

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

Lake Bardwell

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Lake Bardwell were surveyed in 2006 using electrofishing and trap nets and in 2007 using gill nets. A habitat and vegetation survey was conducted in August 2006. Anglers were surveyed from December 1, 2006-May 31, 2007 with a roving creel. This report summarizes results of the surveys and contains a management plan based on those findings.

- **Reservoir description:** Lake Bardwell is a 3,138-acre reservoir constructed in 1965 on Waxahachie Creek, a tributary of the Trinity River, Texas, for flood control and as a water supply for municipal and industrial purposes. The lake is located in Ellis County and is operated and controlled by the U.S. Army Corps of Engineers. The productivity in Lake Bardwell has declined in recent years. Habitat consisted of featureless shoreline, eroded bank, and small amounts of native submersed vegetation, native emergent vegetation, and hydrilla.
- **Management history:** Important sport fish include sunfishes, largemouth bass, white bass, palmetto bass, blue catfish, channel catfish, white crappie, and black crappie. The management plan from 2003 included annual stockings of palmetto bass to maintain the fishery. A roving angler creel survey was conducted from December 2006 – May 2007 to collect angler use and harvest of the palmetto bass fishery. U.S. Army Corps of Engineers (USACE) has conducted herbicide control of hydrilla in the swimming area.
- **Fish community**
 - **Prey species:** Threadfin shad abundance has increased. Catch rate of gizzard shad was good, and most gizzard shad were available as prey to sport fish. Bluegill, redear sunfish, and longear sunfish were present but in low abundance. Overall prey availability was adequate for sportfishes.
 - **Catfishes:** Catfishes account for 6% of the directed angler effort. Blue catfish size distribution was better than channel catfish. Gill net catch rate for channel catfish is similar to previous surveys. Both species exhibited consistent recruitment.
 - **Temperate basses:** White bass and palmetto bass made up 9% of directed angling effort from December 2006-May 2007. The gill net catch rate of white bass has declined and recruitment of the 2005 year class was low. Gill net catch rate of palmetto bass was lower than the 2005 survey but similar to 2003.
 - **Largemouth bass:** Only 2% of angler directed effort was for largemouth bass from December 2006 to May 2007. Electrofishing catch rates have decreased and body condition of was below the desirable range for most size classes. Angler catch rate was poor.
 - **Crappie:** Crappie were the most sought after sport fishes at Lake Bardwell accounting for nearly 55% of the directed angler effort. Overall angler catch rate of crappie was over 0.5/h and an estimated 5,500 crappie were harvested in from December 2007 through May 2007. Trap net catch rates of white crappie have declined compared to previous surveys.
 - **Management Strategies:** Palmetto bass should be stocked annually with additional gill netting to evaluate stocking effectiveness. Efforts will be made to coordinate with controlling authority to begin a native plant establishment program to enhance the largemouth bass habitat.

INTRODUCTION

This document is a summary of fisheries data collected from Lake Bardwell in 2006-2007. The purpose of this 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 2006-2007 data for comparison.

Reservoir description

Lake Bardwell is a 3,138-acre reservoir constructed in 1965 on Waxahachie Creek, a tributary of the Trinity River, Texas, built for flood control and as a water supply for municipal and industrial purposes. The lake is located in Ellis County and is operated and controlled by the U.S. Army Corps of Engineers. Lake Bardwell is a mesotrophic reservoir with a mean TSI *chl-a* of 44.97, which was lower than previous samples (Texas Commission on Environmental Quality 2002). The littoral zone consists of primarily featureless (30%) and eroded bank (65%) shoreline (Table 4). Littoral habitat is limited in the lower half of the reservoir. Previous surveys have document native emergent vegetation above the SH 34 Bridge. Hydrilla (*Hydrilla verticillata*) was found in trace amounts in 1997 and expanded to 15 acres in 2002. Hydrilla coverage has declined and was found only in trace amounts in 2006. Other descriptive characteristics for Lake Bardwell are reported in (Table 1).

Boat access is good and bank angler access is adequate. Banks anglers can access the lake from 5 designated areas. Boats can be launched from 6 boat ramps surrounding the lake, of which all are designated as public access. All bank and boat access areas are ADA approved.

Management history

Previous management strategies and actions: Management strategies and actions from the previous survey report (Ott and Bister 2002) included:

1. Maintain a fishable population of Palmetto bass (*Morone chrysops* x *M. saxatilis*).
Action: Palmetto bass were stocked at 15/acre annually except for 2006 when none were stocked. Additional gill net sampling (to assess the stockings) was conducted in 2005. A creel survey was conducted from December 2006 through May 2007 to document angler utilization of palmetto bass and white bass.
2. Lake Bardwell offers substantial recreational opportunities, and could benefit from additional promotion.
Action: News releases promoting the Lake Bardwell fishery have been prepared and submitted. Harvest regulation posters have been prepared and provided to USACE, access areas, and surrounding businesses.
3. Monitor the status of hydrilla in the system to ensure infestation does not inhibit public access and recreation.
Action: USACE personnel reportedly conducted herbicide control of hydrilla in the swimming area, further action has not been necessary. An aquatic vegetation survey was conducted in 2006.
4. Two boat ramps were no longer accessible to anglers (SH 34 and Waxahachie Creek Park). Discuss options with USACE to address needed improvements.
Action: USACE has decided against improvements and ramps remain inaccessible.

Harvest regulation history: Sportfishes in Lake Bardwell are currently managed with statewide regulations (Table 2).

Stocking history: Palmetto bass are the most frequently stocked species at Lake Bardwell. Palmetto bass fingerlings were first stocked in 1975. Stocking continues to provide a fishable population. Florida largemouth bass (*Micropterus salmoides floridanus*) were initially stocked in

1992 and were stocked again in 1998 to enhance the quality of the fishery. Largemouth bass (*M. salmoides*) were first stocked in 1971, and the population has been self-sustaining since. Bardwell was stocked with blue catfish (*Ictalurus furcatus*) and channel catfish (*I. punctatus*) initially in 1966, both populations are self-sustaining. Striped bass (*M. saxatilis*) were stocked periodically from 1967-1994; however, stockings have been discontinued. A complete stocking history is found in Table 3.

Vegetation/habitat history: The aquatic vegetation community at Bardwell was sparse. Native emergent species were found around the perimeter of the upper end of the lake, when water levels remain stable but still covers <1% of reservoir area. Hydrilla expanded from trace amounts in 1997 to 15 acres in 2002; at that time total submerged aquatic vegetation occupied only 3% of the reservoir (Ott and Bister 2002). The physical habitat types have remained constant over the last decade (Table 4).

METHODS

Fishes were collected by electrofishing (1 hour at 12 5-min stations), gill netting (5 net nights at 5 stations), and trap netting (5 net nights at 5 stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing and, for gill and trap nets, as the number of fish 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 2005). An aquatic vegetation survey was conducted in September 2006, in accordance with the Fisheries Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2005). A roving creel survey was conducted from December 2006– May 2007 to obtain angler use and catch information. Surveys consisted of 9 creel days per quarter (4 weekdays and 5 weekend days). Angler counts and interviews were conducted in accordance with the Fisheries Assessment and 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). Index of vulnerability (IOV) was calculated for gizzard shad (DiCenzo et al. 1996). Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE statistics and for creel statistics and SE was calculated for structural indices and IOV. Ages were determined using otoliths from 13 specimens with lengths ranging from one inch below to one inch above the legal length limit. Source for water level data was the United States Geological Survey (USGS) website.

RESULTS AND DISCUSSION

Habitat: A survey of the littoral zone was conducted in 2006. Native emergent and submerged vegetation were identified in trace amounts. Pondweed (*Potamogeton spp.*) was the only native submerged species identified. Emergent vegetation was composed of American lotus (*Nelumbo lutea*), arrowhead (*Sagittaria spp.*), cattail (*Typha spp.*), bull tongue (*S. lancifolia*), bulrush (*Scirpus spp.*), and water willow (*Justicia Americana*), which collectively occupied less than 1% of total surface area. Fluctuating water levels (Figure 1), drought, and geography continue to prohibit the expansion of the aquatic plant community in this reservoir. Native submerged vegetation occupied less than 1% of the total reservoir surface area (Table 4). Hydrilla was identified, but only in trace amounts (0.05 acres). Collectively aquatic vegetation was present in 2% of the reservoir surface area.

