

PERFORMANCE REPORT

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FEDERAL AID PROJECT F-221-M-1

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2010 Survey Report

Marine Creek Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Marine Creek Reservoir were surveyed in 2010 using electrofishing and trap netting and in 2011 using gill netting. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Marine Creek, a 250-acre reservoir located on Marine Creek (a tributary of the Trinity River), was constructed in 1958 by the Tarrant Regional Water District primarily for flood control and limited recreational activities. It is located in Tarrant County in northwest Fort Worth, Texas. Habitat is composed mainly of native emergent aquatic vegetation in the forms of water willow, cattails, and bulrush and rocky shoreline.
- **Management history:** Important sport fish include largemouth bass, spotted bass, white crappie, and channel catfish. Largemouth bass were managed under statewide 14-inch minimum length limit until September 1, 2006 when the minimum length limit was changed to 18 inches. Marine Creek was a study site for the Operation World Record special project.
- **Fish Community**
 - **Prey species:** Gizzard and threadfin shad are present in the reservoir. However, catch rates of these species remain well below averages of other district reservoirs. The primary forage base was sunfishes. The total catch rate of bluegill was the highest ever recorded, while the catch rate of longear sunfish has fluctuated over the last three years. Redear sunfish abundance decreased in the reservoir.
 - **Catfishes:** Channel catfish are present in the reservoir. Catch rates were low despite a 2004 stocking. Flathead catfish were present. Blue catfish are not present in Marine Creek.
 - **White bass:** Past gill netting surveys revealed a small population of white bass present in Marine Creek. In 2010 white bass were caught at a low rate by gill netting. All white bass collected were greater than 12 inches.
 - **Black basses:** The electrofishing catch rate of largemouth bass has varied in over the past three years but remained over 100 fish/hour. The catch rate of fish > 14 inches in length has continued to be low. Growth rates are slow. Spotted bass abundance has declined in the reservoir.
 - **White crappie:** The white crappie population continued to exhibit fluctuations in abundance with trap net catch rates higher than in previous years.

Management Strategies: Work closely with the Tarrant Regional Water District to improve regulation signage at the reservoir. Check all largemouth bass collected via electrofishing for tags and record data on all ShareLunker largemouth bass. Clip fins on ShareLunker largemouth for DNA confirmation.

INTRODUCTION

This document is a summary of fisheries data collected from Marine Creek Reservoir in 2010-2011. 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 2010-2011 data for comparison.

Reservoir Description

Marine Creek Reservoir is a 250-acre impoundment constructed in 1958 on Marine Creek (a tributary of the Trinity River), by the Tarrant Regional Water District for flood control and limited recreational activities. Water level remains fairly constant except during times of prolonged drought. It is located in Tarrant County approximately 7 miles northwest of downtown Fort Worth, Texas. The watershed is small and mostly residential development with some agricultural land remaining. Angler and boat access are adequate. Most of the fishing facilities are accessible to the handicapped. At the time of sampling the fishery habitat was emergent aquatic vegetation in the forms of water willow, cattails, and bulrush along with rocky shoreline. Marine Creek is a constant water-level reservoir and surveys were conducted at near full pool. Other descriptive characteristics for Marine Creek Reservoir are in Table 1. In the spring of 2007, approximately 30 trees were bundled and sunk in the reservoir to provide habitat. The trees were donated Christmas trees and quickly deteriorated.

Management History

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

Work with the Tarrant Regional Water District to improve boat ramp conditions and install regulation signage at the reservoir.

Actions: Despite repeated efforts, regulation signs have not been installed at the reservoir. A trail system being constructed at the reservoir includes a new boat ramp on the east side.

Marine Creek did not have a page on the TPWD public website with access, fishing tips, and other relevant information.

Actions: Worked with IF staff in Austin to create a page for Marine Creek Reservoir.

Harvest regulation history: Sport fish populations in Marine Creek Reservoir were managed with statewide regulations with the exception of an 18-inch minimum length limit on largemouth bass (Table 2).

Stocking history: Marine Creek was stocked in 2006 and 2008 with ShareLunker largemouth bass. The complete stocking history is in Table 3.

Vegetation/habitat history: Marine Creek Reservoir aquatic vegetation is primarily composed of shoreline emergent species including cattails, bulrushes, and water willow. Hydrilla and American lotus were historically found in Marine Creek but have not been observed in many years.

Water Transfer: Marine Creek Reservoir is primarily used for flood control and recreation. There are no pumping structures on the reservoir.

METHODS

Fishes were collected by electrofishing (0.67 hours at 8 5-min stations), gill netting (3 net nights at 3 stations), and trap netting (3 net nights at 3 stations). Since Marine Creek Reservoir is only 250 acres in size, effort was reduced from standard levels. Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/hr) 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 2008).

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 X SE of the estimate/estimate) was calculated for all CPUE statistics and SE was calculated for structural indices and IOV. Ages for female largemouth bass were determined using otoliths in the spring of 2010 (TPWD, Inland Fisheries Division, unpublished manual revised 2008).

RESULTS AND DISCUSSION

Habitat: Littoral zone habitat consisted primarily of native emergent aquatic vegetation in the form of water willow, cattail, and bulrush and rocky shoreline (Table 4).

Prey species: The threadfin shad catch rates varied from a high in 2008 of 112.5/hr to a low of 21.0/hr in 2010. The electrofishing catch rate of gizzard shad has remained well below the district average of 278.2/hr for the past several surveys (Figure 1). Index of vulnerability for gizzard shad was poor, indicating that only 42% of gizzard shad captured in 2010 were available to existing predators; this was higher than IOV estimates in the previous survey (Figure 1). The primary forage base in Marine Creek is sunfishes. Electrofishing catch rates of bluegill was similar in 2007 and 2008 and increased to a reservoir record 532.5/hr in 2010 (Figure 2). The bluegill population does not contain large numbers of quality sized fish (>6 inches) or preferred sized fish (>8 inches) as evident in PSD values. Longear sunfish catch rates have varied from a low of 48.0/hr in 2008 to a high of 153.0/hr in 2007 (Appendix D). However, in 2010 the catch rate of longear sunfish was 127.5/hr. Redear sunfish were also moderately abundant (55.5/hr) in 2007 but declined to just 9.0/hr in 2010 (Figure 3).

Channel Catfish: The gill net catch rate of channel catfish was 1.3/nn in 2010 (Figure 4). This catch rate is a decline from 2007 (2.3/nn). Channel catfish were stocked in 2004 (Table 3). Since only 4 channel catfish were collected in 2010, fish were released after being measured and were not weighed.

White bass: White bass were not very abundant in Marine Creek. The gill netting catch rate of white bass in 2010 (1.3/nn) was below the district average of 6.6/nn (Figure 5). The size structure is dominated by adults as the PSD was 100 and included no individuals below 10 inches. Body condition was between 90 and 100 for all sizes of fish. The past several springs have been characterized by low run-off indicative of a small watershed, perhaps hindering spawning opportunities.

Black basses: The electrofishing catch rate of spotted bass in 2010 was 9.0/hr (Figure 6). Spotted bass had generally become more abundant since 2002, but declined since 2007. The decline in spotted bass may have been caused by the increase in relative abundance of largemouth bass resulting in interspecific competition. The electrofishing catch rate of largemouth bass has varied from a low of 114.0/hr in 2008 to a highs of 165.0/hr in 2007 and 2010 (Figure 7). Size structure of the population has steadily improved from 2007 as PSD values increased from 14 in 2007, 23 in 2008, and 44 in 2010. Growth of largemouth bass in Marine Creek Reservoir is slow, indicative of an unexploited population (Figure 8). Body conditions have remained fairly good (relative weight about 90) for nearly all size classes of fish (Figure 7). Florida

largemouth bass influence was low in 2004 and Florida genotype was 0; no genetic data were collected in 2010 (Table 5). For information on Operation World Record please refer to Appendix C.

White crappie: The trap net catch rate of white crappie was 8.7/nn in 2010, which was much higher when compared to 2006 (2.3/nn; Figure 9). The PSD in 2010 was 71 which was slightly lower than the previous sample in 2006 (86).

Fisheries management plan for Marine Creek Reservoir, Texas

Prepared – July 2011

ISSUE 1: Marine Creek is controlled by the Tarrant Regional Water District. With the inception of the Operation World Record project at Marine Creek, the minimum length limit on largemouth bass increased to 18 inches. New regulation signs were developed and sent to TRWD, however, they still have not been posted at the reservoir

MANAGEMENT STRATEGY

1. Work with TRWD to install regulation signs at boat ramps.

ISSUE 2: Marine Creek was stocked in 2006 and 2008 with ShareLunker largemouth bass as part of the Operation World Record project. The primary objectives were accomplished in 2010, although tagged fish still remain in the reservoir.

MANAGEMENT STRATEGIES

1. All largemouth bass collected during sampling will be checked for tags and data will be recorded accordingly.
2. Fin clips will be collected from tagged fish for DNA confirmation of ShareLunker largemouth bass.

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. Arlington is especially susceptible through pipelines from Cedar Creek and Richland-Chambers Reservoirs.

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

General monitoring of sport fish species with trap netting and gill netting will be conducted every 4 years and electrofishing will be conducted every other year.

LITERATURE CITED

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- Benz, G. W. and R. P. Jacobs. 1986. Practical field methods for sexing largemouth bass. The Progressive Fish-Culturist 48: 221-225.
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- 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.
- Hungerford, T and R. Brock. 2007. Statewide freshwater fisheries monitoring and management program survey report for Marine Creek Reservoir, 2006. Texas Parks and Wildlife Department, Federal Aid Report F-30-R, Austin.

Table 1. Characteristics of Marine Creek Reservoir, Texas.

Characteristic	Description
Year Constructed	1958
Controlling authority	Tarrant Regional Water District
Counties	Tarrant
Reservoir type	Tributary of Trinity River
Conductivity	375 umhos/cm

Table 2. Harvest regulations for Marine Creek Reservoir.

Species	Bag Limit	Length Limit (inches)
Catfish: channel and blue catfish, their hybrids and subspecies	25 (in any combination)	12 minimum
Catfish, flathead	5	18 minimum
Bass, white	25	10 minimum
Bass: largemouth	5	18 minimum
Bass, spotted	in any combination	no minimum
Crappie: white and black crappie, their hybrids and subspecies	25 (in any combination)	10 minimum

Table 3. Stocking history of Marine Creek Reservoir, Texas. Size categories are fry (FRY), fingerlings (FGL), advanced fingerlings (AFGL), adults (ADL) and unknown (UNK). 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	2004	11,608	AFGL	8.8
	Total	11,608		
Florida largemouth bass	1977	11,880	AFGL	5.0
	1977	12,000	FRY	1.0
	1978	15,200	FGL	3.0
	Total	39,080		
ShareLunker largemouth bass	2006	6,290	AFGL	6.7
	2008	6,254	AFGL	6.3
	Total	12,544		

Table 4. Survey of littoral zone and physical habitat types, Marine Creek Reservoir, Texas, 2010. A linear shoreline distance (miles) was recorded for each habitat type found. Surface area (acres) and percent of reservoir surface area was determined for each type of aquatic vegetation found.

Shoreline habitat type	Shoreline Distance		Surface Area	
	Miles	Percent of total	Acres	Percent of reservoir surface area
Native emergent + rocky shoreline	2.2	43.4		
Native emergent + natural	1.9	36.8		
Rocky shoreline	0.7	13.0		
Natural	0.2	4.8		
Native emergent	>0.1	0.7		
Bulk head + boat docks	>0.1	0.7		
Dead trees	>0.1	0.6		

Gizzard Shad

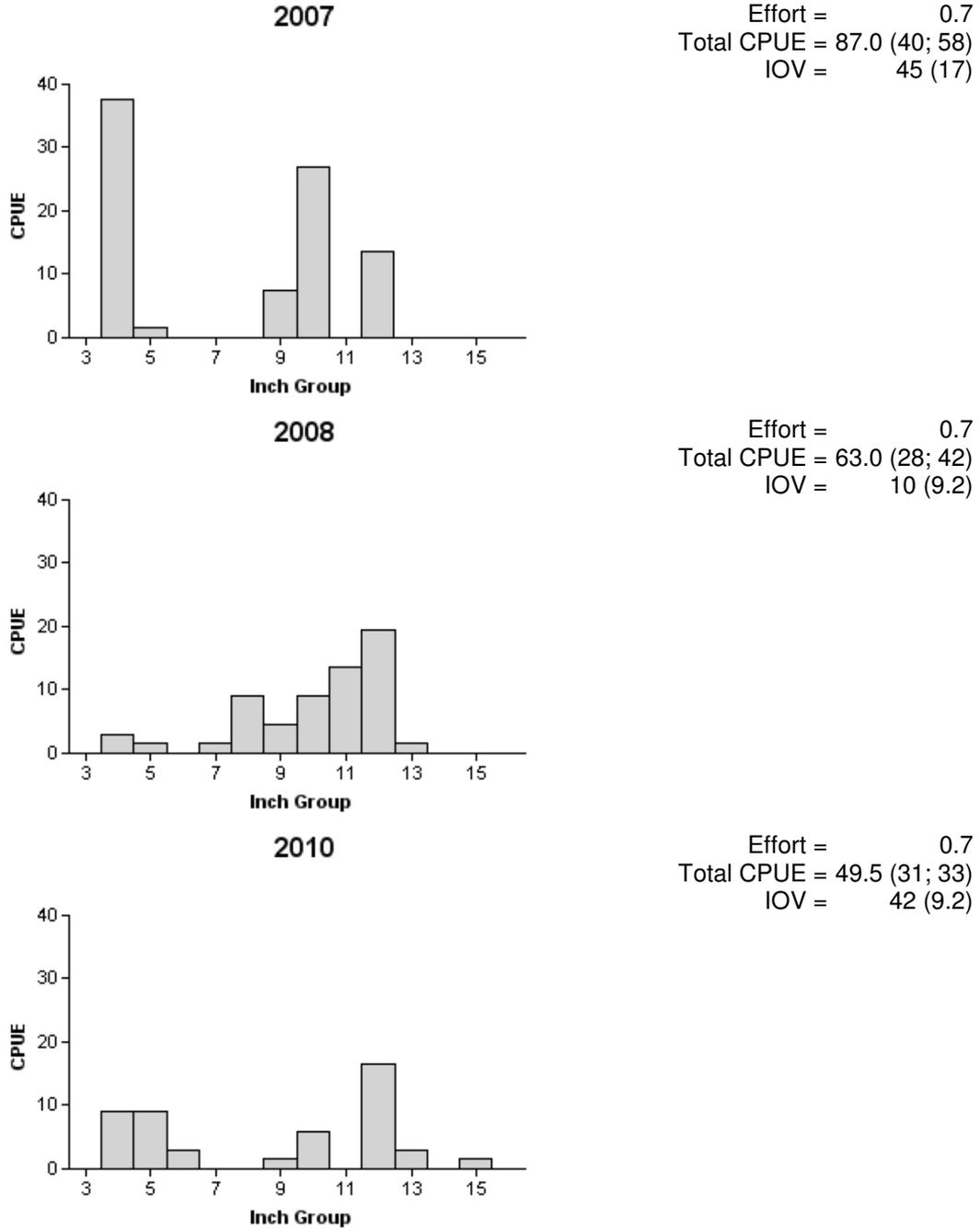


Figure 1. Number of gizzard shad caught per hour (CPUE; bars) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Marine Creek Reservoir, Texas, 2007, 2008, and 2010.

Bluegill

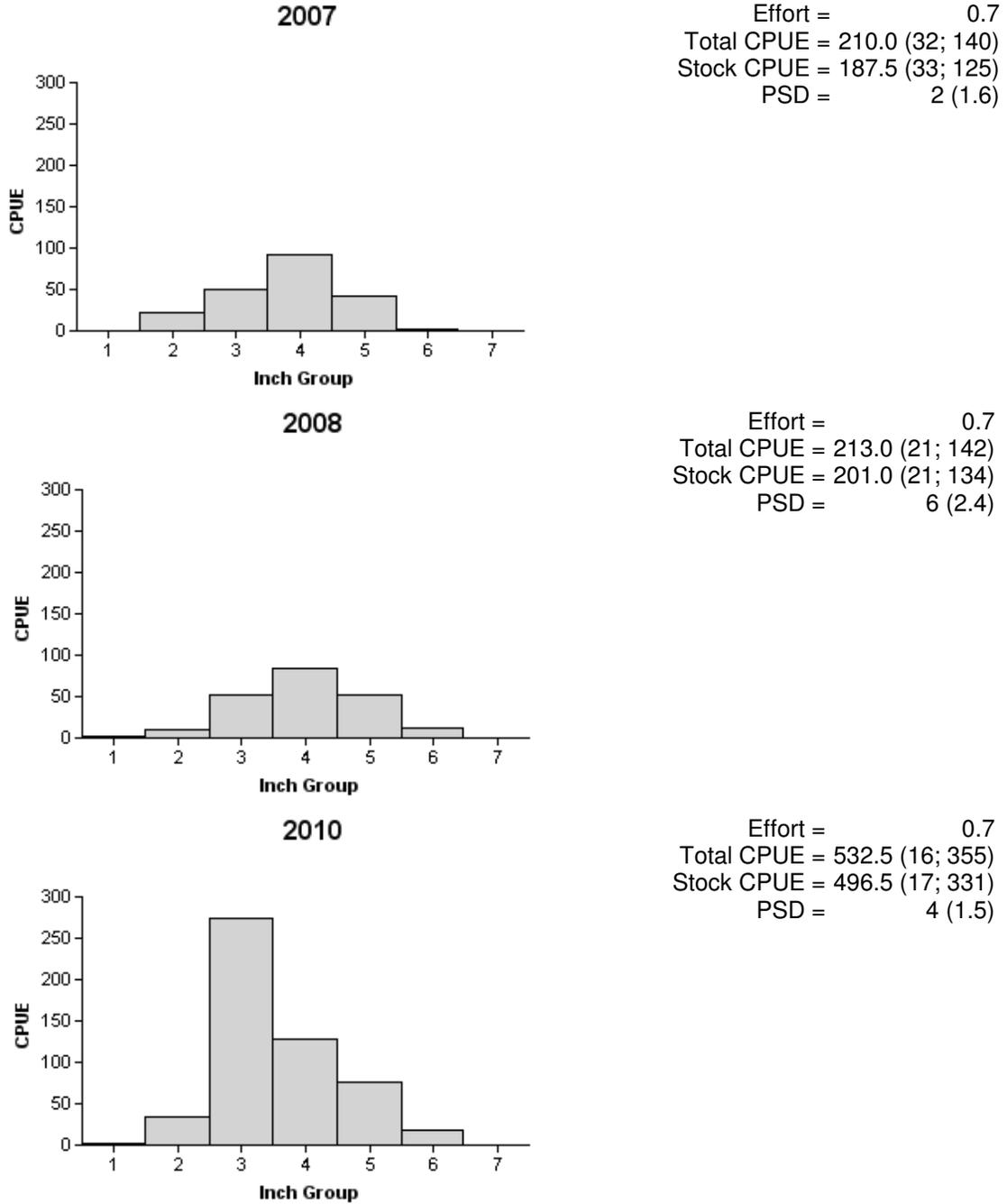


Figure 2. Number of bluegill caught per hour (CPUE; bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Marine Creek Reservoir, Texas, 2007, 2008, and 2010.

