PERFORMANCE REPORT

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FEDERAL AID PROJECT F-221-M-2

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2011 Survey Report

Hubbard Creek Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Hubbard Creek Reservoir were surveyed in 2011 using electrofishing and trap nets and in 2012 using gill nets. This report summarizes survey results 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 a water level increase of 13 feet and finally filled in spring 2008. Water level was about 15 feet below conservation level at time of sampling in fall 2011, and littoral habitat consisted primarily of rock, dead brush, featureless mud flats, 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, 2003, and 2011.

- **Fish Community**
  - **Prey species:** Bluegill, small gizzard shad, and threadfin shad abundance has been consistently low in this reservoir and has declined following a peak in 2007.

  - **Catfishes:** Blue and channel catfish numbers and size distribution should support sportfishing opportunities. Flathead catfish were present in the reservoir.

  - **White bass:** Catch of white bass in 2012 was much lower than it was in 2008. Over half of the white bass collected were over 10 inches long. The largest white bass collected was 15 inches long.

  - **Largemouth bass:** There was reproductive success in 2011, even with a low and dropping water level. There was a shift to larger fish (14 inches and longer) in 2011 compared to previous surveys. Body condition and growth were poor.

  - **White crappie:** Numbers and size of adult fish provided excellent angling opportunities the last few years. Low water level had no apparent negative effect on the white crappie population but did restrict angler access to Sandy Creek in winter 2011/2012.

- **Management Strategies:** Monitor hydrilla coverage annually. Complete two-year stocking plan for largemouth bass. Educate the public about negative impacts of invasive species and how to prevent their spread. Monitor fish populations with electrofishing and trap nets in 2013 and with gill nets, trap nets, and electrofishing in 2015/2016.

INTRODUCTION

This document is a summary of fisheries data collected from Hubbard Creek Reservoir in 2011-2012. 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 2011-2012 data for comparison.

Reservoir Description

Hubbard Creek Reservoir is a 15,250-acre impoundment (9,600 acres at 13 feet below conservation level) 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. A water level rise of 13 feet in summer 2007 nearly filled the reservoir (Figure 1). Since July 2008 water level has steadily declined and was over 13-feet low in December 2011. Littoral habitat at time of sampling was hydrilla, dead brush, rocks, and featureless mud flats.

Boat access, by summer 2011, was limited to the boat ramp at the dam. 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 2008) included:

1. Monitor hydrilla abundance
   Action: Aquatic vegetation has been surveyed annually. Hydrilla management plans were provided to the West Central Texas Municipal Water Authority in 2008 and 2009.

2. High water level in 2007 provided an opportunity to publicize fishing opportunities at Hubbard Creek Reservoir.
   Action: Several newspaper articles were written about fishing opportunities and distributed to area newspapers. Anglers were also informed about various opportunities through Facebook. An article on Hubbard Creek Reservoir was published in the December/January 2010 issue of In-Fisherman magazine.

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, 2003, and 2011. The complete stocking history is in Table 3.

Vegetation/habitat management history: Hydrilla was first documented in 1998, covered an estimated 25 acres in 1999, and was not found in 2003. Following the large water level increase in 2007, hydrilla

immediately invaded newly flooded areas. Hydrilla coverage ranged from 17 to 24% in 2008-2011. Hydrilla management plans were written in 2008 and 2009 and provided to the controlling authority.

Water Transfer: There is one permanent pumping station on the reservoir which can transfer water to Fort Phantom Hill Reservoir.

METHODS

Fishes were collected by electrofishing (2.0 hours at 24 5-min stations), gill netting (10 net nights at 10 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). A random sample of largemouth bass (no size or age excluded) was used for Microsatellite DNA analysis in 2011; prior to 2011, random samples included only age-0 or age-1 largemouth bass. All survey sites were randomly selected, and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). Substrate habitat composition was determined by assessing presence or absence of each substrate type in the water, within 10 ft of the shoreline, at 237 random sites. Substrate was categorized as soft (clay, silt, sand), small rock (diameter < 4”), or large rock (diameter >4”). Water-column habitat composition was determined by assessing presence or absence of habitat (excluding substrate) in the water column at 549 random sites in the reservoir. Water level at time of habitat sampling was approximately 13 feet below conservation level. Percent occurrence was determined for each habitat type and 95% confidence intervals were calculated with 1,000 resamples of the original data (with replacement) by the percentile method.

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), terminology modified by 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. Ages of largemouth bass and white crappie were determined using otoliths. Mean age of 12- and 14-inch long largemouth bass were based on ages of largemouth bass 11.0-12.9 inches long and 13.0-14.9 inches long, respectively. Mean age of 10-inch long white crappie was based on ages of white crappie 9.0-10.9 inches long. Source for water level data was the United States Geological Survey website (http://waterdata.usgs.gov/tx/nwis/).

RESULTS AND DISCUSSION

Habitat: Hydrilla coverage has been consistent since 2008; it was 24% (95% C.I. 18-30%) in 2008, 17% in 2009 (digital shapefile method), 24% (95% C. I. 20-28%) in 2010, and 23% (95% C.I. 20-27%) in 2011. Nearshore substrate was predominately soft, but rocks were common at many sites (Table 4). The most common water-column habitat was open water, dead brush, and hydrilla, but a variety of other habitat types were present to a much lesser extent (Table 4). Aquatic vegetation diversity in 2008 (12 species of aquatic vegetation), when water level was high, was considerably higher than in 2011 (six species of aquatic vegetation), when water level was low (Table 4). Despite a steadily dropping water level since 2008, hydrilla has maintained its coverage, unlike other species of aquatic vegetation.

Prey species: Electrofishing CPUE of gizzard shad was 180.0/h in 2011, similar to catch rates in 2007 and 2009 (Figure 2). There was a decline in electrofishing CPUE of bluegill from 211.8/h in 2007 and 246.0/h in 2009 to 103.5/h in 2011 (Figure 3). Size structure of gizzard shad since 2007 has been bimodal, with modes at 4-5 inches and 9-10 inches (Figure 2). Gizzard shad IOV, inconsistent the last three surveys and ranging from 40-84 (Figure 2), can be explained, in part, by historically low and variable catch of sub-stock gizzard shad (Figure 4). Bluegill PSD has steadily increased the last three surveys (Figure 3). Bluegill CPUE was significantly higher in years with hydrilla (mean CPUE=187.1; 2007-2011)

than in years without hydrilla (mean CPUE=42.9; 1996-2003) (t-test; P = 0.02; Figure 4). Prey relative abundance, measured by bluegill, threadfin shad, and sub-stock gizzard shad CPUE, has always been low in this reservoir and has declined following a peak in 2007 (Figure 4). Threadfin shad were present, but electrofishing CPUE of threadfin shad declined from 211.2/h in 2007 to 27.0/h in 2011.

