PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-221-M-4

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2013 Fisheries Management Survey Report

Bridgeport Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Smallmouth Bass only sampling was conducted in Bridgeport Reservoir during spring 2011 by electrofishing. All fish populations in Bridgeport Reservoir were surveyed in 2013 by electrofishing and trap netting; and in 2014 by gill netting. Habitat was surveyed in 2013. Anglers were surveyed by roving creel surveys in fall 2013 and spring 2014. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Bridgeport Reservoir is an 11,954-acre impoundment located on the West Fork Trinity River approximately 8 miles west of Bridgeport. Water level has been below conservation elevation (836 feet-mean sea level) since July 2010. Bridgeport Reservoir has moderate, but increasing, productivity. Habitat features consisted mainly of rocky shoreline and submerged boulders. There was some standing timber and a small amount of hydrilla present in the reservoir.

- **Management History:** Important sport fish included Channel Catfish, White Bass, Palmetto Bass, Smallmouth Bass, Spotted Bass, Largemouth Bass, and White Crappie. The fisheries management plan prepared in 2010 included resuming stocking Palmetto Bass at 5/acre biennially. Gill netting in 2011 and 2014 and spring electrofishing in 2011 for Smallmouth only. Zebra mussels have infested Bridgeport Reservoir, boat ramp signage recommended. Marina personnel have been informed. An ongoing roving creel affords opportunity to inform anglers.

- **Fish Community**

  - **Prey species:** Despite some low winter temperatures in 2013-14, Threadfin Shad continued to be present in the reservoir. Twenty specimens were collected by electrofishing near the dam May 7, 2014. Half the Gizzard Shad were available as prey. Electrofishing catch of prey-size Bluegills was lower than previous years.
  - **Channel Catfish:** The gill netting catch rate of Channel Catfish in 2014 was higher than previous catches with a preponderance of legal-size (12-inches and larger). Anglers caught more fish in 2003 than in 2013.
  - **Temperate basses:** The gill netting catch rate of White Bass was down from previous years. Angler harvest was greater in 2013 than in 2003. The gill netting catch rate of Palmetto Bass was down from previous years. Angler harvest was higher in 2003 than in 2013.
  - **Black basses:** The electrofishing catch rate of Smallmouth Bass was down from previous years. Anglers did not harvest any Smallmouth Bass in 2003 or 2013. The electrofishing catch rate of Spotted Bass was higher than in previous years. Anglers harvested Spotted Bass in 2003, but not in 2013. The electrofishing catch rate of Largemouth Bass was down from previous years. Angler harvest was greater in 2003 than in 2013.
  - **White Crappie:** White Crappie trap-netting catch rate was higher than in previous years. Anglers harvested more White Crappie in 2013 than in 2003.

- **Management Strategies:** Continue stocking Palmetto Bass at 5/acre in 2015 and 2017. Inform Tarrant Regional Water District about new exotic species threats to Texas waters, and work with them to display appropriate signage, educate constituents, and understand appropriate enforcement actions.

INTRODUCTION

This document is a summary of fisheries data collected from Bridgeport Reservoir in 2013-2014. 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 is presented with the 2013-2014 data for comparison.

Reservoir Description

Bridgeport Reservoir is an 11,954-acre impoundment constructed in 1932 on the West Fork Trinity River. It is located in Wise County approximately 8 miles west of Bridgeport and is operated and controlled by the Tarrant Regional Water District. Primary water uses included municipal and industrial water supply and recreation. Bridgeport Reservoir was mesotrophic with a mean TSI chl-*a* of 42.6 (Texas Commission on Environmental Quality 2011). Habitat at time of sampling consisted of rocks and boulders. There were small isolated patches of native submerged and emergent vegetation, and an isolated patch of hydrilla near the marina bay in Runaway Bay. Native aquatic plants present were pondweed and buttonbush. Hydrilla, a non-native, was first discovered in marina bay in December, 1994, and has spread very little. Water level has been declining for most of the time since October 2010 (Figure 1). At its lowest point, the reservoir was approximately 21 feet below conservation elevation. Boat access consisted of five public boat ramps and several private boat ramps. Bank fishing access was restricted to the Wise County Park, the boat ramp site near the US Highway 380 Bridge, and the boat ramp site near the dam. Other descriptive characteristics for Bridgeport Reservoir are in Table 1.

Angler Access

Bridgeport Reservoir has five public boat ramps. Only one boat ramp was use able during this report year; the boat ramp off US 380 (Table 2). Shoreline access is limited to the public boat ramp areas.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Hysmith and Moczygemba 2010) included:

1. Recommended gill netting in 2011 in lieu of 2010, due to high water.
   Action: Conducted gill netting in 2011.
2. Recommended continuing the stocking strategy of 5/ acre every other year for Palmetto Bass in 2011 and 2013.
   Action: Monitored the Palmetto Bass population using the standard random gill netting in 2011 and 2014.
3. Recommended monitoring Gizzard and Threadfin Shad populations during standard electrofishing survey in 2013.
   Action: Monitored shad populations with standard electrofishing in 2013.
4. Recommended monitoring Smallmouth Bass by electrofishing in early spring 2011 when water temperature is around 60°.
   Action: Monitored Smallmouth Bass population in early spring 2011.
5. Recommended cooperation with Tarrant Regional Water District to post appropriate signage at access points around the reservoir advising of zebra mussel infestation, brief marina operators and reservoir visitors about zebra mussel infestation.
   Action: Personnel with Tarrant Regional Water District installed appropriate signage,

TPWD staff briefed the marina operator, and staff shared the message about zebra mussels with visitors and/or anglers during routine creel surveys.

Harvest regulation history: Sport fishes in Bridgeport Reservoir are currently managed with statewide regulations with the exception of Largemouth Bass (Table 3). From 1986 to 1993, Largemouth Bass were managed with a 14-inch minimum length limit. A 14- to 18-inch slot length limit was implemented in 1993 to improve the population size structure. In September, 2000, the 12-inch minimum length limit for Spotted Bass was dropped to a no minimum length limit.

Stocking history: Bridgeport Reservoir was last stocked in 2011 and 2013 (Palmetto Bass; 5/acre). The complete stocking history is in Table 4.

Vegetation/habitat history: Bridgeport Reservoir supported very limited aquatic vegetation (Table 5). Hydrilla, an invasive species, was first documented in and around the marina bay in December 1994. It is persistent where first found, but has not spread since its discovery. In 2009 yellow floating heart was discovered in the reservoir at the confluence of Big Creek.

Water Transfer: Bridgeport Reservoir is primarily used for municipal and industrial water supply and recreation. There are currently 11 permitted diversions from the reservoir: five municipal (City of Decatur, City of Bridgeport, City of Runaway Bay, Walnut Creek SUD, and West Wise SUD), three industrial (Hanson, Martin Marietta, and Texas Industries), one golf course (Runaway Bay Golf Course), and two power companies (Brazos Power and Wise County Power). Other than downstream releases to Eagle Mountain Reservoir, no water is transferred to another public reservoir.

METHODS

Fishes were collected by electrofishing (2 hours at 24 5-min stations), gill netting (15 net nights at 15 stations), and trap netting (15 net nights at 15 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 caught per net night (fish/nn). All survey sites were randomly selected and surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011).

A roving creel survey was conducted from 1 September 2013 through 30 November 2013 and 1 March 2014 through 31 May 2014. Angler interviews were conducted on 5 weekend days and 4 weekdays per quarter to assess angler use and fish catch/harvest statistics in accordance with 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 (Wr)] 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 for creel statistics and SE was calculated for structural indices and IOV. Ages for Largemouth Bass and White Crappie were determined using Category 2 protocol according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). The manual specifies Largemouth Bass, but we adapted the protocol to include White Crappie.

Genetic analysis of Largemouth Bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). Micro-satellite DNA analysis was used to determine genetic composition of individual fish from 2005 through 2012 and by electrophoresis for previous years.

Vegetation, habitat, and access surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). Source for water level data was the United States Geological Survey (USGS 2014).

RESULTS AND DISCUSSION

Habitat: Littoral zone habitat consisted primarily of rocky shoreline, standing timber and stumps (Table 6). Rocky shoreline habitat was augmented by boulders. Almost 99% of this reservoir is pelagic habitat.

Creel: Directed fishing effort by anglers was highest for Largemouth Bass (25.8%), followed by anglers fishing for Palmetto Bass, Channel Catfish, and White Crappie during the fall of 2013 (Table 7). Palmetto Bass were the most sought-after species in the fall of 2003. Total fishing effort for all species and direct expenditures at Bridgeport Reservoir were higher in the fall of 2003 compared to the fall of 2013 (Table 9). Similar statistics for the spring of 2004 showed higher total fishing effort and expenditures when compared to spring of 2014 (Tables 8 & 10).

Prey species: Electrofishing CPUE of Gizzard Shad and Bluegill were 46.0/h and 104.0/h, respectively (Figures 2 and 3). The IOV for Gizzard Shad was fair, with only 55 % vulnerable to predation. At 48 % to 55 %, the IOV for Gizzard Shad was well within the acceptable range (26 % to 70 %) reported by DiCenzo el al. (1996). Average CPUE for Threadfin Shad was 95.9/h (Appendix E). The CPUE (104.0/h) for Bluegill continued to decline from CPUE of 227.5/h in 2005 (Figure 3). Based on size, most of the Bluegill were vulnerable to predation.

Channel Catfish: The gill net catch rate of Channel Catfish was 3.8/nn in 2014. Mean relative weight varied from 90% to 120%, increasing with length. Relative abundance has remained consistent over the past 19 years with an average gill net catch rate of 3.0/nn (Appendix C). Population structure has changed very little since 2006 (Figure 4). Directed fishing effort, catch per hour, and total harvest for Channel Catfish showed a decline from the fall of 2003 to the fall of 2013 (Table 11). Almost 73% of legal catfish caught by anglers in 2013 were released (Table 11). There was evidence of some angler non-compliance (Figure 5). Directed fishing effort was much higher in 2004 than 2014, despite total harvest being higher in 2014 (Table 12). Size distribution of total harvest was greater in 2014 (Figure 6).

White Bass: The gill net catch rate of White Bass was 1.7/nn in 2014, a nine-fold decline since 2011 (Figure 7). Average catch rates over the past 19 years were 6.6/nn (Appendix C). The highest catch rates were recorded in 2008 and 2011. White Bass grew to 10 inches in 2 years (N=11; 10.59 inches). Despite a difference in catch per hour, directed angling effort and total harvest of White Bass during the fall of 2003 was similar to the fall of 2013 (Table 13). Total catch per hour by anglers was 2.46 in 2013 compared to 0.25 in 2003. At 16,400 total harvest, angling for White Bass during the spring of 2004 was very successful and only 33.23 % of the legal harvest was released (Table 14). Observed harvest in the fall of 2003 and fall of 2013 showed good angler compliance; harvested fish ranged from 11 to 15 inches (Figure 8). Angler harvest in spring 2004 exceeded angler harvest in spring 2014 (Table 14 and Figure 9).

Palmetto Bass: The gill net catch rate of Palmetto Bass was 0.4/nn in 2014, down from 3.0/nn in 2011 and 0.9/nn in 2006 (Figure 10). Directed effort and angler harvest of Palmetto Bass was higher during the fall of 2003 compared to the fall of 2013 (Table 15). Harvested fish ranged in size from 18 to 23 inches in length (Figure 11) and good angler compliance was indicated. Directed effort and total harvest was higher in the spring of 2004 than in the spring of 2014 (Table 16 and Figure 12). The reduced angler effort probably was related to limited boat ramp access.

Smallmouth Bass: The electrofishing total CPUE of Smallmouth Bass was 3.0/h and has remained at 3.0/h to 4.0/h since 2008 (Figure 13 and Appendix C). Historically, electrofishing has not produced catch

rates of Smallmouth Bass in excess of 6.5/h (Appendix C). Anecdotal information from anglers provided a much brighter picture of the Smallmouth Bass fishery in Bridgeport Reservoir which began with the stocking of 104 adults in 1982. Spring electrofishing when water temperature is around 60º F was suggested to be more effective in collecting Smallmouth Bass. To some extent this was true since CPUE during spring of 2011 was 4.0/h (Figure 14 and Appendix C). There was no directed angling effort or harvest of Smallmouth Bass in either the fall of 2003 and 2013 or the spring of 2004 and 2014.

Spotted Bass: The electrofishing total CPUE of Spotted Bass was 56.0/h, the highest CPUE since 1999 (Figure 15 and Appendix C). Recruitment of sub-stock Spotted Bass was consistent with past surveys. Relative weights remain consistent around 90%. There was no directed effort for Spotted Bass nor was there directed catch. There was harvest in fall 2003, but most (76%) were released (Table 17). There is no minimum length limit. Spotted Bass kept by anglers ranged from 9 to 12 inches (Figure 16). There was no directed angling effort for Spotted Bass in the spring of 2004 or 2014, but there was 10X harvest in 2004 versus 2014 (Table 18 and Figure 17).

Largemouth Bass: The electrofishing total CPUE of Largemouth Bass was 35.0/h (Figure 18), which was down from 2008 and 2009, and below the historical average total CPUE of 67.8/h (Appendix C). Recruitment of sub-stock fish has been declining since 2008 (Figure 18) growth was excellent (Prentice 1987), an average of 14 inches in 2 years (N= 13; 14.48 inches). Despite an abundance of Gizzard Shad and good numbers of Bluegill, relative weights were fair to low. Anecdotal information from anglers suggested more and bigger Largemouth Bass are being caught than before the slot. Positive impact of the slot length limit is based on results from two 3-month roving creel surveys in 2003 and 2013 which showed anglers continued to harvest fish below the slot and fish continue to grow through the slot (Figure 19). Directed angling effort for Largemouth Bass declined in fall of 2013 (Table 19) and was probably related to a dropping water level. We encountered no Bass angling tournaments during our most recent creel surveys. Creel survey interviews in the spring of 2004 and 2014 did not differentiate among Smallmouth, Spotted, and Largemouth Bass caught by anglers. Instead they were lumped into Black Basses. Largemouth Bass harvest dropped dramatically from 2004 to 2014 and harvested fish were below the slot (Table 20 and Figure 20). One pure Florida Largemouth Bass was collected in 2013, the first since 2003 (Table 21). Percent Florida Largemouth Bass (FLMB) alleles increased to 42 % and 26 of 30 Largemouth Bass in our sample were intergrades, which bodes well for the future of FLMB influence in Bridgeport Reservoir.

White Crappie: The trap net CPUE of White Crappie was 16.0/nn (Figure 19), well above the catch rate in 2009 and the overall 19-year average 11.1/nn for the district (Appendix C). Relative weights changed very little since 2009 (Figure 21). White Crappie grew to harvestable size of 10 inches in two years (N=13; 10.6 inches). Size structure improved since 2009 (Figure 19). Directed angling effort for White Crappie increased from 2003 to 2013 (Table 22), but more dramatic was the increase in White Crappie harvested. White Crappie anglers were harvest-oriented as supported by the low percent of legal released fish in 2003 (6.0 %) and only 6.90 % released in 2013. Based on our small sample set, there was angler compliance with fish harvest regulations in 2003 and 2013 (Figure 22). Directed angler effort for White Crappie declined from the spring of 2004 to the spring of 2014 along with total harvest (Table 23). Anglers harvested White Crappie from 10- to 15-inches (Figure 23).

Fisheries management plan for Bridgeport Reservoir, Texas

Prepared – July 2014.

ISSUE 1: Palmetto Bass population is responding well to the stocking strategy of 5/acre every other year.

MANAGEMENT STRATEGIES

1. Continue stocking Palmetto Bass at 5/acre in 2015 and 2017.
2. Monitor the population during the standard random gill net survey in 2018.

ISSUE 2: Of the five boat ramps on Bridgeport Reservoir, only one is useable. At two ramps, extension of the ramp is feasible.

MANAGEMENT STRATEGIES

1. Encourage Tarrant Regional Water District to consider extensions on boat ramps at Wise County Park and Dam site ramp. US 380 does not need to be extended at this time.

ISSUE 3: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. Adult zebra mussels (*Dreissena polymorpha*) were found in Bridgeport Reservoir in 2014. They 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 Tarrant Regional Water District to post appropriate signage at access points around the reservoir.
2. Contact and educate marina owners about invasive species, and provide them with posters, literature, etc… so that they can in turn educate their customers.
3. Educate the public about invasive species through the use of media and the internet.
4. Make a speaking point about invasive species when presenting to constituent and user groups.
5. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule (Table 24) involves general monitoring surveys in 2017 – 2018 which requires electrofishing, trap netting, and gill netting.

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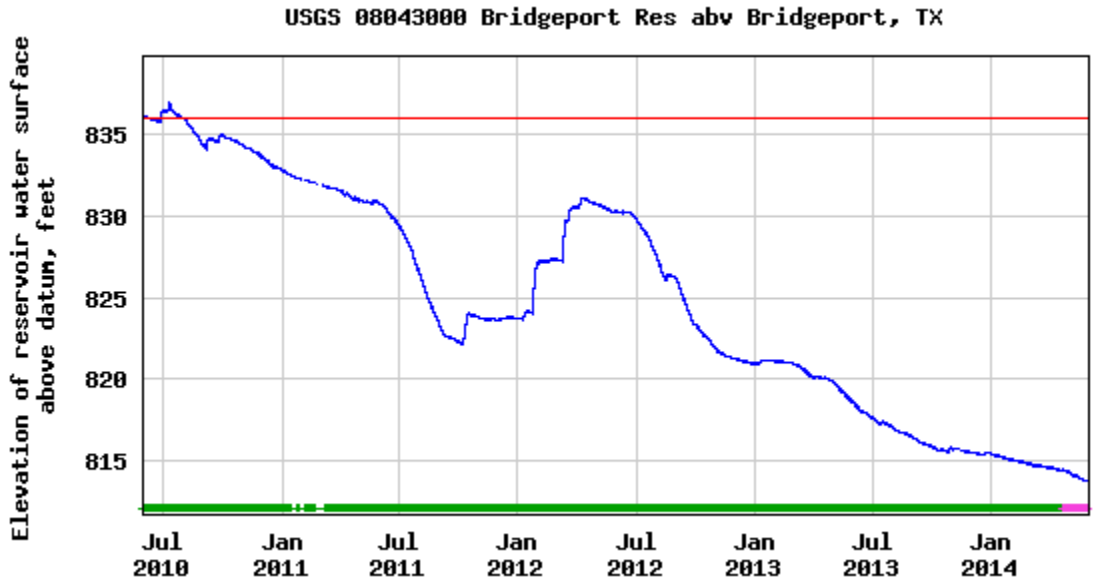


Figure 1. Monthly average water level elevations in feet above mean sea level (msl) recorded for Bridgeport Reservoir, Texas, June 2010-May 2014.

Table 1. Characteristics of Bridgeport Reservoir, Texas.

Characteristic	Description
Year constructed	1932
Controlling authority	Tarrant Regional Water District
Counties	Wise and Jack
Reservoir type	Mainstream
Shoreline development index	10.60
Conductivity	361 umhos/cm

Table 2. Boat ramp characteristics for Bridgeport Reservoir, Texas, June, 2013. Reservoir elevation at time of survey was 817.7 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Wise County Park Primary Ramps	33.27869 -97.85441	Y	20	819.7	Out of water. Extension is not feasible
Wise County Park Secondary Ramps	33.27875 -97.85678	Y	20	818.7	Out of water, but still useable. Extension is feasible
US 380	33.17187 -97.85956	Y	10	819.0	Out of water, but still useable. Extension is feasible
Runaway Bay	33.17275 -97.86107	Y	5	820.7	Out of water. Extension is not feasible
Dam	33.21879 -97.83066	Y	10	818.7	Out of water. Extension is feasible

Table 3. Harvest regulations for Bridgeport Reservoir.

Species	Bag Limit	Length Limit
Catfish, Channel	25	12-inch minimum
Catfish, Flathead	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass, Palmetto	5	18-inch minimum
Bass, Smallmouth	5 (in any combination)	14-inch minimum
Bass, Spotted		No Limit
Bass, Largemouth		14- to 18-inch slot
Crappie: White and Black Crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

Table 4. Stocking history of Bridgeport, 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	1972	52,000	AFGL	7.9
	Total	52,000		
Coppernose Bluegill	1983	130,000	UNK	UNK
	Total	130,000		
Florida Largemouth Bass	1982	1,439	FGL	3.0
	1985	10,700	FRY	1.0
	1988	10,000	FGL	1.5
	1990	326,430	FRY	0.7
	1997	125,264	FGL	1.1
	2007	299,781	FGL	1.8
	2008	300,049	FGL	1.6
	Total	1,073,663		
Largemouth Bass	1970	250,000	UNK	UNK
	Total	250,000		
Mixed Largemouth Bass	1988	12,750	UNK	1.5
	Total	12,750		
Palmetto Bass (Striped X White Bass hybrid)	1983	130,144	UNK	UNK
	1994	195,693	FGL	1.5
	1995	339,300	FGL	1.3
	1996	100,700	FGL	1.4
	1997	112,206	FGL	1.5
	1998	70,767	FGL	1.3
	1998	61,832	FRY	0.9
	1999	65,004	FGL	1.5
	2002	65,005	FGL	1.5
	2005	71,788	FGL	1.5
	2007	63,879	FGL	1.5
	2009	60,820	FGL	1.4
	2011	59,931	FGL	1.5
	2013	59,756	FGL	1.9
	Total	1,456,825		

Table 4. continued.

Species	Year	Number	Life Stage	Mean TL (in)
Smallmouth Bass	1982	104	UNK	UNK
	1983	130,034	UNK	UNK
	1984	50,826	FGL	2.0
	1985	33,172	FGL	2.0
	Total	214,136		
Threadfin Shad	1984	4,500	AFGL	2.0
	1985	4,300	ADL	4.0
	Total	8,800		
Walleye	1974	204,000	FRY	0.2
	1975	247,000	FRY	0.2
	1984	4,692,000	FRY	0.2
	1992	7,834,586	FRY	0.2
	Total	12,977,586		

Table 5. Survey of aquatic vegetation for Bridgeport Reservoir, Texas, 2009 and 2013. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2009	2013
Native submersed	0.6(<0.1)	0.0
Non-native		
Floating Yellow Heart	2.0(<0.1)	0.0
Hydrilla	2.0(<0.1)	<0.1(<0.1)

Table 6. Survey of structural habitat types for Bridgeport Reservoir, June 2013. Shoreline habitat type units are in miles

Habitat type	Estimate	% of total
Natural	25.0	15.0
Rocky	145.2	85.0
Boat Houses	8.4	<0.1
Standing Timber	115.0	1.0

Table 7. Percent directed angler effort by species for Bridgeport Reservoir, Texas, fall 2003 and fall 2013. Survey periods were from 1 September through 30 November 2003 and 1 September through 30 November 2013.

Species	Year 2003	Year 2013
Channel Catfish	16.0	17.2
White Bass	2.0	8.3
Palmetto Bass	20.0	22.1
Largemouth Bass	19.0	25.8
Crappie	3.5	14.3
Anything	39.5	12.3

Table 8. Percent directed angler effort by species for Bridgeport Reservoir, Texas, spring 2004 and spring 2014. Survey periods were from 1 March through 31 May 2004 and 1 March through 31 May 2014.

Species	Year 2004	Year 2014
Channel Catfish	6.1	6.4
Temperate Basses	0.7	-
White Bass	4.2	1.5
Palmetto Bass	14.8	5.2
Largemouth Bass	24.9	14.4
Crappie	33.3	46.5
Anything	16.0	26.0

Table 9. Total fishing effort (h) for all species and total directed expenditures at Bridgeport Reservoir, Texas, fall 2003 and fall 2013. Survey periods were from 1 September through 30 November 2003 and 1 September through 30 November 2013. Relative standard error is in parentheses.

Creel statistic	2003	2013
Total fishing effort	18,621 (23)	5,886 (30)
Total directed expenditures	$88,939 (49)	$41,017 (66)

Table 10. Total fishing effort (h) for all species and total directed expenditures at Bridgeport Reservoir, Texas, spring 2004 and spring 2014. Survey periods were from 1 March through 31 May 2004 and 1 March through 31 May 2014. Relative standard error is in parentheses.

Creel statistic	2004	2014
Total fishing effort	64,408 (17)	12,750 (33)
Total directed expenditures	$302,389 (46)	$97,618 (49)

Gizzard Shad

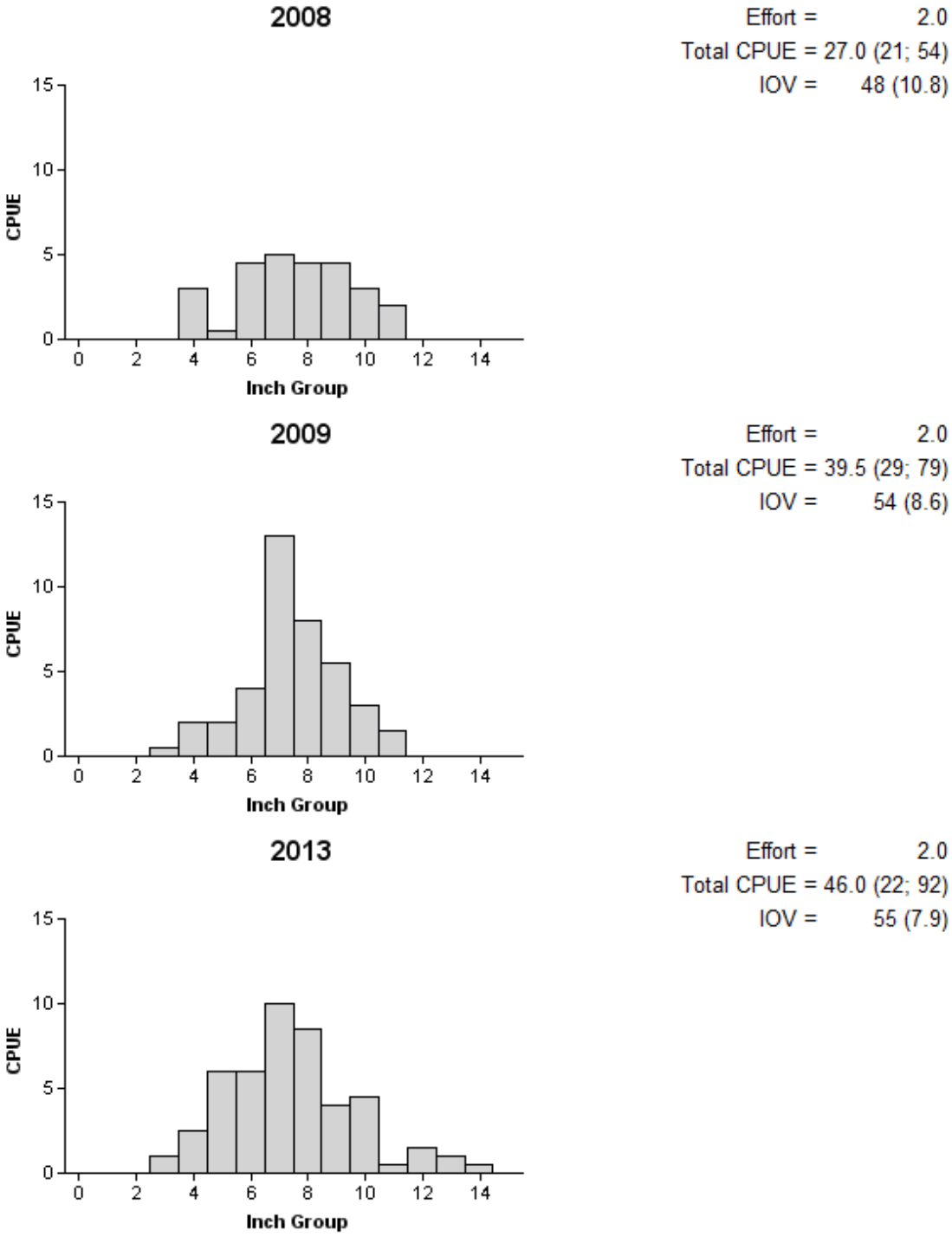


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Bridgeport Reservoir, Texas 2008, 2009, and 2013.