Redear Sunfish

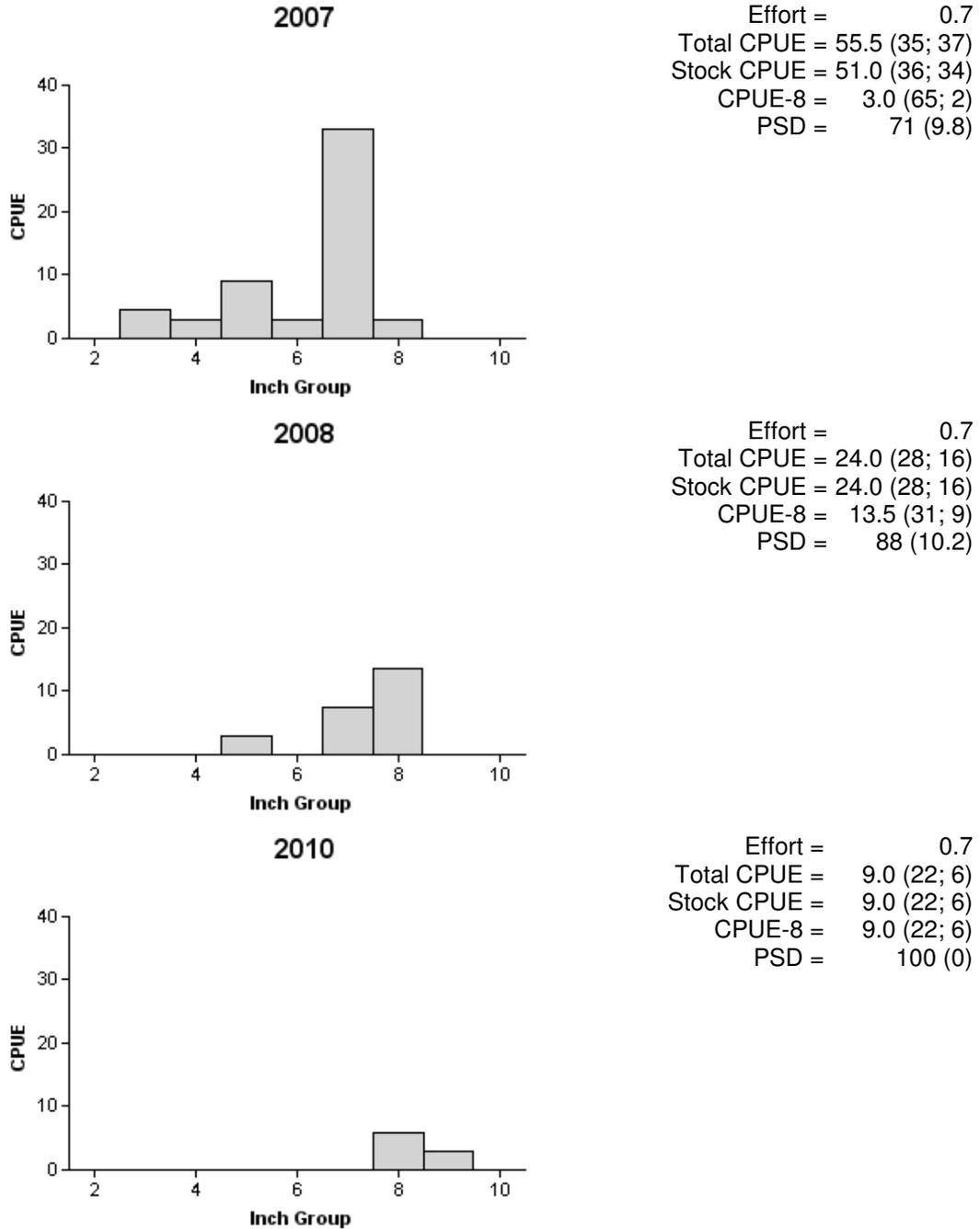


Figure 3. Number of redear sunfish caught per hour (CPUE; bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Marine Creek Reservoir, Texas, 2007, 2008, and 2010.

Channel Catfish

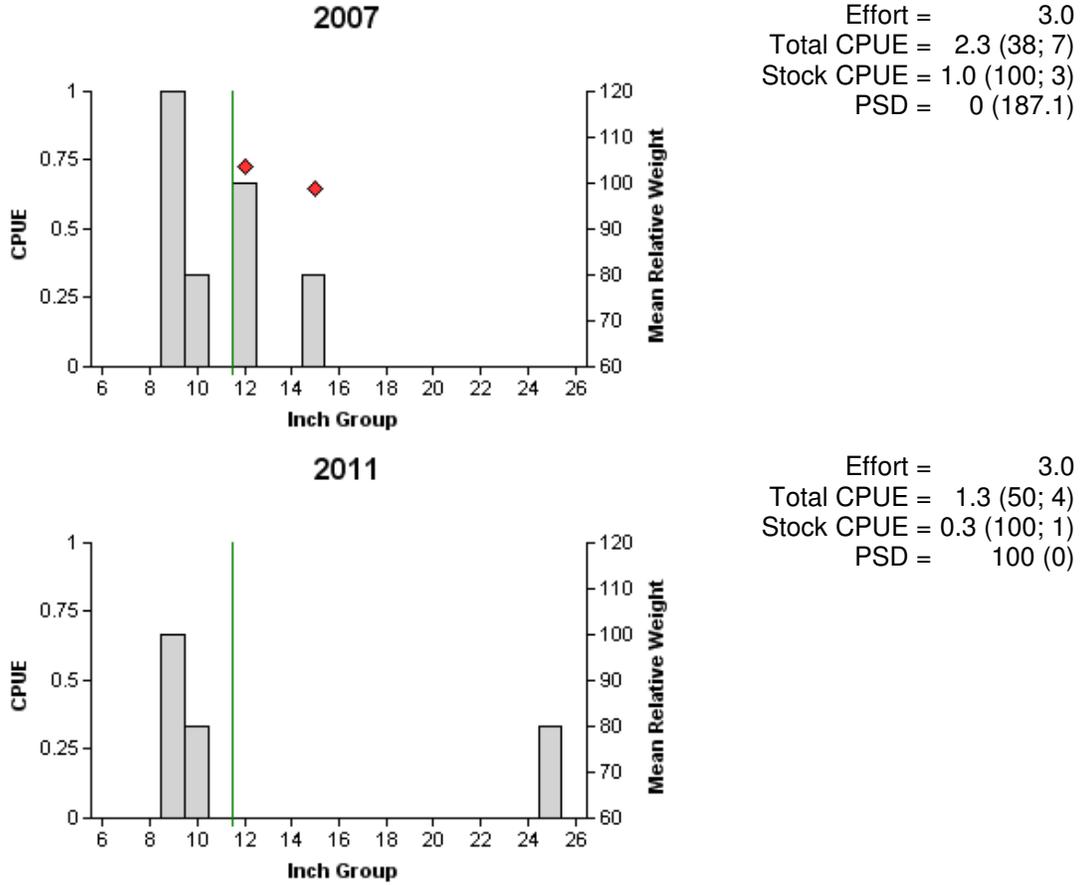


Figure 4. Number of channel catfish caught per net night (CPUE; bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net survey, Marine Creek Reservoir, Texas, 2007 and 2011. Vertical line represents length limit at time of sampling.

White Bass

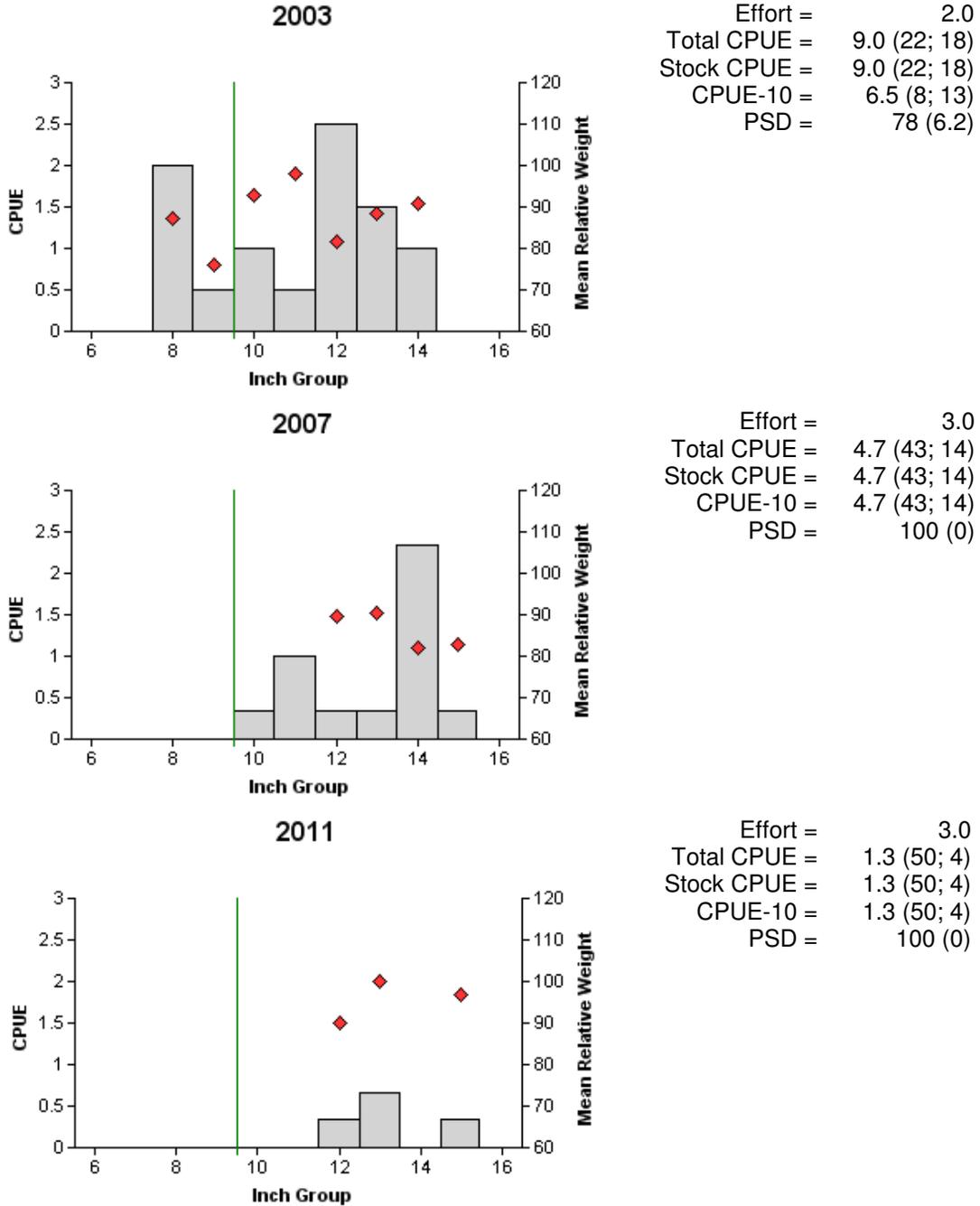


Figure 5. Number of white bass caught per net night (CPUE; bars), mean relative weight (diamonds), and population indices (RSE and N are in parentheses) for spring gill net surveys, Marine Creek Reservoir, Texas, 2003, 2007, and 2011. Vertical line represents length limit at time of sampling.

Spotted Bass

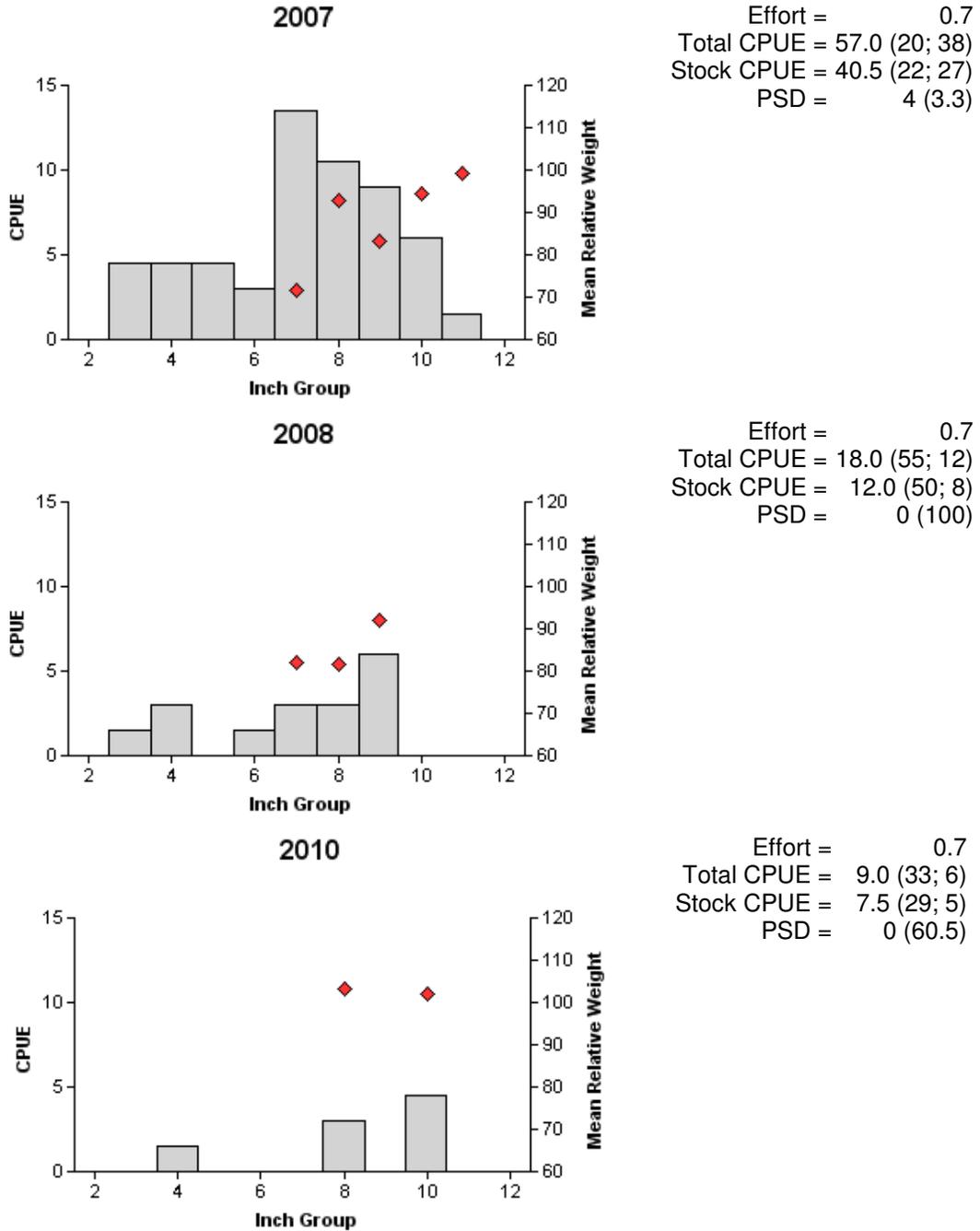


Figure 6. Number of spotted bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Marine Creek Reservoir, Texas, 2007, 2008, and 2010.

Largemouth Bass

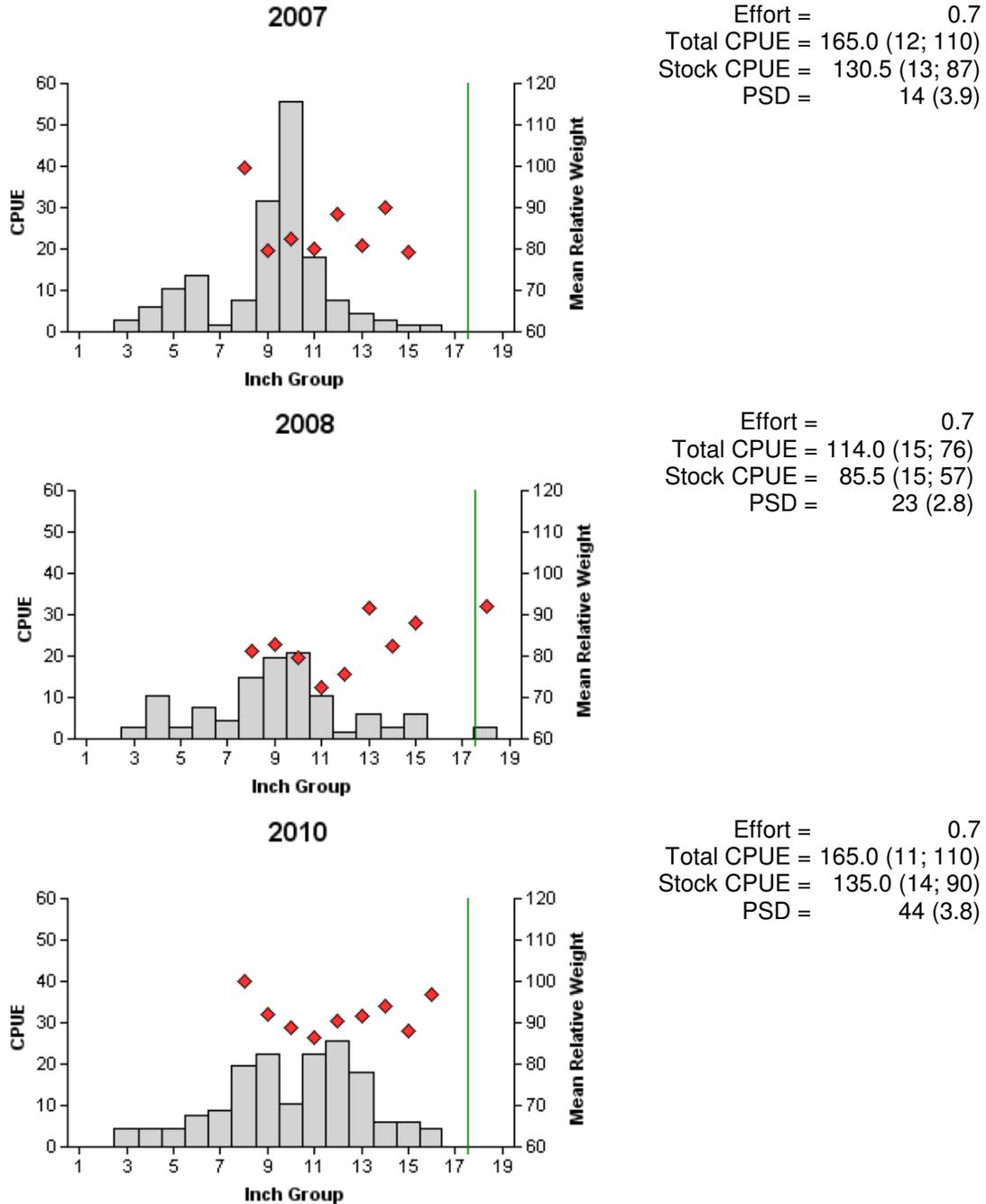


Figure 7. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Marine Creek Reservoir, Texas, 2007, 2008, and 2010. Vertical lines represent minimum length limit at time of sampling.

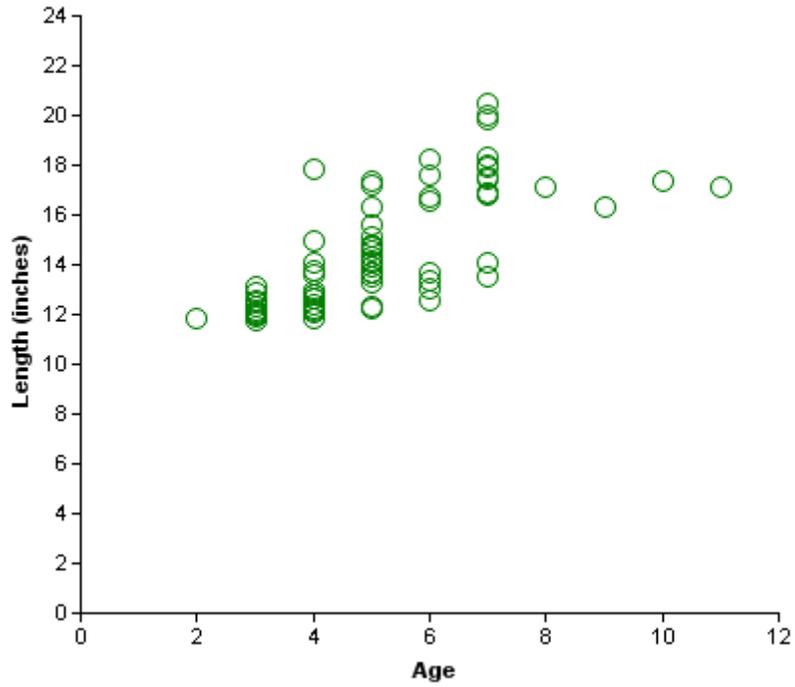


Figure 8. Length at age of female largemouth bass collected from Marine Creek Reservoir, Texas, Spring 2010 (N=72).

Table 5. Results of genetic analysis of largemouth bass collected by fall electrofishing, Marine Creek Reservoir, Texas, 2004. FLMB = Florida largemouth bass, NLMB = Northern largemouth bass, F1 = first generation hybrid between a FLMB and a NLMB, Fx = second or higher generation hybrid between a FLMB and a NLMB.

Year	Sample size	Genotype				% FLMB alleles	% pure FLMB
		FLMB	F1	Fx	NLMB		
2004	18	0	2	12	4	25.0	0.0

White Crappie

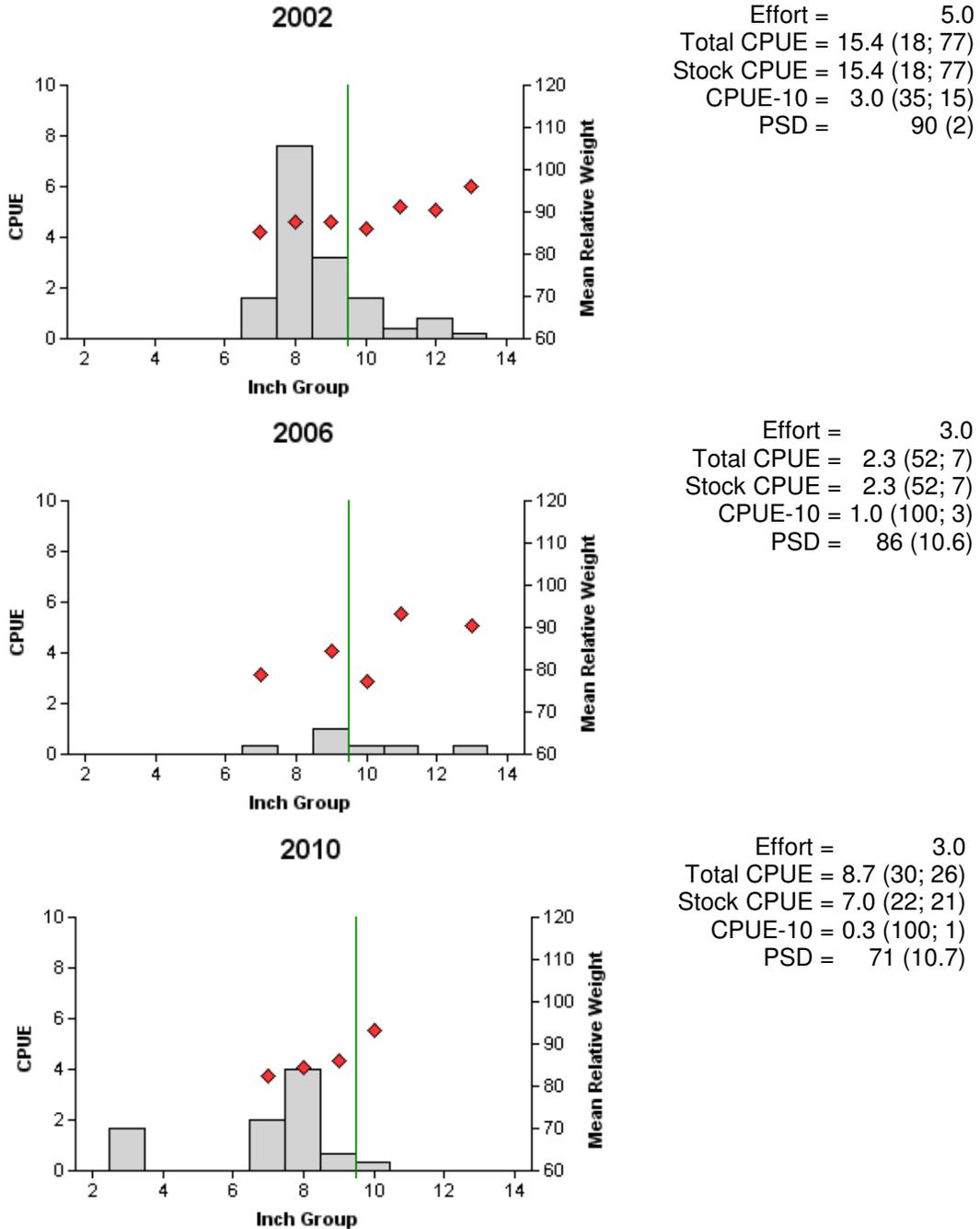


Figure 9. Number of white crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Marine Creek Reservoir, Texas, 2002, 2006, and 2010. Vertical line represents length limit at time of sampling.

Table 5. Proposed sampling schedule for Marine Creek Reservoir, Texas. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. Standard surveys are denoted by S and additional surveys denoted by A.

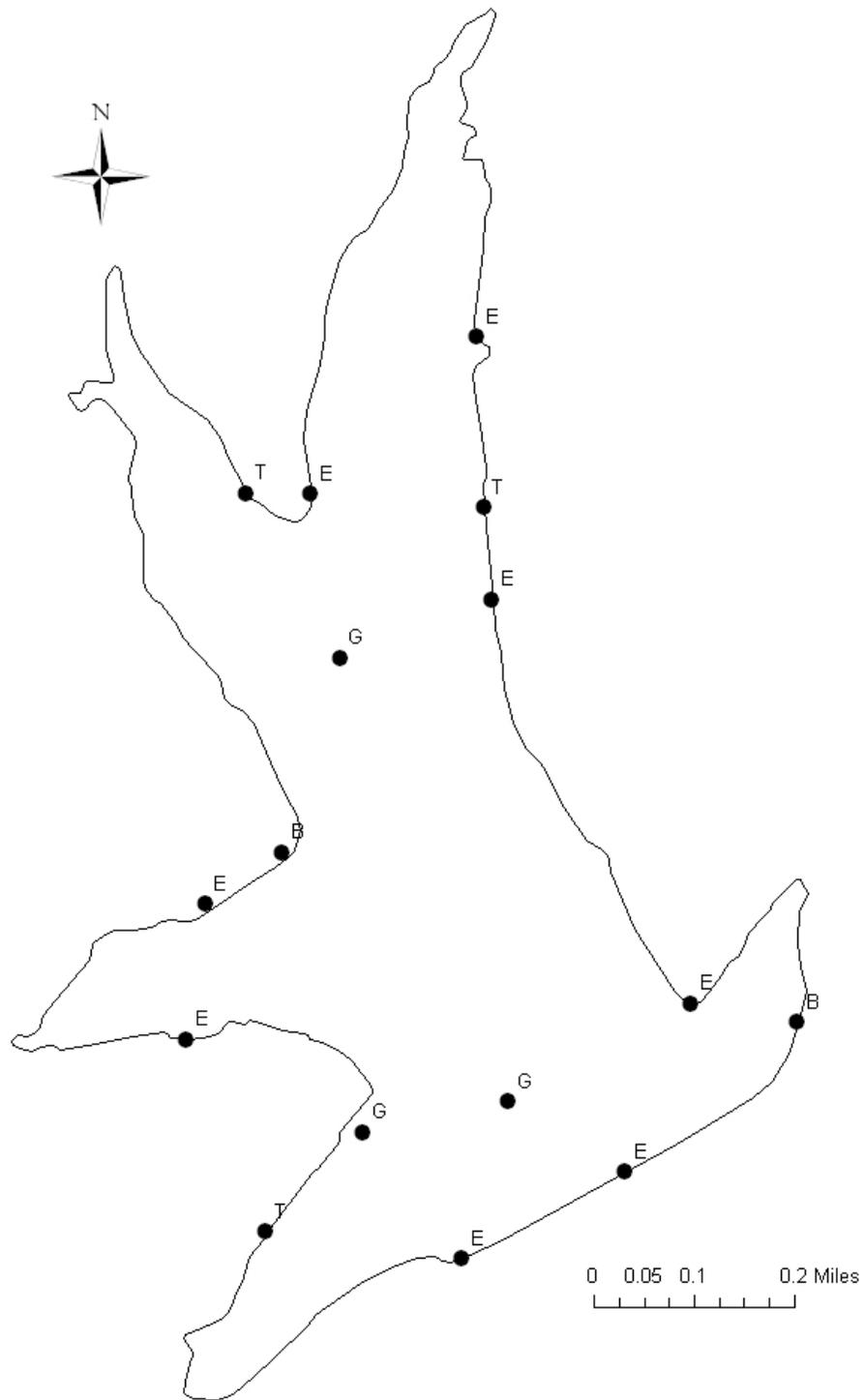
Survey Year	Electrofisher	Trap Net	Gill Net	Creel Survey	Vegetation Survey	Access Survey	Report
Fall 2011-Spring 2012							
Fall 2012-Spring 2013	A						
Fall 2013-Spring 2014							
Fall 2014-Spring 2015	S	S	S		S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all species collected from all standard surveys from Marine Creek Reservoir, Texas, 2010-2011.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad	12	3.0			33	49.5
Threadfin shad					14	21.0
Channel catfish	4	1.3				
Flathead catfish	1	0.3				
White bass	4	1.3				
Bluegill					355	532.5
Longear sunfish					85	127.5
Redear sunfish					6	9.0
Spotted bass					6	9.0
Largemouth bass	9	3.0			110	165.0
White crappie	28	9.3	26	8.7		

APPENDIX B



Location of sampling sites, Marine Creek Reservoir, Texas, 2010-2011. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively. Boat ramps are indicated with a B.

APPENDIX C

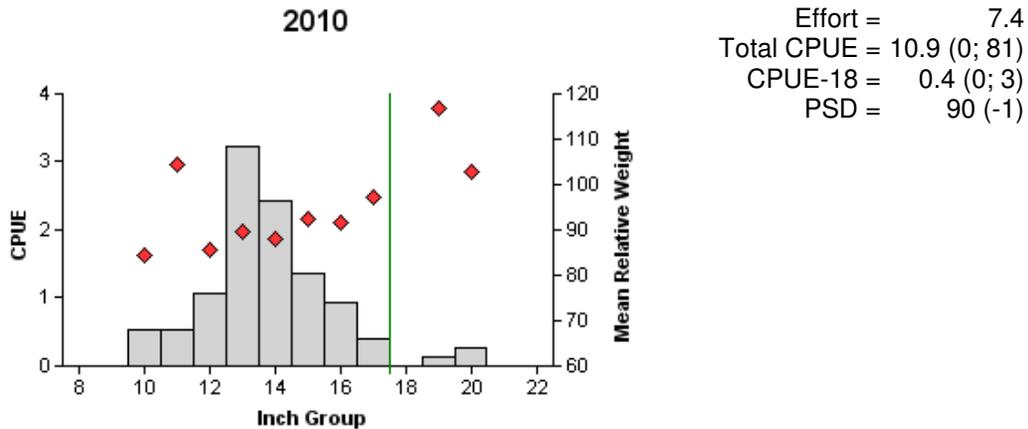
Operation World Record

Project Description

Operation World Record is a statewide research project evaluating growth of selectively bred largemouth bass in six Texas reservoirs. The study reservoirs include Mill Creek, Pinkston, Raven, Purvis Creek State Park, Meridian State Park, and Marine Creek. The objective of the study was to compare mean length and weight of age 4 ShareLunker (LOS) and resident largemouth bass (RLMB) in those six public reservoirs. Prior to the first stocking of LOS in Marine Creek, an 18-inch minimum length limit was implemented in 2006 to protect stocked fish. Fingerlings from the Toyota ShareLunker program were reared to 6 inches. Prior to being stocked, fish were tagged with coded wire tags (CWT) for later identification. The stocking rate for all reservoirs was 25 fish per acre; 6,290 and 6,254 LOS were stocked in 2006 and 2008, respectively.

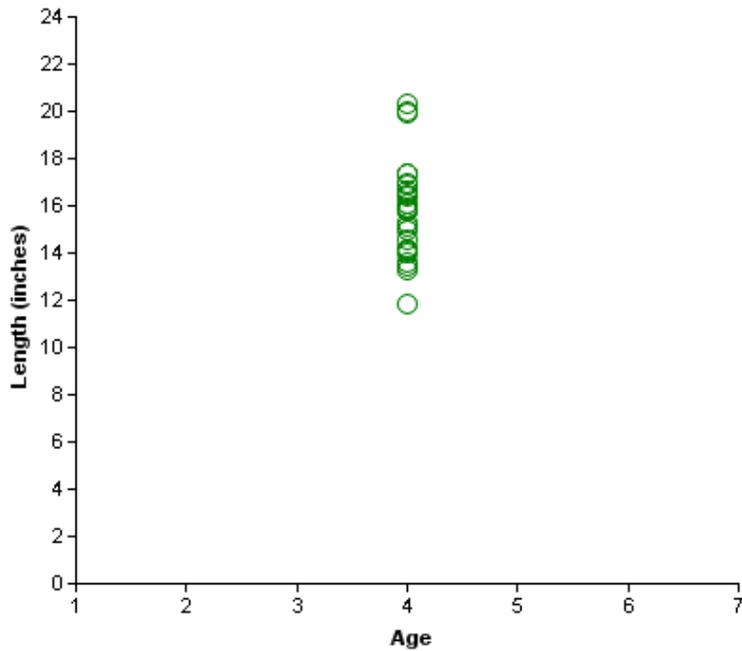
Fish were sampled in March of 2010 for the age-4 comparison of growth of LOS and RLMB using electrofishing. Two crews sampled nearly the entire shoreline and held fish briefly before transferring them to a holding tank where staff checked for CWT to determine appropriate cohort. Length and weight were recorded by cohort and sex was determined according to Benz and Jacobs (1986). If fish of either cohort were determined to be male, they were released. A portion of the pectoral fin was clipped from fish determined to be LOS for DNA confirmation. Holes were punched in anal fins of LOS to identify recaptures. Female RLMB between 14 and 20 inches were aged using otoliths. Comparisons in mean length and weight were made from only 4 year old females of each cohort.

A total of 27 female LOS and 15 RLMB (age-4) were collected. On average, the LOS were nearly twice as heavy as the resident fish at 4 years. The LOS were also approximately 2.5 inches longer at age 4 than the RLMB in Marine Creek.



Length frequency distribution of ShareLunker largemouth bass (sexes combined) from Marine Creek Reservoir, Texas, Spring 2010. All fish collected were from the 2006 year class and 2008 year class.

Appendix C, continued



Length at age-4 for female ShareLunker largemouth bass from Marine Creek Reservoir, Texas, Spring 2010 (N=27).

Mean length and weight of ShareLunker largemouth bass (LOS) and resident largemouth bass (RLMB) at age 4 (female) at Marine Creek Reservoir, Texas, Spring 2010.

	Mean	SD	Max	Min	N
<hr/>					
LOS					27
Length (mm)	401.1	52.6	517.0	300.0	
Weight (g)	976.4	543.4	2454.0	418.0	
<hr/>					
RLMB					15
Length (mm)	336.5	38.9	453.0	300.0	
Weight (g)	536.5	259.5	1388.0	362.0	
<hr/>					

APPENDIX D

Historical catch rates of targeted species by gear type for Marine Creek Reservoir, Texas.

Gear	Species	Year								
		2002	2003	2004	2005	2006	2007	2008	2010	2011
Gill Netting (fish/net night)	Channel catfish						2.3			1.3
	White bass						4.7			1.3
Electrofishing (fish/hour)	Gizzard shad	38.0	27.0	40.5	30.0	37.5	87.0	63.0	49.5	
	Threadfin shad	99.0	15.0	40.5	31.5	60.0	27.0	112.5	21.0	
	Bluegill	417.0	307.5	184.5	208.5	286.5	210.0	213.0	355.0	
	Longear sunfish	11.0	42.0	87.0	201.0	133.5	153.0	48.0	127.5	
	Redear sunfish	168.0	115.5	66.0	121.5	63.0	55.5	24.0	9.0	
	Largemouth bass	192.0	94.0	129.0	202.5	148.5	165.0	114.0	165.0	
	Spotted bass	15.0	31.5	16.5	45.0	40.5	57.0	18.0	9.0	
Trap Netting (fish/net night)	White crappie	15.4				2.3			8.7	