Creel: Directed fishing effort by anglers was highest for crappie (*Pomoxis spp.*) (55%), followed by anglers fishing for anything (28%) (Table 5). Highview marina located on the west side of the

lake is equipped with excellent bank access. The marina is equipped with several crappie houses with well maintained brush piles. Much of the effort for crappie exists at this location. Much of the shoreline is accessible to bank anglers, many of which set out "lines" to fish while they are at camp, thus explaining the abundance of non-target effort. A substantial amount of specific species effort was also directed towards temperate basses (9%). Total fishing effort for all species at Bardwell was 39,826 angler hours from December 2006 – May 2007, and anglers spent an estimated \$88,855 on direct expenditures (Table 6).

Prey species: Gizzard shad (*Dorosoma cepedianum*) and threadfin shad (*D. petenense*) were collected at Lake Bardwell. Catch rates for gizzard shad in 2006 (283/hour) were lower than the 2002 survey (350/hour), but are higher than the 1997 survey (138/hour) (Figure 2). However, the index of vulnerability (IOV) of gizzard shad was excellent with 90% of gizzard shad collected available to predators. The prey base for Lake Bardwell was composed of predominately shad species. Sunfish (*Lepomis spp.*) were present but in low abundance. Bluegill (*L. macrochirus*), redear sunfish (*L. macrolophus*), and longear sunfish (*L. megalotis*) were collected, but had a combined catch rate of 19/hour, substantially lower than the 2002 catch rate (59/hour). Lake levels (Figure 1) were low at the time of sampling making sample undesirable possibly resulting in lower than average catch rate. Prey availability did not appear to be a limiting factor for sportfish growth.

Catfish: Lake Bardwell contains populations of channel catfish and blue catfish. The gill net catch rate of blue catfish was 1.8/nn (Figure 4). This is similar to the 2005 catch rate (1.2). Population structure (PSD=78) continues to improve, with nearly all of the individuals collected ≥ 22 inches. Recruitment of blue catfish is negligible with no evidence of recruitment in the 2007 sample. The channel catfish catch rate was 3.8/nn in 2007, which was lower than the 2005 and 2003 catch rates (Figure 5). Channel catfish recruitment continues to be consistent, with year classes present in each sampling year. Channel catfish > 18 inches were not collected in 2007; however, anglers harvested one 23 inch catfish (Figure 6). Body condition of channel catfish was low with mean W_r values less than 90) for all size classes. Growth assessment of channel and blue catfish was not conducted in 2007. Angler catch rate for catfish was low 0.03/acre with 2,590 hours of directed effort (Table 7).

Temperate basses: The gill net catch rate of white bass was 13.4/nn in 2006 (Figure 7). This was similar to gill net catch rates in 2005, but suggests a declining trend from a high of 27.2/nn in 2003. The peak in catch rate for 2003 may have been due to a strong 2001 year-class produced by high inflows in 2001 (Figure 1). The PSD exceeded expectations for this fishery at 90. Relative weight was generally above 90 for most inch groups. Average age at 10-inch (10.3-12.2) was 2.3 years (N =13, range 1-4 years).

Gill net catch rate of palmetto bass was 2.2/nn in 2007 (Figure 8). This was lower than gill net catch rates in 2005 (10.6/nn). Body condition for palmetto bass was lower than desired ($W_r < 90$), for all length classes. Average age at 18-inch (18.3-19.7) was 2.8 years (N =4, range 2-3 years). Larger palmetto bass (> 19 inches) were not sampled in gill nets; however, harvested fish up to 24 inches were observed in the angler creel survey.

Temperate basses (including white bass) made up 8.8% of the Bardwell fishery from December 2006-May 2007. Directed effort toward temperate basses was approximately 0.85/acre during this time period. Angler catch rate was relatively low (0.85/h) and size distribution of harvested white bass was 10-13 inches and palmetto bass 17-24 inches (Figure 9, Table 8).

Largemouth bass: Size distribution of largemouth bass (*Micropterus salmoides*) was slightly below the target range (40-70) for a balanced population; fish of preferred size were not collected (Figure 10). Electrofishing catch rates of stock-size fish decreased from 2002 (62 fish/hour) to 2006 (16 fish/hour). Body condition of largemouth bass was desirable ($W_r > 90$) for most size classes (Figure 10), and similar to the range exhibited in previous surveys. Size structure for 2006 (PSD=38) was poor compared to the 2002 (PSD=53) survey. The relative lack of fish > 14

inches is a concern as is the decrease in total electrofishing catch rate (21/h) compared to the historical range. Creel data included harvest of fish up to 16 inches; however, only two harvested fish were measured during the survey period (Figure 11). Additionally, anglers harvested legal-length largemouth bass 53% of the time (Table 9). The low abundance of largemouth bass is likely a function of low coverage of submersed aquatic vegetation and low water level during the electrofishing survey.

Crappie: Both white crappie (*P. annularis*) and black crappie (*P. nigromaculatus*) were present in Lake Bardwell. Trap net catch rate of white crappie in 2006 (10/nn) was below the 2002 and 1997 surveys (17.4 and 23/nn respectively) (Figure 12). Size distribution of white crappie in 2006 was good (PSD=76); however, recruitment was lower in 2006 than in previous surveys. Average age at 10-inch (9.3-11.4) was 1.2 years (N =13, range 1-2 years). Although black crappie were collected in trap nets and observed during the creel survey, they were a minor part of the overall fishery. Trap net catch of black crappie was low at 0.2/nn, and was similar to previous surveys. Black crappie growth was not evaluated. Crappie were the most sought after sport fish at Lake Bardwell accounting for nearly 55% of the directed angler effort. The Lake Bardwell crappie fishery received an estimated 21,829 hours of directed angling effort, which equated to 6.1 hours per acre, during the winter and spring seasons (Table 10). Overall angler catch rate of crappie was 0.5/h and an estimated 5,500 crappie were harvested in from December 2006 through May 2007.

Fisheries management plan for Lake Bardwell, Texas

Prepared – July 2007.

ISSUE 1: Stockings of palmetto bass from 2002 through 2005 has resulted in a fishable population. Since this species does not reproduce, annual stockings are required to maintain the fishery.

MANAGEMENT STRATEGIES

1. Continue annual stockings of palmetto bass fingerlings at the current rate (10/acre).
2. Conduct gill netting in spring 2009 to assess recruitment of stocked fingerlings and to monitor the abundance and size distribution of the palmetto bass population. Re-evaluate stocking if necessary.

ISSUE 2: Lake Bardwell offers substantial recreational angling opportunity and could benefit from additional promotion.

MANAGEMENT STRATEGIES

1. Continue promoting Lake Bardwell in news releases describing angling opportunities in the Dallas/Fort Worth area.
2. Continue providing lake-specific regulation posters to vendors of angling-oriented businesses serving the Lake Bardwell vicinity to remind anglers of the reservoir's fisheries.
3. Maintain regulation signs previously mounted at public and private boat ramps on Lake Bardwell.

ISSUE 3: Aquatic habitat had substantially improved at the time of the 2002 survey. Since that time, drought conditions and other environmental factors have limited aquatic habitat growth. The largemouth bass population was increasing in abundance and size distribution was improving, with the increase in vegetation. There has been a dramatic decrease in vegetation from previous survey and the largemouth bass fishery has suffered as a result.

MANAGEMENT STRATEGIES

1. Consult controlling authority regarding native plant introduction and funding.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes additional gill netting in 2009 and routine monitoring in 2010/2011 (Table 13). Optional gill netting in the spring of 2009 will provide additional trend data on the palmetto bass fishery.

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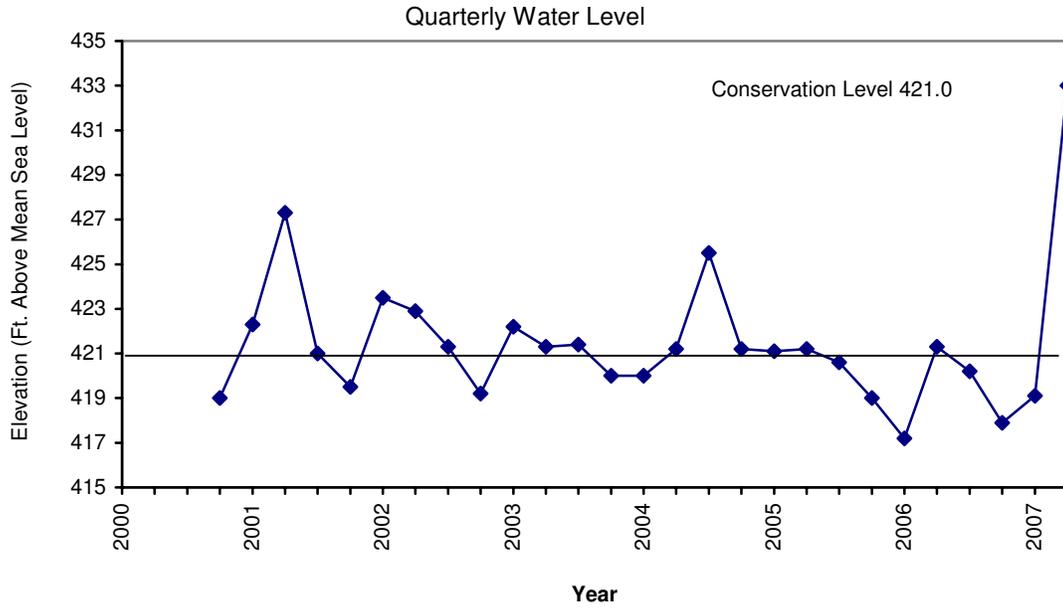


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Lake Bardwell, Texas.

Table 1. Characteristics of Lake Bardwell, Texas.

Characteristic	Description
Year constructed	1965
Controlling authority	U.S. Army Corps of Engineers
County	Ellis
Reservoir type	Tributary
Shoreline development index (SDI)	2.9
Conductivity	330 umhos/cm

Table 2. Harvest regulations for Lake Bardwell.

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 Lake Bardwell, Texas. Size Categories are: FRY =<1 inch; FGL = 1-3 inches.

Species	Year	Number	Size
Blue catfish	1966	7,000	FGL
		<u>7,000</u>	
Channel catfish	1966	22,000	FGL
	1972	2,000	FGL
		<u>24,000</u>	
Striped bass	1967	300,000	FRY
	1968	15,150	FGL
	1969	20,470	FGL
	1970	23,400	FGL
	1981	35,023	FGL
	1983	35,950	FGL
		<u>429,993</u>	
Palmetto bass	1975	20,000	
	1995	61,700	FGL
	1996	53,600	FGL
	1997	53,692	FGL
	1998	41,017	FGL
	2002	35,909	FGL
	2003	47,000	FGL
	2004	47,338	FGL
	2005	47,610	FGL
	2007	<u>32,098</u>	
	485,418		
Green x Redear sunfish	1966	3,400	FGL
	1972	1,000	FGL
		<u>4,400</u>	
Largemouth bass	1966	670,000	FGL
		<u>670,000</u>	
Florida largemouth bass	1992	178,111	FGL
	1998	178,500	FGL
		<u>357,500</u>	

Table 4. Survey of littoral zone and physical habitat types, Lake Bardwell, Texas. Abiotic habitat survey was conducted in 2002 (Ott & Bister 2002). Biotic habitat survey of littoral zone vegetation was conducted in 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
Boat dock	0.1	<1		
Eroded shoreline	16.2	65		
Rip rap	1.0	4		
Featureless	7.6	30		
Native submerged vegetation			0.98	< 1.0
Native emergent vegetation			8.72	< 1.0
Hydrilla			0.05	< 1.0

Table 5. Percent directed angler effort by species groups for Lake Bardwell, Texas, December 2006 – May 2007.

Species	Year
	2006/2007
Crappie spp.	54.8
Anything	27.7
Temperate basses	8.8
Catfish spp.	6.5
Black basses	2.1

Table 6. Total fishing effort (h) for all species and total directed expenditures at Lake Bardwell, Texas, December 2006 - May 2007.

Creel Statistic	Year
	2006/2007
Total fishing effort	39,826
Total directed expenditures	\$88,855

Gizzard shad

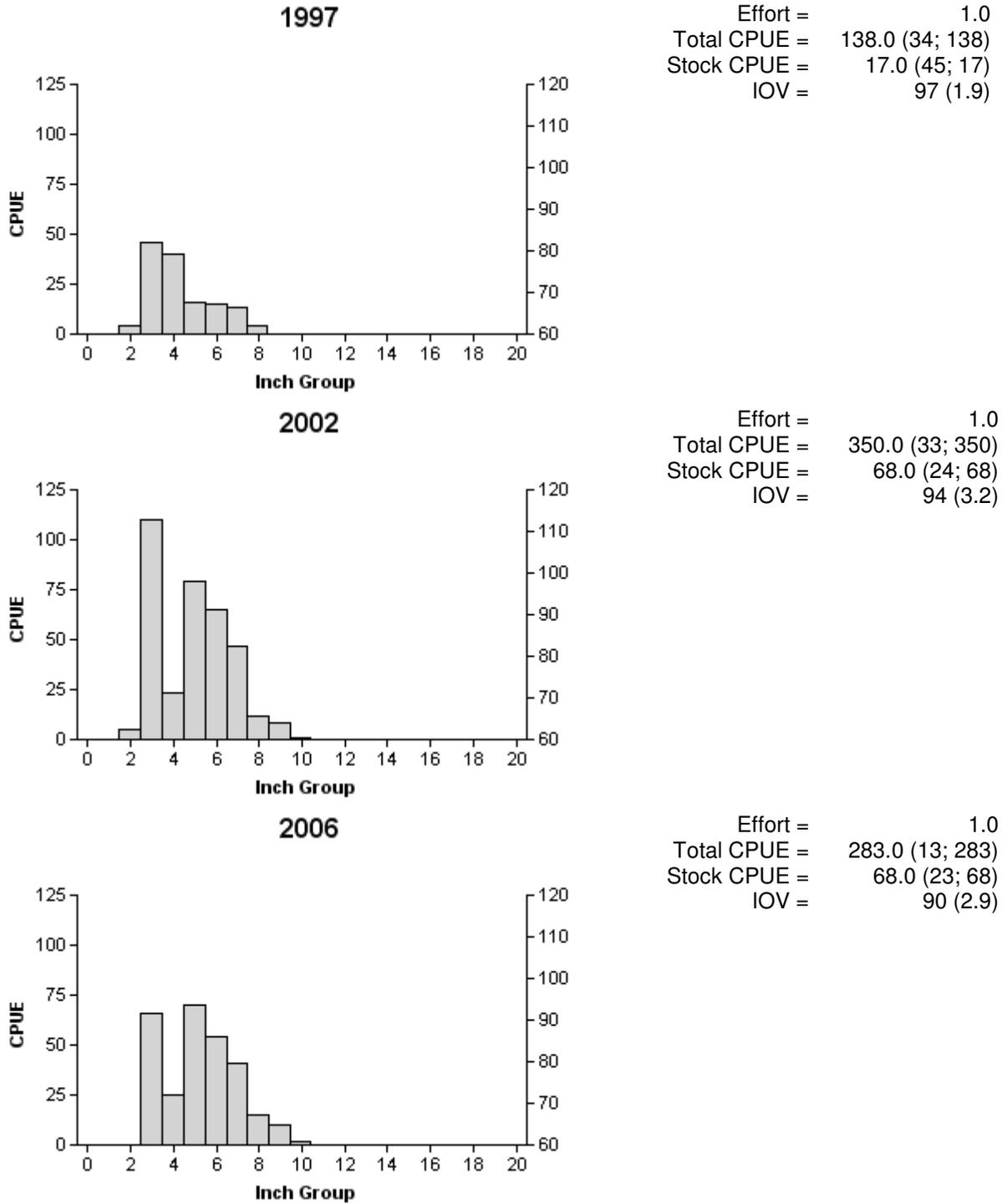


Figure 2. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Lake Bardwell, Texas, 1997, 2002, and 2006.

Bluegill

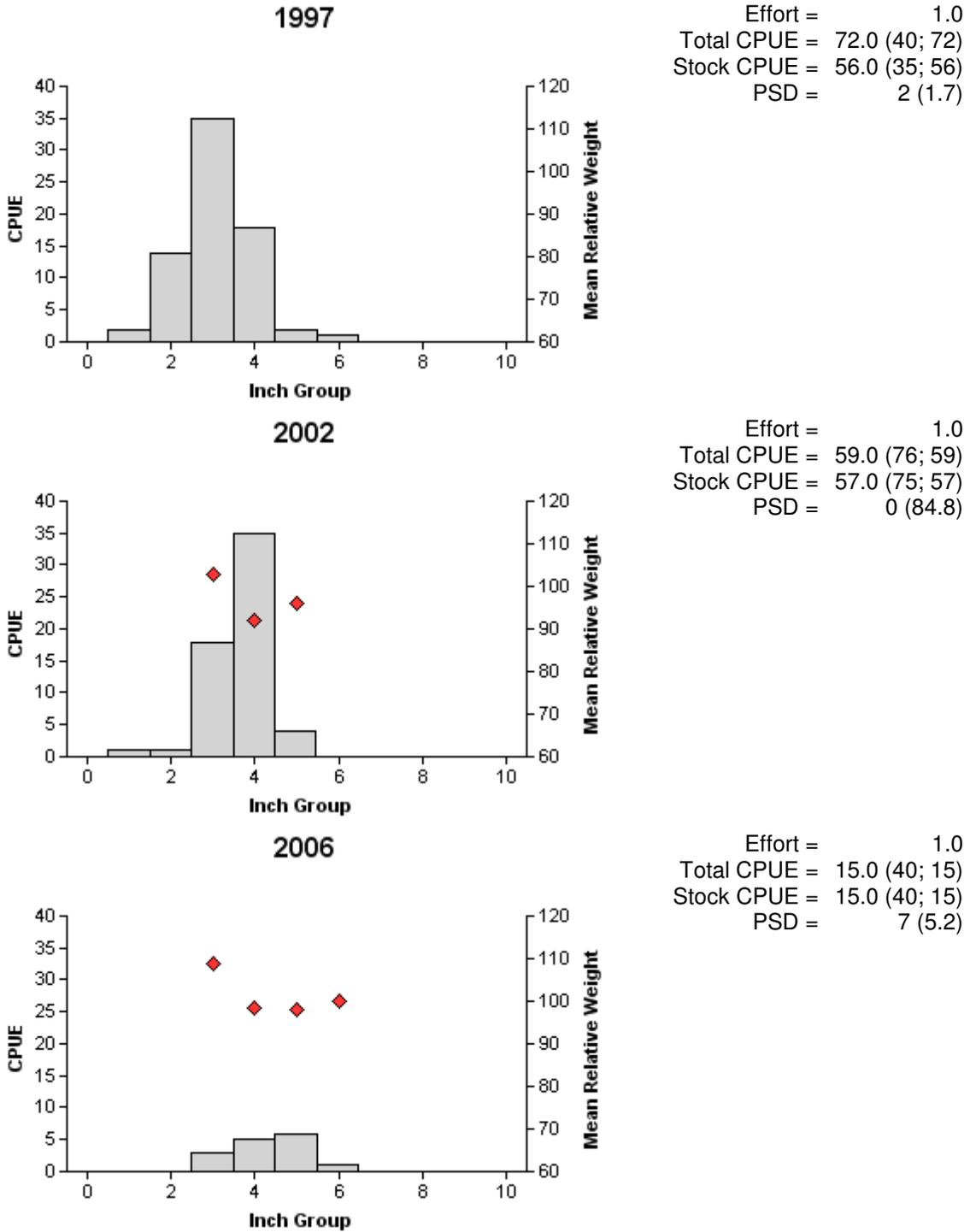
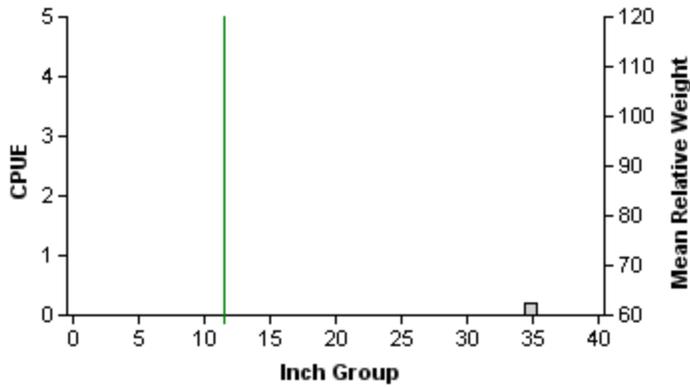


Figure 3. Number of bluegill caught per hour (CPUE, bars) mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Lake Bardwell, Texas, 1997, 2002, and 2006. Wt data not collected 1997.

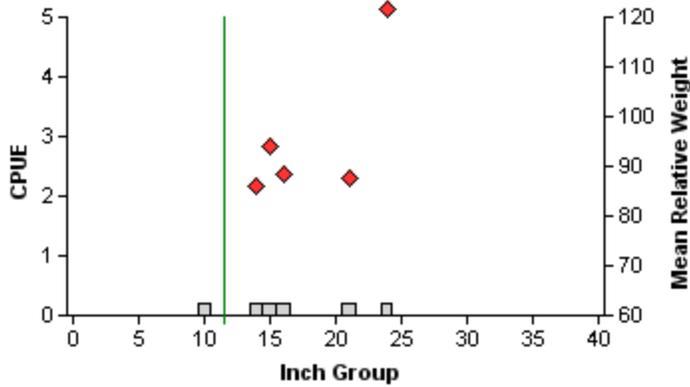
Blue catfish

2003



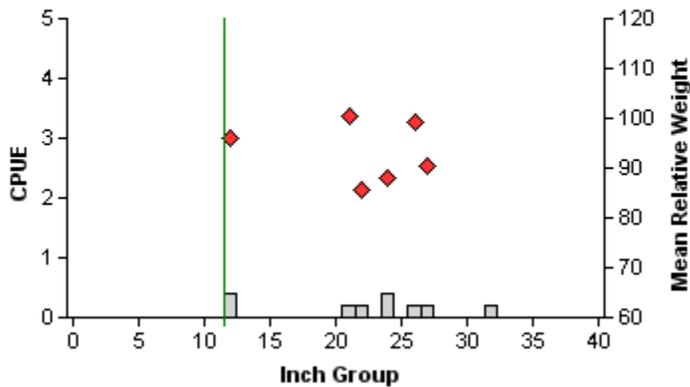
Effort = 5.0
 Total CPUE = 0.2 (100; 1)
 Stock CPUE = 0.2 (100; 1)
 PSD = 100 (0)
 RSD-P = 100 (0)

2005



Effort = 5.0
 Total CPUE = 1.2 (31; 6)
 Stock CPUE = 1.0 (32; 5)
 PSD = 40 (19.0)
 RSD-P = 0 (0)

2007

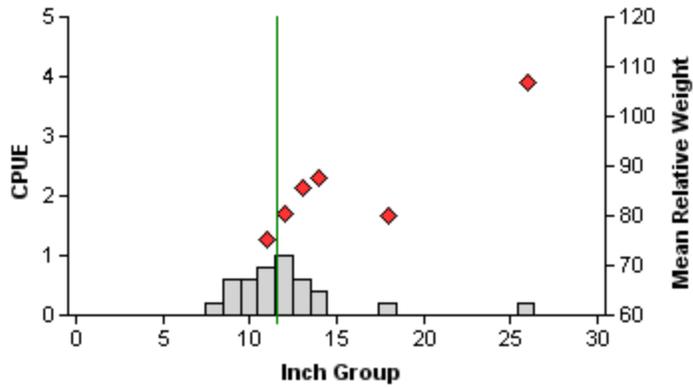


Effort = 5.0
 Total CPUE = 1.8 (44; 9)
 Stock CPUE = 1.8 (44; 9)
 PSD = 78 (10.9)
 RSD-P = 11 (6.2)

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 net surveys, Lake Bardwell, Texas, 2003, 2005 and 2007.

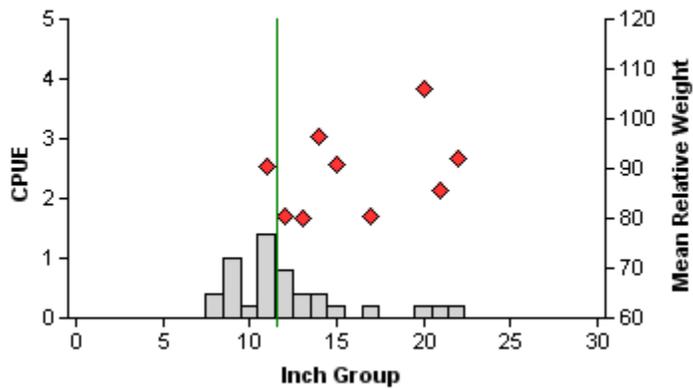
Channel catfish

2003



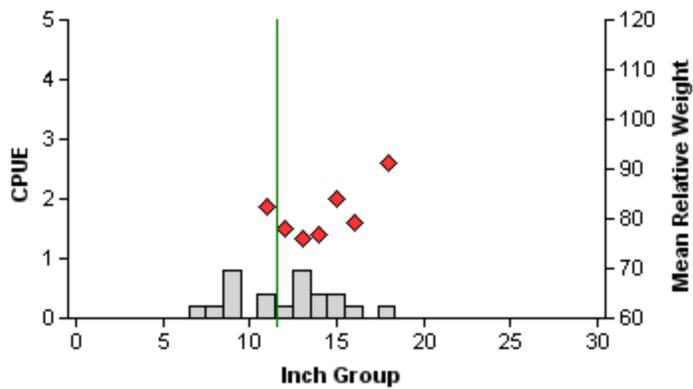
Effort = 5.0
 Total CPUE = 4.6 (35; 23)
 Stock CPUE = 3.2 (36; 16)
 PSD = 12 (10.5)
 RSD-P = 6 (5.2)

2005



Effort = 5.0
 Total CPUE = 5.6 (23; 28)
 Stock CPUE = 4.0 (27; 20)
 PSD = 20 (8.9)
 RSD-P = 0 (0)

2007



Effort = 5.0
 Total CPUE = 3.8 (15; 19)
 Stock CPUE = 2.6 (20; 13)
 PSD = 15 (13.5)
 RSD-P = 0 (0)

Figure 5. 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, Lake Bardwell, Texas, 2003, 2005 and 2007.

Catfish

Table 7. Creel survey statistics for catfish at Lake Bardwell, Texas from December 2006 through May 2007, where total catch per hour is for anglers targeting all 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
	2006/2007
Directed effort (h)	2,590 (53)
Directed effort/acre	0.7 (53)
Total catch per hour	0.03 (137)
Total harvest	129 (259)
Harvest/acre	0.04 (259)
Percent legal released	6

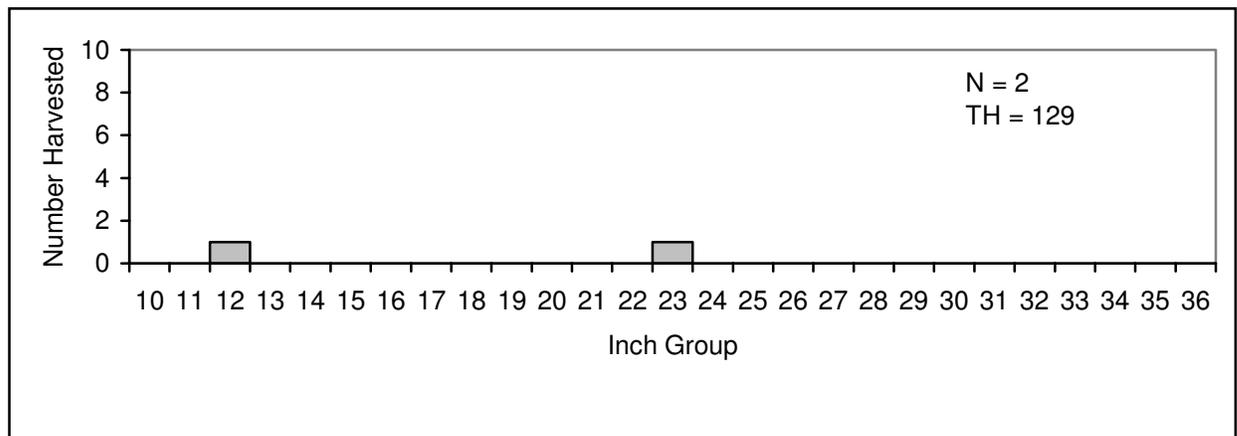


Figure 6. Length frequency of harvested channel catfish observed during creel surveys at Lake Bardwell, Texas, December 2006 through May 2007, all anglers combined. N is the number of harvested channel catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

White bass

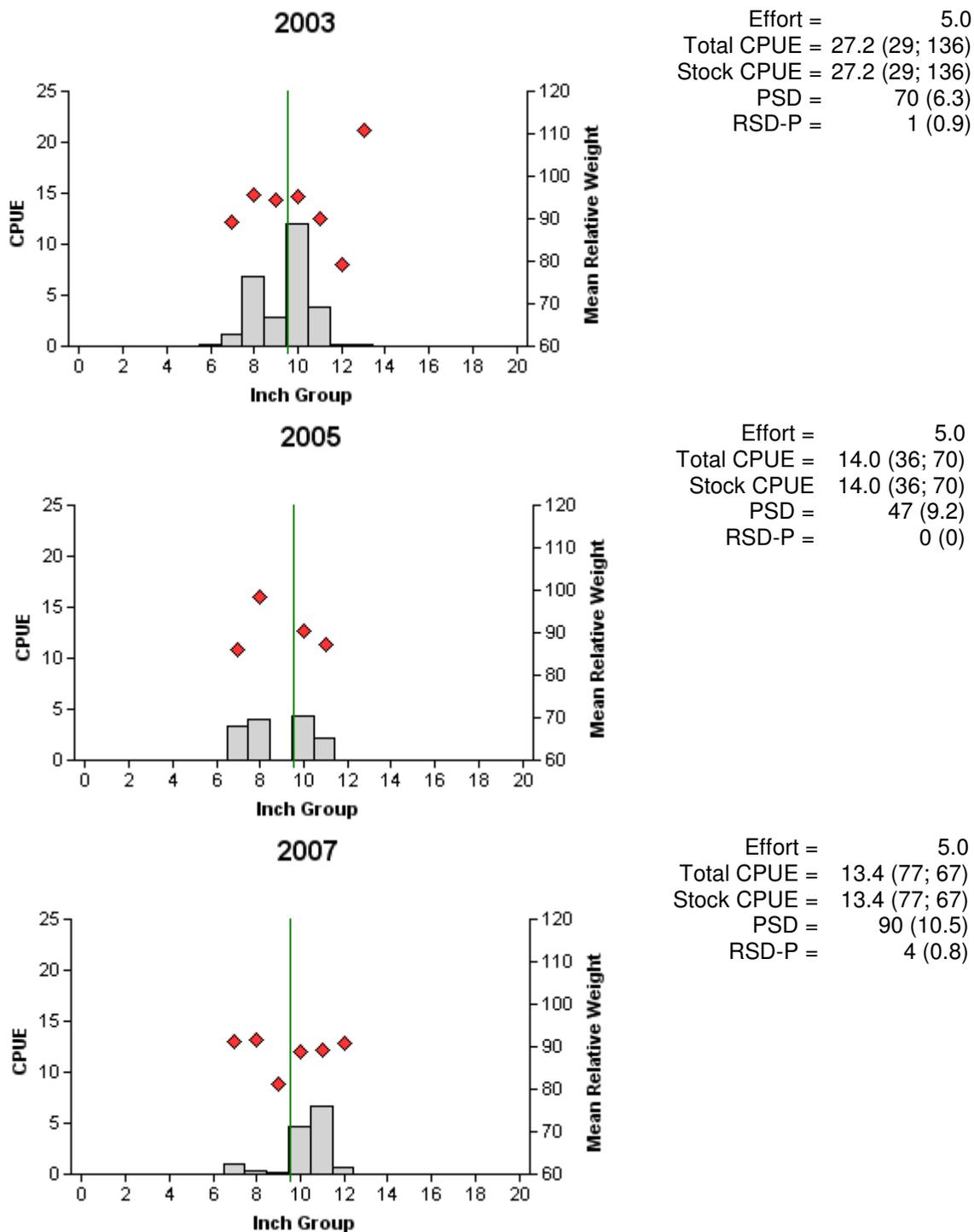


Figure 7. Number of white bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Bardwell, Texas, 2003, 2005 and 2007.

Palmetto bass

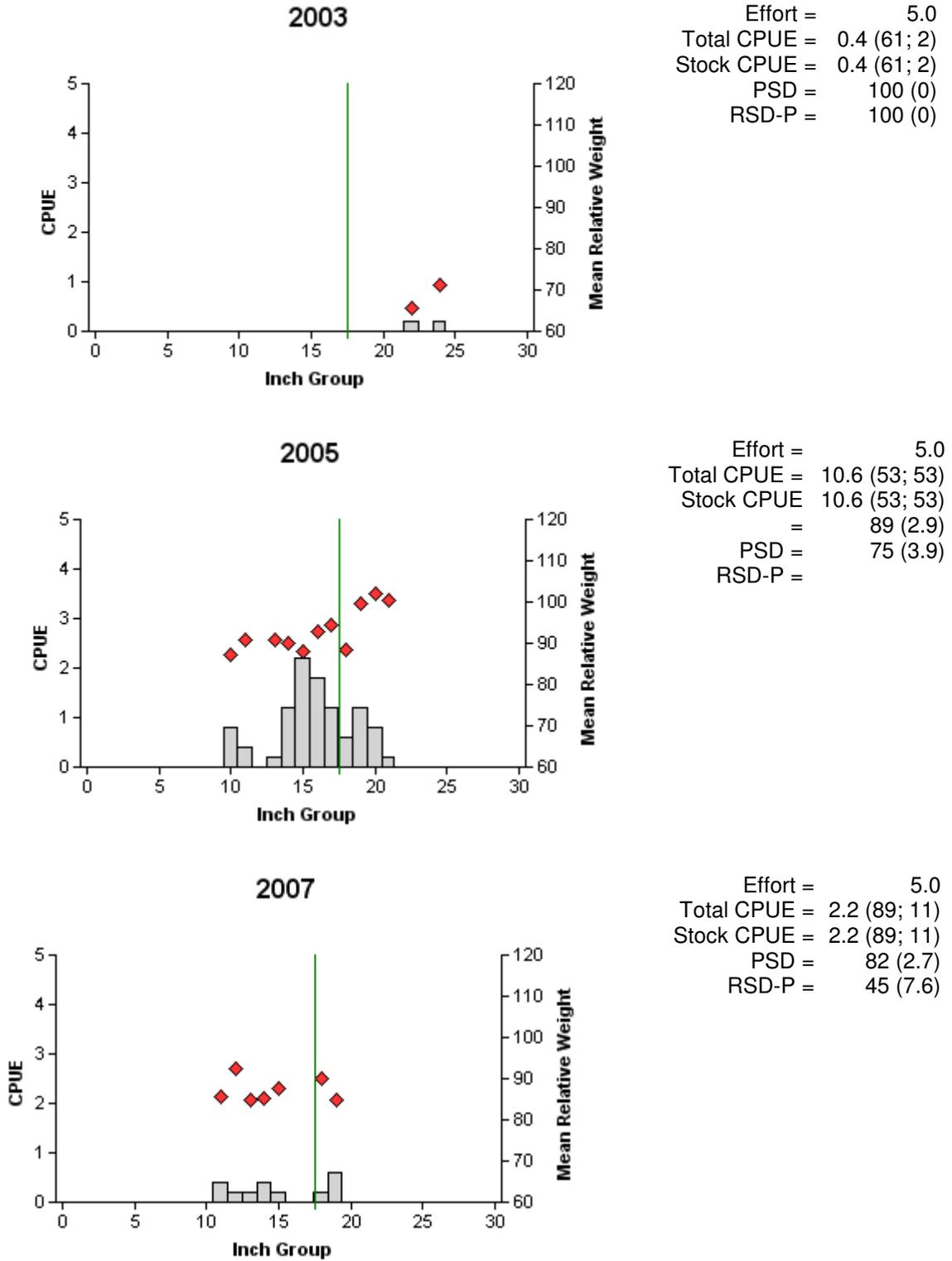


Figure 8. Number of palmetto bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Bardwell, Texas, 2003, 2005 and 2007.

Temperate basses

Table 8. Creel survey statistics for temperate basses at Lake Bardwell from December 2006 through May 2007, where total catch per hour is for anglers targeting temperate basses and total harvest is the estimated number of white bass and palmetto bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year
	2006/2007
Directed effort (h)	3,489 (58)
Directed effort/acre	1.0 (58)
Total catch per hour	0.9 (50)
Harvest	
White bass	1,238 (64)
Palmetto bass	649 (110)
Harvest/acre	
White bass	0.4 (64)
Palmetto bass	0.2 (110)
Percent legal released	
White bass	0
Palmetto bass	11

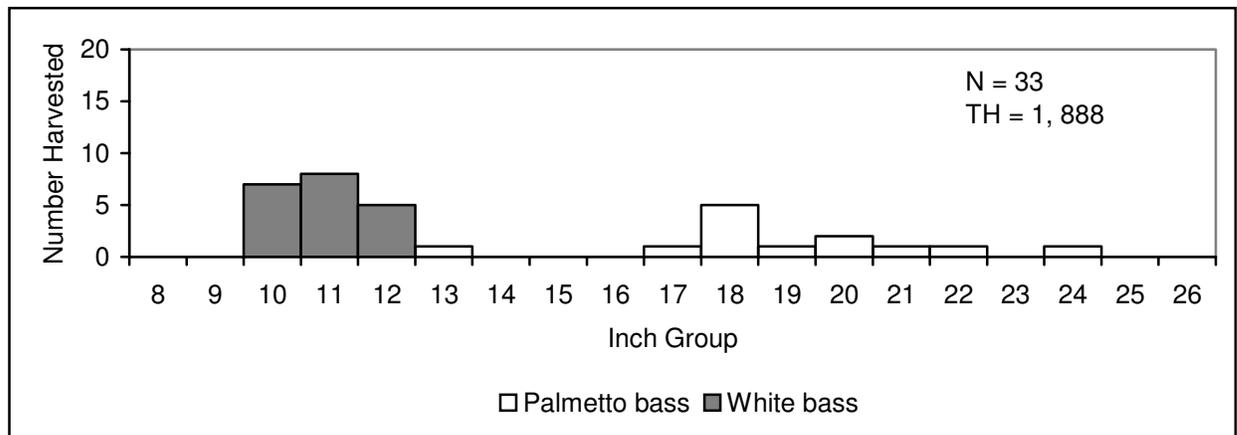
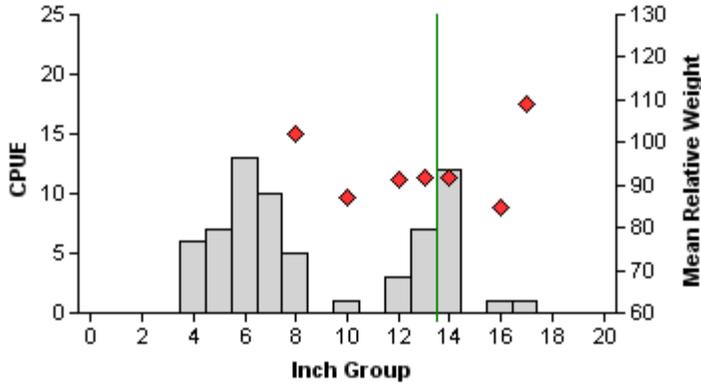


Figure 9. Length frequency of harvested white bass and palmetto bass observed during creel surveys at Lake Bardwell, Texas, December 2006 through May 2007, all anglers combined. N is the number of harvested white bass and palmetto bass (combined) observed during creel surveys, and TH is the total estimated harvest for both species combined for the creel period.

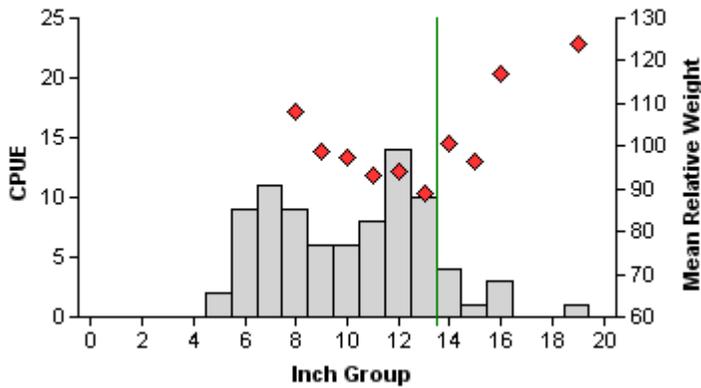
Largemouth bass

1997



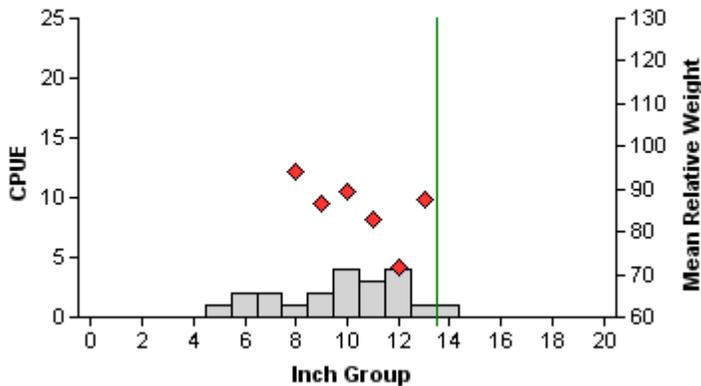
Effort = 1.0
 Total CPUE = 66.0 (30; 66)
 Stock CPUE = 30.0 (40; 30)
 PSD = 80 (9.8)
 RSD-P = 7 (4.5)

2002



Effort = 1.0
 Total CPUE = 84.0 (59; 84)
 Stock CPUE = 62.0 (49; 62)
 PSD = 53 (6.2)
 RSD-P = 8 (2.4)

2006



Effort = 1.0
 Total CPUE = 21.0 (22; 21)
 Stock CPUE = 16.0 (30; 16)
 PSD = 38 (12.9)
 RSD-P = 0 (0)

Figure 10. 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, Lake Bardwell, Texas, 1997, 2002 and 2006.

Largemouth bass

Table 9. Creel survey statistics for largemouth bass at Lake Bardwell from December 2006 through May 2007, 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
	2006/2007
Directed effort (h)	894 (65)
Directed effort/acre	0.3 (65)
Total catch per hour	0.1 (103)
Total harvest	80 (166)
Harvest/acre	0.02 (166)
Percent legal released	47

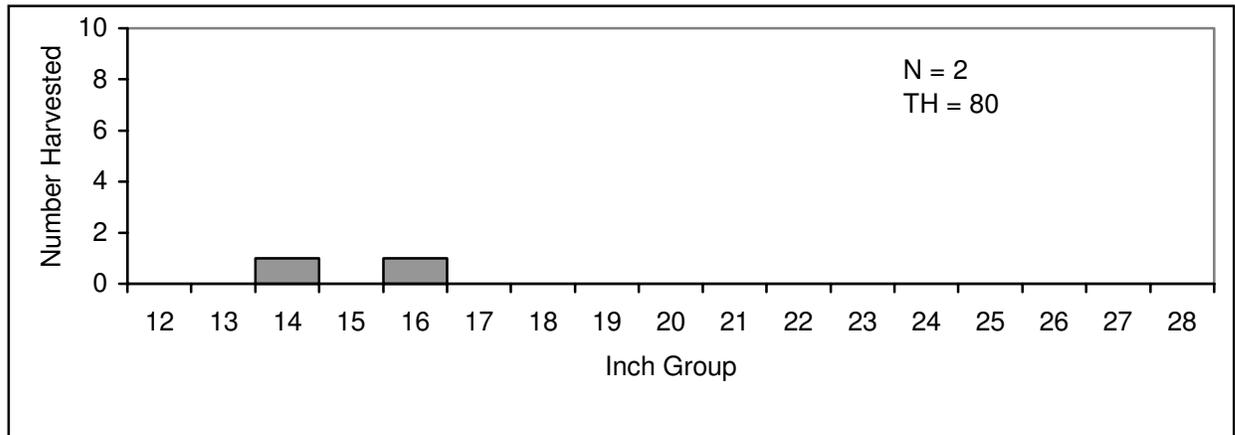


Figure 11. Length frequency of harvested largemouth bass observed during creel surveys at Lake Bardwell, Texas, December 2006 through May 2007, all anglers combined. N is the number of harvested largemouth bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

White crappie

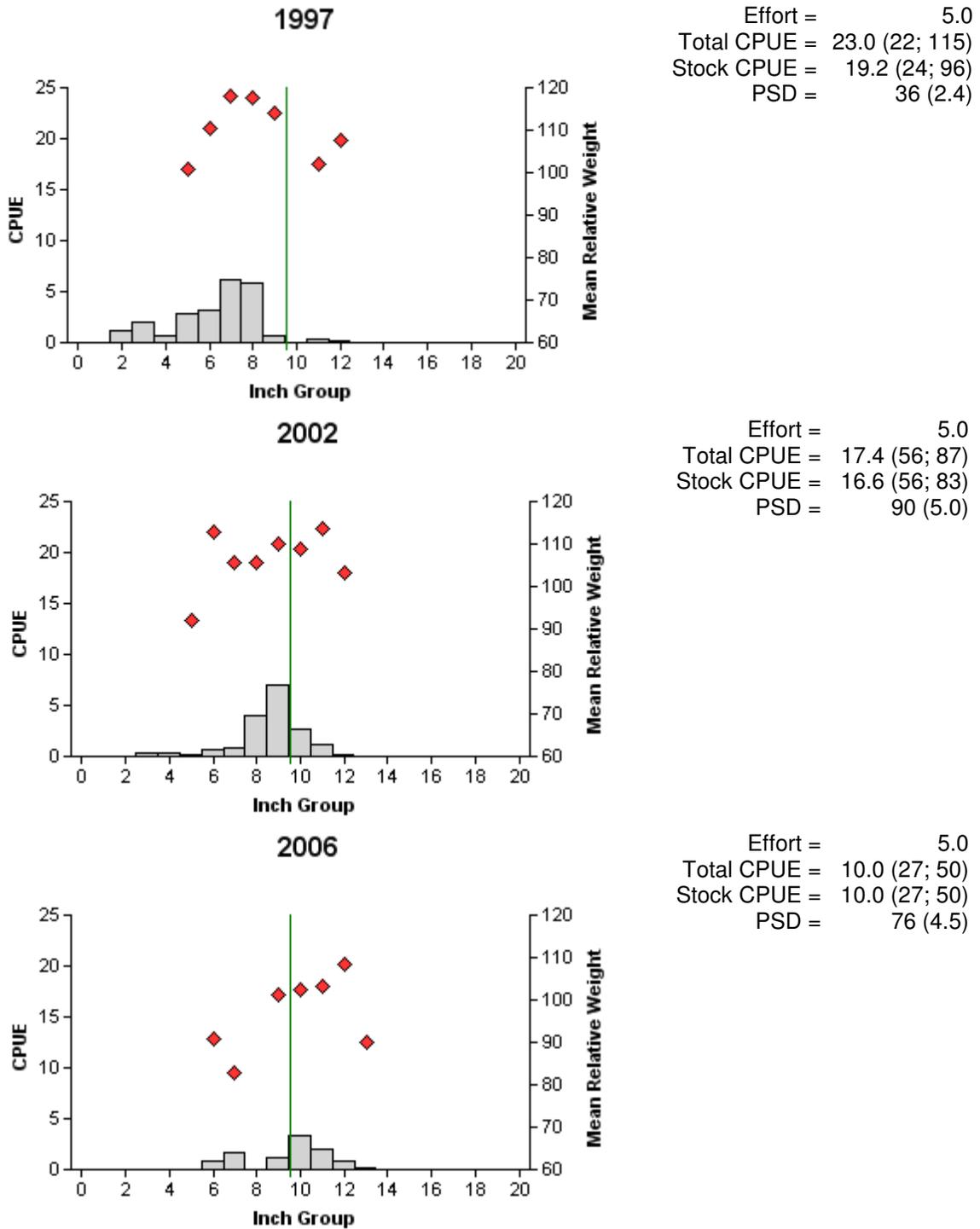


Figure 12. Number of white crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Lake Bardwell, Texas, 1997, 2002, and 2006.

Black crappie

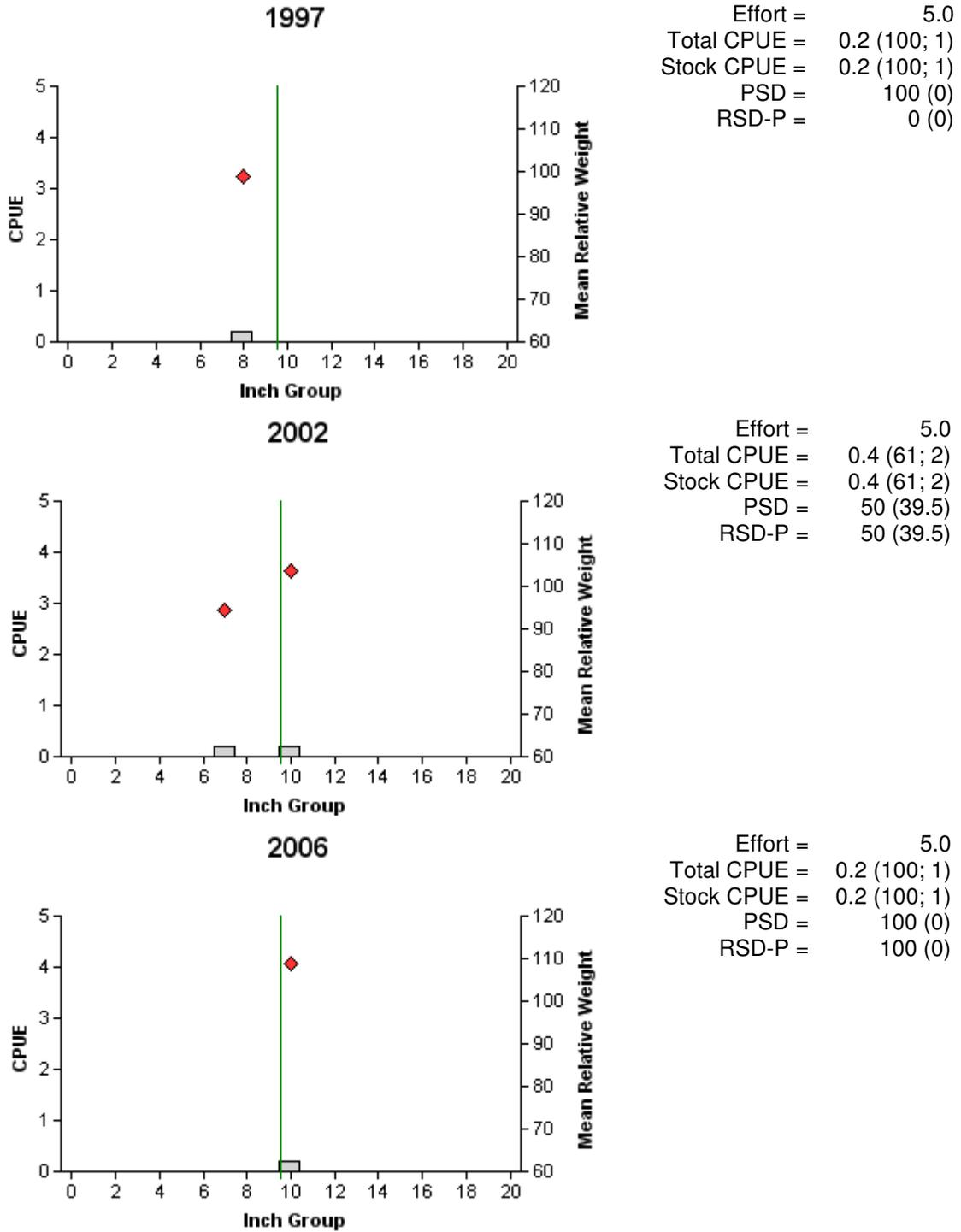


Figure 13. Number of black crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Lake Bardwell, Texas, 1997, 2002 and 2006.

Crappie

Table 10. Creel survey statistics for crappie at Lake Bardwell from December 2007 through May 2007, where total catch per hour is for anglers targeting all crappie and total harvest is the estimated number of crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses

Creel Survey Statistic	Year
	2006/2007
Directed effort (h)	21,829 (28)
Directed effort/acre	6.1 (28)
Total catch per hour	0.5 (26)
Total harvest	5,499 (54)
White crappie	4,768 (32)
Black crappie	731 (197)
Harvest/acre	1.5 (543)
White crappie	1.3 (32)
Black crappie	0.2 (197)
Percent legal released	1

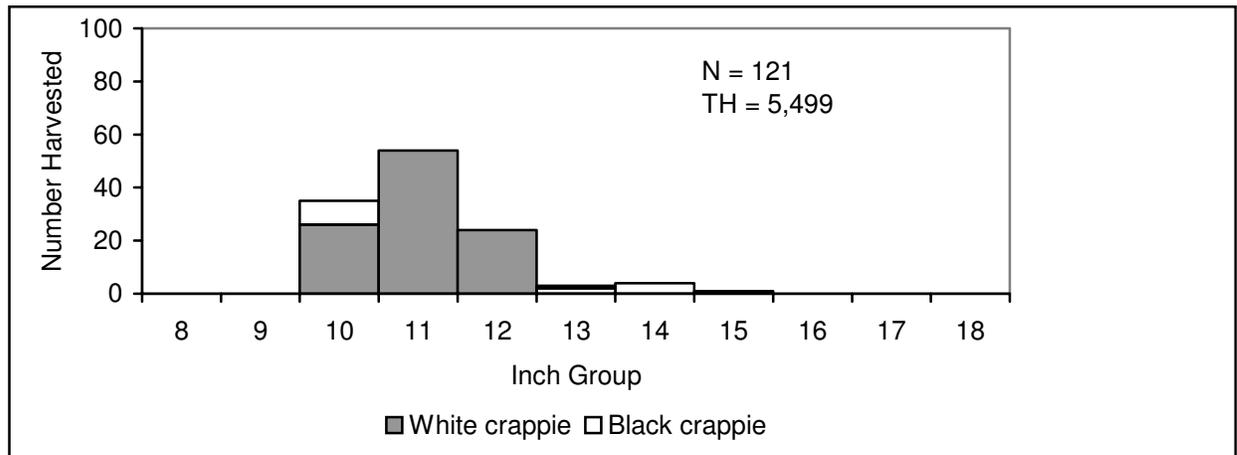


Figure 14. Length frequency of harvested crappie observed during creel surveys at Lake Bardwell, Texas, December 2006 through May 2007, all anglers combined. N is the number of harvested crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Table 11. Proposed sampling schedule for Lake Bardwell, 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.

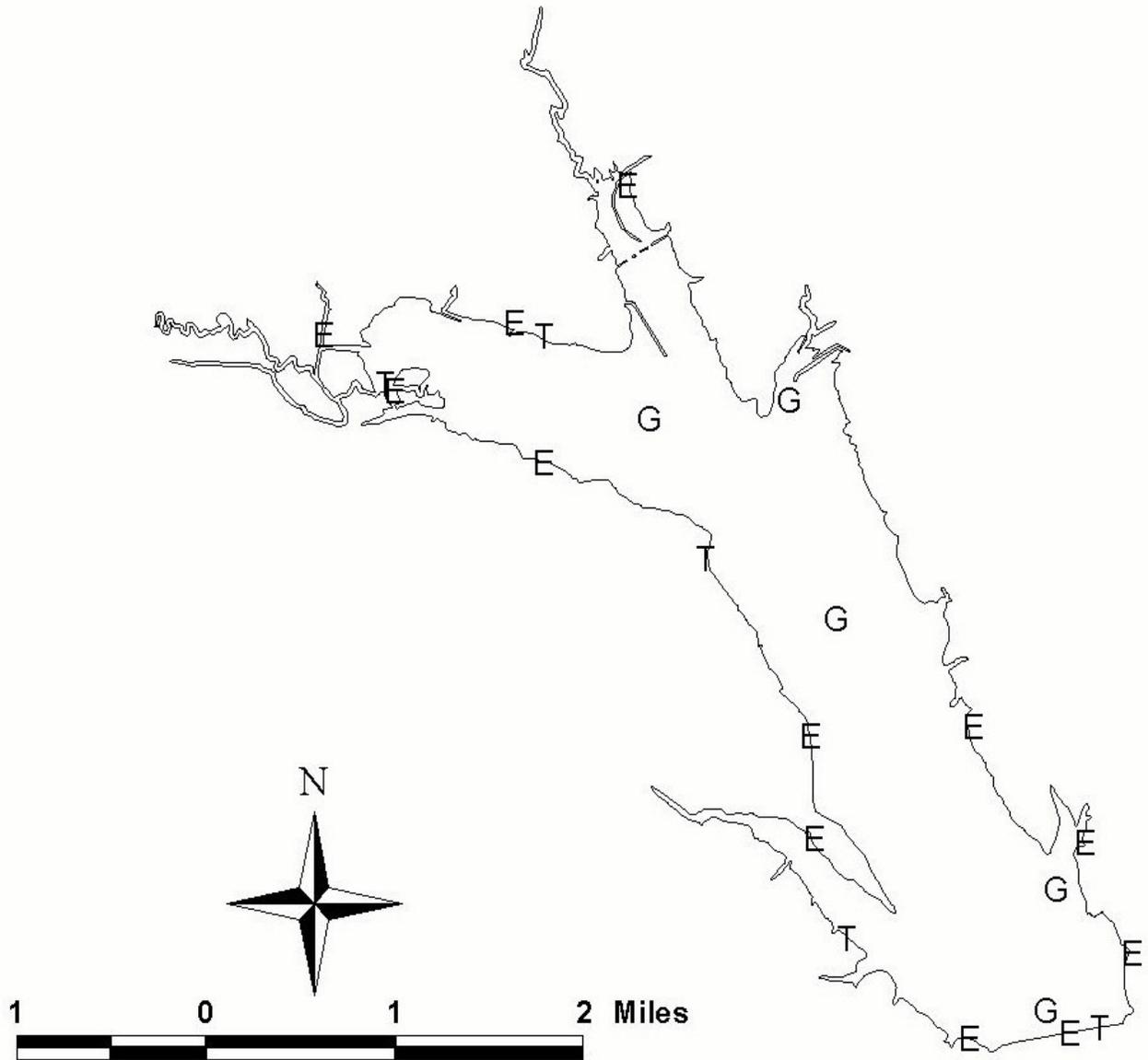
Survey year	Electrofishing	Trap net	Gill net	Report
Fall 2008-Spring 2009			A	
Fall 2010-Spring 2011	S	S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Lake Bardwell, Texas, 2006-2007.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					283	283.0
Threadfin shad					157	157.0
Blue catfish	9	1.8				
Channel catfish	19	3.8				
White bass	67	13.4				
Palmetto bass	18	3.6				
Bluegill					15.0	15.0
Longear sunfish					2.0	2.0
Redear sunfish					2.0	2.0
Largemouth bass					21.0	21.0
White crappie			50	10.0		
Black crappie			1	0.2		

APPENDIX B



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