Bluegill

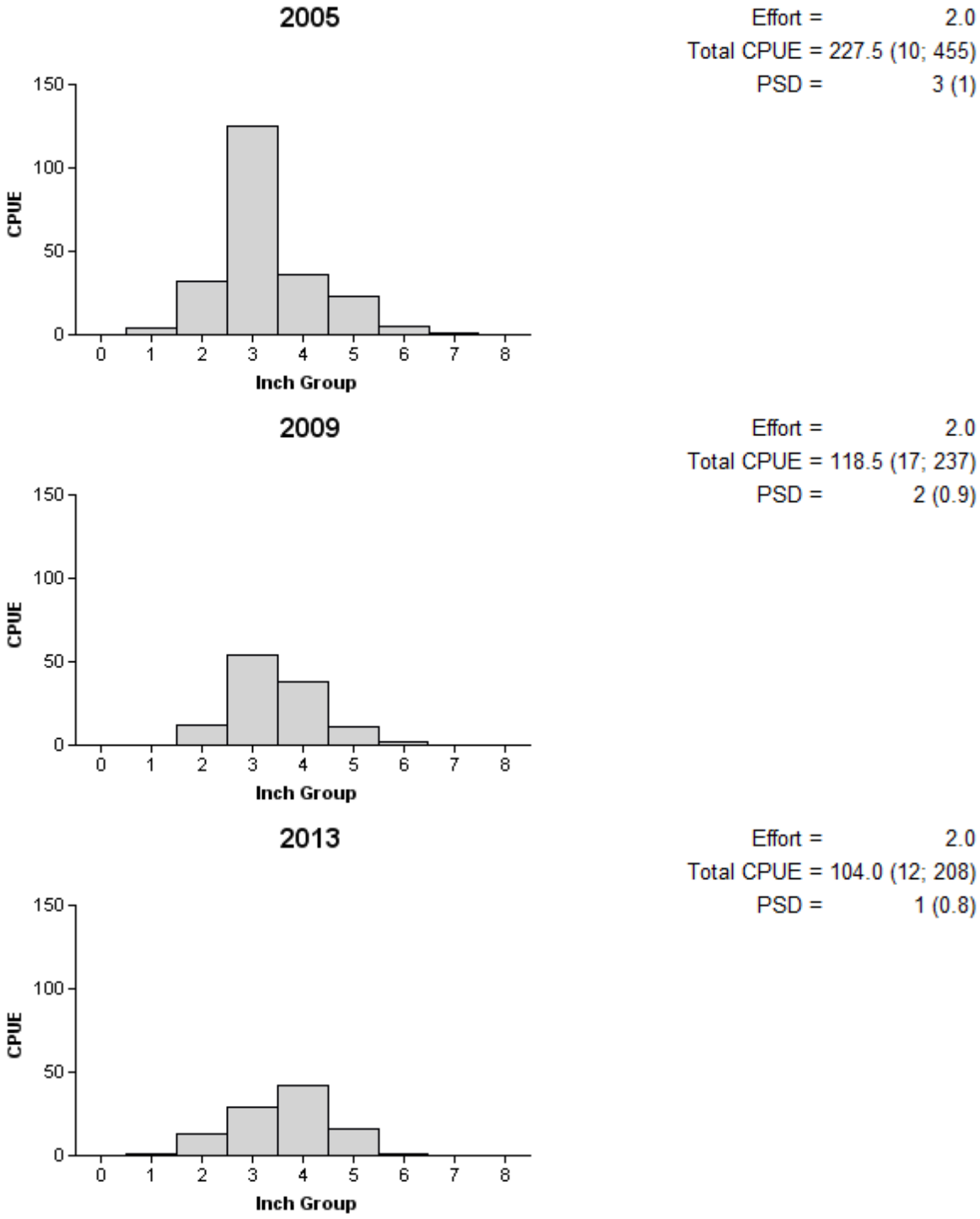


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Bridgeport Reservoir, Texas, 2005, 2009, and 2013.

Channel Catfish

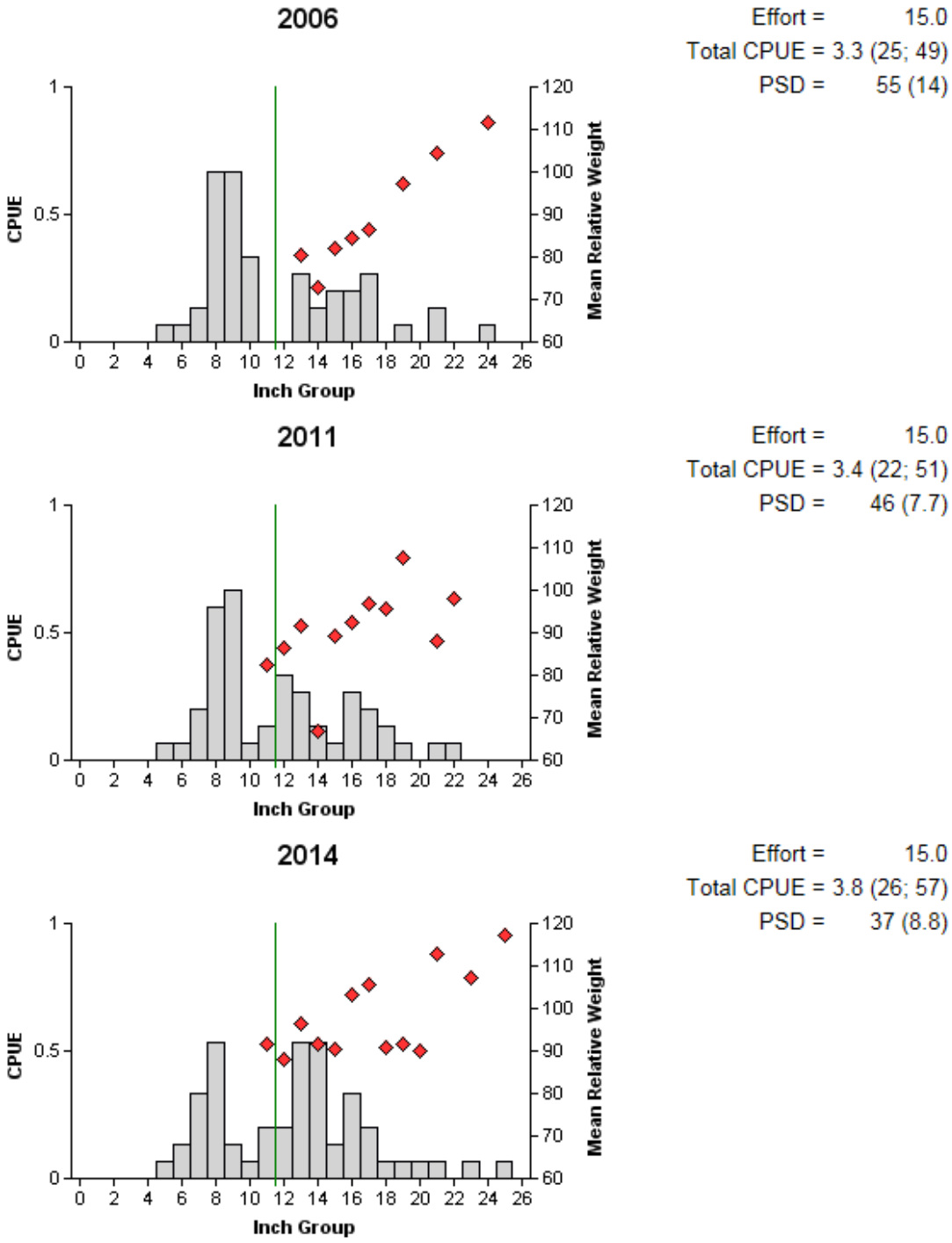


Figure 4. Number of Channel Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Bridgeport Reservoir, Texas, 2006, 2011, and 2014. Vertical lines represent length limit at time of collection.

Table 11. Creel survey statistics for Channel Catfish at Bridgeport Reservoir from September 2003 - November 2003 and from September 2013 - November 2013, where total catch per hour is for anglers targeting Channel Catfish and total harvest is the estimated number of Channel Catfish harvested by all anglers. Relative standard errors are in parentheses.

	Year	
Creel Survey Statistic	2003	2013
Directed effort (h)	3,177.11	1,010.23 (40)
Directed effort(h)/acre	0.31	0.13 (40)
Total catch per hour	1.2 (46)	0.23 (85)
Total harvest	1,676.58 (71)	507.64 (94)
Harvest/acre	0.16 (71)	0.06 (94)
Percent legal released	23.00	62.09

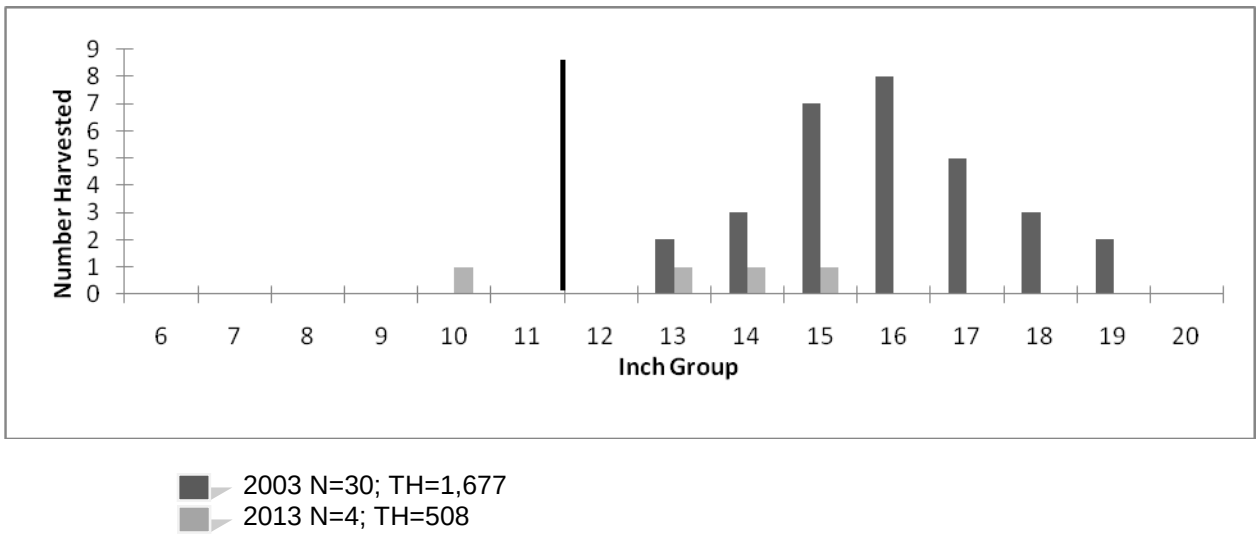


Figure 5. Length frequency of harvested Channel Catfish observed during creel surveys at Bridgeport Reservoir, Texas, September 2003 - November 2003, and from September 2013 – November 2013, all anglers combined. N is the number of harvested Channel Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period. Vertical line represents length limit at time of creel survey.

Table 12. Creel survey statistics for Channel Catfish at Bridgeport Reservoir from March – May 2004 and from March – May 2014, where total catch per hour is for anglers targeting Channel Catfish and total harvest is the estimated number of Channel Catfish harvested by all anglers. Relative standard errors are in parentheses.

	Year	
Creel Survey Statistic	2004	2014
Directed effort (h)	3,957.11	821.19 (56)
Directed effort(h)/acre	0.45	0.11 (56)
Total catch per hour	0.27	0.26 (129)
Total harvest	329.46 (432)	1,172.23 (91)
Harvest/acre	0.04 (432)	0.16 (91)
Percent legal released	92.75	89.20

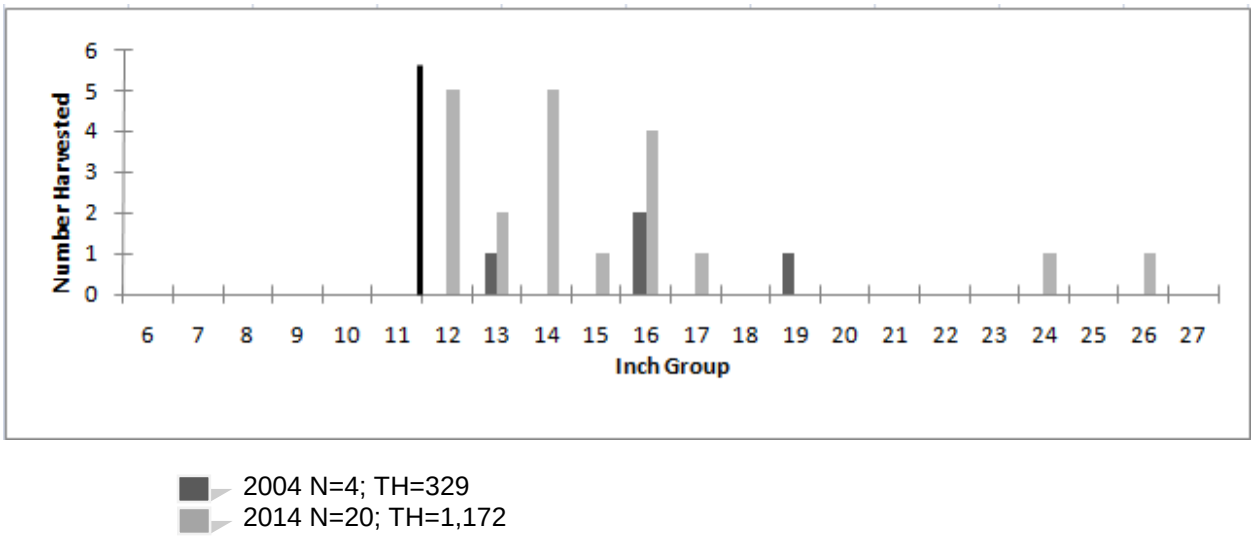


Figure 6. Length frequency of harvested Channel Catfish observed during creel surveys at Bridgeport Reservoir, Texas, March – May 2004, and from March – May 2014, all anglers combined. N is the number of harvested Channel Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period. Vertical line represents length limit at time of creel survey.

White Bass

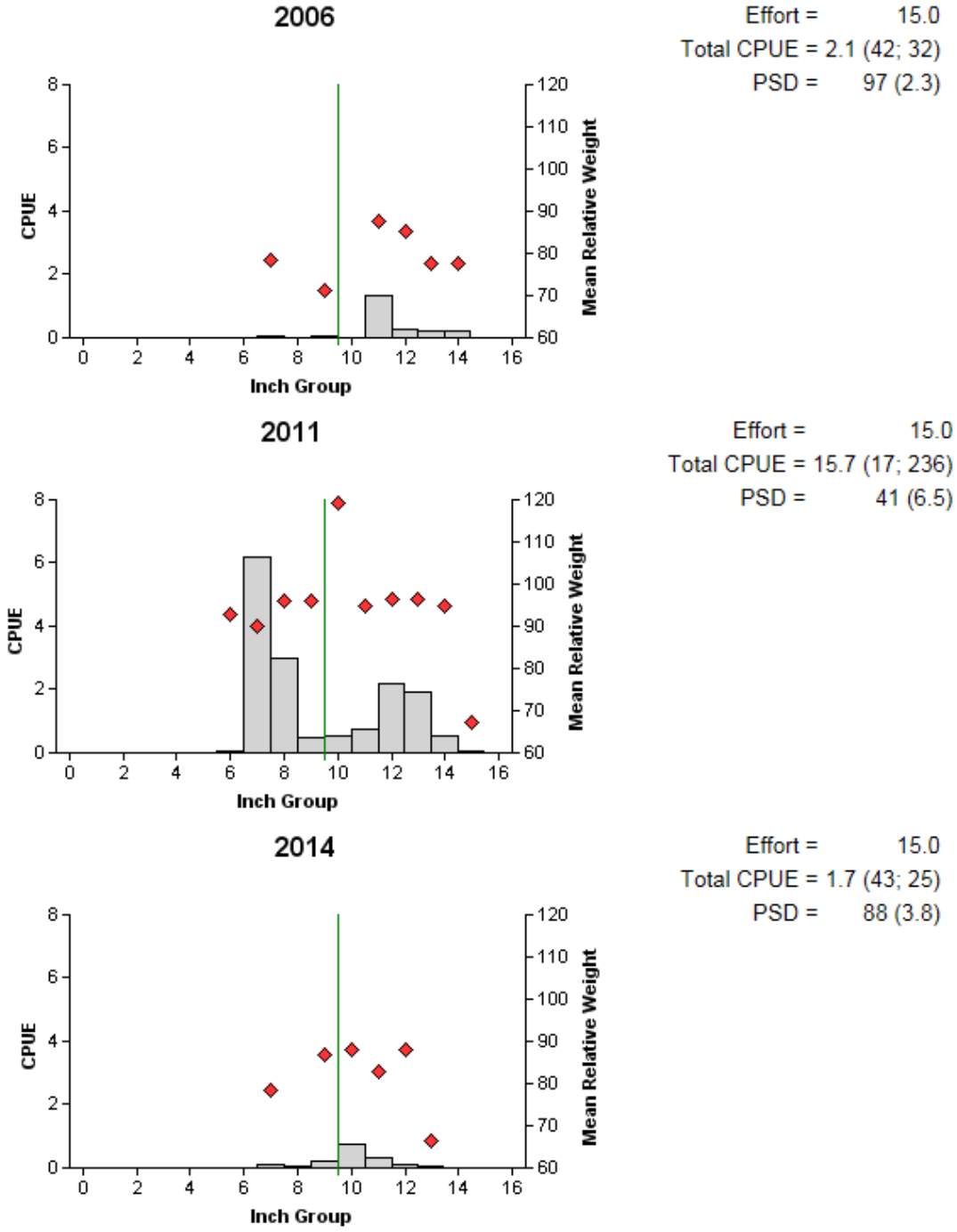


Figure 7. Number of White Bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Bridgeport Reservoir, Texas, 2006, 2011, and 2014. Vertical lines represent length limit at time of collection.

Table 13. Creel survey statistics for White Bass at Bridgeport Reservoir from September - November 2003 and from September - November 2013, where total catch per hour is for anglers targeting White Bass and total harvest is the estimated number of White Bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

	Year	
Creel Survey Statistic	2003	2013
Directed effort (h)	346.99 (75)	487.64 (61)
Directed effort(h)/acre	0.03 (75)	0.06 (61)
Total catch per hour	0.25 (58)	2.46 (52)
Total harvest	1,366.87 (48)	1,893.10 (41)
Harvest/acre	0.13 (48)	0.24 (41)
Percent legal released	63.67	76.79

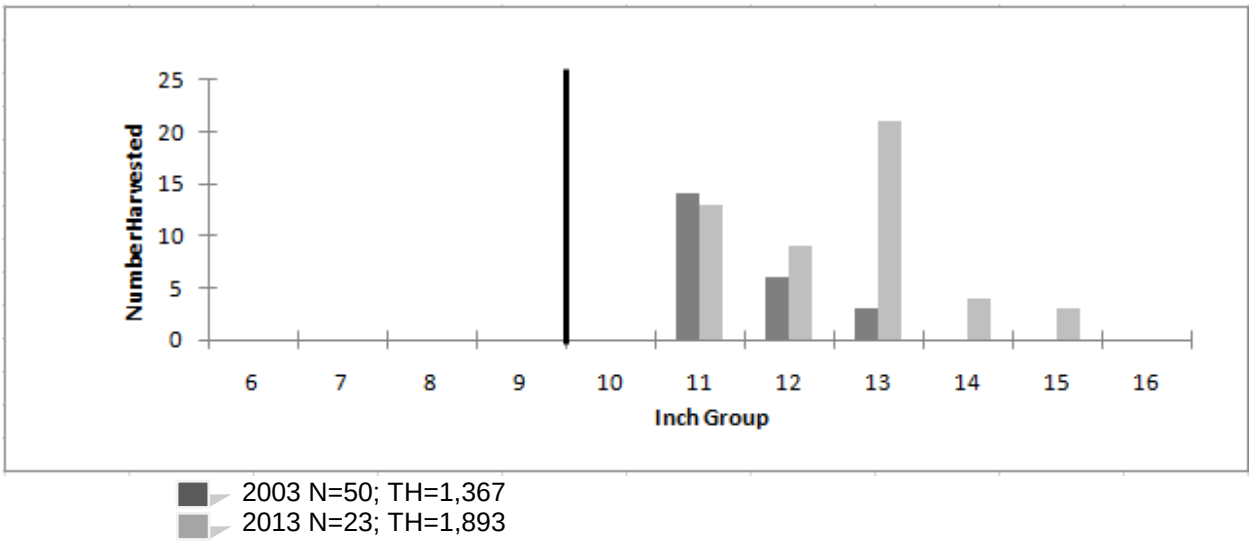


Figure 8. Length frequency of harvested White Bass observed during creel surveys at Bridgeport Reservoir, Texas, September - November 2003 and September - November 2013 all anglers combined. N is the number of harvested White Bass observed during creel surveys, and TH is the total estimated harvest for the creel period. Vertical line represents length limit at time of creel survey.

Table 14. Creel survey statistics for White Bass at Bridgeport Reservoir from March – May 2004 and from March – May 2014, where total catch per hour is for anglers targeting White Bass and total harvest is the estimated number of White Bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

	Year	
Creel Survey Statistic	2004	2014
Directed effort (h)	3,113.81	193.93 (106)
Directed effort(h)/acre	0.35	0.03 (106)
Total catch per hour	4.24 (40)	2.67
Total harvest	16,400.33 (30)	747.31 (98)
Harvest/acre	1.86 (30)	0.10 (98)
Percent legal released	33.23	75.59

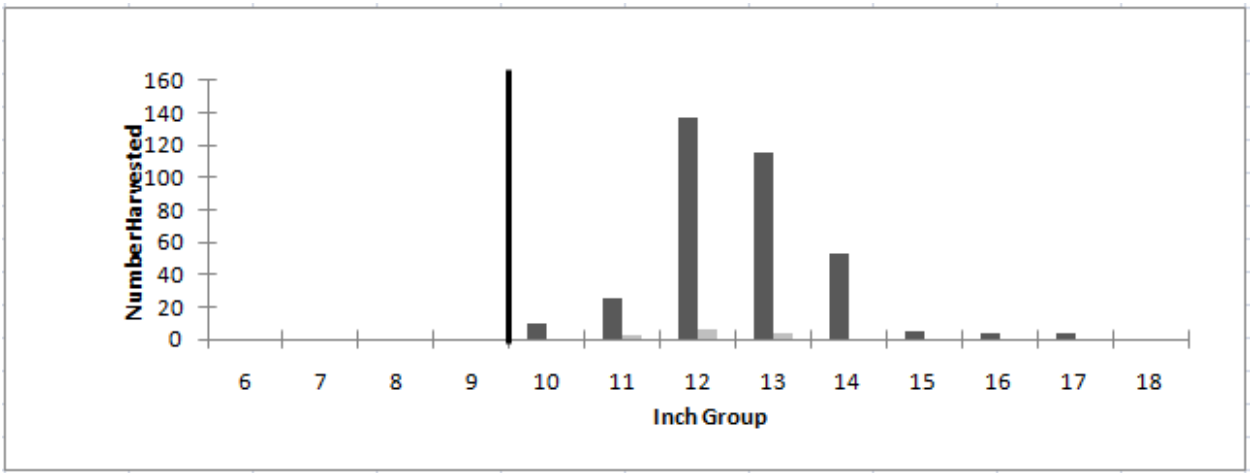


Figure 9. Length frequency of harvested White Bass observed during creel surveys at Bridgeport Reservoir, Texas, March – May 2004 and March - May 2014 all anglers combined. N is the number of harvested White Bass observed during creel surveys, and TH is the total estimated harvest for the creel period. Vertical line represents length limit at time of creel survey.

Palmetto Bass

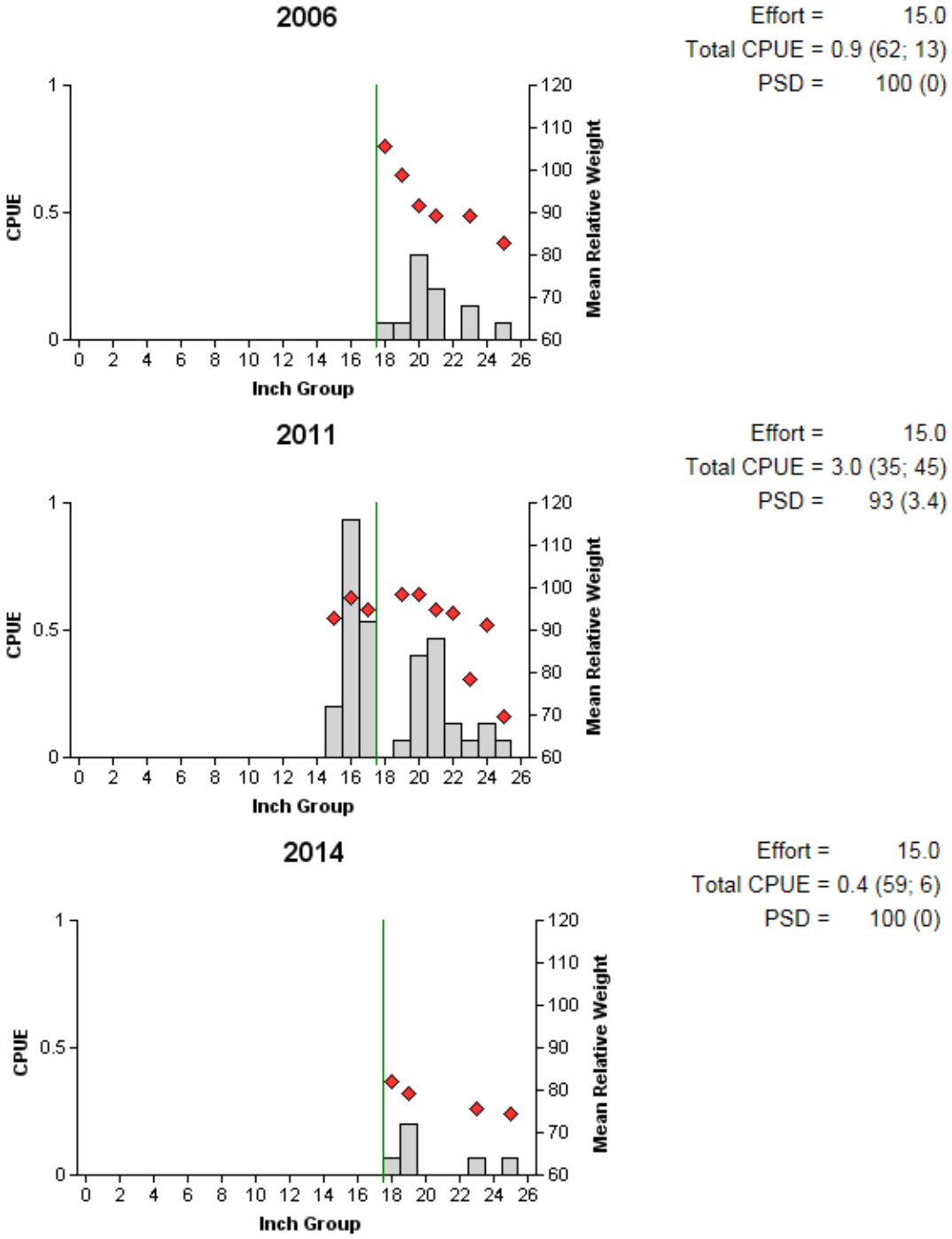


Figure 10. Number of Palmetto Bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net survey, Bridgeport Reservoir, Texas, 2006, 2011, and 2014. Vertical line represents length limit at time of collection.

Table 15. Creel survey statistics for Palmetto Bass at Bridgeport Reservoir from September - November and from September – November 2013, where total catch per hour is for anglers targeting Palmetto Bass and total harvest is the estimated number of Palmetto Bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

	Year	
Creel Survey Statistic	2003	2013
Directed effort (h)	3,538.16 (30)	1,297.61 (45)
Directed effort(h)/acre	0.35 (30)	0.16 (45)
Total catch per hour	0.34 (54)	0.33 (75)
Total harvest	709.07 (11)	246.93 (161)
Harvest/acre	0.07 (11)	0.03 (161)
Percent legal released	11.98	18.33

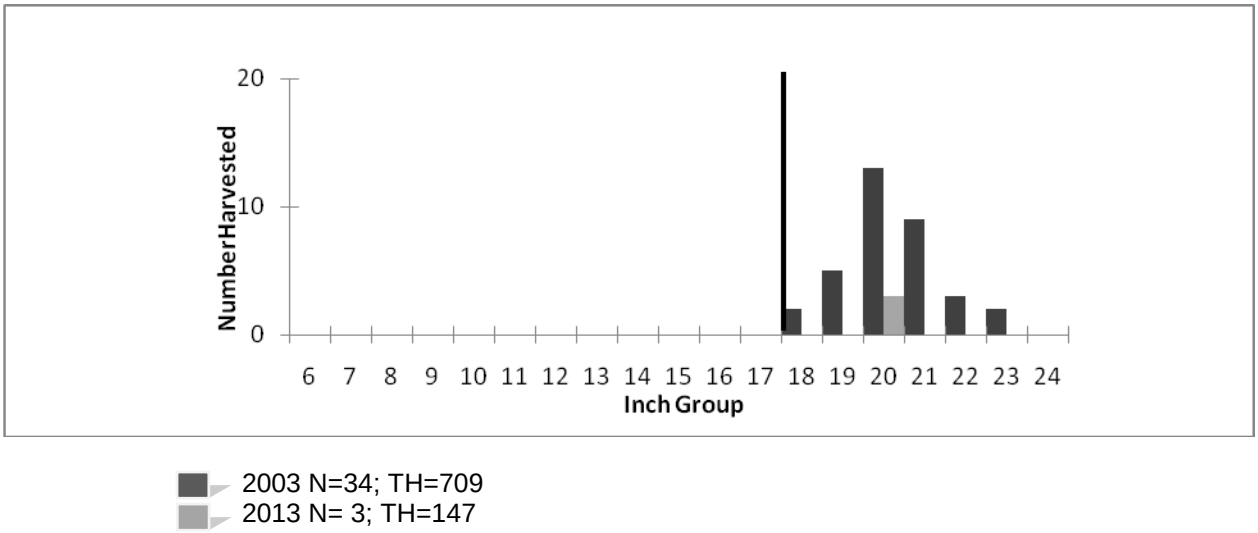


Figure 11. Length frequency of harvested Palmetto Bass observed during creel surveys at Bridgeport Reservoir, Texas, September - November 2003 and September - November 2013, all anglers combined. N is the number of harvested Palmetto Bass observed during creel surveys, and TH is the total estimated harvest for the creel period. Vertical line represents length limit at time of creel survey.

Table 16. Creel survey statistics for Palmetto Bass at Bridgeport Reservoir from March – May 2004 and from March – May 2014, where total catch per hour is for anglers targeting Palmetto Bass and total harvest is the estimated number of Palmetto Bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

	Year	
Creel Survey Statistic	2004	2014
Directed effort (h)	10,010.73	659.95 (61)
Directed effort(h)/acre	1.14	0.09 (61)
Total catch per hour	0.27 (62)	0.77 (95)
Total harvest	1,427.50 (83)	397.48 (131)
Harvest/acre	0.16 (83)	0.05 (131)
Percent legal released	46.92	7.00

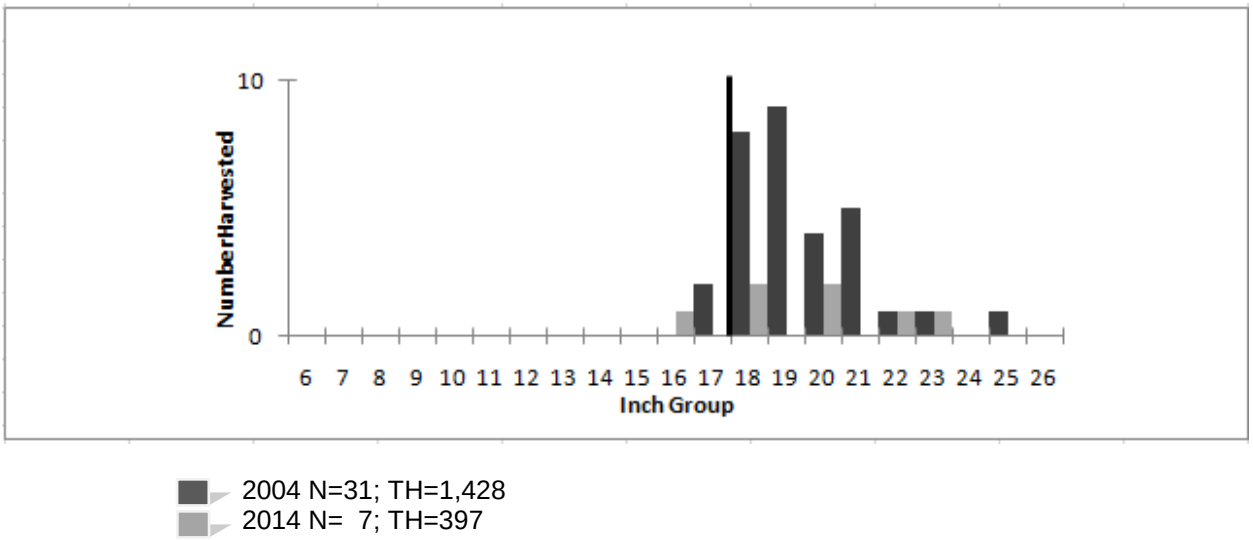


Figure 12. Length frequency of harvested Palmetto Bass observed during creel surveys at Bridgeport Reservoir, Texas, March – May 2004 and March – May 2014, all anglers combined. N is the number of harvested Palmetto Bass observed during creel surveys, and TH is the total estimated harvest for the creel period. Vertical line represents length limit at time of creel survey.

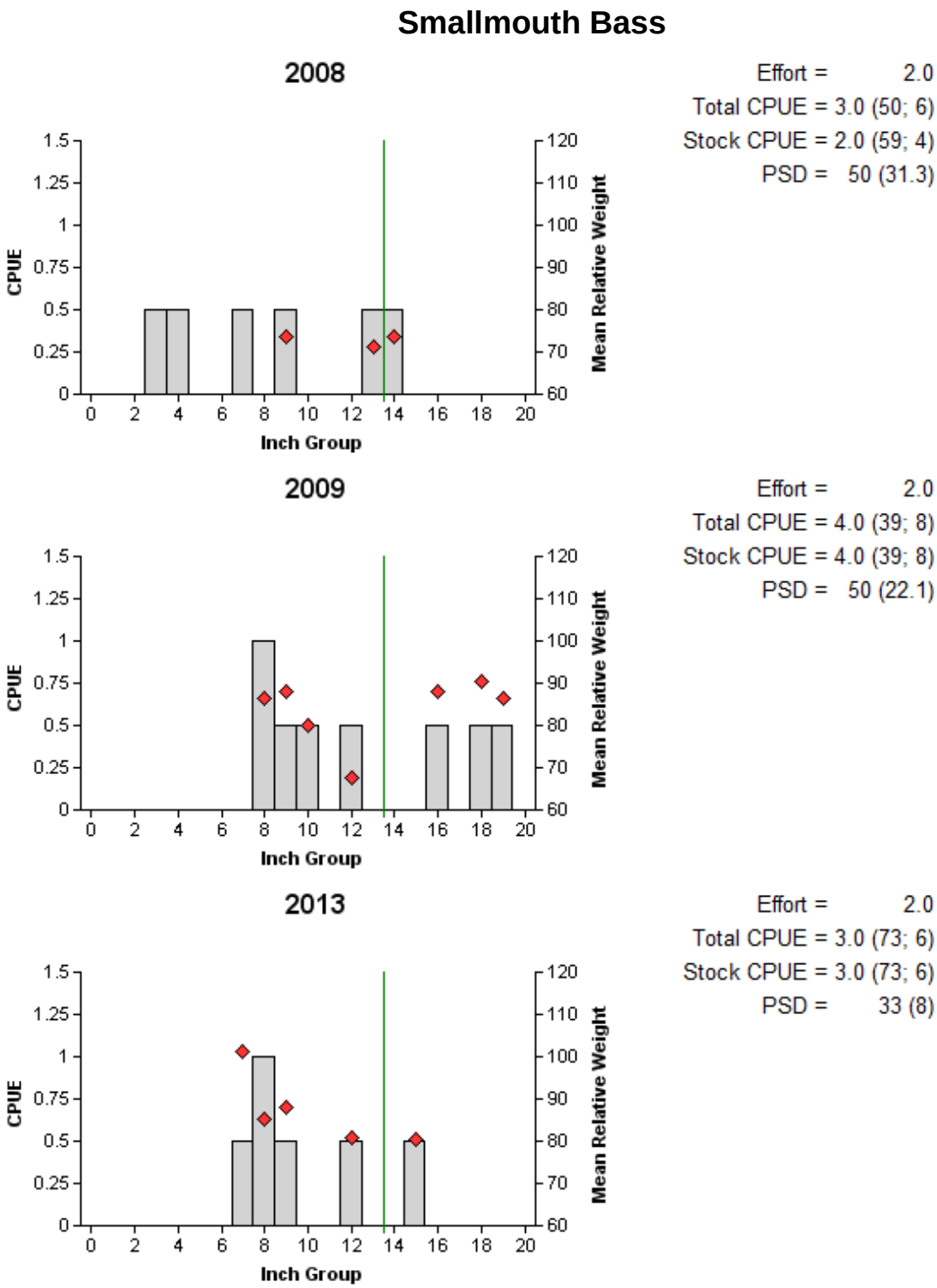


Figure 13. Number of Smallmouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Bridgeport Reservoir, Texas, 2008, 2009, and 2013. Vertical line represents length limit at time of collection.

Smallmouth Bass

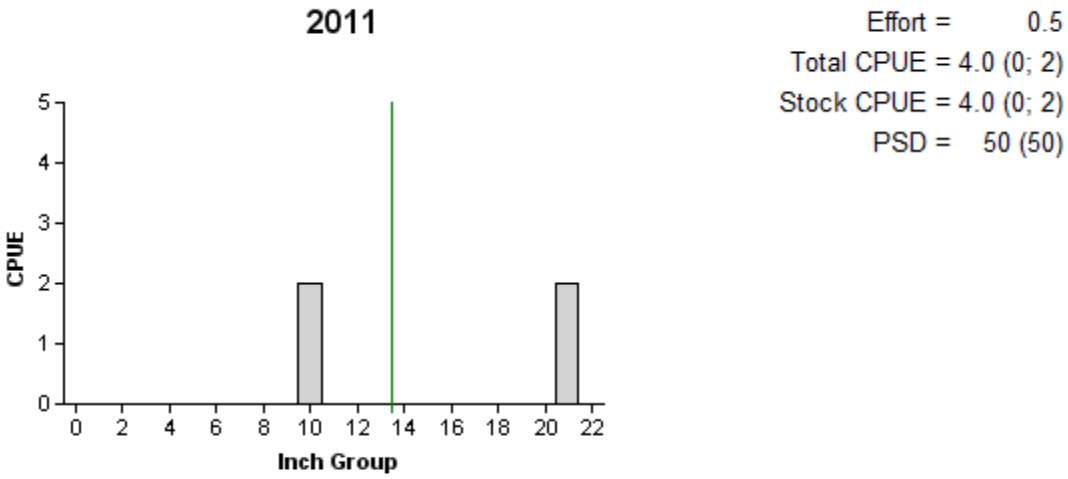


Figure 14. Number of Smallmouth Bass caught per hour (CPUE, bars), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring electrofishing survey, Bridgeport Reservoir, Texas, 2011. Vertical line represents length limit at time of collection.

Spotted Bass

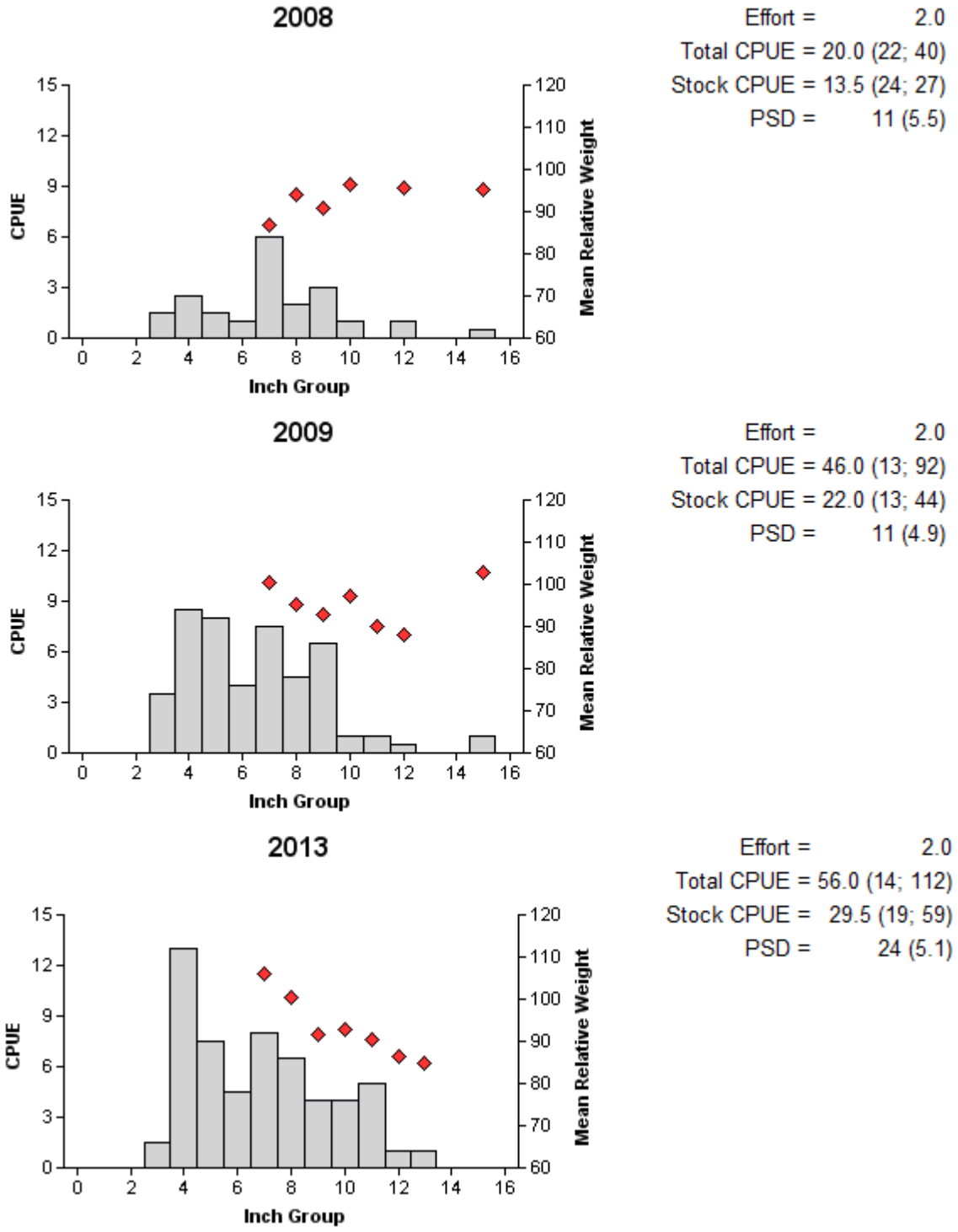


Figure 15. Number of Spotted Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Bridgeport Reservoir, Texas, 2008, 2009, and 2013.

Table 17. Creel survey statistics for Spotted Bass at Bridgeport Reservoir from September - November 2003 and September - November 2013. Relative standard errors (RSE) are in parentheses.

	Year	
Creel Survey Statistic	2003	2013
Total harvest	432.95 (94)	0.00
Harvest/acre	0.04 (94)	0.00
Percent legal released	76.05	100.00

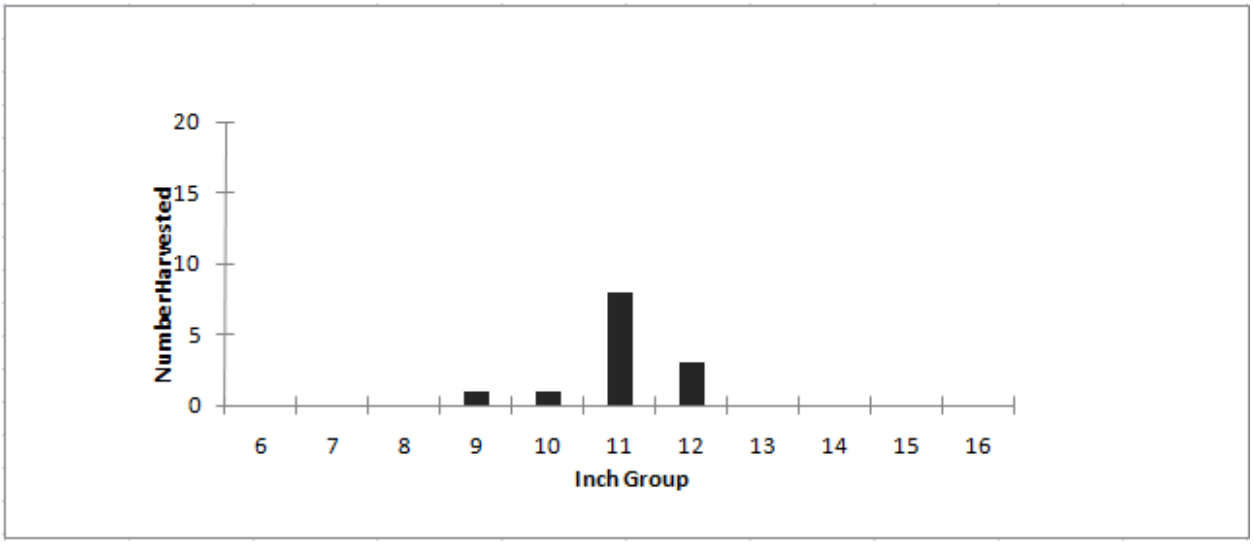


Figure 16. Length frequency of harvested Spotted Bass observed during creel surveys at Bridgeport Reservoir, Texas, September - November 2003 and September - November 2013, all anglers combined. N is the number of harvested Spotted Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

Table 18. Creel survey statistics for Spotted Bass at Bridgeport Reservoir from March – May 2004 and March – May 2014. Relative standard errors (RSE) are in parentheses.

	Year	
Creel Survey Statistic	2004	2014
Total harvest	598.63 (144)	56.78 (707)
Harvest/acre	0.07 (144)	0.01 (707)
Percent legal released	71.03	100.00

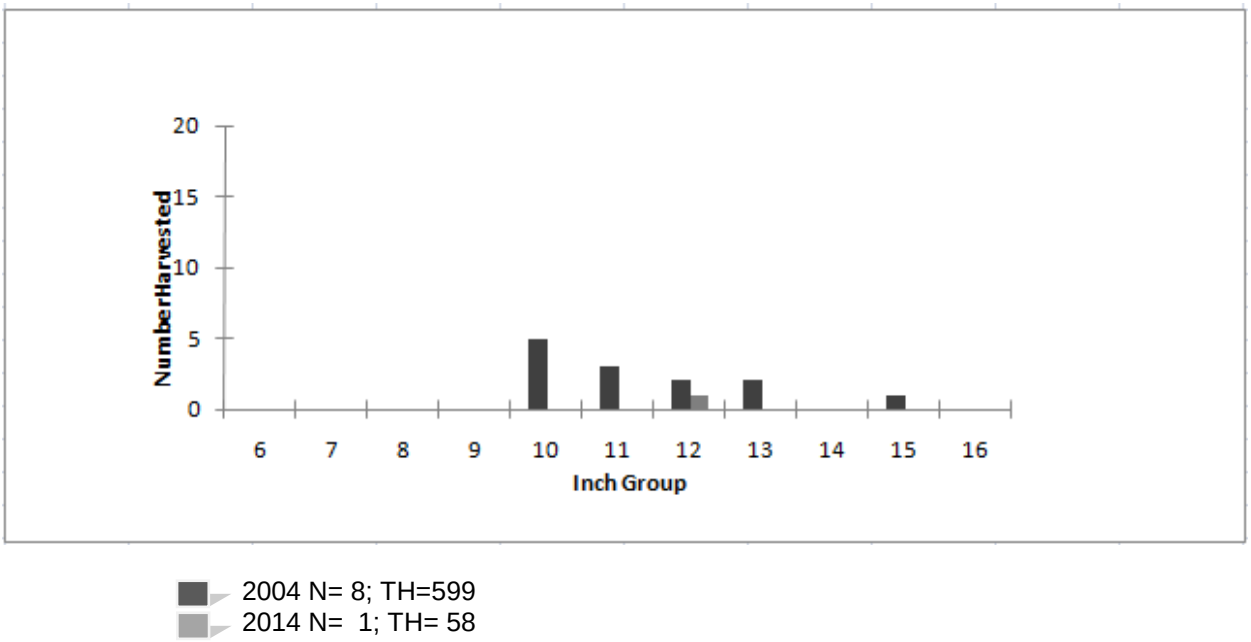


Figure 17. Length frequency of harvested Spotted Bass observed during creel surveys at Bridgeport Reservoir, Texas, March – May 2004 and March - May 2014, all anglers combined. N is the number of harvested Spotted Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

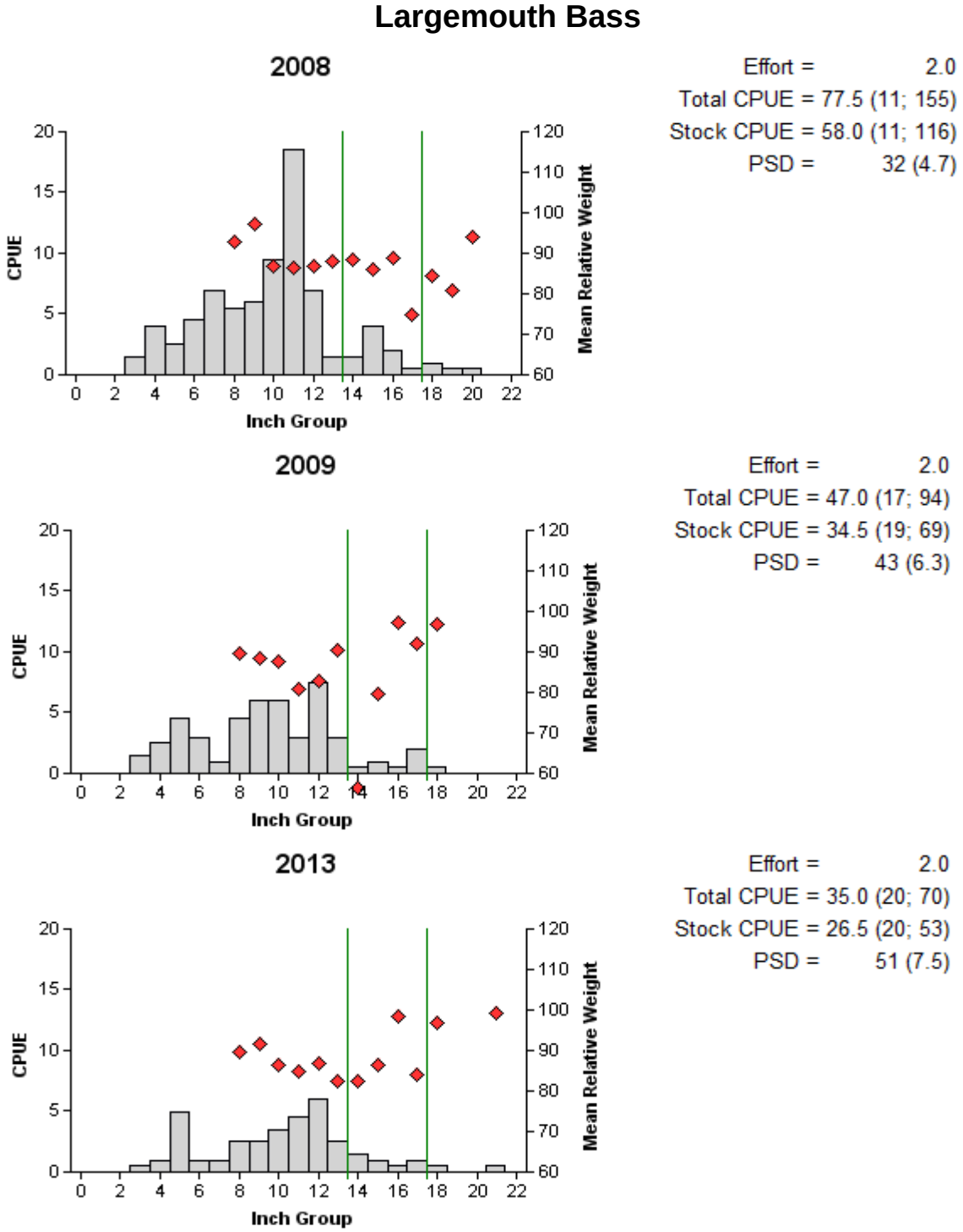


Figure 18. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Bridgeport Reservoir, Texas, 2008, 2009, and 2013. Vertical lines represent slot length limit at time of collection.