Blue catfish: Gill net CPUE of blue catfish has ranged from 2.4/nn to 3.8/nn since 2004 (Figure 5). Size structure in 2004 and 2012 was similar, and 97% of the fish in the 2012 sample were at least 12 inches long (Figure 5).

Channel catfish: Gill net CPUE indicated that channel catfish were more abundant than in previous years, and most of the fish collected in 2012 were 15 to 21 inches long (Figure 6).

Flathead catfish: Flathead catfish were present (0.3/nn).

White bass: Gill net CPUE of white bass was identical in 2004 and 2012 and was much lower than the CPUE in 2008 (Figure 7). Size structure was similar in 2004 and 2012, consisting primarily of fish 7 to 11 inches long, but a higher percentage of legal-length white bass were collected in 2008 (Figure 7).

Largemouth bass: Electrofishing CPUE of stock-size largemouth bass has increased from 18/h in 2007 to 59/h in 2011 (Figure 8), likely a result of large year classes produced in 2007-2009. Even in the face of drought conditions, CPUE of sub-stock fish at Hubbard Creek (34.5/h) was high compared to other area reservoirs sampled in 2011 [Abilene (23.2/h), Cisco (14.7/h), Fort Phantom Hill (10.0/h), and Kirby (1.0/h) reservoirs]. Size structure, measured with PSD and PSD-14, shifted to larger fish in 2011 (Figure 8). There was a marked increase in catch rate of $\geq$ 14 inch largemouth bass in 2011 compared to previous surveys (Figure 9). Relative weight was considerably lower for 8.0-14.9-inch largemouth bass in 2009 and 2011 (W_r range 81-88) compared to 2007 (W_r range 109-110), but was similar to previous drought years (2001-2003; W_r range 78-87; Table 5). Large fish ($\geq$15.0 inches) had a low W_r (80) in 2011, but comparisons to previous years were not attempted because of small sample sizes in 2001-2009. Mean age was 3.4 years (range 1 to 7 years) at 12 inches TL and 3.5 years (range 2 to 6 years) at 14 inches TL in 2011. Largemouth bass growth in 2011 was slower compared to previous estimates for both size groups, but the degree of change for fish 11.0-12.9 inches long was considerable (Table 6). Low and dropping water level and possible density dependent factors (more stock size fish in 2009 and 2011) negatively influenced growth and condition of largemouth bass. Similar patterns have been observed in other area reservoirs. A declining trend in percent Florida alleles and Florida genotype was halted in 2011 (Table 7).

White crappie: Trap-net catch of stock-length and preferred-length white crappie has been similar since 2003 (Figure 10). Excluding sub-stock white crappie, size structure was similar in 2007 and 2011; in 2007, catch of 2-4-inch white crappie was much higher than in 2003 and 2011 (Figure 10). Size structure of adult white crappie was ideal for anglers in 2011. White crappie W_r was high and consistent among size groups: 103 (N=7) for fish 5.0-7.9 inches long, 105 (N=28) for fish 8.0-9.9 inches long, and 102 (N=25) for fish 10.0-13.9 inches long. Mean age of 9.0-10.9-inch white crappie in 2011 was 2.2 years (N=17; range=1-4 years). Body condition and growth indicated a suitable forage base for white crappie. Based on anecdotal evidence a popular winter crappie fishery occurred in Sandy Creek from 2007/2008 to 2010/2011 and in Hubbard Creek since 2007/2008. Anglers were unable to access Sandy Creek in 2011/2012 because of the low water level.

Fisheries management plan for Hubbard Creek Reservoir, Texas

Prepared – July 2012.

ISSUE 1: Hydrilla was still present in the reservoir.

MANAGEMENT STRATEGY

1. Annually monitor hydrilla coverage and submit updates to controlling authority.

ISSUE 2: Hubbard Creek Reservoir has documented trophy largemouth bass potential, but there was a declining trend in Florida largemouth bass influence from 1996-2005. Florida largemouth bass were stocked in 2011 in an attempt to halt the decline and to maintain the reservoir's trophy potential.

MANAGEMENT STRATEGIES

1. Stock Florida largemouth bass in 2012 (25/acre) to complete two-year stocking plan. Additionally, stock Florida largemouth bass beyond 2012 when conditions are optimal for survival of stocked fingerlings. Optimal conditions include either a large increase in flooded terrestrial vegetation after a prolonged low-water period or an adequate presence and distribution of aquatic vegetation, or both.

ISSUE 3: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches and plugging engine cooling systems. Giant Salvinia (*Salvinia molesta*) and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Contact and educate marina owners and controlling authority about invasive species, and provide them with posters, literature, etc. so that they can in turn educate their customers and post appropriate signage at access points around the reservoir if necessary.
2. Educate the public about invasive species through the use of media and the internet.
3. Make a speaking point about invasive species when presenting to constituent and user groups.
4. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.

SAMPLING SCHEDULE JUSTIFICATION:

Electrofishing and trap netting in 2013 is necessary for continuation of trend data of forage, largemouth bass, and white crappie populations. Other species can be monitored with a survey every four years. A sampling schedule is in Table 8.

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Dumont, S. 2008. Statewide freshwater fisheries monitoring and management program survey report for Hubbard Creek Reservoir, 2007. Texas Parks and Wildlife Department, Federal Aid Report F-30-R-33, Austin.

Guy, C. S., R. M. Neumann, D. W. Willis, and R. O. Anderson. 2007. Proportional size distribution (PSD): a further refinement of population size structure index terminology. Fisheries 32(7): 348.

Quarterly Water Level

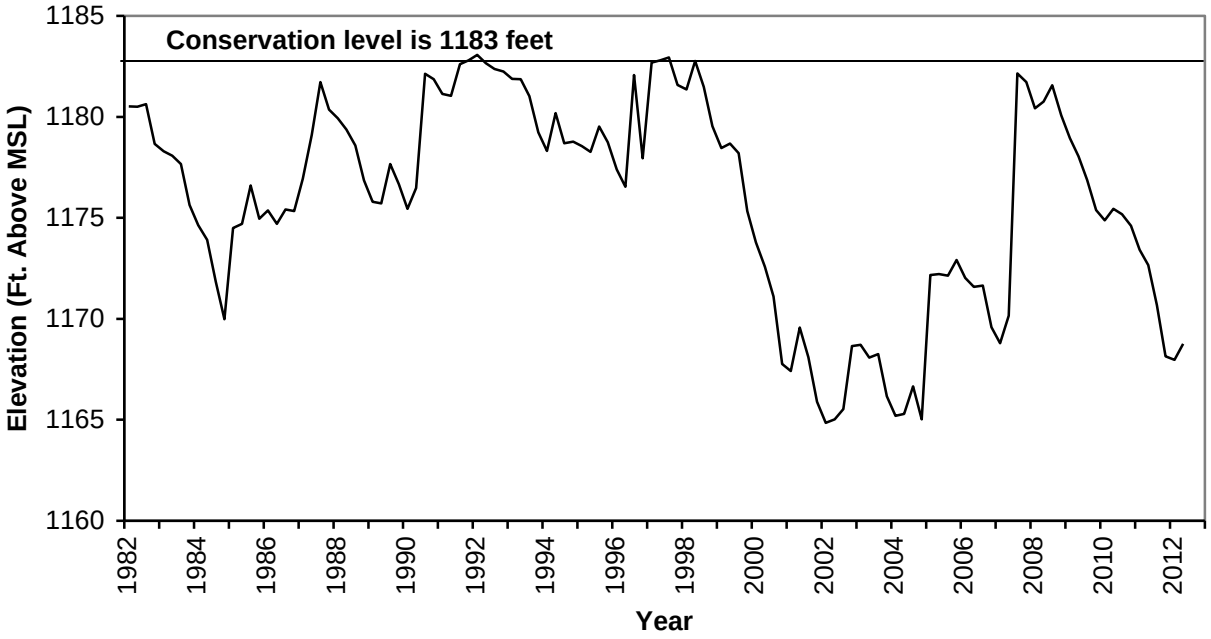


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) for Hubbard Creek Reservoir, Texas, 1982-2012.

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 (SDI)	8.60
Conductivity	1137 umhos/cm

Table 2. Harvest regulations for Hubbard Creek Reservoir, Texas

Species	Bag Limit	Minimum - Maximum Length (inches)
Catfish: channel and blue catfish, their hybrids and subspecies	25 (in any combination)	12 – No Limit
Catfish, flathead	5	18 – No Limit
Bass, white	25	10 – No Limit
Bass, largemouth	5	14 – No Limit
Crappie: white and black crappie, their hybrids and subspecies	25 (in any combination)	10 – No Limit

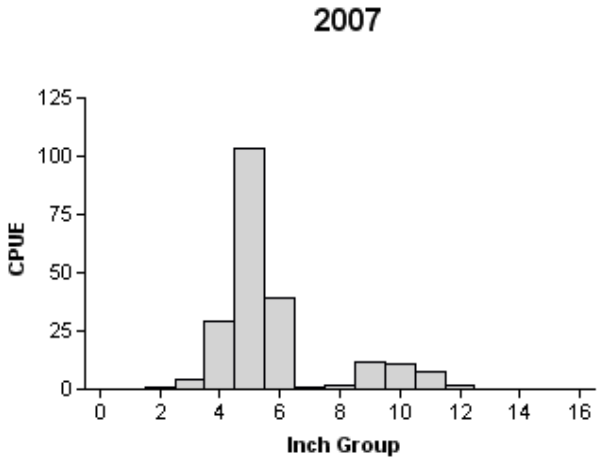
Table 3. Stocking history of Hubbard Creek Reservoir, Texas. Size categories are: FRY = < 1 inch, FGL = 1-3 inches and ADL = adults.

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
	2011		373,397	FGL
		Total	1,710,930	

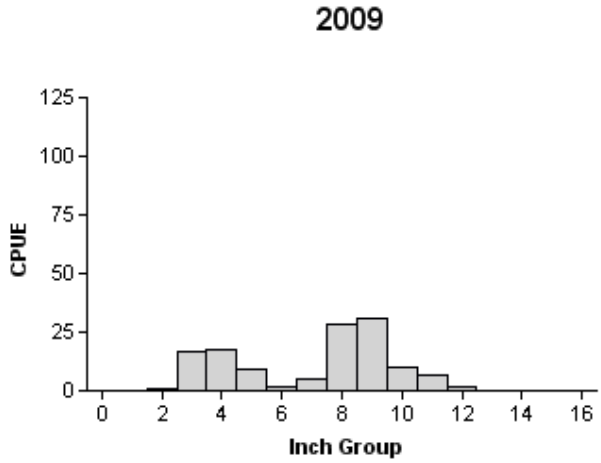
Table 4. Percent occurrence and 95% confidence intervals (C.I.) of substrate habitat (237 random sites) and water-column habitat (207 random sites in 2008; 549 random sites in 2011) in Hubbard Creek Reservoir, Texas, August, 2011.

Habitat Type	Percent Occurrence 2008	95 % C. I.	Percent Occurrence 2011	95 % C. I.
Substrate				
Clay, silt, sand	NA		66	60 – 72
Small rock (< 4”)	NA		40	34 – 46
Large rock (> 4”)	NA		43	36 – 49
Water column				
Open water	67	61-73	45	41 – 49
Dead brush	NA		40	36 – 44
Hydrilla	24	18 - 30	23	20 – 27
Illinois pondweed	16	12 – 22	6	4 – 9
Standing timber	NA		5	3 – 7
Bushy pondweed	13	8 - 17	0	
Chara	8	5 – 12	4	2 – 6
Brittle naiad	0		2	1 – 3
Sago pondweed	8	5 – 12	< 1	0.0 – 1.6
Boat dock	NA		< 1	0 – 1
Stargrass	< 1	0 – 1	< 1	0 – 1
Bulrush	2	0 – 5	0	
Slender naiad	2	0 – 5	0	
Coontail	2	0 – 5	0	
Nitella	1	0 – 3	0	
American lotus	1	0 – 3	0	
Cattail	< 1	0 – 1	0	

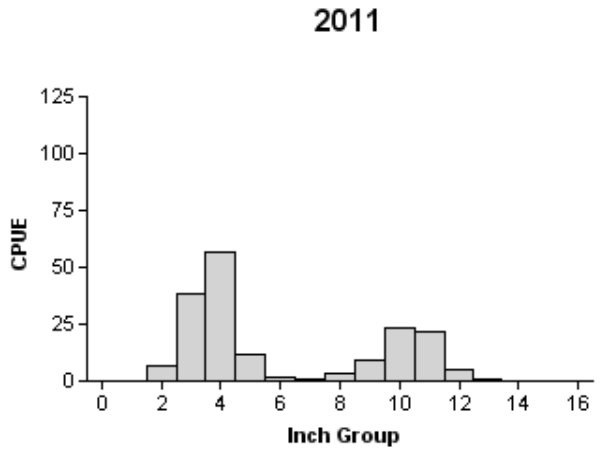
Gizzard Shad



Effort = 1.7
Total CPUE = 211.2 (26; 352)
Stock CPUE = 34.8 (22; 58)
IOV = 84 (4)



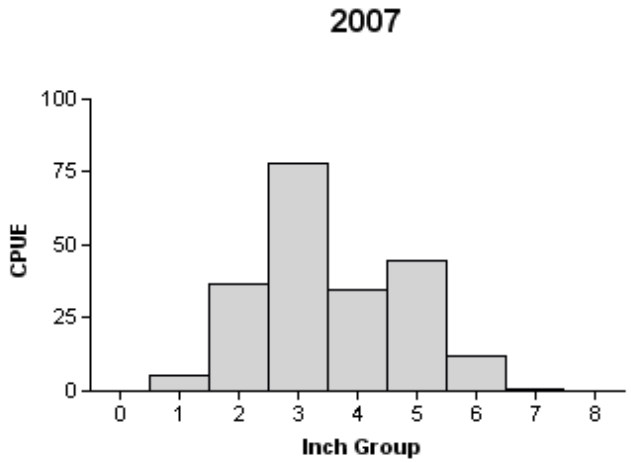
Effort = 2.0
Total CPUE = 128.0 (26; 256)
Stock CPUE = 82.0 (25; 164)
IOV = 40 (11)

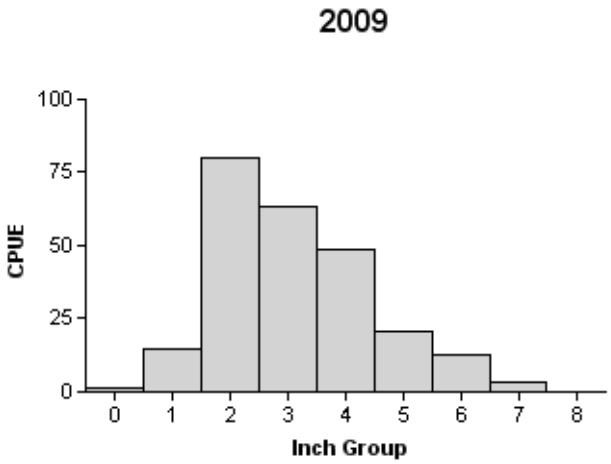


Effort = 2.0
Total CPUE = 180.0 (28; 360)
Stock CPUE = 64.5 (26; 129)
IOV = 64 (7)

Figure 2. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE IOV are in parentheses) for fall electrofishing surveys, Hubbard Creek Reservoir, Texas, 2007, 2009, and 2011.

Bluegill





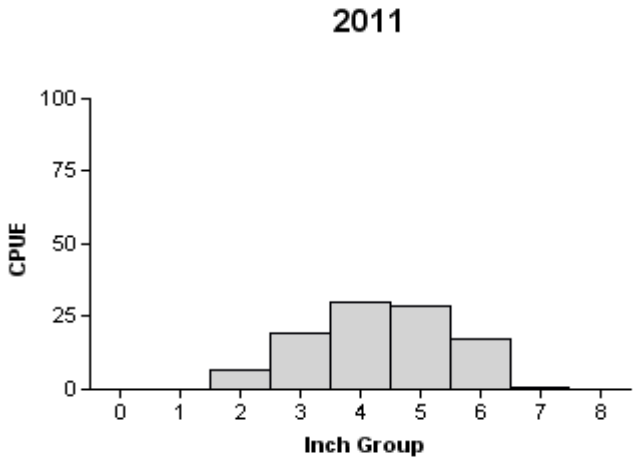


Figure 3. Number of bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Hubbard Creek Reservoir, Texas, 2007, 2009, and 2011.

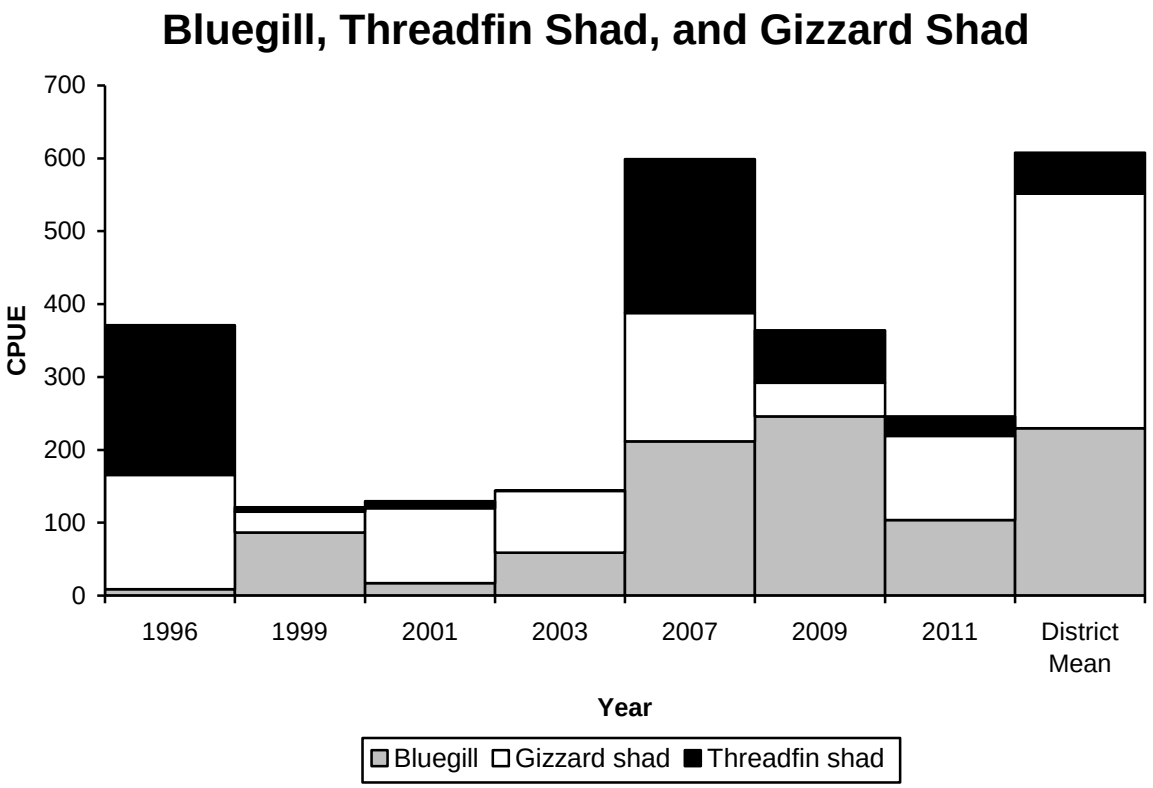
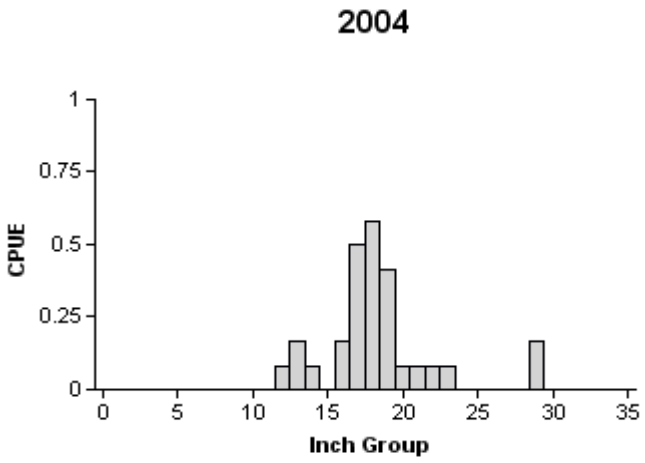
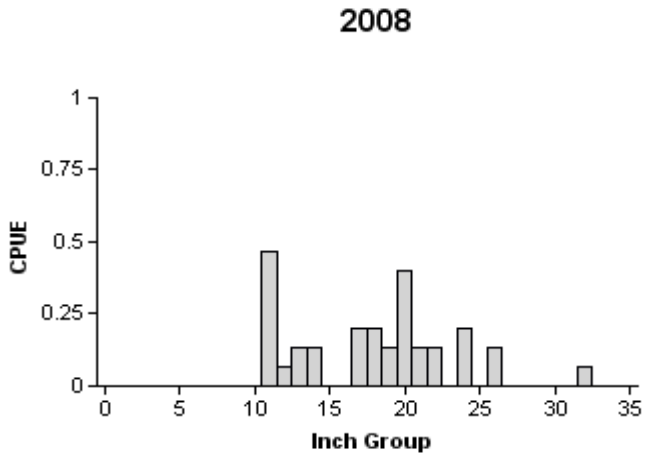


