

PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-221-M-2

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2011 Survey Report

Cedar Creek Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Cedar Creek Reservoir were surveyed in 2011 using daytime electrofisher and trap nets, and in 2012 using gill nets. Anglers were surveyed from June through November 2011 with a creel survey. This report summarizes the results of the surveys and contains a management plan for the reservoir.

Reservoir description: Cedar Creek Reservoir is a 32,623-acre impoundment of Cedar Creek, Texas, a tributary of the Trinity River. The reservoir was constructed by the Tarrant Regional Water District in 1965 to provide water for municipal and industrial use. Boat access is adequate, but public access for bank anglers is limited. There are no handicap-specific facilities. The aquatic vegetation survey, conducted at five feet below conservation pool, indicated poor habitat. Anglers expended approximately 60,489 hours of fishing effort and an estimated \$523,121 on direct expenditures during the June through November creel period.

- **Management history:** Important sportfish include palmetto and white basses, largemouth bass, blue and channel catfishes, and white and black crappies. Supplemental stocking of Florida largemouth bass was conducted in 2008 and 2009. Palmetto bass were stocked in 2008, 2009, and 2011. Supplemental gill netting was conducted in 2010 in order to monitor the popular temperate bass and catfish fisheries. Roving creel surveys were conducted from June 2003 through May 2004, from June 2007 through May 2008, and from June through November 2011.
- **Fish community**
 - **Prey species:** The prey community is dominated by threadfin and gizzard shad. Sunfishes also provide supplemental forage for sport fish.
 - **Catfishes:** Cedar Creek has historically been a popular catfish fishery. Blue catfish are typically more abundant than channel catfish.
 - **Temperate basses:** White bass and palmetto bass provide additional fisheries at Cedar Creek. Gill net catch rate of palmetto bass has declined, reflective of inconsistent stocking density.
 - **Largemouth bass:** Largemouth bass was the most sought after species by anglers at Cedar Creek, and tournament effort comprised 66% of all angler effort for largemouth bass in the 2011 creel period.
 - **Crappie:** White crappie and black crappie were present in the reservoir in equal abundance. Crappies were the third most popular fishery at Cedar Creek Reservoir.
- **Management strategies:** Stock palmetto bass at 10/ac each year, and monitor palmetto bass and catfish populations with gill netting in 2014 and 2016. Monitor the frequency of Florida largemouth bass alleles in 2015 with fall electrofishing. Continue to monitor for exotic species presence and educate resource users. Publish articles in local newspapers highlighting TPWD activities.

INTRODUCTION

This document is a summary of fisheries data collected from Cedar Creek Reservoir from June 2011 through May 2012. 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 2011 and 2012 data for comparison when appropriate.

Reservoir Description

Cedar Creek Reservoir is a 32,623-acre impoundment of Cedar Creek, a tributary of the Trinity River. The reservoir was constructed by the Tarrant Regional Water District in 1965 to provide water for municipal and industrial use. Boat access is adequate, but bank angler access is limited because the majority of the lakeshore is privately owned. There are no handicap-specific facilities. Water level was five feet below conservation pool, and no submersed or emergent vegetation was detected during the vegetation survey. Water hyacinth (*Eichhornia crassipes*) was reported to cover approximately 200 acres during the 2007 survey (Ott and Beck 2008) but was not detected in the present survey. Cedar Creek Reservoir is hyper-eutrophic with a mean TSI *chl-a* of 61.2 (Texas Commission on Environmental Quality 2005). Other descriptive characteristics for Cedar Creek Reservoir are found in Table 1.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Ott and Beck 2008) included:

1. Conduct routine electrofishing to collect at least 30 age-0 or age-1 largemouth bass and assess the success of Florida largemouth bass stockings in fall 2011.
Action: Routine electrofishing was conducted, and a sample of 30 specimens of all ages was collected and submitted for analysis.
2. Conduct annual stockings of palmetto bass at 10/acre; conduct additional gill netting in spring of 2010 to evaluate palmetto bass population characteristics; conduct harvest assessment of palmetto bass with a creel survey from June 2011-May 2012.
Action: Due to reduced availability, palmetto bass were stocked at a reduced rate in 2009 and 2011; no stocking was conducted in 2010. Additional gill netting was conducted in spring 2010 to monitor the population. A roving creel survey was conducted from June through November 2011.
3. Coordinate with the controlling authority to develop a system-wide water hyacinth management plan; continue monitoring water hyacinth and provide assistance to private property owners in developing individual treatment plans as requested. Conduct a comprehensive vegetation survey in 2011.
Action: Controlling authority has not shown interest in managing aquatic vegetation on a system-wide basis. Individual property owners have not contacted the district office regarding individual treatment plans. Water hyacinth has not been observed or reported since the 2007 survey, and a management plan has not been developed. A comprehensive vegetation survey was conducted in 2011, and no water hyacinth was detected.
4. Continue cooperating with the Cedar Creek Reservoir Watershed Protection Plan Steering Committee to develop best management practices to reduce nutrient loading and siltation.
Action: Cedar Creek Watershed Protection Plan has been completed. <http://nctx-water.tamu.edu/media/1475/ccwpp.pdf>

Harvest regulation history: All sport fishes in Cedar Creek Reservoir are currently managed with statewide harvest regulations (Table 2). No regulatory changes have occurred during the survey period.

Stocking history: Supplemental stocking of Florida largemouth bass was conducted in 2008 and 2009. Stocking of palmetto bass was conducted in 2008, 2009, and 2011. A complete stocking history is found in Table 3.

Vegetation/habitat history: Cedar Creek Reservoir has typically contained little aquatic vegetation. This is likely the result of heavy wind action, turbidity, and high annual water level fluctuation. Water hyacinth and alligator weed (*Alternanthera philoxeroides*) were present in the 2008 survey but were not detected in 2011.

Water Transfer: Cedar Creek Reservoir was built by the Tarrant Regional Water District (TRWD) for municipal water supply. TRWD is currently a water wholesaler to more than ten counties in Texas in the Dallas and Fort Worth (DFW) metropolitan complex. Raw water outflow from Cedar Creek releases into the Trinity River, and has the potential to introduce exotic species through an intake into wetland cells before subsequent introduction into Richland Chambers Reservoir. Raw water is also transferred from Cedar Creek through the East Texas Pipeline and converges with water from Richland Chambers near Waxahachie, Texas. Water from the pipeline is available along a grid system to multiple water treatment plants in the DFW area, including Waxahachie, Midlothian, and Fort Worth.

Raw water from Cedar Creek Reservoir has the potential to be introduced directly or indirectly into Lakes Richland Chambers, Halbert, Bardwell, Benbrook, Joe Pool, Mountain Creek, Arlington, Eagle Mountain, and Lake Worth; all with subsequent return into the Trinity River. The TRWD and the City of Dallas Water Utilities have partnered to construct an Integrated Pipeline (IPL) Project, which will create further connections between municipalities and reservoirs, including Lake Palestine.

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 all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011); however, due to low water level, electrofishing was conducted during daylight hours as a safety measure. A comprehensive aquatic vegetation survey and angler access survey were conducted in July and August 2011.

Roving creel surveys were conducted from June 2003 through May 2004, June 2007 through May 2008, and June through November 2011. Surveys consisted of 9 creel days per quarter (4 weekdays and 5 weekend days); angler counts were continuous and consisted of one circumnavigation of the creel section with interviews conducted as anglers were intercepted. For largemouth bass, percent legal released was calculated separately for tournament anglers and non-tournament anglers. All survey dates 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 for creel statistics and SE was calculated for structural indices

and IOV. For largemouth bass (*Micropterus salmoides* spp.), ages were determined using otoliths from 30 specimens with lengths ranging from 4.1 to 20.1 inches. For black crappie (*Pomoxis nigromaculatus*) ages were determined using otoliths from 13 specimens with lengths ranging from 9.0 to 10.8 inches; for white crappie (*P. annularis*) ages were determined using otoliths from 13 specimens with lengths ranging from 9.1 to 10.2 inches. Water level data were obtained from the United States Geological Survey (USGS) website.

RESULTS AND DISCUSSION

Habitat: A comprehensive vegetation survey was conducted in July and August 2011; however, water level at the time of the survey was 5 feet below conservation pool and most of the littoral zone was exposed (Figure 1). In the 2007 survey, water hyacinth and alligatorweed covered 197 and 448 acres of the reservoir, respectively (Ott and Beck 2008). No native submersed emergent or floating-leaved species were detected in 2011. Ott and Beck (2008) reported sixty percent of the structural habitat was bulkhead with boat docks, but their survey was conducted at conservation pool (322 ft, MSL). These structures were exposed during the current survey.

Creel: Fishing effort at Cedar Creek Reservoir was primarily directed at black basses (60%). A large proportion of anglers reported fishing for anything (19%) (Table 4). Crappies were also important target species, comprising 12% of fishing effort combined. Total fishing effort for the summer and fall quarters was 60,489 h and total directed expenditures were \$523,121. Fall fishing effort was only 7% of summer effort and was likely related to poor angler access from low water levels (Table 5).

Prey species: Primary prey species included gizzard shad (*Dorosoma cepedianum*), threadfin shad (*D. petenense*), and bluegill (*Lepomis macrochirus*). Combined catch rates of gizzard and threadfin shad were high (3,335/h) (Appendix A), and most were available as prey (IOV=92). Sunfish abundance was low (5/hour) in 2011, though was likely a result of sampling inefficiency in low water levels. Sunfish species consisted of bluegill, longear sunfish (*L. megalotis*), and redbreast sunfish (*L. auritus*). There was no directed effort toward sunfish reported during the 2011 creel period.

Catfish: Directed effort for catfishes (*Ictalurus* spp.) declined from previous creel surveys to 5% of the total directed effort made by rod and reel anglers at Cedar Creek Reservoir (Table 4). Anglers harvested an estimated 2,497 blue catfish (*I. furcatus*). Channel catfish (*I. punctatus*) were not observed harvested during the creel period. Effort from passive gears (trotline and jugline) was not determined by the traditional creel survey; though passive gears are believed to represent an important fishery. Gill net catch rate of blue catfish in 2011 (24.6/nn) increased from previous surveys in 2007 (17.5/nn) and 2003 (10.6/nn). Channel catfish were less abundant than blue catfish, though catch rates in 2012 (10.3/nn) increased from 2010 (5.8/nn) and 2008 (1.5/nn).