Table 19. Creel survey statistics for Largemouth Bass at Bridgeport Reservoir from September - November 2003 and September - November 2013, where total catch per hour is for anglers targeting Largemouth Bass and total harvest is the estimated number of Largemouth Bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

	Year	
Creel Survey Statistic	2003	2013
Directed effort (h)	3,381.64	1,520.77 (43)
Directed effort(h)/acre	0.33	0.19 (43)
Total catch per hour	1.01	1.07 (33)
Total harvest	704.31 (63)	329.23 (91)
Harvest/acre	0.07 (63)	0.04 (91)
Percent legal released	66.56	91.74

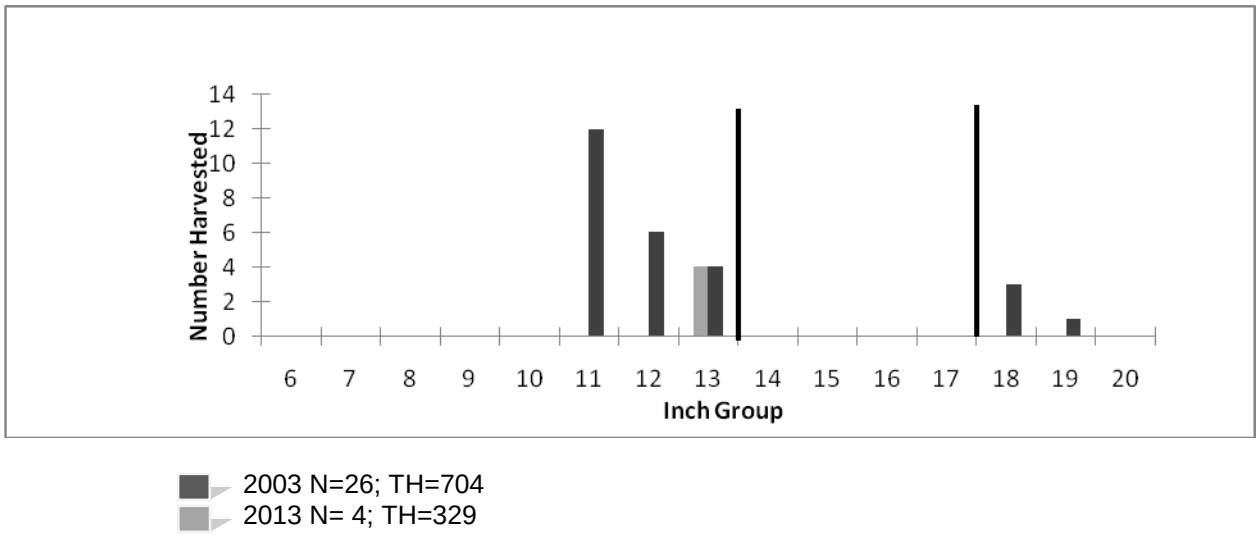


Figure 19. Length frequency of harvested Largemouth Bass observed during creel surveys at Bridgeport Reservoir, Texas, September - November 2003 and September – November 2013, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and TH is the total estimated harvested Largemouth Bass for the creel period. Vertical lines represent the slot-length limit at time of creel survey.

Table 20. Creel survey statistics for Largemouth Bass at Bridgeport Reservoir from March – May 2004 and March – May 2014, where total catch per hour is for anglers targeting Largemouth Bass and total harvest is the estimated number of Largemouth Bass harvested by all anglers. Directed effort data for March – May 2004 was not segregated for each species of black bass, so it is not presented. Relative standard errors (RSE) are in parentheses.

	Year	
Creel Survey Statistic	2004	2014
Directed effort (h)		1,836.19 (43)
Directed effort(h)/acre		0.25 (43)
Total catch per hour		0.69 (32)
Total harvest	2,862.12 (45)	113.56 (167)
Harvest/acre	0.33 (45)	0.02 (167)
Percent legal released	79.45	76.72

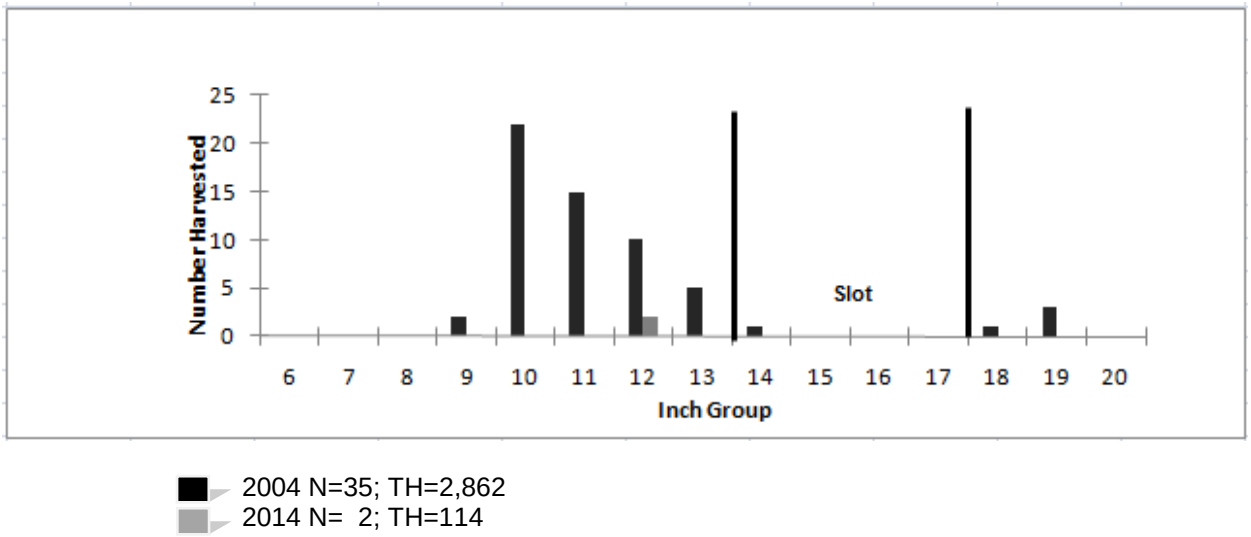


Figure 20. Length frequency of harvested Largemouth Bass observed during creel surveys at Bridgeport Reservoir, Texas, March – May 2004 and March – May 2014, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and TH is the total estimated harvested Largemouth Bass for the creel period. Vertical lines represent the slot-length limit at time of creel survey.

Table 21. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Bridgeport Reservoir, Texas, 1995, 1998, 1999, 2001, 2003, 2005, 2013. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, Intergrade = hybrid between a FLMB and a NLMB. Genetic composition was determined by electrophoresis prior to 2005 and with micro-satellite DNA analysis since 2005.

		Number of fish				
Year	Sample size	FLMB	Intergrade	NLMB	% FLMB alleles	% FLMB
1995	35	1	13	21	19.3	2.9
1998	40	0	27	13	30.0	0.0
1999	40	3	25	12	38.8	7.5
2001	30	0	18	12	22.5	0.0
2003	30	1	21	8	35.0	3.3
2005	30	0	20	10	15.5	0.0
2013	30	1	26	3	42.0	3.0

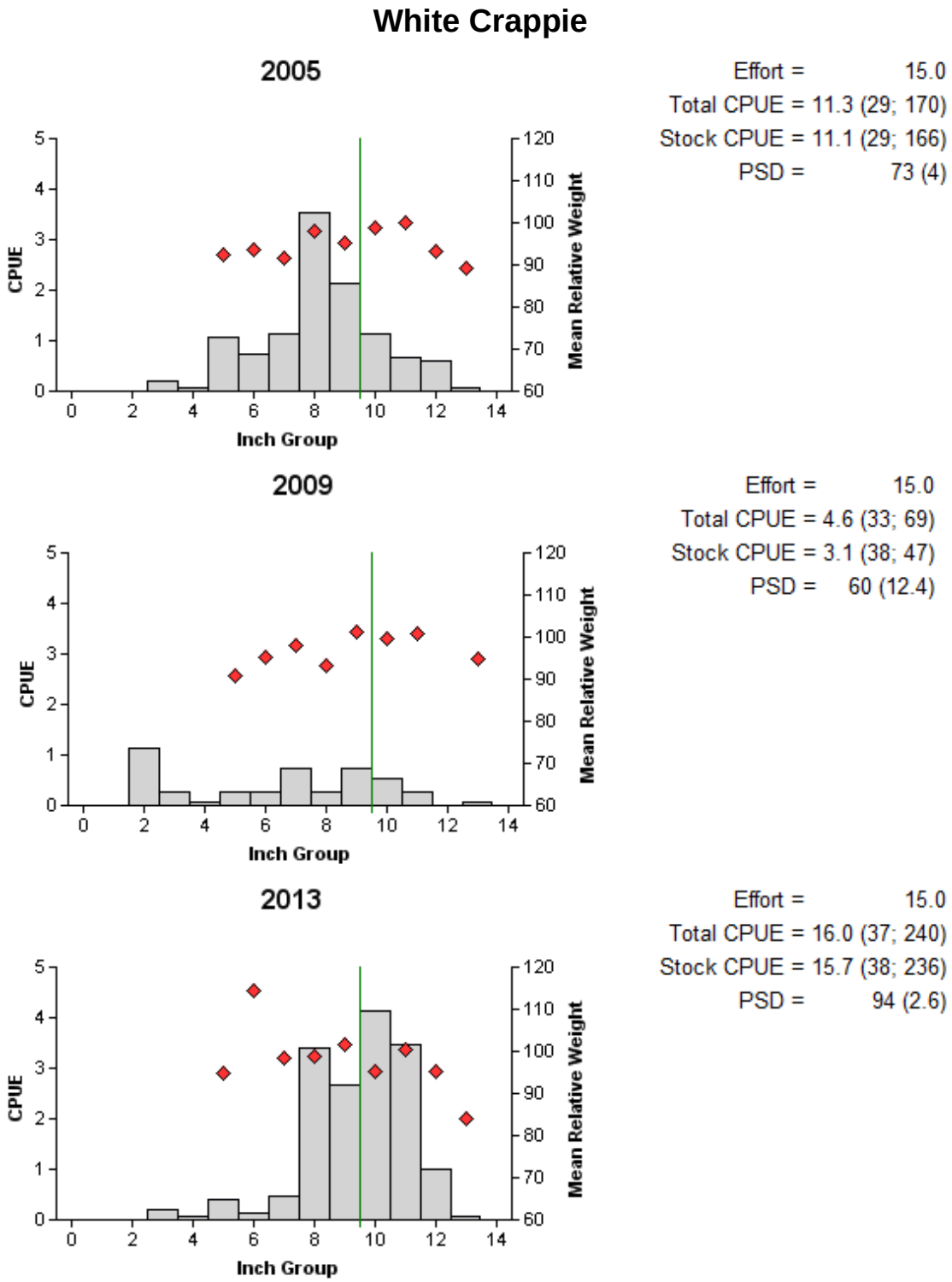


Figure 21. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Bridgeport Reservoir, Texas, 2005, 2009, and 2013. Vertical lines represent length limit at time of collection.

Table 22. Creel survey statistics for White Crappie at Bridgeport Reservoir from September - November 2003 and from September - November 2013, where total catch per hour is for anglers targeting White Crappie and total harvest is the estimated number of White Crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses.

	Year	
Creel Survey Statistic	2003	2013
Directed effort (h) for White Crappie	630.25	843.64 (41)
Directed effort(h)/acre for White Crappie	0.06	0.11 (41)
Total catch per hour for White Crappie	0.96 (57)	4.02 (96)
Total harvest for White Crappie	477.40 (98)	1,495.34 (55)
Harvest/acre for White Crappie	0.05(98)	0.19 (55)
Percent legal released for White Crappie	0.00	6.90

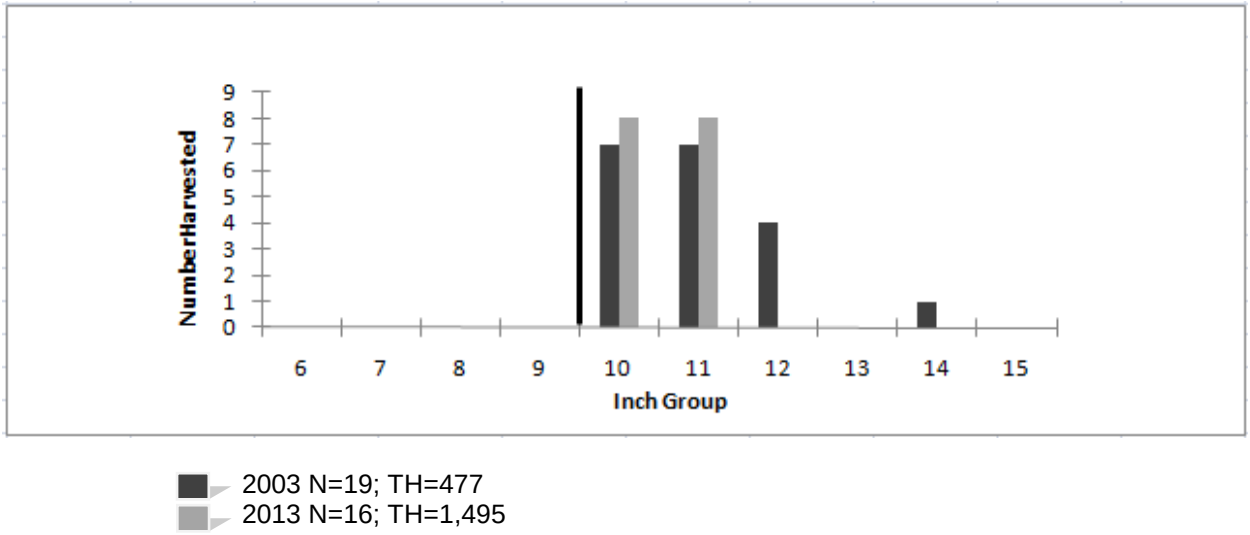


Figure 22. Length frequency of harvested White Crappie observed during creel surveys at Bridgeport Reservoir, Texas, September - November 2003 and September - November 2013, all anglers combined. N is the number of harvested White Crappie observed during creel surveys, and TH is the total estimated harvest for the creel period. Vertical line represents length limit at time of creel survey.

Table 23. Creel survey statistics for White Crappie at Bridgeport Reservoir from March – May 2004 and from March – May 2014, where total catch per hour is for anglers targeting White Crappie and total harvest is the estimated number of White Crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses.

	Year	
Creel Survey Statistic	2004	2014
Directed effort (h) for White Crappie	21,419.29	5928.55 (28)
Directed effort(h)/acre for White Crappie	2.43	0.80 (28)
Total catch per hour for White Crappie	7.00	2.38 (31)
Total harvest for White Crappie	29,787.70 (40)	14,780.47 (58)
Harvest/acre for White Crappie	3.38 (40)	2.00 (58)
Percent legal released for White Crappie	11.61	1.20

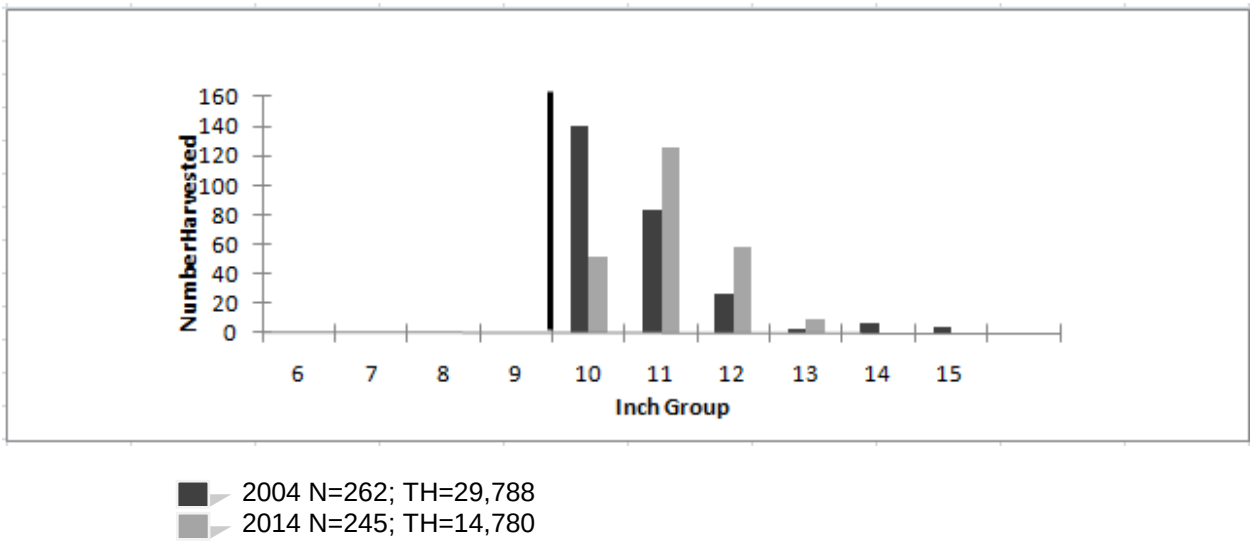


Figure 23. Length frequency of harvested White Crappie observed during creel surveys at Bridgeport Reservoir, Texas, March – May 2004 and March – May 2014, all anglers combined. N is the number of harvested White Crappie observed during creel surveys, and TH is the total estimated harvest for the creel period. Vertical line represents length limit at time of creel survey.

Table 24. Proposed sampling schedule for Bridgeport 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.

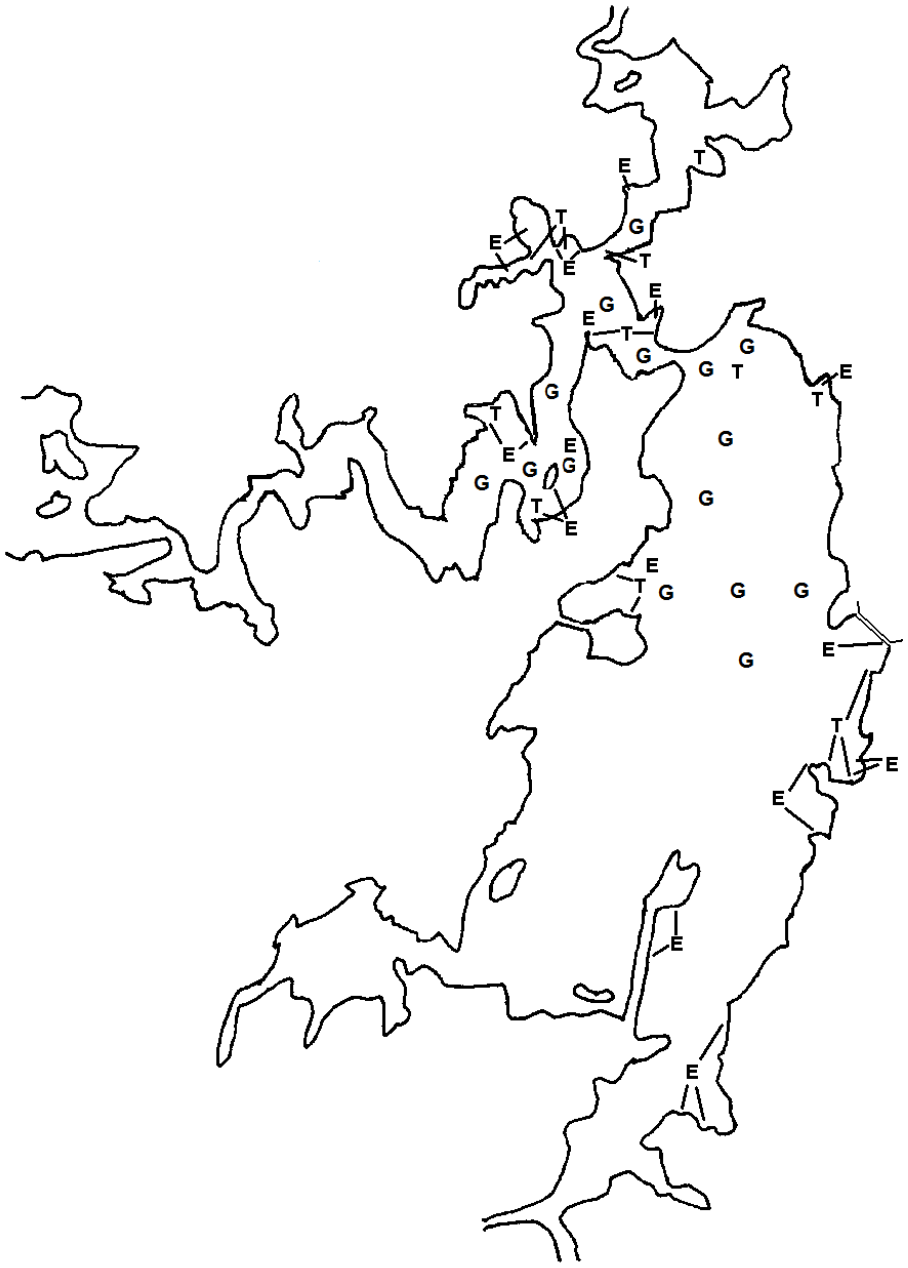
Survey year	Electrofish Fall(Spring)	Trap net	Gill net	Habitat		Access	Creel survey	Report
				Structural	Vegetation			
2014-2015								
2015-2016								
2016-2017								
2017-2018	S	S	S		S	S		S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Bridgeport Reservoir, Texas, 2013-2014.

	Gill Netting		Trap Netting		Electrofishing	
Species	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad					92	46.0
Threadfin Shad					382	191.0
Channel catfish	57	3.8				
Flathead catfish	2	0.1				
White Bass	25	1.7				
Palmetto Bass	6	0.4				
Green Sunfish					71	35.5
Warmouth					4	2.0
Orangespotted Sunfish					3	1.5
Bluegill					208	104.0
Longear Sunfish					198	99.0
Redear Sunfish					17	8.5
Smallmouth Bass					6	3.0
Spotted Bass					112	56.0
Largemouth Bass					70	35.0
White Crappie			240	16.0		
Black Crappie			20	1.3		

APPENDIX B



Location of sampling sites, Bridgeport Reservoir, Texas, 2013-2014. Trap netting, electrofishing, gill netting sample stations are indicated by T, E, and G, respectively. Water level was 20.6 feet below conservation for trap netting, 20.4 feet below conservation for electrofishing, and 21.5 feet below conservation for gill netting.

APPENDIX C

Historical catch rates of targeted species by gear type for Bridgeport Reservoir, Texas, 1995-1999 and 2001-2003.

		Year							
Gear	Species	1995[a, b]	1996[a, b]	1997[c]	1998[b, c]	1999[b, c]	2001[c]	2002[c]	2003[c]
Gill Netting	Channel catfish			1.9				2.5	
(fish/net night)	Flathead catfish			0.0				0.2	
	White bass			4.3				2.7	
	Palmetto bass			9.2				2.0	
Electrofishing	Gizzard shad			49.0			69.0		25.0[e]
(fish/hour)	Threadfin shad			4.5			43.5		22.0[e]
	Green sunfish			37.0			23.0		
	Warmouth			5.5			2.0		
	Orangespotted sunfish			0.0			0.0		
	Bluegill			42.0			109.0		
	Longear sunfish			44.0			138.5		
	Redear sunfish			10.5			10.5		
	Smallmouth bass	0.0	1.0	2.0	6.5	6.0	1.0	0.0	1.1[d]/1.0[e]
	Spotted bass	61.5	93.0	55.5	76.0	79.0	33.0	36.5	27.4[d]/73.0[e]
	Largemouth bass	72.0	63.5	63.0	119.5	107.5	89.0	40.5	44.0[d]/56.0[e]
Trap Netting	White crappie			10.2			13.6		
(fish/net night)	Black crappie			0.0			0.0		

APPENDIX C (continued)

Historical catch rates of targeted species by gear type for Bridgeport Reservoir, Texas, 2004 – 2006, 2008-2009, 2011, and 2013 – 2014.

		Year								
Gear	Species	2004[c]	2005[c, f]	2006[c, g]	2008[g, h]	2009[c]	2011[i]	2013[c]	2014[c]	**Avg.**
Gill Netting	Channel catfish	1.8		3.3	4.0		3.4		3.8	**3.0**
(fish/net night)	Flathead catfish	0.1		0.3	0.0		0.2		0.1	**0.1**
	White Bass	4.3		2.1	15.3		15.7		1.7	**6.6**
	Palmetto Bass	1.5		0.9	19.6		3.0		0.4	**5.2**
Electrofishing	Gizzard Shad		21.5	76.0	27.0	39.5		46.0		**50.4**
(fish/hour)	Threadfin Shad		88.5	12.7	37.0	456.0		191.0		**106.9**
	Green Sunfish		61.0			53.5		35.5		**42.0**
	Warmouth		9.0			1.5		2.0		**4.0**
	Orangespotted Sunfish		0.0			2.0		1.5		**0.7**
	Bluegill		227.5			118.5		104.0		**120.2**
	Longear Sunfish		260.0			93.0		99.0		**126.9**
	Redear Sunfish		33.0			12.0		8.5		**14.9**
	Smallmouth Bass		1.0	1.3	3.0	4.0	4.0[j]	3.0		**2.6[d]/2.3**
	Spotted Bass		37.5	21.3	20.0	46.0		56.0		**27.4[d]/52.9**
	Largemouth Bass		92.0	18.7	77.5	47.0		35.0		**44.0[d]/67.8**
Trap Netting	White Crappie		11.3			4.6		16.0		**11.1**
(fish/net night)	Black Crappie		0.0			0.1		1.3		**0.3**

[a] All sampling stations for all gear were subjectively selected.
[b] Black bass sampled only.
[c] All sampling stations for all gear were randomly selected.
[d] Bass only electrofishing survey in the spring.
[e] Bass and shad only electrofishing survey in the fall of 2003.
[f] Electrofishing and gill netting stations were randomly selected, while trap netting stations were subjectively selected.
[g] Black bass and shad sampled only during electrofishing.
[h] Gill net survey sampling stations were subjectively selected and effort was 7 net nights.
[i] Gill net survey sampling stations were randomly selected.
[j] Electrofishing survey was Smallmouth Bass only in the spring.