

PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-221-M-2

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2011 Survey Report

**Millers Creek Reservoir**

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## SURVEY AND MANAGEMENT SUMMARY

Fish populations in Millers Creek Reservoir were surveyed in 2011 using trap nets and electrofishing and in 2012 using gill nets. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Millers Creek is a 1,794-acre impoundment located in Baylor county on Millers Creek in the Brazos River Basin approximately 77 miles southwest of Wichita Falls. The reservoir was completed in 1974 and is owned and operated by the North Central Texas Municipal Water Authority in Munday, Texas. At the time of the habitat survey the reservoir was quite low and the shoreline habitat consisted of natural and rocky shoreline. Shoreline and boat access are adequate, including limited handicapped access at normal pool elevations. Conservation pool elevation is 1,333.9 feet above mean sea level (MSL). The improved three lane boat ramp is serviceable at elevations above 1,322 (MSL).
- **Management history:** Important sport fish include catfish, white bass, palmetto bass, largemouth bass, and white crappie. Palmetto bass and Florida largemouth bass were last stocked in 2012. Millers Creek has always been managed with statewide regulations.
- **Fish Community**
  - **Prey species:** Gizzard shad catch rate was lower than average for the reservoir but the percentage available to predators slightly increased over the previous survey. The catch per unit effort (CPUE) for bluegill was the highest ever documented. Overall, there is plenty of prey in the reservoir.
  - **Catfishes:** Blue catfish were well represented in the gill net survey of 2012, and CPUE increased from the previous two surveys. Body condition was similar to the previous two surveys. The channel catfish population was similar to the two previous surveys. Flathead catfish are present in the reservoir.
  - **White bass:** White bass CPUE increased compared to the last two surveys. It is probable that the white bass population was unable to enter tributaries for their annual spawning migration because of low water conditions, trapping them in the reservoir and making them more vulnerable to gill nets.
  - **Palmetto bass:** Palmetto bass CPUE increased from the two previous surveys and was the second highest CPUE for the reservoir. Trophy sized palmetto bass can be found as evidenced by three fish over 25 inches being sampled. Growth rates in 2010 were slightly below the ecological region average.
  - **Largemouth bass:** Largemouth bass had a slightly increased electrofishing catch rate compared to the previous survey and was near the historical average for the reservoir. Body condition of legal sized bass is considered good and there was a high number of legal sized bass sampled compared to previous surveys. There was however; few small bass sampled indicating the species had poor recruitment in 2011.
  - **White crappie:** The 2011 CPUE was lower than the 2003 and 2007 surveys. Legal-sized crappie had body conditions that were considered to be very good. Comparing the last three surveys, it is obvious recruitment has been poor, probably caused by low water conditions that have left needed spawning and rearing habitat dry.
- **Management Strategies:** Millers Creek is recognized by anglers as an excellent reservoir for catfish, palmetto bass, largemouth bass, and white crappie and should be promoted to increase angler effort, especially to anglers from around Lubbock. An abundant gizzard shad population exists, so palmetto bass stockings should be requested annually.

## INTRODUCTION

This document is a summary of fisheries data collected from Millers Creek Reservoir in 2011 and 2012. The purpose 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 important sport fish and prey species. Historical data is also presented for comparison.

### *Reservoir Description*

Millers Creek Reservoir is a 1,794-acre impoundment constructed in 1974 on Millers Creek. It is located in Baylor County approximately 77 miles southwest of Wichita Falls and is operated and controlled by North Central Texas Municipal Water Authority-Texas Water Development Board. Primary uses include municipal water supply and recreation. Maximum depth is 46 feet and mean depth when full is 14 feet, shoreline development index is 3.64, and conductivity in July 2011 was 391 umhos/cm. Habitat at time of sampling consisted of natural or rocky shoreline. Reservoir elevation has been falling since 2010 when the water level was within two feet of conservation pool (Figure 1). Boat access consisted of a single, three lane boat ramp. Bank fishing was available at the public access points comprising nearly the entire north shoreline including the boat ramp. A public fishing pier is maintained near the ramp. Other descriptive characteristics for Millers Creek are in Table 1.

### *Management History*

**Previous management strategies and actions:** Management strategies and actions from the previous survey report (Howell and Mauk 2008) included:

1. An abundant population of gizzard shad exists in the reservoir. This prey population has increased during the last few years while the reservoir has been stocked with palmetto bass every two years at the rate of 10/acre. Palmetto bass are a target species for anglers.  
**Action:** Requested stocking palmetto bass every year at the rate of seven per acre.
2. Continue to promote fishery, especially beyond our district boundaries. A creel survey in 2003 found that most of the Millers Creek anglers reside outside of our district with many from the Lubbock area. News releases should include the Lubbock media.  
**Action:** Continued to promote fishery through mainly news releases, especially beyond our district boundaries.

**Harvest regulation history:** Sport fish species in Millers Creek Reservoir have always been managed using statewide regulations (Table 2).

**Stocking history:** Palmetto bass and Florida largemouth bass were stocked in 2012. Other sport fish have not been stocked recently since surveys have indicated adequate populations and recruitment. The complete stocking history is in Table 3.

**Vegetation/habitat history:** Millers Creek has no significant vegetation/habitat management history. Noxious vegetation has not been observed at the reservoir.

**Water transfer:** Water is not transferred from the reservoir except through the North Central Texas Municipal Water Authority pump station. Water is pumped to the treatment plant from the reservoir for local municipalities.

## METHODS

Fishes were collected by electrofishing (1.0 hours at 12 five-min stations), gill netting (10 net nights at 10 stations), and trap netting (7 net nights at 7 stations). Catch per unit effort 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).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), as defined by Guy et al. (2007)], and condition indices [relative weights ( $W_r$ )] were calculated for target fishes according to Anderson and Neumann (1996). Index of vulnerability (IOV) was calculated for gizzard shad (DiCenzo et al. 1996). Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE statistics and SE was calculated for structural indices and IOV. Ages were determined using otoliths from 5 to 10 fish per inch group. Source for water level data was the United States Geological Survey.

## RESULTS AND DISCUSSION

**Habitat:** A physical habitat survey conducted July, 2011 indicated the littoral zone habitat consisted of primarily natural or rocky shoreline (Table 4). The reservoir was down 7.9 feet from normal pool at the time of the survey. The previous physical habitat survey was conducted in 2007 (Howell and Mauk 2008). Very few manmade changes to the physical habitat had occurred during the four year period.

**Creel Survey:** A 9-month creel survey was conducted from September 2011 – May 2012. Results from this creel survey are presented along with the results of a six-month long creel survey that ran from June 1 – Nov. 30, 2003 (Tables 5). Since the two creel surveys have only the Sept.-Nov. quarter in common, little comparison will be made between the two creel surveys. Total fishing effort during the nine-months was 34,629.7 hrs or 19.3 hrs/acre. White crappie (40.7%) was the most sought after species at the reservoir followed by catfish spp. (22.5%). Largemouth bass (12.5%) is the third most sought after species. White crappie constituted 68.9% of the harvest and 69.1% of the catch. Largemouth bass constituted 3.9% of harvest and most of the bass were caught during tournaments and were to be released later. Very few sub-legal fish were observed being harvested during the creel survey. One individual accounted for all of the sub-legal channel catfish harvest. Analysis of angler's zip codes found that 25.6% were from Lubbock County and its surrounding counties.

Just comparing the two fall creel periods, angler effort increased 26%. This increase is likely attributed to drought conditions at many west Texas reservoirs and the golden alga caused fish kills that have occurred at another local reservoir, Lake Kemp.

**Economic Impact:** An estimated total of \$227,270 in direct expenditures related to fishing trips was made by anglers during the 9-month creel period that ended in May 2012 (Table 6). Just comparing the fall quarters of the two creel surveys, total expenditures were \$23,203.00 during 2003 and \$74,796.00 in 2011. The reason for the large increase in estimated total expenditures is the drought has reduced angling opportunities in west Texas and gas prices are much higher so anglers are paying more to reach this destination. This reservoir is an important angling destination in this portion of Texas.

**Prey species:** Electrofishing catch rates of gizzard shad and bluegill during 2011 were 828.0/h and 231.0/h, respectively. Index of vulnerability for gizzard shad was good, indicating that 82% of gizzard shad were available to predators; this was a slight increase over IOV estimates in the previous survey. Total CPUE of gizzard shad was lower in 2011 compared to the previous two surveys and below the historical average of 940.8/hr (Figure 2). While abundance is below historical averages, it is still considered

adequate for the predators in the reservoir. Total CPUE of bluegill in 2011 was higher than any previous survey (Figure 3).

**Blue catfish:** Blue catfish 2012 gill net CPUE (12.6/nn) was up from the 2010 CPUE (8.2/nn) and the 2008 CPUE of 10.2/nn (Figure 4). Blue catfish were initially stocked into the reservoir in 1990 and 1991 but CPUE was low until the 2004 survey when many small fish were sampled. Blue catfish ranged in size from 6- to 24 inches in length. Wr's for blue catfish ranged from 80- to 95 which is similar to Wr's for the previous two surveys for the same length of fish. Directed effort for blue catfish was 0.1 h/acre and estimated harvest was 510 catfish for the nine-month creel survey.

**Channel catfish:** Channel catfish 2012 gill net CPUE was 1.0/nn, similar to the 2010 and 2008 CPUE's of 1.3/nn and 1.1/nn, respectively (Figure 6). These catch rates are 33% of the 1999 survey CPUE documented before blue catfish became well established in the reservoir. Over half of the sampled channel catfish are below the minimum length limit of 12 inches. Directed effort for channel catfish was 0.3h/acre and estimated harvest was 3,216. While many anglers (20.6%) say they are targeting catfish spp., they are harvesting many more channel than blue catfish.

**White bass:** The gill net catch rate for white bass was 3.7/nn in 2012, which was up from 0.1/nn in 2008 and 2010 (Figure 8). Low water conditions probably accounts for this rise in CPUE as bass could not enter tributaries to spawn and were confined to the reservoir making them vulnerable to the gill nets. Wr's ranged from 80-95 and generally increased with length once they attained the minimum legal length limit. Directed effort was only 0.5h/acre with 1,468 fish estimated being harvested. This is quite a decrease from the 2003 creel survey when directed effort was 1.6h/acre and estimated harvest was 3,846. The 2002 gill net CPUE was 11.8 so there were more white bass available to the anglers during 2003 then there has been in recent years.

