

PERFORMANCE REPORT

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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2012 Fisheries Management Survey Report

Texoma Reservoir

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TABLE OF CONTENTS

Survey and Management Summary	2
Introduction.....	3
Reservoir Description.....	3
Angler Access	3
Management History	3
Methods.....	4
Results and Discussion.....	5
Fisheries Management Plan	6
Literature Cited.....	7
Figures and Tables	8-32
Water Level (Figure 1)	8
Seasonal Pool Example (Figure 2)	8
Reservoir Characteristics (Table 1)	9
Boat Ramp Characteristics (Table 2).....	10
Harvest Regulations (Table 3)	11
Stocking History (Table 4).....	12
Structural Habitat Survey (Table 5).....	15
Aquatic Vegetation Survey (Table 6).....	15
Gizzard Shad (Figure 3).....	16
Bluegill (Figure 4)	17
Blue Catfish (Figures 5-6)	18
Channel Catfish (Figure 7).....	21
White Bass (Figure 8)	23
Striped Bass (Figure 9)	25
Smallmouth Bass (Figure 10)	27
Spotted Bass (Figure 11)	28
Largemouth Bass (Figure 12)	29
White Crappie (Figure 13)	30
Black Crappie (Figure 14)	31
Proposed Sampling Schedule (Table 7)	32
Appendix A: Catch Rates for all Target Species from all Gear Types	33
Appendix B: Map of 2012-2013 Sampling Locations	34
Appendix C: Historical Catch Statistics 1993-2013	35

SURVEY AND MANAGEMENT SUMMARY

Fish populations in Texoma Reservoir were surveyed in 2012 using electrofishing and trap netting and in 2013 using gill netting. Habitat was surveyed in 2004, 2008, and 2012. 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:** Texoma Reservoir is a 74,686-acre impoundment on the Red River between Texas and Oklahoma. Water level closely paralleled conservation elevation (617 feet-mean sea level) May 2009 to March 2013 except for infrequent high water events. Texoma Reservoir has moderate productivity. Habitat features consisted mainly of natural features, rocky and gravel shoreline, and boat docks.
- **Management History:** Important sport fish included Blue and Channel Catfish; White Bass; Striped Bass; Smallmouth, Spotted, and Largemouth Bass; and Black and White Crappie. Management activities included: low pulse and low amp electrofishing in the upper Red River arm during August 2012 for Blue Catfish; annual gill net surveys at 30 sites in February of each year by Texas Parks and Wildlife (TPWD) and Oklahoma Department of Wildlife Conservation (ODWC); gill net data was shared with ODWC fisheries personnel, analyzed, and presented in the annual fisheries report on Texoma Reservoir and at the annual bi-state strategy meeting each December; golden alga infestation monitoring in Texoma Reservoir along with personnel from ODWC and University of Oklahoma Biological Station (UOBS); participation in resource review meetings; public awareness communications. Zebra mussel infestation in Texoma Reservoir was monitored with other resource agencies, the U.S. Army Corps of Engineers, and North Texas Municipal Water District (NTWM), and conduct public awareness campaign to slow down the spread of this invasive species. The Texoma Reservoir web page was updated as required.
- **Fish Community**
 - **Prey species:** Threadfin Shad remain in record numbers. Gizzard Shad showed the highest catch rate on record since 2000. Over one-half were excellent-size prey. Electrofishing catch of Bluegill was high, with one-half being 4 inches and smaller.
 - **Catfishes:** Gill net catch of Blue Catfish was high. Most of the population was legal-size and larger, in fair condition, with good recruitment. Catch of Channel Catfish was above the annual average. Most were legal size and in good condition.
 - **Temperate basses:** Catch of White Bass was above the annual average. Striped Bass has maintained a level just below the annual average, good body condition, excellent recruitment, and good growth.
 - **Black basses:** Catch rate of Smallmouth, Spotted, and Largemouth Bass were high with Largemouth Bass the most abundant. Body condition and growth was good for all three species.
 - **Crappie:** Catch rate of White and Black Crappie was down.
- **Invasive Organisms**
 - **Mussels:** Zebra mussels, *Dreissena polymorpha*, were found throughout Texoma Reservoir.
- **Management Strategies:** Based on current information, Texoma Reservoir should continue to be managed with existing harvest regulations. Annual gill net monitoring of Striped Bass will continue with cooperation of ODWC. Monitoring golden alga and zebra mussels will continue. Standard sampling will be conducted in 2016-2017.

INTRODUCTION

This document is a summary of fisheries data collected from Texoma 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 species of 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

Texoma Reservoir is a 74,686-acre impoundment constructed in 1944 on the Red River between Texas and Oklahoma. Denison Dam impounds waters of the upper Red River basin and the entire Washita River basin for a total watershed of 40,000 square miles in west Texas and central and western Oklahoma. The shoreline is 580 miles long and approximately 40% of the reservoir is ≤ 15 feet deep. Texoma Reservoir is operated and controlled by the U.S. Army Corps of Engineers (USACOE). Reservoir purposes include: flood control; hydropower; municipal, industrial, and agricultural water supply; and recreation. Water level stayed at or below conservation elevation (617 ft-MSL) June 2009 to May 2013 because of the drought conditions the past several years (Figure 1). In 1992 the USACOE implemented a seasonal pool elevation management plan that bore the consensus of the USACOE and other members of the "Texoma Reservoir Advisory Committee". This committee is comprised of, in addition to USACOE personnel, various conservation/recreation agency personnel, area businesses, and chambers of commerce. The plan varies from the conventional reservoir conservation elevation (617 ft-MSL; Figure 2) in that water level is allowed to drop to a level below conservation elevation during the spring and early fall. Reservoir level is then maintained above the conservation elevation during summer, late fall, and early winter. This unique plan serves to minimize negative impacts of extreme high and low water conditions. Unfortunately the plan was hard to implement the past several years. Fish habitat consisted primarily of natural features, rocky and gravel shoreline, and boat docks. Texoma Reservoir was mesotrophic with a mean Trophic State Index of 40.00 based on Secchi Disc readings (Texas Commission on Environmental Quality 2008). Other descriptive characteristics for Texoma Reservoir are in Table 1.

Angler Access

Boat access is adequate with 39 public boat ramps at 21 sites, which also have bank access available (Table 2). However, some public facilities are being leased to private operations which disallow or charge a fee for access. Free access to most of the public facilities on the reservoir does not exist. Access to facilities for the physically challenged are provided. Fishing piers are located at Eisenhower State Park, Highport Marina, and Juniper Point East and West (Appendix B).

Management History

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

1. Recommended conducting low pulse and low amp electrofishing (Mauck and Boxrucker, 2004) in the upper Red River arm during August of 2009, 2010, 2011, and 2012 to assess the Blue Catfish population in that area.
Action: Assisted Oklahoma Department of Wildlife Conservation (ODWC) personnel in conducting recommended electrofishing for Blue Catfish in the upper Red River arm during the summer of 2012. Competing activities, scheduling with ODWC and weather events precluded earlier sampling.
2. Recommended continuing annual gill net surveys of the premier Striped Bass fishery in Texoma Reservoir. This fishery was valued at over \$22 million by Schoor et al. (1995), however, considering inflation since 1995, the value is more realistically \$26 million. Fisheries managers in Texas and Oklahoma need to monitor this important fishery annually.

Action: Annual gill net surveys were conducted during February by Texas Parks and Wildlife (TPWD) and ODWC.

3. Recommended continuing our agency role along with personnel from ODWC and the University of Oklahoma Biological Station (UOBS) in monitoring golden alga in Texoma Reservoir.
Action: Organized monitoring of golden alga by local personnel of TPWD, ODWC, and UOBS ceased due to lack of funding. However, TPWD and ODWC maintain a task force that answers complaints/reports of problems related to golden alga infestation.
4. Recommended continuing our inter-agency role along with personnel from ODWC, U.S. Army Corps of Engineers (USACOE), U.S. Fish and Wildlife Service (USFWS), and Dr. Robert McMahon (retired UT Arlington) in monitoring zebra mussels in Texoma Reservoir.
Action: Fisheries personnel from TPWD and ODWC, USACOE, and USFWS conducted observations of zebra mussels while in the field conducting other sampling. The zebra mussel population has been severely compromised by the drought that began 2010. Corresponded with Dr. Robert McMahon who maintains an active sampling regimen for adult zebra mussels and veliger larvae in Texoma Reservoir and other selected waters.

Harvest regulation history: Only Smallmouth, Spotted, and Largemouth Bass in Texoma Reservoir are currently managed with statewide regulations. All other sportfishes are managed with exceptions to statewide regulations (Table 3).

Stocking history: Texoma's first stocking occurred in 1944 with 67,000 Channel Catfish fingerlings; 2,400 copperside Bluegill fingerlings; 225,000 Largemouth Bass fingerlings; and 18,000 Redear Sunfish fingerlings (Table 4). The reservoir was last stocked in 2007 with 2,029 sub-adult Paddlefish by the USFWS.

Vegetation/habitat management history: Texoma Reservoir supported limited aquatic vegetation (Tables 5 & 6). Most of this was native emergent (water willow and smartweed). Structural habitat consisted mostly of natural shoreline features, rock, and gravel. Piers, boat docks, and boat ramps (active and inactive) augmented structural habitat. Low water caused by drought conditions in 2012 precluded assessing aquatic vegetation.

Water transfer: With the identity of zebra mussels in Texoma Reservoir, North Texas Municipal Water District ceased water transfer activity to Lavon Reservoir in 2009. However, Greater Texoma Utility Authority and Red River Authority of Texas continued to provide municipal water needs from Texoma Reservoir.

METHODS

Fishes were collected by electrofishing (2 hours at 24 5-min stations), gill netting [30 net nights (nn) at 30 stations, 15 stations by ODWC], and trap netting (15 nn at 15 stations). Additional Blue Catfish information was collected by low-pulse electrofishing (1.7 hours at 20 5-min stations) in cooperation with ODWC. 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 caught per net night (fish/nn). Survey sites for electrofishing and trap netting were randomly selected. Low-pulse electrofishing sites (10 sites in the upper Red River Arm and 10 sites in upper Washita Arm) were selected by ODWC. Gill netting survey sites were the same sites used annually for 15 stations by ODWC and 15 stations by TPWD. All surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011), except low-pulse electrofishing, which was done according to ODWC's sampling procedures.

Sampling statistics (CPUE for various length categories) and structural indices [Proportional Size Distribution (PSD)] as defined by Guy et al. (2007) and condition indices [relative weight (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. Otoliths for aging Striped Bass and White Crappie were aged according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). Ages were determined using Tier 2 protocol according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). The manual specifies procedures for Largemouth Bass only, but we adapted the protocol to other target fishes for identifying the number and size(s) of target fish to sample. Source for water level data was the USACOE website.

RESULTS AND DISCUSSION

Habitat: Littoral zone habitat consisted primarily of natural shoreline features along with rocky and gravel substrate, stumps, boat docks, boat ramps, and standing timber (Table 5).

Prey species: Electrofishing CPUE of Gizzard Shad and Bluegill were 229.5/h and 174.0/h, respectively (Figures 3 and 4). The IOV for Gizzard Shad indicated 89% of Gizzard Shad were available to existing predators, much higher than 2004 and 2008. Electrofishing CPUE for Threadfin Shad was 972.5/h (Appendix A). Total CPUE of Bluegill was high but lower than the overall average (Appendix C). Approximately one-half the sample population was ≤ 4 inches.

Catfish: Gill net CPUE of Blue Catfish was 0.6/nn, a decrease from previous years (Figure 5), but still equal to the overall average (Appendix C). Relative weight was good to excellent and increased with size. There was evidence of recruitment. Good recruitment is further exemplified by data from low pulse/low amp electrofishing (Figure 6).

Gill net CPUE of Channel Catfish (2.3/nn; Figure 7) was unchanged from 2012 and the second highest on record (Appendix C). Relative weights were good generally increasing with size (Figure 7) and recruitment was excellent.

Temperate basses: Gill net CPUE of White Bass (4.8/nn) was down from recent years (Figure 8), but higher than the overall average (Appendix C). Relative weight was good and there was good recruitment (Figure 8).

Gill net CPUE of Striped Bass (15.8/nn) was down from recent years (Figure 9 and Appendix C). Despite the decrease, CPUE is just shy of the overall average since 1993. Relative weights indicated healthy fish. A sample of 3-year old Striped Bass averaged 19.5 inches (N=8).

Black basses: Electrofishing total CPUE of Smallmouth Bass was 25.5/h (Figure 10), much higher than recent years, including the overall average (Appendix C). Relative weight was good, recruitment was evident, but growth was slow.

Electrofishing total CPUE of Spotted Bass (35.5/h), exceeded the overall average (Figure 11 and Appendix C). Relative weight was good and recruitment was evident.

Electrofishing CPUE of Largemouth Bass (50.0/h) was similar to 2008, and higher than in recent years (Figure 12 and Appendix C). Relative weights showed good body condition and recruitment was excellent.

Crappie: Trap net CPUE of White Crappie (6.8/nn) was down from 21.5/nn in 2008, which was the second highest on record (Figure 13 and Appendix C). Recruitment was poor, but growth was good, legal size was reached in 2 years (N=13).

Trap net CPUE of Black Crappie was 0.1/nn, which precluded any meaningful statement related to the population.

Mussels: Although they remain in Texoma Reservoir, the zebra mussel population has been impacted by the drought that began 2010.

Fisheries management plan for Texoma Reservoir, Texas

Prepared – July 2013.

ISSUE 1: Texoma Reservoir supports a popular and valuable Striped Bass fishery that has contributed over \$22 million annually to the local economy (Schoor et al. 1995). Economic data needs updating.

MANAGEMENT STRATEGIES

1. Conduct annual creel survey beginning December 2013 through November 2014.

ISSUE 2: Texoma Reservoir supports a popular and valuable Striped Bass fishery that fisheries managers in Texas and Oklahoma need to monitor annually especially since the infestation of zebra mussels which can have a negative impact on sport fish populations.

MANAGEMENT STRATEGIES

1. Conduct annual gill netting surveys at 30 established stations. Oklahoma Department of Wildlife Conservation (ODWC) personnel will set 15 stations on the Oklahoma side and Texas Parks and Wildlife Department (TPWD) personnel will conduct 15 stations on the Texas side of the reservoir.
2. Resulting data will be shared, analyzed, and presented at a scheduled Texoma Reservoir management meeting.

ISSUE 3: Smallmouth bass fishing has gained in popularity since they were introduced in the 1980's. Data from the current survey year showed one of the highest catch rates in recent years, but there was an obvious scarcity of legal size and larger fish. Random electrofishing for smallmouth bass has not produced a representative sample of the entire population.

MANAGEMENT STRATEGIES

1. Conduct electrofishing in known smallmouth bass habitat during the fall 2013 and spring of 2014.

ISSUE 4: Gill net sampling historically produces low blue catfish CPUE's; hence, not an accurate representation of blue catfish populations in Texoma Reservoir.

MANAGEMENT STRATEGY

1. Conduct low pulse and low amp electrofishing in the upper Red River and Washita arms during August 2014.

ISSUE 5: 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 USACOE to post appropriate signage at access points around the reservoir.
2. Provide USACOE with up-to-date information on invasive species. Provide them with posters, literature, etc... so that they can in turn educate their reservoir visitors.
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:

Sampling will include annual gill netting at selected historical sites to monitor Striped Bass in cooperation with ODWC, smallmouth bass electrofishing 2013-2014, and low pulse electrofishing for blue catfish in 2014. A creel survey is planned for 2015-2016. General monitoring surveys in 2016 – 2017 require electrofishing and trap netting, at randomly selected sites.

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Texoma Reservoir Surface Elevation

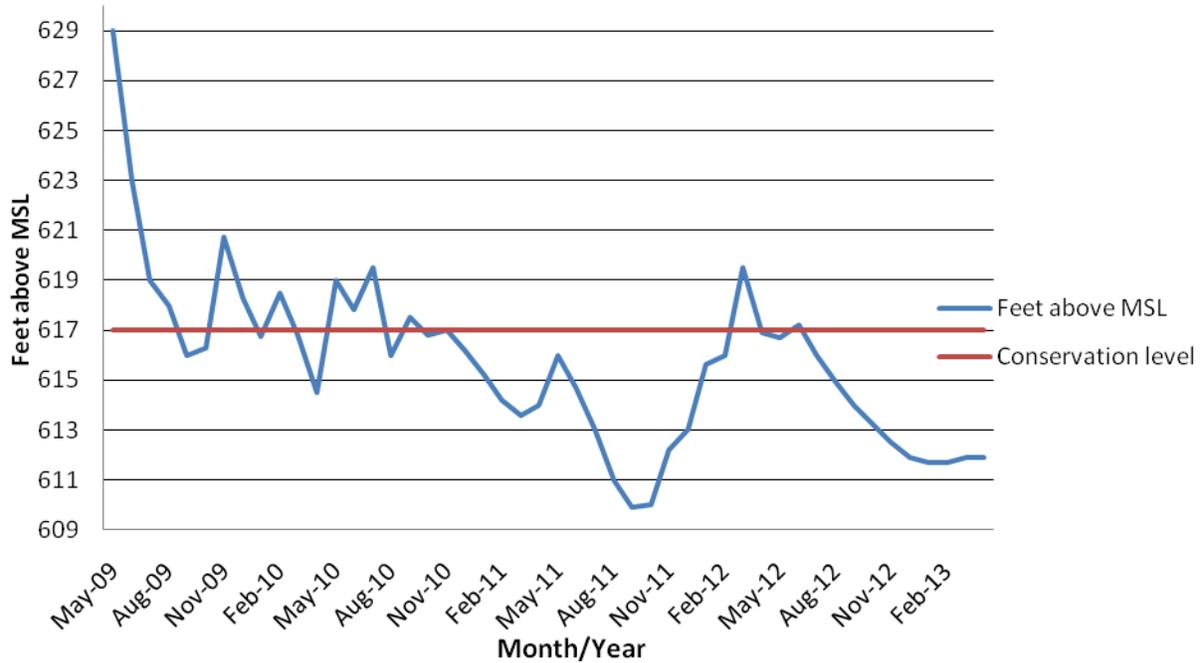


Figure 1. Monthly water level elevations in feet above mean sea level (msl) recorded for Texoma Reservoir, Texas-Oklahoma, May 2009-April 2013.

LAKE TEXOMA POOL ELEVATION - 2008

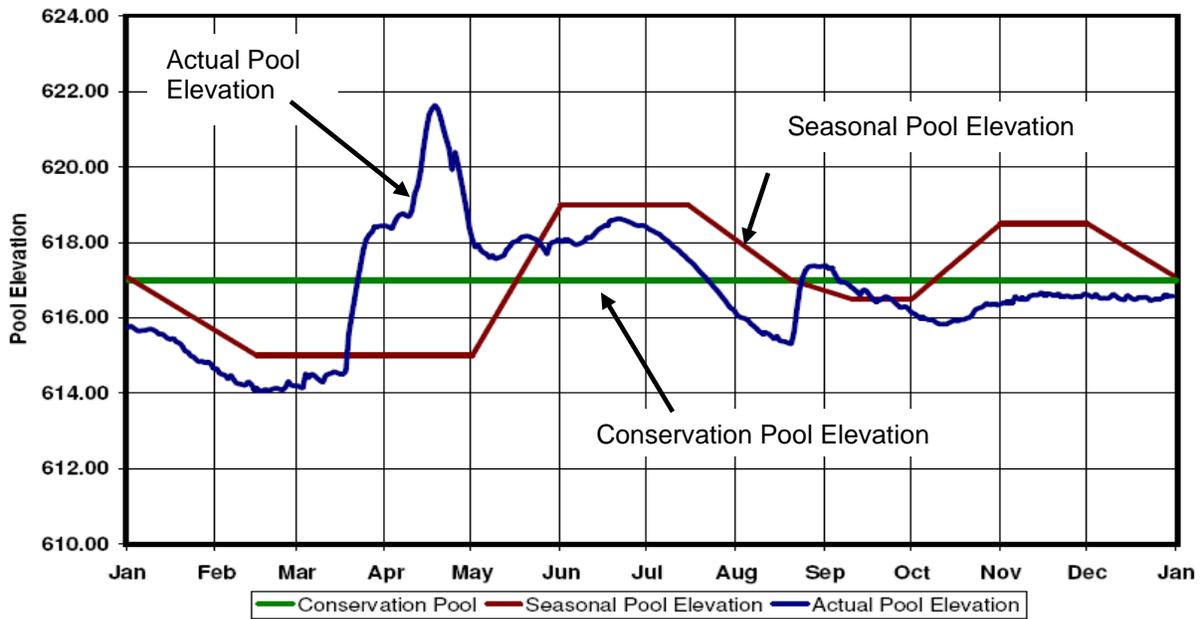


Figure 2. Example of the seasonal pool elevation management plan for Texoma Reservoir, Texas-Oklahoma, 2008.

Table 1. Characteristics of Texoma Reservoir, Texas-Oklahoma.

Characteristic	Description
Year constructed	1944
Controlling authority	U.S. Army Corps of Engineers
Counties	Grayson and Cooke, Texas; Bryan, Marshall, and Love, Oklahoma
Reservoir type	Mainstream
Shoreline development index	13.9
Conductivity	1456-1940 $\mu\text{mhos/cm}$

Table 2. Boat ramp characteristics for Texoma Reservoir, Texas, April 2013. Reservoir elevation at time of survey was 612.26 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Dam site	33.8165 -96.5764	Y	90	606.95	Excellent
Eisenhower State Park West	33.8141 -96.6080	Y	30	611.12	Not useable
Eisenhower State Park East	33.8141 -96.6079	Y	30	603.95	Excellent
Grandpappy Point	33.8580 -96.6446	Y	5	605.95	Excellent
Preston Bend Recreation Area	33.8745 -96.6440	Y	10	612.45	Not useable, needs silt removal
Little Mineral Marina	33.8716 -96.6474	Y	10	604.95	Excellent
Lighthouse Marina North	33.8608 -96.6607	Y	10	605.45	Good
Lighthouse Marina South	33.8598 -96.6601	Y	10	608.45	Fair, needs silt removal
Preston Shores	33.8438 -96.6691	Y	5	607.45	Excellent
Simmons Shores	33.8242 -96.6680	Y	20	609.45	Excellent
Walnut Creek	33.8107 -96.8340	Y	20	607.76	Excellent
Big Mineral Camp	33.7865 -96.8061	Y	20	609.76	Good
Cedar Mills Marina	33.8294 -96.8115	Y	10	604.26	Excellent
Flowing Wells Resort	33.7773 -96.7712	Y	15	610.26	Excellent
Highport Marina	33.8263 -96.7050	Y	84	604.26	Excellent
Mill Creek Marina	33.8201 -96.7712	Y	10	612.76	Not useable, needs silt removal
Juniper Point East	33.8614 -96.8294	Y	25	613.01	Not useable, needs silt removal
Juniper Point West	33.8619 -96.8351	Y	16	607.01	Excellent
Texoma Marina and Resort	33.8683 -96.8914	Y	15	606.26	Excellent
Cedar Bayou Marina	33.8440 -96.8527	Y	10	607.26	Excellent
Paradise Cove	33.7871 -96.7841	Y	20	610.26	Good

Table 3. Harvest regulations for Texoma Reservoir, Texas-Oklahoma.

Species	Bag Limit	Length Limit
Catfish: channel and Blue Catfish, their hybrids and subspecies	15 (in any combination) (Blue Catfish only 1 > 30 inches)	12-inch minimum
Catfish, Flathead	5	20-inch minimum
Bass, White	25	None
Bass, striped: its hybrids and subspecies	10 (in any combination) (Only 2 >20 inches)	None
Bass, Spotted	5	None
Bass, Largemouth and Smallmouth	(in any combination)	14-inch minimum
Crappie: White Black Crappie, their hybrids and subspecies	37 (in any combination)	10-inch minimum
Walleye	5	18-inch minimum

Table 4. Stocking history of Texoma Reservoir, Texas. Life stages are fry (FRY), fingerlings (FGL), advanced fingerlings (AFGL), sub-adults (SADL), and adults (ADL). 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)
Bluegill	1945	22,400	AFGL	2.0
	1948	15,500	AFGL	2.0
	1949	18,000	AFGL	2.0
	1951	4,000	AFGL	2.0
	1979	20,400	AFGL	2.0
	Total	80,300		
Channel Catfish	1944	67,000	FGL	2.0
	1945	104,500	FGL	2.0
	1946	43,000	FGL	2.0
	1947	18,000	FGL	2.0
	1948	6,000	FGL	2.0
	1949	9,000	FGL	2.0
	1974	30,000	FGL	2.0
	1979	12,200	FGL	2.0
	2002	67,000	FGL	2.0
Total	356,700			
Coppernose Bluegill	1944	2,400	AFGL	2.0
	Total	2,400		
Florida Largemouth Bass	1975	200,000	FGL	2.0
	1975	112,000	FRY	1.0
	1976	25,000	FGL	2.0
	1977	23,748	FGL	2.0
	1977	200,000	FRY	1.0
	1986	231,850	FGL	2.0
	1997	109,950	FGL	1.3
	1998	110,500	FGL	1.2
	1999	327,191	FGL	1.4
	2000	324,444	FGL	1.2
Total	1,664,683			
Kemp's Largemouth Bass	1975	80,000	FGL	2.0
	Total	80,000		
Largemouth Bass	1944	225,000	FGL	2.0
	1945	61,000	FGL	2.0
	1946	7,000	FGL	2.0
	1947	14,500	FGL	2.0
	1948	28,000	FGL	2.0
	1949	34,000	FGL	2.0
	1949	425,000	FRY	0.7
	1951	34,000	FGL	2.0

Species	Year	Number	Life Stage	Mean TL (in)
	1953	142,000	FGL	2.0
	1954	8,000	FGL	2.0
	1980	30,976	FGL	2.0
	Total	1,009,476		
Other sunfishes	1945	14,000	FGL	2.0
	Total	14,000		
Paddlefish	1999	5,757	SADL	14.3
	2000	20,846	SADL	12.2
	2001	770	SADL	12.0
	2002	16,792	SADL	12.0
	2003	4,421	SADL	12.0
	2004	26,330	SADL	12.0
	2005	30,478	SADL	12.0
	2006	10,920	SADL	12.0
	2007	2,029	SADL	18.0
	Total	118,343		
Redear Sunfish	1944	18,000	FGL	2.0
	1945	220,500	FGL	2.0
	1946	116,000	FGL	2.0
	1947	16,000	FGL	2.0
	1948	82,500	FGL	2.0
	1949	87,000	FGL	2.0
	1951	4,000	FGL	2.0
	Total	544,000		
Rock Bass	1945	21,000	FGL	2.0
	1947	4,000	FGL	2.0
	Total	25,000		
Smallmouth Bass	1981	576,655	FGL	1.5
	1982	452,372	FGL	1.3
	1983	48,104	FGL	2.0
	1987	6,800	FGL	2.0
	Total	1,083,931		
Striped Bass	1965	138	FGL	2.0
	1967	200,000	FRY	0.8
	1968	5,000	FGL	2.0
	1969	284,614	FGL	2.0
	1970	77,640	FGL	2.0
	1971	96,839	FGL	2.0
	1972	208,340	FGL	2.0
	1973	141,612	FGL	2.0
	1974	548,898	FGL	2.0
	1977	1,600	FGL	2.0
	1984	490	FGL	2.0

Species	Year	Number	Life Stage	Mean TL (in)
	1985	500	FGL	2.0
	Total	1,565,671		
Threadfin Shad	1979	31,181	AFGL	2.0
	1982	1,500	AFGL	2.0
	1984	19,176	AFGL	2.5
	1985	271,959	AFGL	2.0
	Total	323,816		
Walleye	1968	50,400	FGL	2.0
	1968	400	FRY	0.2
	1969	500,000	FGL	2.0
	1970	3,219,891	FRY	0.2
	1975	8,398,000	FRY	0.2
	1976	98,000	FGL	2.0
	1976	180,000	FRY	0.2
	1977	2,261,000	FRY	0.2
	Total	14,707,691		
Warmouth	1947	4,000	FGL	2.0
	Total	4,000		
White Crappie	1945	3,000	FGL	2.0
	1946	28,000	FGL	2.0
	1948	11,100	FGL	2.0
	1953	12,000	FGL	2.0
	Total	54,100		

Table 5. Survey of structural habitat types, Texoma Reservoir, Texas, 2012. Shoreline habitat type units are in miles and standing timber is acres.

Habitat type	Estimate	% of total
Bulkhead	0.4 miles	<0.1
Natural	398.4 miles	68.7
Rocky	49.7 miles	8.5
Gravel	131.5 miles	22.7
Open water	74,181 acres	99.9
Standing timber	15 acres	<0.1
Piers, Boat Docks, Marinas	490 acres	<0.1

Table 6. Survey of aquatic vegetation, Texoma Reservoir, Texas, 2004 – 2012. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2004	2008	2012
Native floating-leaved	10 (<0.1)		
Native emergent	70 (<0.1)	80 (<0.1)	

Gizzard Shad

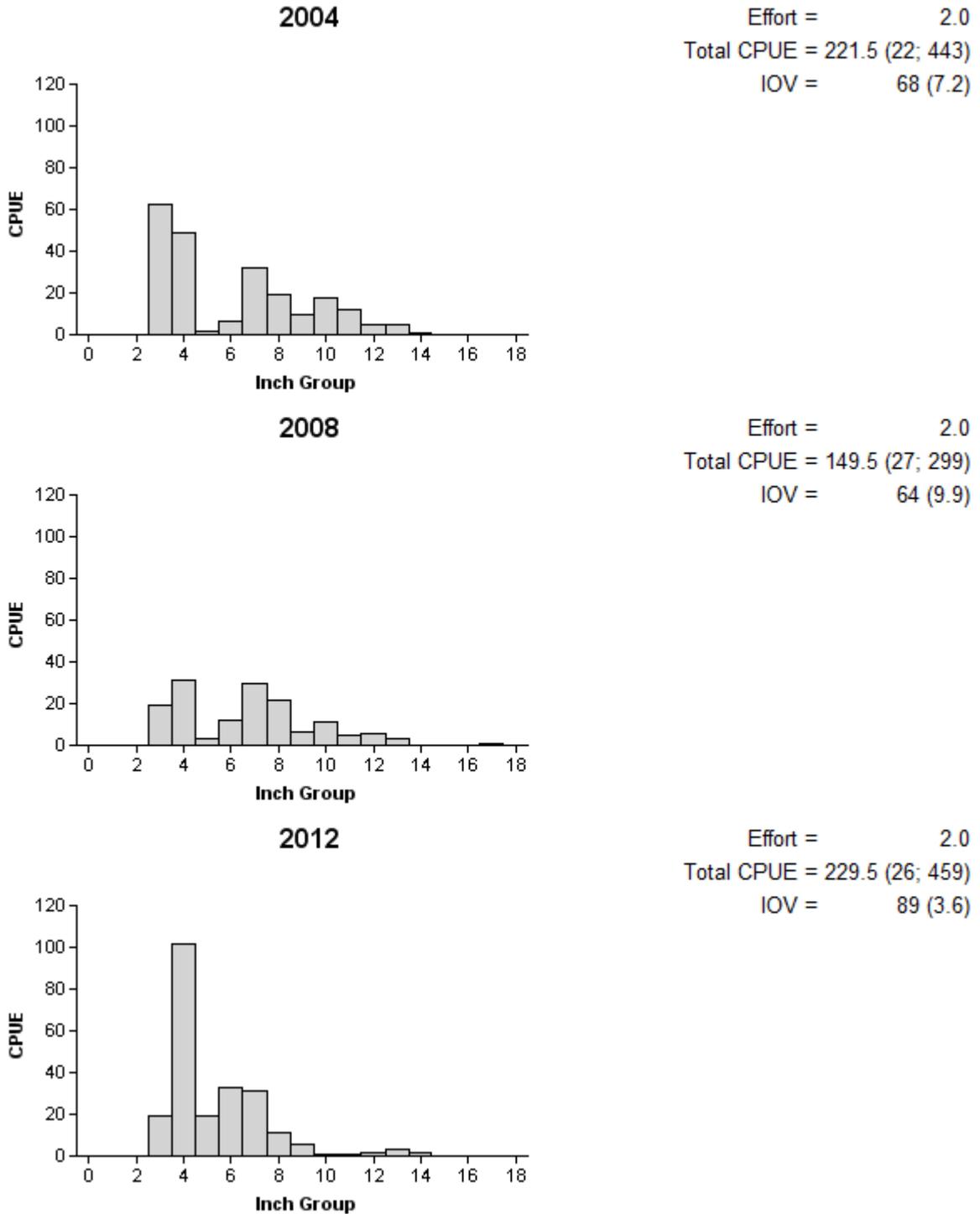
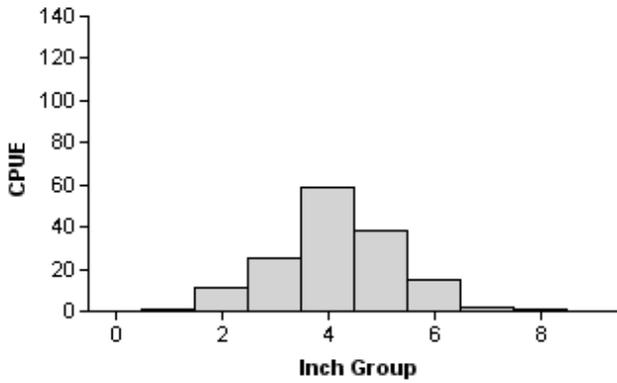


Figure 3. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Texoma Reservoir, Texas-Oklahoma, 2004, 2008, and 2012.

Bluegill

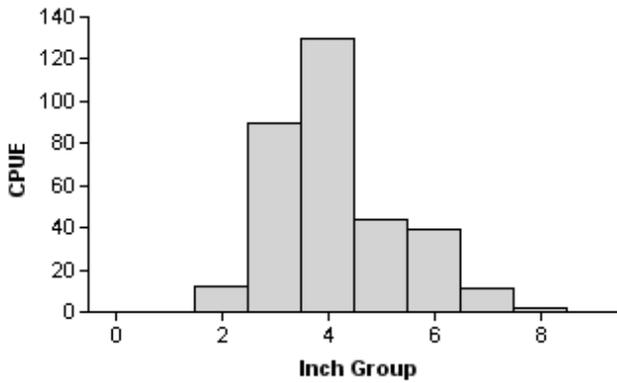
2004

Effort = 2.0
 Total CPUE = 151.5 (16; 303)
 PSD = 13 (3.3)



2008

Effort = 2.0
 Total CPUE = 327.5 (19; 655)
 PSD = 17 (3.1)



2012

Effort = 2.0
 Total CPUE = 174.0 (14; 348)
 PSD = 22 (2.8)

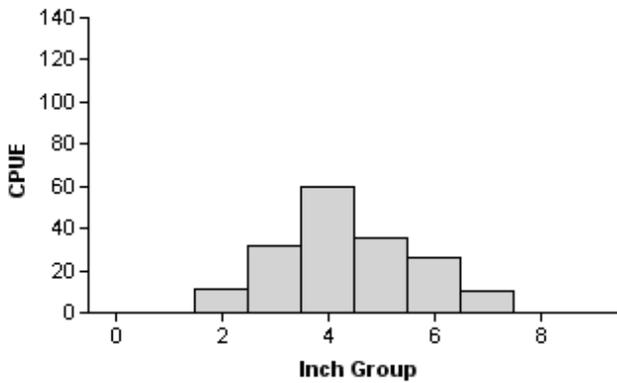


Figure 4. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Texoma Reservoir, Texas-Oklahoma, 2004, 2008, and 2012.

Blue Catfish

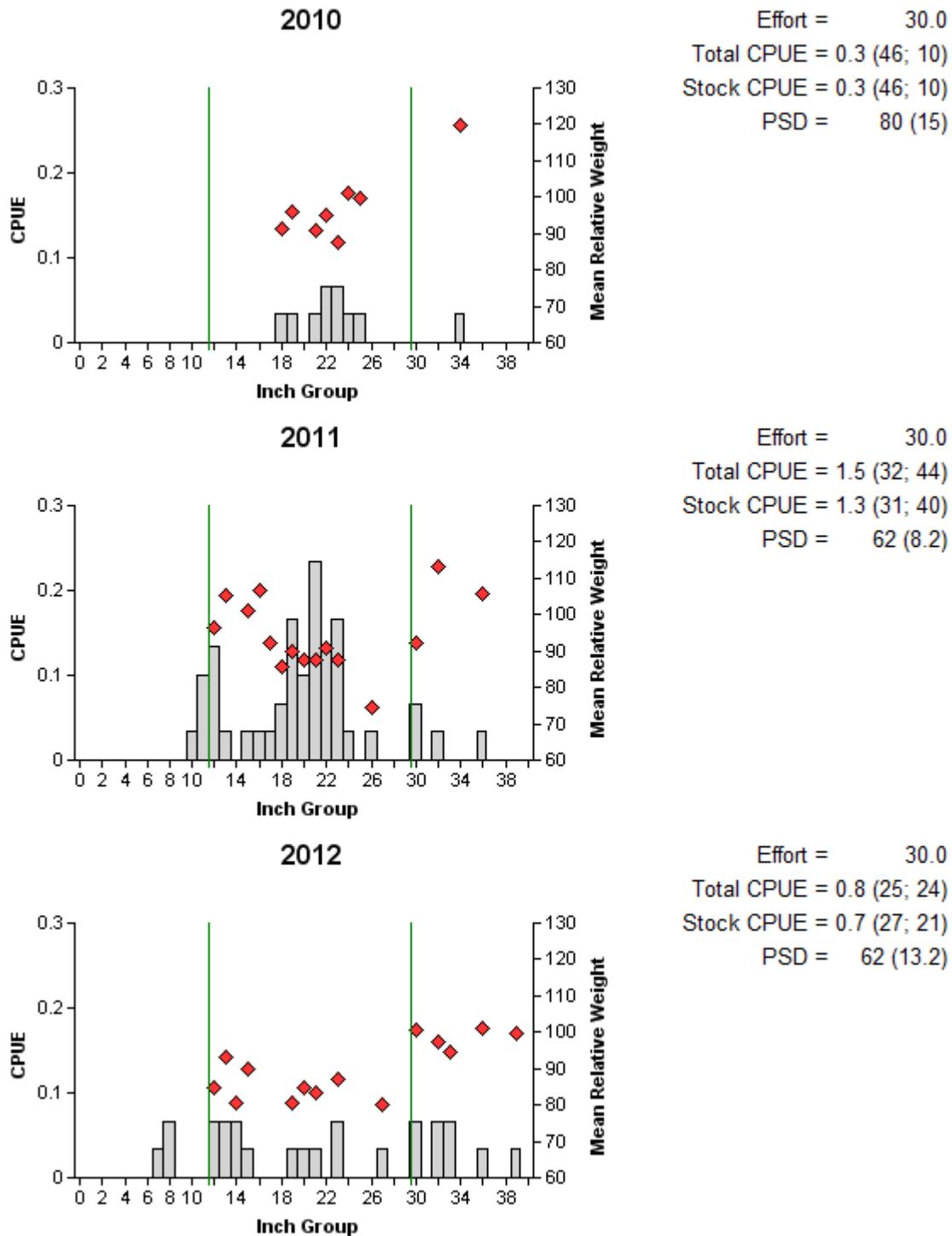


Figure 5. Number of Blue Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Texoma Reservoir, Texas-Oklahoma, 2010, 2011, and 2012. Vertical lines represent length limit at time of collection.

Blue Catfish

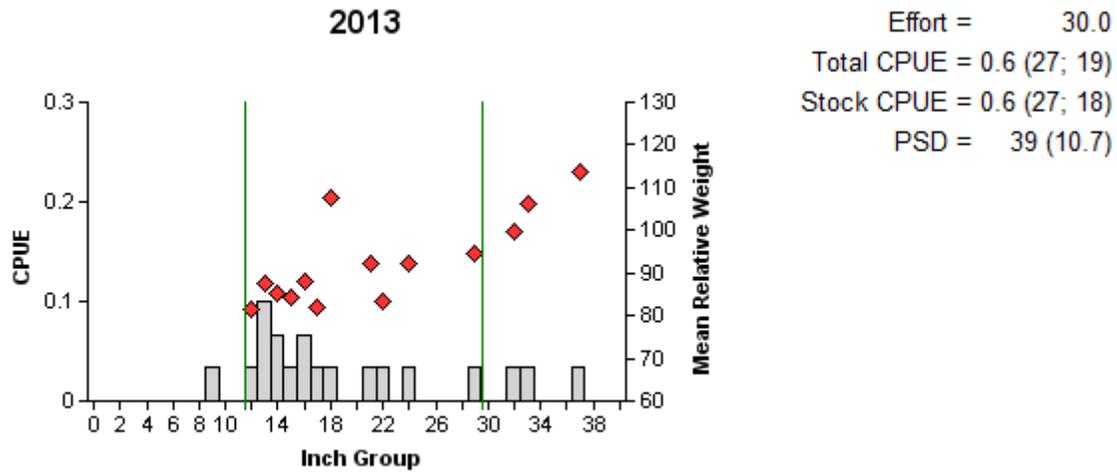


Figure 5 continued. Number of Blue Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Texoma Reservoir, Texas-Oklahoma, 2013. Vertical lines represent length limit at time of collection.

Blue Catfish

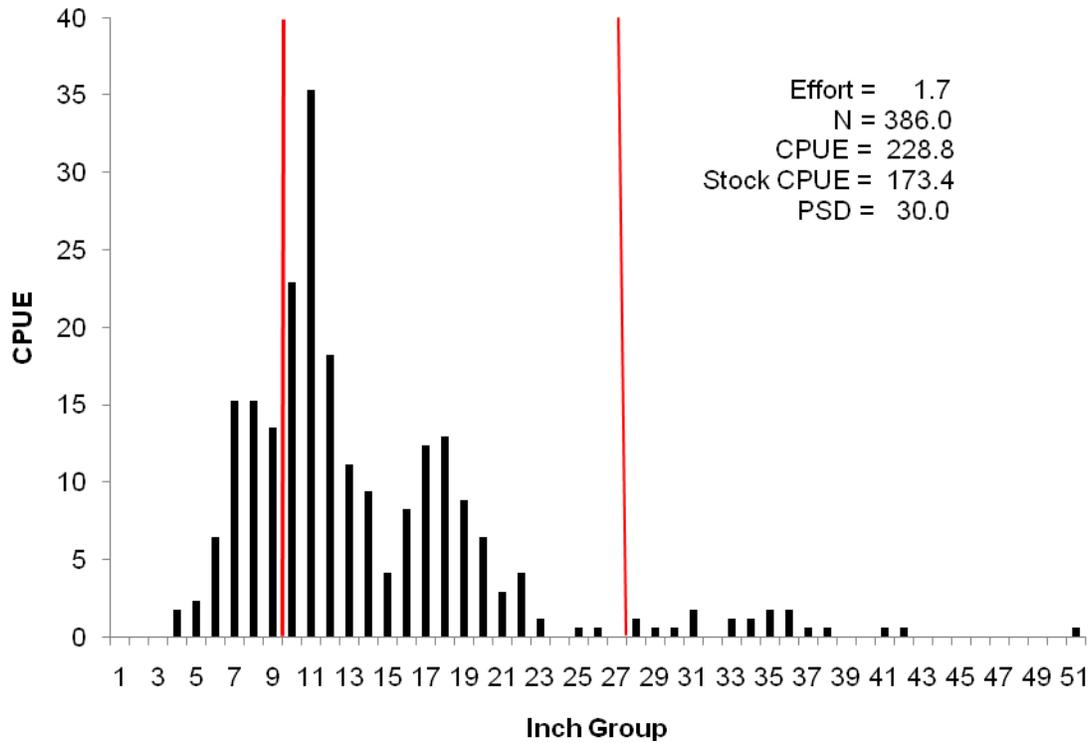
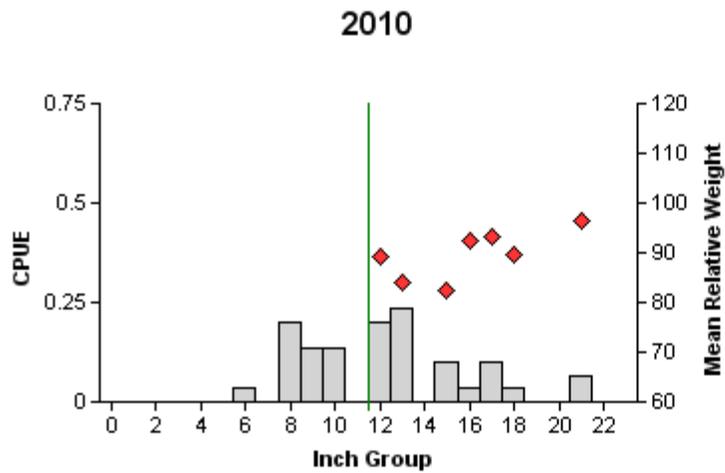
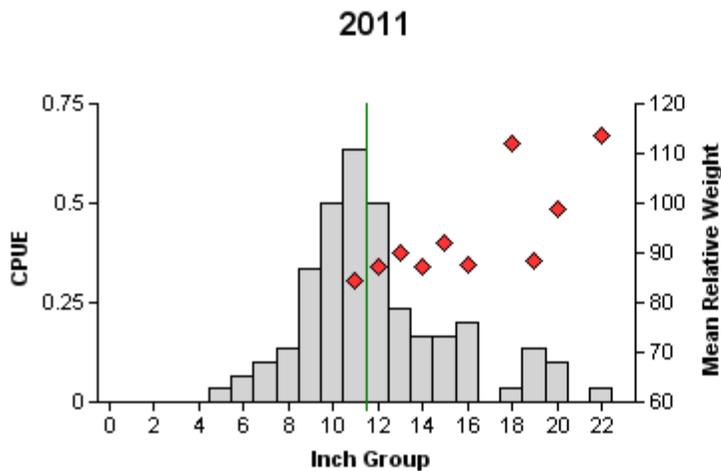


Figure 6. Number of Blue Catfish (CPUE, bars) caught with summer low pulse electrofishing survey, Texoma Reservoir, Texas-Oklahoma, 2012. Survey conducted by Oklahoma Department of Wildlife Conservation and Texas Parks and Wildlife Department. Vertical lines represent length limits at time of collection.

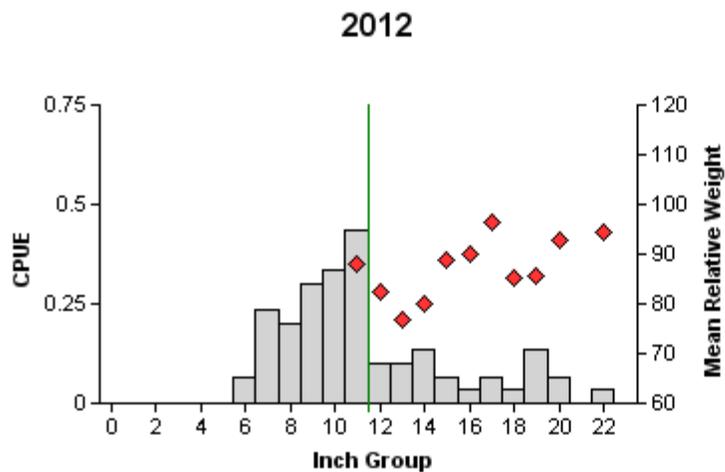
Channel Catfish



Effort = 30.0
 Total CPUE = 1.3 (28; 38)
 Stock CPUE = 0.8 (35; 23)
 PSD = 30 (6.7)



Effort = 30.0
 Total CPUE = 3.4 (18; 101)
 Stock CPUE = 2.2 (21; 66)
 PSD = 23 (6.6)



Effort = 30.0
 Total CPUE = 2.3 (28; 70)
 Stock CPUE = 1.2 (24; 36)
 PSD = 31 (9.9)

Figure 7. 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 surveys, Texoma Reservoir, Texas-Oklahoma, 2010, 2011, and 2012. Vertical lines represent length limit at time of collection.

Channel Catfish

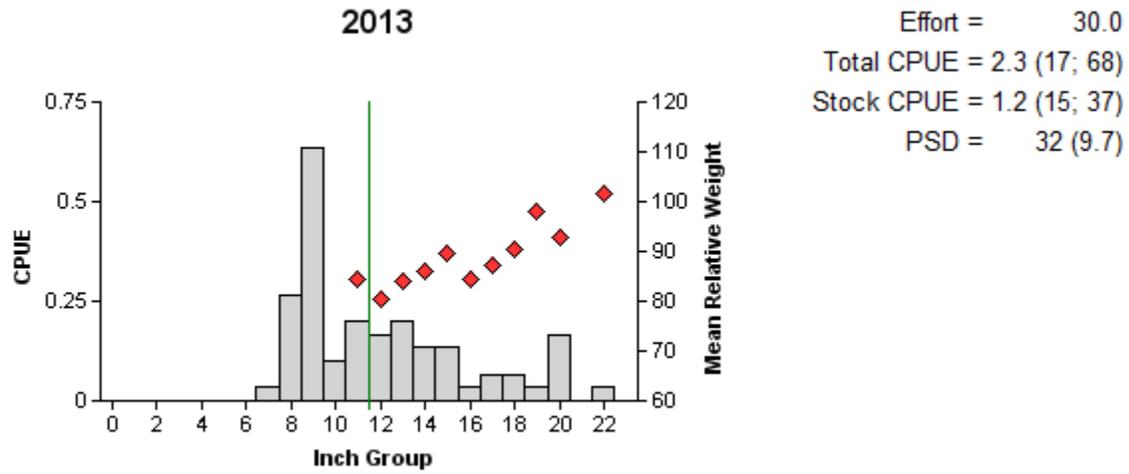
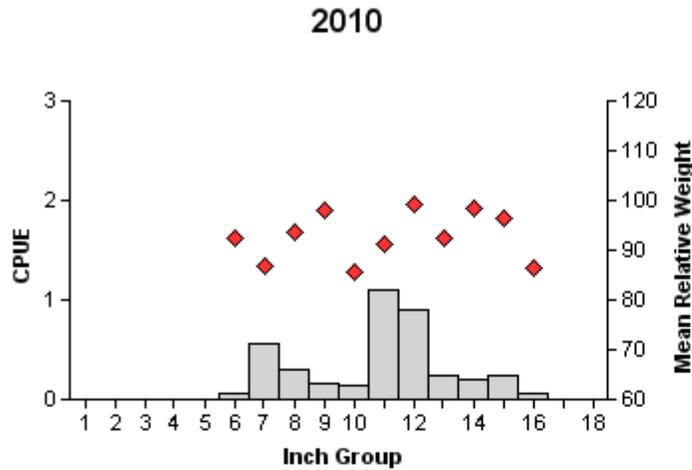
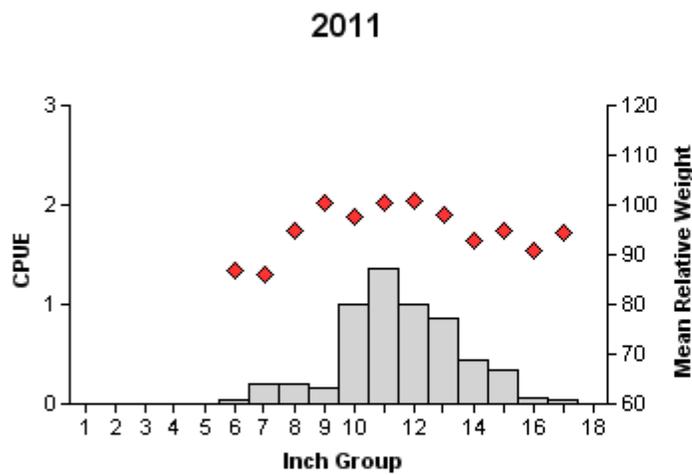


Figure 7 continued. Number of Channel Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Texoma Reservoir, Texas-Oklahoma, 2013. Vertical lines represent length limit at time of collection.

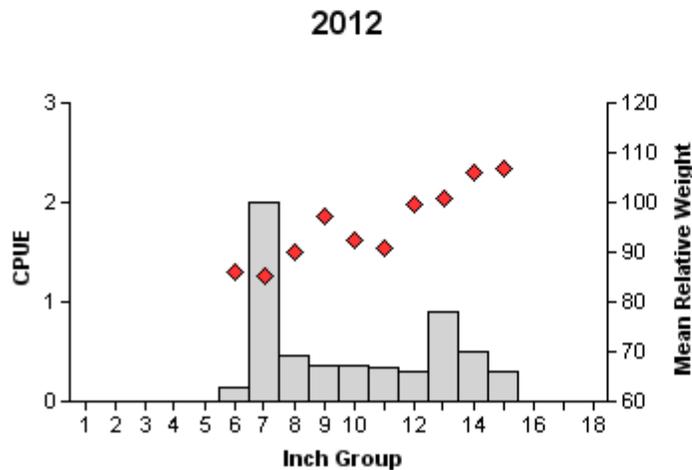
White Bass



Effort = 30.0
 Total CPUE = 4.0 (33; 119)
 Stock CPUE = 4.0 (33; 119)
 PSD = 76 (7.9)



Effort = 30.0
 Total CPUE = 5.7 (24; 171)
 Stock CPUE = 5.7 (24; 171)
 PSD = 92 (1.5)



Effort = 30.0
 Total CPUE = 5.7 (23; 170)
 Stock CPUE = 5.7 (23; 170)
 PSD = 54 (6.9)

Figure 8. Number of White Bass 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 surveys, Texoma Reservoir, Texas-Oklahoma, 2010, 2011, and 2012.

White Bass

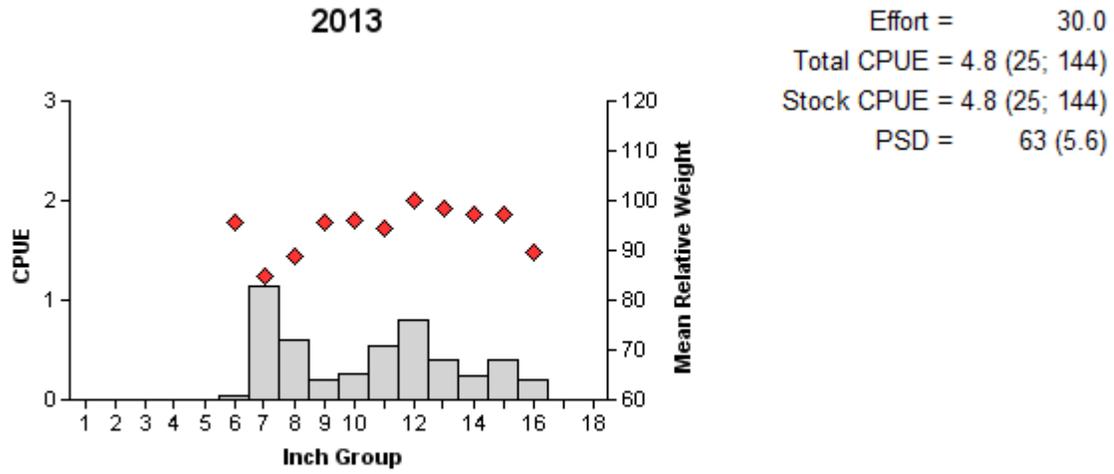


Figure 8 continued. Number of White Bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Texoma Reservoir, Texas-Oklahoma, 2013.

Striped Bass

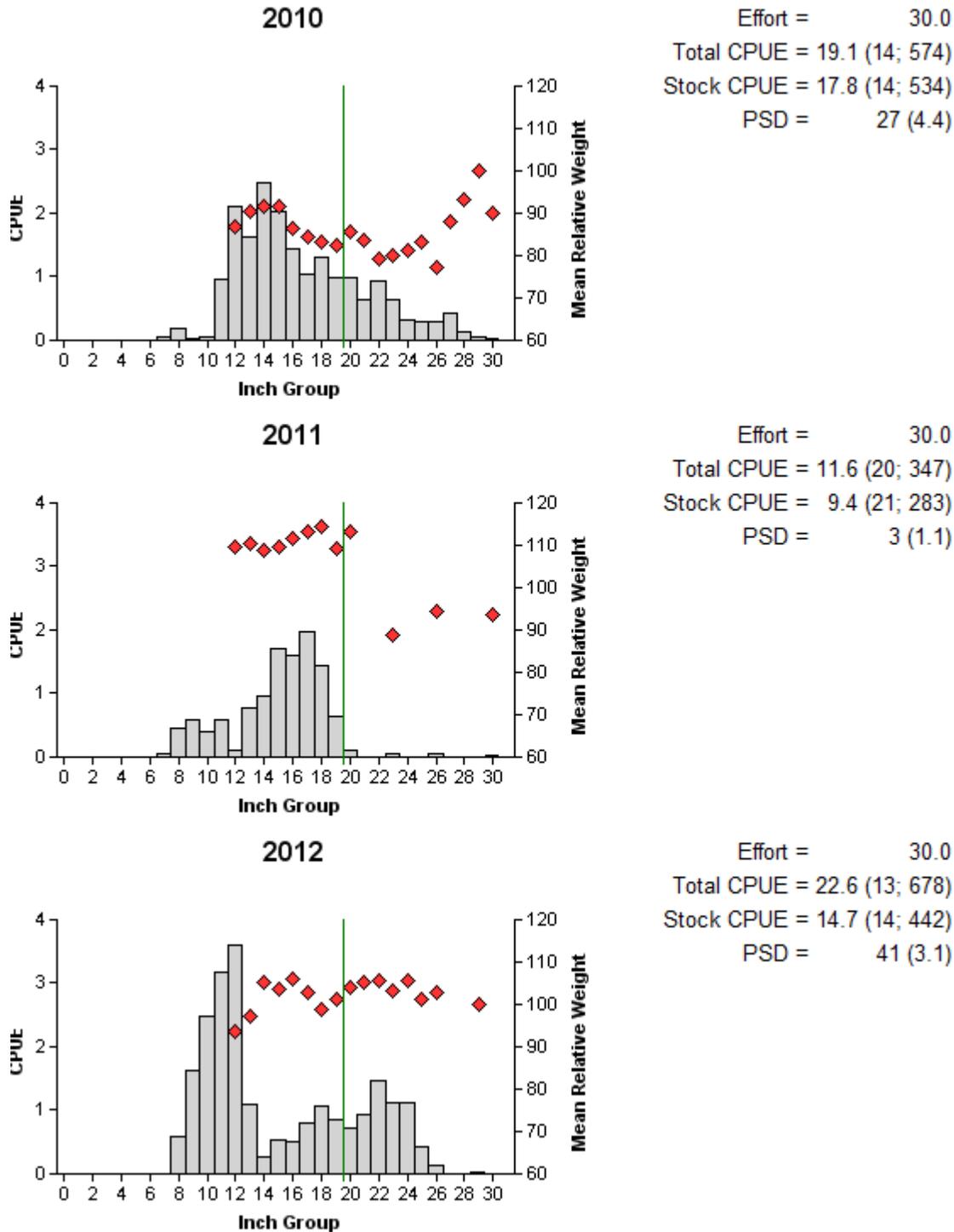


Figure 9. Number of Striped Bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Texoma Reservoir, Texas-Oklahoma, 2010, 2011, and 2012. Vertical lines represent length above which only 2 fish can be retained in the daily bag of 10 fish.

Striped Bass

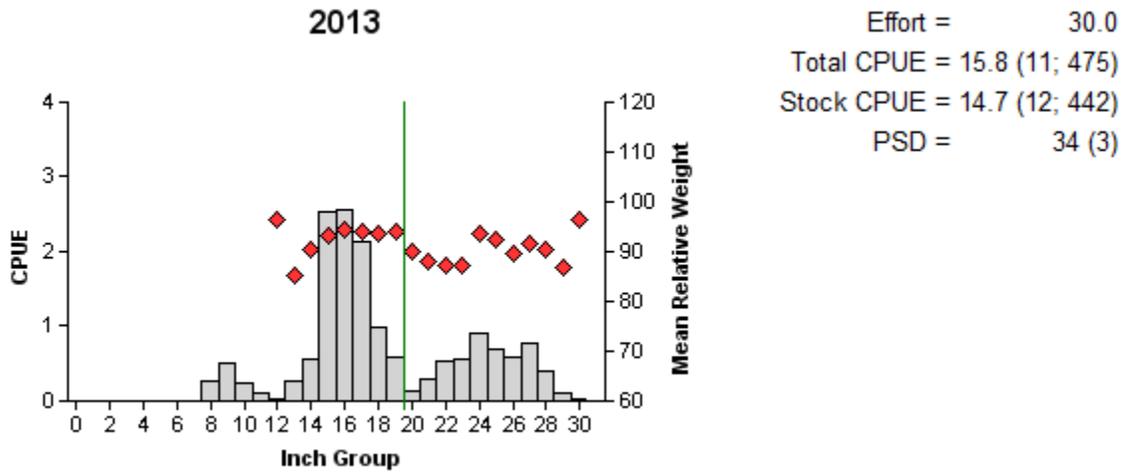


Figure 9 continued. Number of Striped Bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Texoma Reservoir, Texas-Oklahoma, 2013. Vertical lines represent length above which only 2 fish can be retained in the daily bag of 10 fish.

Smallmouth Bass

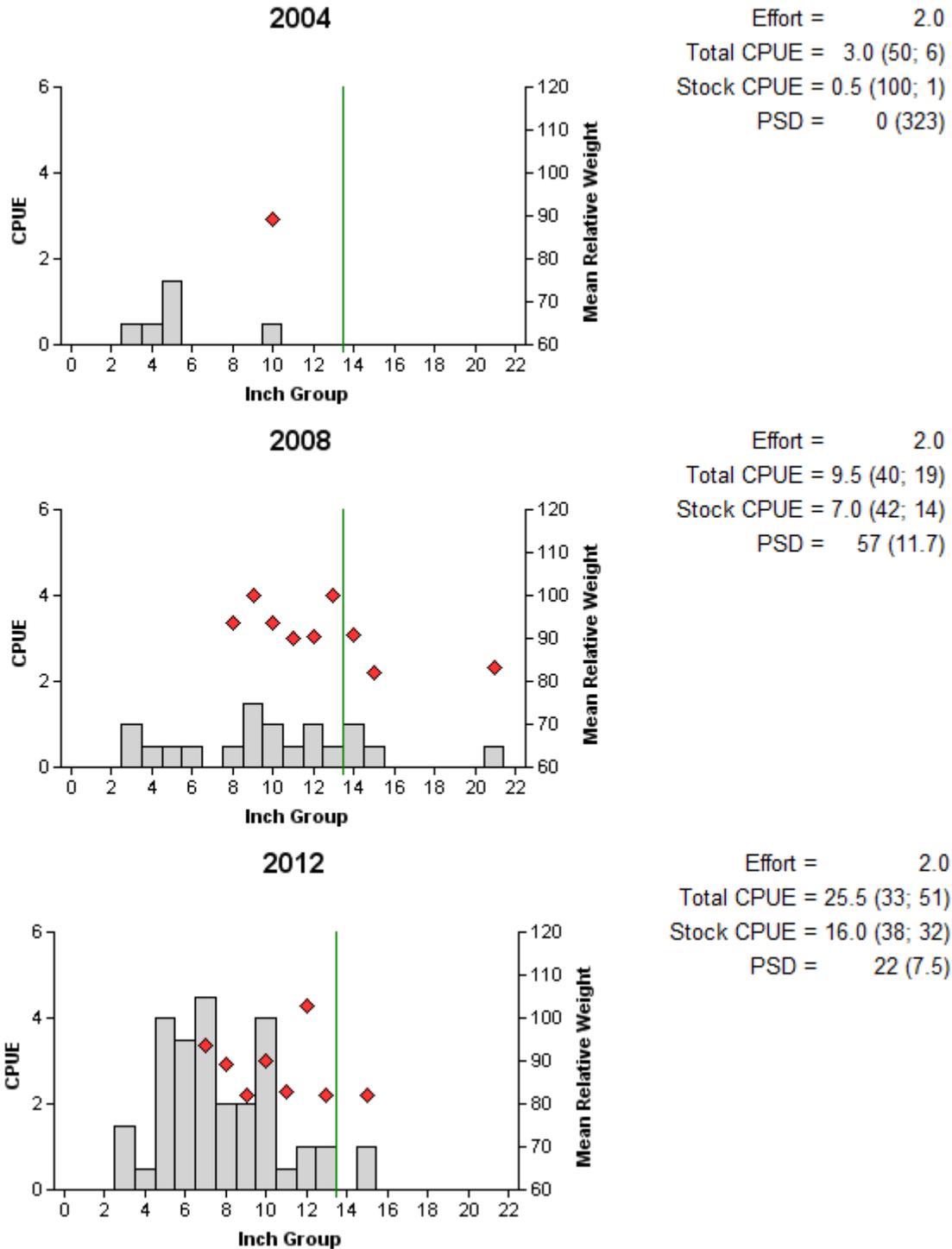


Figure 10. Number of Smallmouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Texoma Reservoir, Texas-Oklahoma, 2004, 2008, and 2012. Vertical lines represent length limit at time of collection.

Spotted Bass

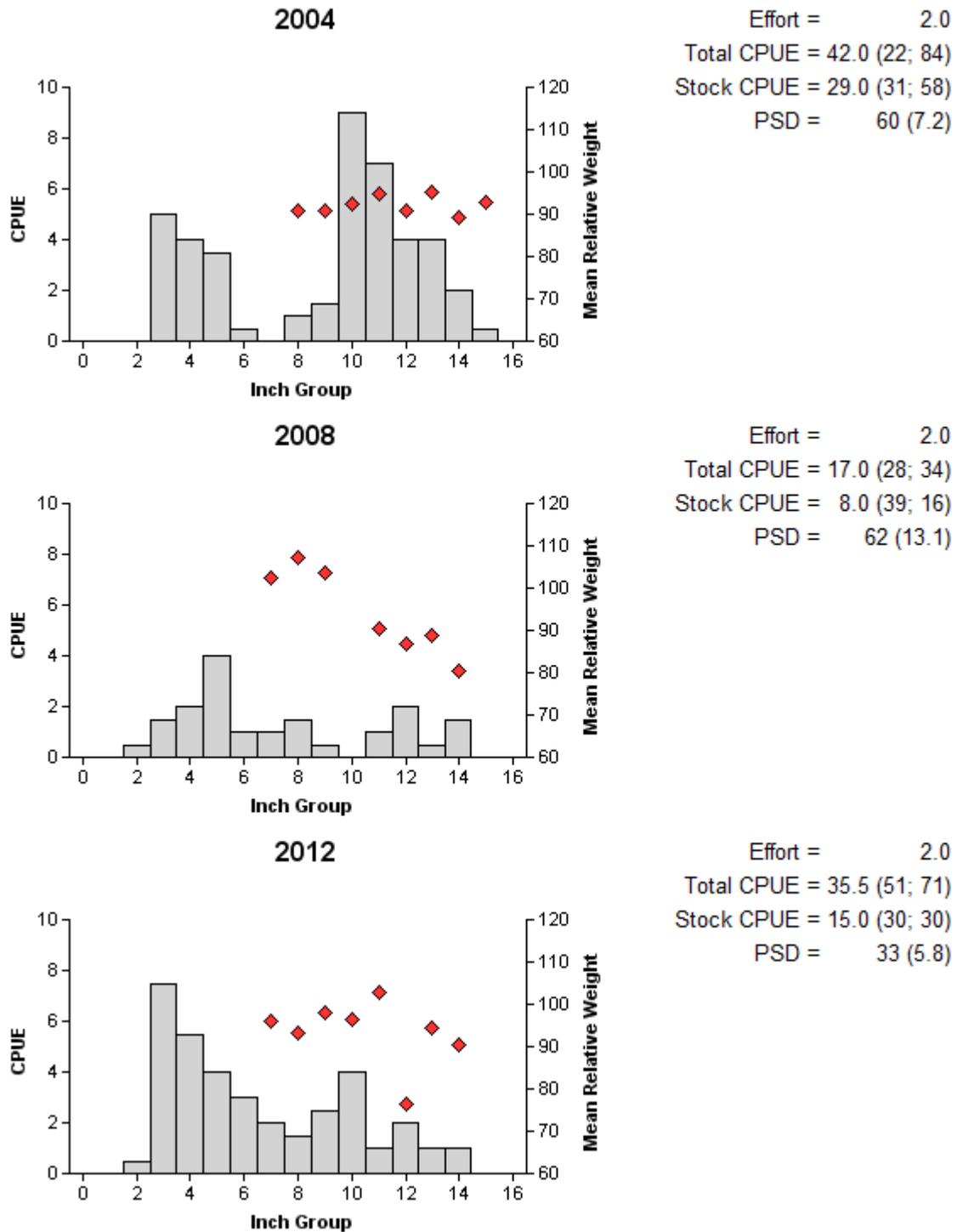


Figure 11. Number of Spotted Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Texoma Reservoir, Texas-Oklahoma, 2004, 2008, and 2012.