Temperate basses: Temperate basses (*Morone* spp.) accounted for 4% of the total directed angling effort (Table 4). Angler catch rate remains excellent for temperate basses with anglers catching 5.4/hour. An estimated 28,883 white bass were harvested over the 6-month creel period (Table 10). White bass gill net catch rate in 2012 (1.5/net night) declined slightly from previous surveys (2.0/nn in 2010 and 3.1/nn in 2008) (Figure 9). Gill net catch rate of palmetto bass (*M. chrysops* x *saxatilis*) declined (0.1/nn) and is reflective of low stocking density due to limited stockings in recent years (Figure 8). Insufficient numbers of white and palmetto bass were collected for age and growth analysis.

Black bass: Angler effort for largemouth bass was higher than previous years approximating 60% of the directed effort (Table 4). A large proportion (66%) of the directed effort for largemouth bass was tournament effort. Angler catch rates were consistent with previous years at 0.6/h (Table 8). There was no traditional harvest of largemouth bass observed during the creel period. Tournament retained

largemouth bass were measured from 14 to 19 inches in the 2011 angler creel survey (Figure 12). Electrofishing catch rate in 2011 (7.5/h) was lower than in 2007 (80.0/h) and 2003 (41.5/h). Size distribution was dominated by fish ≥ 12 inches (PSD=65). Catch rate of stock-size fish (≥ 8 inches) was similar to previous surveys (5.5/h), though the proportion of legal size (≥ 14 inches) fish was high (PSD-14=55). Average age of largemouth bass at 14 inches (13-14.3) was 1.1 years (N=7, range 1-2 years), and most recruiting to preferred size (≥ 15 inches) by age three (Figure 11). Relative weight for most size classes of largemouth bass (Figure 10) was high ($W_r > 90$).

Crappie: Crappie (*Pomoxis spp.*) were the third most sought after sport fish group at Cedar Creek Reservoir in 2011 accounting for 12% of the directed effort (Table 4). Angler catch rate was 3.3/h which was an increase from catch rates observed during the previous angler creel survey (Table 9). An estimated 26,765 white crappie (*P. annularis*) and 31,162 black crappie (*P. nigromaculatus*) were harvested from June to November 2011 (Figure 15). The trap net catch rate of white crappie in 2011 (7.8/nn) was higher than in 2007 (3.6/nn) and 2003 (1.0/nn) (Figure 13). The size distribution of white crappie in 2011 was good (PSD=97). Relative weight was high ($W_r > 95$) for all length classes. The average age of white crappie at 10 inches (9.1-10.2) was 1.0 year (N=13, range 1 year). The trap net catch rate of black crappie in 2011 (1.9/nn) was similar to 2007 (2.5/nn) and 2003 (2.1/nn) (Figure 14). The average age of black crappie at 10 inches (9.0-10.8) was 1.4 years (N=13, range 1-2 years).

Fisheries management plan for Cedar Creek Reservoir, Texas

Prepared – July 2012

ISSUE 1: Florida largemouth bass fingerlings were stocked in 2008 and 2009 to increase the number of large fish. Traditional harvest of largemouth bass was low; however, tournament retained largemouth bass accounted for 100% of harvested largemouth, and tournament effort made up 66% of total angling pressure for largemouth bass.

MANAGEMENT STRATEGIES

1. Request periodic stocking of FLMB (500,000 fingerlings) to maintain and improve large fish numbers.
2. Examine largemouth bass growth every four years (Tier 3).
3. Collect at least 30 largemouth bass and assess allele frequency of Florida largemouth bass in 2015.

ISSUE 2: Annual stockings of palmetto bass (combined with natural recruitment of white bass) have developed a fishery that is utilized by anglers. Because the high demand for this species and consumptive nature of the fishery, annual stockings are required to maintain fishery quality.

MANAGEMENT STRATEGIES

1. Continue to request annual stockings of palmetto bass at 10/acre.
2. Provide assistance to striped bass (*M. saxatilis*) procurement program to ensure successful annual collection of brood fish for hatcheries.
3. Provide permitting and stocking assistance to private parties interested in funding supplemental stockings of palmetto bass.
4. Conduct additional gill netting in spring of 2014 to evaluate palmetto bass population characteristics.
5. Conduct harvest assessment of palmetto bass during a creel survey conducted from June 2015-May 2016.

ISSUE 3: Hydrilla, alligator weed, and water hyacinth are present in low abundance in the reservoir and have the potential to become problematic in the future in high traffic areas.

MANAGEMENT STRATEGIES

1. Continue to monitor the presence and coverage of exotic species in the reservoir when reported or observed by staff, and through a standard vegetation survey in 2015.
2. Review treatment plans if submitted and provide technical assistance.

ISSUE 4: Cedar Creek offers substantial recreational angling opportunities for temperate basses, catfishes, and crappies, and could benefit from additional promotion.

MANAGEMENT STRATEGY

1. Continue promoting Cedar Creek in news releases and continue presentations to angling clubs promoting angling opportunities in the area.

ISSUE 5: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches and

plugging engine cooling systems. Giant Salvinia (*Salvinia molesta*) and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing, and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Contact and educate marina owners about invasive species, and provide them with posters, literature, etc... so that they can in turn educate their customers.
3. Educate the public about invasive species through the use of media and the internet.
4. Make a speaking point about invasive species when presenting to constituent and user groups.
5. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes standard electrofishing every four years, and additional gill netting and trap netting every two years (Table 10). Gill net surveys will be conducted every two years to adequately monitor catfish populations and the success of palmetto bass stockings. Growth of largemouth bass, white bass, and crappie will be examined every four years.

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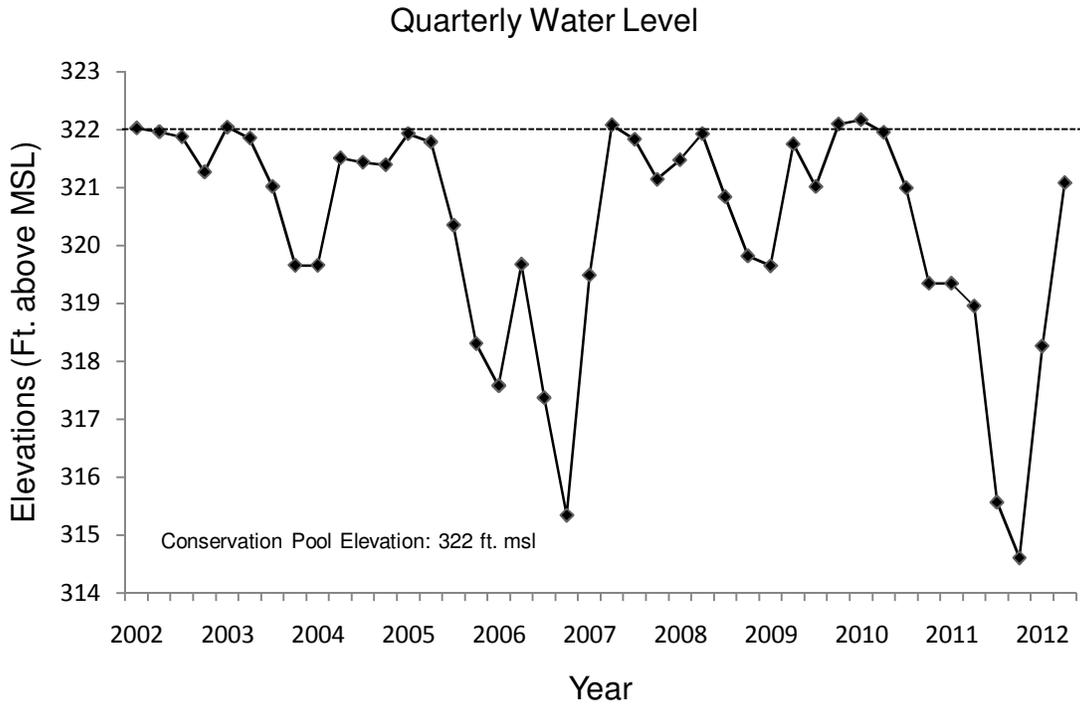


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Cedar Creek Reservoir, Texas.

Table 1. Characteristics of Cedar Creek Reservoir, Texas.

Characteristic	Description
Year constructed	1965
Controlling authority	Tarrant Regional Water District
Counties	Henderson (dam), Kaufman
Reservoir type	Water Supply
Shoreline Development Index (SDI)	1.9
Conductivity	280 umhos/cm

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

Species	Bag Limit	Minimum-Maximum Length (inches)
Catfish: channel and blue catfish, their hybrids and subspecies	25 (in any combination)	12 - No Limit
Catfish, flathead	5	18 - No Limit
Bass, white	25	10 - No Limit
Bass, palmetto	5	18 - No Limit
Bass, largemouth	5	14 - No Limit
Crappie: white and black crappie, their hybrids, and subspecies	25 (in any combination)	10 - No Limit

Table 3. Stocking History of Cedar Creek Reservoir, Texas. Size categories are: FRY <1 inch; FGL = 1-3 inches; Adult; UNK = unknown.

Species	Year	Number Stocked	Size
Shad, Threadfin	1984	<u>7,015</u>	Adult
	Total	7,015	
Catfish, Channel	1966	7,600	UNK
	1973	<u>125</u>	UNK
		7,725	
Bass, Palmetto	1977	169,900	UNK
	1979	172,425	UNK
	1983	143,332	UNK
	1984	452,940	FGL
	1991	1,033,577	FRY
	1991	175,232	FGL
	1992	521,494	FGL
	1993	889,000	FRY
	1993	114,757	FGL
	1994	518,259	FGL
	1995	531,200	FGL
	1996	516,724	FGL
	1997	290,540	FGL
	1998	514,907	FGL
	1999	265,310	FGL
	2002	258,467	FGL
	2003	244,723	FGL
	2004	326,988	FGL
	2005	215,660	FGL
	2006	132,664	FGL
	2007	170,396	FGL
2007	1,054,822	FRY	
2008	308,108	FGL	
2009	124,836	FGL	
2011	<u>101,341</u>	FGL	
Total		9,247,602	
Bass, Largemouth	1966	<u>690,000</u>	UNK
	Total	690,000	
Bass, Florida Largemouth	1976	343,000	FGL
	1977	20,000	FGL
	1978	398,837	FGL
	1997	343,012	FGL

Stocking history of Cedar Creek Reservoir, continued.

