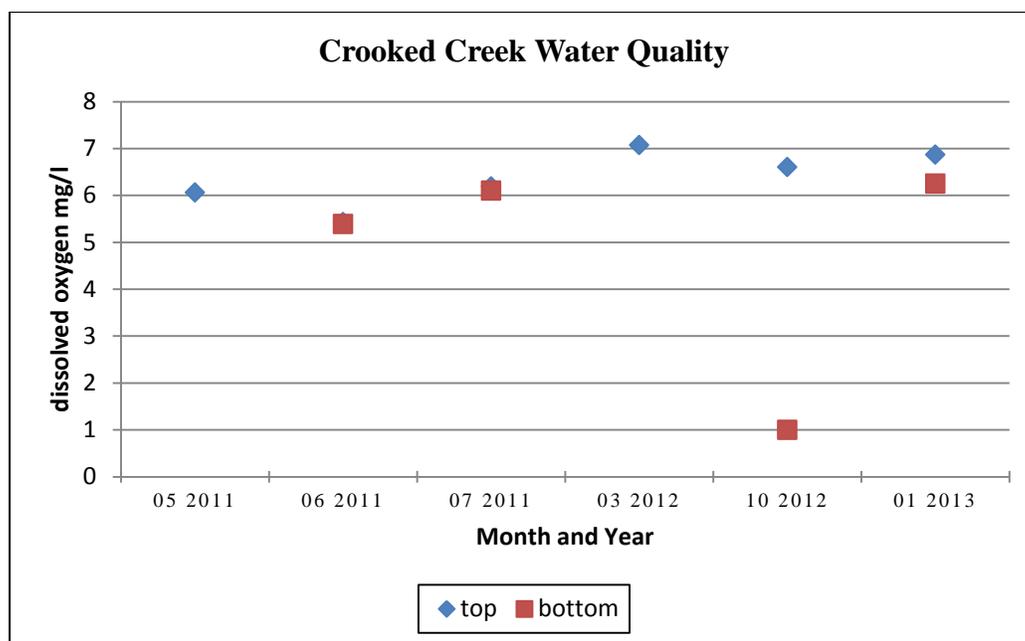


Figure 6. Dissolved oxygen measured in milligrams per liter (mg/l) in Crooked Creek Reservoir, LA, from 2011 – 2013.

Water quality parameters including dissolved oxygen, temperature, pH, conductivity and depths were taken during standardized samples and random site visits. Instantaneous dissolved oxygen (DO) levels have been above the EPA action level of 5.0 mg/l with one exception as shown in Figure 6. That one bottom reading measured 1.0 mg/l, which may be related to stratification due to warm water temperatures.

## HABITAT EVALUATION

### Aquatic Vegetation

#### **2011**

Hydrilla covered approximately 75% of the reservoir and was a serious impediment to boating activities. The Evangeline Parish Police Jury stocked 500 TGC in 2008. LDWF stocked an additional 60 adult TGC in 2011.

#### **2012**

In September, water shield (40%), fanwort (40%) and coontail (20%) covered approximately 180 acres on the north and northeast end of the reservoir. Other plants included American lotus (15 acres), alligator weed (10 acres), water hyacinth (5 acres) and duckweed (8 acres) which made up a small percent of emergent and floating plant coverage.

## 2013

Crooked Creek continues to have a heavy infestation of water shield (*Brasenia schreberi*). A thick mat of this plant covers a large area north of the public swimming area. In June, water shield (45%), fanwort (35%) and coontail (20%) cover approximately 200 acres. Other plants include American lotus (15 acres), alligator weed (10 acres), water hyacinth (5 acres) and duckweed (5 acres) which make up a small percent of emergent and floating plant coverage. There have been no efforts to re-establish these plant species.

Hydrilla has noticeably decreased. Coverage decreased from 200 acres in 2012 to 150 acres in 2013. Follow-up evaluations of hydrilla will be conducted. Other vegetation such as duckweed, lotus, water hyacinth, etc. will be controlled as needed using foliar herbicide applications.

### Substrate

Crooked Creek Reservoir is an open Reservoir with a hard sandy bottom. Surrounding the perimeter of the Reservoir is buttonbush (*Cephalanthus occidentalis*), Bald Cypress (*Taxodium distichum*) and black willow (*Salix nigra*) especially along the north and west shoreline.

## **CONDITION IMBALANCE / PROBLEM**

Currently aquatic vegetation exceeds the recommended range of complex cover needed for adequate sportfish production. Crooked Creek Reservoir anglers have trouble fishing areas with overabundant aquatic vegetation. Nuisance aquatic vegetation, particularly hydrilla, continues to inhibit recreational usage of the reservoir. Other species including coontail, fanwort, water hyacinth and water shield require maintenance control.

## **CORRECTIVE ACTION NEEDED**

1. Overabundant aquatic vegetation should be controlled.
2. Follow-up sampling is necessary to determine effects of the TGC stockings.

## **RECOMMENDATIONS**

1. Conduct chemical and biological treatments to nuisance aquatic plants as necessary in accordance with Inland Fisheries protocol.
2. Evaluate previous triploid grass carp introductions with LDWF standardized sampling to determine abundance/longevity and effects on submersed vegetation.
3. Meet with Evangeline Parish Police Jury on an annual basis to discuss all management decisions as it relates to aquatic vegetation and fisheries.
4. Continue standardized fisheries sampling on Crooked Creek Reservoir every third year to assess populations.