Largemouth Bass

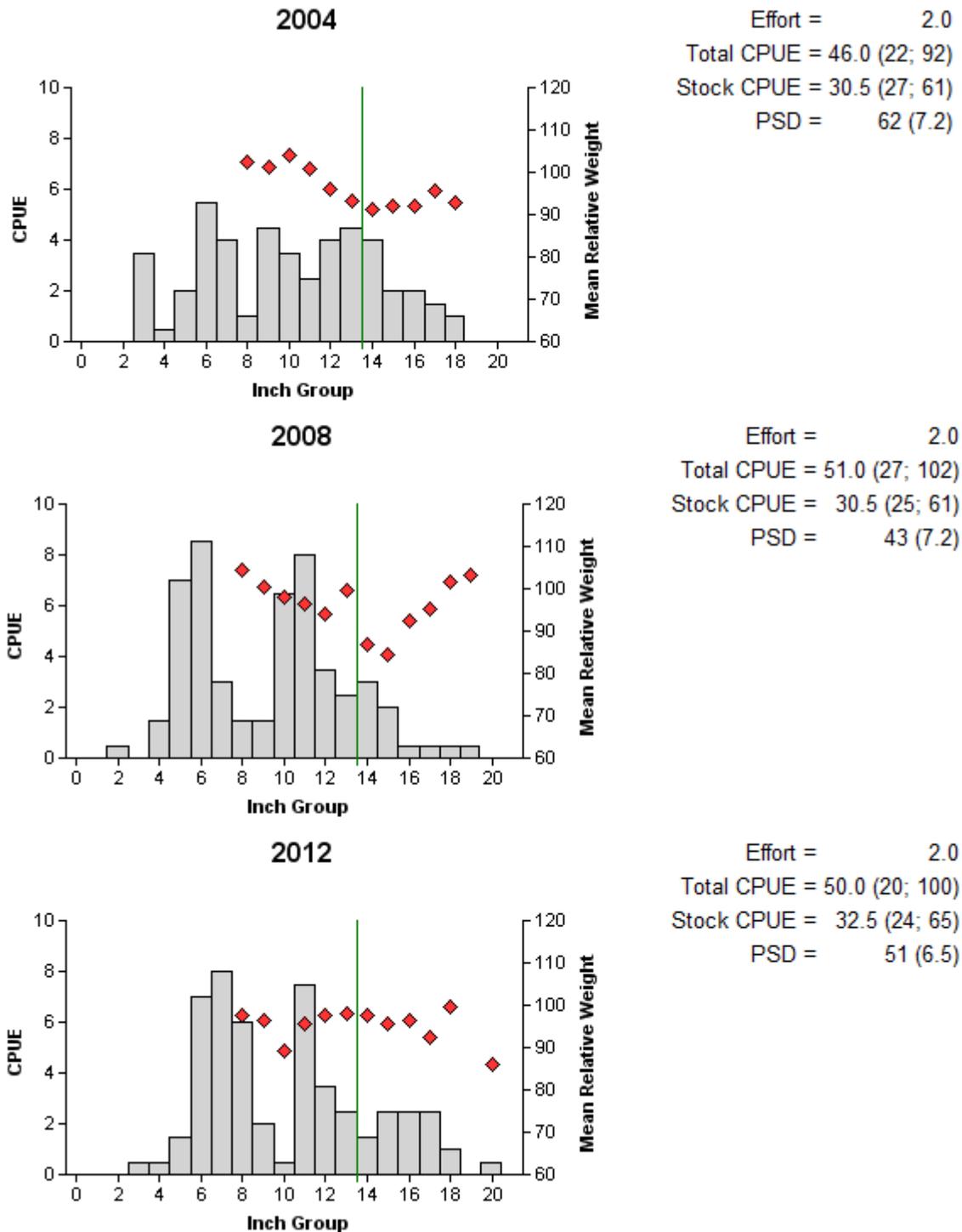


Figure 12. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Texoma Reservoir, Texas-Oklahoma, 2004, 2008, and 2012. Vertical lines represent length limit at time of collection

White Crappie

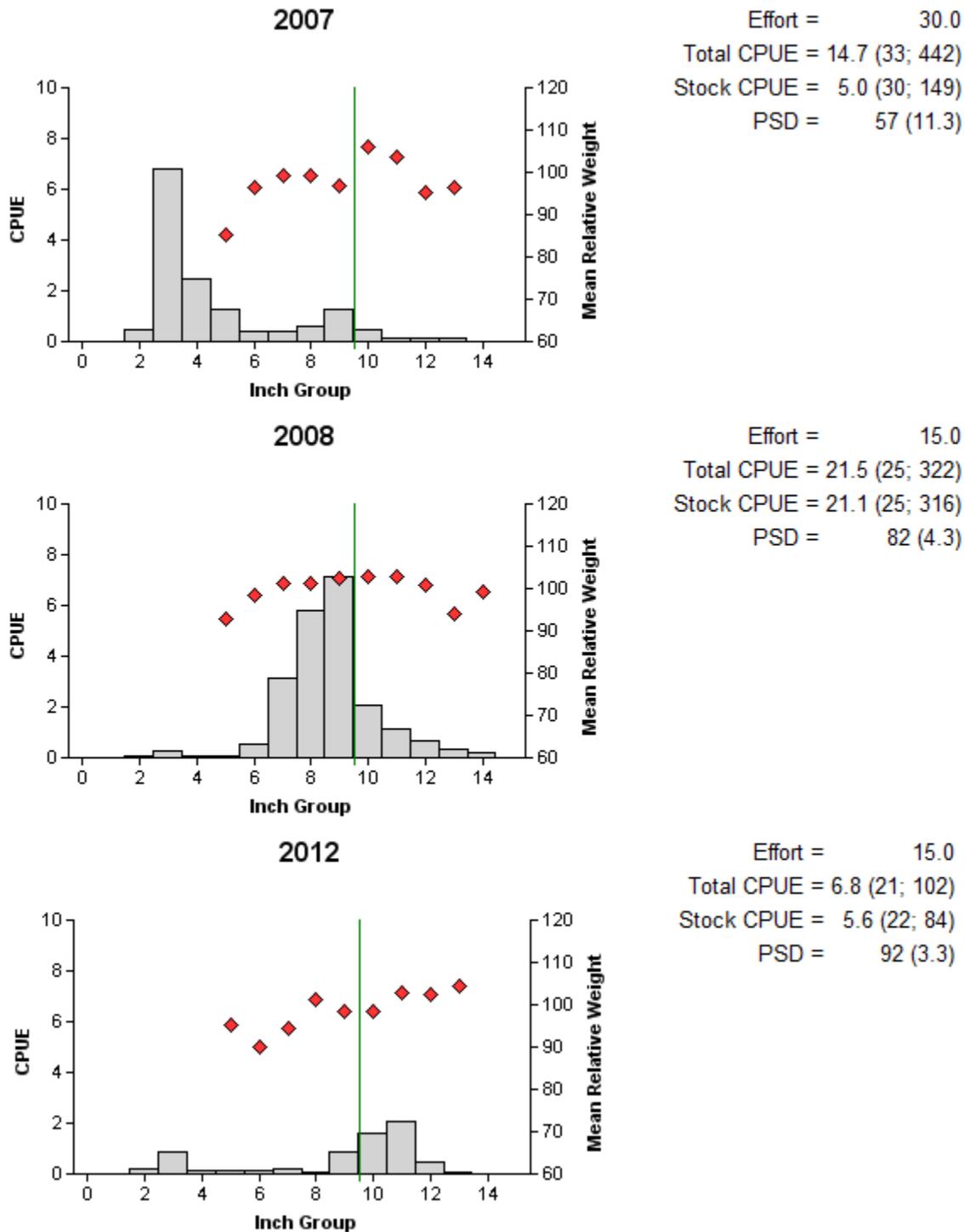
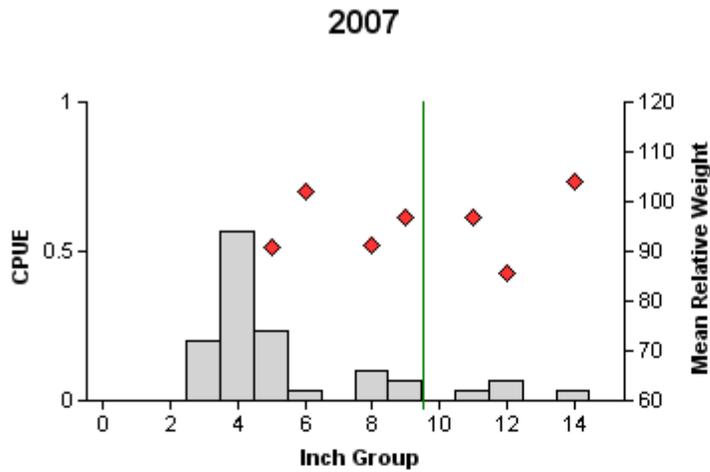
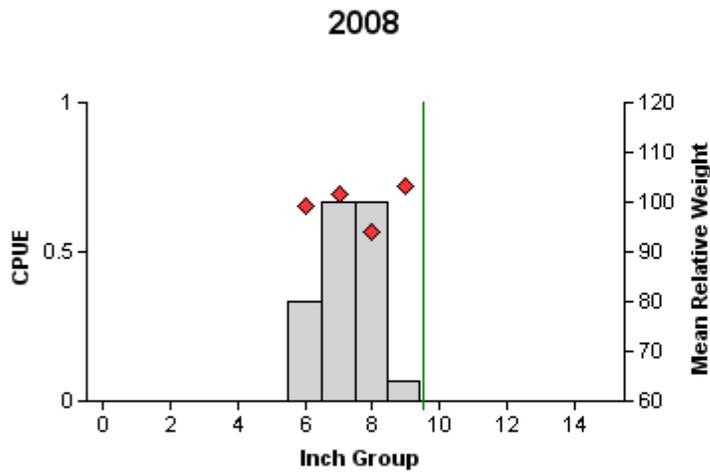


Figure 13. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Texoma Reservoir, Texas-Oklahoma, 2007, 2008, and 2012. Vertical lines represent length limit at time of collection.

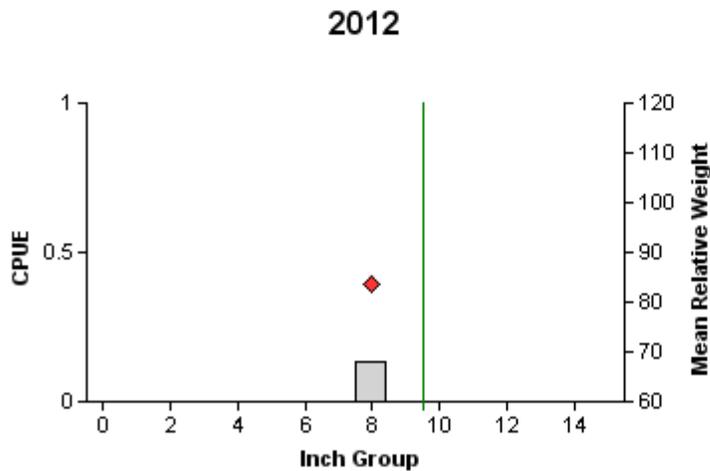
Black Crappie



Effort = 30.0
 Total CPUE = 1.3 (32; 40)
 Stock CPUE = 0.6 (25; 17)
 PSD = 53 (14.5)



Effort = 15.0
 Total CPUE = 1.7 (34; 26)
 Stock CPUE = 1.7 (34; 26)
 PSD = 42 (13.5)



Effort = 15.0
 Total CPUE = 0.1 (68; 2)
 Stock CPUE = 0.1 (68; 2)
 PSD = 100 (0)

Figure 14. Number of Black 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 netting surveys, Texoma Reservoir, Texas-Oklahoma, 2007, 2008, and 2012. Vertical lines represent length limit at time of collection.