**Palmetto bass:** Palmetto bass gill net CPUE was 3.4/nn, up from 1.1/nn and 1.2/nn sampled in 2010 and 2008, respectively (Figure 10). It is the second highest gill net CPUE for the reservoir. Relative weights were considered good, being near 100. Trophy size palmetto bass are available to the angler as evidenced by three trophy sized fish being sampled. This is an under-utilized species that is not targeted by many anglers nor harvested. The population is excellent in terms of numbers and size of fish even with the last stocking occurring in 2009. Many fish exceed the minimum legal length limit of 18 inches, and yet, the number and size range of gizzard shad is still excellent (Figure 2). Growth, as measured in 2010, appeared slightly below the ecological regional average (Table 10). Directed effort was 0.2h/acre and no harvest was documented. While the population is good, anglers either don't know about them or don't care. Two news releases have been sent to media outlets trying to increase interest in this species.

**Largemouth bass:** The electrofishing CPUE of largemouth bass was 48.0/h in 2011, similar to the previous survey in 2007 (46.0/h), but a decrease from 2003 (76.0/h; Figure 11). Body condition for legal length bass ( $\geq 14$  inches) was good averaging almost 98. Notable was a lack of smaller bass in the survey indicating poor recruitment in 2011. There was also a higher number (n=18) of legal sized bass surveyed compared to past surveys (n=10 and 11 in 2007 and 2003; respectively). The percentage of Florida alleles increased to 35.0% from 27.7% in 2007 (Table 12). A category 2 age sample was collected. Only 5 bass around 14 inches were collected with four being age-2 and one being age-4. Directed effort was 2.4h/acre making largemouth bass one of the more popular species in the reservoir. An estimated 881 bass were harvested, though many of these were caught during tournaments to be released after weigh-in.

**White crappie:** The trap net catch rate of white crappie was 11.9/nn in 2011, lower than the previous surveys of 2007 (44.3/nn) and 2003 (60.7/nn; Figure 13). This was the lowest catch rate for Millers Creek to date and well below the historical average of 35.4/nn. Legal sized crappie had Wr's near 105 indicating good body condition. Comparing the catch rates and length frequency histograms of the last three surveys, it is obvious recruitment in 2011 has been poor, probably caused by low water conditions that

have left needed spawning and rearing habitat dry. White crappie directed effort was 7.9h/acre making it the most popular species at the reservoir. An estimated 14,762 were harvested during the recent creel survey.

## Fisheries management plan for Millers Creek Reservoir, Texas

Prepared – July 2012

**Issue 1:** An abundant population of gizzard shad exists in the reservoir. This prey population has remained abundant during the last decade while the reservoir has been stocked with palmetto bass every other year at the rate of 10/acre.

### MANAGEMENT STRATEGY

1. Request stocking palmetto bass every year at the rate of 10/acre.

**Issue 2:** Millers Creek is recognized as an excellent reservoir for catfish, white bass, palmetto bass, white crappie, and largemouth bass and should be promoted to increase angler effort. However, since it is at the edge of the district boundary, it needs to be promoted outside of the district.

### MANAGEMENT STRATEGIES

1. Continue to promote the fishery, especially beyond our district boundaries. A creel survey in 2011-12 found that most of the Millers Creek anglers reside outside of our district with many from the Lubbock area. News releases should include the Lubbock media using VOCUS.
2. Update the reservoirs web page when appropriate with new information on the fishery.

**Issue 3:** Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches and plugging engine cooling systems. Giant salvinia (*Salvinia molesta*) and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

### MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Contact and educate marina owners about invasive species, and provide them with posters and literature so that they can in turn educate others.
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.

**Issue 4:** Largemouth bass are an important component of the fishery and the 2011 electrofishing survey found an apparent lack of recruitment for the 2011 age class. Persistent low water elevation conditions could lead to a decline in numbers and size structure of this fishery.

### MANAGEMENT STRATEGY

1. Conduct a standardized electrofishing survey in 2013 to monitor the population.

**SAMPLING SCHEDULE JUSTIFICATION:**

Conduct an electrofishing survey in fall of 2013 to monitor the largemouth bass population which is an important component of the fishery. Electrofishing results indicated a lack of recruitment in 2011 and with the reservoir elevation still low, the population would be expected to start to decline in terms of abundance and size structure. Conduct a gill net survey in 2014 to monitor the palmetto bass population. Standard surveys with electrofishing, gill and trap nets will be conducted every 4 years.

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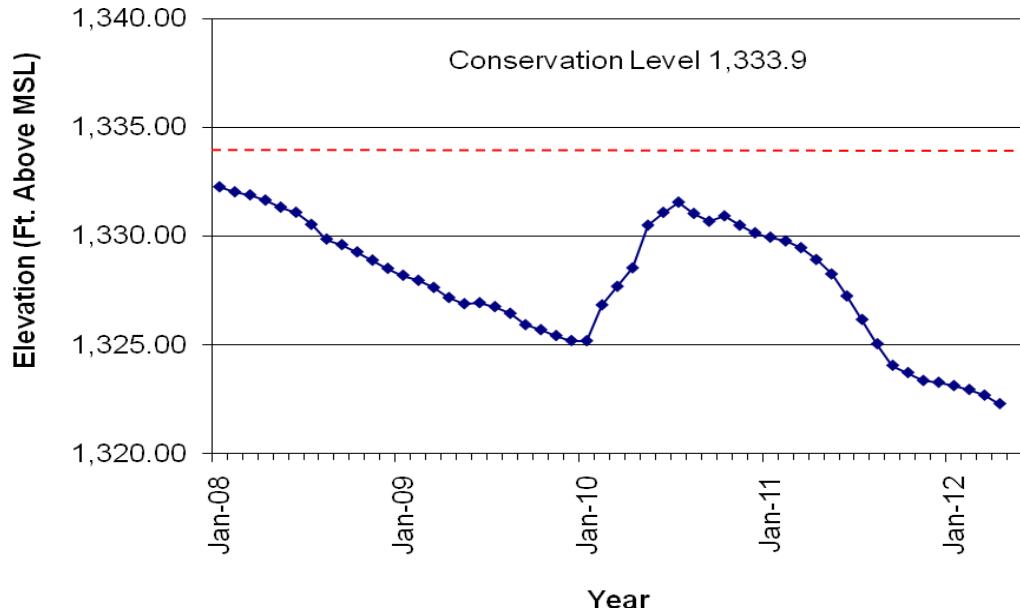


Figure 1. Monthly water level elevations in feet above mean sea level (MSL) recorded for Millers Creek Reservoir, Texas. Reservoir elevation data obtained from USGS website.

Table 1. Characteristics of Millers Creek Reservoir, Texas.

Characteristic	Description
Year Constructed	1974
Controlling authority	North Central Texas Municipal Water Authority
County	Baylor
Reservoir type	Tributary
Shoreline Development Index (SDI)	3.64
Conductivity	391 $\mu\text{mhos}/\text{cm}$

Table 2. Harvest regulations for Millers Creek Reservoir, Texas.

Species	Bag Limit	Length Limit (inches)
Catfish: Channel and blue catfish, their hybrids and subspecies	25 (in any combination)	12 minimum
Catfish, Flathead	5	18 minimum
Bass, White	25	10 minimum
Bass, Palmetto	5	18 minimum
Bass, Largemouth	5	14 minimum
Crappie, White	25	10 minimum

Table 3. Stocking history of Millers Creek Reservoir, 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.

<b>Species</b>	<b>Year</b>	<b>Number</b>	<b>Life Stage</b>	<b>Mean TL (in)</b>
Blue catfish	1990	19,354	FGL	2.0
	1991	<u>19,000</u>	FGL	2.1
	Total	38,354		
Channel catfish	1974	62,500	AFGL	7.9
	1980	<u>750</u>	UNK	UNK
	Total	63,250		
Florida Largemouth bass	1985	93,341	FRY	1.0
	2012	<u>87,759</u>	FGL	1.6
	Total	181,100		
Largemouth bass	1974	<u>25,000</u>	UNK	UNK
	Total	25,000		
Palmetto Bass (striped X white bass hybrid)	1980	12,376	UNK	UNK
	1982	21,036	UNK	UNK
	1994	24,900	FGL	1.6
	1995	30,457	FGL	1.1
	1997	16,256	FGL	1.1
	1999	23,048	FGL	1.3
	2002	23,090	FGL	1.3
	2004	18,013	FGL	1.7
	2006	19,000	FGL	1.7
	2008	18,600	FGL	1.6
	2009	16,510	FGL	1.3
	2012	<u>6,605</u>	FGL	2.1
	Total	229,891		
White crappie	1994	479	ADL	6.0
	1994	<u>3,094</u>	AFGL	5.0
	Total	3,573		

Table 4. Survey of littoral zone and physical habitat types, Millers Creek Reservoir, Texas, July 2011. A linear shoreline distance (miles) was recorded for each habitat type found. Surface area (acres) and percent of reservoir surface area was determined for each type of aquatic vegetation found. Reservoir elevation was 1,326.0 msl at time of survey (1,333.9 msl when full).

Shoreline habitat type	Shoreline Distance		Surface Area	
	Miles	Percent of total	Acres	Percent of reservoir surface area
Natural	10.3	60.6		
Rocky shore	6.4	37.6		
Gravel	0.3		1.8	
Total shoreline length	17.0			
<u>Habitat adjacent to shoreline</u>				
Standing timber			55.2	0.5
Native submerged vegetation			<0.1	0.0

Table 5. Percent directed angler effort by species, percent harvest and catch for all anglers for Millers Creek Reservoir, Texas, from June – November 2003 compared to September 2011 – May 2012 quarters.

Species	Percent directed effort		Percent harvest all anglers		Percent catch all anglers	
	Year	2003	2011-12	2003	20011-12	2003
Spotted gar				0.1		0.1
Common carp			2.7	0.1	1.5	0.1
Blue catfish		0.5	2.1	2.4	1.6	2.2
Channel catfish	13.9	1.6	21.0	14.4	14.4	9.5
Flathead catfish			0.3	0.1	0.1	0.1
Catfish spp.	25.2	20.4				
White bass	16.8	2.6	32.9	6.8	21.0	9.4
Palmetto bass	1.4	1.3	0.3		0.3	0.2
Green sunfish			4.4		3.1	
Warmouth					0.2	
Bluegill			7.4	3.2	3.2	3.9
Longear sunfish			6.6		2.6	
Panfish spp.	0.8					0.3
Largemouth bass	13.3	12.5	1.7	3.9	3.2	3.7
White crappie	12.4	40.7	20.6	68.9	48.4	69.1
Freshwater drum					0.4	1.3
Anything	16.1	20.5				

Table 6. Total fishing effort (h) for all species and total directed expenditures at Millers Creek from June – November 2003 compared to September 2011– May 2012 quarters.

