

PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-30-R-33

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2007 Survey Report

Hubbard Creek Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Hubbard Creek Reservoir were surveyed in 2007 using electrofishing and trap nets and in 2008 using gill nets. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Hubbard Creek Reservoir is a 15,250-acre impoundment constructed on Sandy Creek and Hubbard Creek, tributaries of the Brazos River. It is approximately 55 miles northeast of Abilene, Texas. It was constructed in 1962 for municipal water supply and flood control. There was a long-lasting drought from 1998 through summer 2007 as water level dropped to 18 feet below conservation level in 2002 and 2005. It nearly filled in summer 2007 with an increase of 12 feet and finally filled in spring 2008. Water level was about 3-foot below conservation level at time of sampling, and littoral habitat consisted primarily of rock, dense flooded-terrestrial vegetation, black willow, Illinois pondweed, and hydrilla.
- **Management History:** Fish populations have always been managed with statewide harvest regulations. Threadfin shad were introduced in 1984 and remain an important prey species. Palmetto bass were stocked twice (1979 and 1982). No palmetto bass have been collected since 2000. Florida largemouth bass were introduced in 1979 and additional stockings occurred in 1986, 1990, 1991, and 2003.
- **Fish Community**
 - **Prey species:** Abundance of gizzard shad, threadfin shad, and bluegill for existing predators was excellent.
 - **Catfishes:** Blue catfish numbers and size were such that good fishing opportunities should exist. Flathead catfish and channel catfish were present in the reservoir.
 - **Temperate basses:** The white bass population was excellent, with many fish in the 10- to 14-inch size range.
 - **Largemouth bass:** Abundance of fish from the spring 2007 spawn was very good which bodes well for the future of bass fishing in this reservoir. Adult fish, although relatively few in number, had a good size distribution. Growth and body condition were good as well. Florida largemouth bass were well established.
 - **White crappie:** Numbers and size of adult fish have improved in the last few years and, in winter 2007-2008, there was an excellent fishery for white crappie in Hubbard Creek and Sandy Creek.
- **Management Strategies:** Monitor hydrilla coverage annually, beginning in 2008. Promote fishing through popular articles in local newspapers. Develop vegetation management plan and present to controlling authority. Monitor fish populations with electrofishing in 2009 and with gill nets, trap nets, and electrofishing in 2011/2012.

INTRODUCTION

This document is a summary of fisheries data collected from Hubbard Creek Reservoir in 2007-2008. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other species of fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2007-2008 data for comparison.

Reservoir Description

Hubbard Creek Reservoir is a 15,250-acre impoundment constructed on Sandy Creek and Hubbard Creek, tributaries of the Brazos River. It is approximately 55 miles northeast of Abilene, Texas. It was constructed in 1962 for municipal water supply and flood control. Secondary use was recreation.

Like all West Texas impoundments, Hubbard Creek experienced chronic water level fluctuations (Figure 1). There was a long-lasting drought from 1998 through summer 2007; water level dropped to 18 feet below conservation level in 2002 and 2005. It nearly filled in summer 2007 with an increase of 12 feet (Figure 1). Water level was about 3-foot below conservation level at time of sampling, and littoral habitat consisted primarily of rock, dense flooded-terrestrial vegetation, black willow, Illinois pondweed, and hydrilla.

Hubbard Creek Reservoir was eutrophic based on Carlson's Trophic State Index for Chlorophyll-a (TSI Chl-a) with a mean TSI chl-a of 46.7 and a trend that indicated a decrease in algal content (Texas Commission on Environmental Quality 2008). Boat access consisted of several public boat ramps. Bank fishing access was limited to boat ramp areas and a park on the north shore. Other descriptive characteristics for Hubbard Creek Reservoir are in Table 1.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Dumont 2004) included:

1. Monitor hydrilla abundance

Action: No hydrilla was found in a 2003 survey. However, re-establishment of hydrilla did occur following a water level increase in summer 2007 as observed in the fall electrofishing survey.

Harvest regulation history: Fish populations have always been managed with statewide harvest regulations at Hubbard Creek Reservoir (Table 2).

Stocking history: Threadfin shad were introduced in 1984 and remain an established part of the forage community. Palmetto bass were stocked twice, once in 1979 and once in 1982; no palmetto bass have been collected since 2000. Florida largemouth bass were introduced in 1979 and additional stockings occurred in 1986, 1990, 1991, and 2003. The complete stocking history is in Table 3.

Vegetation/habitat history: Hubbard Creek Reservoir has no significant vegetation/habitat management history. Hydrilla was first documented in 1998, covered an estimated 25 acres in 1999, and was not found in 2003. No management action has occurred regarding hydrilla control.

