

PERFORMANCE REPORT

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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2013 Fisheries Management Survey Report

Davy Crockett Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Davy Crockett Reservoir were surveyed in 2013 using electrofishing and trap netting and in 2014 using gill netting. Habitat, vegetation, and angler access was surveyed in 2013. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings

- **Reservoir description:** Davy Crockett Reservoir is a 355-acre impoundment located on Dixon and Sandy Creeks approximately 14 miles northeast of Bonham. A water level drawdown has kept the reservoir 6.5 feet low since spring 2013. Davy Crockett Reservoir has high biological productivity. Habitat features consisted of open water, natural shoreline, and native aquatic vegetation (floating-leaved, emergent, submersed; greater than 55% coverage).
- **Management history:** Important sport fish included Channel Catfish, Largemouth Bass, and crappies. The management plan from the 2010 survey report included a recommendation to stock advanced sized Channel Catfish to supplement low recruitment to legal size. Advanced Channel Catfish were stocked in 2010 and 2011. The plan also included the introduction of Threadfin Shad. They were stocked successfully in 2011. Electrofishing sampling indicated their establishment in the forage base. The 14- to 18-inch slot length limit for Largemouth Bass was evaluated with a creel in spring 2011 and winter electrofishing. Habitat surveys have revealed an increase in emerged and submerged vegetation in this reservoir.
- **Fish community**
 - **Prey species:** Electrofishing catch rate of Gizzard Shad was low, with only 6% of the Gizzard Shad available as prey. Threadfin Shad catch rates dropped from previous survey, but still provided prey. However, they may have been killed during extreme cold temperatures of the winter of 2013-2014. Electrofishing catch rates of Bluegill declined over previous years. They still remained an important prey and recreational species. The drawdown may have affected catch rates.
 - **Channel Catfish:** Gill net catch rate of Channel Catfish was higher than past surveys and the entire sample population was legal length and in excellent condition. Aging indicated all collected fish were from stocking years and there was no evidence of reproduction. Growth was excellent. There was a viable fishery.
 - **Largemouth Bass:** Electrofishing catch rate of Largemouth Bass was down again but fish were collected in and over the slot. Size structure has improved. Supplemental sampling also showed fish in and above the slot. Largemouth bass had good growth below the slot and grew through the slot quickly. They were generally in good condition. They were the most sought after fish by anglers with some harvest.
 - **Crappies:** White Crappie catch rates dropped and body condition was adequate. Black Crappie catch rates were higher than White Crappie and highest on record. Crappie were the second most sought after fish by anglers and harvest was good with fish up to 15 inches being harvested.
- **Management strategies:** The Channel Catfish population may benefit from stocking advanced size fingerlings. The existing slot length limit on Largemouth Bass will be kept. Sample the Largemouth Bass population. Due to possible winter (2013-2014) kill of Threadfin Shad, stock adult Threadfin Shad to ensure forage diversity. Encourage U.S. Forest Service to install and maintain lighting between existing boat ramp and boarding/fishing pier at the east campground and to repair boat ramp. Monitor American lotus and advise U.S. Forest Service on treatment if needed. Inform U.S. Forest Service 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 Davy Crockett 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 are presented with the 2013-2014 data for comparison.

Reservoir Description

Davy Crockett Reservoir is a 355-acre impoundment constructed in 1938 on Dixon and Sandy Creeks. It is located in Fannin County approximately 14 miles northeast of Bonham and is operated and controlled by the U.S. Forest Service. Primary water uses included wildlife management and recreation. Average Secchi disk transparency was 46.1 inches for 2013-2014 and suggests eutrophic conditions as per Carlson's Trophic State Index (Texas Commission on Environmental Quality 2011). Dense macrophyte growth around the shoreline is another eutrophic indicator. Eutrophic conditions are further supported by a heavily vegetated watershed that deposits organic debris on the ground resulting in allochthonous enrichment (Findenegg 1966; Sorokin 1966). Habitat at time of sampling consisted of open water, natural shoreline, and native aquatic vegetation. Water elevation was not monitored in this reservoir, but a reservoir drawdown to control aquatic vegetation was initiated in spring of 2013. The reservoir had been kept 6.5 feet below conservation until spring of 2014, when the outlet gates were closed in March 2014. Other descriptive characteristics for Davy Crockett Reservoir are in Table 1.

Angler Access

Boat access consisted of one public boat ramp with parking, but no lighting. Additional boat ramp characteristics are in Table 2. The ramp is in need of repair where parts of the ramp have cracked and broken. An unlighted boarding pier is available for the ramp. There is a campground on the west side of the reservoir with bank angler access, which is hindered by excessive growth of bulrush and cattails. Further information about Davy Crockett Reservoir and its facilities can be obtained by visiting the Texas Parks and Wildlife Department (TPWD) web site at www.tpwd.state.tx.us and navigating within the fishing web page.

Management History

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

1. Stock advanced fingerling Channel Catfish (12.5/acre) when surplus is available.
Action: Advanced fingerling Channel Catfish were stocked in 2010 (11/acre) and 2011 (106/acre).
2. Conduct supplemental hoop netting survey in fall 2010 to verify absence of sub-stock Channel Catfish.
Action: With the stocking of Channel Catfish in 2010 and 2011, hoop netting would not have been able to verify the absence of sub-stock Channel Catfish. Any fish collected by hoop netting could be stocked fish or reservoir fish.
3. Evaluate the Largemouth Bass 14- to 18-inch slot limit with a spring creel and Largemouth Bass only electrofishing during low aquatic vegetation months of January, February, and March 2011.
Action: A spring creel was conducted in 2011. Largemouth Bass only electrofishing was conducted in January and March 2011. Results are presented in this report and the conclusion was to keep the 14- to 18-inch slot.
4. Stock adult Threadfin Shad (1/acre) spring of 2010.
Action: Adult Threadfin Shad were stocked in 2010 (1.1/acre). Electrofishing samples in

- 2013 indicated the Threadfin Shad were established.
5. Boat ramp and boarding/fishing pier are unlighted.
Action: U.S. Forest Service was encouraged to install and maintain lighting between existing boat ramp and boarding/fishing pier at the east campground. Lighting has not been installed.
 6. Cooperate with the U.S. Forest Service to post appropriate signage on invasive species, especially zebra mussels, at access points around the reservoir.
Action: Signage was posted at access points and U.S. Forest Service personnel were informed of invasive species program.

Harvest regulation history: Sportfishes in Davy Crockett Reservoir are currently managed with statewide regulations with the exception of Largemouth Bass (Table 3). From 1986 to 1996, Largemouth Bass were managed with a 14-inch minimum length limit. A 14- to 18-inch slot length limit was implemented in 1996 to improve the population size structure.

Stocking history: Since the last survey in 2009-2010, Davy Crockett Reservoir was stocked with Threadfin Shad and Channel Catfish. Florida Largemouth Bass were stocked annually from 1997 to 1999. The complete stocking history since 1968 is in Table 4.

Vegetation/habitat history: Davy Crockett Reservoir supports a diverse native aquatic vegetation community of emergent (common cattail and bulrush), submersed (southern naiad and coontail), and floating-leaved plants (American lotus). Over the years the submersed and floating-leaved vegetation has increased to cause some access problems in the upper end of each arm for anglers and fish sampling. In 2010 the native aquatic vegetation coverage was 45%.

Water Transfer: Davy Crockett Reservoir is used exclusively for wildlife management and recreation and water is not transferred to or from any other location.

METHODS

Fishes were collected by electrofishing (1 hour at 12 5-min stations), gill netting (5 net nights at 5 stations), and trap netting (5 net nights at 5 stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing and for gill and trap nets as the number of fish caught per net night (fish/nn). All survey sites were randomly selected and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011).

A roving creel survey was conducted from March through May 2011. Angler interviews were conducted on 5 weekend days and 4 weekdays 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 (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 were used for aging Channel Catfish, Largemouth Bass, and Black and White Crappie according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). Tier 1 protocol of the aging procedures in the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011) was used to select sizes of Channel Catfish. Tier 2 protocol was used to select the sizes of all other target species for aging. 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.

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 2013 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).

RESULTS AND DISCUSSION

Habitat: Shoreline habitat (Table 5) at Davy Crockett Reservoir was mostly natural with some rock outcroppings and bulkhead (dam face). The reservoir supported emergent, submersed, and floating-leaved native aquatic vegetation (Table 6). Emergent aquatic vegetation (common cattail and bulrush) was common and not problematic. It remained static from previous surveys. Submersed aquatic vegetation (southern naiad and coontail) was also common, but was considered a nuisance. Due to the drawdown submersed vegetation decreased by about one-third. However, floating-leaved aquatic vegetation (American lotus) doubled and limited access to portions of both major bays in the upper part of the reservoir. Native aquatic vegetation covered over 55% of the reservoir and occurred from the shoreline out to 8 feet deep water. This was a 22% increase from the 2010 survey. As the reservoir recovers from the drawdown, vegetation densities should decrease and allow better angling access.

