

PERFORMANCE REPORT

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FEDERAL AID PROJECT F-221-M-2

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2011 Survey Report

Pat Cleburne Reservoir

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July 31, 2012

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SURVEY AND MANAGEMENT SUMMARY

Fish Populations in Pat Cleburne Reservoir were surveyed in 2011 using electrofisher and trap nets and in 2012 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:** Pat Cleburne Reservoir is a 1,568-acre impoundment within the Brazos River Basin, Johnson County. Water levels were six feet below conservation pool (733.5) during 2011 electrofisher and trap net surveys and four feet above conservation pool during 2012 gill net surveys. Fish habitat at the time of sampling was dominated by natural shoreline and rip-rap. Boat access (two ramps) on the reservoir is adequate, and there are currently no handicap-specific facilities.
- **Management history:** Important sport fish include largemouth bass, white crappie, and catfish. The management plan from the 2007 survey report included conducting vegetation and physical habitat surveys in summer 2011 and publicizing the reservoir's angling opportunities. The most recent fish stocking was advanced fingerling channel catfish in 1998.
- **Fish Community**
 - **Prey species:** Threadfin and gizzard shad were collected at good rates. Other forage species included bluegill, longear sunfish, redear sunfish, warmouth, and green sunfish.
 - **Catfishes:** The gill net catch of blue catfish was poor while the catch of channel catfish was excellent. Body condition was average for both species, and length classes were dominated by legal-sized fish.
 - **White bass:** The white bass catch rate was good, although much lower than historical rates. Body condition was average for most size classes, but decreased with increasing lengths.
 - **Largemouth bass:** Largemouth bass were collected in good numbers and body condition was generally good. Fair numbers of legal-sized fish were observed.
 - **White crappie:** Few white crappie were collected and body condition remained good.
- **Management Strategies:** Continue managing Pat Cleburne Reservoir with statewide regulations. Conduct general monitoring with electrofisher, trap nets, and gill nets in 2015 and 2016.

INTRODUCTION

This document is a summary of fisheries data collected from Pat Cleburne 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

Pat Cleburne Reservoir is supplied by the Nolan River within the Brazos River Basin, Johnson County. The reservoir is used as a municipal water supply and for recreation. The 1,568-acre impoundment has a drainage area of 100 square miles, a storage capacity of 26,008 acre-feet, and a shoreline length of 15.3 miles. Mean and maximum depths are 16.5 and 64.0 feet respectively. Water levels were six feet below conservation pool (733.5) during 2011 electrofisher and trap net surveys and four feet above conservation pool during 2012 gill net surveys. Fish habitat at the time of sampling was dominated by natural shoreline and rip-rap. Bank and boat access (two ramps) on the reservoir is adequate, but there are currently no handicap-specific facilities. Other descriptive characteristics for Pat Cleburne Reservoir are in Table 1. Further information about Pat Cleburne Reservoir and its facilities can be obtained by visiting the Texas Parks and Wildlife Web site at www.tpwd.state.tx.us and navigating within the fishing link.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Baird and Tibbs 2007) included:

1. Conducting an aquatic vegetation and shoreline habitat survey in summer 2011.
Action: Aquatic vegetation and physical habitat surveys were conducted in summer 2011 and winter 2012; those data are included in this report.
2. Issuing one or more news releases informing the angling public about good fishing opportunities.

Action: Several fishing and angling articles have been released to local television and radio stations highlighting Pat Cleburne opportunities, including a written release titled *Fishing for New Lake Records at Pat Cleburne*, released in February 2012.

Harvest regulation history: Sportfishes in Pat Cleburne Reservoir are currently managed with statewide regulations (Table 2).

Stocking history: Pat Cleburne Reservoir has not been stocked since 1998, when channel catfish were stocked at a rate of 25 fish per acre. To date, Florida largemouth bass, northern largemouth bass, flathead catfish, and channel catfish have been stocked into the reservoir (Table 3).

Vegetation/habitat history: Pat Cleburne is a small, moderately shallow, reservoir with a secchi range less than two feet. A full vegetation survey conducted in summer 2011 found dominant shoreline vegetation to be water willow (*Justicia americana*) covering 37.4 acres, cattail (*Typha spp.*) covering 1.8 acres, and bulrushes (*Scirpus spp.*) covering 0.2 acres. No noxious species of vegetation have been identified in the reservoir to date.

Water Transfer: Pat Cleburne is primarily used for municipal water supply and recreation. The City of Cleburne has the only raw water intake structure on the reservoir which serves the adjoining 20 MGD treatment plant. The City also transfers water to Pat Cleburne from Lake Aquilla via a 31-mile pipeline. There are currently no additional water transfers being considered.

Reservoir capacity: Pat Cleburne was impounded in 1964. Original plans calculated the reservoir's

capacity at conservation pool (733.5 feet above mean sea level) to be 25,560 acre-feet with a surface area of 1,545 acres. Two volumetric surveys have been conducted by the Texas Water Development Board (TWDB) on Pat Cleburne since impoundment; one in 1998 and one in 2008. The 1998 survey found a volume of 25,730 acre-feet and a surface area of 1,558 acres, whereas the 2008 survey found a volume of 26,008 acre-feet and a surface area of 1,568 acres at conservation pool elevation. Since both surveys report capacities greater than the original volume of the lake, no estimated sedimentation rate could be determined, and none is presumed to have occurred up to the time of the 2008 report. Additional information can be found at the following web link:
http://www.twdb.state.tx.us/hydro_survey/PatCleburne2008/PatCleburne2008_FinalReport.pdf

METHODS

Fishes were collected by electrofisher (1 hour at 12 5-min stations), gill nets (5 net nights at 5 stations), and trap nets (5 net nights at 5 stations). 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). 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).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD)], as defined by Guy et al. (2007), and condition indices [relative weights (W_r)] were calculated for target fishes according to Anderson and Neumann (1996). Index of vulnerability (IOV) was calculated for gizzard shad (DiCenzo et al. 1996). Relative standard error ($RSE = 100 \times SE$ of the estimate/estimate) was calculated for all CPUE statistics and SE was calculated for structural indices and IOV. No age and growth was conducted in 2011-2012. Source for water level data was the United States Geological Survey (USGS) website.

RESULTS AND DISCUSSION

Habitat: Littoral zone habitat consisted primarily of natural shoreline and rip-rap. Aquatic vegetation and physical habitat surveys were conducted in summer 2011 and winter 2012 (Table 4).

Creel: No creels were performed on Pat Cleburne Reservoir in the last four years.

Prey species: Threadfin and gizzard shad were collected by electrofisher at 344.0/h and 241.0/h respectively in 2011, and these catch rates are above the historical averages for both species. The index of vulnerability (IOV) for gizzard shad was good as 83% of the population was available to existing predators as forage. Other important forage species collected were bluegill (391.0/h), longear sunfish (27.0/h), and redear sunfish (69.0/h). Panfish seldom reach preferred size classes in Pat Cleburne, and few anglers actively seek them (Figures 2 and 3; Appendices A and B).

Catfishes: Blue catfish were collected with gill nets at 0.2/nn in 2012; this catch rate equates to 1 collected individual, and is the lowest catch rate on record. Proportional size distribution values have varied over the past three surveys indicating unstable recruitment, growth, or mortality. The single blue catfish collected was well below the preferred size category of 30 inches. Body condition was average (Figure 4; Appendices A and B).

Channel catfish were collected with gill nets at 8.4/nn in 2012; this catch rate equates to 42 collected individuals, and is the second highest catch rate on record. Proportional size distribution values have remained stable over the past two surveys indicating steady recruitment, growth, and mortality. Several sampled channel catfish approached the preferred size category of 24 inches. Body condition was average, and improved with increasing lengths (Figure 5; Appendices A and B).

The flathead catfish population is a low density one and only a single individual was collected (Appendix A).

White bass: White bass were collected with gill nets at 4.2/nn in 2012; this catch rate equated to 21 collected individuals, yet was well below the historical average for Pat Cleburne. The PSD for white bass has varied moderately over the past three surveys, indicating inconsistent recruitment, growth, or mortality. Body condition declined with increasing lengths (Figure 6; Appendices A and B).

Largemouth bass: Largemouth bass were collected by electrofisher at 209.0/h in 2011; this catch rate equates to 209 collected individuals, and was higher than the historical average. Proportional size distribution was poor (15), and reflects the significant drop in catch rate beyond the eleven-inch class. The proportion of individuals 14-inches and larger was 9, indicating low numbers of harvestable bass for anglers - and several individuals at or near 20 inches. Body condition was good, with Wrs averaging between 90 and 100 for most size classes. Florida largemouth bass influence has remained relatively constant as Florida alleles were estimated at 37% in 2007 (Figure 7; Table 5; Appendices A and B).

Crappies: White crappie were collected from trap nets at 1.0/nn in 2011; this catch rate is below average for white crappie in the reservoir. The PSD has remained high (100) over the past three surveys, indicating low recruitment. All sampled crappie were near the legal size limit of 10-inches. Body condition was excellent (Figure 8; Appendices A and B).

Black crappie were also collected from trap nets at 1.0/nn, but have not been part of the historical catch (Appendix A).

Fisheries management plan for Pat Cleburne Reservoir, Texas

Prepared – July 2012

ISSUE 1: Largemouth bass recruitment in Pat Cleburne Reservoir has been consistent for the past four surveys; however PSD-14 values have been consistently low, indicating possible growth or harvest issues.

MANAGEMENT STRATEGIES

1. Sample the largemouth bass population with electrofisher in fall 2013 and 2015 to monitor the population and catch rates of legal-sized fish.
2. Consider conducting a tier II or higher age and growth evaluation in fall 2015, pending the fall 2013 electrofisher results.

ISSUE 2: The gill net catch rate of channel catfish is the second-highest on record for the reservoir.

MANAGEMENT STRATEGIES

1. Release one or more news articles showcasing the excellent channel catfish angling opportunities on Pat Cleburne Reservoir.
2. Update the Texas Parks and Wildlife Department's website to reflect the most recent fish species data for Pat Cleburne Reservoir.

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 when they become available.
2. Educate the public about invasive species through the use of media and the internet when appropriate.
3. Make a speaking point about invasive species when presenting to constituent and user groups. 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 electrofisher sampling in fall 2013, standard electrofisher and trap net sampling in fall 2015 and gill net sampling in spring 2016 (Table 6). A tier II or higher age and growth analysis will be conducted in the fall of 2015 on largemouth bass, pending additional electrofisher results from fall 2013.

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- DiCenzo, V. J., M. J. Maceina, and M. R. Stimert. 1996. Relations between reservoir trophic state and gizzard shad population characteristics in Alabama reservoirs. North American Journal of Fisheries Management 16:888-895.
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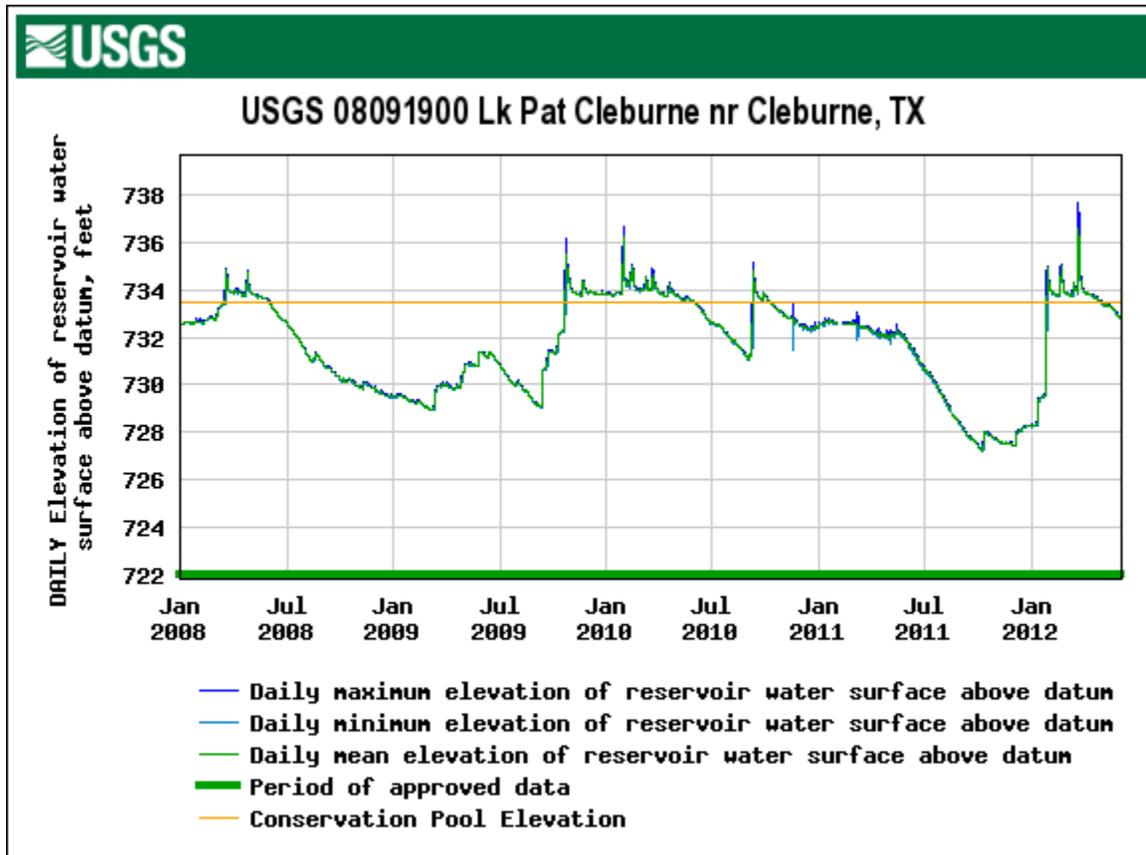


Figure 1. Daily mean water levels for Pat Cleburne Reservoir from January 1, 2008 through June 1, 2012. Conservation pool level is 733.5 feet above mean sea level. Figure from USGS website.

Table 1. Characteristics of Pat Cleburne Reservoir, Texas.

Characteristic	Description
Year Constructed	1964
Controlling authority	City of Cleburne
County	Johnson
Reservoir type	Tributary
Shoreline Development Index (SDI)	1.6
Conductivity	320 umhos/cm

Table 2. Harvest regulations for Pat Cleburne Reservoir.

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
Bass, spotted	5 (in any combination)	No Limit
Crappie: white and black crappie, their hybrids and subspecies	25 (in any combination)	10 - No Limit

Table 3. Stocking history of Pat Cleburne, Texas. Life stages are fry (FRY), fingerlings (FGL), advanced fingerlings (AFGL), adults (ADL) and unknown (UNK). Life stages for each species are defined as having a mean length that falls within the given length range. For each year and life stage the species mean total length (Mean TL; in) is given. For years where there were multiple stocking events for a particular species and life stage the mean TL is an average for all stocking events combined.

Species	Year	Number	Life Stage	Mean TL (in)
Channel catfish	1990	15,723	FGL	2.5
	1998	39,182	AFGL	8.6
	Total	54,905		
Flathead catfish	1982	18		UNK
	Total	18		
Florida Largemouth bass	1992	154,689	FGL	1.0
	1995	155,332	FGL	1.3
	Total	310,021		
Largemouth bass	1971	50,000	UNK	UNK
	1980	235	UNK	UNK
	Total	50,235		

Table 4. Survey of littoral zone and physical habitat types, Pat Cleburne Reservoir, Texas, 2011-2012. Linear shoreline distance (miles) and percent of linear shoreline distance was recorded for each habitat type greater than one percent; otherwise noted as trace. Percent of total shoreline distance is blank for boat docks/piers because they were dually coded with adjacent habitat; counts are given instead. Survey was conducted using 2010 NAIP, 1-meter resolution satellite imagery.

Shoreline habitat type	Shoreline Distance	
	Miles	Percent of total
Natural shoreline	13.8	90.2
Rock shoreline	1.5	9.7
Bulkhead		trace
Boat docks/piers		N=11

Gizzard Shad

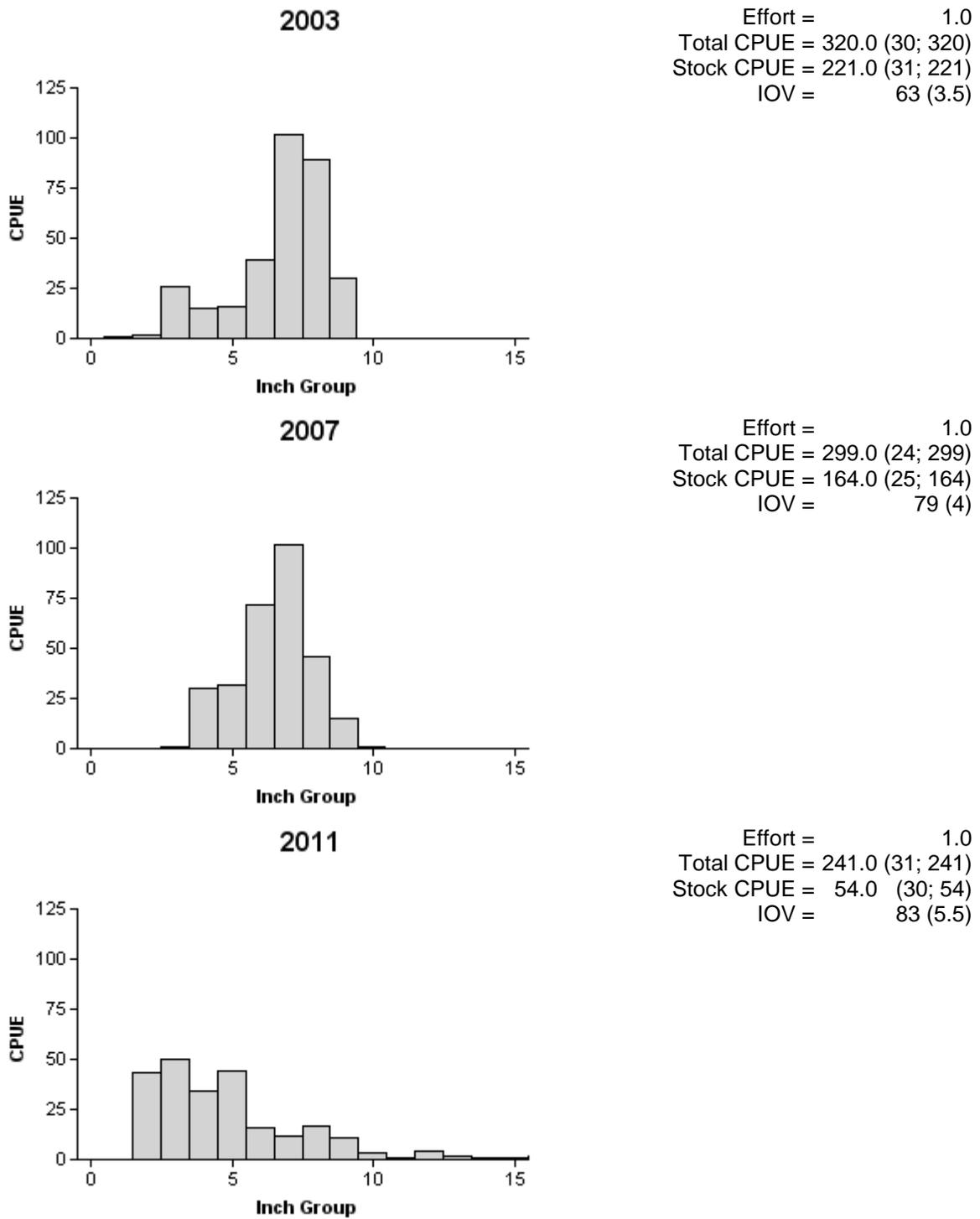
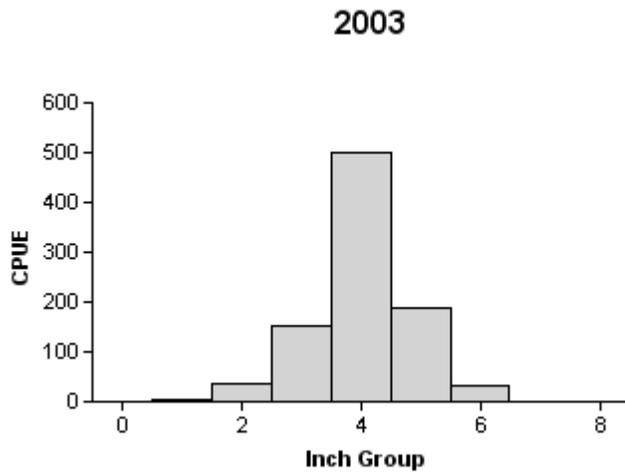
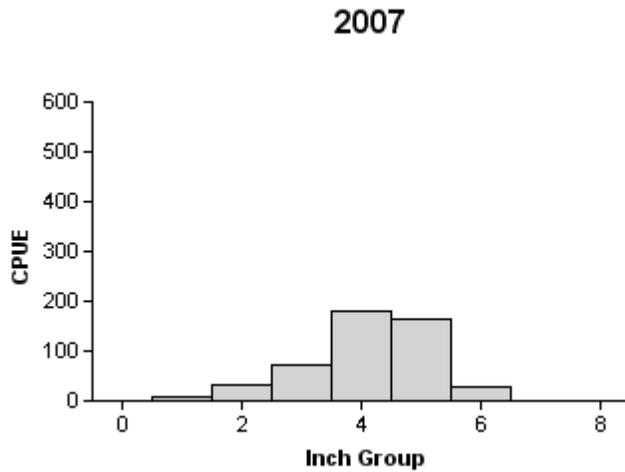


Figure 2. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Pat Cleburne Reservoir, Texas, 2003, 2007, and 2011.

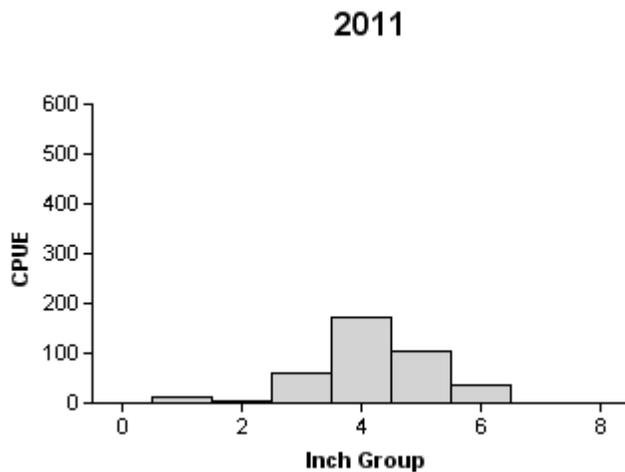
Bluegill



Effort = 1.0
 Total CPUE = 913.0 (21; 913)
 Stock CPUE = 874.0 (23; 874)
 PSD = 4 (1.8)



Effort = 1.0
 Total CPUE = 492.0 (28; 492)
 Stock CPUE = 449.0 (29; 449)
 PSD = 7 (2.7)



Effort = 1.0
 Total CPUE = 391.0 (47; 391)
 Stock CPUE = 373.0 (49; 373)
 PSD = 10 (2.1)

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, Pat Cleburne Reservoir, Texas, 2003, 2007, and 2011.

Blue Catfish

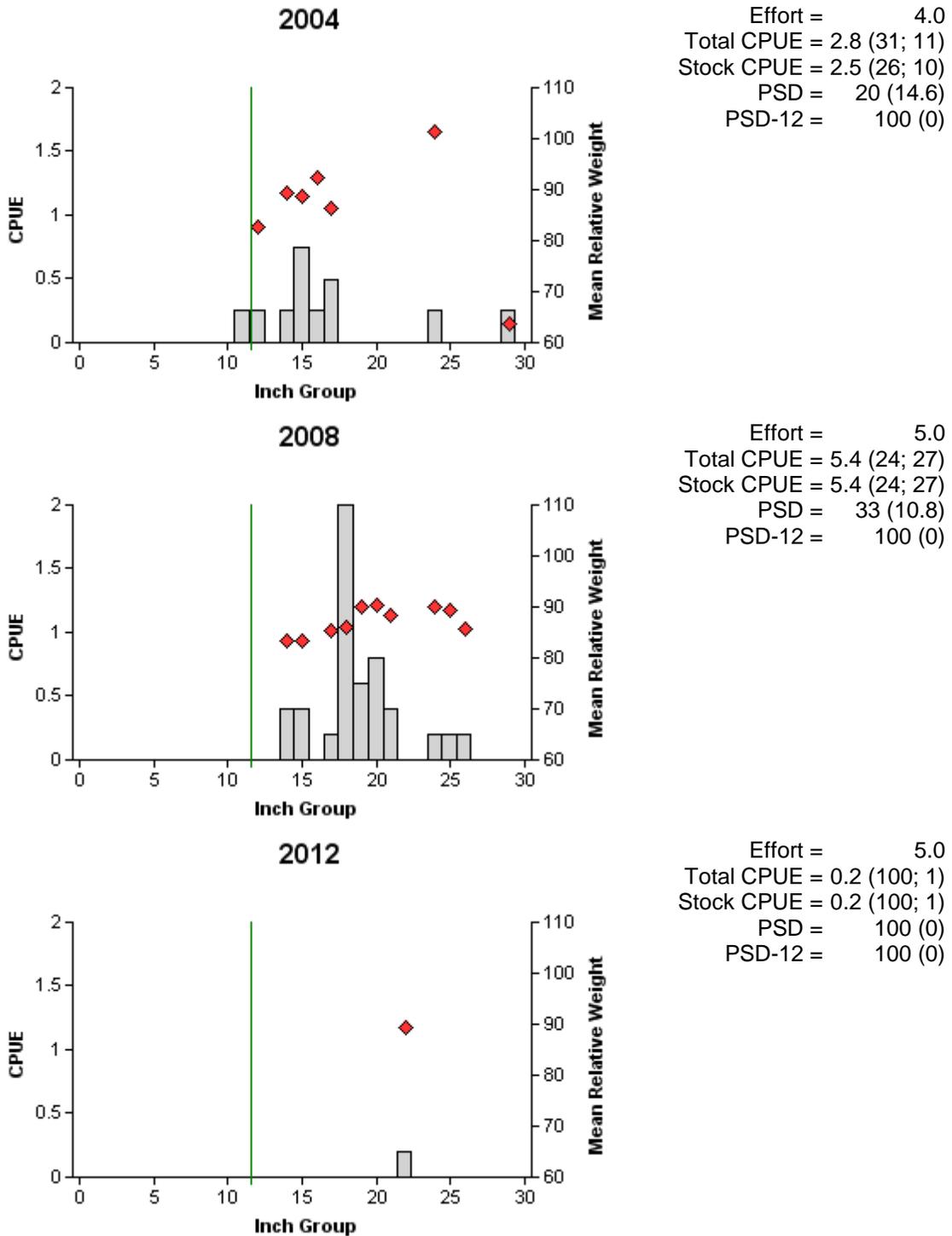


Figure 4. Number of blue catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Pat Cleburne Reservoir, Texas, 2004, 2008, and 2012.

Channel Catfish

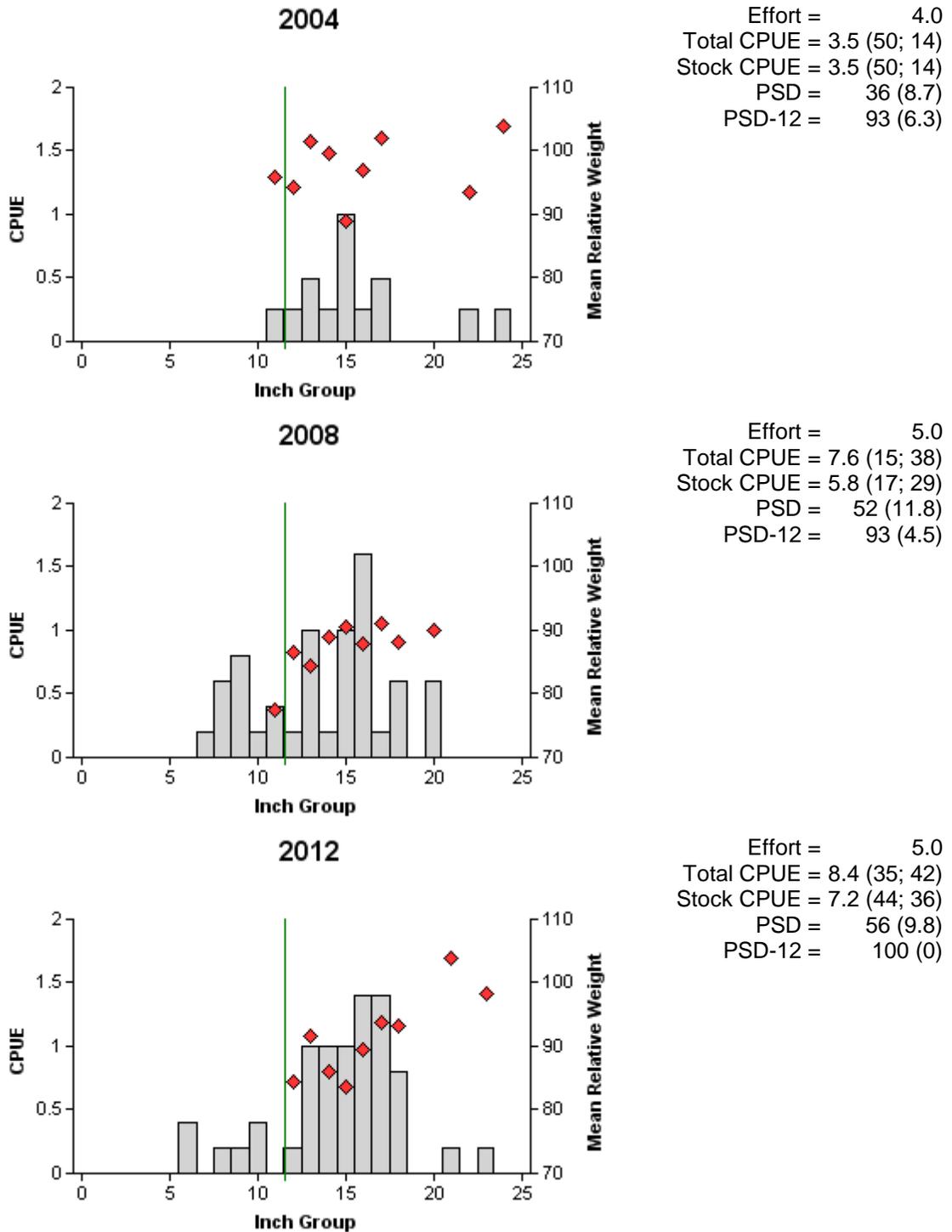


Figure 5. Number of channel catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Pat Cleburne Reservoir, Texas, 2004, 2008, and 2012.

White Bass

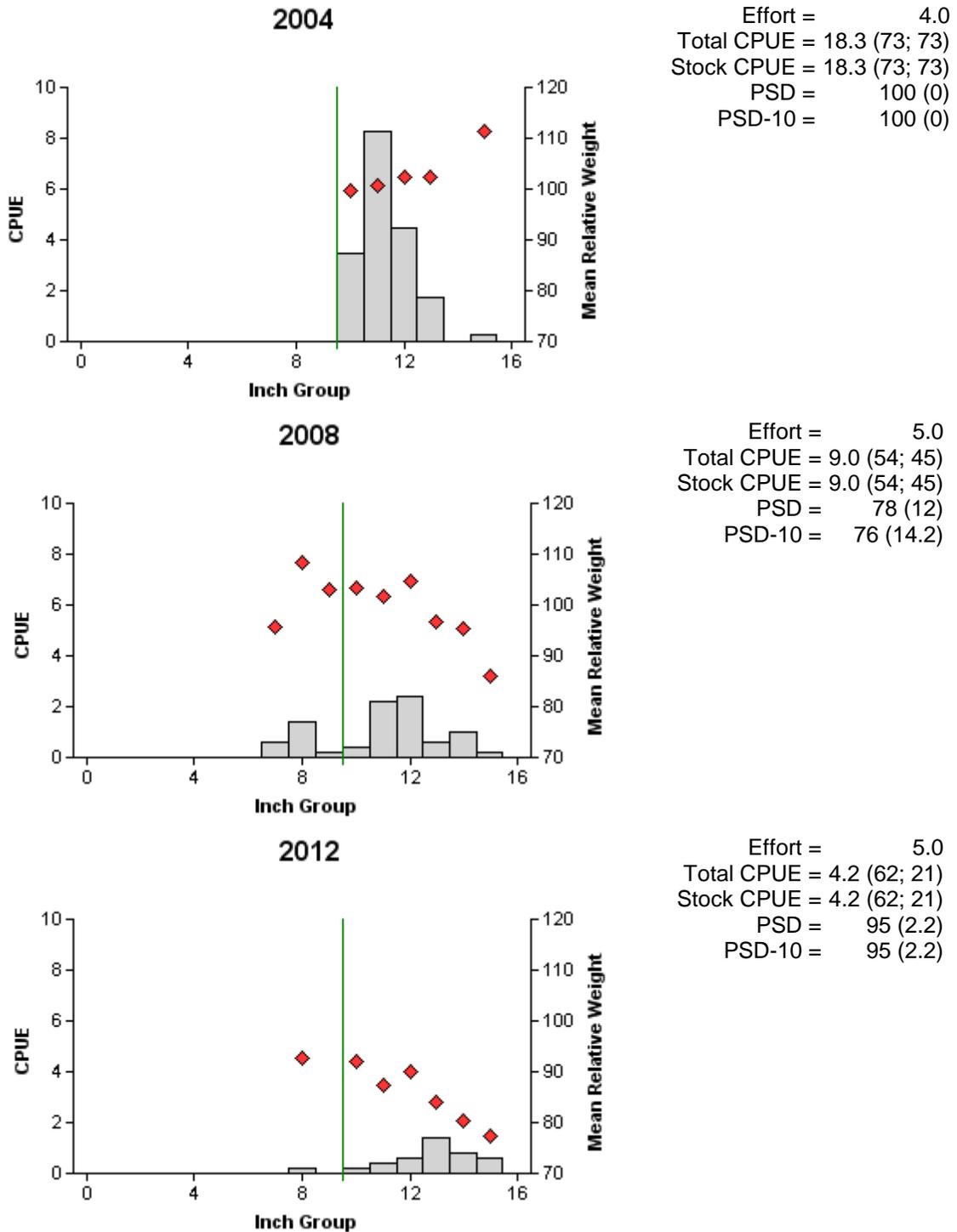


Figure 6. Number of white bass caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Pat Cleburne Reservoir, Texas, 2004, 2008, and 2012.

Largemouth Bass

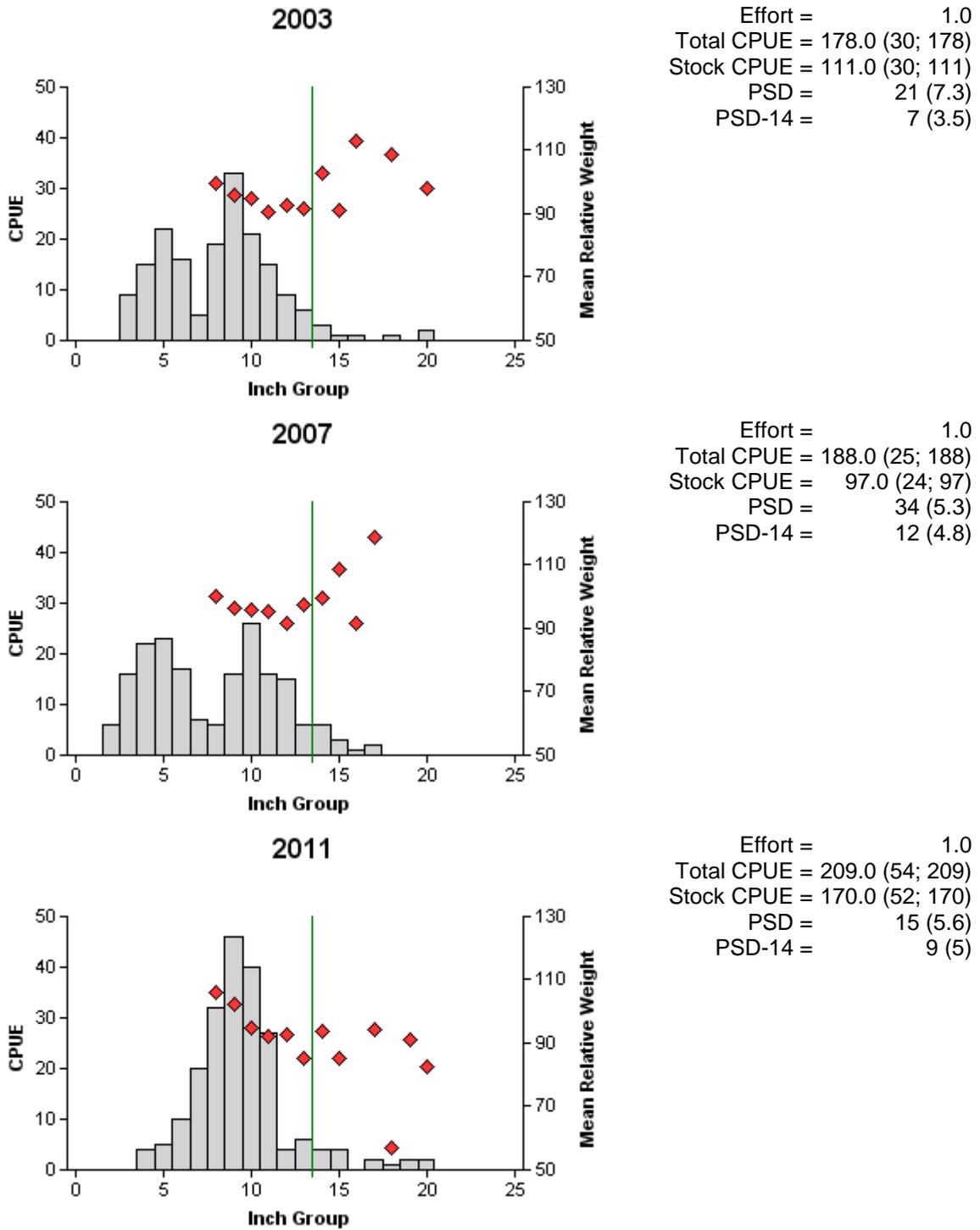


Figure 7. Number of largemouth bass caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Pat Cleburne Reservoir, Texas, 2003, 2007, and 2011.

Table 5. Results of genetic analysis of largemouth bass collected by fall electrofishing, Pat Cleburne Reservoir, Texas, 1999, 2003, and 2007. Analysis conducted prior to 2004 are based on allozyme testing, while later analyses are based on microsatellite DNA testing. Genetic information was not collected during the 2011 electrofishing season. FLMB = Florida largemouth bass, NLMB = northern largemouth bass, Hybrid = bass with both FLMB and NLMB alleles.

Year	Sample size	Genotype			% FLMB alleles	% Northern alleles
		%FLMB	%Hybrid	%NLMB		
1999	26	8	46	46	26	74
2003	30	10	69	21	44	56
2007	30	0	80	20	37	63

White Crappie

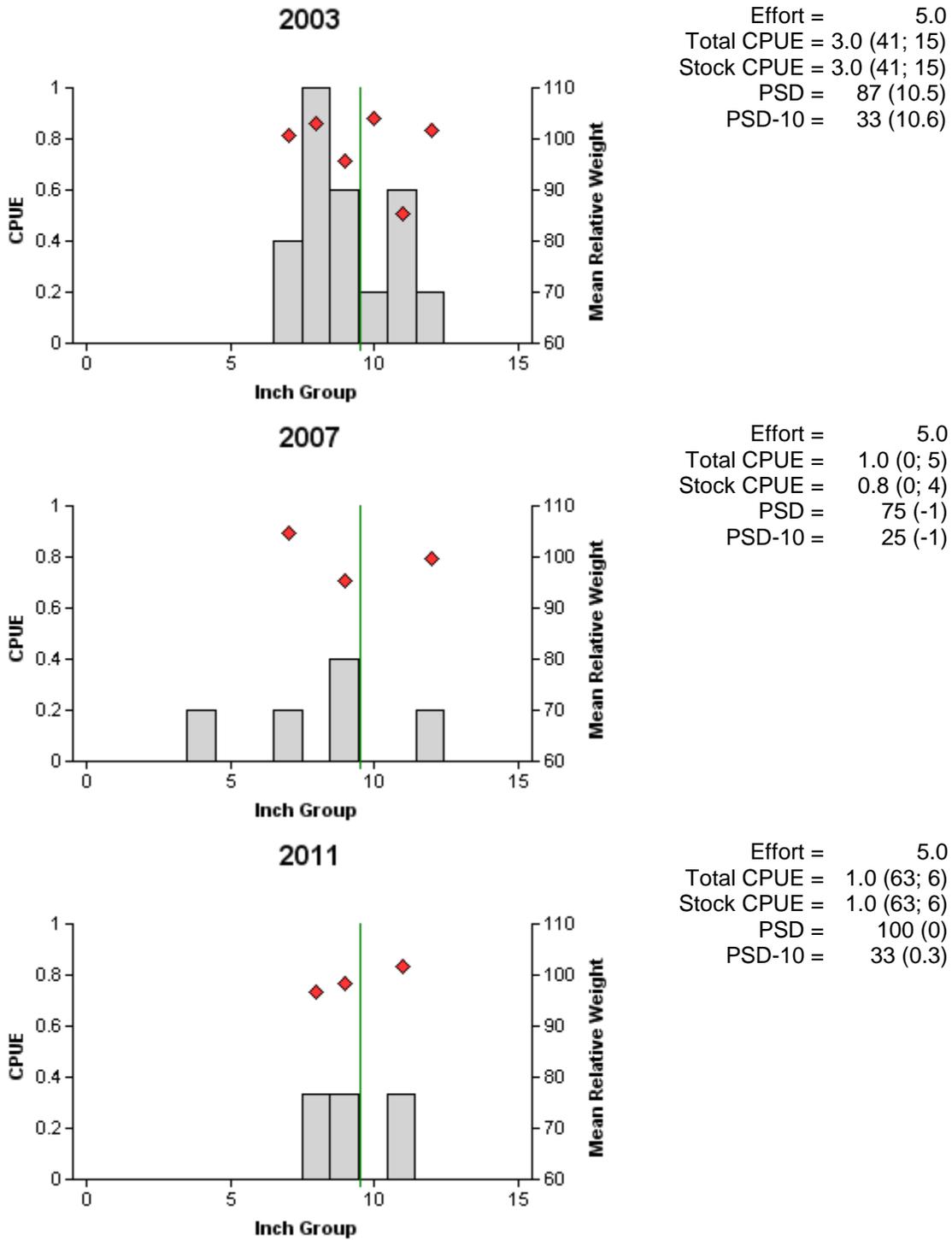


Figure 8. Number of white crappie caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Pat Cleburne Reservoir, Texas, 2003, 2007, and 2011.

Table 6. Proposed sampling schedule for Pat Cleburne Reservoir, Texas. Gill net surveys are conducted in the spring, vegetation and access surveys are conducted in the summer, and electrofisher and trap net 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 Survey	Access Survey	Creel Survey	Report
Fall 2012-Spring 2013							
Fall 2013-Spring 2014	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 from Pat Cleburne Reservoir, Texas, 2011-2012.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					241	241.0
Threadfin shad					344	344.0
Blue catfish	1	0.2				
Channel catfish	42	8.4				
Flathead catfish	1	0.2				
White bass	21	4.2				
Green sunfish					1	1.0
Warmouth					1	1.0
Bluegill					391	391.0
Longear sunfish					27	27.0
Redear sunfish					69	69.0
Largemouth bass					209	209.0
White crappie			6	1.0		
Black crappie			6	1.0		

APPENDIX B

Historical catch rates (CPUE) of targeted species by gear type for standard surveys on Pat Cleburne Reservoir, Texas, 1996 to present. All stations were randomly selected. Electrofishing stations were shocked with a 5.0 Smith-Root GPP (Gas Powered Pulsator) until 2010, when a 7.5 Smith-Root GPP began being used. Species averages are in bold.

Gear	Species	1996	1997	1999	2000	2003	2004	2007	2008	2011	2012	Avg.
Electrofisher												
	Largemouth bass	63.3		228.0		178.0		188.0		209.0		173.3
	Gizzard shad	216.7		14.0		320.0		299.0		241.0		218.4
	Threadfin shad	14.7		0.0		20.0		265.0		344.0		128.7
	Bluegill	89.3		77.3		913.0		492.0		391.0		392.5
	Longear	40.0		0.0		163.0		65.0		27.0		59.0
	Green sunfish	20.0		0.0		5.0		18.0		1.0		8.8
	Warmouth	1.3		0.0		3.0		5.0		1.0		2.1
	Redear sunfish									69.0		
Gill nets												
	Blue catfish		3.6		4.0		2.8		5.4		0.2	3.2
	Channel catfish		11.8		3.4		3.5		7.6		8.4	6.9
	White bass		14.0		8.8		18.3		9.0		4.2	10.9
Trap nets												
	White crappie	10.7		2.2		3.0		1.0		1.0		

APPENDIX C



Location of sampling sites, Pat Cleburne Reservoir, Texas, 2011-2012. Trap net, gill net, and electrofisher stations are indicated by squares, triangles, and circles, respectively. Water levels were six feet below conservation pool (733.5) during 2011 electrofisher and trap net surveys and four feet above conservation pool during 2012 gill net surveys.