Creel Statistic	Year	
	June – November 2003	September 2011– May 2012
Total fishing effort (h)	16,823.5	34,629.7
Total directed expenditures	\$54,123	\$227,270

## Gizzard Shad

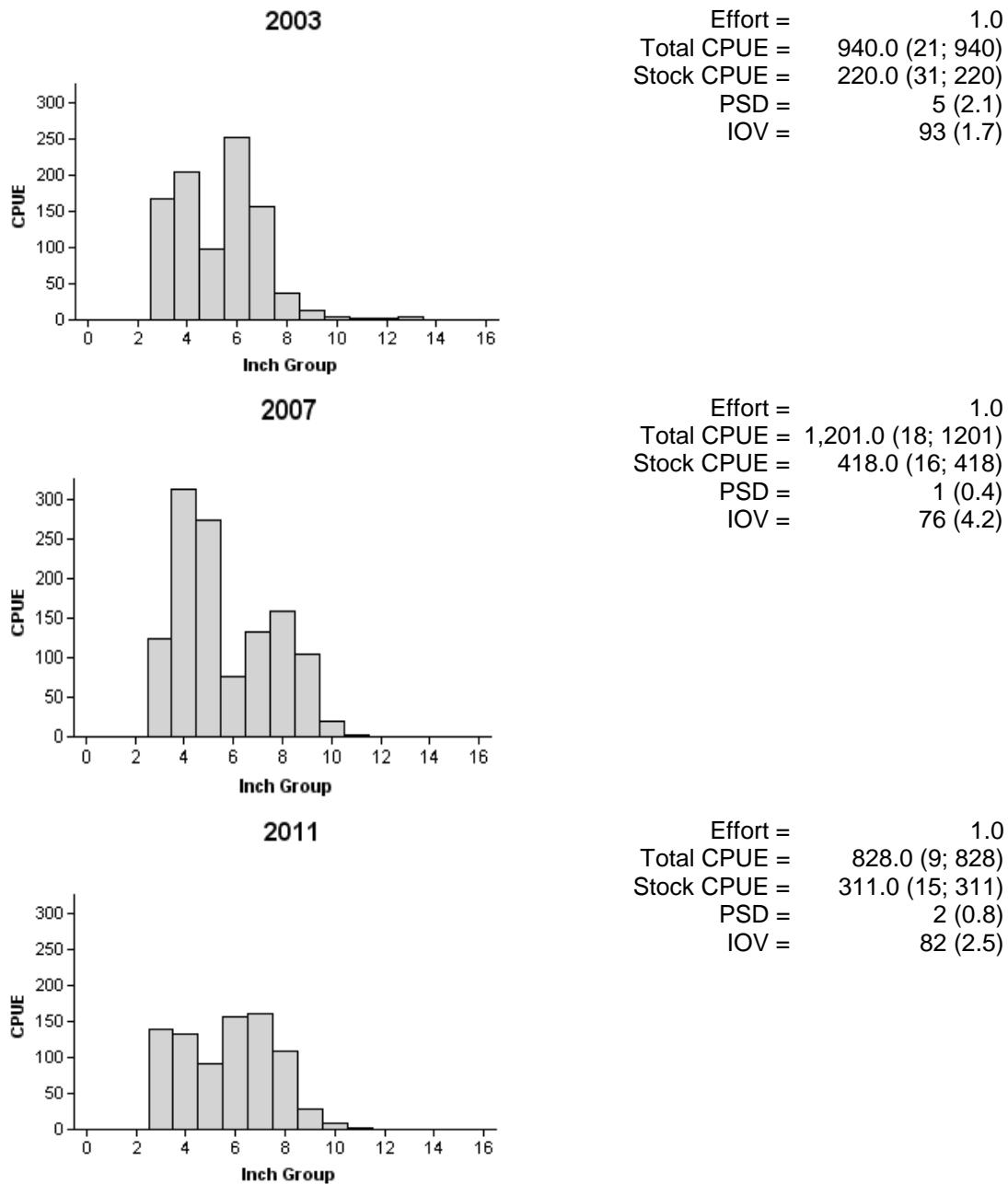


Figure 2. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and SE for CPUE and SE for IOV are in parenthesis) for fall electrofishing surveys, Millers Creek Reservoir, Texas, 2003, 2007, and 2011.

## Bluegill

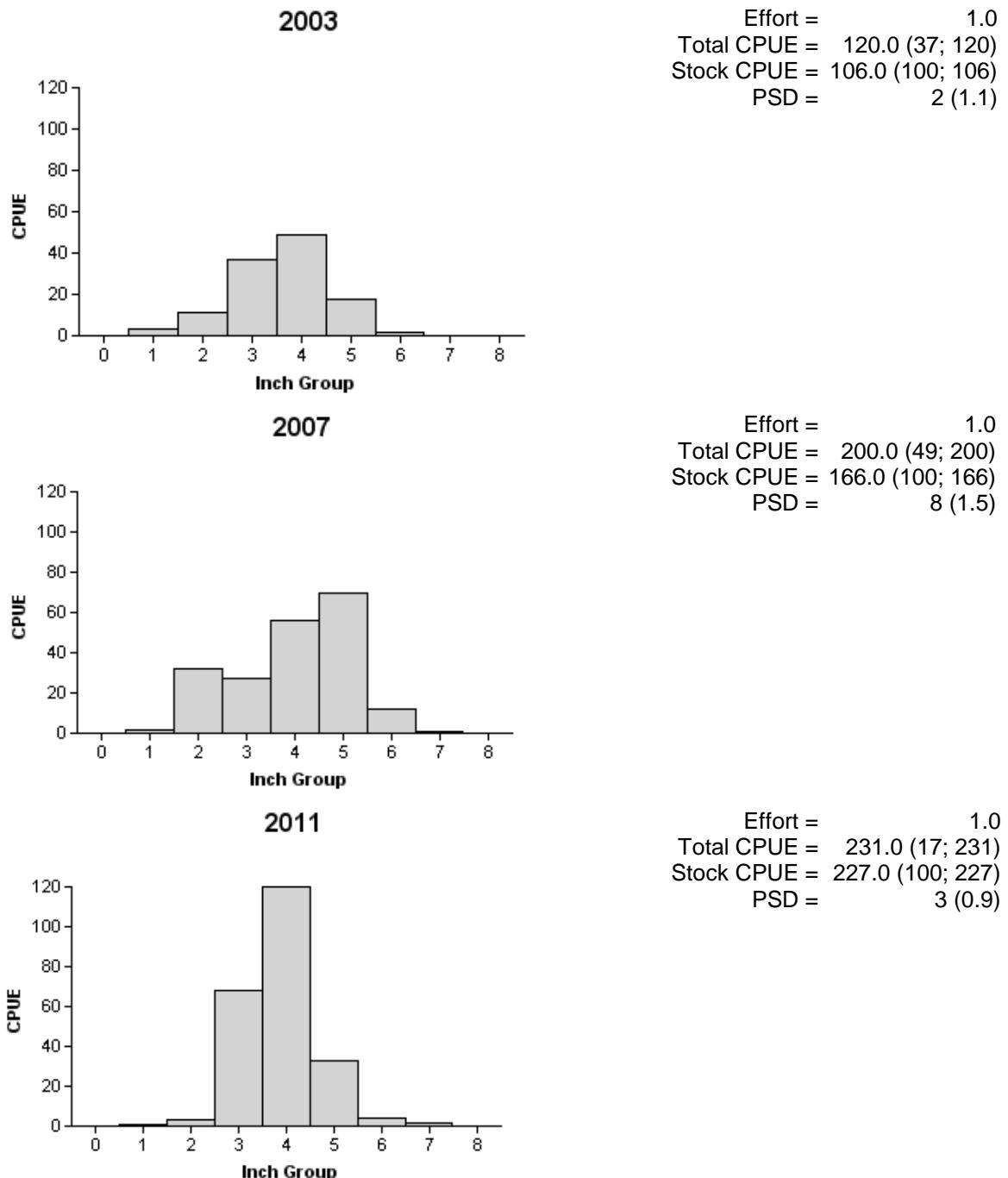


Figure 3. Number of bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Millers Creek Reservoir, Texas, 2003, 2007, and 2011.

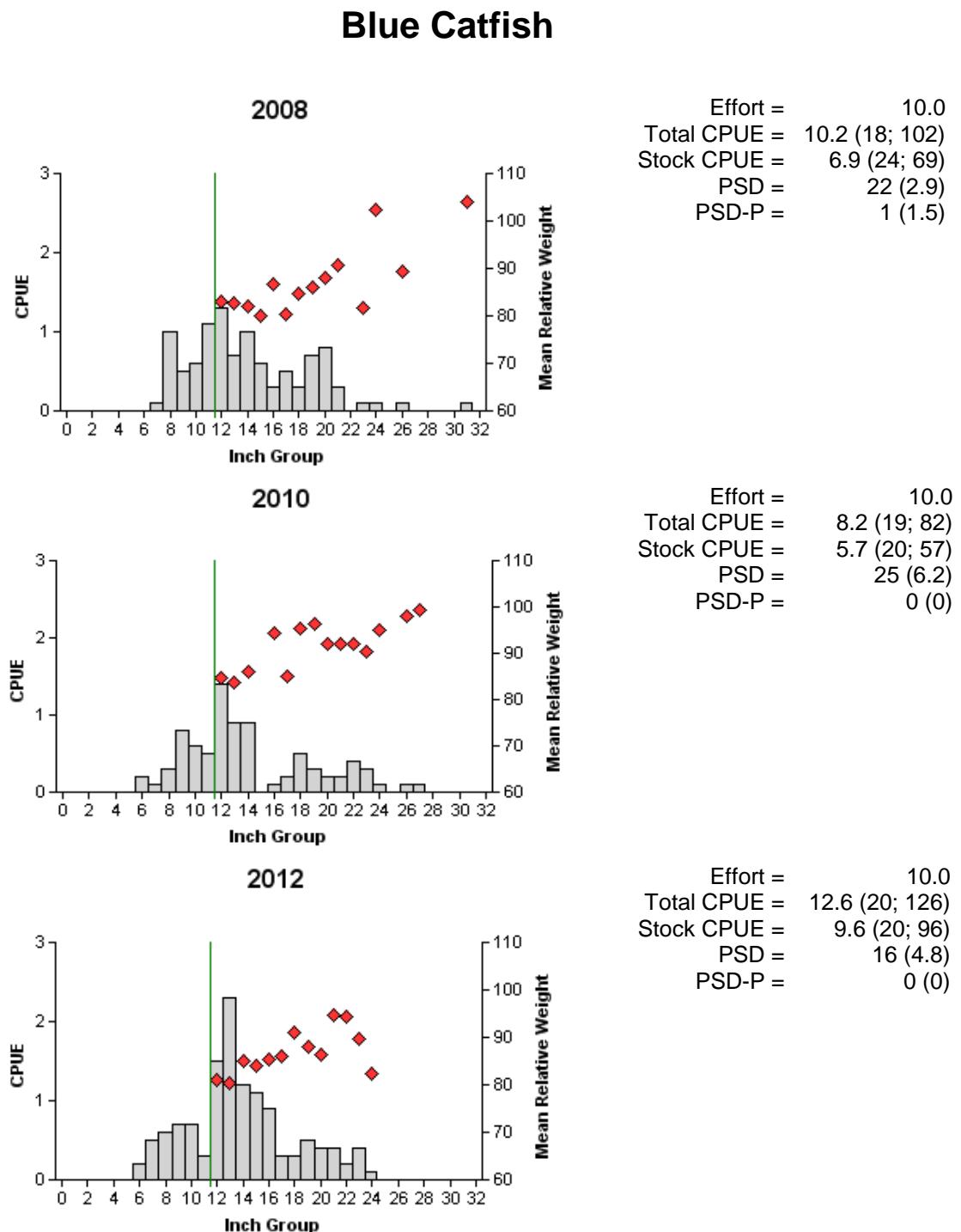


Figure 4. Number of blue catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill netting surveys, Millers Creek Reservoir, Texas, 2008, 2010, and 2012. Line indicates minimum length limit at time of sampling.

## Blue Catfish

Table 7. Creel survey statistics for blue catfish at Millers Creek Reservoir from June – November 2003 compared to September 2011 – May 2012 quarters, where total catch per hour is for anglers targeting blue catfish and total harvest is the estimated number of blue catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year	
	June – November 2003	September 2011 – May 2012
Directed effort (h)	0.0(-)	160.2 (113.8)
Directed effort/acre	0.0(-)	0.1 (113.8)
Total catch per hour	0.0(-)	0.0(-)
Total harvest	245.4 (45.8)	510.3 (117.1)
Harvest/acre	0.1 (45.8)	0.3 (117.1)

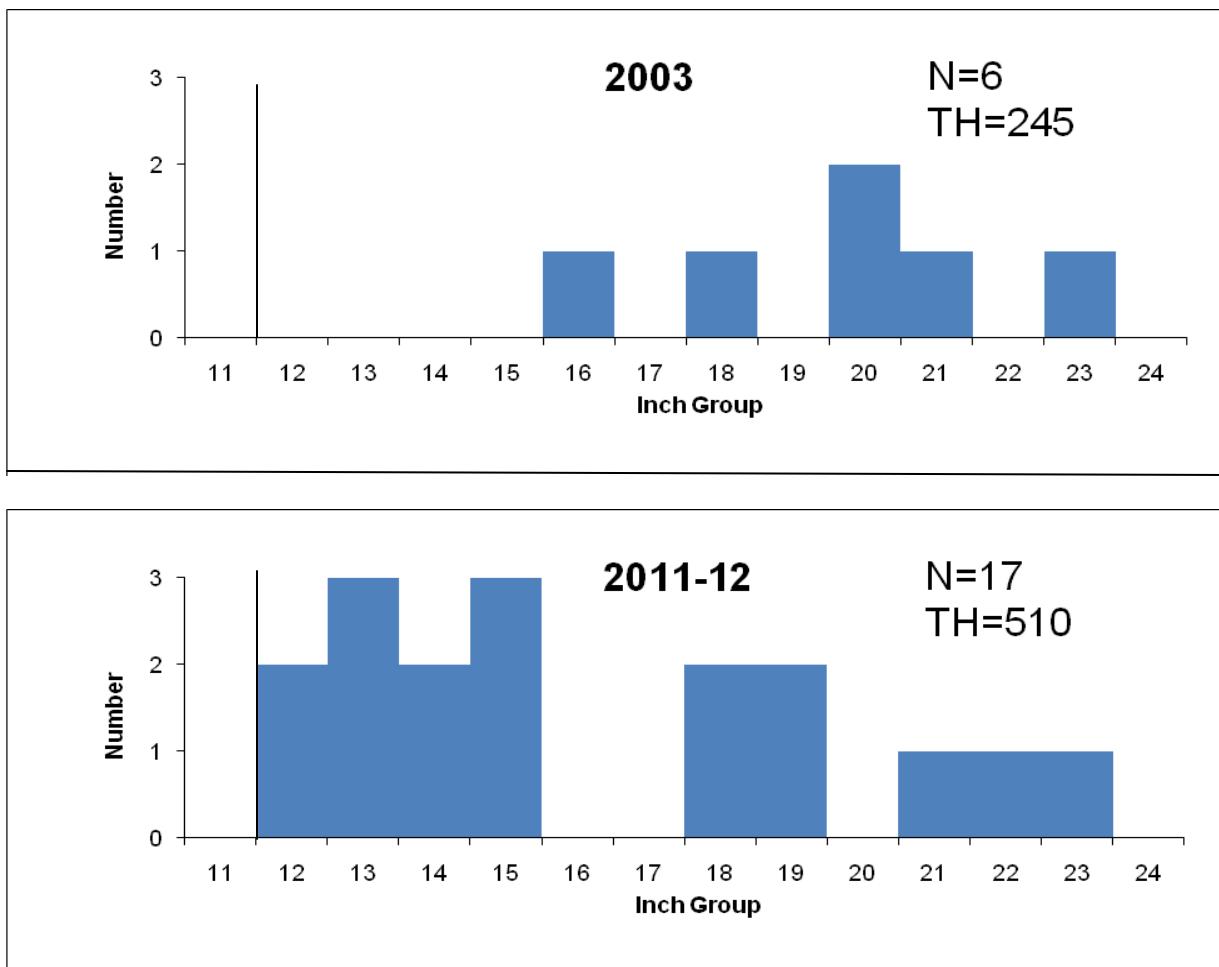


Figure 5. Length frequency of harvested blue catfish observed during creel surveys at Millers Creek June – November 2003 compared to September 2011 – May 2012, all anglers combined. N is the number of harvested channel catfish observed during creel surveys, and TH is the total estimated harvest for the creel period. Twelve inch minimum length limit at time of sampling.

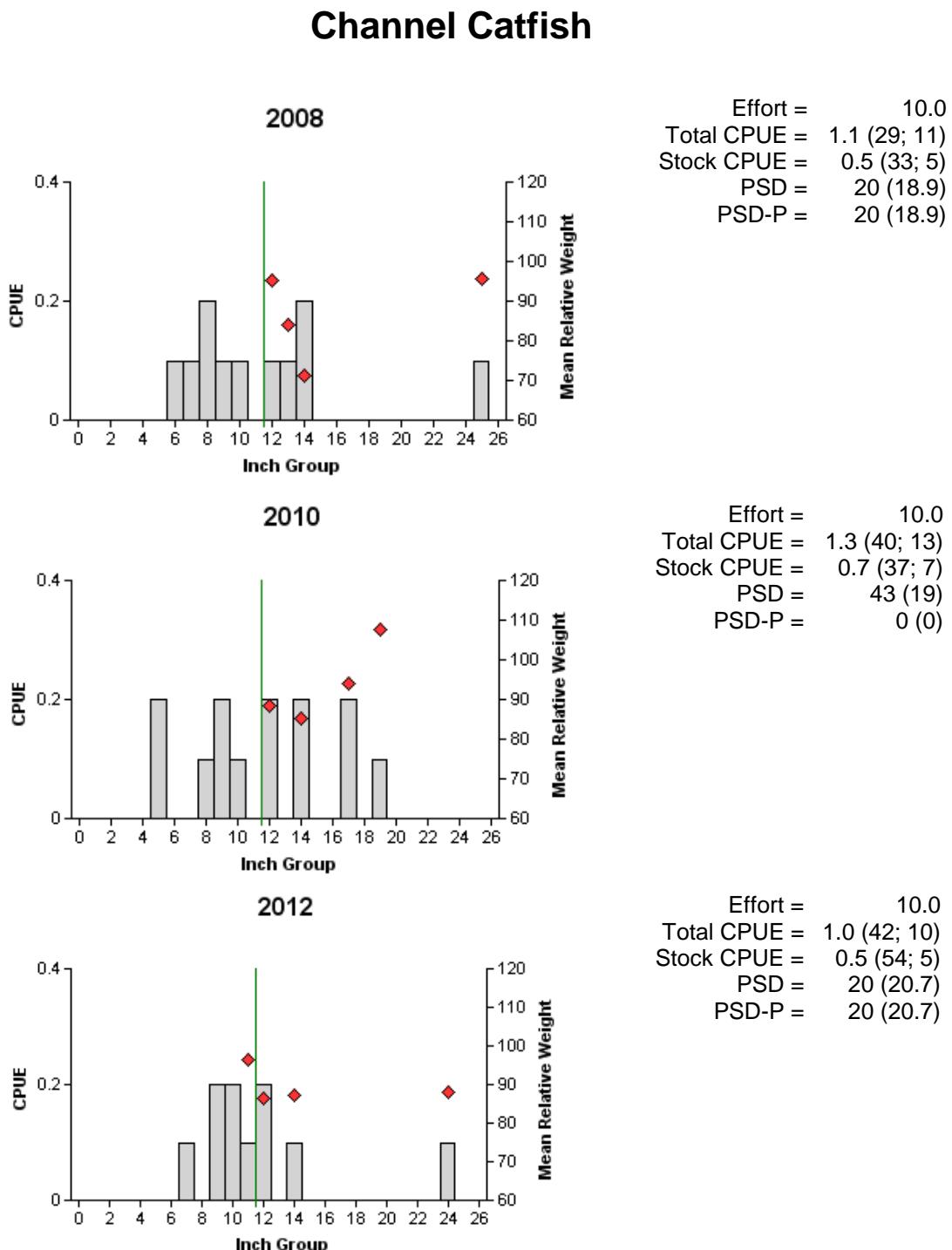


Figure 6. Number of channel catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill netting surveys, Millers Creek Reservoir, Texas, 2008, 2010, and 2012. Line indicates minimum length limit at time of sampling.

