

PERFORMANCE REPORT

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FEDERAL AID PROJECT F-221-M-3

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2012 Fisheries Management Survey Report

Brownwood Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Brownwood Reservoir were surveyed in 2012 using electrofishing and trap netting and in 2013 using gill netting. Historical data are presented with the 2012-2013 data for comparison. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Brownwood Reservoir is a 7,300-acre impoundment located on Pecan Bayou in the Colorado River Basin approximately 70 miles southeast of Abilene. It was constructed in 1933 as a municipal water supply and is controlled by the Brown County Water Control and Irrigation District No. 1. Watershed land use was primarily agriculture, residential, and ranching. The reservoir was about 10 ft. below spillway level at time of sampling. Habitat consisted of rocky shoreline, boat docks, and some standing timber, vegetation, and flooded brush.
- **Management History:** Palmetto Bass were regularly stocked from the 1980s through the mid-1990s before being discontinued because of lack of directed fishing effort and insufficient availability of Palmetto Bass fingerlings for stocking. Largemouth Bass were managed with a 16-inch minimum length limit (MLL) from 1 September 1993 to 1 September 1999. Blue Catfish were stocked in 2007 and 2010 to improve catfish populations and fisheries.
- **Fish Community**
 - **Prey species:** The prey community included abundant small Gizzard Shad, Threadfin Shad, and small Bluegill.
 - **Catfishes:** The Blue Catfish population is becoming established after stockings in 2007 and 2010. Individuals up to 26 inches in length were captured in the most recent gill netting survey. Channel Catfish abundance declined slightly since the last report.
 - **Temperate basses:** Palmetto Bass have almost disappeared from Brownwood Reservoir (stockings were discontinued in 2002). White Bass appeared to be increasing in number, and were growing up to 14 inches in length.
 - **Largemouth bass:** Catch rate of Largemouth Bass decreased from the previous report, and body condition was poor. Not many Largemouth Bass over the 14-inch minimum length limit were collected, indicating a possible growth problem.
 - **White crappie:** Catch rates of White Crappie declined sharply over the past three surveys, and body condition was fair.
- **Management Strategies:** Work with angling groups to install artificial habitat structures. Further investigate Largemouth Bass growth problem and consider proposing a change to harvest regulations. Work with area stakeholders to educate the public about preventing the spread of invasive species.

INTRODUCTION

This document is a summary of fisheries data collected from Brownwood Reservoir in 2012-2013. 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 fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2012-2013 data for comparison.

Reservoir Description

Brownwood Reservoir is a 7,300-acre impoundment constructed on Pecan Bayou approximately 70 miles southeast of Abilene, Texas. It is located in the Colorado River Basin, and its primary use was municipal water supply. Secondary uses included recreation and flood control.

Water level historically fluctuated less than 5 ft. from conservation level under normal conditions. Low-water periods occurred in 2006, and over the current sampling period (Figure 1). Water level was about 10 ft. below conservation level at time of sampling.

Brownwood Reservoir was eutrophic based on Carlson's Trophic State Index for Chlorophyll-a (TSI Chl-a) with a mean TSI chl-a of 46.78 (Texas Commission on Environmental Quality 2011). Other descriptive characteristics for Brownwood Reservoir are in Table 1.

Angler Access

Boat access consisted of four public boat ramps. Bank fishing access was available at boat ramp areas, Lake Brownwood State Park, and several marinas and parks. More details about the boat access areas can be found in Table 2.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Dumont and Neely 2009) included:

1. Conduct a gill net survey to monitor Blue Catfish recruitment.
Action: A gill net survey was conducted in spring 2013.
2. Stock Blue Catfish in 2010 to supplement the 2007 stocking.
Action: Blue Catfish were stocked in 2010 at a rate of approximately 50/acre.

Harvest regulation history: All sport fish are currently regulated with statewide harvest regulations (Table 2). Largemouth Bass were managed under a 14-inch minimum length limit (MLL) one year prior to the regulation going statewide (1 September 1986) and with a 16-inch MLL from 1 September 1993 to 1 September 1999.

Stocking history: Although stockings have been discontinued, Brownwood Reservoir was stocked heavily with Palmetto Bass from the 1980s to 2002. Blue Catfish fingerlings were stocked after the discontinuation of Palmetto Bass stockings. The complete stocking history is in Table 4.

Vegetation/habitat management history: Brownwood Reservoir has no vegetation/habitat management history.

Water transfer: Brownwood Reservoir is primarily used for municipal water supply, recreation, and to a lesser extent, flood control. No interbasin water transfers are known to occur.

METHODS

Fishes were collected by electrofishing (1.5 hours at 18, 5-min stations), gill netting (10 net nights at 10 stations), and trap netting (10 net nights at 10 random stations). An optional hoop-netting survey was conducted using tandem (groups of three) baited hoop nets (3 hoop-net series at 3 stations fished for two nights). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing. For gill and trap nets, CPUE was recorded as the number of fish per net night (fish/nn) and, for hoop nets, as the number of fish per hoop net series. 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). Survey sites for the 2009 trap net survey were determined based on a stratified random design (for methods, see Dumont and Neely 2009). In 2009, 10 nn were predetermined to be the desired effort. Allocation of effort was 0 nn in Jim Ned stratum (lower), 8 nn in Pecan Bayou stratum (upper), and 2 nn in the main lake stratum (middle).

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 target fishes according to Anderson and Neumann (1996). Palmetto Bass PSD was calculated according to Dumont and Neely (2011). Index of vulnerability (IOV) was calculated for gizzard shad (DiCenzo et al. 1996). Standard error (SE) was calculated for structural indices and IOV. Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE and creel statistics.

The vegetation survey was conducted by circumnavigation of the lake by boat (visual survey). Source for water level data was the United States Geological Survey (USGS) website.

RESULTS AND DISCUSSION

Habitat: The most recent structural habitat survey was conducted in 2008 (Dumont and Neely 2009). A vegetation survey was conducted in summer 2012; no aquatic vegetation was found.

Prey species: Gizzard Shad CPUE was 230.7/h in 2012, similar to 2010 but lower than 2008 (Figure 2). Index of vulnerability was high (88%), meaning that most Gizzard Shad were small enough to be prey. There was also an abundant population of Threadfin Shad (282.0/h, Appendix A). Bluegill CPUE was 122.0/h in 2012, a decline from the two previous surveys (Figure 3). Bluegill up to six inches were captured, but most were three to four inches in length, providing another food source for sport fish.

Blue Catfish: The Blue Catfish stockings in 2007 and 2010 were successful, as evidenced by the presence of Blue Catfish from 9 to 26 inches in length in the 2013 gill netting survey (Figure 4). In 2013, total CPUE was 2.9/nn, and PSD was 27, indicating a fairly balanced size structure. The catch rate improved substantially since 2009 (CPUE 0.6/nn).

Channel Catfish: Hoop netting in 2013 was not successful in producing a larger sample of Channel Catfish than the gill netting surveys. The hoop netting CPUE was 1.3/nn, and the fish ranged from 9 to 12 inches. In gill net surveys (Figure 5), CPUE remained fairly constant from 2005 (2.4/nn) to 2009 (2.5/nn) to 2013 (1.8/nn). Also, the size structure shifted so that more of the captured fish were smaller than the 12-inch minimum length limit. PSD decreased as well, from the 70s in 2005 and 2009 to 25 in 2013.

White Bass: White Bass from 6 to 14 inches were captured in the 2013 gill netting survey (Figure 6). The catch rate of 8.0/nn was similar to 2009 (6.6/nn) but much higher than in 2005 (0.8/nn). The average relative weights from the 2009 survey indicated fair body condition (mostly 90-100).

Palmetto Bass: Only one 27-inch Palmetto Bass was captured in the 2013 gill netting survey. No Palmetto Bass were captured in the 2009 survey. The population has dwindled after the discontinuation of stocking in 2002.

Largemouth Bass: Largemouth Bass abundance was moderate; electrofishing CPUE was 66/h in 2012 (Figure 7). This was similar to 2010 (74/h) but lower than 2008 (136/h). Abundance of stock-size fish also decreased over that timeline, but size structure improved slightly (PSD increased from the 30s to the 50s). The catch rate of legal-sized fish was low in each survey (6.9/h, 6.0/h, and 6.7/h in 2008, 2010, and 2012, respectively). Average W_r were also low, ranging mostly from 80 to 90, with several W_r inch classes averaging in the high 70s in 2012. There appears to be a growth bottleneck around the 14-inch size—not many fish were able to grow larger, and body condition was poor for fish in the 11- to 15-inch range.

White Crappie: Trap netting catch rate of White Crappie has declined over the past three surveys from 33.8/nn in 2008, to 16.2/nn in 2009, to 7.3/nn in 2012 (Figure 8). Stock CPUE and CPUE of legal-sized crappie have also declined. Body condition was fair in 2009, with average W_r values between 90 and 100. The dropping water level has likely negatively impacted White Crappie.

Fisheries management plan for Brownwood Reservoir, Texas

Prepared – July 2013.

ISSUE 1: Low water level in recent years has limited the amount of cover available for centrarchids. This has likely contributed to declining abundance and angler catch of Largemouth Bass and White Crappie.

MANAGEMENT STRATEGY

1. Work with area angling groups to install brush piles or other artificial cover in the reservoir.

ISSUE 2: The Largemouth Bass population appears to be experiencing a growth bottleneck around the 14-inch minimum length limit. Although trophy-size fish are not commonly captured in surveys, the lake record from 1990 is 12.65 pounds, and the lake is a popular destination for area bass tournaments.

MANAGEMENT STRATEGY

1. Conduct an intensive age-and-growth sample to further investigate this issue.
2. Review results of previous creel surveys to determine willingness of Lake Brownwood anglers to harvest largemouth bass.
3. If data are sufficient, investigate potential effects of a changed harvest regulation on the largemouth bass population using computer modeling.

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

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes additional electrofishing in 2014, additional gill netting in 2015, and mandatory monitoring in 2016/2017 (Table 15). An additional electrofishing survey in 2014 is necessary to maintain consistent data for trend information on this heavily used Largemouth Bass fishery, and to gather intensive age-and-growth data. Additional gill netting is necessary to monitor the recruitment of the new Blue Catfish population. Trap net surveys are only necessary every four

Table 1. Characteristics of Brownwood Reservoir, Texas.

Characteristic	Description
Year constructed	1933
Controlling authority	Brown County Water Control & Irrigation District No. 1
County	Brown
Reservoir type	Tributary, Colorado River Basin
Shoreline Development Index (SDI)	4.1
Conductivity	650 $\mu\text{S}/\text{cm}$

Table 2. Boat ramp characteristics Brownwood Reservoir, Texas, August, 2012. Reservoir elevation at time of survey was 1412 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Condition	Extension Feasible?
Lake Brownwood State Park	32.860792 -99.02753	Y	10	Good	
Flatrock Park	31.829732 -99.04970	Y	20	Out of water	N-privately maintained
Mountain View	31.819085 -99.07027	Y	15	Out of water	N-privately maintained
Dam	31.841983 -99.00331	Y	35	Good	

Table 3. Harvest regulations for Brownwood Reservoir, Texas.

Species	Bag limit	Length limit
Catfish: Channel and Blue, their hybrids and subspecies	25 (in any combination)	12-inch minimum
Catfish, Flathead	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass, Palmetto	5	18-inch minimum
Bass, Largemouth	5	14-inch minimum
Crappie: White and Black, their hybrids and subspecies	25 (in any combination)	10-inch minimum

Table 4. Stocking history of Brownwood Reservoir, Texas. FGL = fingerling; AFGL = advanced fingerling; ADL = adults.

Species	Year	Number	Size
Threadfin Shad	1984	1,000	ADL
Blue Catfish	1988	17	ADL
	2007	326,174	FGL
	2010	325,761	FGL
	Total	651,952	
Channel Catfish	1972	72,000	FGL
	1980	150	ADL
	2010	300	ADL
	2011	302	ADL
	2012	300	ADL
	2013	301	ADL
	Total	73,353	
Palmetto Bass	1980	73,850	FGL
	1983	75,600	FGL
	1986	145,601	FGL
	1987	145,101	FGL
	1988	148,325	FGL
	1989	154,470	FGL
	1991	39,600	FGL
	1992	40,500	FGL
	1994	45,006	FGL
	1995	89,970	FGL
	1996	36,869	FGL
	2002	36,680	FGL
	Total	1,031,572	
	Smallmouth Bass	1980	72,950
1982		70,000	FGL
Total		142,950	
Largemouth Bass	1969	10,000	FGL
	1970	500,000	FGL
	1994	169	FGL
	1995	86	FGL
	1996	50	FGL
	Total	510,305	
Florida Largemouth Bass	1975	200,000	FGL
	1976	356,000	FGL
	1977	367,545	FGL
	1978	218,975	FGL
	1996	177,163	FGL
	2007	326,520	FGL
	2012	327,352	FGL
	Total	1,974,035	

Table 4. Stocking history continued.

Species	Year	Number	Size
Green X Redear Sunfish	1971	5,000	FGL
	1972	22,000	FGL
	1978	7,000	FGL
	1980	150	ADL
	Total	34,150	
Walleye	1976	75,000	FGL
	1977	1,500,000	FRY
	1978	1,550,000	FRY
	Total	3,125,000	

Gizzard Shad

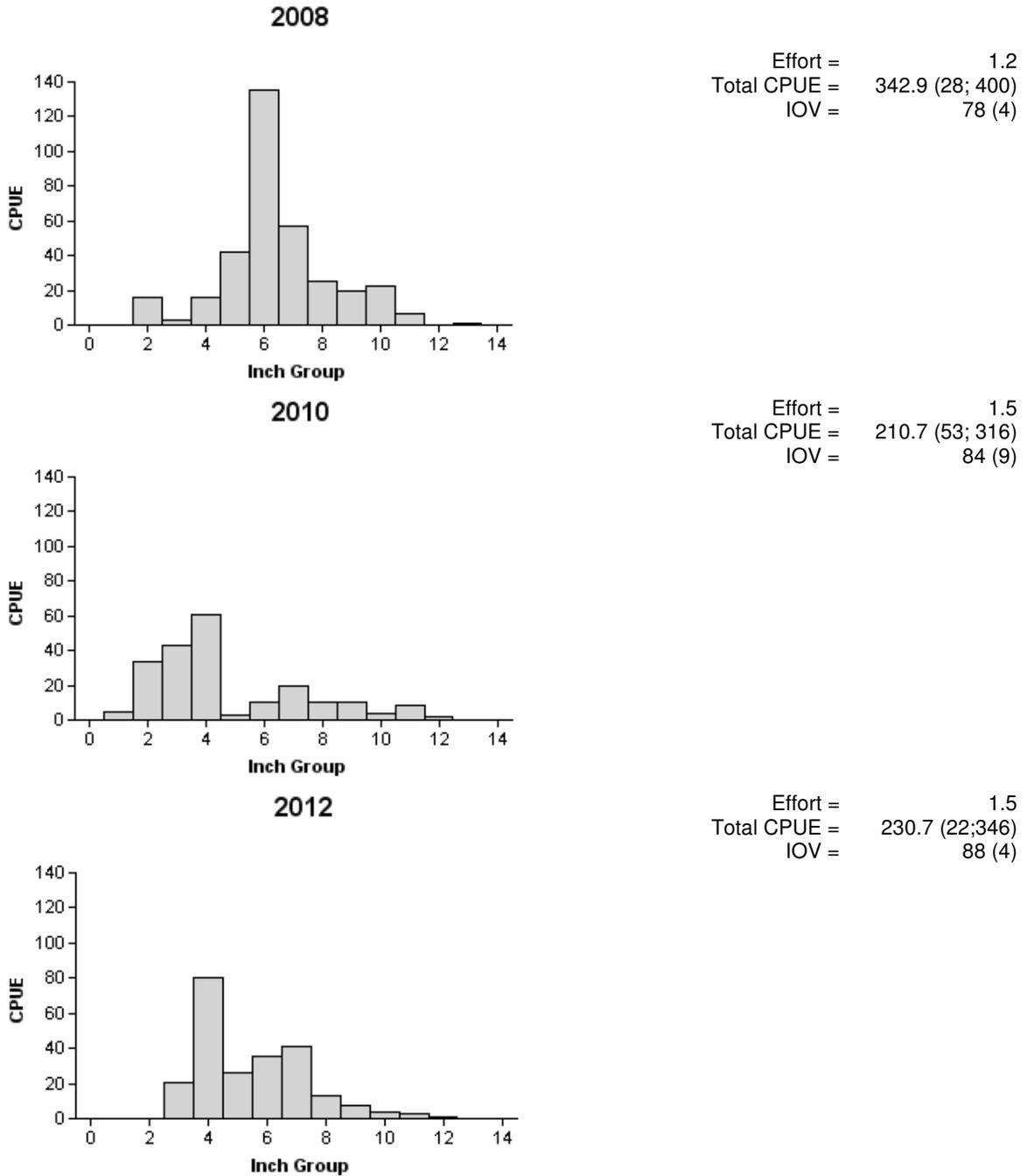
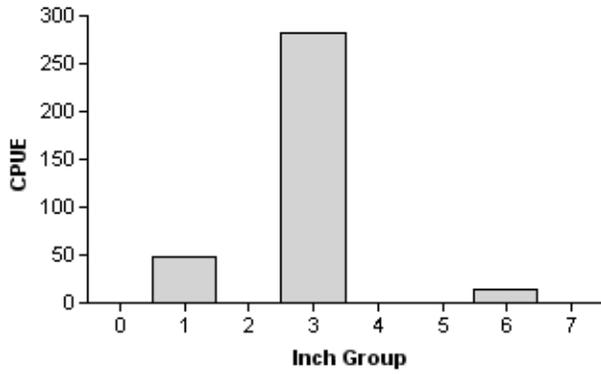


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Brownwood Reservoir, Texas, 2008, 2010, and 2012.

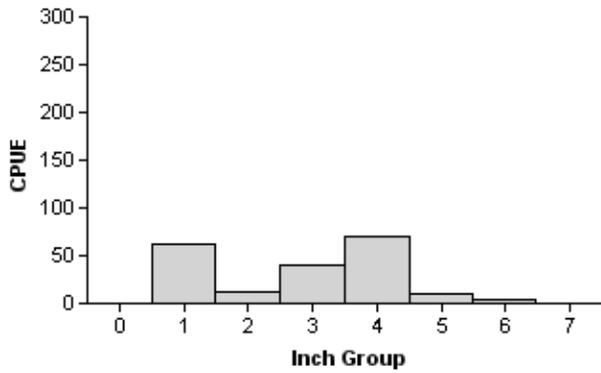
Bluegill

2008



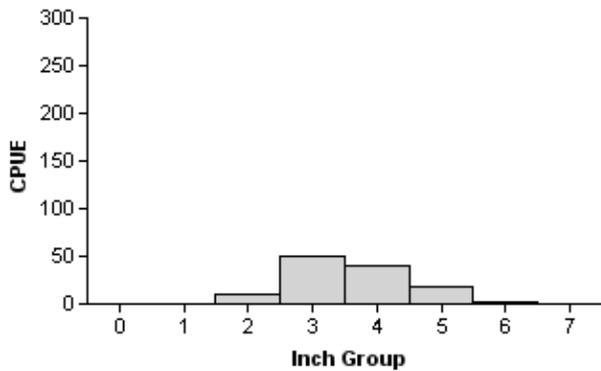
Effort = 1.2
 Total CPUE = 344.6 (16; 402)
 Stock CPUE = 297.4 (16; 347)
 PSD= 5 (1)

2010



Effort = 1.5
 Total CPUE = 196.0 (16; 294)
 Stock CPUE = 122.7 (12; 184)
 PSD= 3 (1)

2012



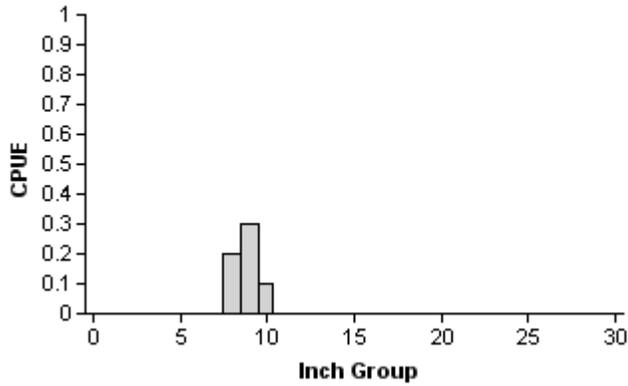
Effort = 1.5
 Total CPUE = 122.0 (20; 183)
 Stock CPUE = 110.7 (20; 166)
 PSD= 3 (2)

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, Brownwood Reservoir, Texas, 2008, 2010, and 2012.

Blue Catfish

2009

Effort = 10
 Total CPUE = 0.6 (67; 6)
 Stock CPUE = 0 (0; 0)
 PSD = 0 (0)



2013

Effort = 10
 Total CPUE = 2.9 (27; 29)
 Stock CPUE = 2.2 (27;22)
 PSD = 27 (8)

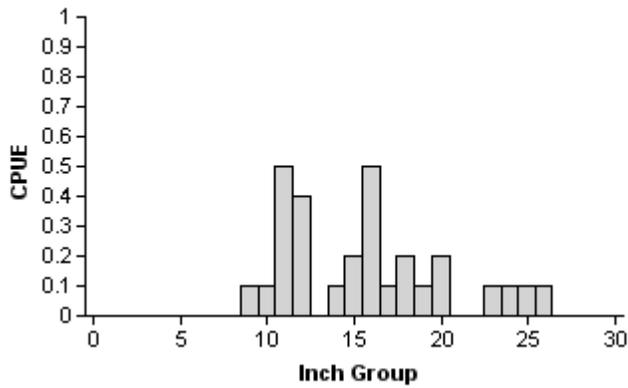
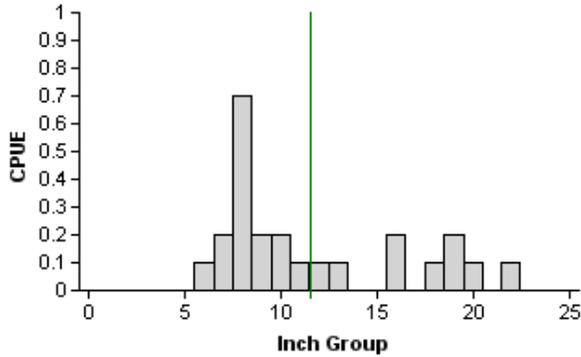


Figure 4. Number of Blue Catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Brownwood Reservoir, Texas, 2009 and 2013. No Blue Catfish were captured in 2005 gill netting survey.

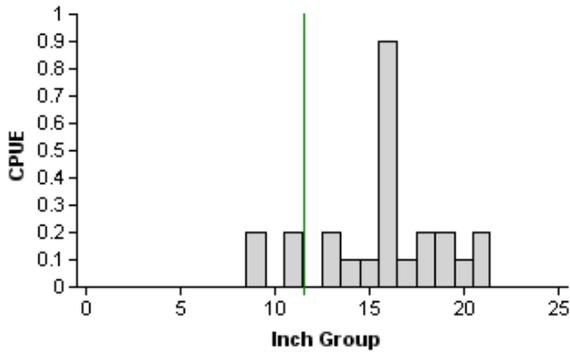
Channel Catfish

2005



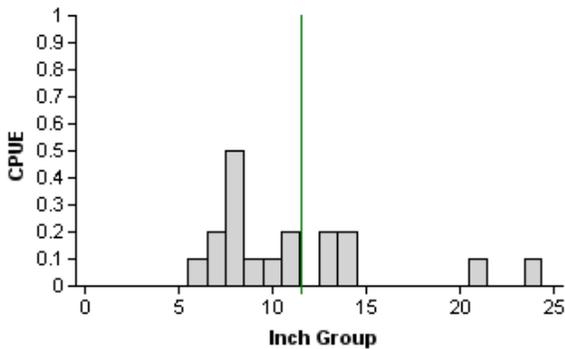
Effort = 10
 Total CPUE = 2.4 (41; 24)
 Stock CPUE = 1.0 (33; 10)
 PSD = 70 (14)

2009



Effort = 10
 Total CPUE = 2.5 (25; 25)
 Stock CPUE = 2.3 (28; 23)
 PSD = 74 (10)

2013



Effort = 10
 Total CPUE = 1.8 (20; 18)
 Stock CPUE = 0.8 (31; 8)
 PSD = 25 (22)

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 netting surveys, Brownwood Reservoir, Texas, 2005, 2009, and 2013. The vertical line represents the 12-inch minimum length limit.

White Bass

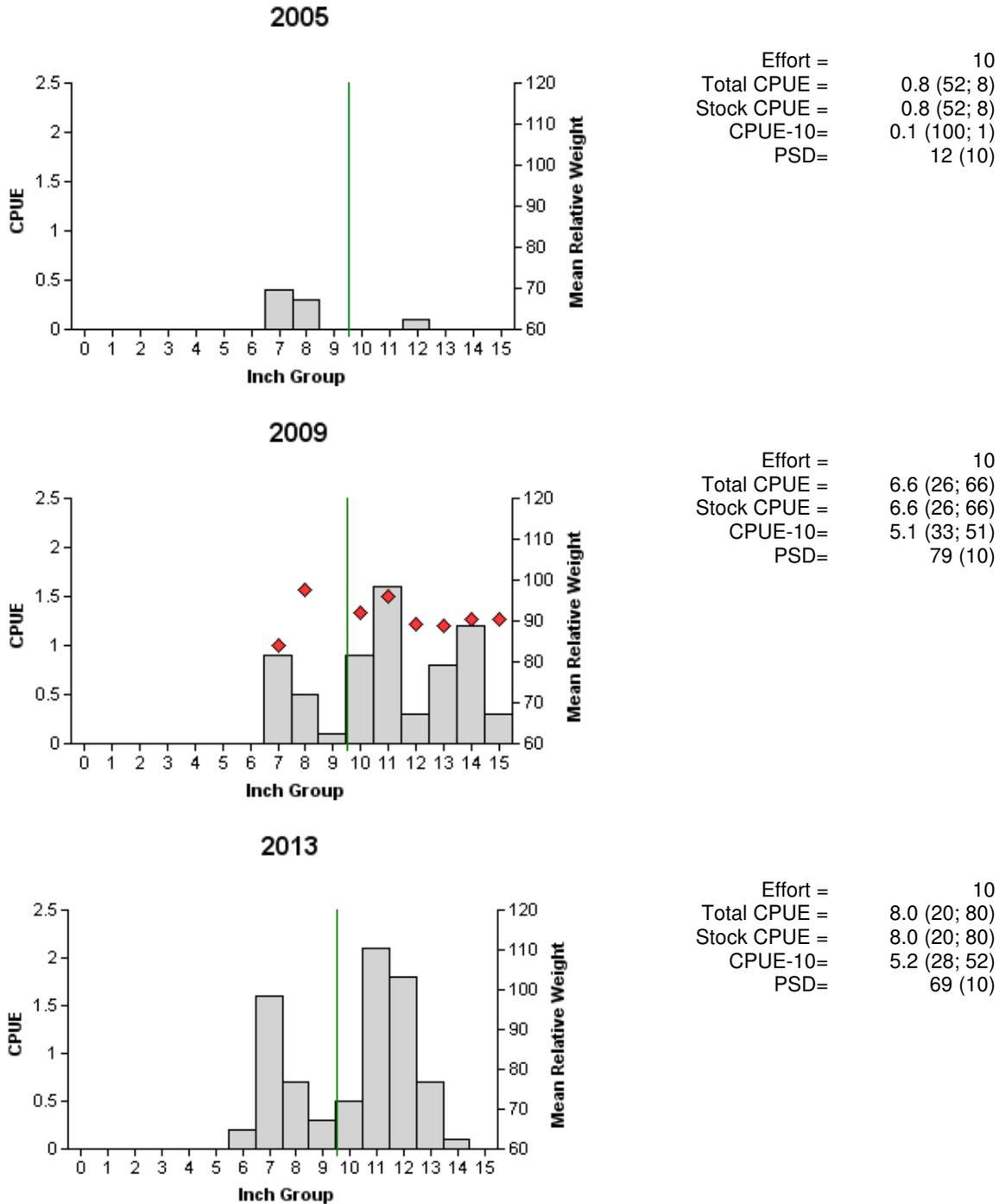
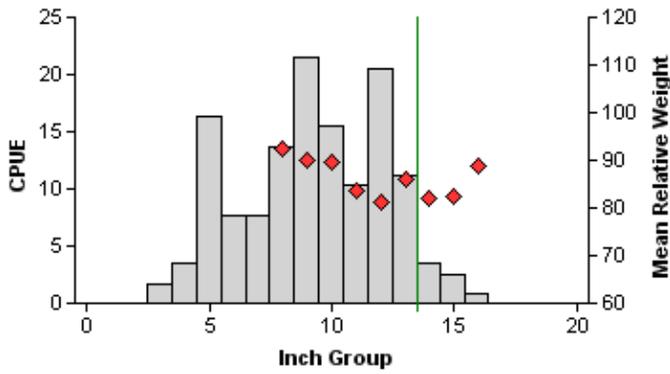


Figure 6. Number of White Bass caught per net-night (CPUE), relative weight (red diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill netting surveys, Brownwood Reservoir, Texas, 2005, 2009, and 2013. The vertical line represents the 10-inch minimum length limit.

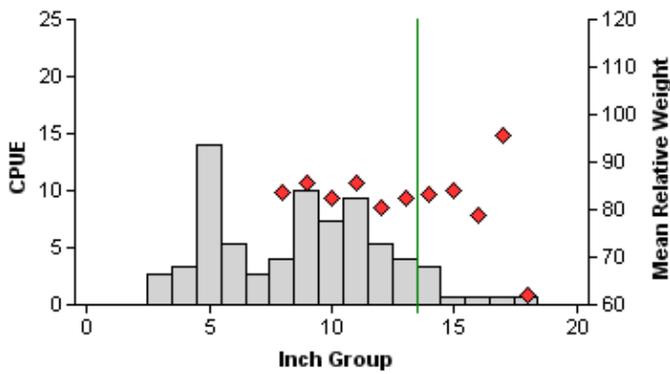
Largemouth Bass

2008



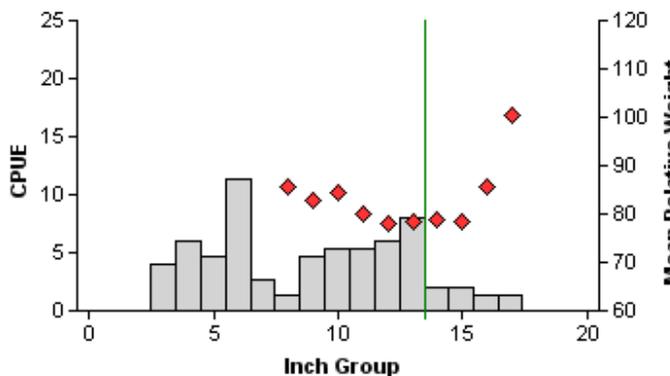
Effort = 1.2
 Total CPUE = 136.3 (18; 159)
 Stock CPUE = 99.4 (22; 116)
 CPUE-14 = 6.9 (30; 8)
 PSD = 39 (4)

2010



Effort = 1.5
 Total CPUE = 74.0 (21; 111)
 Stock CPUE = 46.0 (28; 69)
 CPUE-14 = 6.0 (40; 9)
 PSD = 33 (4)

2012



Effort = 1.5
 Total CPUE = 66.0 (18; 99)
 Stock CPUE = 37.3 (24; 56)
 CPUE-14 = 6.7 (42; 10)
 PSD = 55 (7)

Figure 7. Number of Largemouth Bass caught per hour (CPUE), relative weight (red diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Brownwood Reservoir, Texas, 2008, 2010, and 2012. The vertical line represents the 14-inch minimum length limit.

White Crappie

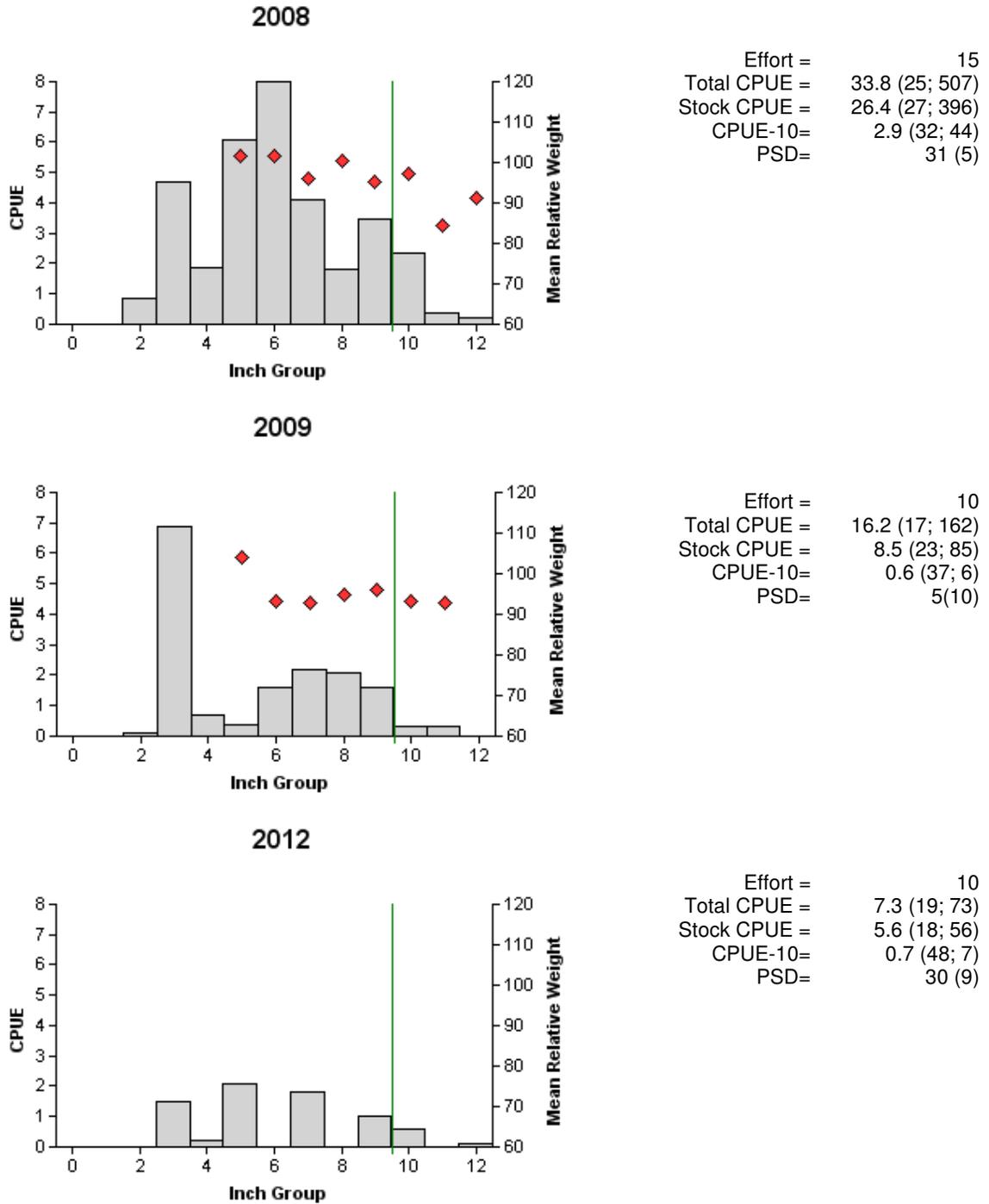


Figure 8. Number of White Crappie caught per net-night (CPUE), relative weight (red diamonds) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Brownwood Reservoir, Texas, 2008, 2009, and 2012. The vertical line represents the 10-inch minimum length limit.