Creel: Directed fishing effort in spring 2011 was highest for Largemouth Bass (42.6%), followed by anglers fishing for White Crappie and anything (Table 7). Channel Catfish angling pressure dropped off considerably in spring 2011. Total fishing effort for all species and direct expenditures at Davy Crockett Reservoir were substantially higher in spring 2011 (Table 8).

Prey species: Electrofishing CPUE of Gizzard Shad and Bluegill were 71.0/h and 131.0/h, respectively. Index of vulnerability (IOV) for Gizzard Shad was poor with only 6% of Gizzard Shad available to existing predators; this was much lower than IOV estimates in previous years (Figure 1). Total CPUE of Gizzard Shad increased from 2009 survey (Figure 1). Threadfin Shad, re-introduced in 2010, were collected in decreased numbers (Appendices A and C), but still provided acceptable levels of vulnerable prey. The area once again experienced an unusually cold winter during 2013-2014 and may have resulted in a significant winter-kill of Threadfin Shad. Total CPUE of Bluegill in 2013 was below the 2009 sample, which made the 2013 survey the lowest on record (Appendix C) and size structure continued to be dominated by small individuals (Figure 2). The reservoir drawdown could have had an impact on the catch rates of prey species with the dramatic increase in floating-leaved aquatic vegetation, which made it difficult to sample the forage population.

Anglers had directed effort for sunfish, but Bluegill was the most common sunfish caught. Table 9 shows the directed effort for sunfish and the harvest for Bluegill was higher in 2011. Bluegill 6- and 7-inches total length (TL) were the most abundant in the creel (Figure 3).

Channel catfish: The gill net CPUE of Channel Catfish was 5.0/nn in 2014 (Figure 4). The CPUE was above the 14-year reservoir average of 4.6 and the highest since 2001. The absence of sub-stock fish was once again noted. All of the Channel Catfish were legal length (12 inches) and the PSD was over 80%. Relative weights increased with size to above 130. A random sample (N=16) of Channel Catfish was aged to determine their year class. Three year classes were represented (2006, 2008, and 2010) and Channel Catfish were stocked in these years (Table 4). The 2010 year class averaged 16.6 inches TL (N=12), 2008 year class 22.5 inches TL (N=1), and the 2006 year class 23.1 inches TL (N=3). The average growth for Channel Catfish in the Red River Drainage for same age Channel Catfish would be 12.6 inches TL, 16.6 inches TL, and 20.4 inches TL, respectively (Prentice 1987). This suggests growth was excellent for Channel Catfish in Davy Crockett Reservoir. No smaller fish were collected to indicate successful reproduction in 2013. The Channel Catfish population may benefit with stocking of advanced-size fingerlings. Directed fishing effort, catch per hour, and total harvest for Channel Catfish showed an increase from 2001 to 2011 (Table 10). Channel Catfish anglers were harvest-oriented as no legal fish were released in 2001 and only 7% of the legal fish were released in 2011. Observed harvest from 2001

and 2011 showed good angler compliance, and harvested fish ranged in length from 12 to 26 inches in 2001. Only 12-inch fish were observed in 2011 (Figure 5).

Largemouth bass: The electrofishing CPUE of Largemouth Bass was 58/.0/h in 2013, lowest on record for fall electrofishing (Figure 6 and Appendix C). There were fish above the slot. All inch groups had acceptable Wr's. Two supplemental bass-only electrofishing surveys in winter 2011 collected 52.0 (January)/h and 119.0 (March)/h. This was done to survey during time of decreased density of aquatic vegetation, so bass would be more vulnerable to electrofishing. Size structure was good in both collections with high PSDs (Figure 7). The March survey observed many fish in the slot with some above the slot. Growth of sub-slot Largemouth Bass in Davy Crockett Reservoir was better than the Red River Drainage average (Prentice 1987), growing to 14 inches in 3+ years (N=8, range = 2-3 years). It took seven years for Largemouth Bass to exceed the upper slot-limit (N=2, both 7 years), which was two years faster than average for the Red River Drainage (Prentice 1987). Creel surveys in spring 2001 and 2011 showed very little harvest of below-slot fish (Figure 8). The directed effort for Largemouth Bass more than doubled from the 2001 creel survey (Table 11). There was very little harvest with almost 95% of the legal bass being released. Although there is very little harvest of sub-slot Largemouth Bass, there are bass in and above the slot (as evidenced by the March electrofishing) and growth is above average for the Red River Drainage, which indicated the slot may be working.

Genetic analysis of Largemouth Bass collected by electrofishing indicated Florida Largemouth Bass alleles made up 22.0% of the total bass alleles (Table 12), which was the highest since Florida Largemouth Bass were stocked. However no pure Florida Largemouth Bass were detected. The current reservoir record of 12.59 pounds, caught in May 2007, was the state catch-and-release record for three years.

Crappies: The trap net CPUE of White Crappie was 3.4/nn in 2013 (Figure 9), which was lowest on record (Appendix C). The drawdown may have affected the catch rates. The PSD was 62, which was a decline from the 2009 survey results (Figure 9). Growth was not determined due to lack of target size (10-inch) White Crappie, but growth determined from previous surveys (Moczygemba and Hysmith 2010) was slow, taking 3-4 years to reach 10 inches (N = 10; range = 2 – 5 years).

The trap net CPUE of Black Crappie (Figure 10) was 15.4/nn and well above the historical (2001-2013) average of 5.0 and highest on record (Appendix C). This trend of increasing Black Crappie catches was observed at other district reservoirs. Legal size fish (≥ 10 inches) comprised 39% of the sample population, and the growth was very erratic with 10-inch Black Crappie being anywhere from 2 to 7 years old (N=13). The mean relative weights for all inch groups were between 75 and 90.

Creel survey results combine White and Black Crappie for directed effort statistics, while results for harvest data were for each species (Tables 13 and 14). Directed effort for crappie increased 5 fold in 2011 over 2001 and catch rate increased 3 fold. Harvest of White Crappie was much higher in 2011 than 2001 and 11-inch White Crappie was the most common length observed (Figure 11). Black Crappie had less harvest than White Crappie but still much higher than in 2001 (Table 14). The most abundant Black Crappie harvested was 10 inches (Figure 12).

Fisheries management plan for Davy Crockett Reservoir, Texas

Prepared – July 2010.

ISSUE 1: The Channel Catfish fishery seems to benefit from stocking advanced Channel Catfish fingerlings. Aged Channel Catfish indicated only fish from stocking years were found. There is a viable fishery. Gill netting data from 2014 show Channel Catfish up to 30 inches are present. Without supplemental stocking the Channel Catfish fishery will decline.

MANAGEMENT STRATEGIES

1. Request advanced fingerling Channel Catfish (5 - 10/acre) every other year beginning in fall of 2015 or if there is a surplus in TPWD hatcheries.

ISSUE 2: Based on this survey the slot length limit for Largemouth Bass may be working. The reservoir water levels have started to increase after planned drawdown. The population structure can be better evaluated after conservation water level has been attained.

MANAGEMENT STRATEGY

1. The 14- to 18-inch slot limit for Largemouth Bass should be kept
2. Conduct standard electrofishing survey in fall of 2017 to evaluate Largemouth Bass population structure.

ISSUE 3: Threadfin Shad were established after stocking adults in 2011. However they may have been killed during extreme cold temperatures of the winter of 2013-2014. To keep the diversity of prey available to predators, this species needs to be present in Davy Crockett Reservoir.

MANAGEMENT STRATEGY

1. Stock adult Threadfin Shad (1/acre) when available to ensure their presence in the fishery.

ISSUE 4: Boat ramp and boarding/fishing pier are unlighted. The boat ramp is cracked and needing repair.

MANAGEMENT STRATEGY

1. Encourage U.S. Forest Service to install and maintain lighting between existing boat ramp and boarding/fishing pier at the east campground.
2. Encourage U.S. Forest Service to repair the boat ramp.

ISSUE 5: American lotus has more than doubled since the last survey. The reservoir drawdown has triggered this increase, which has limited the amount of angler access to the upper ends of the two major arms. Angler bank access is also limited around the shoreline of the west campground by bulrush and cattails.

MANAGEMENT STRATEGY

1. Monitor the American lotus coverage as the reservoir water levels rise (2015) and as needed to see if the coverage area decreases to allow better angler access to upper areas of the reservoir.
2. Advise U.S. Forest Service on treatment methods of American lotus if there is a need to improve angler access.
3. Advise U.S. Forest Service to remove some of the bulrush and cattails from the shoreline of the west campground to provide better angler bank access.