## Channel Catfish

Table 8. Creel survey statistics for channel catfish at Millers Creek Reservoir from June – November 2003 compared to September 2011 – May 2012 quarters, 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 (RSE) are in parentheses.

Creel Survey Statistic	Year	
	June – November 2003	September 2011 – May 2012
Directed effort (h)	2,341.8 (39.5)	569.9 (66.4)
Directed effort/acre	1.3 (39.5)	0.3 (66.4)
Total catch per hour	0.5 (78.6)	0.0(-)
Total harvest	2,458.5 (132.1)	3,216.4 (77.3)
Harvest/acre	1.4 (132.1)	1.8 (77.3)

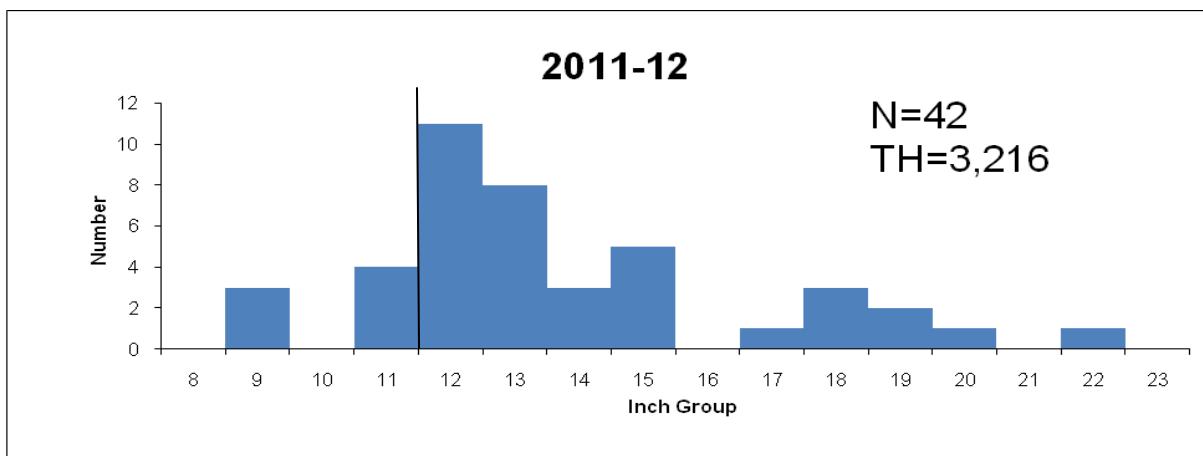
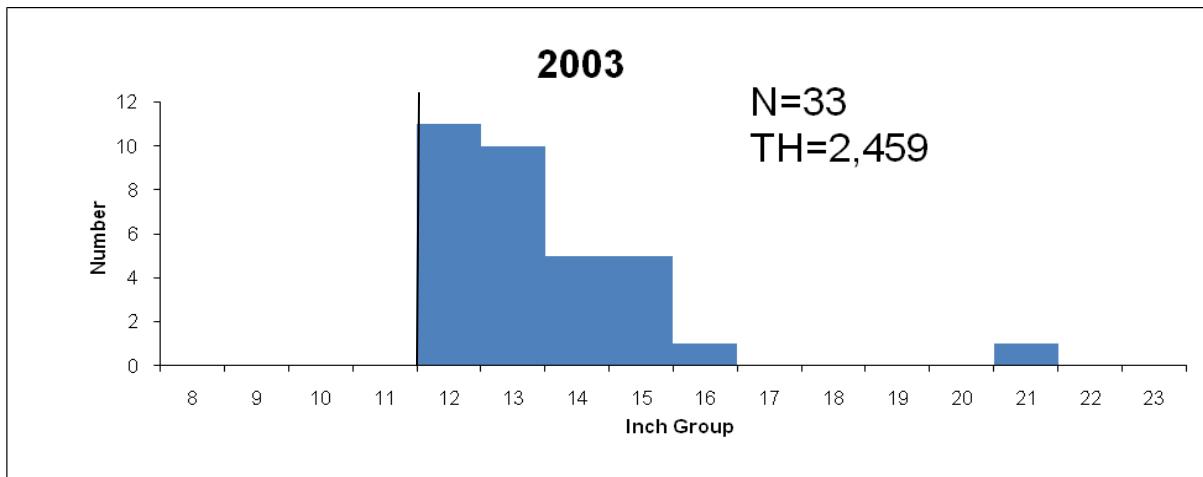


Figure 7. Length frequency of harvested channel catfish observed during creel surveys at Millers Creek June – November 2003 compared to September 2011 – May 2012, all anglers combined. N is the number of harvested channel catfish observed during creel surveys, and TH is the total estimated harvest for the creel period. Twelve inch minimum length limit at time of sampling.

## White Bass

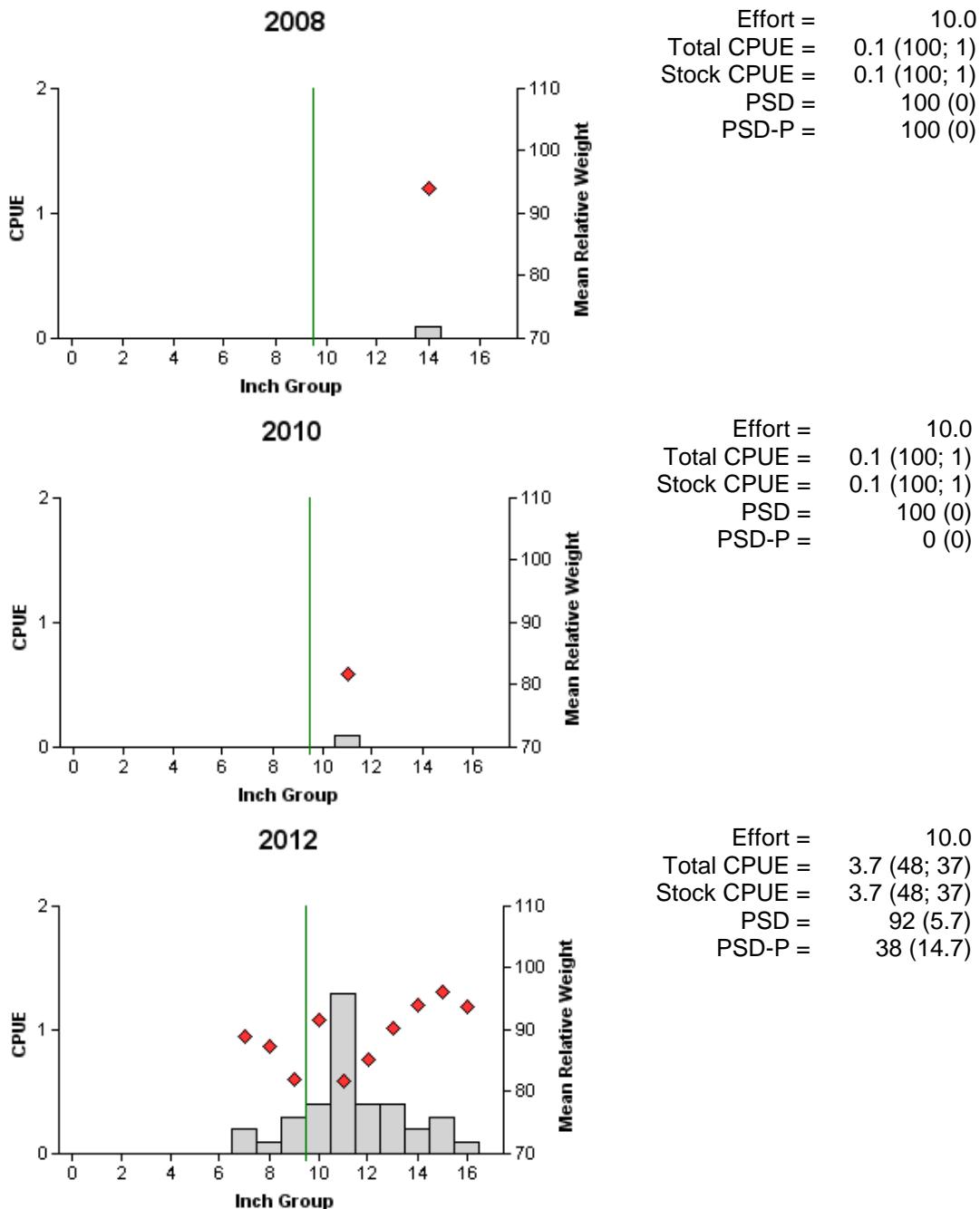


Figure 8. Number of white bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill netting surveys, Millers Creek Reservoir, Texas, 2008, 2010, and 2012. Line indicates minimum length limit at time of sampling.

## White Bass

Table 9. Creel survey statistics for white bass at Millers Creek Reservoir from June – November 2003 compared to September 2011 – May 2012 quarters, 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.

Creel Survey Statistic	Year	
	June – November 2003	September 2011 – May 2012
Directed effort (h)	2,828.9 (30.8)	894.9 (54.6)
Directed effort/acre	1.6 (30.8)	0.5 (54.6)
Total catch per hour	1.3 (44.7)	1.7 (45.8)
Total harvest	3,845.6 (59.4)	1,467.7 (50.7)
Harvest/acre	2.1 (59.4)	0.8 (50.7)

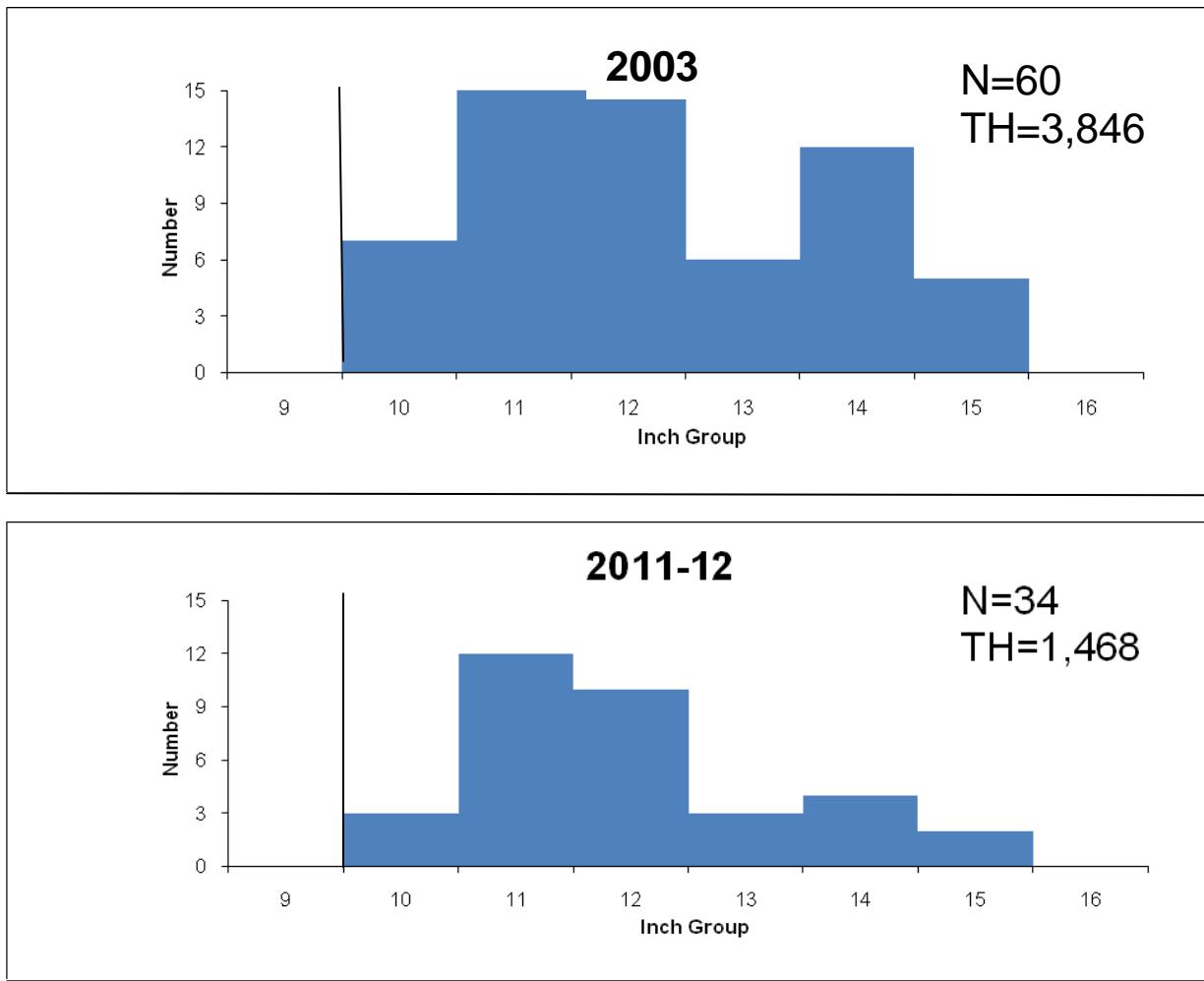


Figure 9. Length frequency of harvested white bass observed during creel surveys at Millers Creek Reservoir, Texas, June – November 2003 and September 2011 – May 2012, all anglers combined. N is the number of harvested white bass observed during creel surveys, and TH is the total estimated harvest for the creel period. Ten inch minimum length limit at time of sampling.

## Palmetto bass

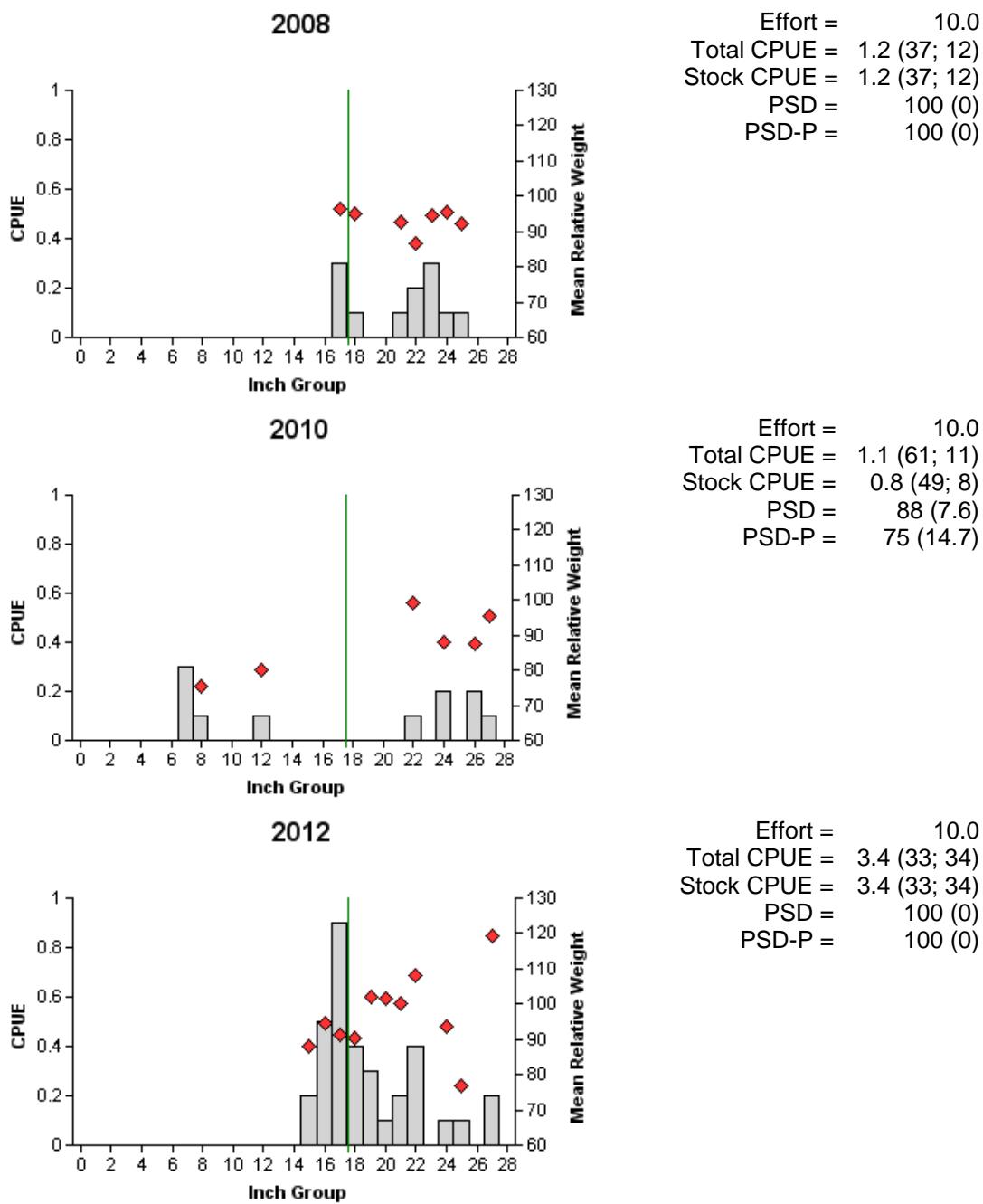


Figure 10. Number of palmetto bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill netting surveys, Millers Creek Reservoir, Texas, 2008, 2010, and 2012. Line indicates minimum length limit at time of sampling.

Table 10. Mean length at age of capture for palmetto bass (sexes combined) collected by gill nets, Millers Creek Reservoir, Texas, April 1996, 1999, 2002, 2008 and March 2010. Sample sizes are in parentheses. Ages were determined using otoliths.

Year	Length (inches) at age							
	1	2	3	4	5	6	7	8
1996	9.6 (1)	13.9 (8)						
1999		14.5 (7)		20.4 (3)	22.5 (1)			
2002			18.7 (7)		22.6 (11)		24.3 (10)	25.2 (3)
2008		17.7 (3)				23.3 (8)		
2010	7.9 (4)				24.4 (1)			25.1 (4)
Averages*	13.6	17.4	20.3	22.6	24.5	25.9	27.0	27.9

\* Ecological region averages from Prentice (1987); lengths derived for April 15.

Table 11. Creel survey statistics for palmetto bass at Millers Creek Reservoir from June – November 2003 compared to September 2011 – May 2012 quarters, 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.

Creel Survey Statistic	Year	
	June – November 2003	September 2011 – May 2012
Directed effort (h)	241.8 (92.0)	446.3 (66.7)
Directed effort/acre	0.1 (92.0)	0.2 (66.7)
Total catch per hour	0.0 (-)	0.0 (-)
Total harvest	40.9 (542.1)	0.0 (-)
Harvest/acre	0.0 (542.1)	0.0 (-)