Table 5. Proposed sampling schedule for Brownwood Reservoir, Texas. Survey period is June through May. 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.

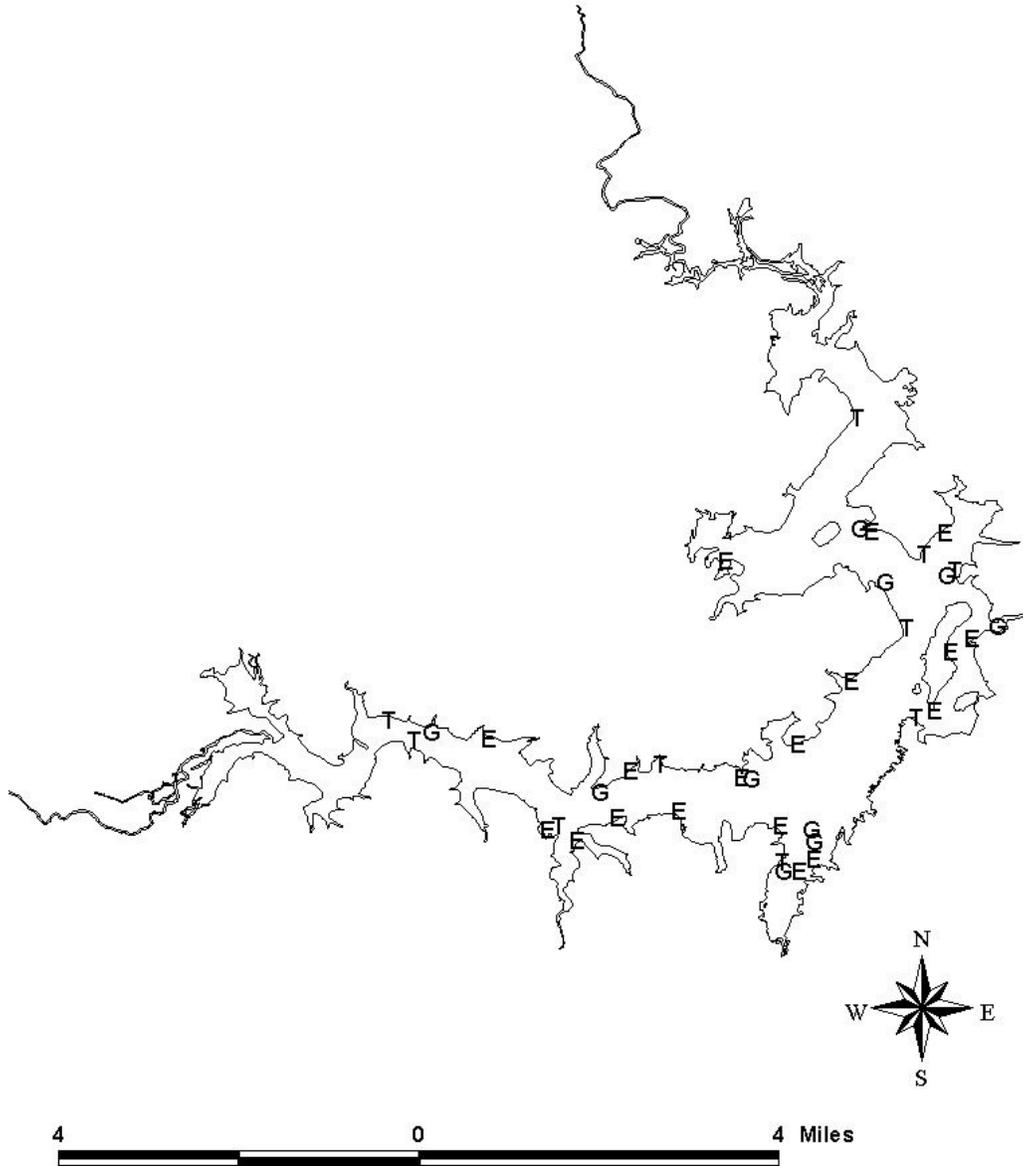
Survey year	Electrofishing Fall(Spring)	Trap net	Gill net	Habitat			Creel survey	Report
				Structural	Vegetation	Access		
2013-2014								
2014-2015	A		A					
2015-2016								
2016-2017	S	S	S		S	S		S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Brownwood Reservoir, Texas, 2012-2013. Sampling effort was 10 net nights for gill netting, 10 net nights for trap netting, and 1.5 hours for electrofishing.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad					346	230.7
Threadfin Shad					423	282.0
Blue Catfish	29	2.9				
Channel Catfish	18	1.8				
White Bass	80	8.0				
Palmetto Bass	1	0.1				
Green Sunfish					24	16.0
Warmouth					3	2.0
Orangespotted Sunfish					6	4.0
Bluegill					183	122.0
Longear Sunfish					111	7.0
Redear Sunfish					3	2.0
Largemouth Bass					99	66.0
White Crappie			73	7.3		

APPENDIX B



Location of sampling sites, Brownwood Reservoir, Texas, 2012-2013. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively. Water level was about 10 feet below full pool at time of sampling.