Table 7. Proposed sampling schedule for Texoma 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	A (A)		A					
2014-2015	A*		A					
2015-2016			A				A	
2016-2017	S	S	S		S	S		S

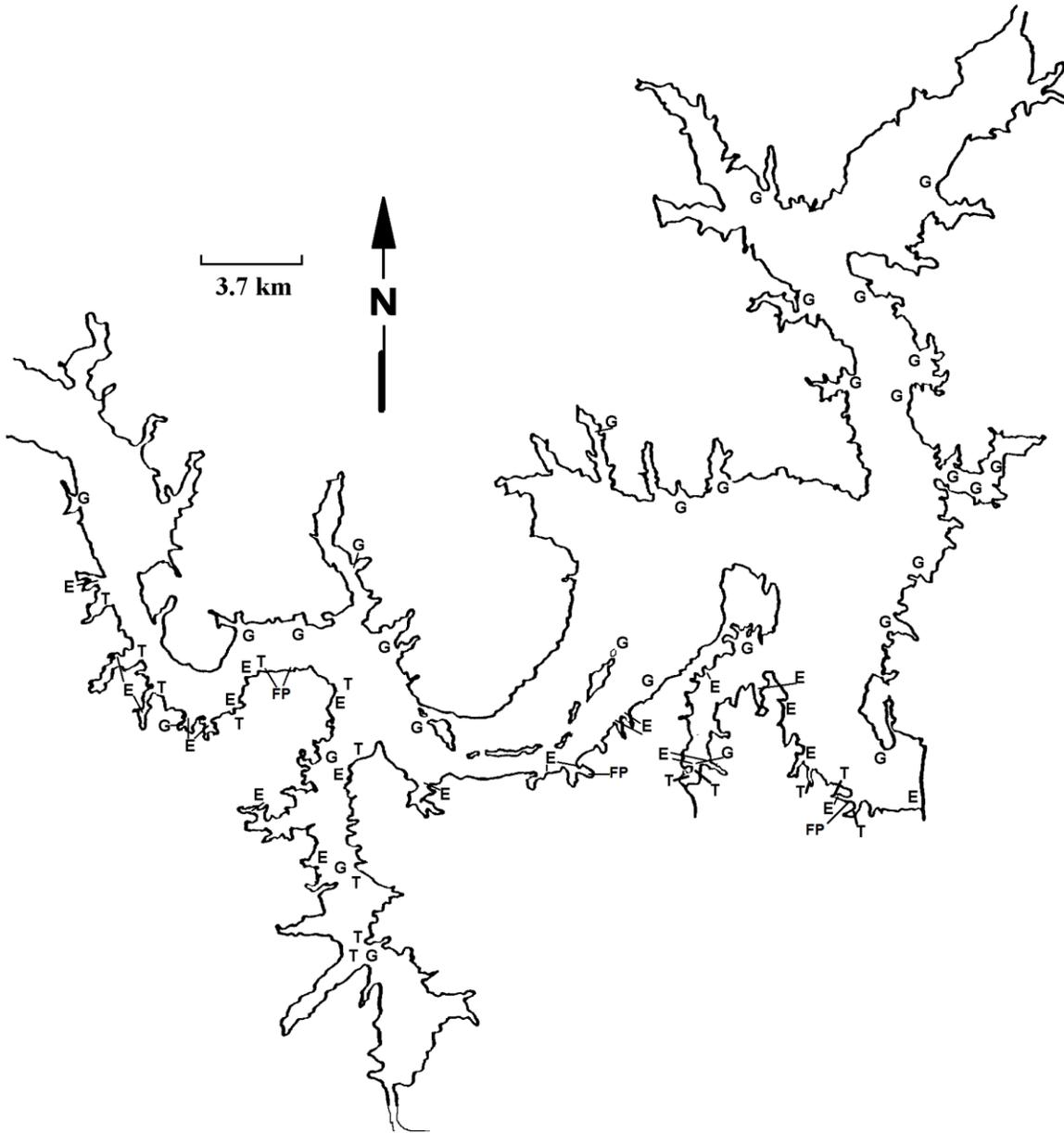
* Low pulse electrofishing August 2014

Appendix A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Texoma Reservoir, Texas, 2012-2013. Sampling effort was 30 net nights for gill netting, 15 net nights for trap netting, and 2 hours for electrofishing.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad					459	229.5
Threadfin Shad					1945	972.5
Blue Catfish	19	0.6				
Channel Catfish	68	2.3				
Flathead Catfish	2	0.1				
White Bass	145	4.8				
Striped Bass	475	15.8				
Green Sunfish					47	23.5
Warmouth					9	4.5
Bluegill					348	174.0
Longear Sunfish					33	16.5
Redear Sunfish					10	5.0
Smallmouth Bass					51	25.5
Spotted Bass					71	35.5
Largemouth Bass					100	50.0
White Crappie			102	6.8		
Black Crappie			2	0.1		

Appendix B



Location of sampling sites and fishing piers, Texoma Reservoir, Texas-Oklahoma, 2012-2013. Electrofishing, gill netting, and trap netting stations are indicated by E, G, and T, respectively. Fishing piers are marked FP. Water level was 4.5 feet below conservation level for electrofishing, 5.5 feet below conservation level during gill netting, and 4 feet below conservation level for trap netting.

Appendix C

Catch rates (CPUE) of targeted species by gear type and year for Texoma Reservoir, Texas.

Gear	Species	Year						
		1993 _a	1994 _a	1995 _b	1996 _b	1997 _b	1998 _b	1999 _b
Gill Netting _c Winter; Spring	Blue Catfish	1.3	0.3	1.0	1.3	0.1	0.3; 1.1	0.6; 1.6
	Channel Catfish	1.6	1.2	2.1	1.1	0.7	1.1; 1.3	1.8; 3.5
	Flathead Catfish	<0.1	0.3	<0.1	0.0	<0.1	0.2; 0.3	<0.1; 0.1
	White Bass	8.7	6.1	3.2	11.1	2.6	10.3; 1.3	2.2; 0.9
	Striped Bass	16.1	19.0	11.0	12.5	17.7	19.3; 3.3	18.2; 3.1
	Palmetto Bass	0.0	<0.1	0.0	0.0	0.0	0.0; 0.0	0.0; 0.0
Electrofishing _d Spring; Fall	Gizzard Shad	215.5; 193.5	211.5; 152.0	134.0	161.5	191.0	204.0	228.0
	Threadfin Shad	103.0; 20.5	22.5; 6.0	121.0	3.5	5.5	11.0	28.0
	Green Sunfish	10.0; 11.5	48.5; 21.5	13.5	4.0	0.0	17.5	23.0
	Warmouth	1.5; 10.5	10.5; 6.0	3.0	1.0	0.5	1.0	2.5
	Bluegill Sunfish	181.5; 259.0	261.0; 295.5	315.0	110.0	127.5	92.5	209.0
	Longear Sunfish	17.0; 38.5	26.5; 44.0	28.5	24.5	35.5	8.5	57.0
	Redear Sunfish	7.5; 12.5	4.0; 8.0	5.5	7.5	9.0	0.5	1.0
	Smallmouth Bass	22.0; 31.5	27.0; 33.5	27.0	9.0	2.5	9.5	8.0
	Spotted Bass	21.0; 41.0	25.5; 53.0	42.5	21.5	19.5	21.0	23.0
Largemouth Bass	72.5; 116.0	76.5; 96.5	155.5	40.5	65.0	37.5	65.5	
Trap Netting	White Crappie	7.3	5.8	10.1	1.6	1.0	1.3	2.7
	Black Crappie	0.2	0.0	0.2	0.0	0.3	0.0	0.1

_aElectrofishing, gill netting, and trap netting sampling sites were subjectively selected.

_bElectrofishing and trap netting sampling sites were randomly selected, and gill netting sampling sites were subjectively selected.

_cGill netting in 1998 and 1999 was conducted in winter and spring. Gill netting in all other years was conducted in winter.

_dElectrofishing in 1993 and 1994 was conducted in spring and fall. Electrofishing in all other years was conducted in fall.

Appendix C (continued)

Catch rates (CPUE) of targeted species by gear type and year for Texoma Reservoir, Texas.

Gear	Species	Year									
		2000	2001	2002	2003	2004	2005 _f	2006	2007	2008	2009
Gill Netting _e Winter; Spring	Blue Catfish	0.3	0.8; 0.1	0.4	0.2	0.3	0.2; 0.8	0.5	0.3	0.7	0.9
	Channel Catfish	0.8	2.2;1.7	1.6	2.0	1.8	1.6; 1.1	1.9	1.3	2.2	2.4
	Flathead Catfish		0.2		0.1	0.1	0.0; 0.2			0.1	0.1
	White Bass	6.7	2.4;0.9	1.9	5.0	0.9	4.5; 0.1	2.6	4.1	6.4	5.3
	Striped Bass	18.9	24.9;10.7	19.3	21.7	24.4	22.3; 9.3	25.2	22.5	19.9	23.4
	Palmetto Bass		0.1								
Electrofishing	Gizzard Shad	245.5				221.5				149.5	
	Threadfin Shad	57.5				37.0				56.0	
	Green Sunfish	25.0				17.5				24.5	
	Warmouth	5.0				2.5				5.5	
	Bluegill Sunfish	166.5				151.5				327.5	
	Longear Sunfish	57.5				41.5				57.0	
	Redear Sunfish	2.0				7.5				12.0	
	Smallmouth Bass	4.5				3.0	17.3			9.5	
	Spotted Bass	36.5				42.0	29.4			17.0	
	Largemouth Bass	38.5				46.0	24.2			51.0	
Trap Netting	White Crappie	1.8	3.9	5.5	5.5	27.1			14.7	21.5	
	Black Crappie	0.2	0.0	0.0	0.2	0.2			1.3	1.7	

_eGill netting in 2001 and 2005 was conducted in winter and spring. Gill netting in all other years was conducted in winter.

_fCombined daytime and nighttime electrofishing at subjectively selected sites.

Appendix C (continued)

Catch rates (CPUE) of targeted species by gear type and year for Texoma Reservoir, Texas.

Gear	Species	Year				Avg
		2010	2011	2012	2013	
Gill Netting	Blue Catfish	0.3	1.5	0.8	0.6	0.6
	Channel Catfish	1.3	3.4	2.3	2.3	1.7
	Flathead Catfish		<0.1		<0.1	<0.1
	White Bass	4.0	5.7	5.7	4.8	4.1
	Striped Bass	19.1	11.6	22.6	15.9	16.6
	Palmetto Bass					<0.1
Electrofishing	Gizzard Shad			229.5		195.2
	Threadfin Shad			972.5		111.1
	Green Sunfish			23.5		18.5
	Warmouth			4.5		4.2
	Bluegill Sunfish			174.0		205.4
	Longear Sunfish			16.5		34.8
	Redear Sunfish			5.0		6.3
	Smallmouth Bass			25.5		16.4
	Spotted Bass			35.5		30.6
	Largemouth Bass			50.0		66.8
Trap Netting	White Crappie			6.8		7.8
	Black Crappie			0.1		0.3