	1998	453,072	FGL
	1999	342,424	FGL
	2000	57,986	FGL
	2004	501,870	FGL
	2005	496,806	FGL
	2008	185,016	FGL
	2009	<u>531,063</u>	FGL
	Total	3,673,086	
Walleye	1975	1,650,000	UNK
	1976	1,852,000	UNK
	1977	<u>2,100,000</u>	UNK
	Total	5,602,000	

Table 4. Percent directed angler effort by species for Cedar Creek Reservoir, Texas, June 2003 through May 2004, June 2007 through May 2008 and June 2011 through Nov 2011. For black basses, percent of tournament-angler effort is in parentheses.

Species	Year		
	2003/2004	2007/2008	Summer through Fall 2011
Catfishes	32	41	5
Temperate basses	6	9	4
Largemouth bass	35	19	60 (66%)
Crappies	18	8	12
Anything	9	23	19

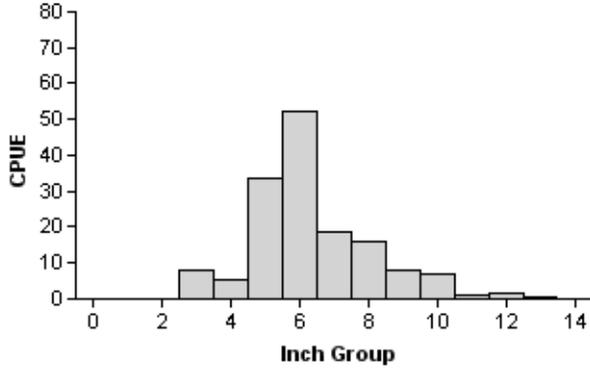
Table 5. Total fishing effort (h) for all species and total directed expenditures at Cedar Creek Reservoir, Texas, June 2003 through May 2004, June 2007 through May 2008, and summer (June through August) 2011, and fall (September through November) 2011.

Creel Statistic	Year		
	2003/2004	2007/2008	Summer/Fall 2011
Total fishing effort	293,662	272,047	56,159/4,330
Total directed expenditures	\$1,295,153	\$1,630,227	\$490,043/ \$33,078

Gizzard Shad

2003

Effort = 2.0
 Total CPUE = 152.0 (28; 304)
 Stock CPUE = 52.5 (26; 105)
 IOV = 78 (3.5)



2007

Effort = 2.0
 Total CPUE = 295.0 (15; 590)
 Stock CPUE = 83.5 (16; 167)
 IOV = 88 (1.9)

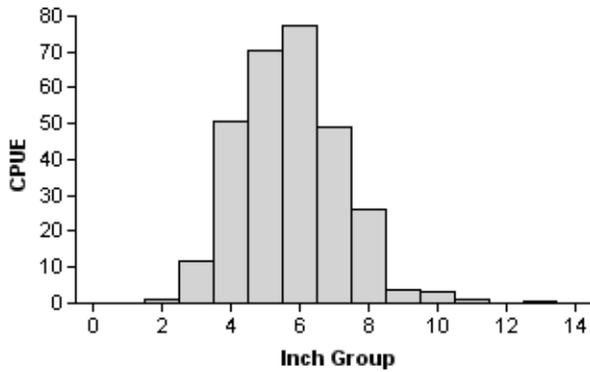


Figure 2. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Cedar Creek Reservoir, Texas, 2003, and 2007.

Gizzard Shad

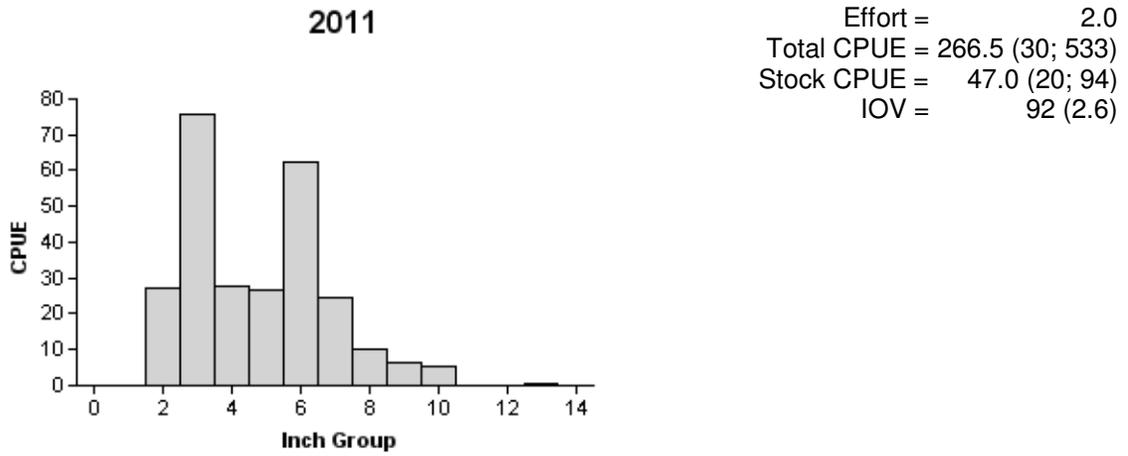


Figure 3. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for daytime fall electrofishing survey, Cedar Creek Reservoir, Texas, 2011.

Bluegill

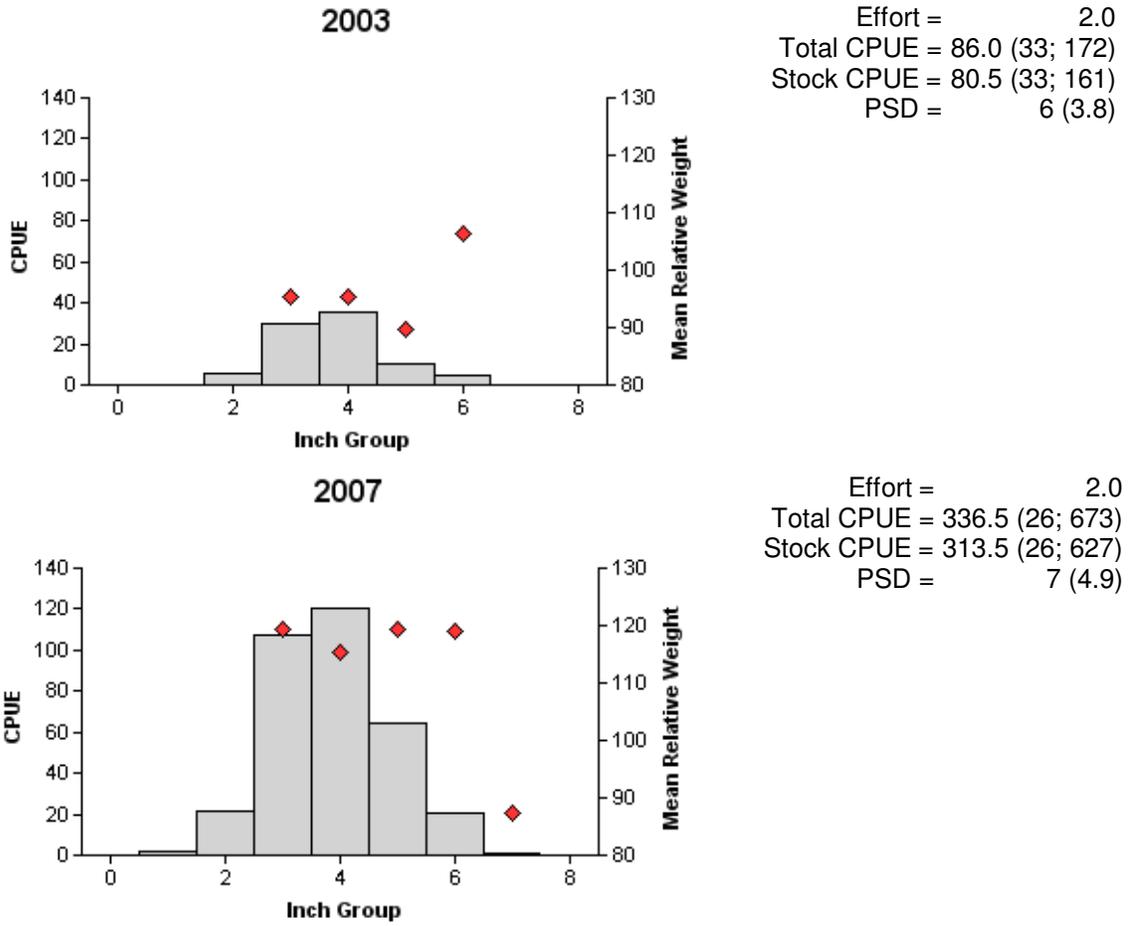


Figure 4. Number of bluegill caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Cedar Creek Reservoir, Texas, 2003 and 2007.