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METHODS

Fishes were collected by electrofishing (1.7 hours at 20 5-min stations), gill netting (15 net nights at 15 stations), and trap netting (10 net nights at 10 sites). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing and, for gill and trap nets, as the number of fish per net night (fish/nn). Electrophoresis was used to determine largemouth bass genetics. All survey sites were randomly selected and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2005).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD)] (Guy *et al.* 2007), and condition indices [relative weight (W_r)] were calculated for some target fishes according to Anderson and Neumann (1996). Index of vulnerability (IOV) was calculated for gizzard shad (DiCenzo *et al.* 1996). Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE statistics and SE was calculated for structural indices and IOV. Source for water level data was the United States Geological Survey website.

RESULTS AND DISCUSSION

Habitat: A habitat survey was last conducted in 1996 (Munger and Dumont 1997). No hydrilla was found in a 2003 vegetation survey. There were 25 acres of hydrilla in 1999.

Prey species: Electrofishing CPUE of gizzard shad, threadfin shad, and bluegill was 211.2/h, 211.2/h, and 211.8/h, respectively. The IOV for gizzard shad was 84% in 2007, indicating that a large majority of gizzard shad were available as forage to most predators. The IOV has been nearly identical since 2001, ranging from 84 to 87 (Figure 2). Catch rate of gizzard shad in 2007 was about twice that estimated in 2001 and 2003, due to the catch of 4- to 6-inch fish (Figure 2). Catch rate of bluegill has increased since 2001, but size structure consisted of small fish (Figure 3). There appears to be ample forage for existing predators.

Blue catfish: Gill net CPUE of blue catfish has ranged from 2.3/nn to 2.5/nn since 1999 (Figure 4). Size structure has been good in each survey and, in 2008, fish ranged in size from 11 to 32 inches long with a high proportion of fish over 17 inches in length (Figure 4).

Channel catfish: Gill net CPUE indicated that channel catfish were present with low abundance, which has been the case at least since 1999 (Figure 5).

Flathead catfish: Flathead catfish were present.

White bass: Gill net CPUE of white bass has increased in each survey since 1999 and was 8.0/nn in 2008 (Figure 6). Also, size structure was excellent as many fish were at least 12 inches long, and fish up to 17 inches in length were collected (Figure 6).

Largemouth bass: Electrofishing CPUE of largemouth bass has increased since 2001 and was 163.2/h in 2007 (Figure 7). The increased catch in 2007 was attributed to sub-stock length fish which amounted to 145.2/h. Catch rate of stock-length and legal-size fish in 2007 actually declined slightly (Figure 7). However, the proportional size distribution was adequate (PSD=47, PSD-14=20) and similar to previous surveys (Figure 7). Other than 1999, catch and size distribution of stock-length largemouth bass has been similar (Figure 8). Body condition of largemouth bass has steadily improved in each survey since 2001 and averaged around 95 for stock-length fish in 2007 (Table 4). Mean age at 12 and 14 inches was 1.8 and 2.2 years, respectively. Growth of 14-inch fish was considerably better than estimates obtained in 1999 and 2003 (Table 5). Genetic samples from 1996 to 2005 indicated that Florida largemouth bass were well established (Table 6).

White crappie: Trap net CPUE of white crappie in 2007 was excellent (12.0/nn) given tremendous

increases in recently flooded terrestrial vegetation. In fact, improvements in nearly all population indices were apparent compared to surveys in 1999 and 2003 (Figure 9). Nearly half the crappie collected in the 2007 were legal-size or longer and there was evidence of a successful 2007 spawn as indicated by the catch of 2- to 4-inch white crappie (Figure 9). Anecdotal support for this apparent improvement in the crappie population came in the form of an extremely successful winter fishery in Hubbard Creek and Sandy Creek from November through February, 2007-2008.

Fisheries management plan for Hubbard Creek Reservoir, Texas

Prepared – July 2008.

ISSUE 1: There is a window of opportunity to publicize great fishing opportunities available to anglers now and in the near future at Hubbard Creek Reservoir.

MANAGEMENT STRATEGY

1. Write Abilene Reporter News articles on fishing opportunities at Hubbard Creek Reservoir.

ISSUE 2: Hydrilla is again present in Hubbard Creek Reservoir following the large water level increase in summer 2007.

MANAGEMENT STRATEGY

1. Annually monitor hydrilla coverage and initiate control measures if necessary.
2. Develop vegetation management plan and present it to West Central Texas Municipal Water Authority.

SAMPLING SCHEDULE JUSTIFICATION:

Electrofishing in 2009 would be beneficial in determining post-drought status of forage and largemouth bass populations. A once every four year sampling rotation would be adequate for gill net and trap net surveys. A sampling schedule is in Table 7.