Figure 4. Electrofishing catch per hour (CPUE) of bluegill, sub-stock (< 7 in TL) gizzard shad, and threadfin shad from Hubbard Creek Reservoir, 1996-2011.

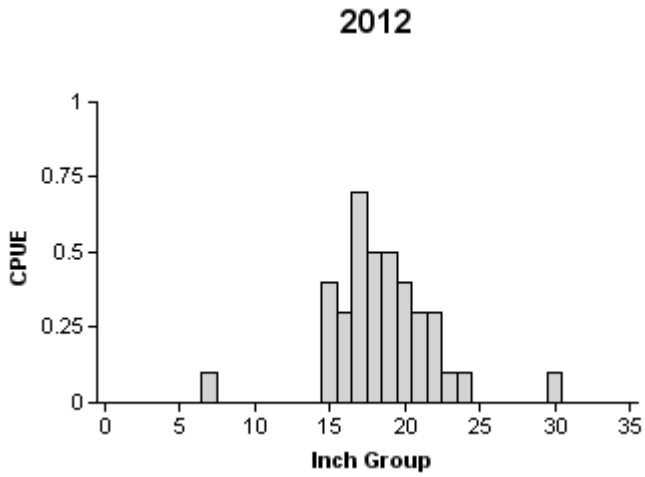
Blue Catfish



Effort = 12.0
Total CPUE = 2.5 (24; 30)
CPUE-12 = 2.5 (24; 30)



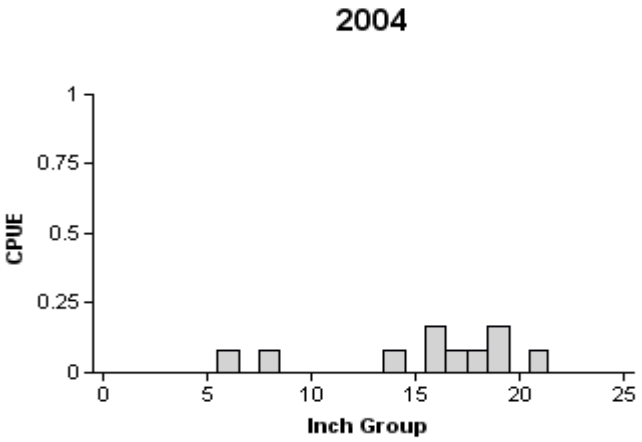
Effort = 15.0
Total CPUE = 2.4 (20; 36)
CPUE-12 = 1.9 (20; 29)

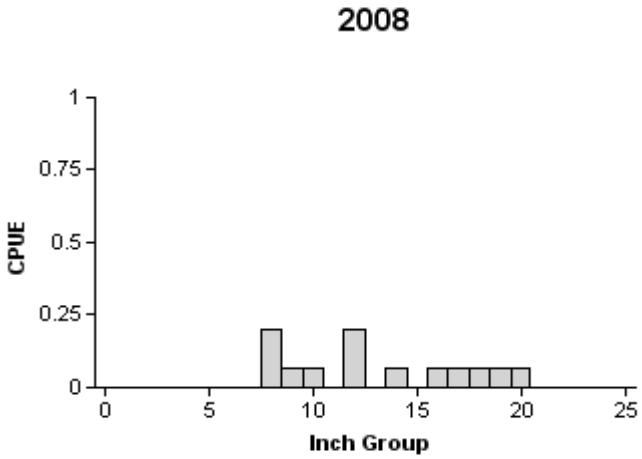


Effort = 10.0
Total CPUE = 3.8 (22; 38)
CPUE-12 = 3.7 (24; 37)

Figure 5. 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, 2004, 2008, and 2012.

Channel Catfish





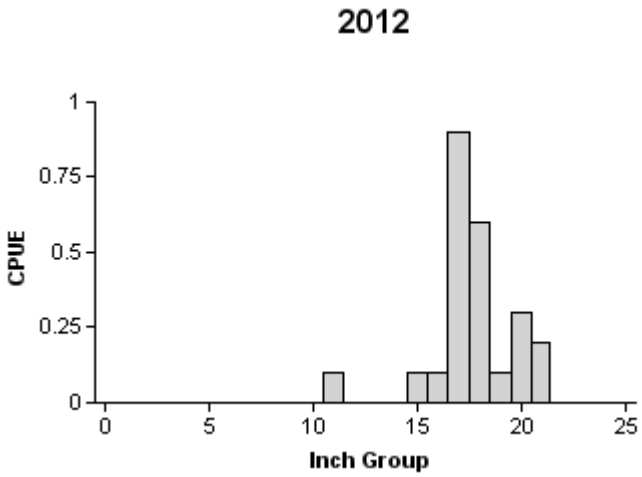
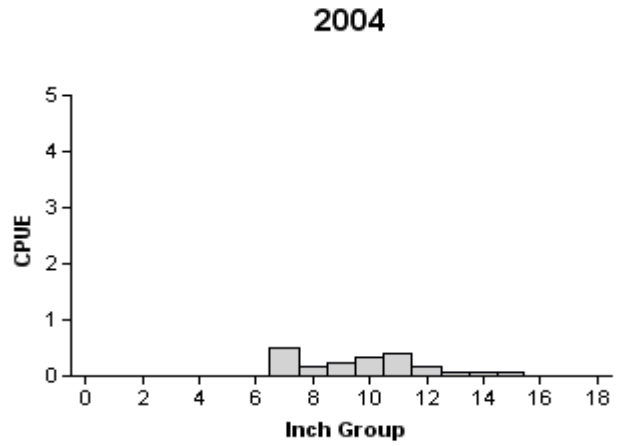
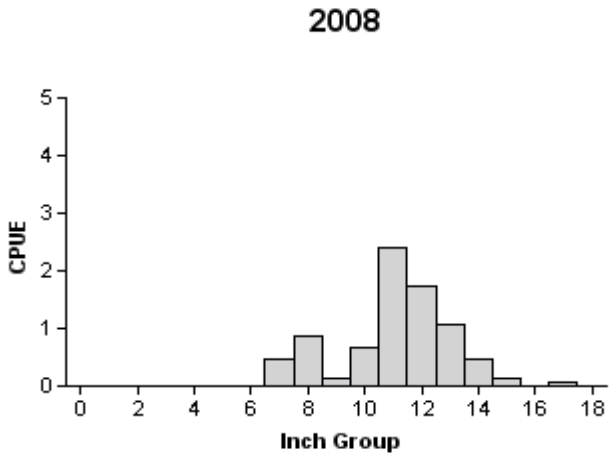


Figure 6. Number of channel catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Hubbard Creek Reservoir, Texas, 2004, 2008, and 2012.

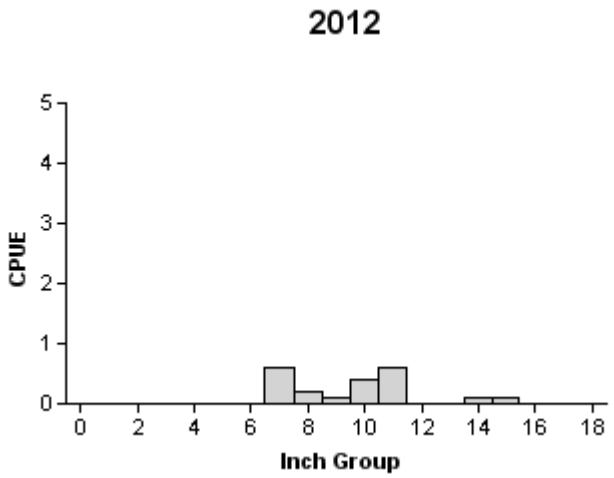
White Bass



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



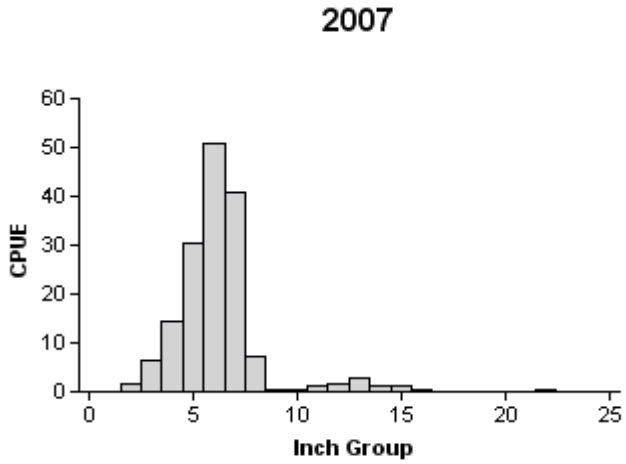
Effort = 15.0
Total CPUE = 8.0 (28; 120)
CPUE-10 = 6.5 (28; 98)



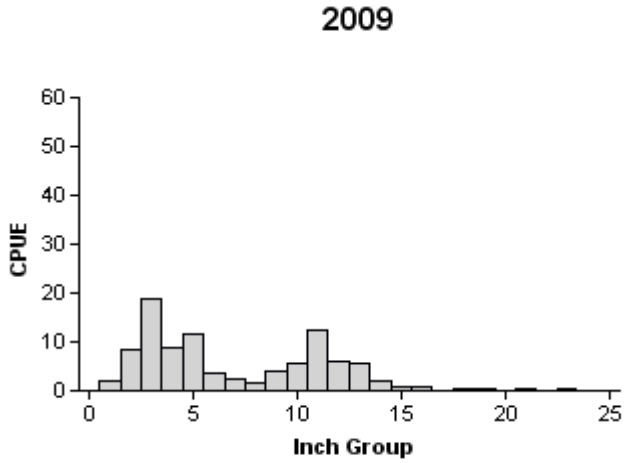
Effort = 10.0
Total CPUE = 2.1 (51; 21)
CPUE-10 = 1.2 (65; 12)

Figure 7. 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, 2004, 2008, and 2012.

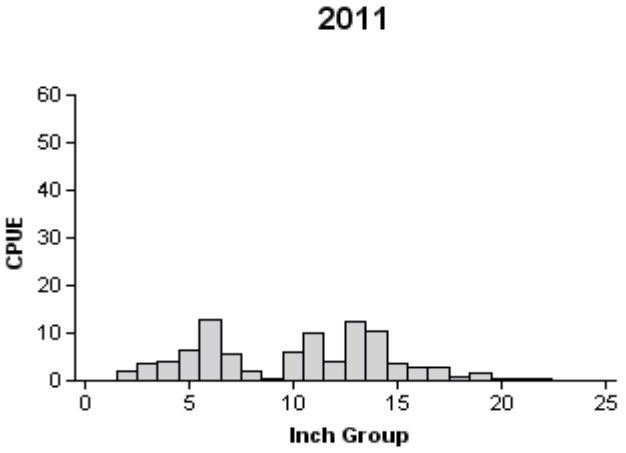
Largemouth Bass



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)



Effort =	2.0
Total CPUE =	97.0 (11; 194)
Stock CPUE =	41.0 (13; 82)
CPUE-14 =	6.0 (40; 12)
PSD =	43 (6)
PSD-14 =	15 (5)



Effort =	2.0
Total CPUE =	93.5 (21; 187)
Stock CPUE =	59.0 (20; 118)
CPUE-14 =	24.0 (26; 48)
PSD =	69 (5)
PSD-14 =	41 (5)

Figure 8. 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, 2007, 2009, and 2011.

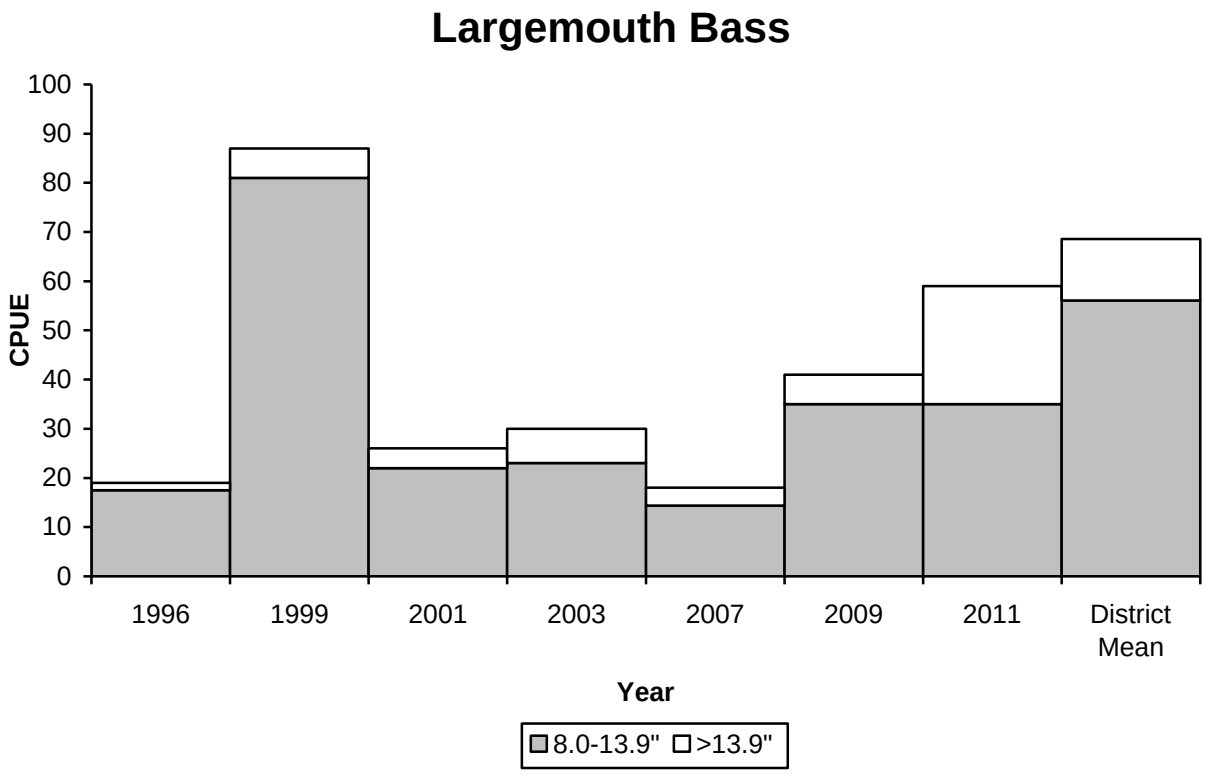


Figure 9. Catch per unit effort (CPUE) of largemouth bass from fall electrofishing surveys, Hubbard Creek Reservoir, Texas, 1996-2011.

Largemouth Bass

Table 5. Average relative weight of 8.0-11.9-inch and 12.0-14.9-inch largemouth bass from 2001 to 2011 at Hubbard Creek Reservoir, Texas. Sample size for each estimate is in parentheses.

	Mean Wr		
Year	8.0-11.9	12.0-14.9	≥ 15.0
2001	84 (14)	78 (33)	
2003	85 (29)	87 (25)	
2007	110 (16)	109 (10)	
2009	88 (47)	86 (27)	
2011	87 (37)	81 (54)	80 (27)

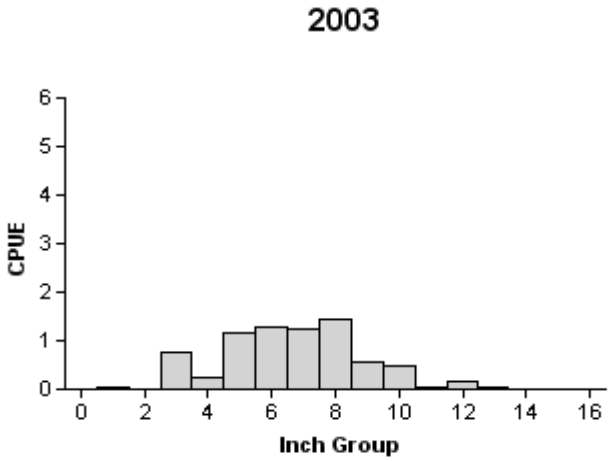
Table 6. Mean age at length of largemouth bass at 12 inches and 14 inches collected from fall electrofishing surveys in Hubbard Creek Reservoir, Texas, in 1999, 2003, 2007, and 2011. Sample size for each estimate is in parentheses.

	Mean age at length	
Year	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)
2011	3.4 (12)	3.5 (19)

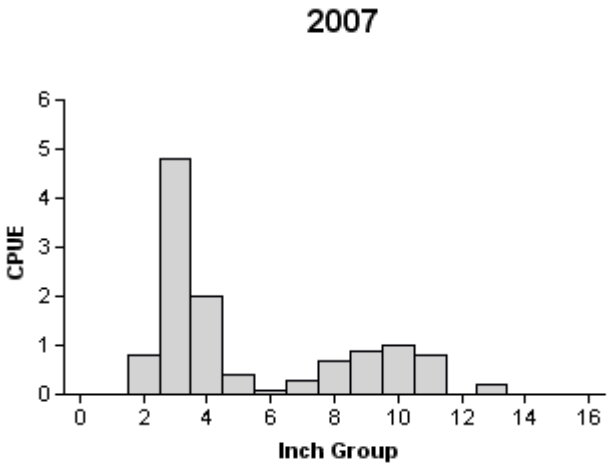
Table 7. Results of genetic analysis of largemouth bass collected by fall electrofishing, Hubbard Creek Reservoir, Texas, 1993, 1996, 1999, 2005, and 2011. FLMB = Florida largemouth bass, NLMB = Northern largemouth bass.