ISSUE 6: 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 U.S. Forest Service to post appropriate signage at access points around the reservoir.
2. Educate the public about invasive species through the use of media and the internet.
3. Make a speaking point about invasive species when presenting to constituent and user groups.
4. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes a survey to monitor American lotus coverage when reservoir water levels increase after the planned drawdown. Mandatory monitoring will be conducted in 2017-2018 (Table 15).

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Table 1. Characteristics of Davy Crockett Reservoir, Texas.

Characteristic	Description
Year constructed	1938
Controlling authority	U.S. Forest Service
County	Fannin
Reservoir type	Offstream
Shoreline development index	2.1
Conductivity	164 umhos/cm

Table 2. Boat ramp characteristics for Davy Crockett Reservoir, Texas, October, 2013. Reservoir elevation at time of survey was 481 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Crockett East	33.73755 -95.92195	Y	5	477	Fair, ramp cracked and needs repair

Table 3. Harvest regulations for Davy Crockett Reservoir.

Species	Bag Limit	Length Limit
Catfish, Channel	25	12-inch minimum
Bass, Largemouth	5	14– to18-inch slot
Crappie: White and Black Crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

Table 4. Stocking history of Davy Crockett, 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	1968	48,680	AFGL	7.9
	1978	10,859	AFGL	7.9
	1991	7,500	AFGL	6.5
	1992	6,106	AFGL	5.8
	1994	1,100	ADL	11.3
	1995	1,200	AFGL	6.0
	1999	8,776	AFGL	7.8
	2006	3,559	AFGL	10.0
	2008	4,449	AFGL	8.3
	2008	38,640	FGL	3.2
	2010	4,008	AFGL	10.3
2011	37,722	AFGL	6.3	
	Total	172,599		
Florida Largemouth Bass	1997	35,000	FGL	1.3
	1998	35,004	FGL	1.1
	1999	35,281	FGL	1.9
	Total	105,285		
Green Sunfish x Redear Sunfish	1976	260	UNK	UNK
	1978	17,785	UNK	UNK
	Total	18,045		
Largemouth Bass	1976	260	UNK	UNK
	Total	260		
Threadfin Shad	2008	245	ADL	3.1
	2009	800	ADL	3.9
	2011	400	AFGL	3.0
	Total	1,445		

Table 5. Survey of structural habitat types for Davy Crockett Reservoir, October 2013. Shoreline habitat type units are in miles

Habitat type	Estimate	% of total
Natural	5.1 miles	93.0
Bulkhead	0.2 miles	3.5
Rocky	0.2 miles	3.5

Table 6. Survey of aquatic vegetation for Davy Crockett Reservoir, Texas, 2009 and 2013. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2009	2013
Native submersed	60.0 (16.9)	44.5 (12.5)
Native floating-leaved	48.0 (13.5)	100.6 (28.3)
Native emergent	55.6 (15.7)	55.6 (15.7)

Table 7. Percent directed angler effort by species for Davy Crockett Reservoir, Texas, spring 2001 and spring 2011. Survey periods were from 1 March through 31 May 2001 and 1 March through 31 May 2011.

Species	Year 2001	Year 2011
Channel Catfish	27.4	4.2
Largemouth Bass	39.5	42.6
Crappie	17.1	37.0
Sunfishes	2.2	5.6
Anything	13.8	10.6

Table 8. Total fishing effort (h) for all species and total directed expenditures at Davy Crockett Reservoir, Texas, spring 2001 and spring 2011. Survey periods were from 1 March through 31 May 2001 and 1 March through 31 May 2011. Relative standard error is in parentheses.

Creel statistic	2001	2011
Total fishing effort	5,558 (27)	12,922 (46)
Total directed expenditures	\$20,915 (110)	\$98,836 (105)

Gizzard Shad

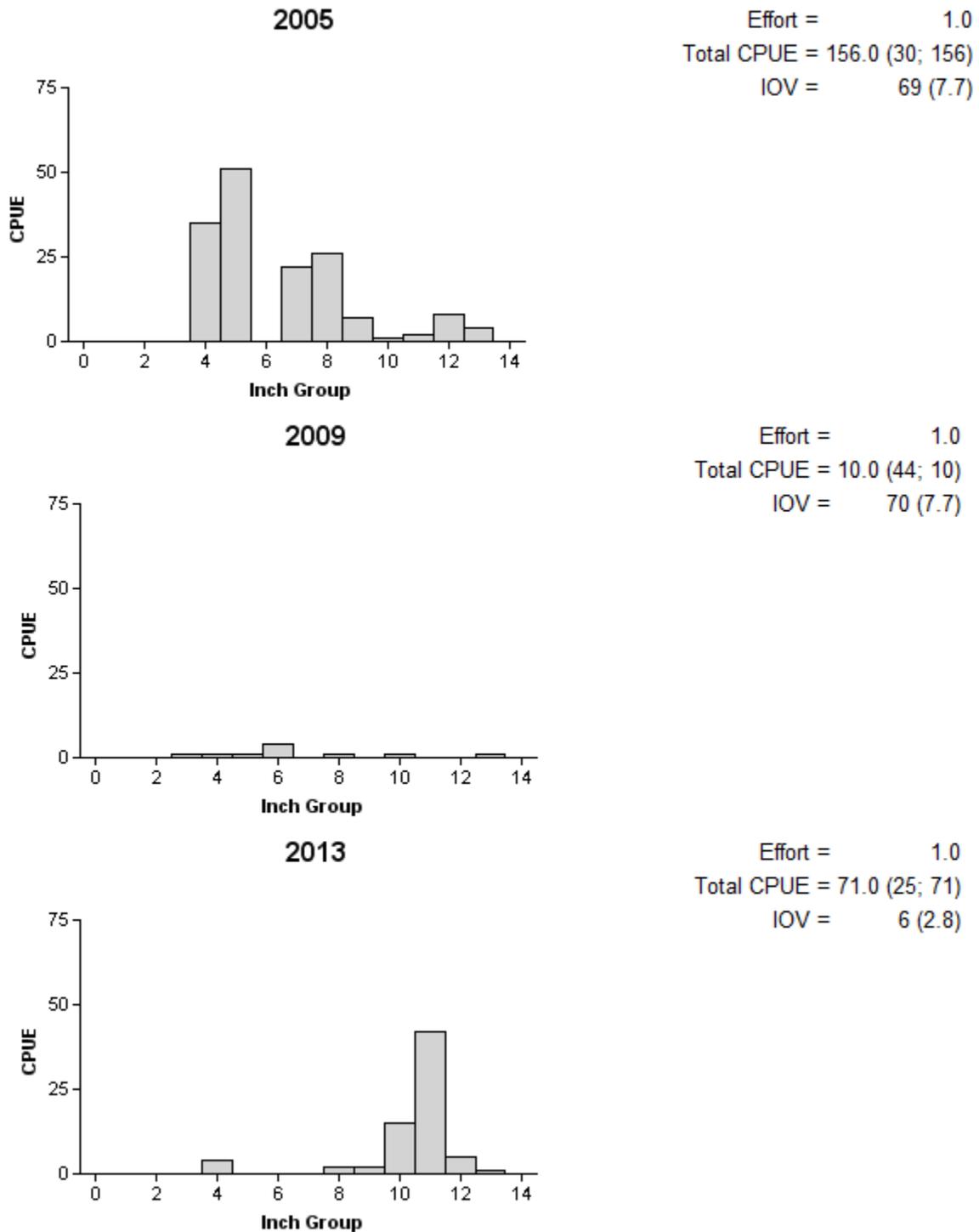


Figure 1. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Davy Crockett Reservoir, Texas, 2005, 2009, and 2013.

Bluegill

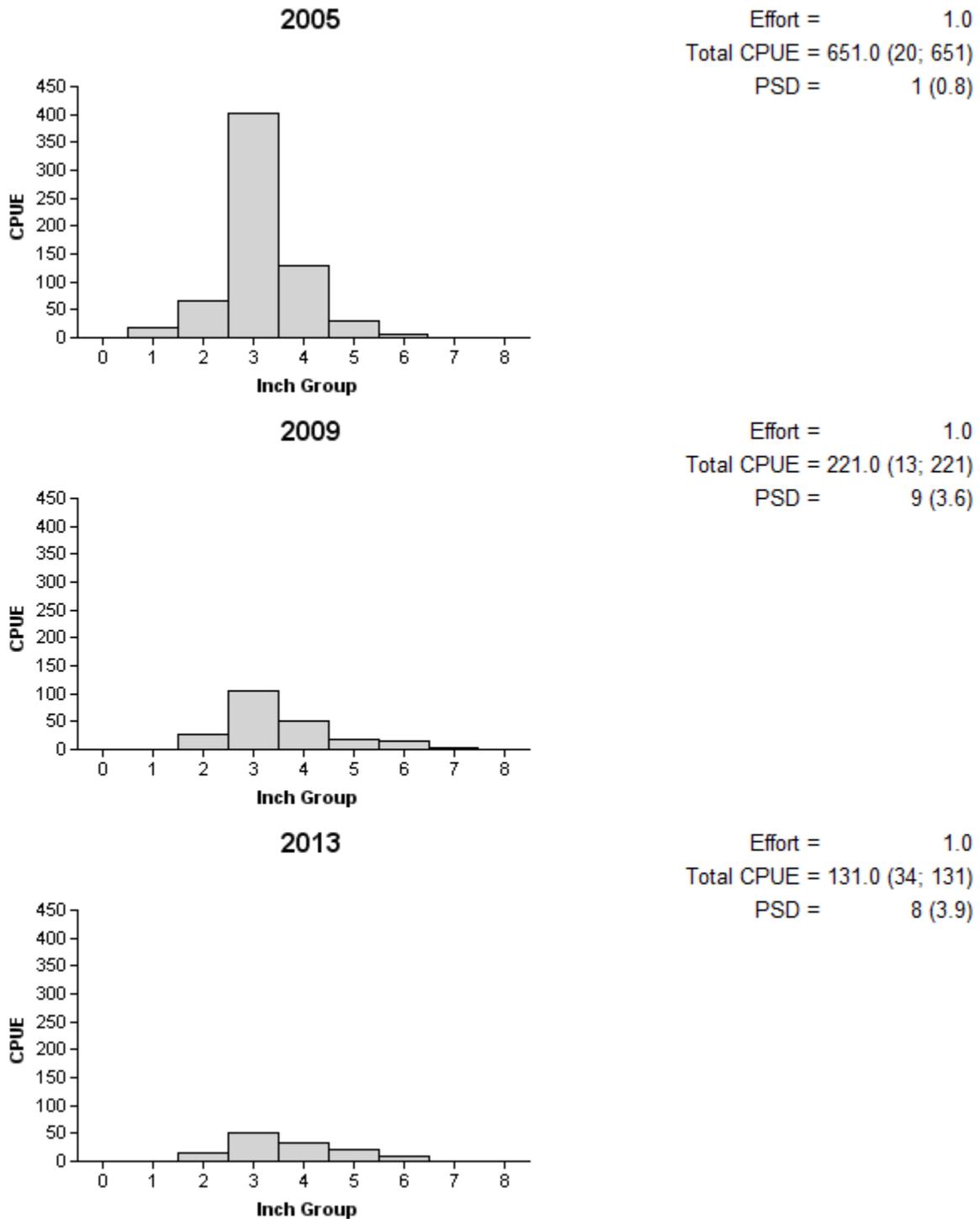


Figure 2. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Davy Crockett Reservoir, Texas, 2005, 2009, and 2013.

Table 9. Creel survey statistics for Bluegill at Davy Crockett Reservoir from March – May 2001 and from March – May 2011, where directed effort is for anglers targeting sunfish (2001) or Bluegill (2011) and total catch per hour is for anglers targeting sunfish (2001) or Bluegill (2011) and total harvest is the estimated number of Bluegill harvested by all anglers. Relative standard errors are in parentheses.

Creel Survey Statistic	Year	
	2001	2011
Directed effort (h)	119.9 (104)	726.7 (83)
Directed effort(h)/acre	0.3 (104)	2.1 (83)
Total catch per hour	1.0	0.8
Total harvest	81.6 (142)	736.3 (82)
Harvest/acre	0.2 (142)	2.1 (82)
Percent legal released	48.9	49.8

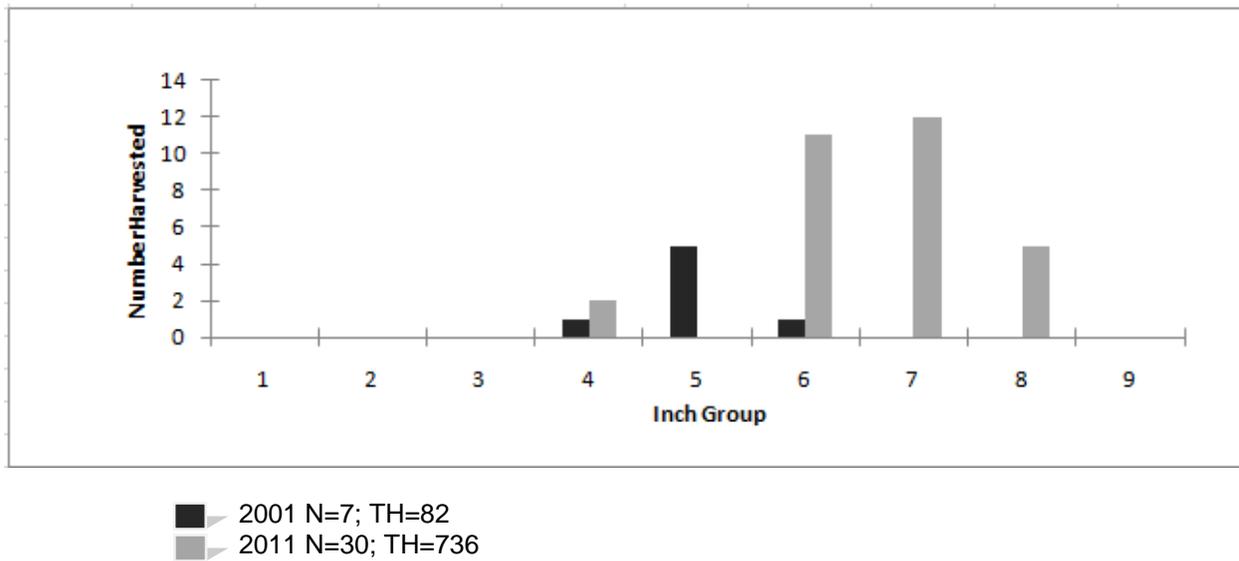


Figure 3. Length frequency of harvested Bluegill observed during creel surveys at Davy Crockett Reservoir, Texas, March - May 2001, and from March - May 2011, all anglers combined. N is the number of harvested Bluegill observed during creel surveys, and TH is the total estimated harvest for the creel period.

Channel Catfish

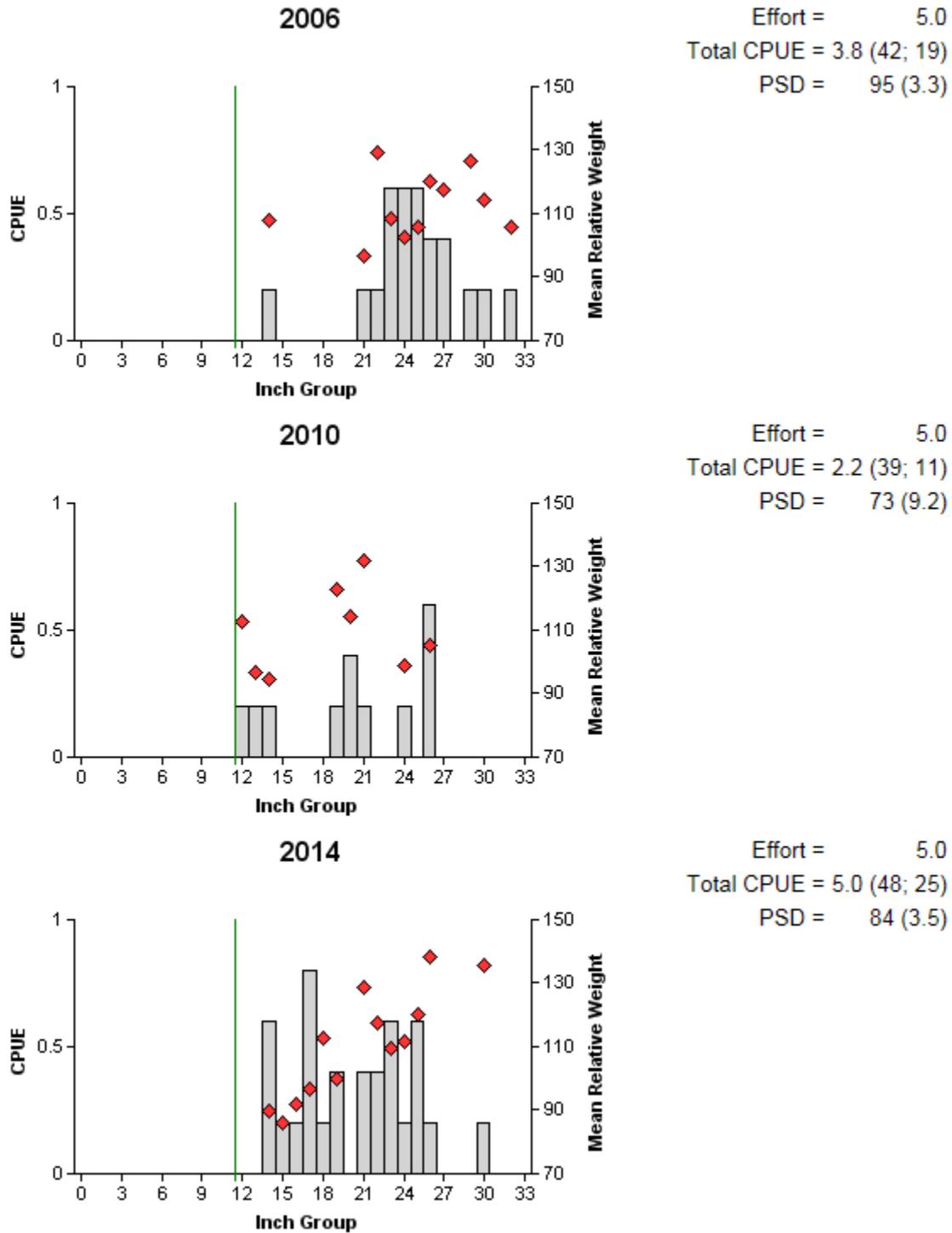


Figure 4. Number of Channel Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Davy Crockett Reservoir, Texas, 2006, 2010, and 2014. Vertical lines represent length limit at time of collection.

Table 10. Creel survey statistics for Channel Catfish at Davy Crockett Reservoir from March – May 2001 and from March – May 2011, 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.

Creel Survey Statistic	Year	
	2001	2011
Directed effort (h)	179.8 (86)	537.4 (87)
Directed effort(h)/acre	0.5 (86)	1.5 (87)
Total catch per hour	1.2 (46)	1.9 (81)
Total harvest	122.5 (71)	654.9 (90)
Harvest/acre	0.4 (71)	1.8 (90)
Percent legal released	0.0	7.0

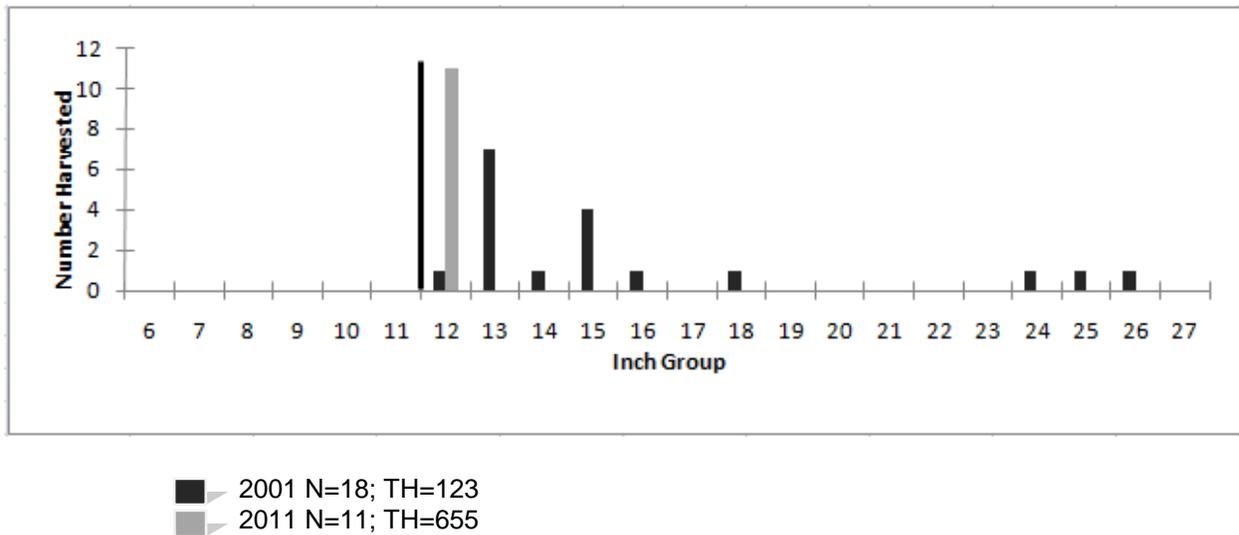


Figure 5. Length frequency of harvested Channel Catfish observed during creel surveys at Davy Crockett Reservoir, Texas, March - May 2001, and from March - May 2011, all anglers combined. N is the number of harvested Channel Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period. Vertical line represents length limit at time of creel survey.

Largemouth Bass

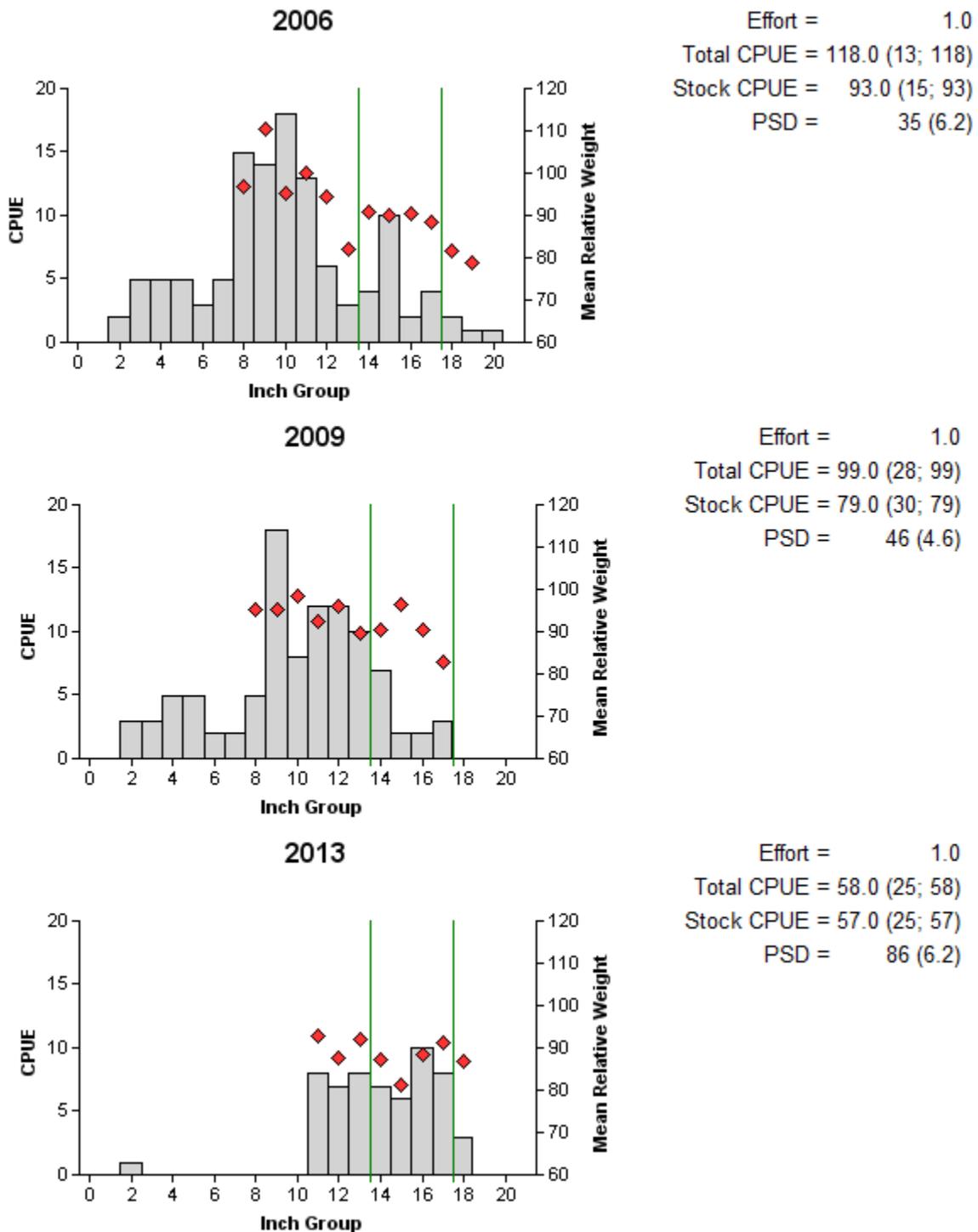


Figure 6. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Davy Crockett Reservoir, Texas, 2006, 2009, and 2013. Vertical lines represent slot length limit at time of collection.

Largemouth Bass

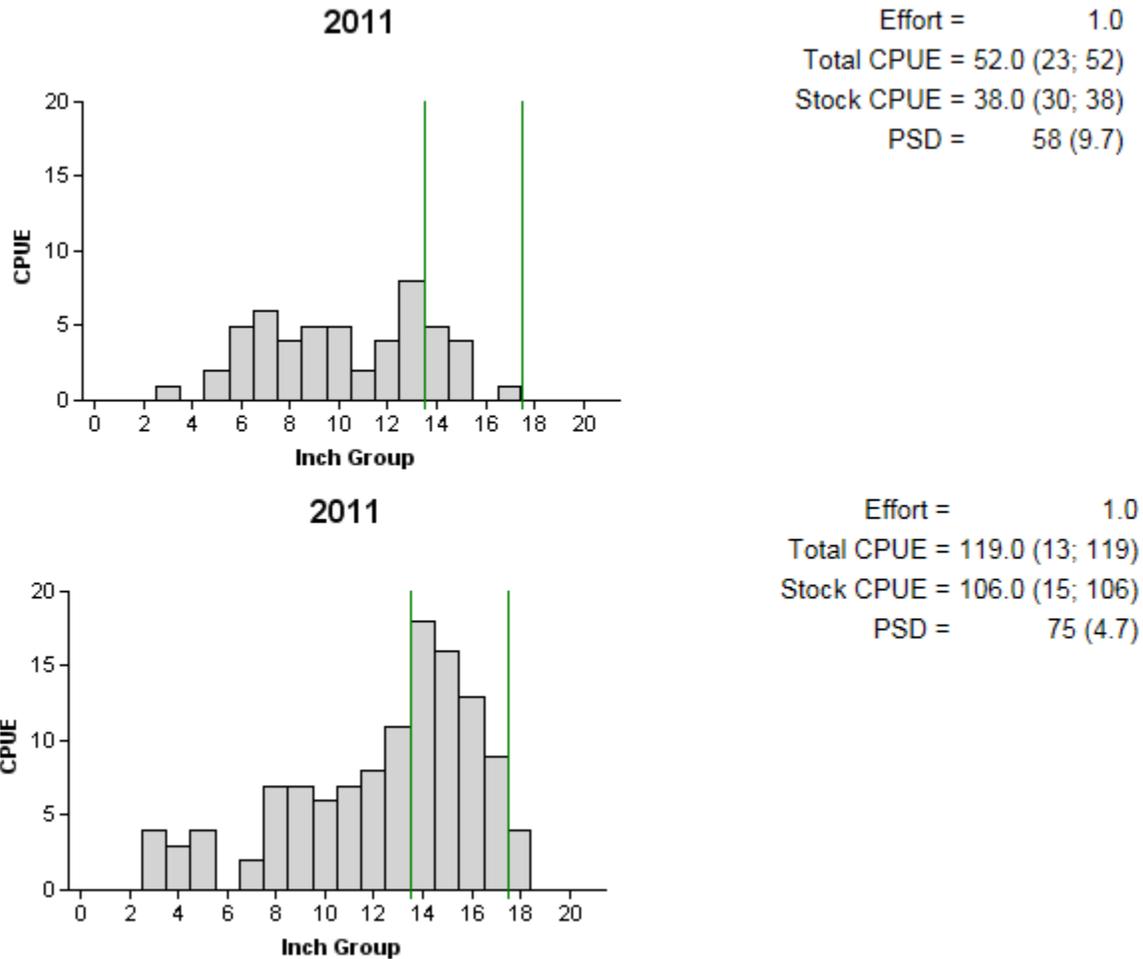


Figure 7. Number of Largemouth Bass caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for supplemental winter electrofishing surveys, Davy Crockett Reservoir, Texas, January (upper) and March (lower) 2011. Vertical lines represent slot length limit at time of collection.

Table 11. Creel survey statistics for Largemouth Bass at Davy Crockett Reservoir from March – May 2001 and from March – May 2011, 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 are in parentheses.

Creel Survey Statistic	Year	
	2001	2011
Directed effort (h)	2,203.4	5,510.3 (41)
Directed effort(h)/acre	6.2	15.5 (41)
Total catch per hour	0.3	1.7 (26)
Total harvest	11.7 (351.9)	44.1 (96)
Harvest/acre	>0.0 (351.9)	0.1 (96)
Percent legal released	73.8	94.9

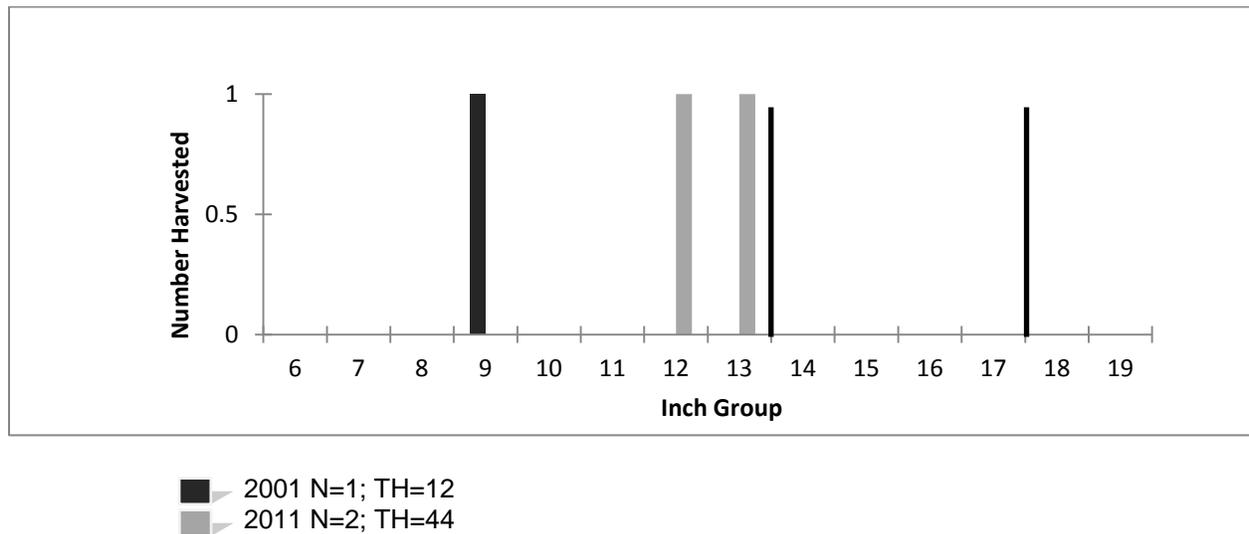


Figure 8. Length frequency of harvested Largemouth Bass observed during creel surveys at Davy Crockett Reservoir, Texas, March - May 2001, and from March - May 2011, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and TH is the total estimated harvest for the creel period. Vertical line represents slot length limit at time of creel survey.

Table 12. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Davy Crockett Reservoir, Texas, 1999, 2001, 2005, and 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.

Year	Sample size	Number of fish			% FLMB alleles	% FLMB
		FLMB	Intergrade	NLMB		
1999	40	2	3	35	7.5	5.0
2001	30	0	11	19	12.5	0.0
2005	30	0	8	22	8.7	0.0
2013	30	0	20	10	22.0	0.0