Bluegill

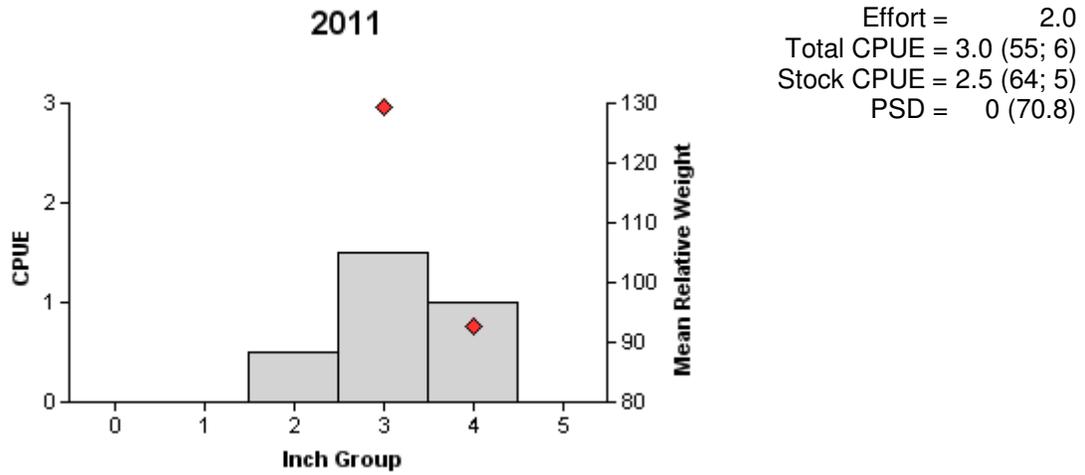


Figure 5. Number of bluegill caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for daytime fall electrofishing surveys, Cedar Creek Reservoir, Texas, 2011.

Blue Catfish

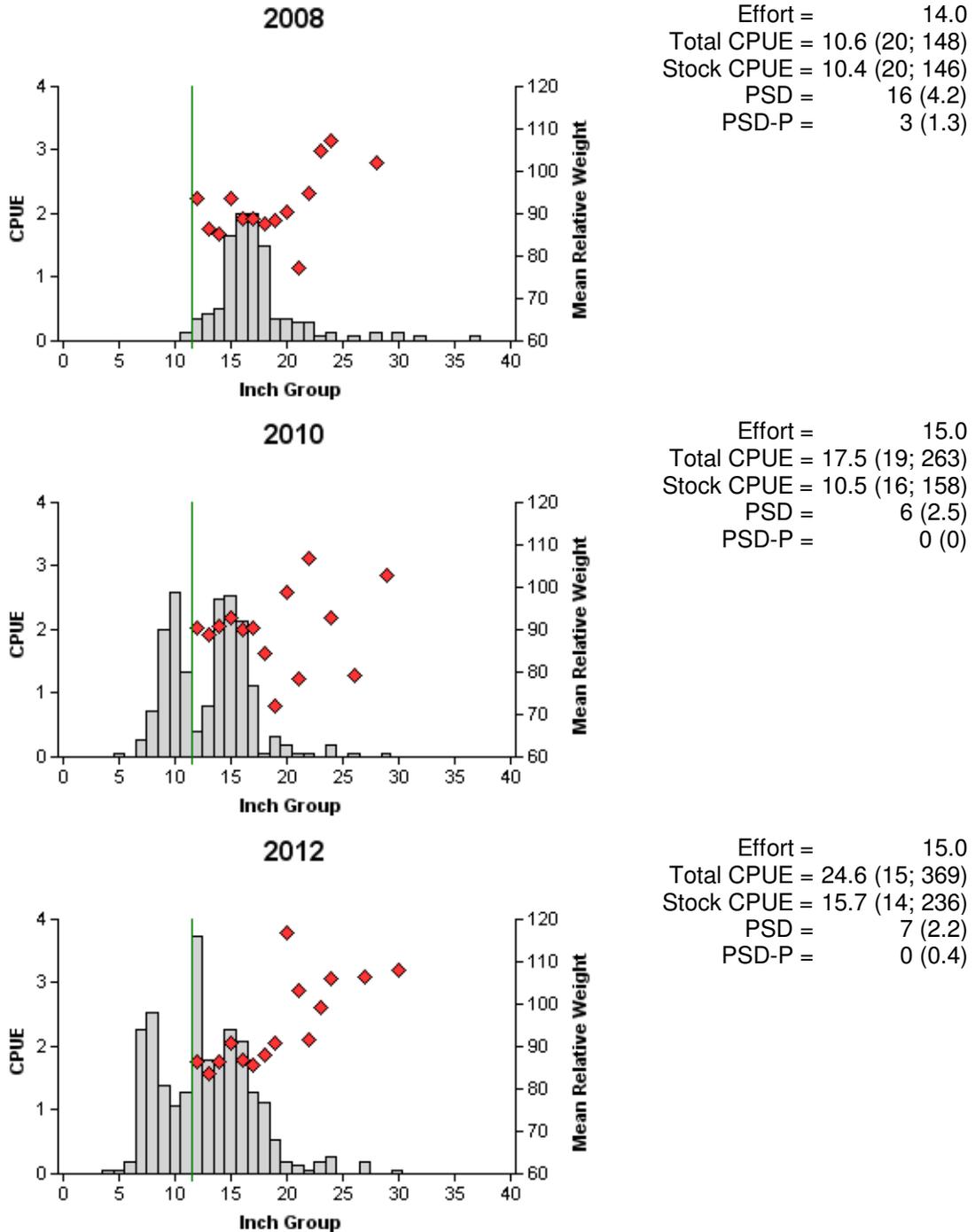
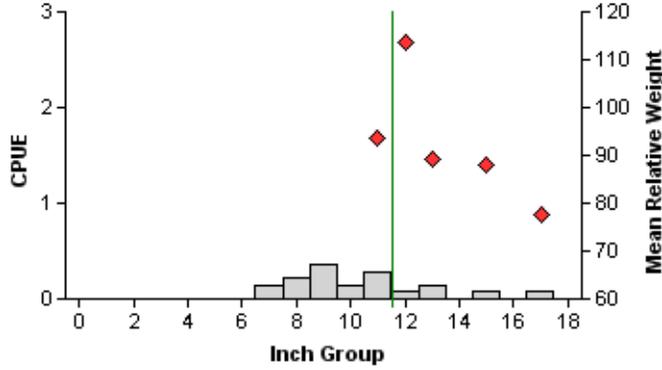


Figure 6. Number of blue catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure in parentheses) for spring gill net surveys, Cedar Creek Reservoir, Texas, 2008, 2010, and 2012. Vertical lines indicate length limit.

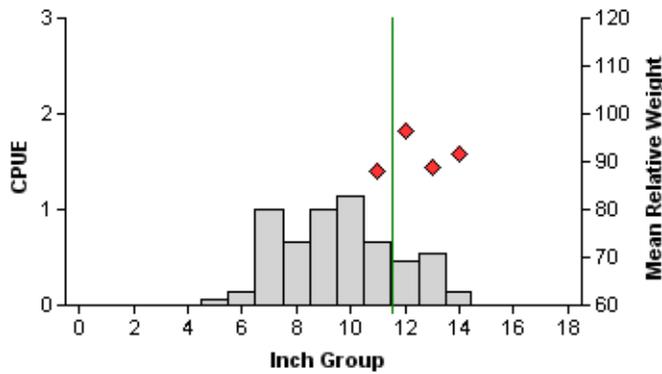
Channel Catfish

2008



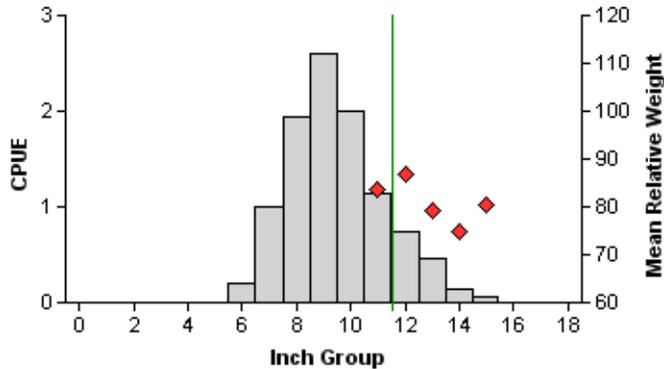
Effort = 14.0
 Total CPUE = 1.5 (34; 21)
 PSD = 11 (10.6)
 PSD-12 = 56 (17.5)

2010



Effort = 15.0
 Total CPUE = 5.8 (39; 87)
 PSD = 0 (152.3)
 PSD-12 = 63 (3.4)

2012



Effort = 15.0
 Total CPUE = 10.3 (42; 154)
 PSD = 0 (202.2)
 PSD-12 = 55 (4.7)

Figure 7. Number of channel catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Cedar Creek Reservoir, Texas, 2008, 2010, and 2012. Vertical lines indicate minimum length limit.

Catfishes

Table 6. Creel survey statistics for catfishes at Cedar Creek Reservoir, Texas from June 2003 through May 2004, June 2007 through May 2008 and June through November 2011, where total catch per hour is for anglers targeting catfishes and total harvest is the estimated number of catfishes harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year		
	2003-2004	2007-2008	2011*
Directed effort (h)	94,171 (20)	127,776 (137)	2,897 (78)
Directed effort/acre	2.9 (20)	3.9 (137)	0.09 (78)
Total catch per hour	1.7 (47)	1.8 (52)	1.0 (77)
Total harvest	210,952 (88)	93,097 (31)	2,497 (582)
Channel catfish	68,031 (39)	34,526 (34)	0
Blue catfish	142,921 (49)	58,547 (30)	2,497 (582)
Harvest/acre	6.5 (88)	2.7 (31)	0.08 (582)
Channel catfish	2.1 (39)	1.1 (34)	0
Blue catfish	4.4 (49)	1.8 (30)	0.08 (582)
Percent legal released	0	12	0

*2011 survey was June through November only.

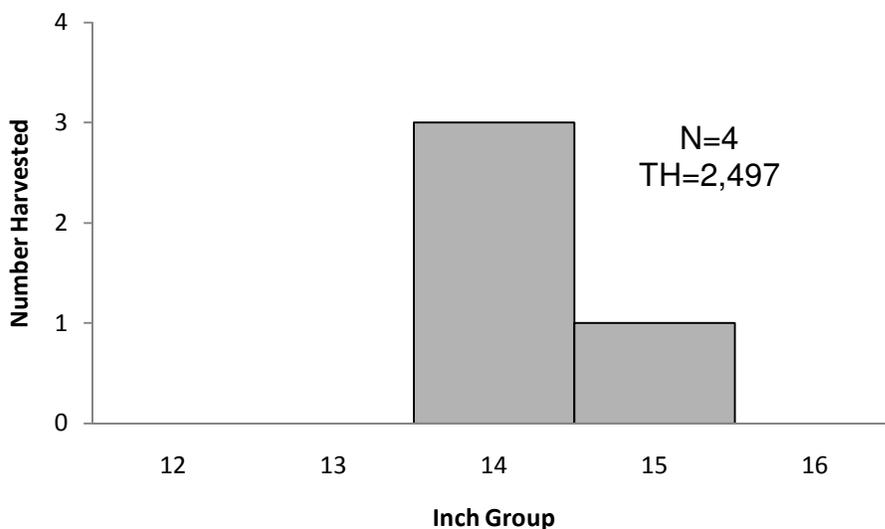


Figure 8. Length frequency of harvested blue catfish observed during creel surveys at Cedar Creek Reservoir, Texas, June through November 2011, all anglers combined. N is the number of harvested blue catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

White Bass

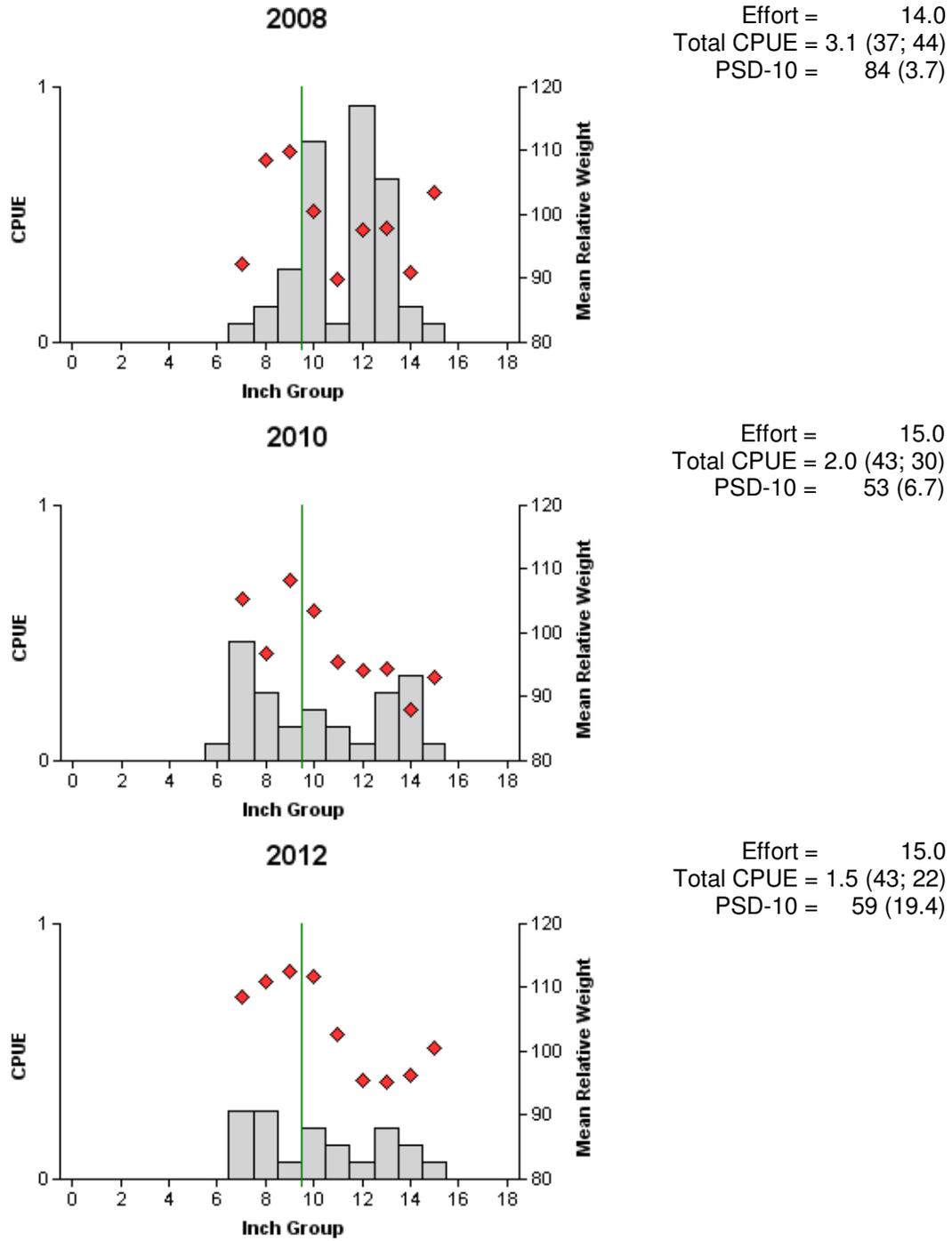


Figure 9. Number of white bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N are in parentheses) for spring gill net surveys, Cedar Creek Reservoir, Texas, 2008, 2010, and 2012.

Palmetto Bass

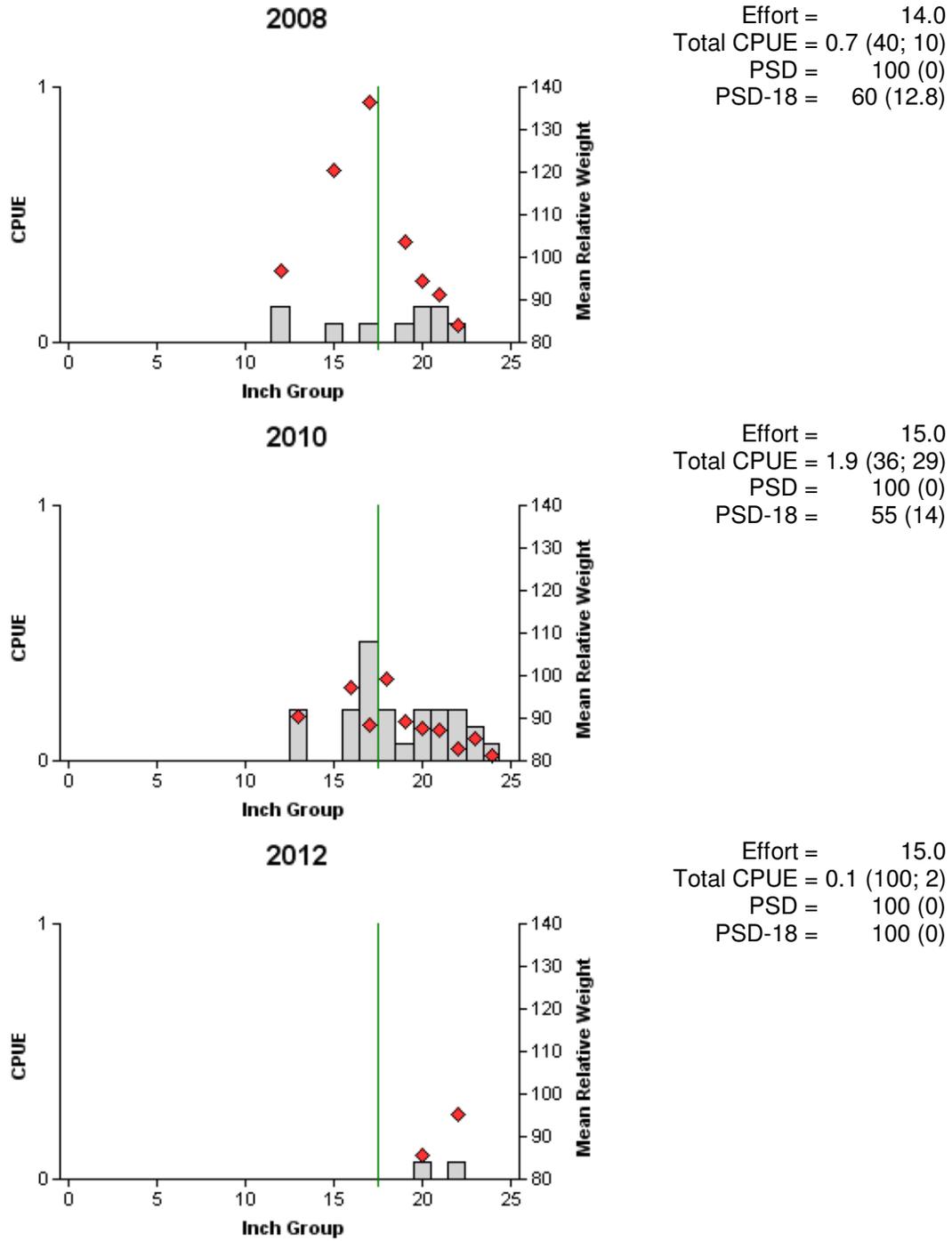


Figure 10. Number of palmetto bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N are in parentheses) for spring gill net surveys, Cedar Creek Reservoir, Texas, 2008, 2010, and 2012.

Temperate basses

Table 7. Creel survey statistics for temperate basses at Cedar Creek Reservoir, Texas from June 2003 through May 2004, June 2007 through November 2008, and June through November 2011, where total catch per hour is for anglers targeting temperate basses and total harvest is the estimated number of temperate basses harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year		
	2003-2004	2007-2008	2011*
Directed effort (h)	16,620 (45)	23,416 (37)	2,284 (84)
Directed effort/acre	0.5 (45)	0.7 (37)	0.07 (84)
Total catch per hour	2.6 (71)	2.5 (47)	5.4 (98)
Total harvest	48,821 (97)	18,239 (58)	28,883 (76)
White Bass	44,771 (78)	16,547 (46)	28,883 (76)
Palmetto Bass	4,050 (306)	1,692 (172)	0
Harvest/acre	1.5 (97)	0.6 (58)	0.9 (76)
White Bass	1.4 (78)	0.5 (46)	0.9 (76)
Palmetto Bass	0.1 (306)	<0.1 (172)	0
Percent legal released			
White Bass	na	56	0
Palmetto Bass	na	65	na

*2011 survey was June through November only.

White bass

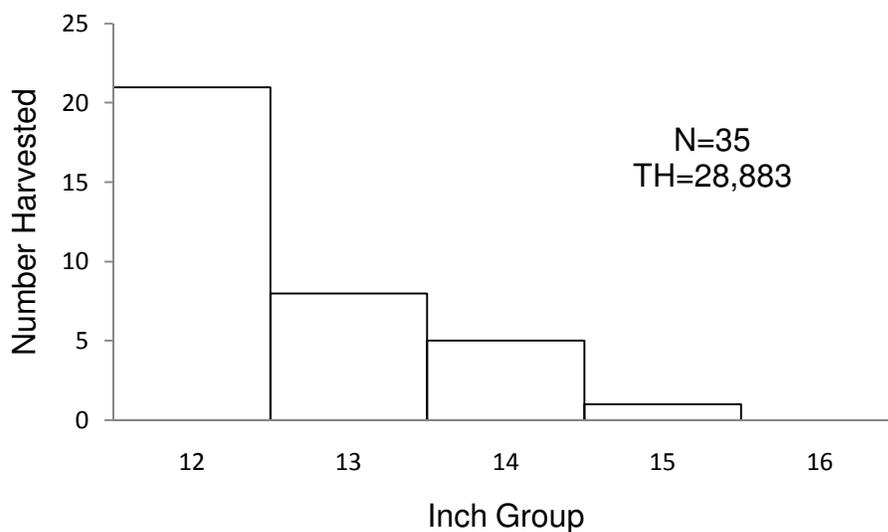
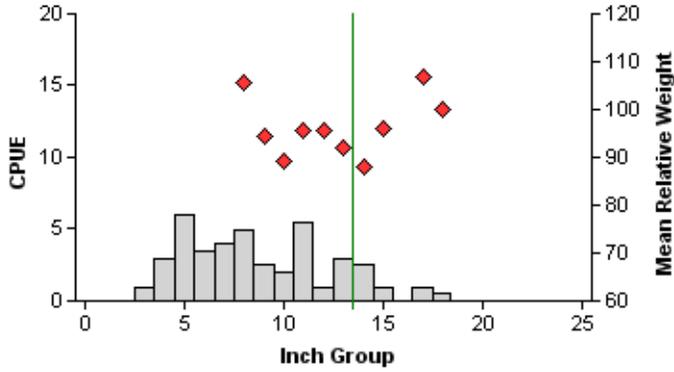


Figure 11. Length frequency of harvested white bass observed during creel surveys at Cedar Creek Reservoir, Texas, June through November 2011, all anglers combined. N is the number of harvested white bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

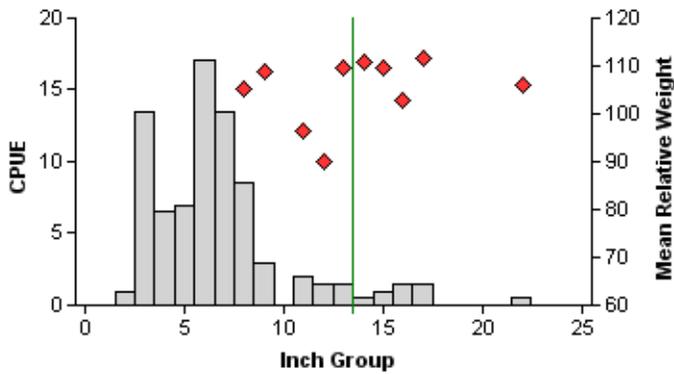
Largemouth Bass

2003



Effort = 2.0
 Total CPUE = 41.5 (19; 83)
 Stock CPUE = 24.0 (23; 48)
 PSD = 38 (6.9)
 PSD-14 = 21 (6)

2007



Effort = 2.0
 Total CPUE = 80.0 (21; 160)
 Stock CPUE = 21.5 (21; 43)
 PSD = 37 (7.9)
 PSD-14 = 23 (6.1)

Figure 12. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE are in parentheses) for fall electrofishing surveys, Cedar Creek Reservoir, Texas, 2003 and 2007. Vertical lines represent length limit.

Largemouth Bass

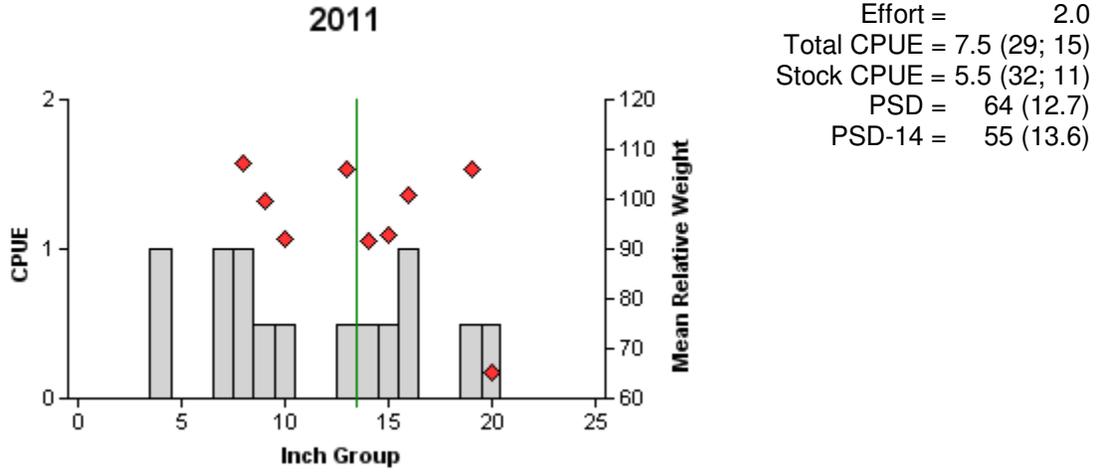


Figure 13. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE are in parentheses) for daytime fall electrofishing surveys, Cedar Creek Reservoir, Texas, 2011. Vertical lines represent length limit.

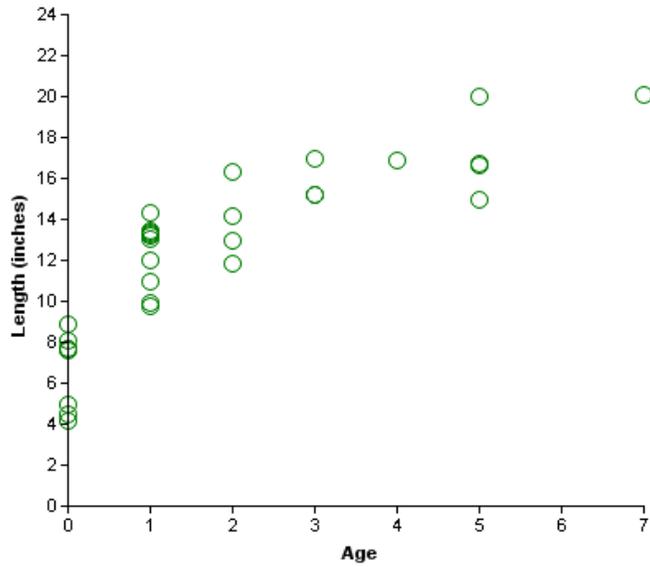


Figure 14. Length at age (inches) of all largemouth bass (N=30) (sexes combined) collected by electrofishing, Cedar Creek Reservoir Texas September, 2011.

Table 8. Results of genetic analysis of largemouth bass collected by fall electrofishing at Cedar Creek Reservoir, Texas, 1993, 1996, 1999, 2003. In 2007 and 2011, Microsatellite DNA analysis was used to determine largemouth bass genetic composition and results are not directly comparable to historic data; determination of integrade status was unavailable. FLMB=Florida largemouth bass, NLMB=Northern largemouth bass, F1=first generation hybrid between a FLMB and a NLMB, Fx=second or higher generation hybrid between a FLMB and a NLMB.

Year	Sample size	Genotype				% FLMB alleles	% pure FLMB
		FLMB	F1	Fx	NLMB		
1993	30	0	4	12	14	25.8	0
1996	30	2	9	11	8	38.3	6.7
1999	30	1	10	10	9	35.0	3.3
2003	30*	0	5	13	3	35.3	0
2007	30	1			2	43.5	3.3
2011	30	1			3	33.0	3.0

* Only 21 samples could be scored for genotype analysis. Percent FLMB alleles were based on sample size of 30.

Largemouth bass

Table 9. Creel survey statistics for largemouth bass at Cedar Creek Reservoir, Texas from June 2003 through May 2004, June 2006 through May 2007, and June through November 2011, where total catch per hour is for anglers targeting black basses and total harvest is the estimated number of black basses harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year		
	2003-2004	2007-2008	2011*
Directed effort (h)	102,808 (19)	51,852 (25)	36,547 (50)
Directed effort/acre	3.2 (19)	1.6 (25)	1.1 (50)
Total catch per hour	0.8 (25)	0.6 (25)	0.6 (17)
Total harvest	35,611 (45)	8,777 (48)	28,057 (59)
Traditional harvest		1,404 (48)	0
Tournament retained		7,373 (48)	28,058 (59)
percent harvest tournament-retained		84	100
Harvest/acre	1.1 (45)	0.3 (48)	0.9 (59)
Percent legal released	9	83	29

*2011 survey was June through November only.

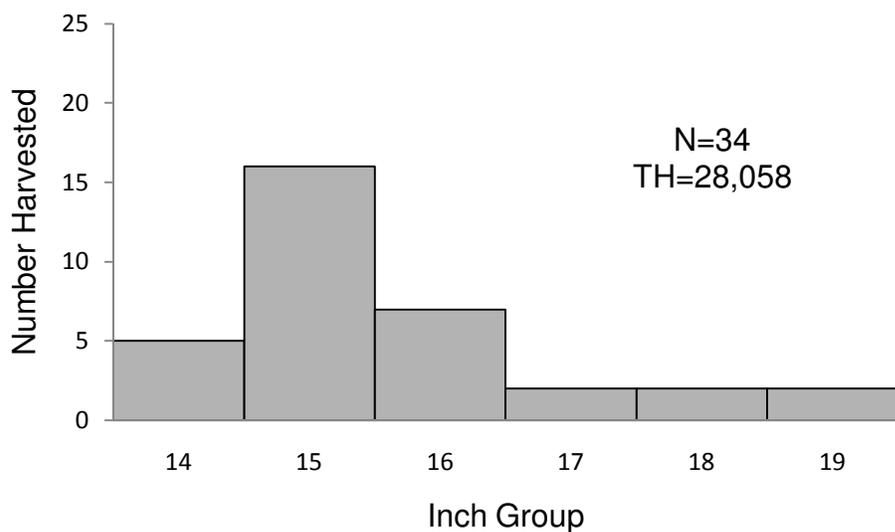


Figure 15. Length frequency of harvested largemouth bass (grey = tournament-retained) observed during creel surveys at Cedar Creek Reservoir, Texas, June through November 2011, all anglers combined. N is the number of harvested largemouth bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

White Crappie

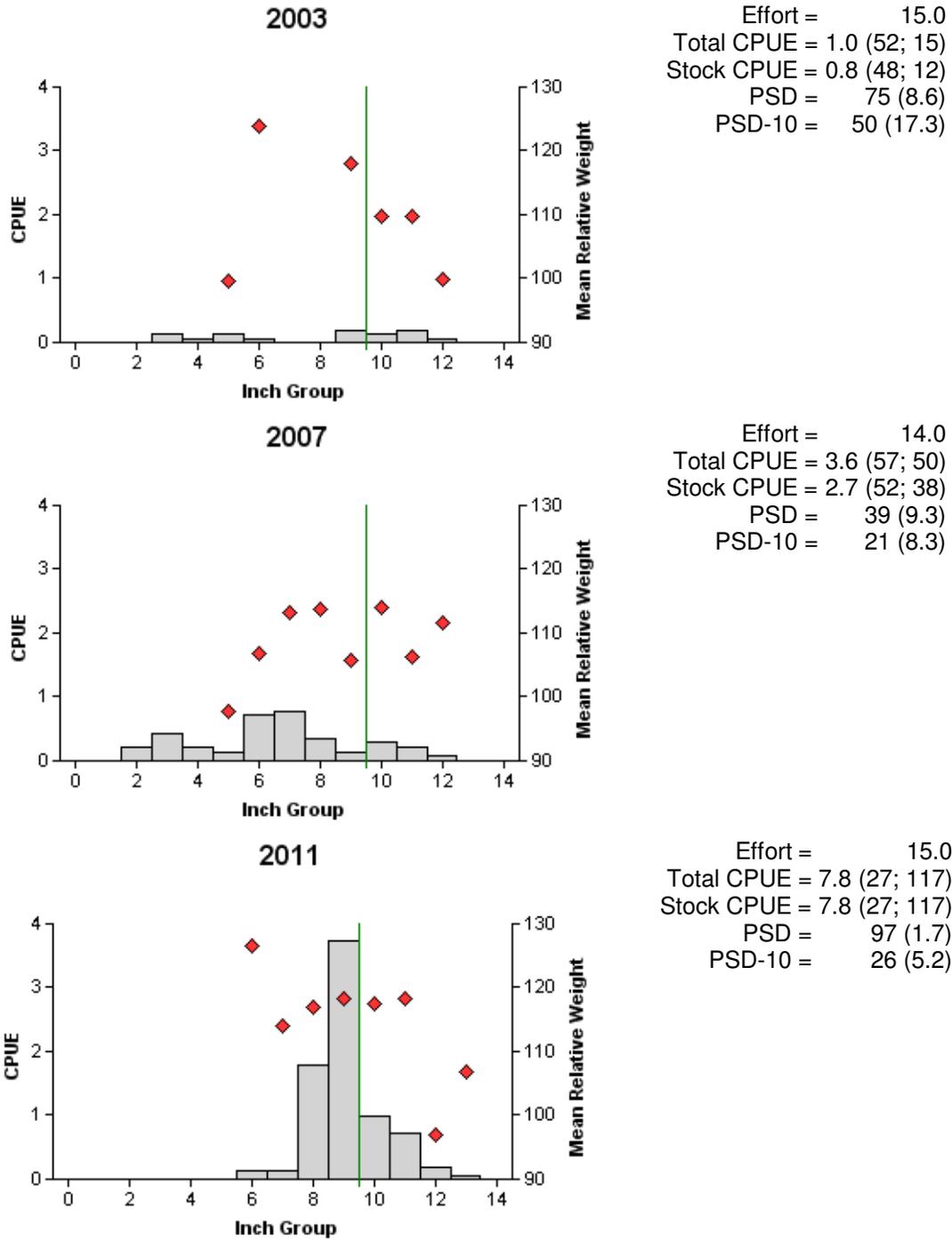


Figure 16. Number of white crappie caught per net night (CPUE, bars), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Cedar Creek Reservoir, Texas, 2003, 2007, and 2011. Vertical lines represent length limit at time of survey.

Black Crappie

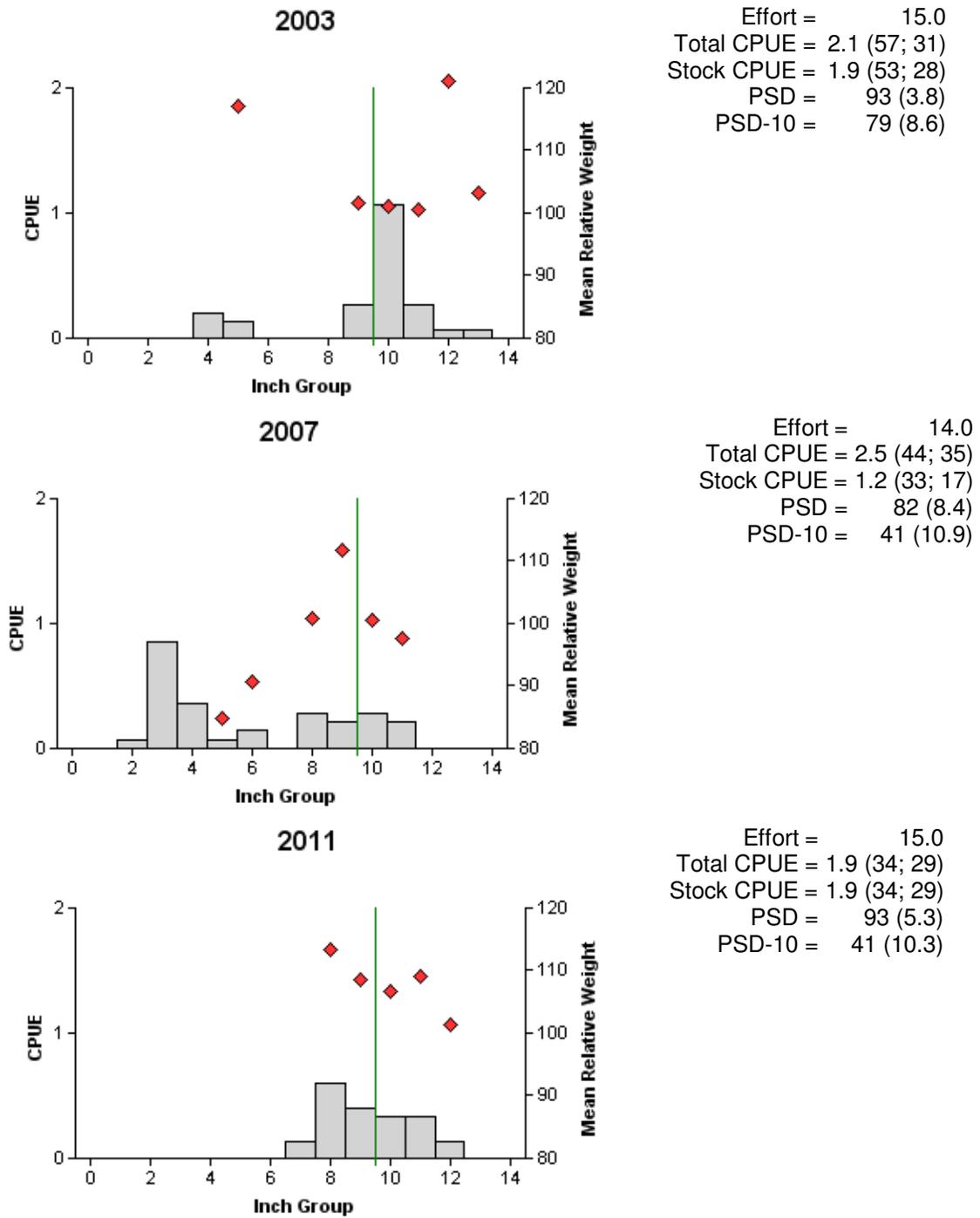


Figure 17. Number of black crappie caught per net night (CPUE, bars), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Cedar Creek Reservoir, Texas, 2003, 2007, and 2011. Vertical lines represent length limit at time of survey.

Crappies

Table 10. Creel survey statistics for crappies at Cedar Creek Reservoir, Texas from June 2003 through May 2004, June 2007 through May 2008, and June through November 2011, where total catch per hour is for anglers targeting crappies and total harvest is the estimated number of crappies harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year		
	2003/2004	2007/2008	2011*
Directed effort (h)	52,780 (25)	22,781 (25)	7,401 (53)
Directed effort/acre	1.6 (25)	0.7 (25)	0.2 (53)
Total catch per hour	1.4 (51)	1.3 (68)	3.3 (34)
Total harvest	69,435 (70)	22,051 (79)	57,927 (69)
White crappie	34,830 (70)	11,578 (76)	26,765 (74)
Black crappie	34,604 (69)	10,473 (82)	31,162 (64)
Harvest/acre	2.2 (70)	0.7 (44)	1.8 (69)
White crappie	1.1 (70)	0.4 (76)	0.8 (74)
Black crappie	1.1 (69)	0.3 (82)	1.0 (64)
Percent legal released	<1	54	0

*Winter quarter was not included in the 2011 creel survey.

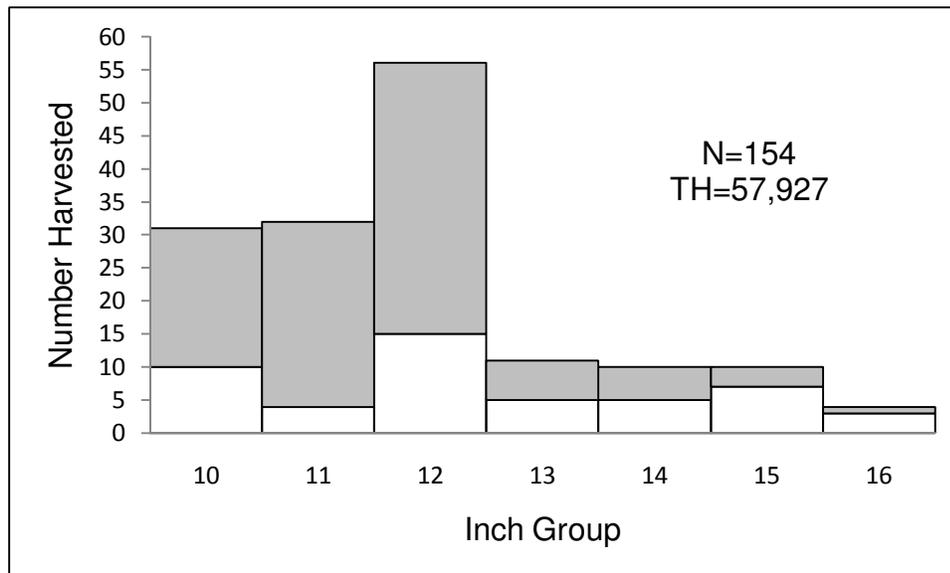


Figure 18. Length frequency of harvested crappies (white = white crappie; grey = black crappie) observed during creel surveys at Cedar Creek Reservoir, Texas, June through November 2011, all anglers combined. N is the number of harvested crappies observed during creel surveys, and TH is the total estimated harvest for the creel period.

Table 11. Proposed sampling schedule for Cedar Creek Reservoir, Texas. 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.

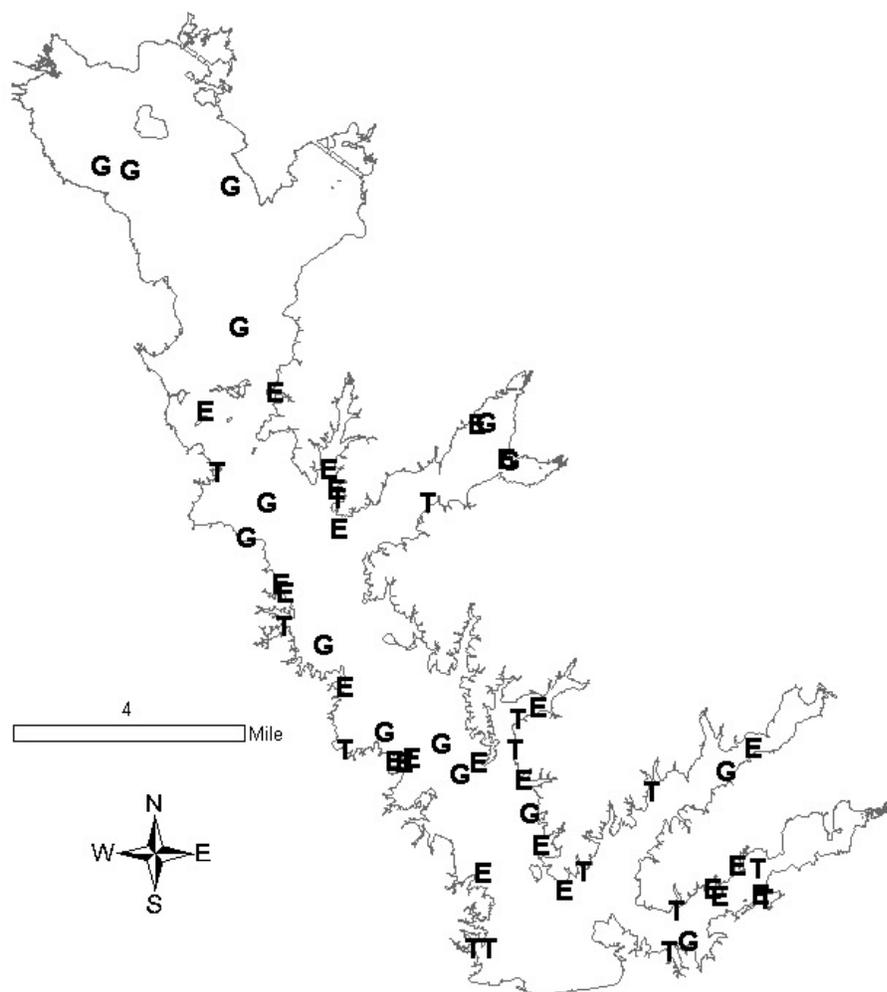
Survey Year	Electrofisher	Gill Net	Trap Net	Creel Survey	Vegetation	Report	Access
2012-2013							
2013-2014		A					
2014-2015							
2015-2016	S	S	S	S	S	S	S

APPENDIX A

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

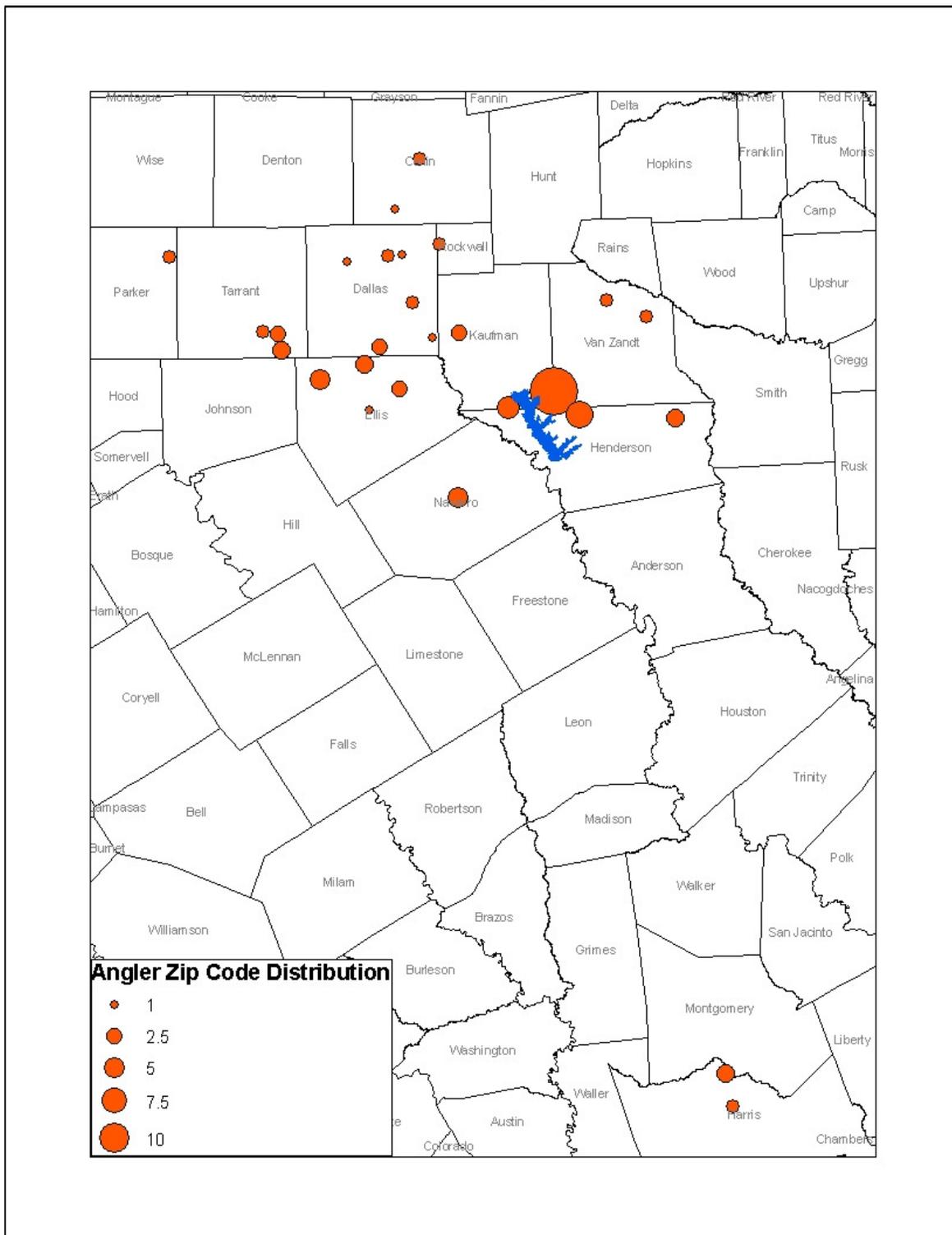
Species	Fall					
	Gill Netting		Electrofishing		Trap Netting	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad			533	266.5		
Threadfin shad			2,802	1,401		
Blue catfish	369	24.6				
Channel catfish	154	10.3				
White bass	22	1.5				
Palmetto Bass (striped X white bass hybrid)	2	0.1				
Redbreast sunfish			1	0.5		
Bluegill			6	3		
Longear sunfish			3	1.5		
Largemouth bass			15	7.5		
White crappie					117	7.8
Black crappie					29	1.9

APPENDIX B



Location of sampling sites, Cedar Creek Reservoir, Texas, 2011 through 2012. Gill net, trap net, and electrofishing stations are indicated by G, T, and E, respectively.

APPENDIX C



Map of angler zip codes in creel survey, June through November, 2011, at Cedar Creek Reservoir, Texas. Symbol size is proportional to the number of anglers surveyed from each zip code (N=102).

APPENDIX D

Average weight of big bass from bass tournaments at Cedar Creek Reservoir, January 2007 through June 2012. Only tournaments with more than 50 individuals were included. Weights are expressed in pounds.

Year	N	Average weight of Big Bass
2007	2	8.2
2008	3	9.3
2009	3	8.4
2010	4	7.5
2011	4	7.6
2012	1	7.7