		Genotype				
Year	Sample size	FLMB	Intergrades	NLMB	% FLMB alleles	% FLMB genotype
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
2011	40	2	37	1	54.4	5.0

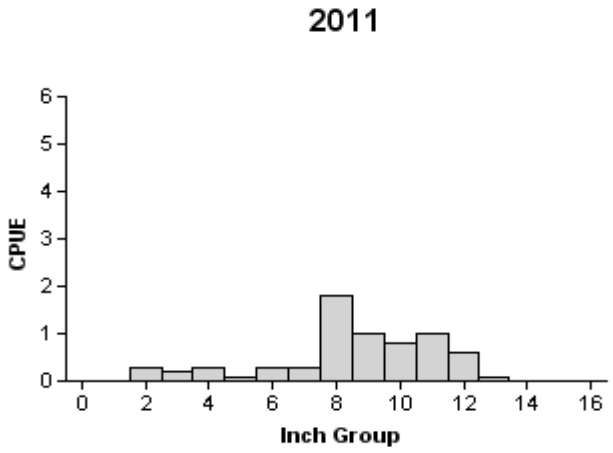
White Crappie



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)



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 (6)



Effort =	10.0
Total CPUE =	6.8 (29; 68)
Stock CPUE =	6.0 (25; 60)
CPUE-10 =	2.5 (38; 25)
PSD =	88 (5)
PSD-10 =	42 (10)

Figure 10. 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, 2003, 2007, and 2011.

Table 8. 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.

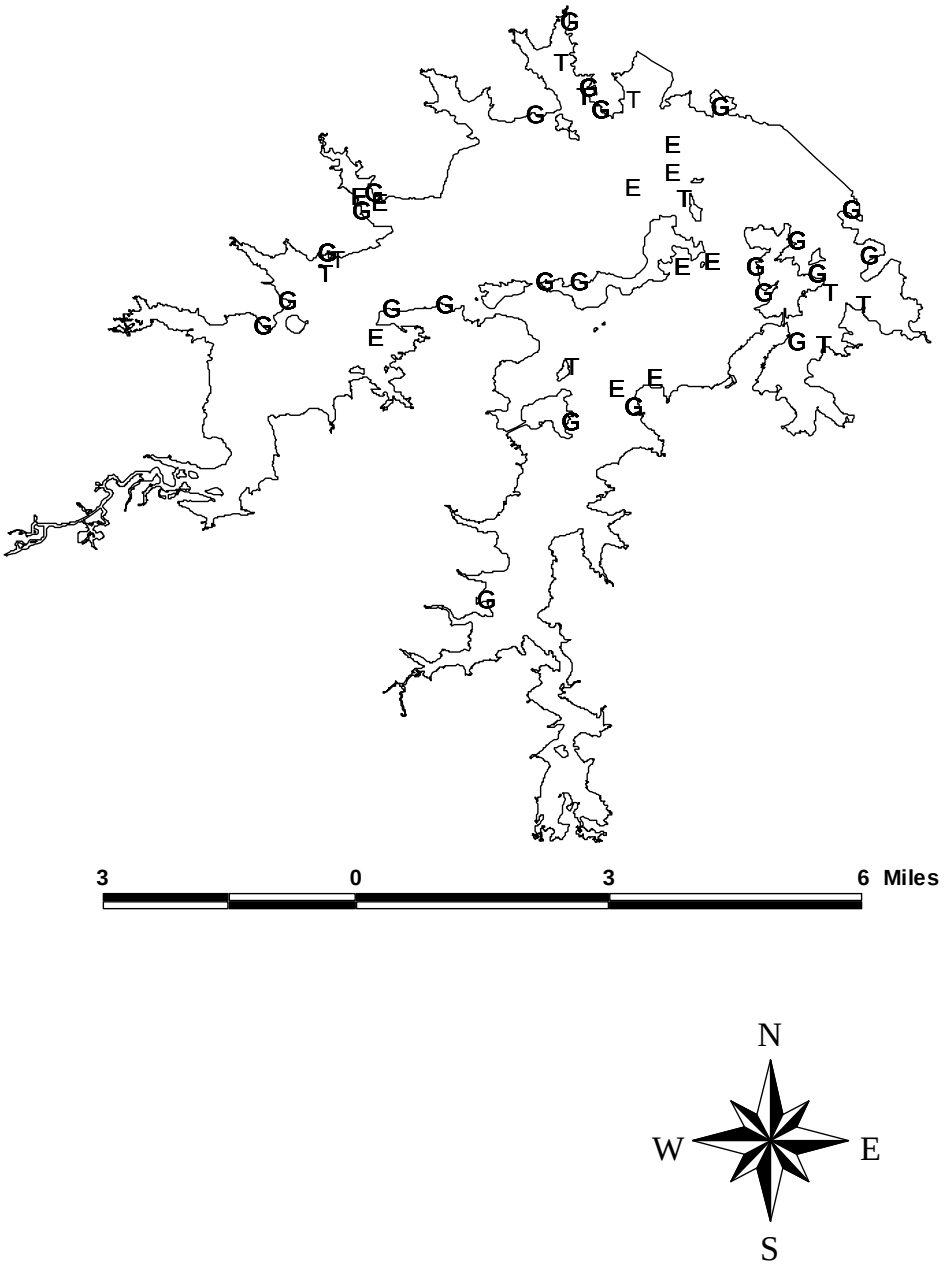
Survey Year	Electrofisher	Trap Net	Gill Net	Vegetation	Access	Report
Fall 2012-Spring 2013						
Fall 2013-Spring 2014	A	A				
Fall 2014-Spring 2015						
Fall 2015-Spring 2016	S	S	S	S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types in Hubbard Creek Reservoir, Texas, 2011-2012.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					360	180.0
Threadfin shad					54	27.0
Blue catfish	38	3.8				
Channel catfish	24	2.4				
Flathead catfish	3	0.3				
White bass	21	2.1				
Green sunfish					4.5	9
Warmouth					3.5	7
Bluegill					103.5	207
Longear sunfish					72	36.0
Redear sunfish					11.5	23
Largemouth bass					93.5	187
White crappie			68	6.8		

APPENDIX B



Location of sampling sites, Hubbard Creek Reservoir, Texas, 2011-2012. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively. Water level was 13 feet below conservation level at time of sampling.

APPENDIX C

Type, location, size, capacity, American Disability Act (ADA) accessibility, and needed improvements of boat ramps (BR) at Hubbard Creek Reservoir, Texas, 2011. Latitude and Longitude are reported as decimal degrees.

Facility Type	Location	Latitude	Longitude	Fee	# of BR Lanes	BR Parking Capacity	Size of FP or J	ADA Accessible (FP or J)	Needed Improvements
BR	Hwy 180	32.767802	-99.014456	N	2	40	NA	NA	
BR	Dam	32.817885	-98.954127	N	2	30	NA	NA	
BR	GWS*	32.836155	-98.976140	N	2	20	NA	NA	
BR	Peeler Park	32.768639	-99.073083	N	2	20	NA	NA	Extension

*Game Warden Slough