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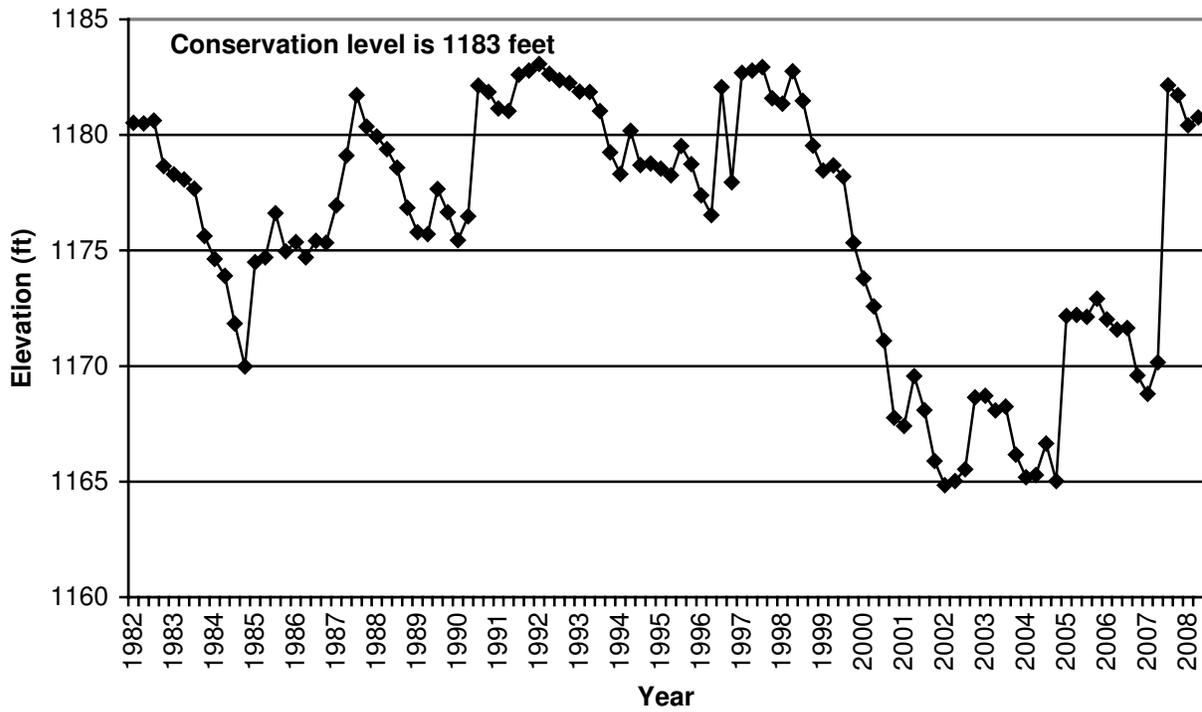


Figure 1. Quarterly water level elevations in feet above mean sea level for Hubbard Creek Reservoir, Texas, 1982-2008.

Table 1. Characteristics of Hubbard Creek Reservoir, Texas.

Characteristic	Description
Year constructed	1962
Controlling authority	West Central Texas Municipal Water Authority
County	Stephens
Reservoir type	Tributary, Brazos River Basin
Shoreline Development Index	7.22
Conductivity	785 umhos/cm

Table 2. Harvest regulations for Hubbard Creek Reservoir, Texas

Species	Bag Limit	Minimum Length Limit (inches)
Catfish: channel and blue catfish, their hybrids and subspecies	25 (in any combination)	12
Catfish, flathead	5	18
Bass, white	25	10
Bass, largemouth	5	14
Crappie: white and black crappie, their hybrids and subspecies	25 (in any combination)	10

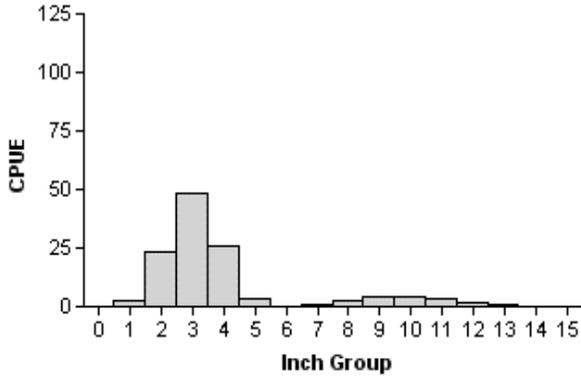
Table 3. Stocking history of Hubbard Creek Reservoir, Texas. Size categories are: FRY = < 1 inch, FGL = 1-3 inches and ADL = adults.

Species	Year	Number	Size
Threadfin shad	1984	1,500	ADL
Channel catfish	1970	100,000	FGL
Palmetto bass	1979	132,450	FGL
	1982	3,090,000	FRY
	Total	3,222,450	
Largemouth bass	1967	18,000	FGL
	1968	200,000	FGL
	1971	100,000	FGL
	Total	318,000	
Florida largemouth bass	1979	80,425	FGL
	1986	135,500	FGL
	1990	383,099	FGL
	1991	382,989	FGL
	2003	355,520	FGL
Total	1,337,533		

Gizzard Shad

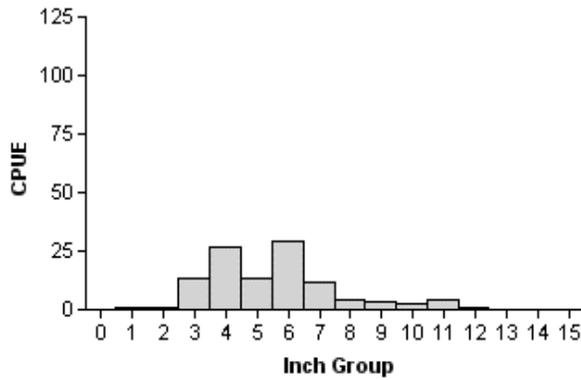
2001

Effort = 2.0
 Total CPUE = 119.5 (35; 239)
 PSD = 33 (7)
 IOV = 87 (7)



2003

Effort = 2.0
 Total CPUE = 111.0 (22; 222)
 PSD = 17 (5)
 IOV = 86 (6)



2007

Effort = 1.7
 Total CPUE = 211.2 (26; 352)
 PSD = 26 (8)
 IOV = 84 (4)

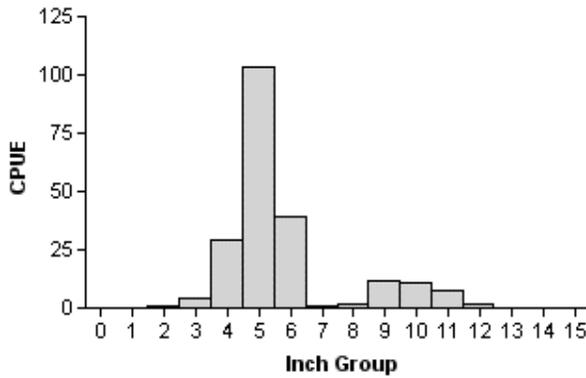
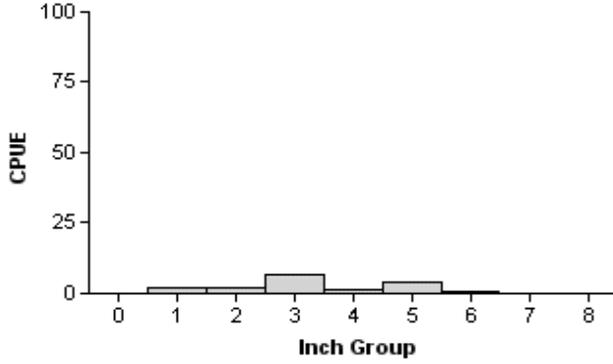


Figure 2. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for PSD and IOV are in parentheses) for fall electrofishing surveys, Hubbard Creek Reservoir, Texas, 2001, 2003, and 2007.

Bluegill

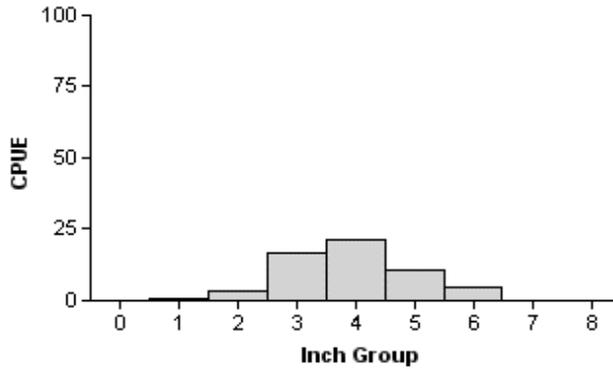
2001

Effort = 2.0
 Total CPUE = 17.0 (35; 34)
 PSD = 4 (3)



2003

Effort = 2.0
 Total CPUE = 59.0 (20; 118)
 PSD = 9 (3)



2007

Effort = 1.7
 Total CPUE = 211.8 (27; 353)
 PSD = 2 (2)

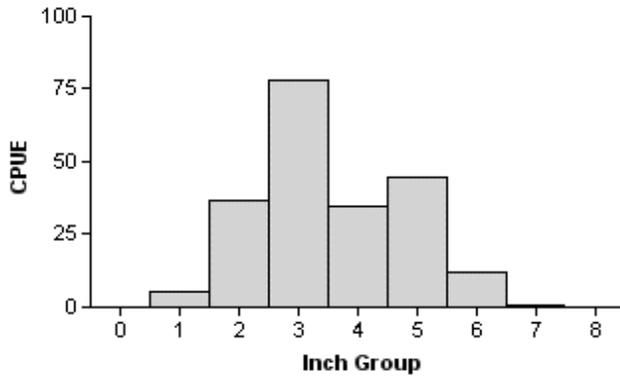
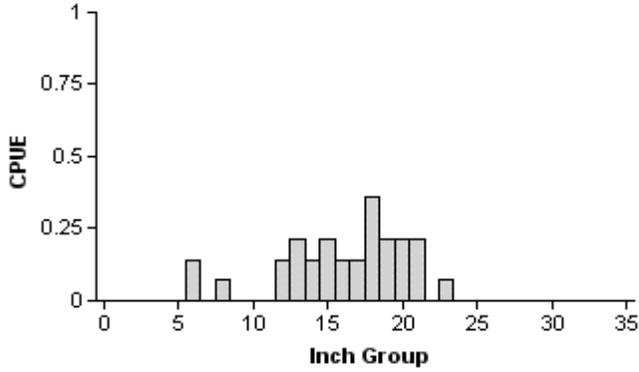


Figure 3. Number of bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Hubbard Creek Reservoir, Texas, 2001, 2003, and 2007.

Blue Catfish

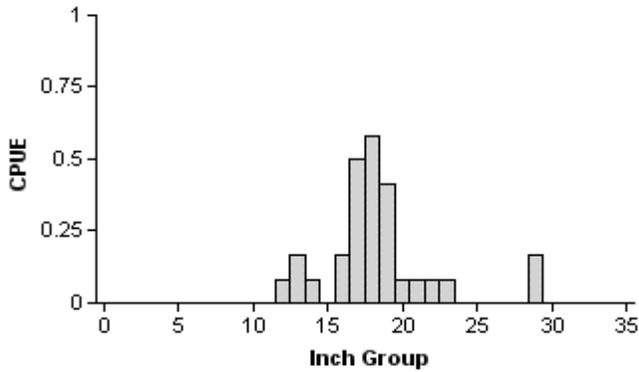
1999

Effort = 14.0
 Total CPUE = 2.3 (17; 32)
 PSD = 24 (6)



2004

Effort = 12.0
 Total CPUE = 2.5 (24; 30)
 PSD = 20 (5)



2008

Effort = 15.0
 Total CPUE = 2.4 (20; 36)
 PSD = 55 (10)

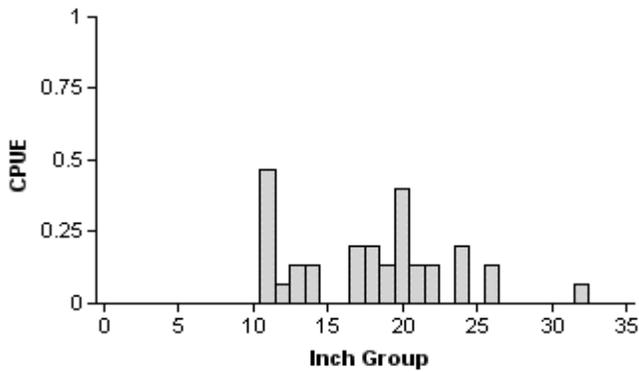
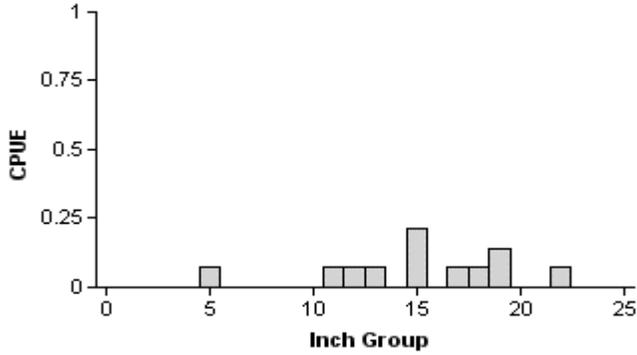


Figure 4. Number of blue catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Hubbard Creek Reservoir, Texas, 1999, 2004, and 2008.

Channel Catfish

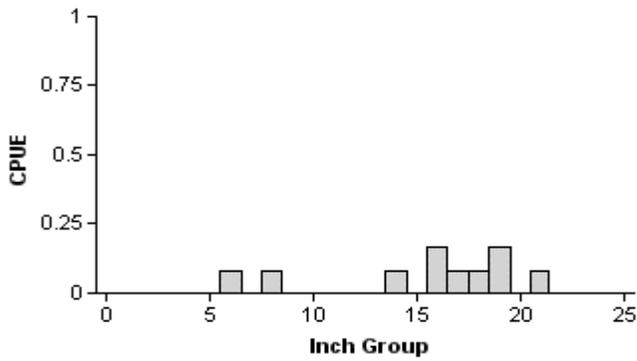
1999

Effort = 14.0
 Total CPUE = 0.9 (36; 12)
 CPUE-12 = 0.7 (37; 10)
 PSD = 45 (22)



2004

Effort = 12.0
 Total CPUE = 0.8 (36; 10)
 CPUE-12 = 0.7 (43; 8)
 PSD = 88 (13)



2008

Effort = 15.0
 Total CPUE = 0.9 (32; 14)
 CPUE-12 = 0.6 (36; 9)
 PSD = 56 (16)

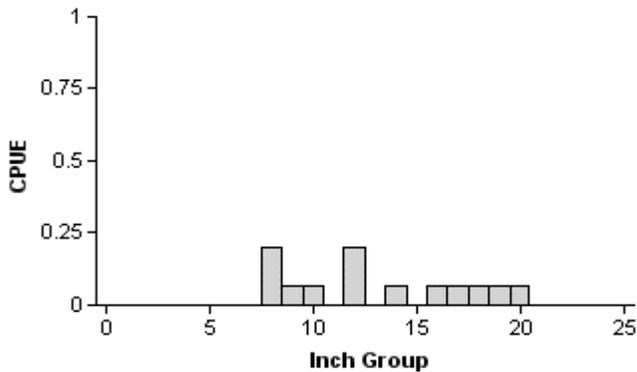
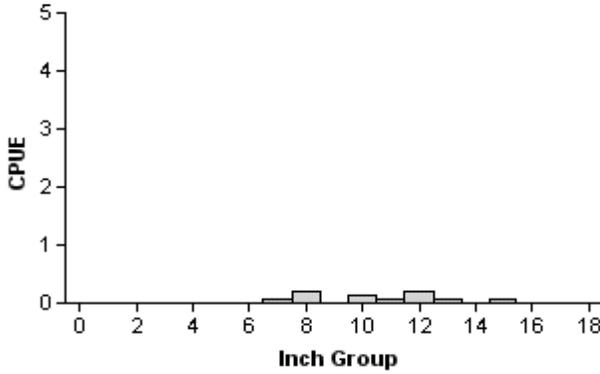


Figure 5. Number of channel catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Hubbard Creek Reservoir, Texas, 1999, 2004, and 2008.

White Bass

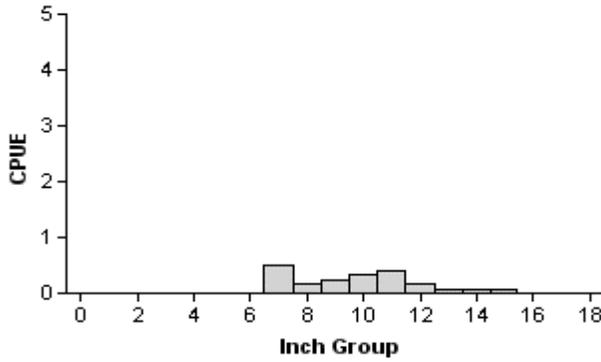
1999

Effort = 14.0
 Total CPUE = 0.9 (36; 12)
 CPUE-10 = 0.6 (30; 8)



2004

Effort = 12.0
 Total CPUE = 2.1 (24; 25)
 CPUE-10 = 1.2 (39; 14)



2008

Effort = 15.0
 Total CPUE = 8.0 (28; 120)
 CPUE-10 = 6.5 (28; 98)

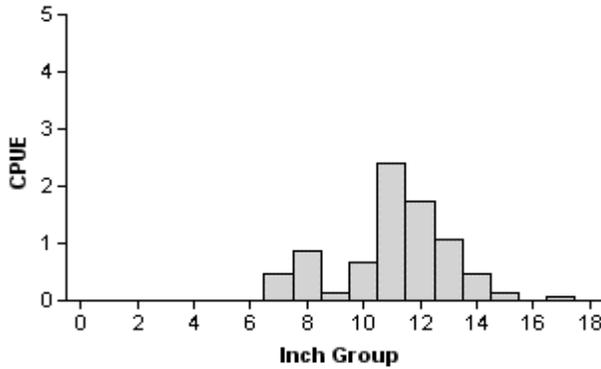
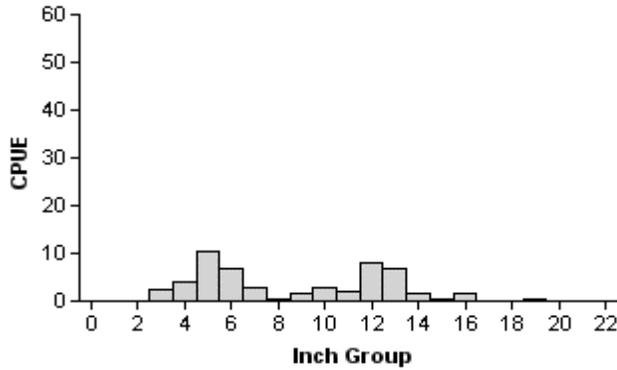


Figure 6. Number of white bass caught per net night (CPUE) and population indices (RSE and N for CPUE are in parentheses) for spring gill net surveys, Hubbard Creek Reservoir, Texas, 1999, 2004, and 2008.

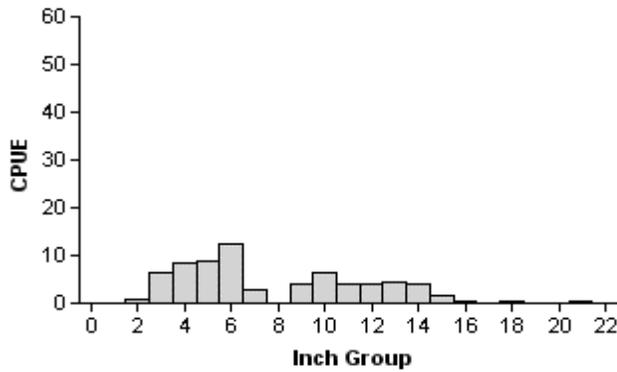
Largemouth Bass

2001



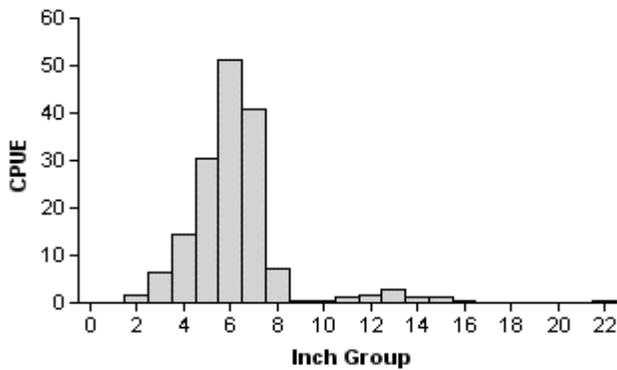
Effort =	2.0
Total CPUE =	53.0 (20; 106)
Stock CPUE =	26.0 (24; 52)
CPUE-14 =	4.0 (35; 8)
PSD =	73 (7)
PSD-14 =	15 (3)
PSD-P=	10 (3)

2003



Effort =	2.0
Total CPUE =	70.5 (16; 141)
Stock CPUE =	30.0 (13; 60)
CPUE-14 =	7.0 (23; 14)
PSD =	52 (6)
PSD-14 =	23 (6)
PSD-P=	10 (4)

2007



Effort =	1.7
Total CPUE =	163.2 (16; 272)
Stock CPUE =	18.0 (31; 30)
CPUE-14 =	3.6 (43; 6)
PSD =	47 (8)
PSD-14 =	20 (8)
PSD-P=	13 (7)

Figure 7. Number of largemouth bass caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Hubbard Creek Reservoir, Texas, 2001, 2003, and 2007.

Largemouth Bass

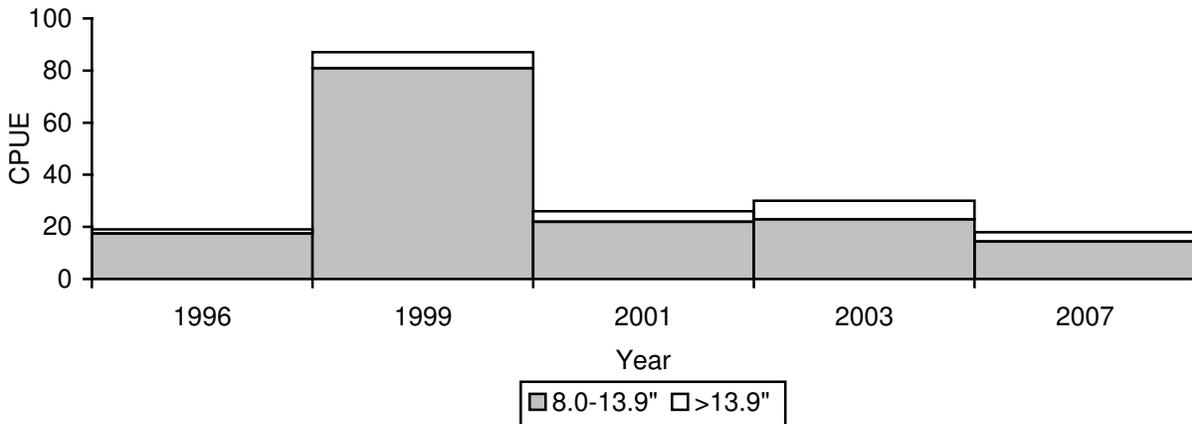


Figure 8. Catch per unit effort (CPUE) of largemouth bass from fall electrofishing surveys, Hubbard Creek Reservoir, Texas, 1996-2007.

Table 4. Average relative weight of 8.0-11.9-inch and 12.0-14.9-inch largemouth bass from 2001, 2003, and 2007 at Hubbard Creek Reservoir, Texas. Sample size for each estimate is in parentheses.

Year	Mean Wr	
	8.0-11.9	12.0-14.9
2001	84 (14)	78 (33)
2003	85 (29)	87 (25)
2007	110 (16)	109 (10)

Table 5. Mean age at length of largemouth bass at 12 inches and 14 inches collected from fall electrofishing surveys in Hubbard Creek Reservoir, Texas, in 1999, 2003, and 2007. Sample size for each estimate is in parentheses.

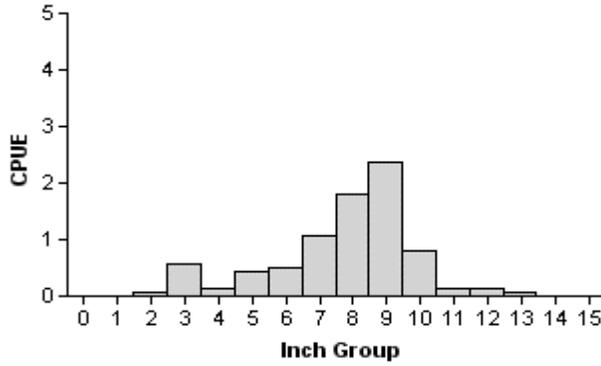
Year	Mean age at length	
	12" (11.0"-12.9")	14" (13.0"-14.9")
1999	2.1 (8)	2.9 (7)
2003	1.7 (15)	3.0 (16)
2007	1.8 (5)	2.2 (6)

Table 6. Results of genetic analysis of largemouth bass collected by fall electrofishing, Hubbard Creek Reservoir, Texas, 1993, 1996, 1999, and 2005. FLMB = Florida largemouth bass, NLMB = Northern largemouth bass.

Year	Sample size	Genotype			% FLMB alleles	% FLMB genotype
		FLMB	Intergrades	NLMB		
1993	40	1	25	14	30.6	2.5
1996	29	10	16	3	68.9	34.5
1999	30	4	26	0	59.2	13.3
2005	32	1	28	3	45.5	3.0

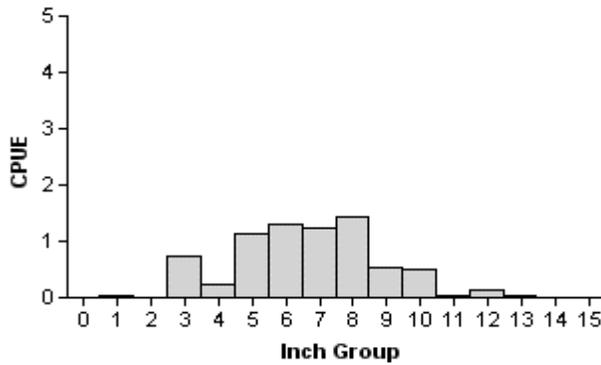
White Crappie

1999



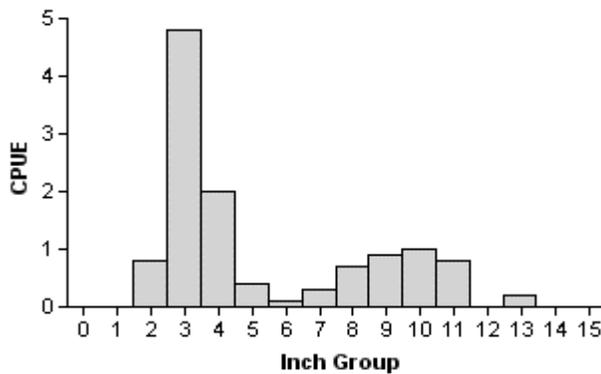
Effort = 14.0
 Total CPUE = 8.1 (54; 113)
 Stock CPUE = 7.3 (60; 102)
 CPUE-10 = 1.1 (57; 16)
 PSD = 73 (2)
 PSD-10 = 16 (3)

2003



Effort = 20.0
 Total CPUE = 7.5 (33; 150)
 Stock CPUE = 6.5 (34; 129)
 CPUE-10 = 0.8 (41; 15)
 PSD = 43 (6)
 PSD-10 = 12 (4)

2007



Effort = 10.0
 Total CPUE = 12.0 (30; 120)
 Stock CPUE = 4.4 (32; 44)
 CPUE-10 = 2.0 (30; 20)
 PSD = 82 (6)
 PSD-10 = 45 (5)

Figure 9. Number of white crappie caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Hubbard Creek Reservoir, Texas, 1999, 2003, and 2007.

Table 7. Proposed sampling schedule for Hubbard Creek Reservoir, Texas. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

Survey Year	Electrofisher	Trap Net	Gill Net	Report
Fall 2008-Spring 2009				
Fall 2009-Spring 2010	A			
Fall 2010-Spring 2011				
Fall 2011-Spring 2012	S	S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from Hubbard Creek Reservoir, Texas, 2007-2008.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					352	211.2
Threadfin shad					352	211.2
Blue catfish	36	2.4				
Channel catfish	14	0.9				
Flathead catfish	5	0.3				
White bass	120	8.0				
Green sunfish					18	10.8
Warmouth					21	6.4
Bluegill					353	211.8
Longear sunfish					75	17.6
Redear sunfish					16	6.4
Largemouth bass					272	163.2
White crappie			120	12.0		

APPENDIX B



Location of sampling sites, Hubbard Creek Reservoir, Texas, 2007-2008. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively. Water level was three feet below conservation level at time of sampling.