White Crappie

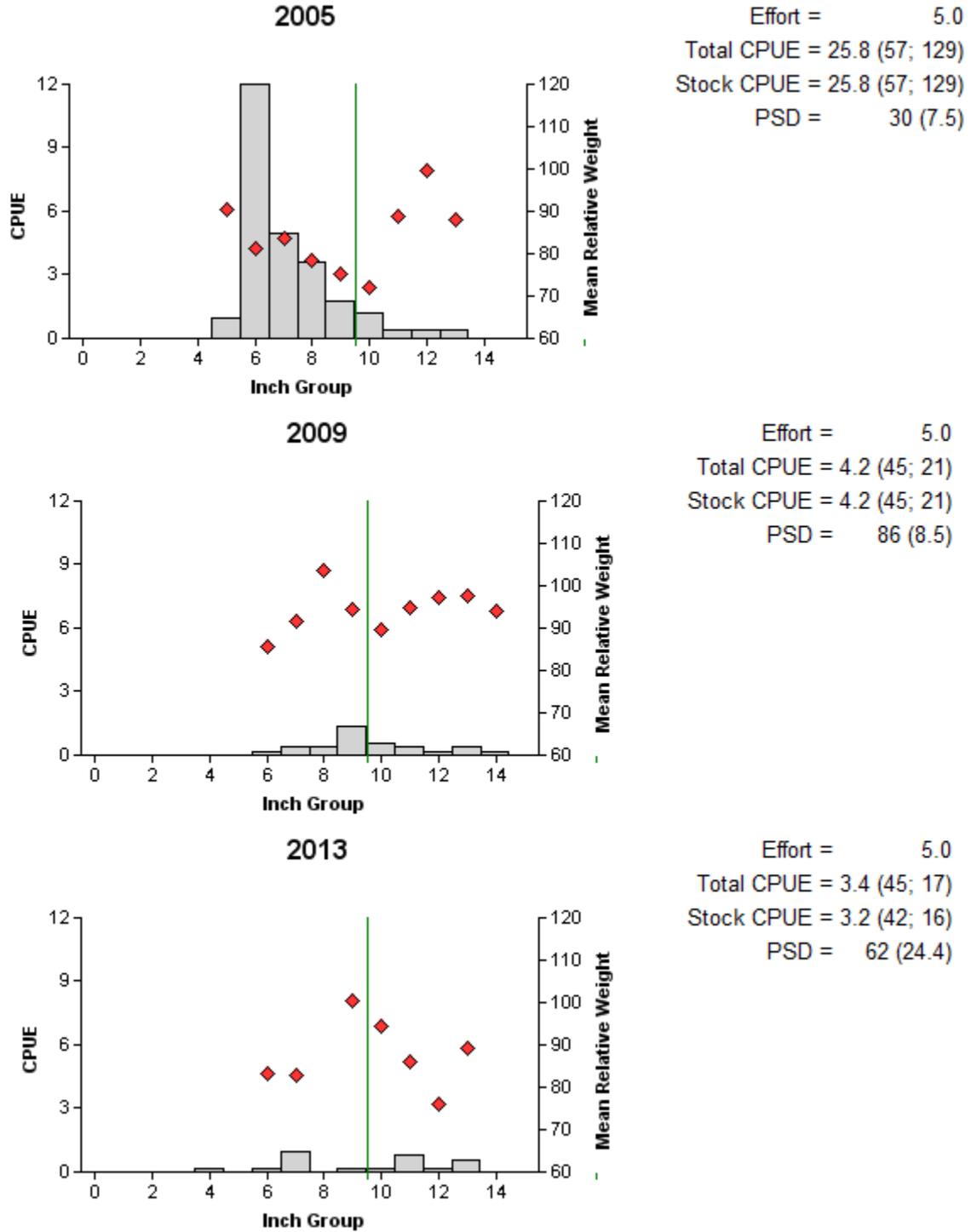


Figure 9. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Davy Crockett Reservoir, Texas, 2005, 2009, and 2013. Vertical lines represent length limit at time of collection.

Black Crappie

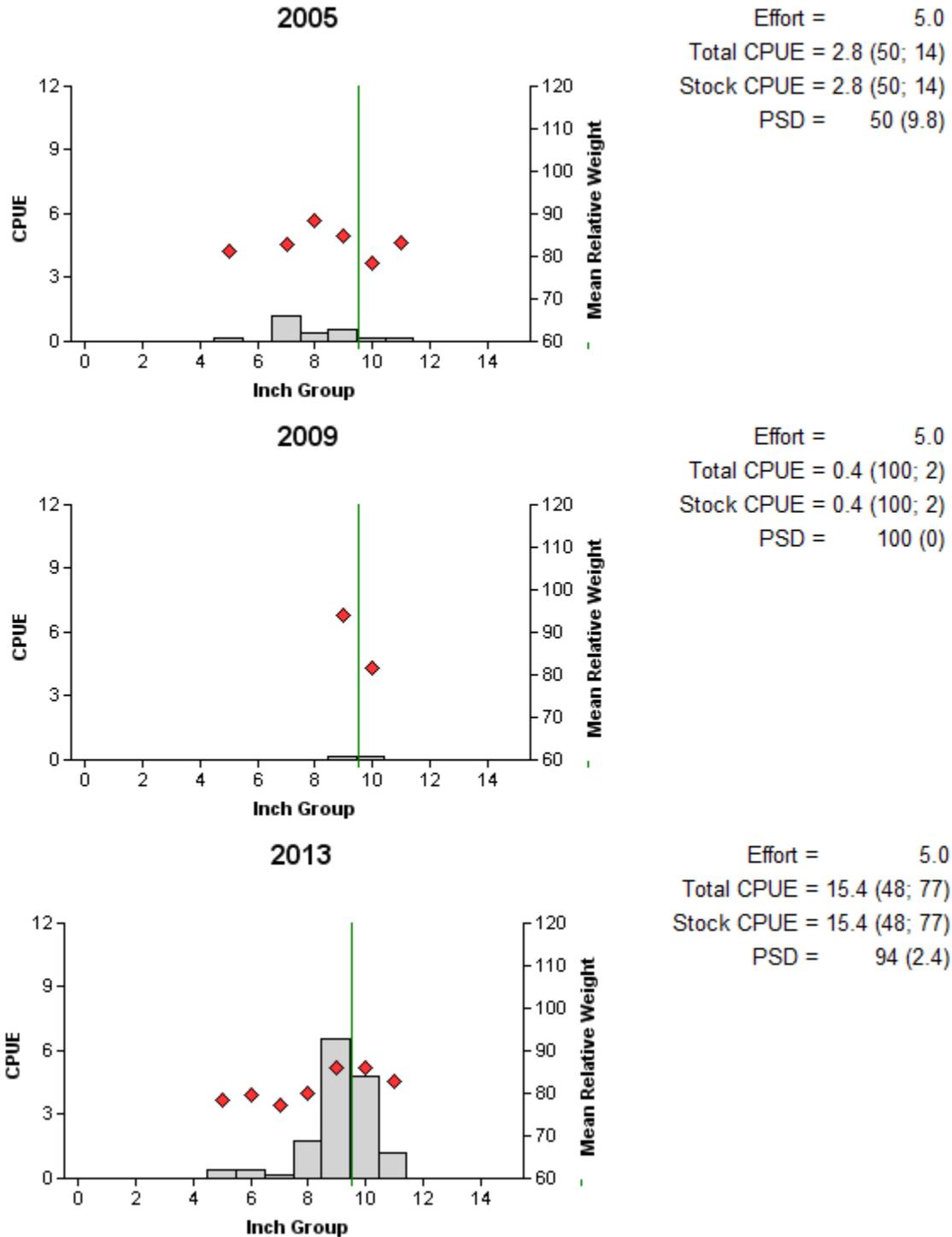


Figure 10. Number of Black Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Davy Crockett Reservoir, Texas, 2005, 2009, and 2013. Vertical lines represent length limit at time of collection.

Table 13. Creel survey statistics for White Crappie at Davy Crockett Reservoir from March – May 2001 and from March – May 2011, where directed effort and total catch per hour is for anglers targeting White and Black Crappie and total harvest is the estimated number of White Crappie harvested by all anglers. Relative standard errors are in parentheses.

Creel Survey Statistic	Year	
	2001	2011
Directed effort (h)	951.9	4,784.9 (39)
Directed effort(h)/acre	2.7	13.5 (39)
Total catch per hour	0.8	2.6 (41)
Total harvest	141.0 (75)	2,226.3 (64)
Harvest/acre	0.4 (75)	6.3 (64)
Percent legal released	0.0	4.5

Table 14. Creel survey statistics for Black Crappie at Davy Crockett Reservoir from March – May 2001 and from March – May 2011, where directed effort and total catch per hour is for anglers targeting White and Black Crappie and total harvest is the estimated number of Black Crappie harvested by all anglers. Relative standard errors are in parentheses.

Creel Survey Statistic	Year	
	2001	2011
Directed effort (h)	951.9	4,784.9 (39)
Directed effort(h)/acre	2.7	13.5 (39)
Total catch per hour	0.8	2.6 (41)
Total harvest	6.8 (715.24)	925.8 (73)
Harvest/acre	>0.0 (715.24)	2.6 (73)
Percent legal released	0.0	2.8

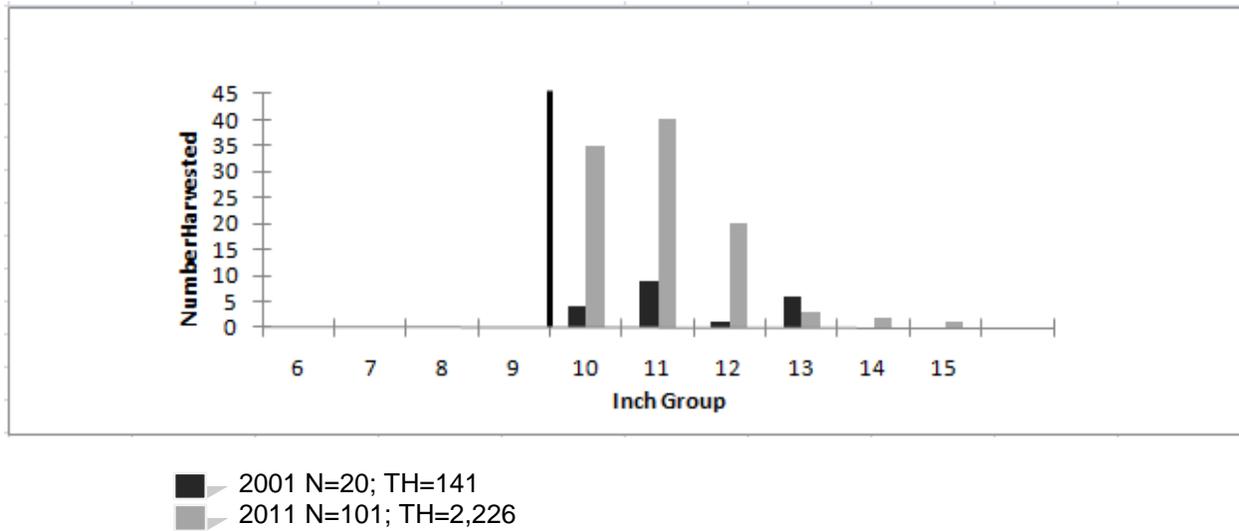


Figure 11. Length frequency of harvested White Crappie observed during creel surveys at Davy Crockett Reservoir, Texas, March - May 2001, and from March - May 2011, all anglers combined. N is the number of harvested White Crappie observed during creel surveys, and TH is the total estimated harvest for the creel period. Vertical line represents length limit at time of creel survey.

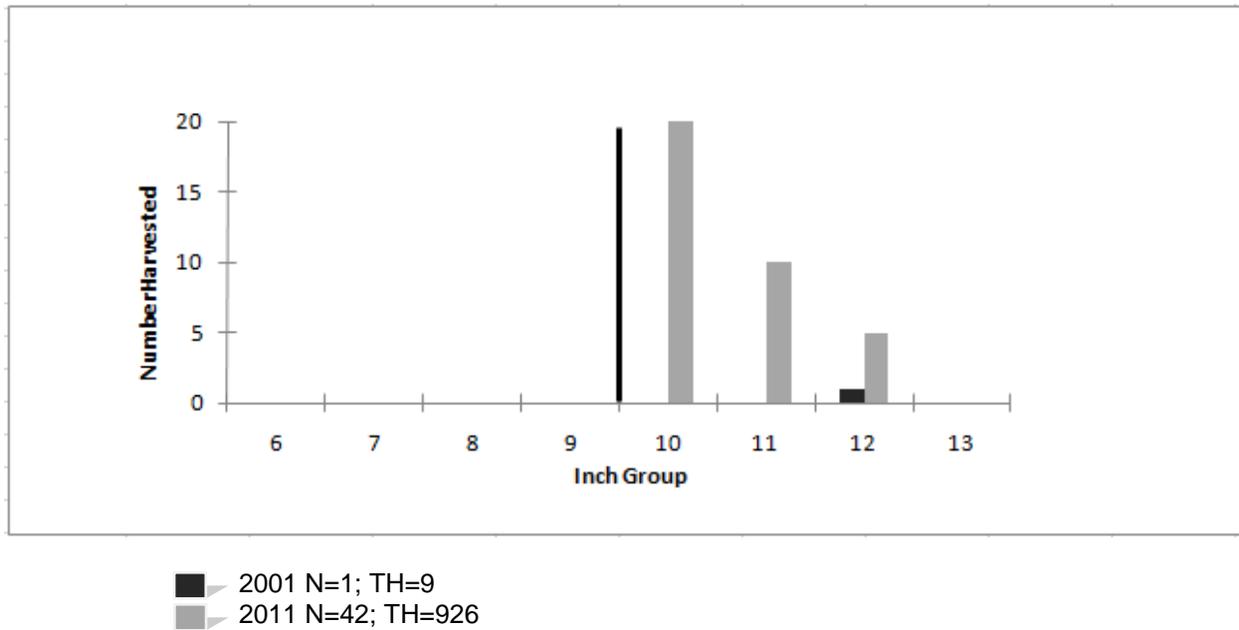


Figure 12. Length frequency of harvested Black Crappie observed during creel surveys at Davy Crockett Reservoir, Texas, March - May 2001, and from March - May 2011, all anglers combined. N is the number of harvested Black Crappie observed during creel surveys, and TH is the total estimated harvest for the creel period. Vertical line represents length limit at time of creel survey.

Table 15. Proposed sampling schedule for Davy Crockett 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.

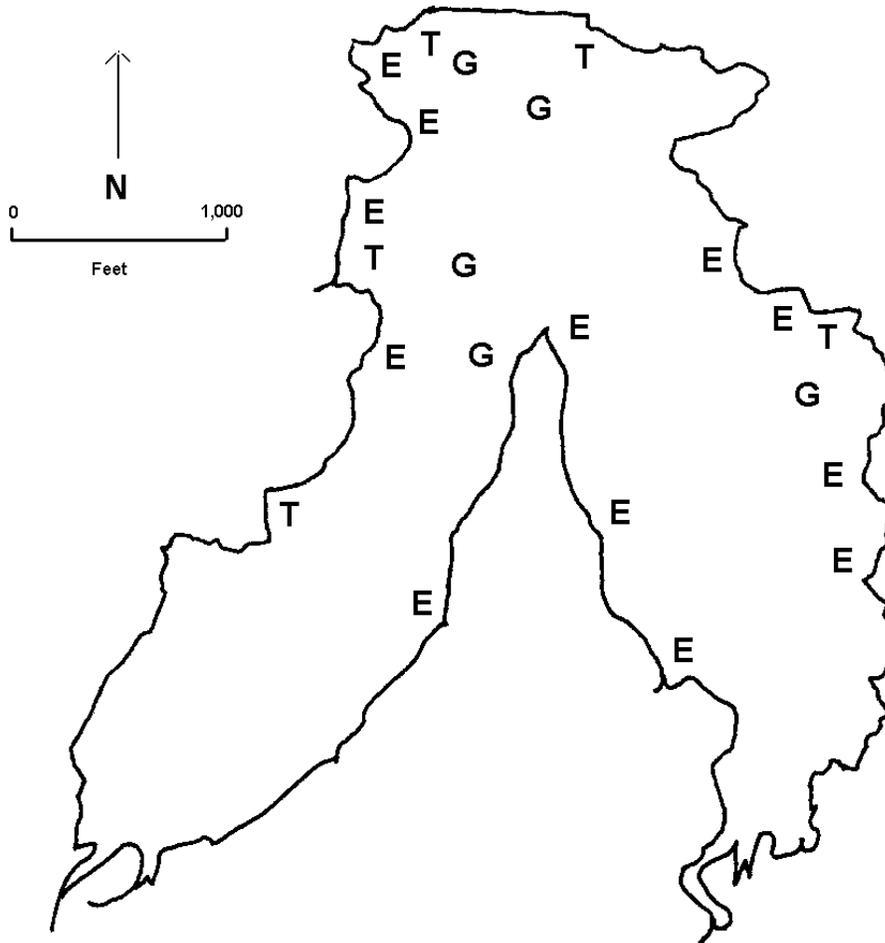
Survey year	Electrofishing Fall(Spring)	Trap net	Gill net	Habitat			Creel survey	Report
				Structural	Vegetation	Access		
2014-2015								
2015-2016					A			
2016-2017								
2017-2018	S	S	S		S	S		S

APPENDIX A

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

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad					71	71.0
Threadfin Shad					377	377.0
Channel Catfish	25	5.0				
Warmouth					3	3.0
Bluegill					131	131.0
Redear Sunfish					27	27.0
Largemouth Bass					58	58.0
White Crappie			17	3.4		
Black Crappie			77	15.4		

APPENDIX B



Location of sampling sites, Davy Crockett Reservoir, Texas, 2013-2014. Trap netting, gill netting, and electrofishing sampling stations are indicated by T, G, and E, respectively. Water level was 6.5 feet below conservation during all sampling.

APPENDIX C

Historical catch rates of targeted species by gear type for Davy Crockett Reservoir, Texas, 2001-2003_a, 2005, 2006_a, 2009, 2010, 2011_b, 2013, and 2014.

Gear	Species	Year										Avg.
		2001	2002	2003 _a	2005	2006 _a	2009	2010	2011 _b	2013	2014	
Gill Netting (fish/net night)	Channel Catfish		7.2			3.8		2.2			5.0	4.6
Electrofishing (fish/hour)	Gizzard Shad	106.0			156.0		10.0			71.0		85.8
	Threadfin Shad						4,535.0			377.0		2456.0
	Green Sunfish	5.0			9.0		3.0			0.0		4.3
	Warmouth	70.0			5.0		2.0			3.0		20.0
	Bluegill	1,783.0			651.0		221.0			131.0		696.5
	Redear Sunfish	109.0			31.0		18.0			27.0		46.3
	Largemouth Bass	165.0		108.0	82.0	118.0	99.0		52.0/119.0	58.0		100.1
Trap Netting (fish/net night)	White Crappie	13.0			25.8		4.2			3.4		11.6
	Black Crappie	1.2			2.8		0.4			15.4		5.0

_a Largemouth bass sampled only.

_b Largemouth bass sampled only, January/March.