## Largemouth Bass

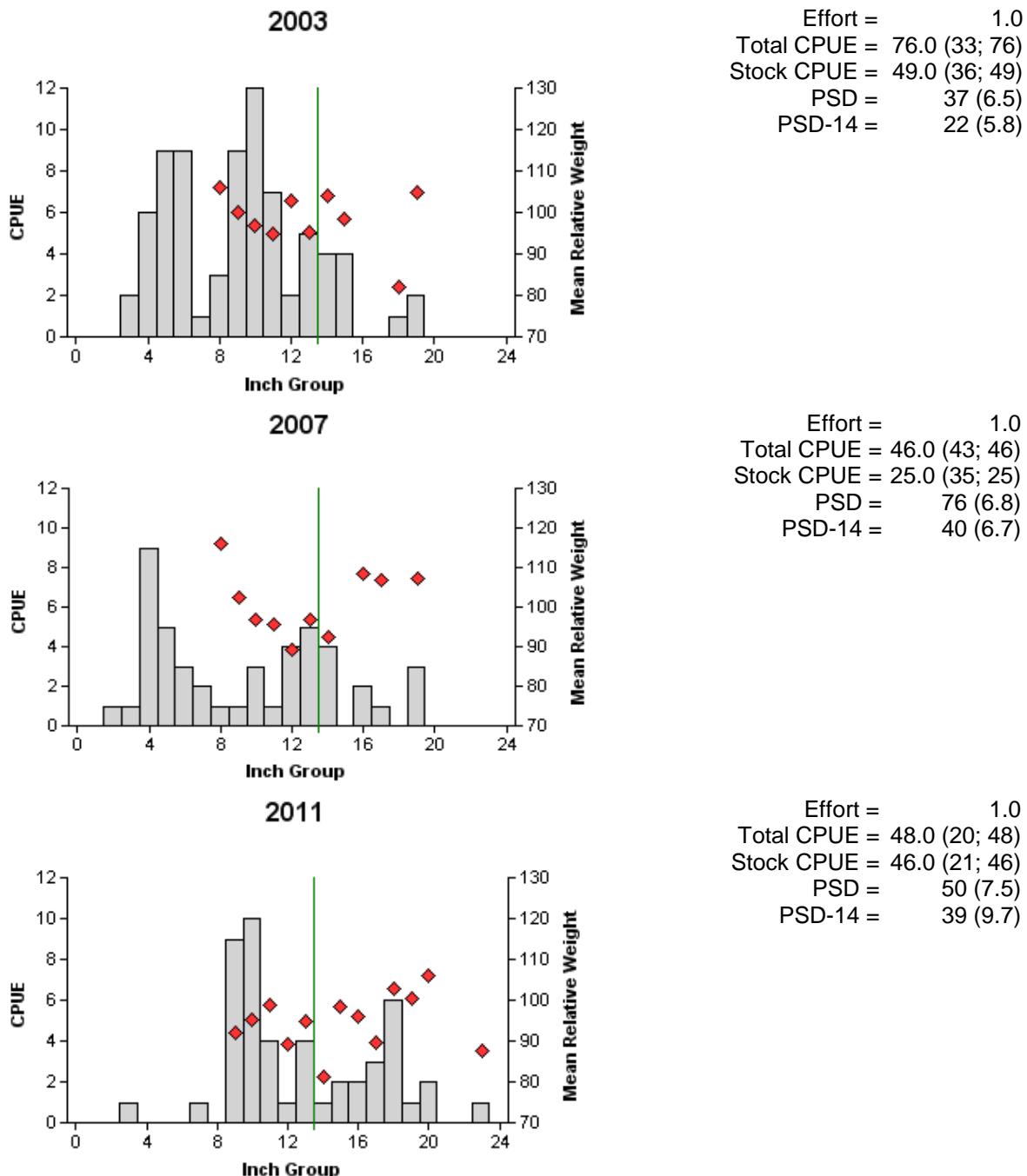


Figure 11. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Millers Creek Reservoir, Texas, 2003, 2007, and 2011. Line indicates minimum length limit at time of sampling.

## Largemouth Bass

Table 12. Results of genetic analysis of largemouth bass collected by fall electrofishing, Millers Creek Reservoir, Texas, 1996, 1999, 2003 2007, and 2011. FLMB = Florida largemouth bass, NLMB = Northern largemouth bass, F1 = first generation hybrid between a FLMB and a NLMB, Fx = second or higher generation hybrid between a FLMB and a NLMB.

Year	Sample size	Genotype			% FLMB alleles	% pure FLMB
		FLMB	F1 or Fx	NLMB		
1996	30	1	23	6	30.0	3.3
1999	22	1	18	3	45.5	4.5
2003	29	1	24	4	37.9	3.4
2007	30	0	28	2	27.7	0.0
2011	30	0	30	0	35.0	0.0

## Largemouth bass

Table 13. Creel survey statistics for largemouth bass at Millers Creek Reservoir from June – November 2003 compared to September 2011 – May 2012 quarters, 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.

Creel Survey Statistic	Year	
	June – November 2003	September 2011 – May 2012
Directed effort (h)	2,235.8 (39.3)	4,332.9 (29.9)
Directed effort/acre	1.2 (39.3)	2.4 (29.9)
Total catch per hour	0.3 (94.3)	0.3 (35.9)
Total harvest	196.3 (180.8)	880.7 (57.7)
Harvest/acre	0.1 (180.8)	0.5 (57.7)

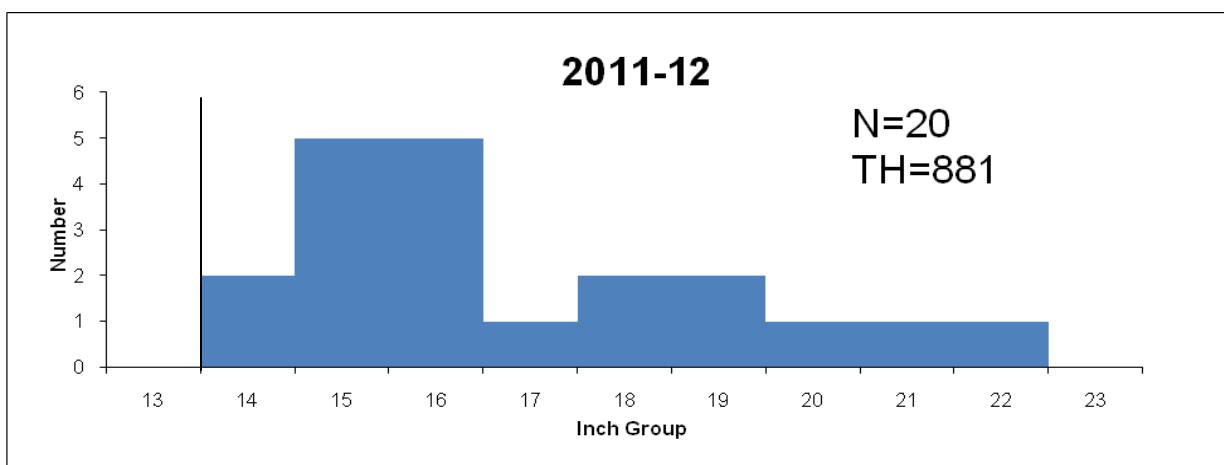
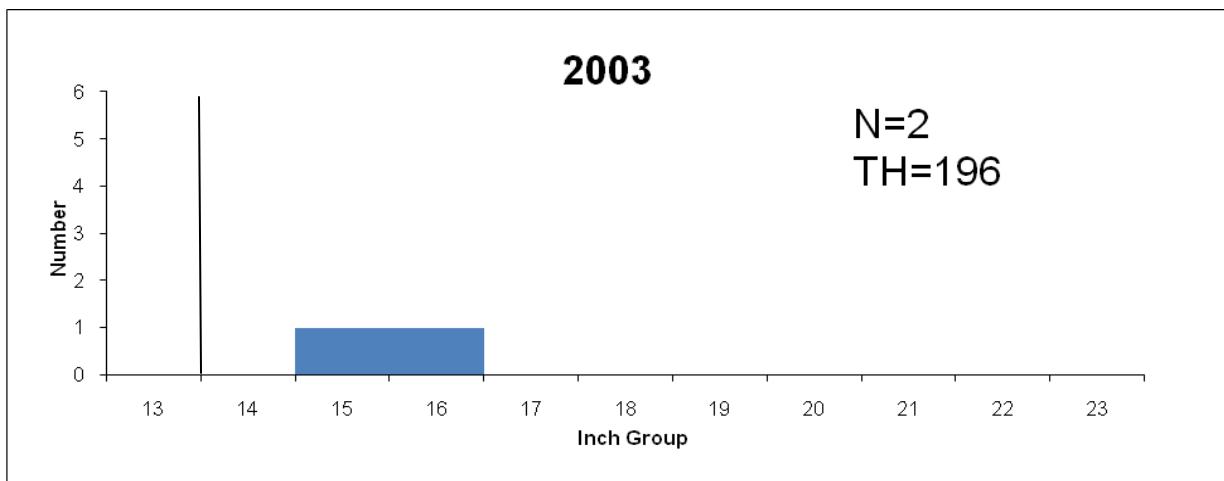


Figure 12. Length frequency of harvested largemouth bass observed during creel surveys at Millers Creek June – November 2003 compared to September 2011 – May 2012 quarters, all anglers combined. N is the number of harvested largemouth bass observed during creel surveys, and TH is the total estimated harvest for the creel period. Dash line indicates minimum length limit at time of sampling.

## White Crappie

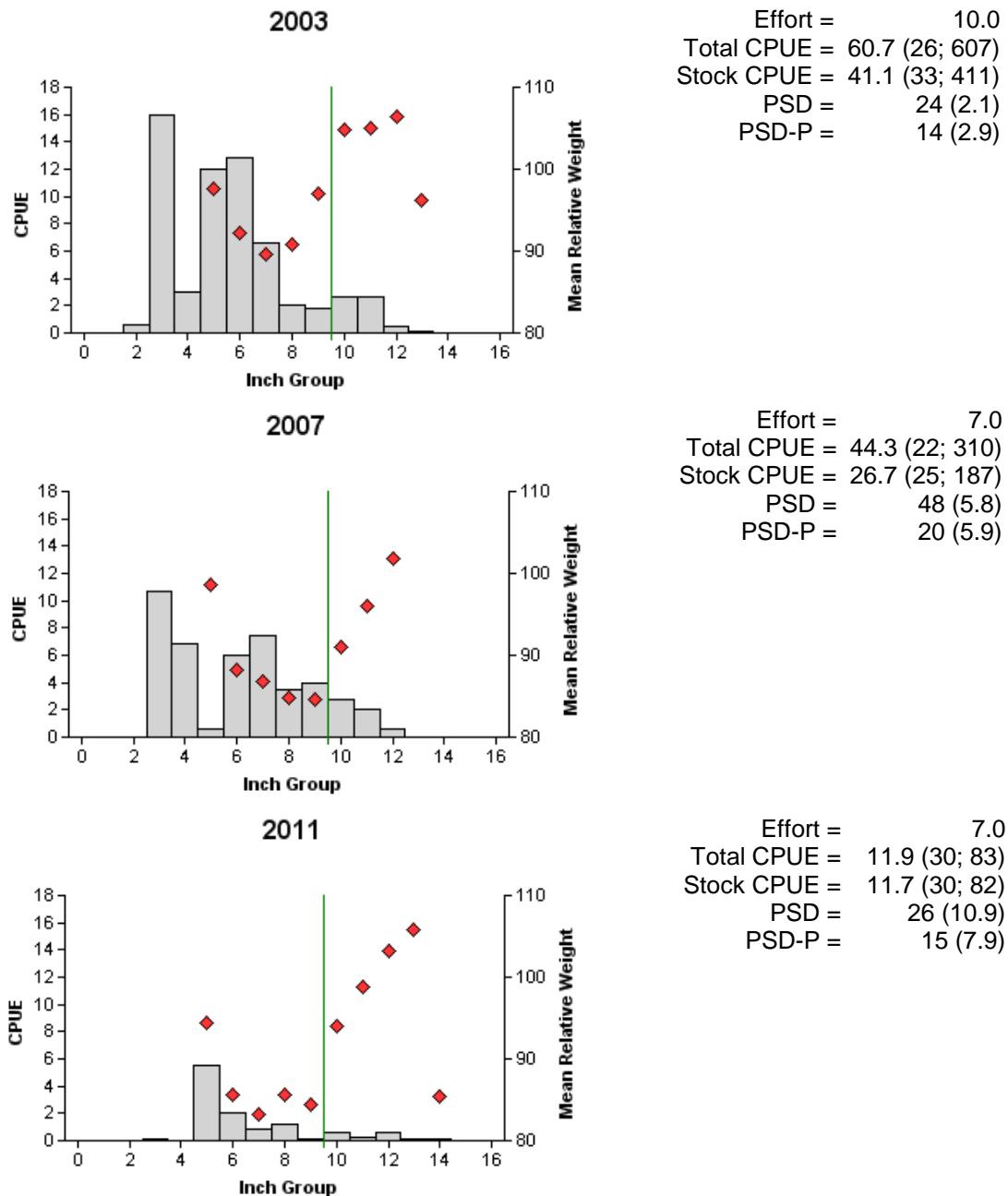


Figure 13. Number of white crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Millers Creek Reservoir, Texas, 2003, 2007, and 2011. Line indicates minimum length limit at time of sampling.

## White Crappie

Table 14. Creel survey statistics for white crappie at Millers Creek Reservoir from June – November 2003 compared to September 2011 – May 2012 quarters, 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.

Creel Survey Statistic	Year	
	June – November 2003	September 2011 – May 2012
Directed effort (h)	2,088.0 (38.6)	14,087.4 (17.9)
Directed effort/acre	1.2 (38.6)	7.9 (17.9)
Total catch per hour	5.9 (65.5)	2.5 (24.6)
Total harvest	2,408.1 (42.3)	14,761.8 (37.3)
Harvest/acre	1.3 (42.3)	8.2 (37.3)

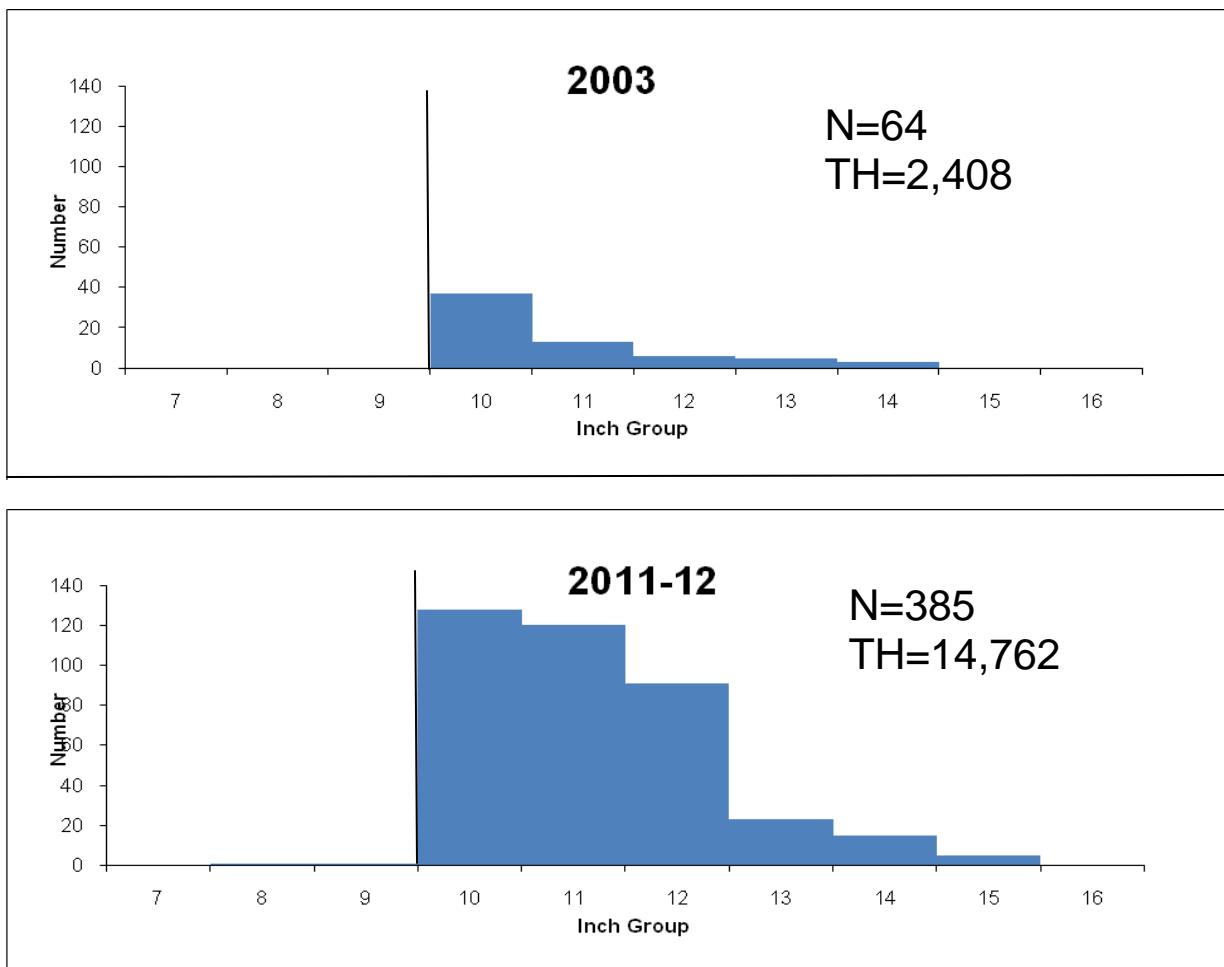


Figure 14. Length frequency of harvested white crappie observed during creel surveys at Millers Creek June – November 2003 compared to September 2011 – May 2012, all anglers combined. N is the number of harvested white crappie observed during surveys, and TH is the total estimated harvest for the creel period. Ten inch minimum length limit at time of sampling.

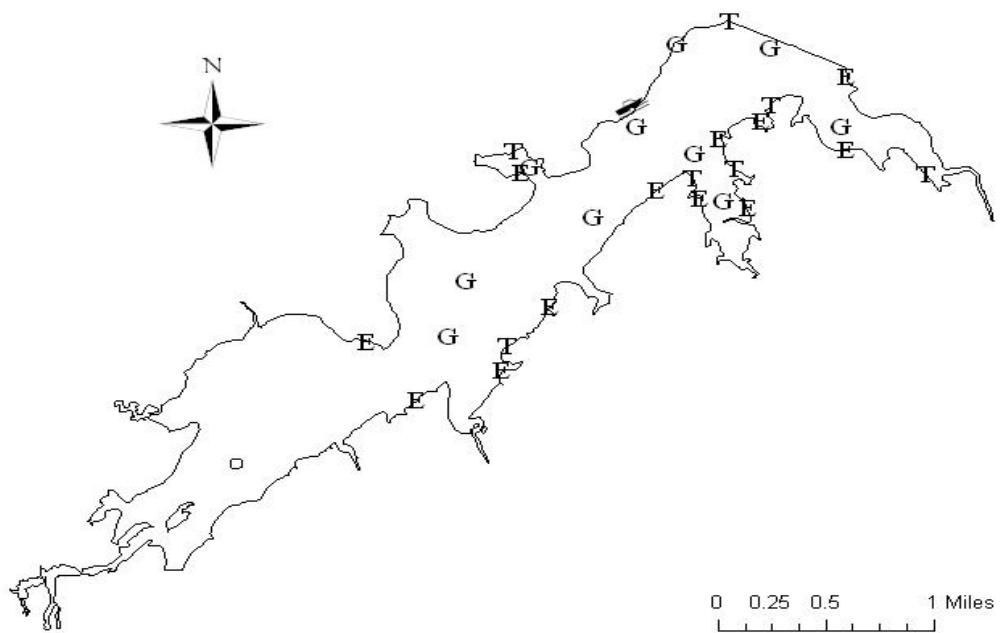
Table 15. Proposed sampling schedule for Millers Creek Reservoir, Texas. Gill net surveys are conducted in the spring, while electrofishing and trap net surveys are conducted in the fall. S denotes standard survey and A denotes additional survey.

Survey Year	Electrofisher	Trap Net	Gill Net	Creel Survey	Vegetation Survey	Access Survey	Report
<b>Fall 2012-Spring 2013</b>							
Fall 2013-Spring 2014	A			A			
Fall 2014-Spring 2015							
Fall 2015-Spring 2016	S	S	S		S	S	S

**APPENDIX A**

Number (N) and catch rate (CPUE) of all species collected from all gear types from Millers Creek Reservoir, Texas, 2011-2012.

Species	Gill Nets		Trap Nets		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Spotted gar	7	0.7				
Longnose gar	7	0.7				
Shortnose gar	1	0.1				
Gizzard shad	572	57.2	25	3.6	828	828.0
Common carp	7	0.7				
River carpsucker	12	1.2				
Smallmouth buffalo	62	6.2				
Blue catfish	126	12.6	2	0.3		
Channel catfish	1	0.1	3	0.4		
Flathead catfish	3	0.3				
White bass	37	3.7	2	0.3		
Palmetto bass	34	3.4				
Green sunfish					40	40.0
Bluegill	1	0.1	32	4.6	231	231.0
Longear sunfish			5	0.7	45	45.0
Hybrid sunfish					1	1.0
Largemouth bass					48	48.0
White crappie	30	3	83	11.9		
Freshwater drum	20	2	1	0.1		

**APPENDIX B**

Location of sampling sites, Millers Creek Reservoir, Texas, 2011-2012. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively.