

PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-30-R-32

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2006 Survey Report

**Possum Kingdom Reservoir**

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## SURVEY AND MANAGEMENT SUMMARY

Fish populations in Possum Kingdom Reservoir were surveyed in 2006 using trap nets and electrofishing and in 2007 using gill nets. A creel survey was conducted during June–November 2006 and March–May 2007. This report summarizes the survey results and contains a management plan based on the findings.

- **Reservoir Description:** Possum Kingdom Reservoir is a 15,588-acre impoundment located on the Brazos River approximately 76 miles west of Fort Worth. It has a primarily rocky shoreline with many boat docks. The reservoir was within 7 feet of conservation pool (1,000 ft. above mean sea level) from July of 2004 through May 2007.
- **Management history:** Important sport fish include catfish, white bass, striped bass, largemouth bass, and white crappie. Possum Kingdom was managed under statewide regulations until September 1, 2002 when the largemouth bass minimum length limit was raised to 16 inches and the striped bass bag limit was lowered to two per day in response to a golden alga (*Prymnesium parvum*) fish kill that occurred in early 2001.
- **Fish Community**
  - **Prey species:** The 2006 gizzard shad catch rate was the highest ever recorded for the reservoir. Threadfin shad were also collected in adequate numbers indicating plentiful forage for game fish. The catch per unit effort (CPUE) for bluegill was also quite high.
  - **Catfishes:** The 2007 CPUE for blue catfish was slightly higher than the previous surveys conducted after 2001. The gill net survey for the channel catfish showed a much higher relative abundance, with many young fish. We expect flathead catfish still exist but they have not been documented since the February 2001 gill net survey.
  - **Temperate bass:** White bass CPUE was down compared to the 2003 and 2005 gill net surveys. However, harvest and fishing effort measured by the 2006-07 creel survey was much increased over the 2000-01 survey. Striped bass total CPUE in 2007 increased slightly compared to the 2005 gill net survey. Stock size CPUE increased even more from 2005 to 2007. Body condition as measured by relative weight was good for striped bass. Some striped bass reached legal size within two years. Fishing effort and harvest as measured by the 2006-07 creel survey showed a marked decline for striped bass from the 2000-01 survey.
  - **Largemouth bass:** The 2006 largemouth bass electrofishing sample matched the historical CPUE reservoir average for previous surveys. The reservoir elevation was about 6.5 feet below full when sampling occurred and probably caused a lower catch rate than normal in the upper reservoir where shallow bare banks were sampled. No spotted or smallmouth bass were observed during the 2006-07 surveys.
  - **Crappie:** The 2006 white crappie CPUE was slightly lower than the 2004 survey but higher than in 2002. Recruitment continues to be good with an adequate abundance of legal-size fish. One black crappie was observed during the 2006 survey and the species persists in low numbers.
- **Management Strategies:** Populations of catfish, white bass and largemouth bass are in good shape and should be promoted to increase angler effort. The striped bass population and fishing effort has declined since the initial golden alga induced fish kill in 2001. Striped bass annual stocking efforts should continue. Previous golden alga kills may have given anglers a more negative image than warranted about current fish populations. Additional sampling will occur as gill net surveys will occur every other year starting in 2009 with the effort doubled to 30 net nights per survey. Electrofishing will also occur every other year.

## INTRODUCTION

This document is a summary of fisheries data collected from Possum Kingdom Reservoir in 2006 and 2007. 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*

Possum Kingdom Reservoir is a 15,588-acre impoundment constructed in 1941 on the Brazos River. It is located in Palo Pinto County approximately 76 miles west of Fort Worth and is operated and controlled by the Brazos River Authority (BRA). Primary uses include hydropower production and recreation. Mean depth is 37 feet, shoreline development index 14.4, and conductivity was 2,835  $\mu\text{mhos/cm}$ . Primary habitats at time of sampling consisted of rocky shorelines and boat docks. The water level has generally been rising since 2004 when the reservoir was about 10 feet below conservation pool (Figure 1). Boat access consists of eight public boat ramps and 15 private ramps. Two of the public boat ramps (North D&D and Sandy Beach) charge a \$3 per person entrance fee on weekends and holidays from mid-May to mid-September. Private ramp fees range from free to \$35. On January 1, 2006 a mandatory Water Recreational User Permit program for boats was initiated by BRA. The fees are as follows: annual \$50.00 (\$35.00 if over 65 or active duty/retired military with proper ID), one day \$5.00, 3-day \$12.00 and 5-day \$20.00. The permit is available at local vendors, the BRA lake office or ticket dispensers at the major boat ramps. Bank fishing is available at the public access points including the boat ramps. Two fishing piers are also present on the reservoir. Other descriptive characteristics for Possum Kingdom are in Table 1.

### *Management History*

**Previous management issues and actions:** Management issues and actions from the previous survey report (Howell and Mauk 2003) included:

1. Possum Kingdom anglers have been showing increased concerns about sport fish populations and TPWD management plans since the 2001 golden alga induced fish kill.  
**Action:** Worked with local newspapers to distribute at least one news release a year about Inland Fisheries management activities at the reservoir.
2. Rebuild the striped bass fishery by continuing annual stockings. This high profile fishery had gained increased angling and economic importance in the years before the 2001 fish kill. Current interest in striped bass fishing and guided trips is low.  
**Action:** Continued annual stockings of striped bass fingerlings at the rate of 6-16 per acre. Rates were dependent on prey availability, striped bass relative weights, previous year class strength and fingerling availability from the hatcheries.  
**Action:** Continued extra monitoring by completing 15 net nights of winter gill netting on an annual basis through 2006.
3. The black bass fishery at Possum Kingdom was popular for both non-tournament and tournament anglers. Historical data show that the reservoir can produce trophy largemouth bass as evidenced by the water body record of 16.02 pounds caught in 1989. Since the 2001 fish kill, the black bass sample has been dominated by sub-legal largemouth bass. Very few smallmouth or spotted bass have been sampled. The high percentage of Florida largemouth bass in the 2002 sample indicates that past stocking efforts have been successful.  
**Action:** Stocked Florida largemouth bass fingerlings at the rate of 43 per acre in 2003

and northern largemouth bass at a rate of 14 per acre in 2005. Annual monitoring continued with fall electrofishing samples every year through 2006.

**Action:** Stocked smallmouth bass fingerlings at the rate of four per acre in 2003. Smallmouth bass fingerlings were not available from state hatcheries other years.

**Harvest regulation history:** Sport fish species in Possum Kingdom Reservoir historically were managed using statewide regulations. On September 1, 2002, in response to the golden alga fish kill of 2001, the largemouth bass minimum size limit was raised from 14 to 16 inches and the striped bass daily bag limit was decreased from five to two 18 inches or greater to aid in the fisheries recovery (Table 2).

**Stocking history:** Since the initial golden alga fish kill in 2001, an aggressive stocking program involving multiple species was continued in response to recurring golden alga kills in 2003 and 2007. Threadfin shad, blue catfish, channel catfish, striped bass, smallmouth bass, and largemouth bass (northern and Florida) have all been stocked since 2001. The complete stocking history is in Table 3.

**Vegetation/habitat history:** Possum Kingdom has no significant vegetation/habitat management history. Noxious vegetation has not been a problem at the reservoir.

## METHODS

Fishes were collected by electrofishing (2.0 hours at 24 five-minute stations), gill netting (15 net nights at 15 stations), and trap netting (15 net nights at 15 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 the surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2005).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Stock Density (PSD), Relative Stock Density (RSD)], and condition indices [relative weight (Wr)] were calculated for target fishes according to Anderson and Neumann (1996). The index of vulnerability (IOV) was calculated for gizzard shad (DiCenzo et al. 1996). Relative standard error ( $RSE = 100 \times SE \text{ of the estimate/estimate}$ ) was calculated for all CPUE statistics and Standard Error (SE) was calculated for structural indices and IOV. Striped bass ages were determined using otoliths from 5 fish per inch group. Largemouth bass ages were determined using otoliths from 5 fish per centimeter group. Source for water level data was the United States Geological Survey.

## RESULTS AND DISCUSSION

**Habitat:** A physical habitat survey conducted July - August 2006 indicated the littoral zone habitat consisted primarily of nondescript or rocky shoreline (Table 4). The reservoir was 4.5 - 5.9 feet below conservation pool at time of survey. The previous physical habitat survey was conducted in 2002 (Howell and Mauk 2003). Few manmade changes to the physical habitat occurred during the four year period.

**Creel Survey:** A nine-month creel survey was conducted from June – November 2006 and March – May 2007. Results from that survey are compared to a 12-month creel conducted from June 2000 – May 2001. Directed fishing effort was slightly lower during the more recent survey, but estimated angler expenditures were slightly higher (Tables 5 and 6).

**Prey species:** Electrofishing catch rates of gizzard shad, threadfin shad, and bluegill were 392.0/h, 41.5/h, and 214.5/h, respectively. The index of vulnerability for gizzard shad was 72% and was higher than the 2005 survey (54%) but lower than the 2001-2004 surveys which exceeded 90%. However, the gizzard shad catch rate was the highest ever recorded for the reservoir (Figure 2). Total CPUE of bluegill in 2006 was also high at 214.5/h (Figure 3).

**Blue catfish:** The 2007 blue catfish gill net CPUE (0.5/nn) was up slightly from the previous surveys conducted since 2001 (Figure 4) when golden alga initially caused a fish kill. Most of the fish sampled were greater than 12 inches and had  $W_r$  values near 100. Directed effort for blue catfish was low.

**Channel catfish:** The 2007 channel catfish gill net CPUE (6.3/nn) was the highest we've sampled though the majority of the fish were sub-legal. Channel catfish population relative abundance has been steadily increasing over the years since the 2001 golden alga fish kill event (Figure 6). While observed harvest of channel catfish was low, directed fishing effort increased during the 2006-07 creel survey.

**White bass:** The 2007 gill net catch rate for white bass was 3.9/nn in 2007, which was down from 11.7/nn in 2005, but higher than the 2.0/nn sampled in 1999 before the golden alga fish kills occurred. Sampling history shows this was a species that did well and filled a niche when other predators' abundance was reduced by the fish kills (Figure 8). White bass harvest and fishing effort as measured by the 2006-07 creel surveys were greatly increased compared to the 2000-01 survey (Figure 9). The improved white bass fishery should be promoted.

**Striped bass:** Striped bass relative abundance improved slightly along with size structure compared to 2005. The 2007 gill net survey had a catch rate of 2.8/nn, up over surveys completed during the 2004-2006 period after the 2003 golden alga fish kill event (Figure 10). We observed legal length striped bass harvested during the 2006-07 creel survey (Figure 11) and sampled legal length fish from the 2005 year class. Twenty striped bass were aged from the gill nets and all were from the same 2005 year class and averaged 17.7 inches in length (Table 10). Estimated fishing effort and harvest, during the 2006-07 creel survey decreased dramatically from the one in 2000-2001 (Table 11).

**Largemouth bass:** The electrofishing CPUE of largemouth bass was 69.0/h in 2006, which is near the historical average for the reservoir. This is lower than the 2004 and 2005 surveys, but may have been related to the low reservoir elevation that existed at the time of the 2006 electrofishing survey (Figure 1). Largemouth bass body condition was good (relative weights near 100) (Figure 12). Florida largemouth bass genetic influence was measured at 60% from the 2006 year class sample (Table 12). Largemouth bass are showing much improved growth rates since the 2001 fish kill (Table 13). This is a likely result of an expanded ecological niche combined with improved prey availability conditions.

**White crappie:** The trap net catch rate of white crappie was 1.8/nn in 2006, lower than the 2004 survey (2.2/nn), but higher than 2002 (1.1/nn) (Figure 14). A single black crappie was captured during the 2006 survey. Black crappie have always been present but in low numbers. Directed effort and harvest are not high for crappie at Possum Kingdom (Table 15).

**Fisheries management plan for Possum Kingdom Reservoir, Texas**

Prepared – July 2007

**ISSUE 1:** Golden alga has impacted not only fish populations, but angler attitudes. This has resulted in some decline in fishing effort despite rebuilding and improving fish populations for most species.

**MANAGEMENT STRATEGY**

1. Issue at least one news release a year, both in the local lake paper and in the more regional Wichita Falls Times-Record News. Maintain and update TPWD website with new lake information as warranted.

**ISSUE 2:** Once thriving striped bass populations have been drastically reduced by golden alga induced impacts. This had been an important species economically with several full time guides on the reservoir. The results of the 2006-07 creel survey shows a great decline in both harvest and fishing effort compared to the 2000-01 survey.

**MANAGEMENT STRATEGY**

1. Continue annual striped bass fingerling stockings at the maximum rate of 15/acre if striped bass growth rates, relative weights and prey availability continue to support it.

**SAMPLING SCHEDULE JUSTIFICATION:**

This important and dynamic fishery needs extra sampling to more closely monitor golden alga impacts. We propose to go twice as frequently as required for electrofishing by sampling on an every other year basis. This would mean returning to electrofish during the fall of 2008. Gill netting, primarily for striped and white bass would resume in the winter of 2009 and again in 2011. We plan to double the usual effort of the gill net surveys to 30 net nights in an attempt to reduce sampling variability. Trap net effort and frequency would follow standard frequency and effort (Table 16).

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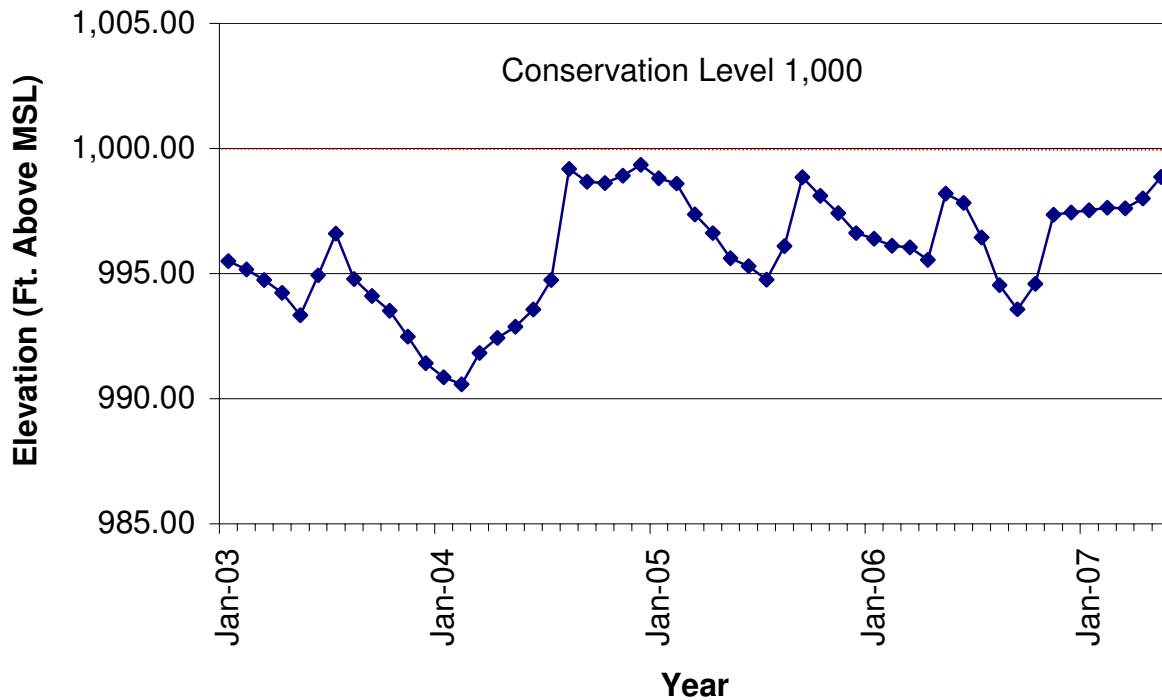


Figure 1. Monthly water level elevation averages in feet above mean sea level (MSL) recorded for Possum Kingdom Reservoir, Texas.

Table 1. Characteristics of Possum Kingdom Reservoir, Texas.

Characteristic	Description
Year constructed	1941
Controlling authority	Brazos River Authority
County	Palo Pinto
Reservoir type	Mainstem
Shoreline Development Index (SDI)	14.41
Conductivity	2,835 $\mu$ mhos/cm

Table 2. Harvest regulations for Possum Kingdom Reservoir.

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, Striped	2	18 minimum
Bass, Smallmouth	5	14 minimum
Bass, Spotted	(in any combination)	None
Bass, Largemouth <sup>a</sup>		16 minimum
Crappie, White	25	10 minimum

<sup>a</sup> Largemouth bass minimum length limit changed on September 1, 2002 from 14 inches to the current 16-inch length limit.

Table 3. Stocking history of Possum Kingdom, 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	2002	70,995	FGL	2.5
	Total	70,995		
Channel catfish	1972	2,800	AFGL	7.9
	2001	8,692	AFGL	9.8
	2001	426,256	FGL	2.8
	Total	437,748		
Florida Largemouth bass	1973	265,500	FRY	1.0
	1975	35,300	FRY	1.0
	1976	113,727	FGL	2.3
	1978	98,230	FGL	2.0
	1978	174,270	FRY	1.0
	2000	443,020	FGL	1.4
	2001	443,251	FGL	1.7
	2002	77	ADL	12.0
	2002	442,454	FGL	1.6
	2003	664,519	FGL	1.6
	Total	2,680,348		
Largemouth bass	1966	70,000	UNK	UNK
	1970	360,000	FRY	0.7
	1972	426,640	FRY	0.7
	1972	278,983	UNK	UNK
	2005	223,690	FGL	1.9
	Total	1,359,313		
Smallmouth bass	1978	162,000	UNK	UNK
	1979	108,000	UNK	UNK
	1980	75,090	UNK	UNK
	1984	131	ADL	10.7
	1987	30	ADL	10.7
	1988	51	ADL	10.7
	1998	71	ADL	10.7
	1998	259,100	FGL	1.1
	2001	20	ADL	10.7
	2002	500	AFGL	3.9
	2002	38,286	FGL	1.5

Table 3. Continued.

Smallmouth bass (continued)	2003	63,839	FGL	1.8
	Total	707,118		
Striped bass	1976	100,000	UNK	UNK
	1978	95,300	UNK	UNK
	1981	93,924	UNK	UNK
	1983	198,990	UNK	UNK
	1986	36,700	FGL	2.0
	1986	123,250	FRY	1.0
	1987	217,740	FGL	2.0
	1988	198,635	FRY	0.8
	1989	70,661	FGL	1.6
	1989	125,544	FRY	1.0
	1990	201,729	FGL	1.7
	1991	212,726	FGL	1.3
	1993	98,475	FGL	1.1
	1993	5,115,522	FRY	0.8
	1994	98,366	FGL	1.0
	1995	99,000	FGL	1.2
	1995	3,000,000	FRY	0.8
	1997	155,700	FGL	1.4
	1998	144,800	FGL	1.3
	1999	178,235	FGL	1.5
	2000	126,304	FGL	1.6
	2001	118,168	FGL	1.9
	2001	3,185,000	FRY	0.8
	2002	354,838	FGL	1.6
	2003	108,804	FGL	1.5
	2003	2,488,196	FRY	0.2
	2004	92,423	FGL	1.6
	2004	2,129,409	FRY	0.2
	2005	156,355	FGL	1.7
	2005	547,112	FRY	0.3
	2006	242,351	FGL	1.9
	2006	387,435	FRY	0.2
	2007	362,392	FGL	1.6
	2007	881,862	FRY	0.2
	Total	21,745,946		
Threadfin shad	1980	8,600	AFGL	2.9
	2001	1,125	AFGL	UNK
	Total	9,725		

Table 4. Survey of littoral zone and physical habitat types, Possum Kingdom Reservoir, Texas, 2006. 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.

Shoreline habitat type	Shoreline Distance		Surface Area	
	Miles	Percent of total	Acres	Percent of reservoir surface area
Boulder	13.9	9.3		
Bulkhead	1.5	0.1		
Concrete	0.2	<0.1		
Featureless/nondescript	60.2	40.5		
Rocky bluff	13.4	9.0		
Rocky shore	59.4	39.9		
Riprap	0.1	<0.1		
Total shoreline length	148.7			
<hr/>				
Habitat adjacent to shoreline				
Standing timber			327	2.1
Boat docks			434	2.8
Native submerged vegetation			205	1.3
Native emerged vegetation			461	3.0

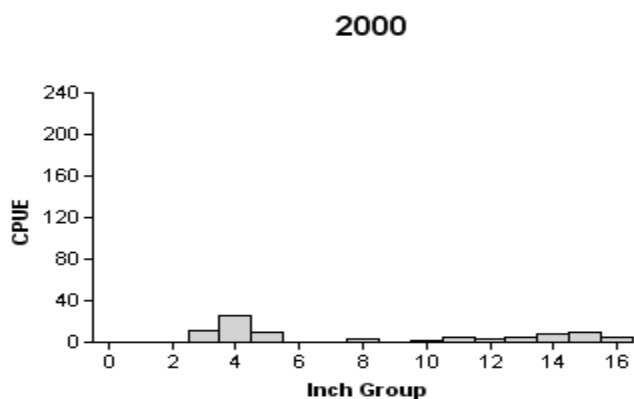
Table 5. Percent directed angler effort by species, percent harvest and catch for all anglers for Possum Kingdom Reservoir, Texas, from June 2000 through May 2001 compared to June - November 2006 plus March - May 2007 quarters.

Species	Percent directed effort		Percent harvest all anglers		Percent catch all anglers	
Year	2000-01	2006-07	2000-01	2006-07	2000-01	2006-07
Carp		6.6				3.7
Smallmouth buffalo				0.1		0.8
Blue catfish		0.2	5.9		0.9	
Channel catfish		1.6	2.7	2.1	1.9	3.3
Catfish spp.	5.6	4.0				0.7
White bass	2.3	14.9	6.6	80.5	7.8	56.9
Striped bass	43.7	4.6	62.2	1.6	72.4	1.8
Temperate bass spp.		3.3				
Green sunfish						0.1
Bluegill				9.7	0.3	3.5
Panfish spp.		1.9				17.5
Smallmouth bass			1.9		0.8	
Spotted bass					0.1	
Largemouth bass	14.5	20.7	14.2	3.6	13.6	9.1
Black bass spp.	12.3					
White crappie	2.8	1.2	6.4	2.4	13.6	1.4
Freshwater drum						1.0
Anything	18.7	41.0				

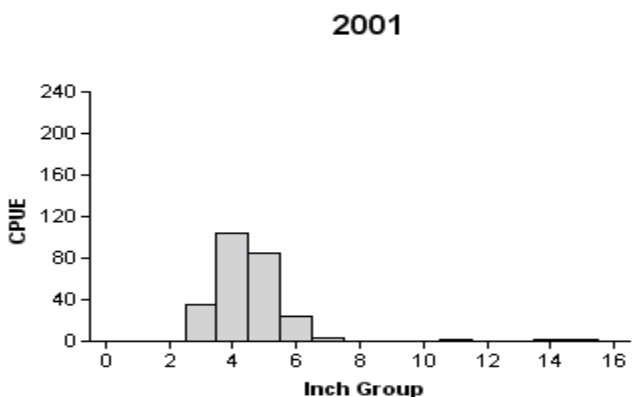
Table 6. Total fishing effort (h) for all species and total directed expenditures at Possum Kingdom from June 2000 through May 2001 compared to June-November 2006 plus March-May 2007 quarters.

Creel Statistic	Year	
	June 2000-May 2001	June-November 2006 and March-May 2007
Total fishing effort (h)	73,483.8	66,406.4
Total directed expenditures	\$696,994	\$714,627

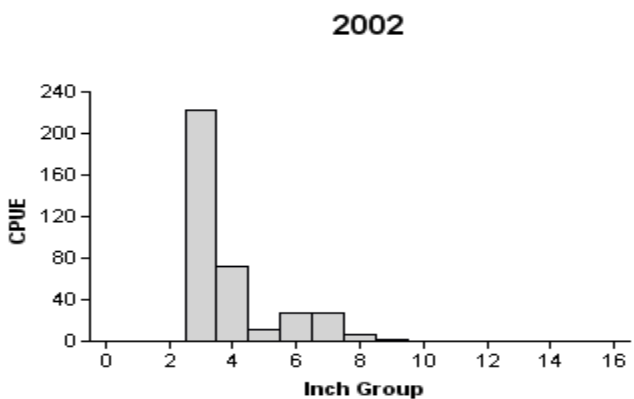
## Gizzard Shad



Effort = 2.0  
 Total CPUE = 84.0 (24; 168)  
 IOV = 54.17 (14.9)



Effort = 2.0  
 Total CPUE = 258.5 (20; 517)  
 IOV = 97.68 (1.2)



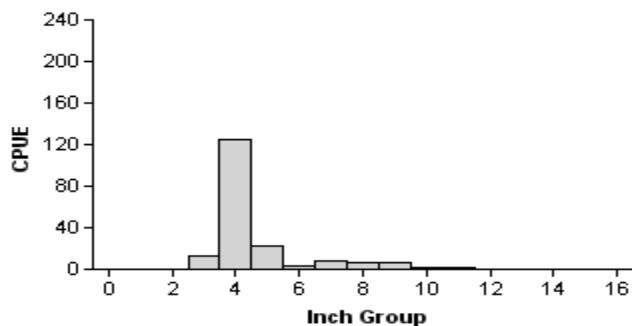
Effort = 2.0  
 Total CPUE = 368.0 (44; 736)  
 IOV = 97.55 (1.7)

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, Possum Kingdom Reservoir, Texas, 2000, 2001, and 2002.

## Gizzard Shad

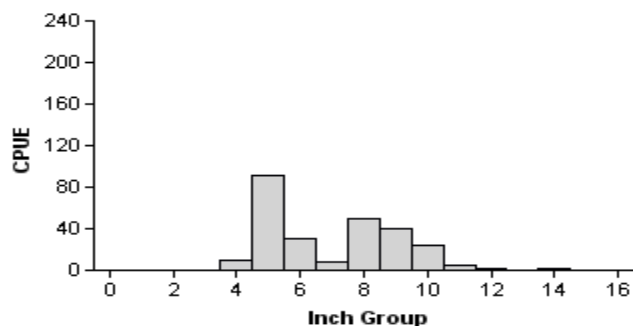
**2004**

Effort = 2.0  
Total CPUE = 188.0 (37; 376)  
IOV = 91.22 (4.5)



**2005**

Effort = 2.0  
Total CPUE = 261.0 (26; 522)  
IOV = 53.64 (7.5)



**2006**

Effort = 2.0  
Total CPUE = 392.0 (22; 784)  
IOV = 71.68 (8.9)

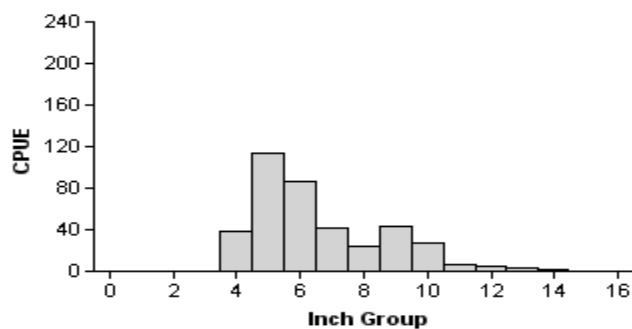
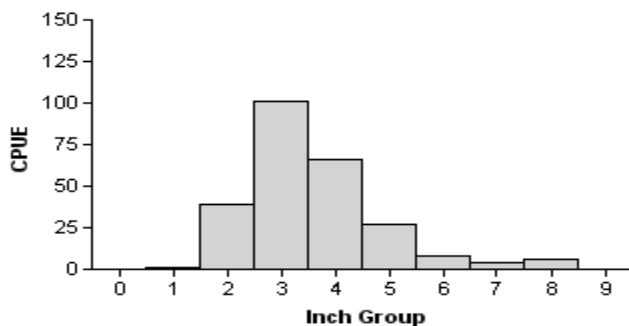


Figure 2 (continued). Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Possum Kingdom Reservoir, Texas, 2004, 2005, and 2006.



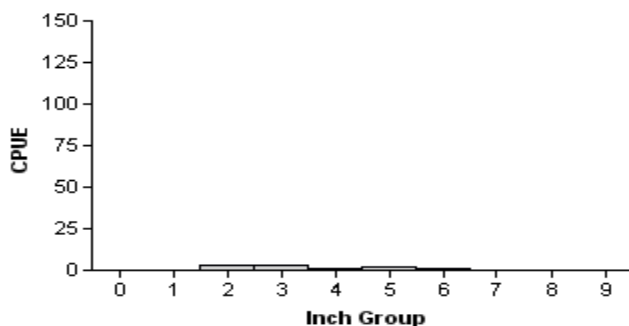
## Bluegill

**2000**



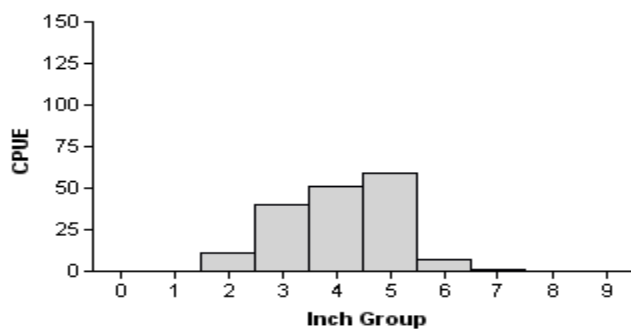
Effort = 2.0  
 Total CPUE = 253.0 (20; 506)  
 PSD = 9 (2.1)

**2001**



Effort = 2.0  
 Total CPUE = 12.0 (35; 24)  
 PSD = 12 (7.5)

**2002**



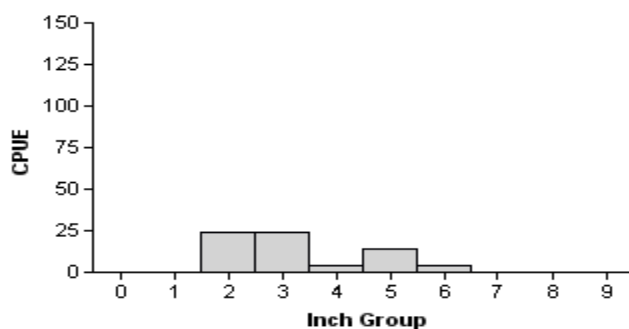
Effort = 2.0  
 Total CPUE = 170.0 (18; 340)  
 PSD = 5 (1.7)

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, Possum Kingdom Reservoir, Texas, 2000, 2001, and 2002.

## Bluegill

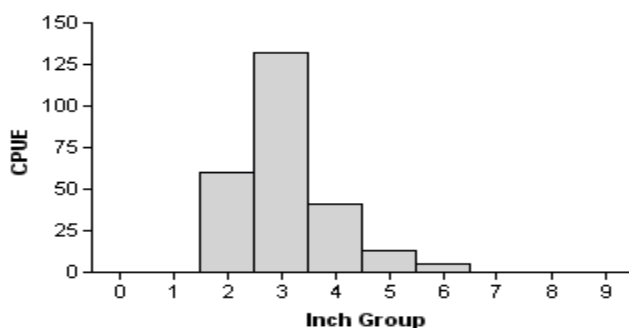
**2004**

Effort = 2.0  
Total CPUE = 71.0 (28; 142)  
PSD = 10 (4.7)



**2005**

Effort = 2.0  
Total CPUE = 252.5 (32; 505)  
PSD = 3 (1.0)



**2006**

Effort = 2.0  
Total CPUE = 214.5 (34; 429)  
PSD = 3 (1.5)

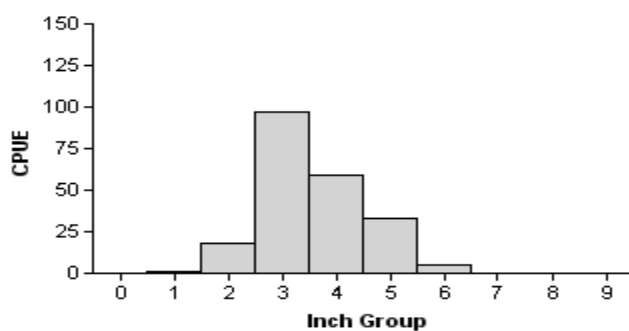


Figure 3 (continued). Number of bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Possum Kingdom Reservoir, Texas, 2004, 2005, and 2006.

## Blue Catfish

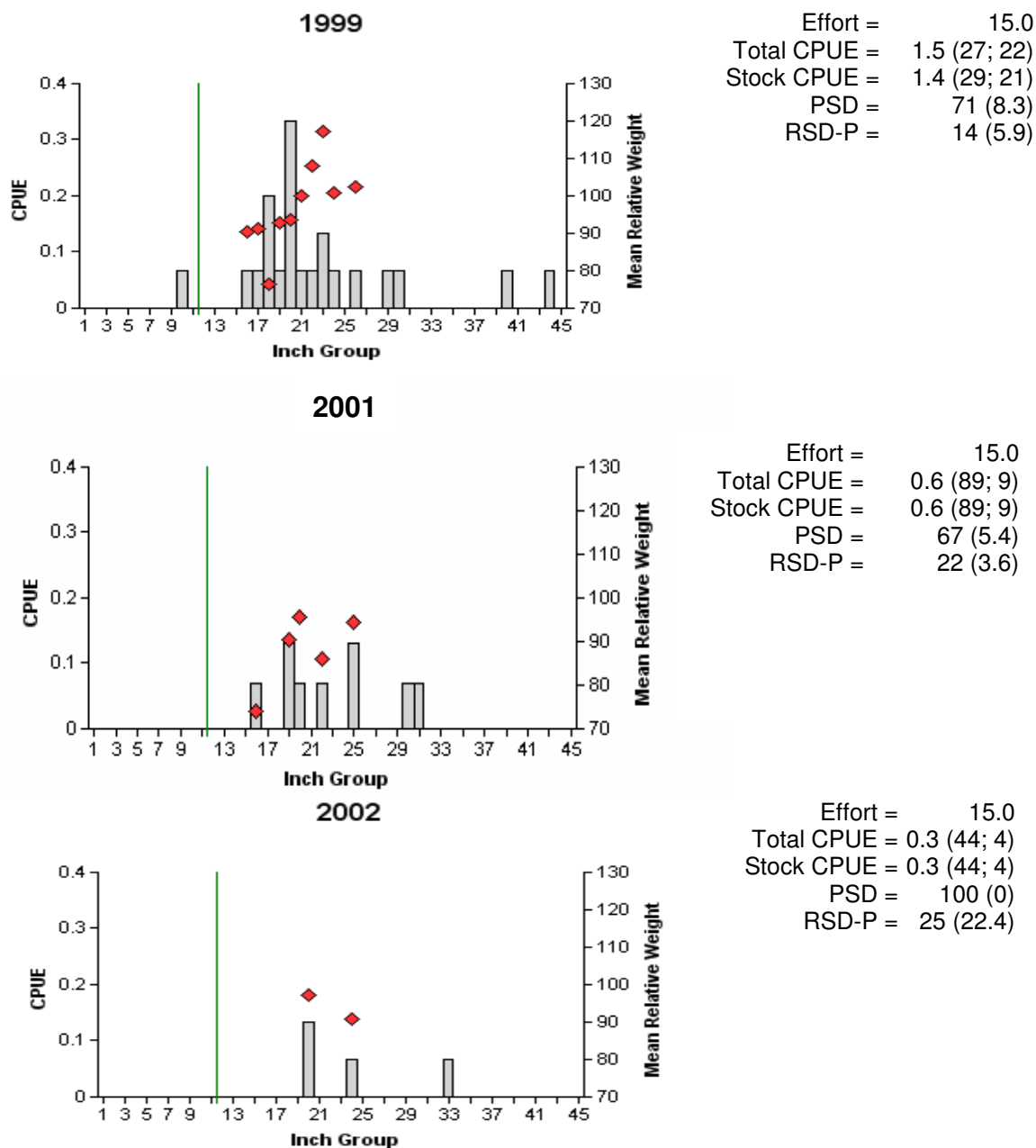


Figure 4. Number of blue catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for winter gill netting surveys, Possum Kingdom Reservoir, Texas, 1999, 2001, and 2002. Line indicates minimum size limit at time of sampling.

## Blue Catfish

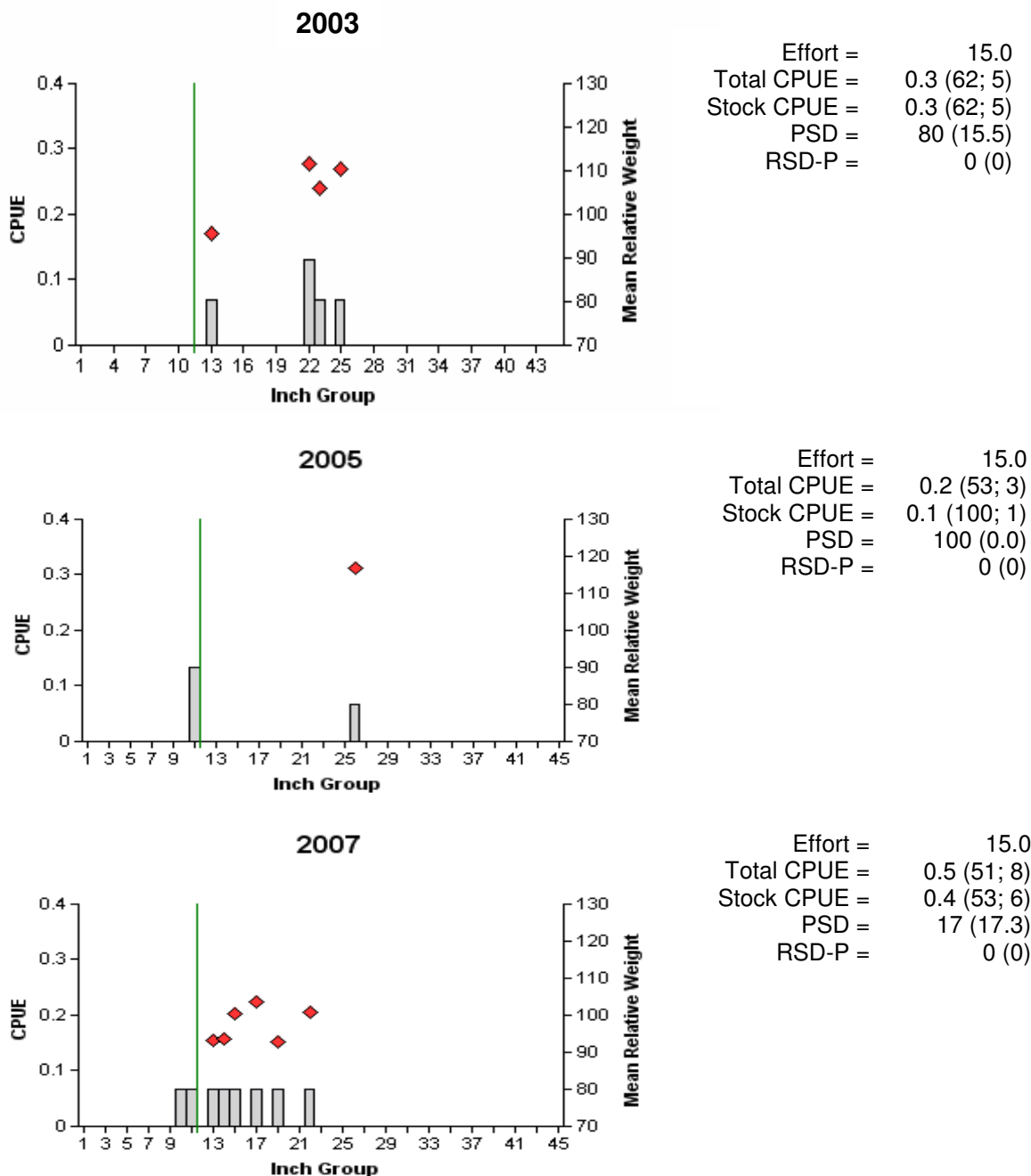


Figure 4 (continued). Number of blue catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for winter gill netting surveys, Possum Kingdom Reservoir, Texas, 2003, 2005, and 2007. Line indicates minimum size limit at time of sampling

## Blue Catfish

Table 7. Creel survey statistics for blue catfish at Possum Kingdom Reservoir from June 2000 through May 2001 compared to June-November 2006 plus March-May 2007 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 2000-May 2001	June-November 2006 and March-May 2007
Directed effort (h)	0.0	151.5 (172.2)
Directed effort/acre	0.0	0.0
Total catch per hour	0.0	0.0
Total harvest	369.2 (132.3)	0.0
Harvest/acre	0.3 (132.3)	0.0

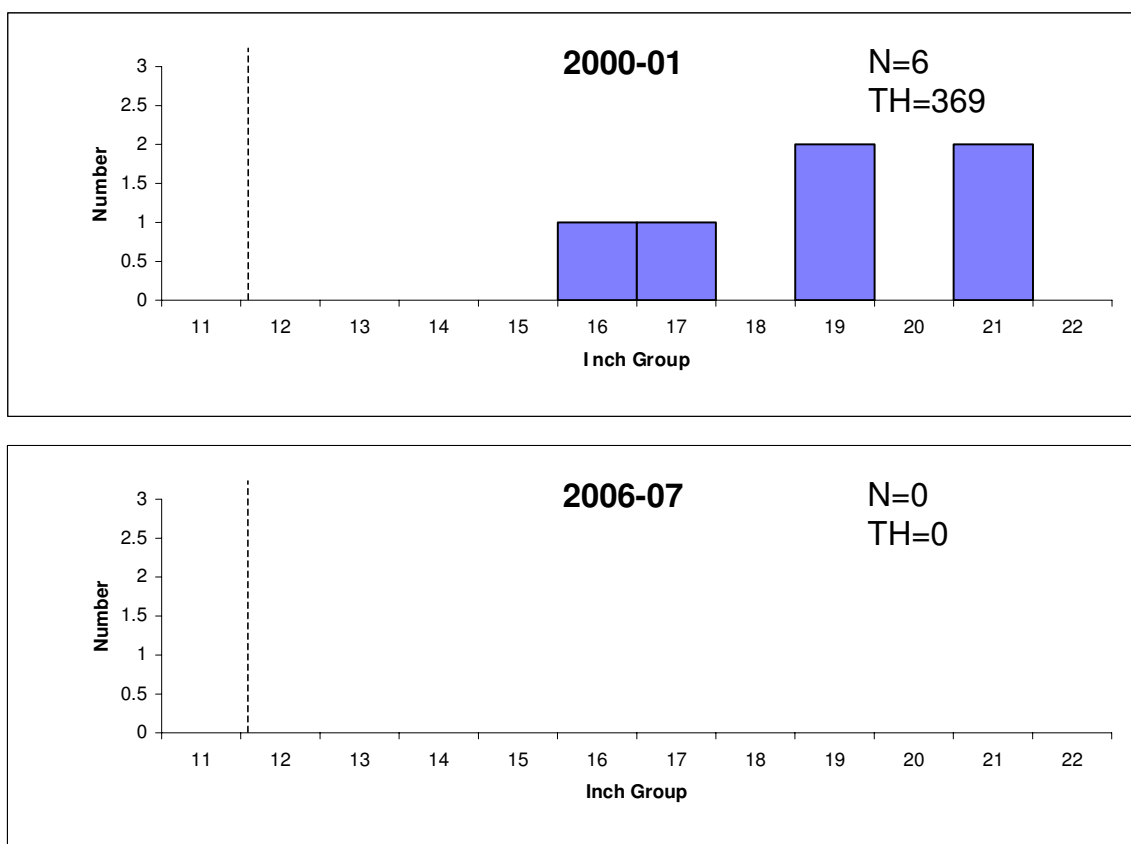


Figure 5. Length frequency of harvested blue catfish observed during creel surveys at Possum Kingdom Reservoir from June 2000 through May 2001 compared to June through November 2006 and March through May 2007 quarters, all anglers combined. N is the number of harvested blue catfish observed during creel surveys, and TH is the total estimated harvest for the creel period. Dash line indicates minimum size limit at time of sampling.

## Channel Catfish

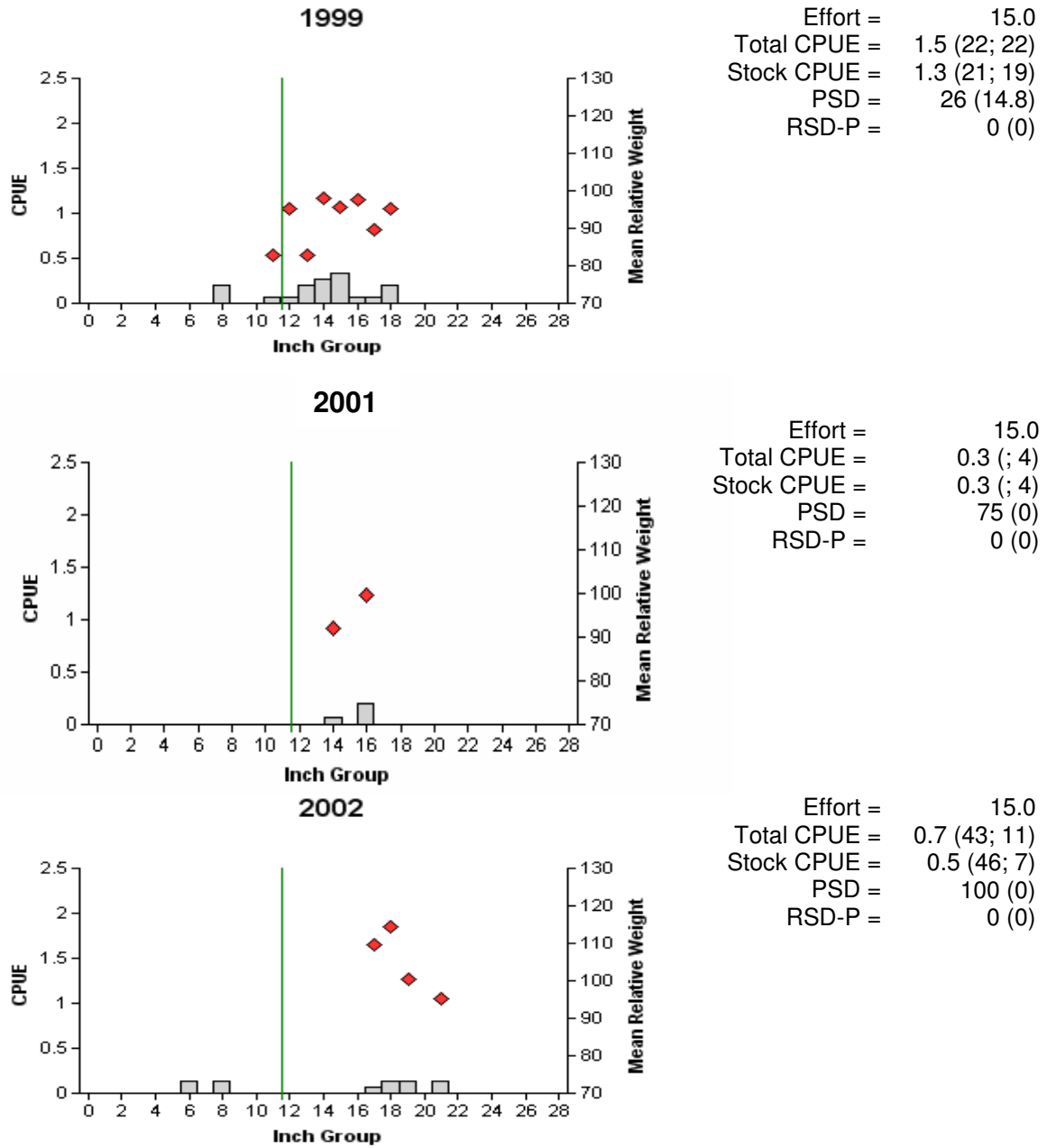


Figure 6. Number of channel catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for winter gill netting surveys, Possum Kingdom Reservoir, Texas, 1999, 2001, and 2002. Line indicates minimum size limit at time of sampling.

## Channel Catfish

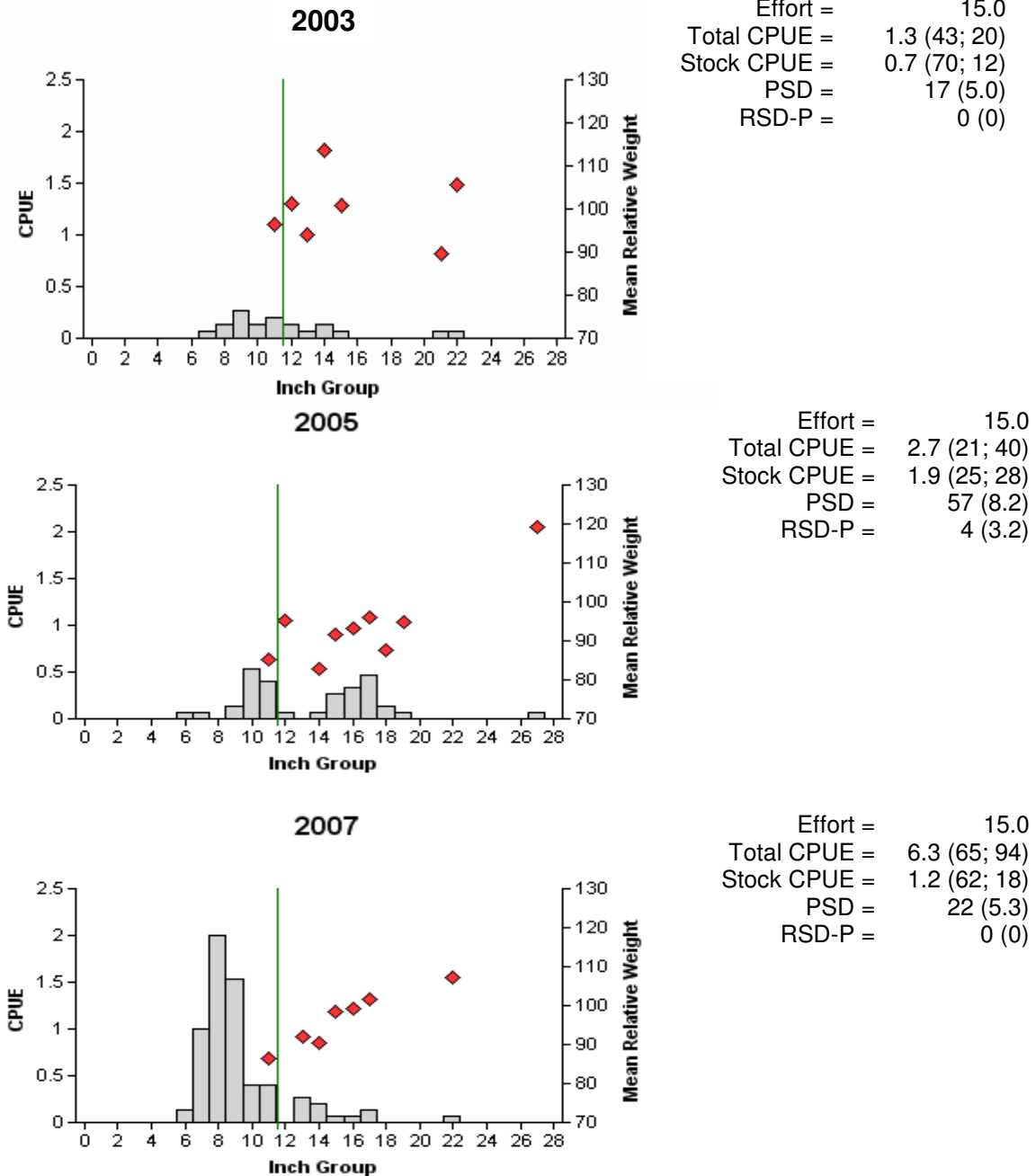


Figure 6 (continued). Number of channel catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for winter gill netting surveys, Possum Kingdom Reservoir, Texas, 2003, 2005, and 2007. Line indicates minimum size limit at time of sampling.

## Channel Catfish

Table 8. Creel survey statistics for channel catfish at Possum Kingdom Reservoir from June 2000 through May 2001 compared to June-November 2006 and March-May 2007 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 2000-May 2001	June-November 2006 and March-May 2007
Directed effort (h)	8.8 (346.4)	1,083.8 (63.3)
Directed effort/acre	0.0 (346.4)	0.1 (63.3)
Total catch per hour	0.0()	0.0()
Total harvest	171.1 (151.6)	536.6 (190.9)
Harvest/acre	0.0 (151.6)	0.0 (190.9)

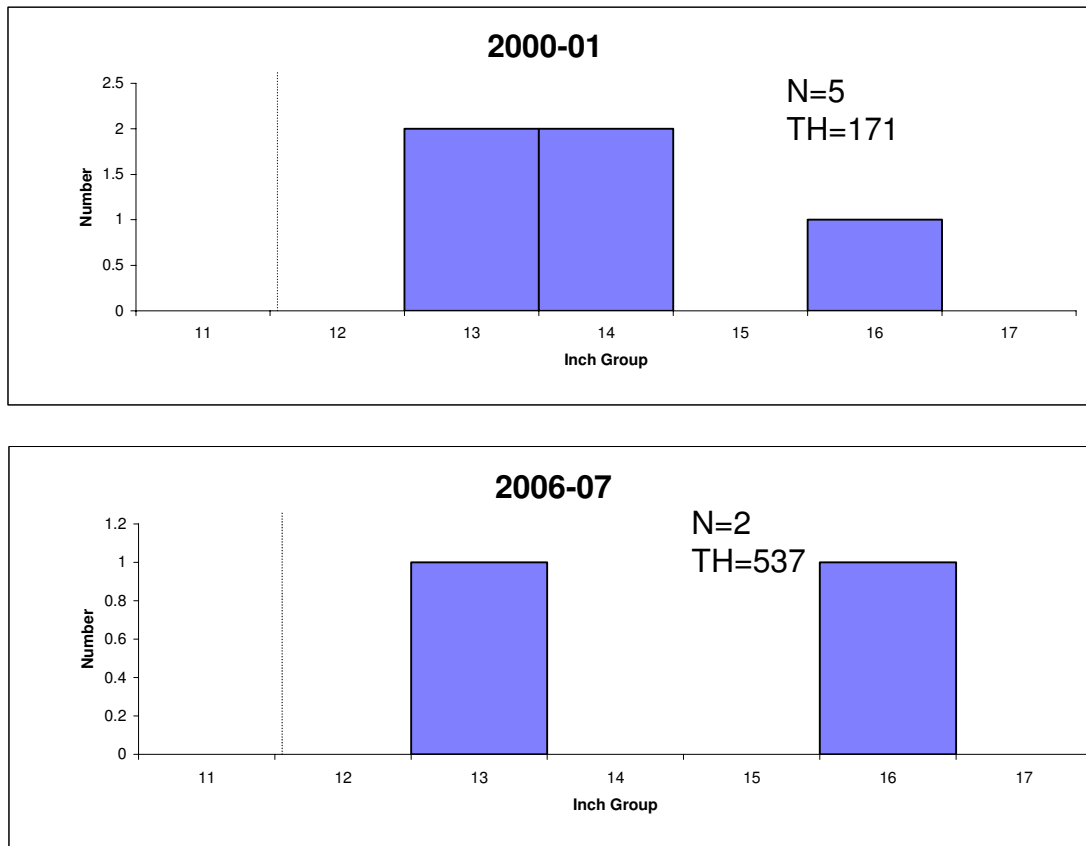


Figure 7. Length frequency of harvested channel catfish observed during creel surveys at Possum Kingdom June 2000 - May 2001 compared to June November 2006 and March-May quarters 2007, all anglers combined. N is the number of harvested blue catfish observed during creel surveys, and TH is the total estimated harvest for the creel period. Dash line indicates length limit at time of sampling.



## White Bass

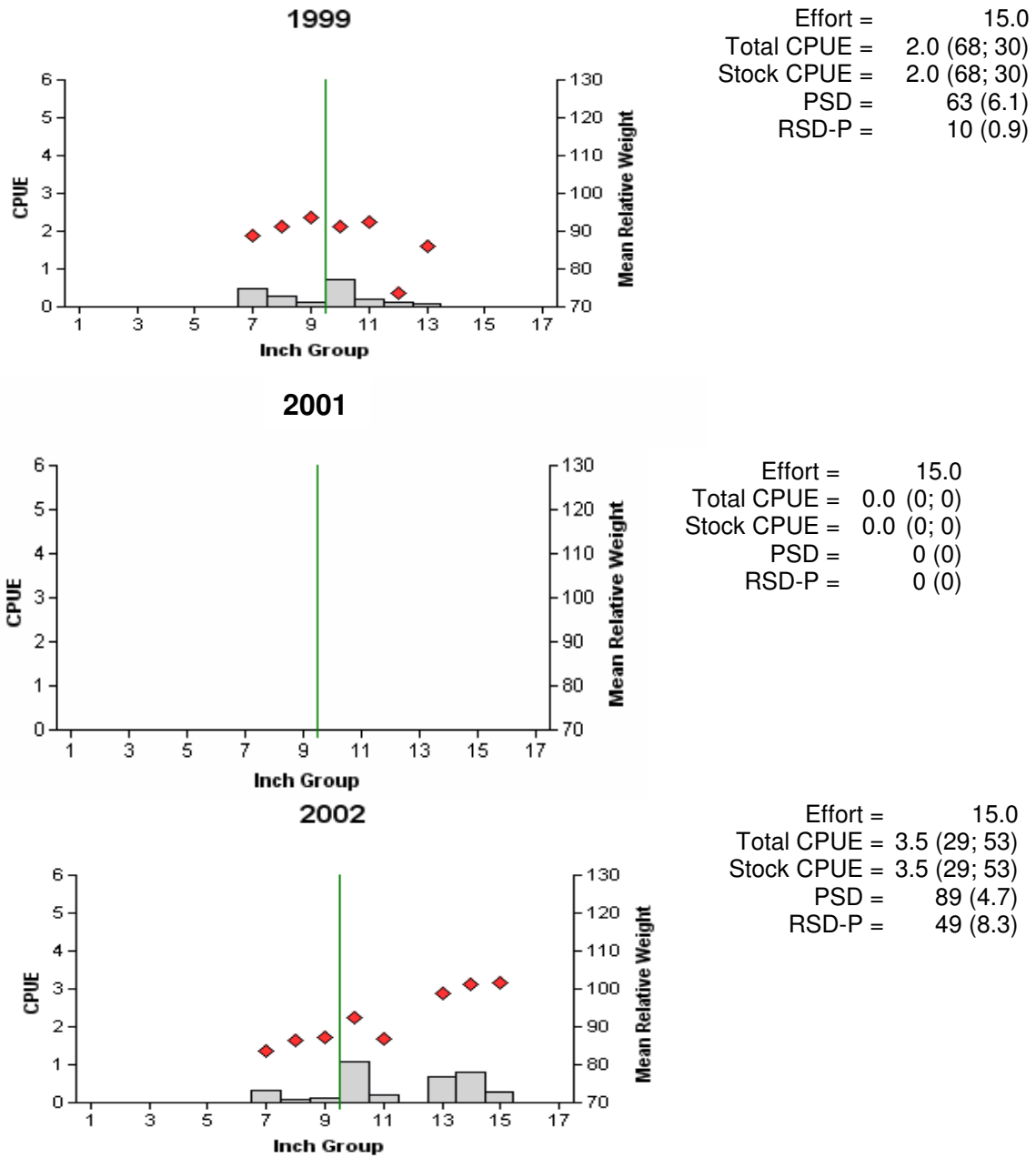


Figure 8. Number of white bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for winter gill netting surveys, Possum Kingdom Reservoir, Texas, 1999, 2001, and 2002. Line indicates minimum size limit at time of sampling.

## White Bass

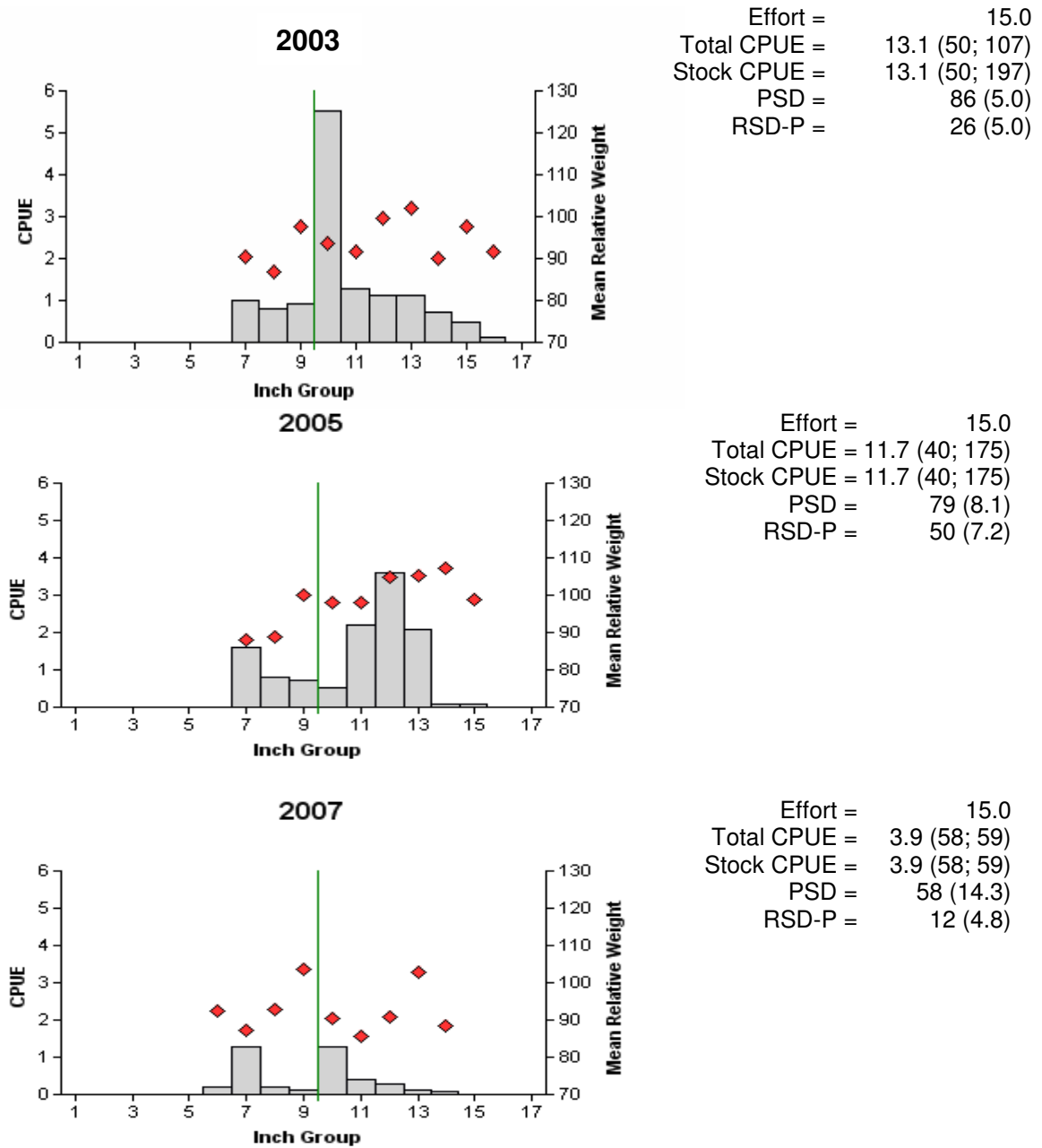


Figure 8 (continued). Number of white bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for winter gill netting surveys, Possum Kingdom Reservoir, Texas, 2003, 2005, and 2007. Line indicates minimum size limit at time of sampling.

## White Bass

Table 9. Creel survey statistics for white bass at Possum Kingdom Reservoir from June 2000 through May 2001 compared to June-November 2006 and March-May 2007 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 2000-May 2001	June-November 2006 and March-May 2007
Directed effort (h)	1,700.4 (86.0)	9,881.5 (27.8)
Directed effort/acre	0.1 (86.0)	0.6 (27.8)
Total catch per hour	0.1 (-)	4.6 (36.3)
Total harvest	414.4 (49.0)	20,568.3 (68.4)
Harvest/acre	0.0 (49.0)	1.3 (68.4)

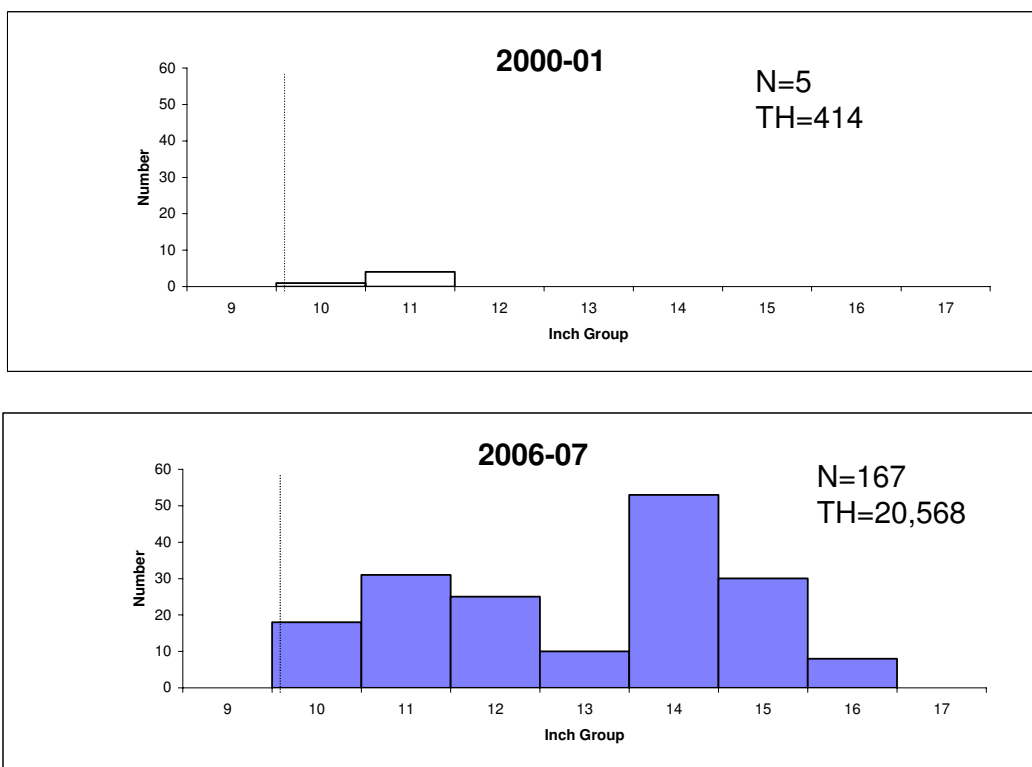
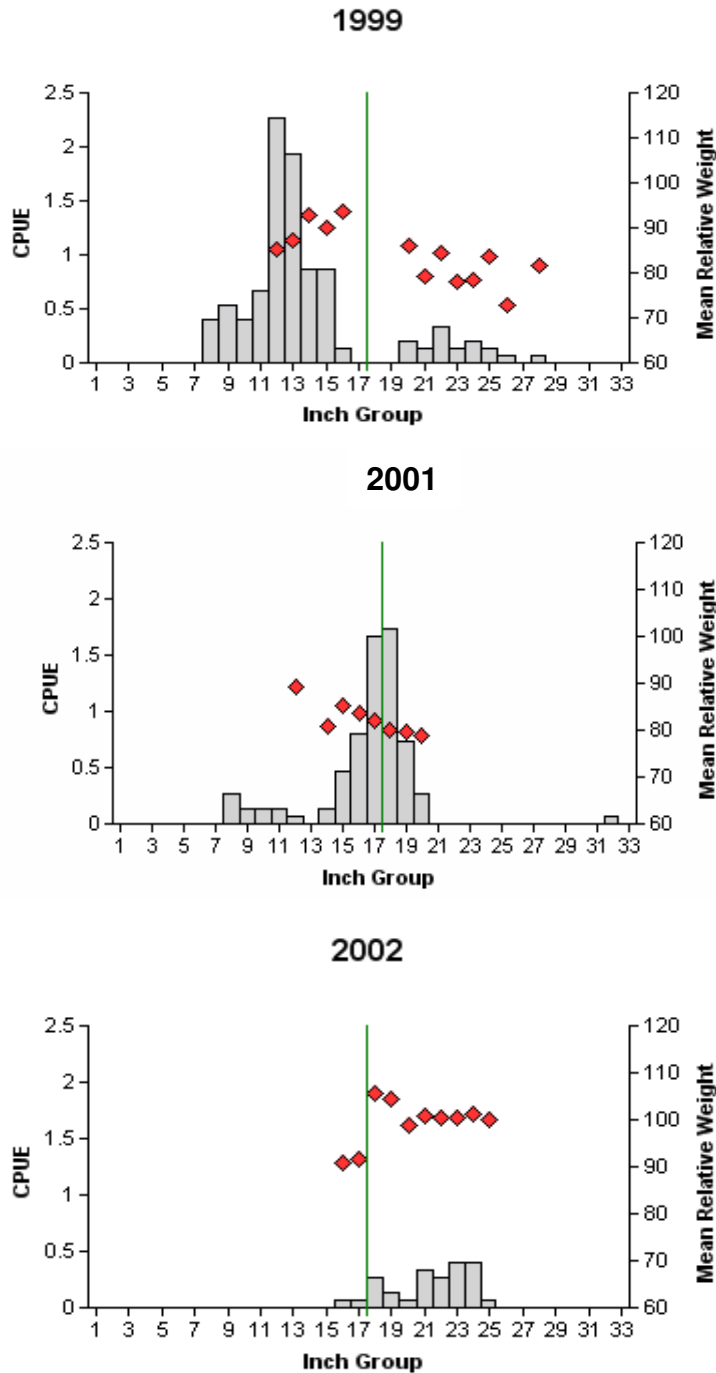


Figure 9. Length frequency of harvested white bass observed during creel surveys at Possum Kingdom Reservoir, Texas, June 2000 through May 2001 and June through November 2006 and March through May 2007, all anglers combined. N is the number of harvested white bass observed during creel surveys, and TH is the total estimated harvest for the creel period. Dash line indicates minimum size limit at time of sampling.

## Striped Bass



Effort = 15.0  
 Total CPUE = 9.3 (24; 140)  
 Stock CPUE = 7.3 (24; 110)  
 PSD = 17 (7.4)  
 RSD-P = 0 (0)

Effort = 15.0  
 Total CPUE = 6.6 (43; 99)  
 Stock CPUE = 5.9 (42; 88)  
 PSD = 6 (3.3)  
 RSD-P = 1 (0.9)

Effort = 15.0  
 Total CPUE = 2.1 (27; 31)  
 Stock CPUE = 2.1 (27; 31)  
 PSD = 74 (8.4)  
 RSD-P = 0 (0)

Figure 10. Number of striped bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for winter gill netting surveys, Possum Kingdom Reservoir, Texas, 1999, 2001, and 2002. Line indicates minimum size limit at time of sampling.

## Striped Bass

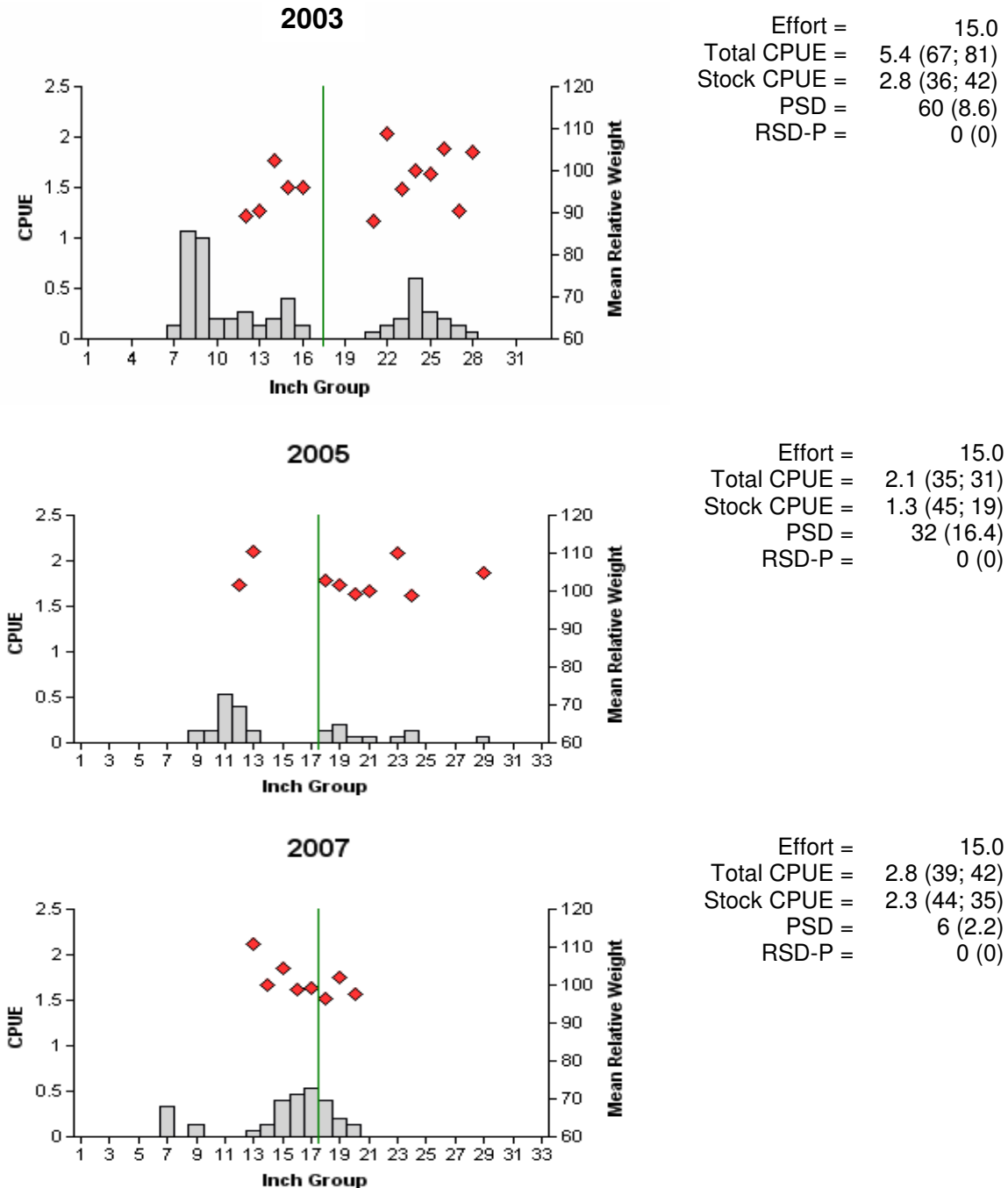


Figure 10 (continued). Number of striped bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for winter gill netting surveys, Possum Kingdom Reservoir, Texas, 2003, 2005, and 2007. Line indicates minimum size limit at time of sampling.

Table 10. Mean length at age of capture for striped bass (sexes combined) collected by gill nets, Possum Kingdom Reservoir, Texas, during winter surveys in 1999, 2001, 2002, 2003, 2005 and 2007. Sample sizes are in parentheses. Ages determined using otoliths.

Year	Length (inches) at Age					
	1	2	3	4	5	6
1999		12.4(54)		22.0(9)	23.2(6)	27.6(1)
2001	9.6(10)	15.7(10)		18.4(19)		
2002		18.5(4)			22.8(11)	
2003	9.5(15)	14.1(16)				24.9(22)
2005	11.6(20)	19.6(6)	22.8(4)			
2007		17.7(20)				
Averages*	13.4	19.3	23.4	26.3	28.3	29.8

\* Ecological region 5 averages from Prentice (1987); lengths derived for February 15.

## Striped Bass

Table 11. Creel survey statistics for striped bass at Possum Kingdom Reservoir from June 2000 through May 2001 compared to June-November 2006 and March-May 2007 quarters, where total catch per hour is for anglers targeting striped bass and total harvest is the estimated number of striped bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year	
	June 2000-May 2001	June-November 2006 and March-May 2007
Directed effort (h)	32,127.6 (24.9)	3,071.2 (34.9)
Directed effort/acre	2.1 (24.9)	0.2 (34.9)
Total catch per hour	0.5 (43.6)	0.0 ()
Total harvest	3,900.5 (71.4)	415.7 (179.5)
Harvest/acre	0.3 (71.4)	0.0 (179.5)

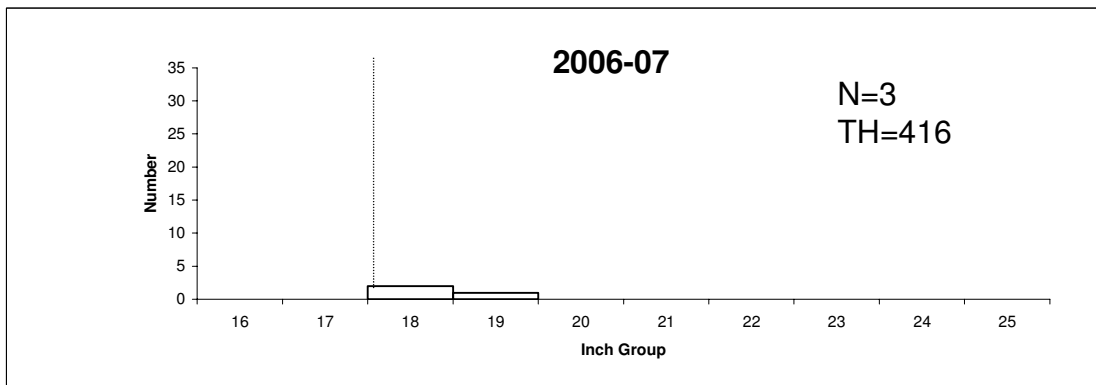
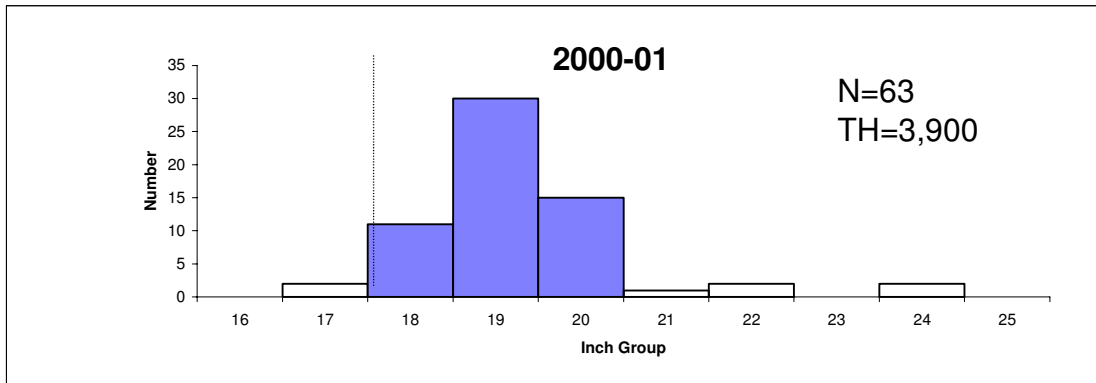


Figure 11. Length frequency of harvested striped bass observed during creel surveys at Possum Kingdom Reservoir June 2000 through May 2001 compared to June through November 2006 and March through May 2007 quarters, all anglers combined. N is the number of harvested striped bass observed during creel surveys, and TH is the total estimated harvest for the creel period. Dash line indicates minimum size limit at time of sampling.

## Largemouth Bass

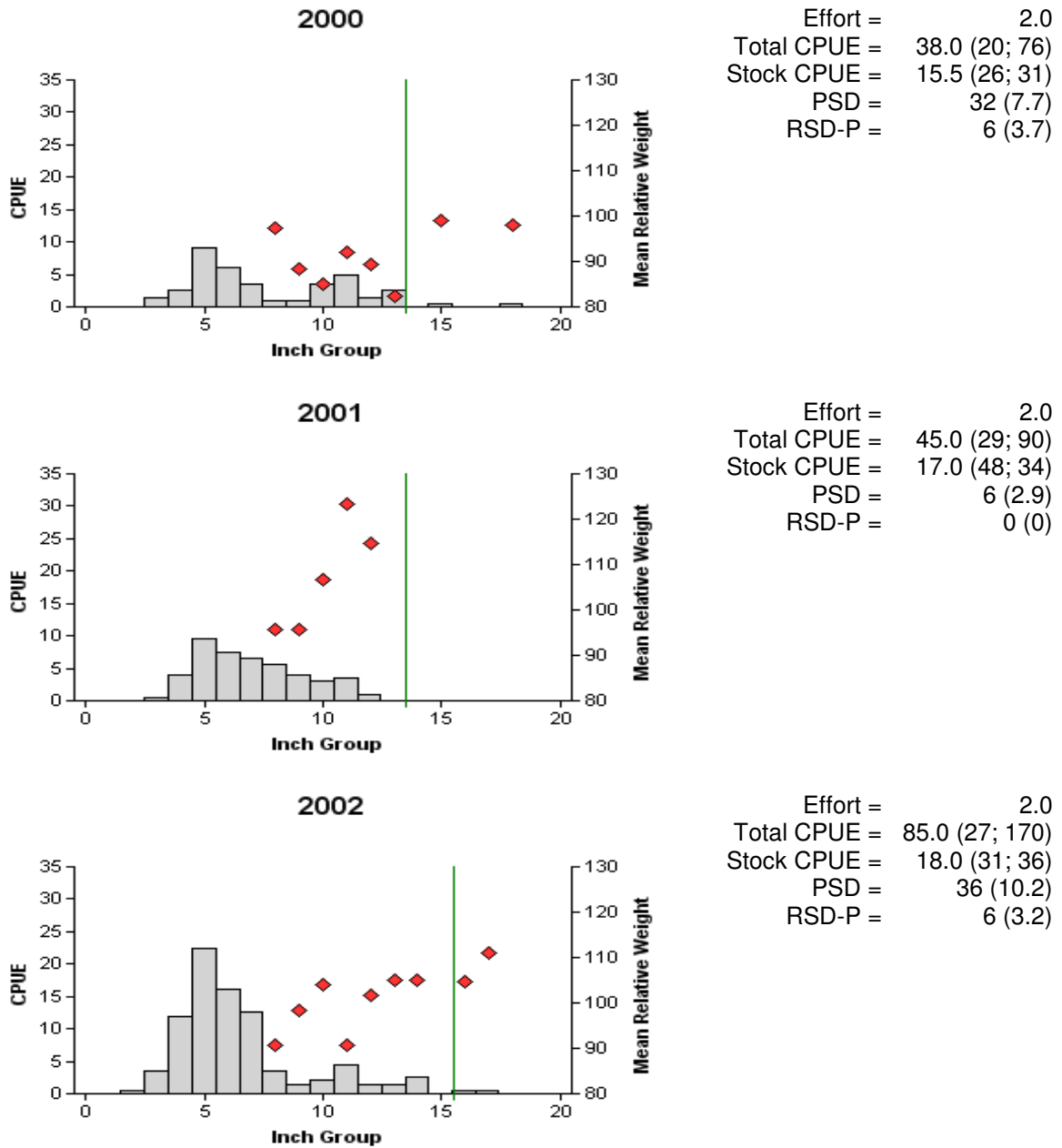


Figure 12. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Possum Kingdom Reservoir, Texas, 2001, 2002 and 2003. Line indicates minimum size limit at time of sampling.



## Largemouth Bass

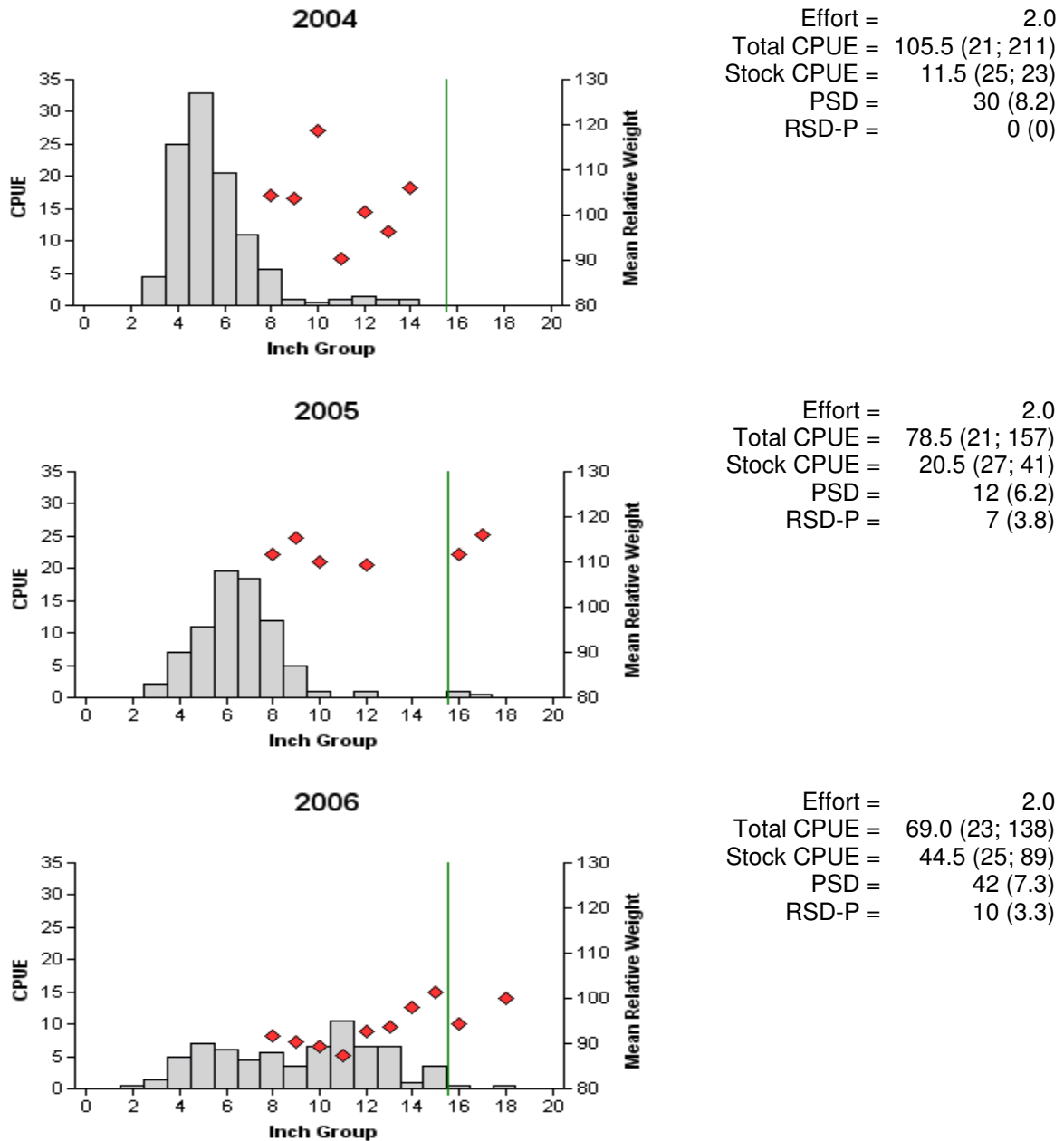


Figure 12 (continued). Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Possum Kingdom Reservoir, Texas, 2004, 2005, and 2006. Line indicates minimum size limit at time of sampling.

## Largemouth Bass

Table 12. Results of genetic analysis of largemouth bass collected by fall electrofishing, Possum Kingdom Reservoir, Texas, 1999, 2001, 2002, 2003, 2004, 2005 and 2006. 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		
1999	28	4	21	3	50.0	14.3
2001	30	3	21	6	40.8	10.0
2002	30	7	15	8	50.8	23.3
2003	31	21	9	1	84.7	67.7
2004	49	12	34	3	62.6	24.5
2005	2	1	1	0	75.0	50.0
2006	30	2	28	0	60.0	6.7

Table 13. Age and mean length at age for largemouth bass (sexes combined) collected by electrofishing, Possum Kingdom Reservoir, October 1999, 2000, 2002, 2003, 2005, and 2006. Sample sizes are in parentheses. Ages determined using otoliths.

Year	Length (inches) at Age			
	1	2	3	4
1999	10.8 (11)	13.6 (5)	14.8 (2)	16.1 (3)
2000	10.9 (17)	13.1 (3)	13.9 (2)	15.4 (1)
2002	12.0 (24)			
2003		15.1 (3)		
2005	12.6 (2)	16.9 (3)		
2006	10.7 (73)	14.8 (8)	18.2 (1)	
Averages*	10.2	13.0	15.2	16.9

\*Ecological region averages from Prentice (1987); lengths derived for November 1.

## Largemouth bass

Table 14. Creel survey statistics for largemouth bass at Possum Kingdom Reservoir from June 2000 through May 2001 compared to June-November 2006 and March-May 2007 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 2000-May 2001	June-November 2006 and March-May 2007
Directed effort (h)	10,676.1 (33.9)	13,764.3 (23.6)
Directed effort/acre	0.7 (33.9)	0.9 (23.6)
Total catch per hour	0.3 (65.6)	1.1 (49.0)
Total harvest	890.6 (64.2)	925.3 (88.4)
Harvest/acre	0.1 (64.2)	0.1 (88.4)

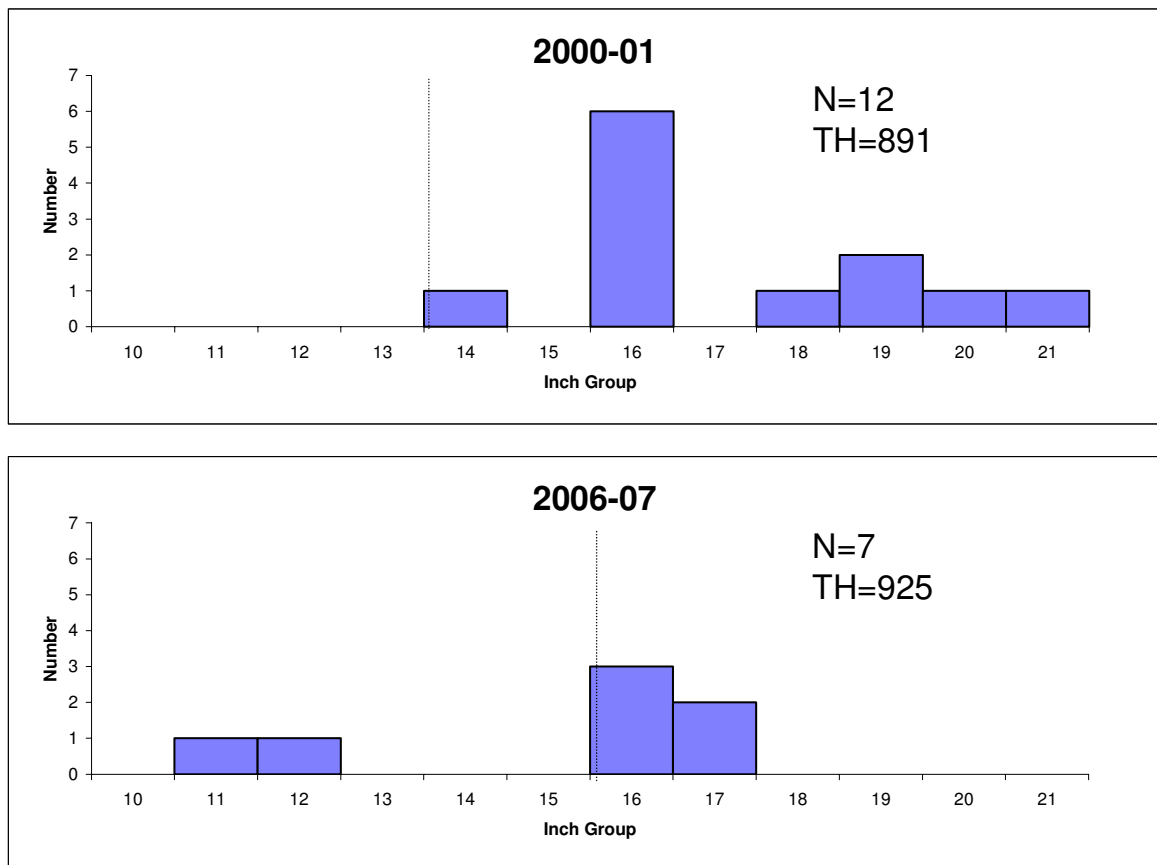
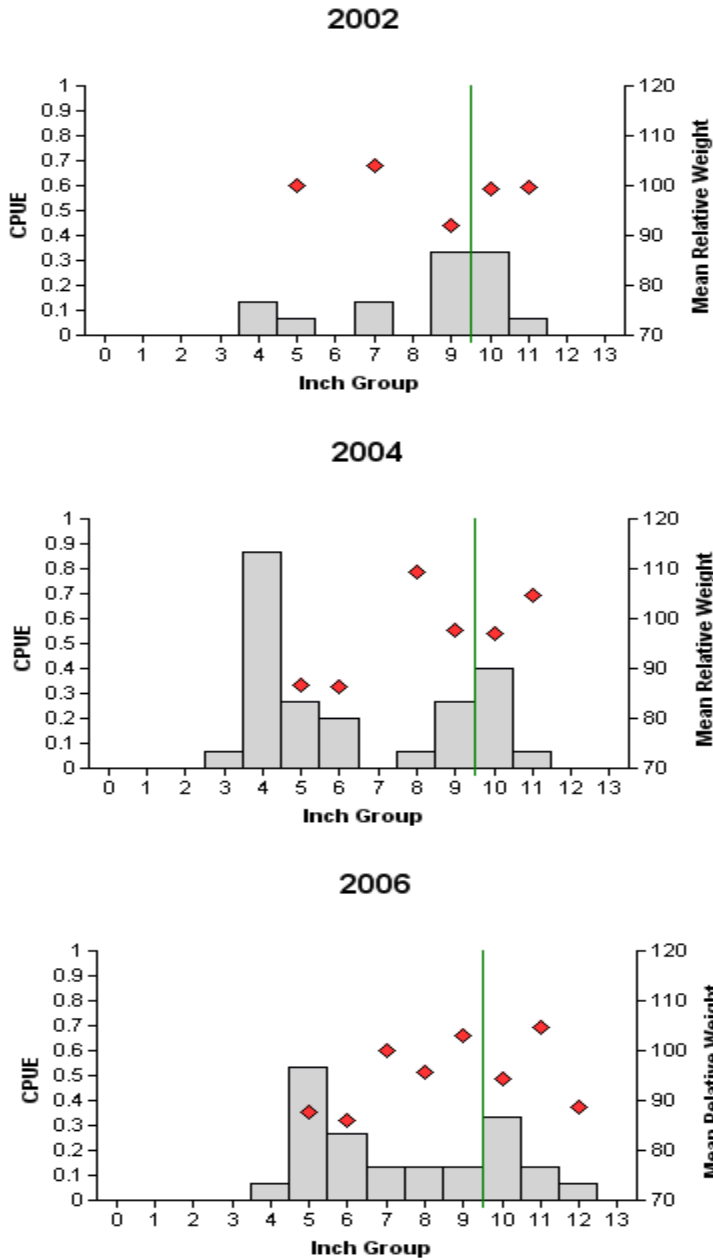


Figure 13. Length frequency of harvested largemouth bass observed during creel surveys at Possum Kingdom Reservoir June 2000 through May 2001 compared to June through November 2006 and March through May 2007 quarters, all anglers combined. N is the number of harvested largemouth bass observed during creel surveys, and TH is the total estimated harvest for the creel period. Dash line indicates minimum size limit at time of sampling.

## White Crappie



Effort = 15.0  
 Total CPUE = 1.1 (49; 16)  
 Stock CPUE = 0.9 (56; 14)  
 PSD = 79 (16.1)  
 RSD-P = 43 (17.2)

Effort = 15.0  
 Total CPUE = 2.2 (34; 33)  
 Stock CPUE = 1.3 (35; 19)  
 PSD = 63 (18.4)  
 RSD-P = 37 (12)

Effort = 15.0  
 Total CPUE = 1.8 (32; 27)  
 Stock CPUE = 1.7 (32; 26)  
 PSD = 46 (11.6)  
 RSD-P = 31 (14.4)

Figure 14. 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, Possum Kingdom Reservoir, Texas, 2002, 2004, and 2006. Line indicates minimum size limit at time of sampling.

## White Crappie

Table 15. Creel survey statistics for white crappie at Possum Kingdom Reservoir from June 2000 through May 2001 compared to June-November 2006 and March-May 2007 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 2000-May 2001	June-November 2006 and March-May 2007
Directed effort (h)	2,021.6 (75.1)	812.4 (70.2)
Directed effort/acre	0.1 (75.1)	0.1 (70.2)
Total catch per hour	0.3 (454.2)	0.3 ()
Total harvest	403.3 (173.1)	616.4 (103.1)
Harvest/acre	0.0 (173.1)	0.0 (103.1)

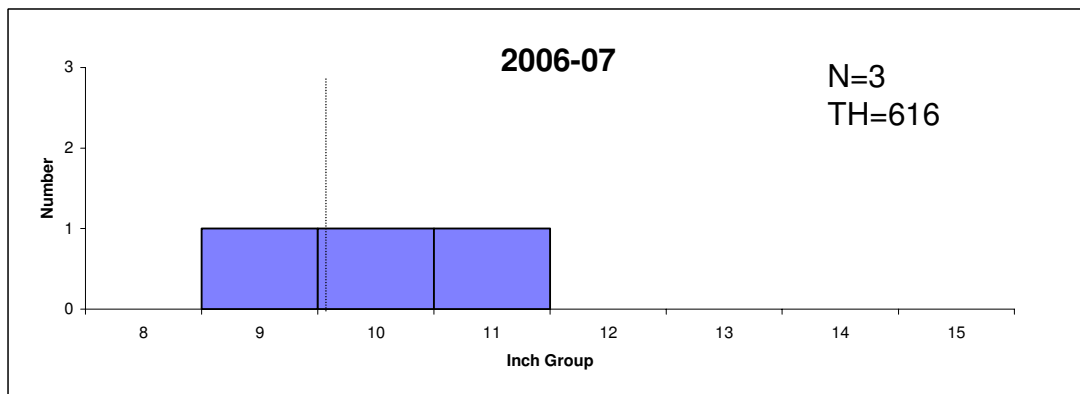
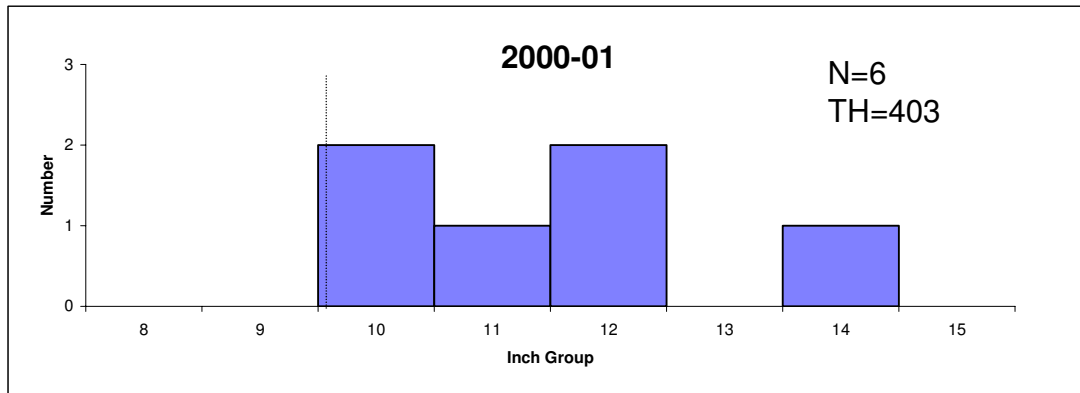


Figure 15. Length frequency of harvested white crappie observed during creel surveys at Possum Kingdom June 2000 - May 2001 compared to June - November 2006 and March- May 2007 quarters, all anglers combined. N is the number of harvested white crappie observed during surveys, and TH is the total estimated harvest for the creel period. Dash line indicates minimum size limit at time of sampling.

Table 16. Proposed sampling schedule for Possum Kingdom 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.

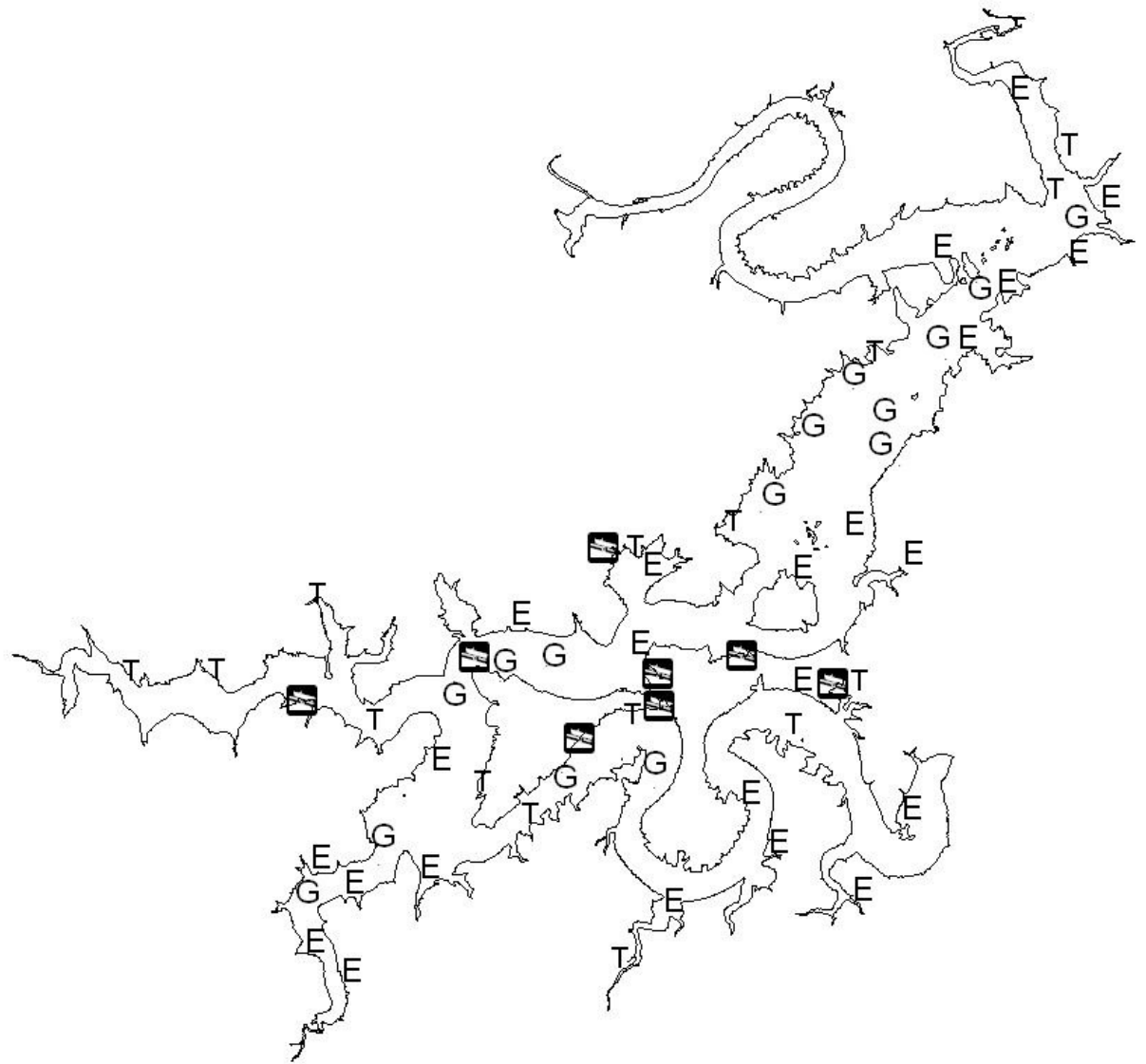
Survey Year	Electrofishing	Trap Net	Gill Net	Creel	Report
Summer 07-Spring 08					
Summer 08-Spring 09	A		A		
Summer 09-Spring 10					
Summer 10-Spring 11	S	S	S		S

**APPENDIX A**

Number (N) and catch rate (CPUE) of all species collected from all gear types from Possum Kingdom Reservoir, Texas, 2006-2007.

Species	Gill Nets		Trap Nets		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Longnose gar	3	0.2				
Gizzard shad	86	5.7			784	392.0
Threadfin shad					83	41.5
Common carp	16	1.1	1	0.1		
River carpsucker	4	0.3				
Smallmouth buffalo	18	1.2				
Blue catfish	8	0.5				
Channel catfish	94	6.3	2	0.1		
White bass	59	3.9	14	0.9		
Striped bass	42	2.8				
Green sunfish			2	0.1	70	35.0
Warmouth			4	0.3	15	7.5
Bluegill	3	0.2	435	29.0	429	214.5
Longear sunfish			19	1.3	112	56.0
Redear sunfish			1	0.1	1	0.5
Largemouth bass					138	69.0
White crappie			27	1.8		
Black crappie			1	0.1		
Freshwater drum	5	0.3	1	0.1		

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**APPENDIX B**



Location of sampling sites, Possum Kingdom Reservoir, Texas, 2006-2007. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively.