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INLAND FISHERIES MONITORING AND MANAGEMENT PROGRAM

2010 Survey Report

Brady Creek Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Brady Creek Reservoir were surveyed in 2004, 2006, and 2010 using trap nets and electrofishing and in 2003, 2007, and 2010 using gill nets. This report summarizes survey results and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Brady Creek Reservoir is a 2,021-acre impoundment on Brady Creek located in the Colorado River basin. It was constructed in 1963 to provide water for municipal, recreational, and flood control purposes. From 1999 to 2011, water level ranged from 0.5 to 15.8 below conservation pool elevation (1,743 feet above mean sea level). Boat and angler access is adequate, however launching larger boats becomes restricted at water levels ≤1,733 feet above mean sea level and lower. In 2010, primary habitat was submersed aquatic vegetation and water level in spring 2011 averaged about 10 feet below conservation elevation.

- **Management History:** Important sport fishes included largemouth bass, white bass, crappie, and blue and channel catfishes. Most fish stockings were conducted to establish species in the reservoir after impoundment. Florida largemouth bass were introduced in 1982 and were stocked again in 2007 to improve trophy potential of the bass fishery. Smallmouth bass were stocked in 1984 and 1986, but neither a self-sustaining population nor a fishery developed. Angler harvest of sportfishes has been managed under statewide length and daily bag limits. The City of Brady used grants from TPWD to repair boat ramps and make improvements to the city park adjacent to the reservoir in 2010-2011.

- **Fish Community**
  - **Prey species:** Gizzard shad, threadfin shad, bluegill, and other sunfishes were the primary prey species in the reservoir. Relative abundance of gizzard shad was adequate; however, most were too large to be suitable as forage for existing predators. Abundance and size structure of bluegill was adequate. Prey species were sufficient in size and number to support existing predators.

  - **Catfishes**: Blue and channel catfishes exist in the reservoir. Their relative abundance in 2011 was lower than historic levels.

  - **White bass**: Relative abundance of white bass has improved since 2006 and most of the fish collected exceeded 10 inches, the minimum length limit for harvest.

  - **Largemouth bass**: Relative abundance was substantially greater in 2010 than in 2006. The population size structure was adequate and has been similar across time with many fish exceeding 14 inches. The stocking of Florida strain largemouth bass (FLMB) in 2007 did not increase the introgression of FLMB into the population.

  - **White crappie**: Relative abundance and size structure of white crappie has declined over the past three surveys.

- **Management strategies**: Encourage the City of Brady to extend the boat ramps. Due to the proximity of this reservoir to the San Angelo District Office, all fisheries sampling and management responsibilities will be transferred to that office to better manage TPWD resources.

INTRODUCTION

This document is a summary of fisheries data collected from Brady Creek Reservoir from 2003 to 2011. 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 current data for comparison.

Reservoir Description

Brady Creek Reservoir is a 2,021-acre impoundment on Brady Creek located in the Colorado River basin about 5 miles west of Brady, Texas. It was constructed in 1963 to provide water for municipal, recreational, and flood control purposes. Water level has remained below conservation pool elevation, 1,743 feet above mean sea level (MSL), since 1999 (Figure 1). From 1999 to 2011, the maximum water level fluctuation was 15.4 feet, with water levels ranging from 0.5 to 15.8 below conservation pool elevation. When the water level drops below 1,733 feet MSL, launching larger boats becomes restricted to two of the four public boat ramps as the other two public boat ramps do not extend into the water at that elevation. At 1,730 feet MSL only one lane of one public boat ramp is usable. Below 1,728 feet MSL, no public boat ramps extend into the water. The City of Brady received a grant from Texas Parks and Wildlife and made repairs to boat ramps including an extension on of one lane of the main boat ramp, extending it down to approximately 1,727 feet MSL. The courtesy docks are also in need of repair. In 2010, habitat consisted primarily of submerged aquatic vegetation. A sparse amount of hydrilla was also observed in 2010 at two locations. Other descriptive characteristics for Brady Creek Reservoir are contained in Table 1.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Myers and Dennis 2006) included:

1. Encourage City of Brady officials to lengthen the boat ramp to facilitate boat launching when water level is low and repair the associated courtesy dock. Assist by providing information about TPWD's boat ramp improvement grant program.
   Action: The City of Brady received a grant from TPWD's boat ramp improvement program. The grant was used to repair the sides of two ramps and lengthen one lane in 2010-2011. Boater access is now available at lower water levels (<1,730 feet MSL).
2. Improve largemouth bass population abundance and maintain genetic composition through stocking. Stock FLMB fingerlings at 50 fish/acre if water level rises or is anticipated to rise to within 3 feet of conservation pool elevation.
   Action: Florida largemouth bass fingerlings were last stocked in 2007 at the rate of 51/acre. Generally declining water levels since the last report have not been conducive to stocking. Stocking was requested for 2011, but not approved. Electrofishing was not conducted in 2008 because low water levels prevented access to the reservoir at that time.

Harvest regulation history: All sport fishes have been and are currently managed with statewide regulations (Table 2).

Stocking history: Florida largemouth bass, blue and channel catfish, smallmouth bass, and threadfin shad have been stocked into the reservoir. Most recently, FLMB fingerlings were stocked in spring 2007 to increase the genetic introgression of FLMB in the population. Previous FLMB stockings occurred in 1982 and 1983. Smallmouth bass stockings were conducted in the mid 1980s, however stocking of this species was terminated because a fishery did not result.

Channel and blue catfish were last stocked in 1999 and 1981, respectively. Threadfin shad were introduced in 1984 to increase the amount and diversity of prey species. The complete stocking history is in Table 3.

Vegetation/habitat management history: There has been no significant vegetation or habitat management on this reservoir.

Water Transfer: Brady Creek Reservoir is primarily used for municipal water supply, recreation, and to a lesser extent, flood control. Water from this reservoir is currently not transferred to any other reservoir.

METHODS

Standard electrofishing surveys (1 hour at 12 5-min randomly selected stations) were conducted in 2004 and 2006. In 2010, 24 5-min randomly selected stations were sampled. Standard gill net surveys (5 net nights at 5 randomly-selected stations) were conducted in 2003, 2007, and 2011. Trap netting surveys were conducted at 10 randomly selected sites in 2004, 5 in 2006, and 8 in 2010. All sampling was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2009). 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 nets and trap nets, as the number of fish per net night (fish/nn). Refer to Appendix A for a reservoir map and location of 2010-2011 standard sampling stations. Aerial photography for Appendix A came from the Texas Natural Resources Information System website (www.tnris.state.tx.us). Source for water level data was the United States Geological Survey website (http://waterdata.usgs.gov/tx/nwis/uv/?site_no=08144900&PARAmeter_cd=00062,72020,00054).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), as defined by Guy et al. (2007)], and condition indices [relative weights (W_r)] were calculated for target fishes according to Anderson and Neumann (1996). Index of vulnerability (IOV) was calculated for gizzard shad (DiCenzo et al. 1996). Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE statistics and SE was calculated for structural indices and IOV. Ages of largemouth bass were determined using otoliths from 15 fish collected by electrofishing between 13.0 and 14.9-inches total length. Ages of white crappie were determined using otoliths from 10 fish collected by trap netting.

Genetic analysis of largemouth bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2009).

Shoreline structural habitat and vegetation surveys were conducted in accordance with Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2009).

RESULTS AND DISCUSSION

Habitat: In 2010, native submersed and emergent aquatic plants were the primary vegetation species in the reservoir (Table 4). Native emergent vegetation (cattail) occupied 40.5 acres of the reservoir. Native submersed vegetation (Chara, sago and Illinois pondweed, marine naiad, bladderwort, and water stargrass) occupied 374.2 acres of the reservoir. Rocky shoreline occurred along 13.1 miles representing 45% of the total shoreline distance. Gravel and rock bluff occupied 3.9 and 0.5 miles of shoreline, respectively (Table 5).

Prey species: Electrofishing CPUE of gizzard shad decreased drastically from 801.0 fish/h in 2004 to 80.0 fish/h in 2006 and then rose slightly to 126.0 fish/h in 2010 (Figure 2). Gizzard shad IOV was good in 2004 (70) but was poor in 2006 and 2010 (46 and 35, respectively). Gizzard shad are not currently providing an abundant forage base for the existing predators.

Electrofishing CPUE of bluegill decreased from 136.0 fish/h in 2004 to 40.0 fish/h in 2008 and then increased to 95.0 fish/h in 2010 (Figure 3). Most bluegill were ≤4 inches TL which is suitably sized forage for most adult predator sport fishes. Other sunfishes (61.5 fish/h, combined) and threadfin shad are also important components of the forage fish community (Appendix B).

Blue catfish: Gill net CPUE of blue catfish in 2011 (0.6 fish/nn) was similar to 2003 (0.6 fish/nn) but lower than 2007 (4.0 fish/nn; Figure 4). Insufficient numbers of blue catfish were collected in 2011 to make meaningful relative weight or population size structure evaluations.

Channel catfish: Gill net CPUE of channel catfish in 2011 was 0.8 fish/nn, lower than the 3.0 fish/nn in 2007 and 2.8 fish/nn in 2003 (Figure 5). Proportional size distribution in 2003 and 2007 was 46 in both years. Insufficient numbers of channel catfish were collected in 2011 to make meaningful relative weight or population size structure evaluations.

White bass: Gill net CPUE of white bass was 2.8 fish/nn in 2011. This was much higher than the 1.0 fish /nn in 2003 and 0.6 fish/nn in 2007 (Figure 6). Mean Wr's ranged from 85-95 in 2011 and PSD was 86. Most of the fish collected were ≥10 inches total length.

Largemouth bass: Electrofishing CPUE of largemouth bass has been highly variable over the last three sample years, falling from 85.0 fish/h to 10.0 fish/h in 2006, and then increasing to 66.0 fish/h in 2010 (Figure 7). We surmise the low catch rate in 2006 was the result of a malfunctioning electrofishing unit based on the unit's total failure a short time later. However, size structure remained similar across all three sample years as shown by the PSDs ranging from 40-44. Mean Wr's were above 80 for all size classes in 2010. Growth of largemouth bass in Brady Creek Reservoir is slow as the average age of 14-inch largemouth bass was 3.4 years (N=15, range=2-6 years). Despite the 2007 stocking, no pure FLMB were collected in 2010 no increase in FLMB alleles was observed (Table 7). The largest documented largemouth bass caught from Brady Creek Reservoir was 12.95 lb. fish caught in 1996 (TPWD, unpublished data).

White crappie: Trap net CPUE of white crappie decreased from 21.8 fish/nn in 2004 to 20.0 fish/nn in 2006 to 12.4 fish/nn in 2010 (Figure 8). Proportional size distribution also declined from 33 to 26 to 15 across the same time period. Additionally, all crappie collected in 2010 were below the 10-inch MLL. Crappie in this reservoir required at least three growing seasons to reach the 10-inch MLL (Figure 9).

Fisheries Management Plan for Brady Creek Reservoir, Texas

Prepared – July 2011

ISSUE 1: Low water levels continue to impact use of this reservoir.

MANAGEMENT STRATEGY

1. Encourage City of Brady officials to lengthen boat ramps and repair or replace the courtesy dock to improve boater access.

ISSUE 2: Brady Creek Reservoir is in much closer proximity to the San Angelo District Office. To more efficiently manage TPWD resources (manpower, travel budgets, etc.) efficient cost saving

MANAGEMENT STRATEGY

1. Transfer all fisheries sampling and management responsibilities for Brady Creek Reservoir to District 1C in San Angelo.

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

MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Contact and educate marina owners about invasive species, and provide them with posters, 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:

Standard gill net sampling (Spring 2015) is necessary to monitor population trends in catfishes and white bass. Fall electrofishing will be conducted in 2014 to monitor trends in the largemouth bass population. Alternative methods of catfish sampling will be conducted as District schedule allows.

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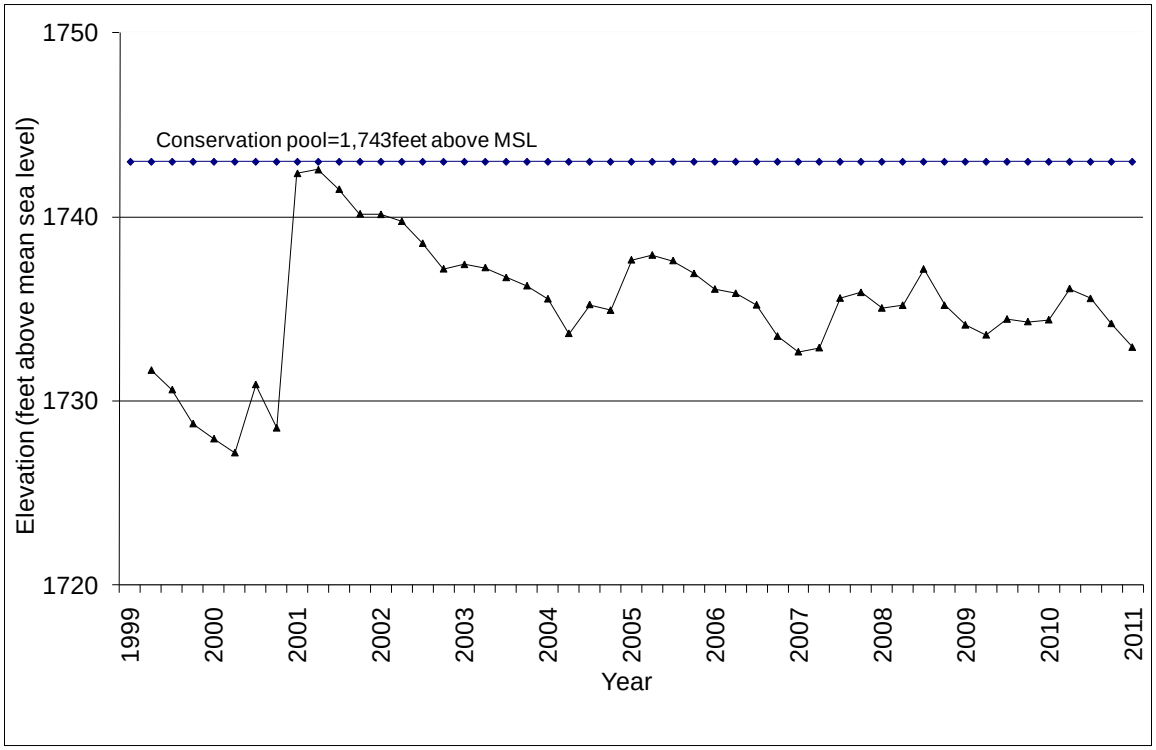


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Brady Creek Reservoir, Texas from 1999 to 2011. At conservation pool elevation, reservoir surface area is 2,021 acres.

Table 1. Characteristics of Brady Creek Reservoir, Texas.

Characteristic	Description
Year constructed	1963
Controlling authority	City of Brady, Texas
County	McCulloch
Reservoir type	Tributary
Shoreline Development Index	4.0
Conductivity	2,350 µmhos/cm

Table 2. Harvest regulations for Brady Creek Reservoir.

Species	Bag Limit	Length Limit
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, largemouth	5	14” minimum
Crappie: white and black crappie, their hybrids and subspecies	25 (in any combination)	10” minimum

Table 3. Stocking history of Brady Creek Reservoir, Texas. Size categories are: FRY =<1 inch, FGL = 1-3 inches, ADL = adults, and NR = size not recorded.

Species	Year	Number	Size
Threadfin shad	1984	500	ADL
Blue catfish	1978	12,257	NR
	1979	43,998	NR
	1980	14,406	NR
	1981	40,000	NR
	Total	110,661	
Channel catfish	1980	35,000	NR
	1987	200,500	FGL
	1999	400	ADL
	Total	204,400	
Smallmouth bass	1984	40,000	FGL
	1986	36,240	FGL
	Total	76,240	
Florida largemouth bass	1982	103,765	FGL
	1983	101,132	FGL
	2007	103,097	FGL
	Total	307,994	

Table 4. Results of a vegetation survey conducted at Brady Creek Reservoir, Texas, in August, 2010. Surface area coverage (acres) was estimated for each vegetation type for the 2,012 acres (at conservation pool) using 70 randomly selected sample points. Water level at time of sampling was 8.2 feet below conservation pool. Although not found at sampling locations, trace amounts of hydrilla was observed at two locations.

Vegetation type	Coverage	Percent	Lower 95% CL	Upper 95% CL
Native submerged vegetation[1]	374.2	18.6	10.3	29.7
Open water	1,637.8	81.4	72.3	90.5
Native emergent vegetation[2]	40.5	1.4	0.0	7.7

[1] chara, sago pondweed, marine naiad, bladderwort, water stargrass, Illinois pondweed
[2] cattail

Table 5. Results of a structural habitat survey conducted at Brady Creek Reservoir, Texas, in August, 2010. Linear distance (miles) was estimated for each habitat type for the 29.2 miles of shoreline using 60 randomly selected sample points. Water level at time of sampling was 8.2 feet below conservation pool.

Habitat type	Linear distance	Percent	Lower 95% CL	Upper 95% CL
Natural shoreline	11.7	40.0	27.6	53.5
Rocky shoreline	13.1	45.0	32.1	58.4
Rock bluff	0.5	1.7	0.0	8.9
Gravel	3.9	13.3	5.9	25.6

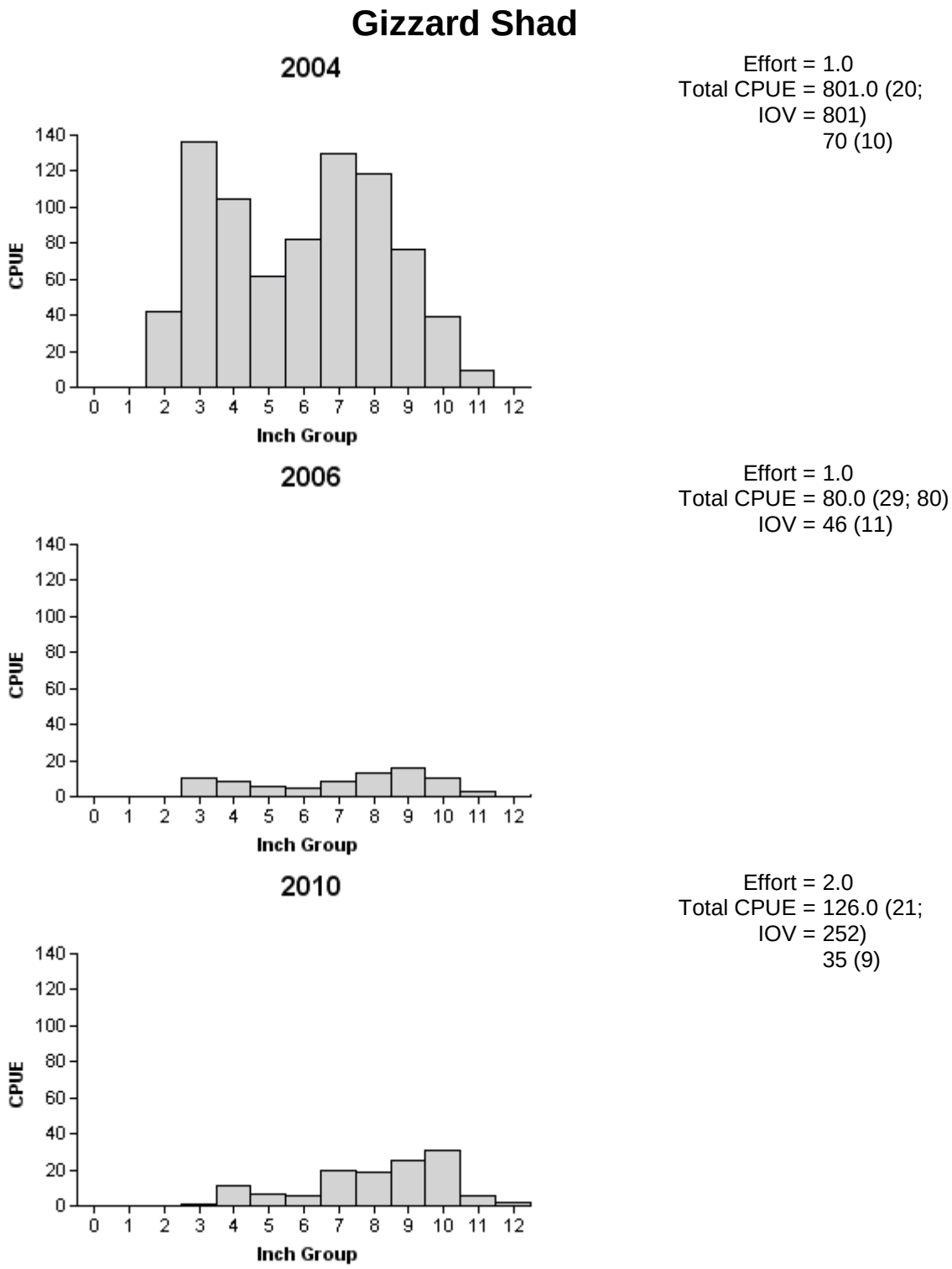


Figure 2. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N are in parentheses) for fall electrofishing surveys, Brady Creek Reservoir, Texas, 2004, 2006, and 2010. For IOV values, SE is provided in parentheses.

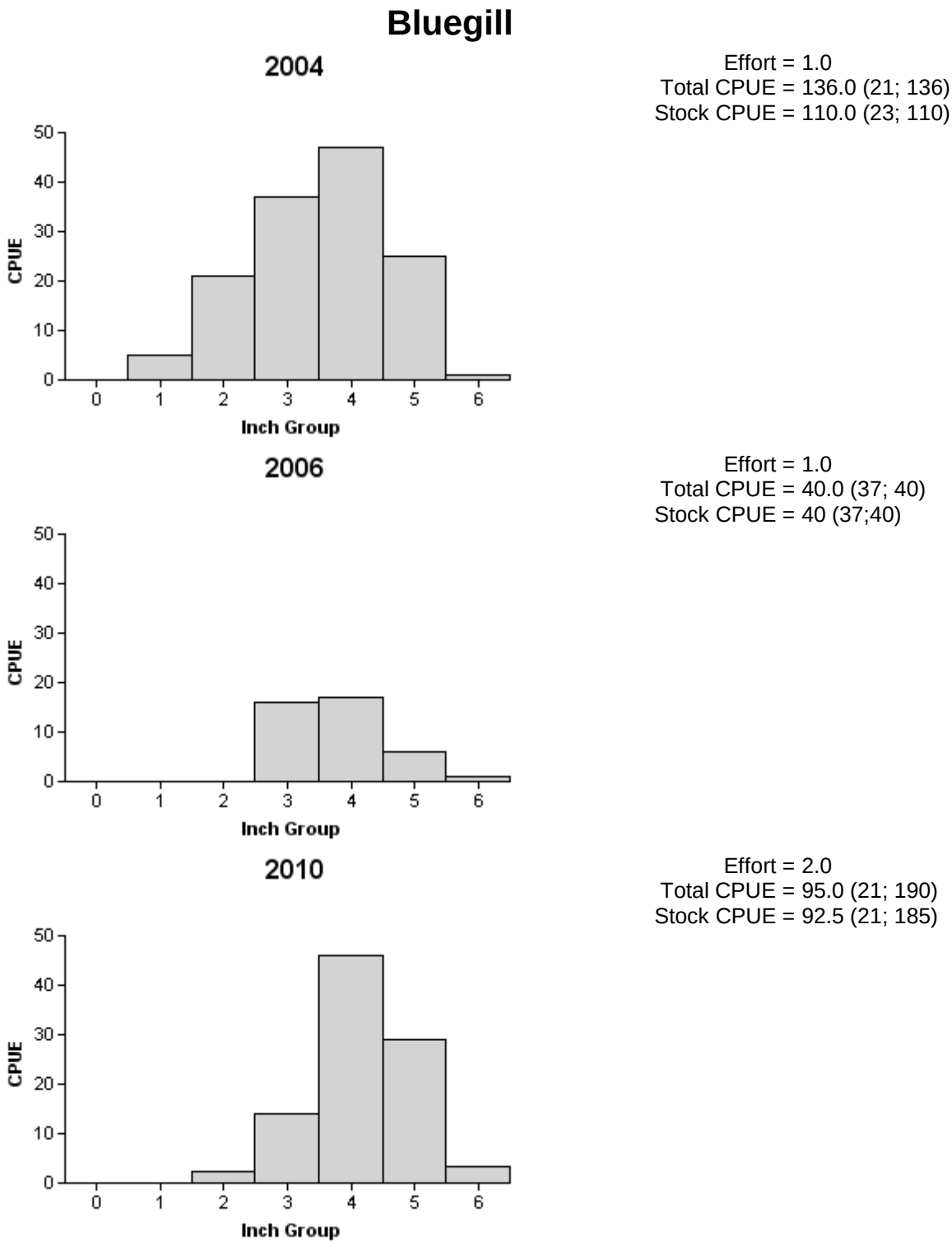


Figure 3. Number of bluegill caught per hour (CPUE) and population indices (RSE and N are in parentheses) for fall electrofishing surveys, Brady Creek Reservoir, Texas, 2004, 2006, and 2010.

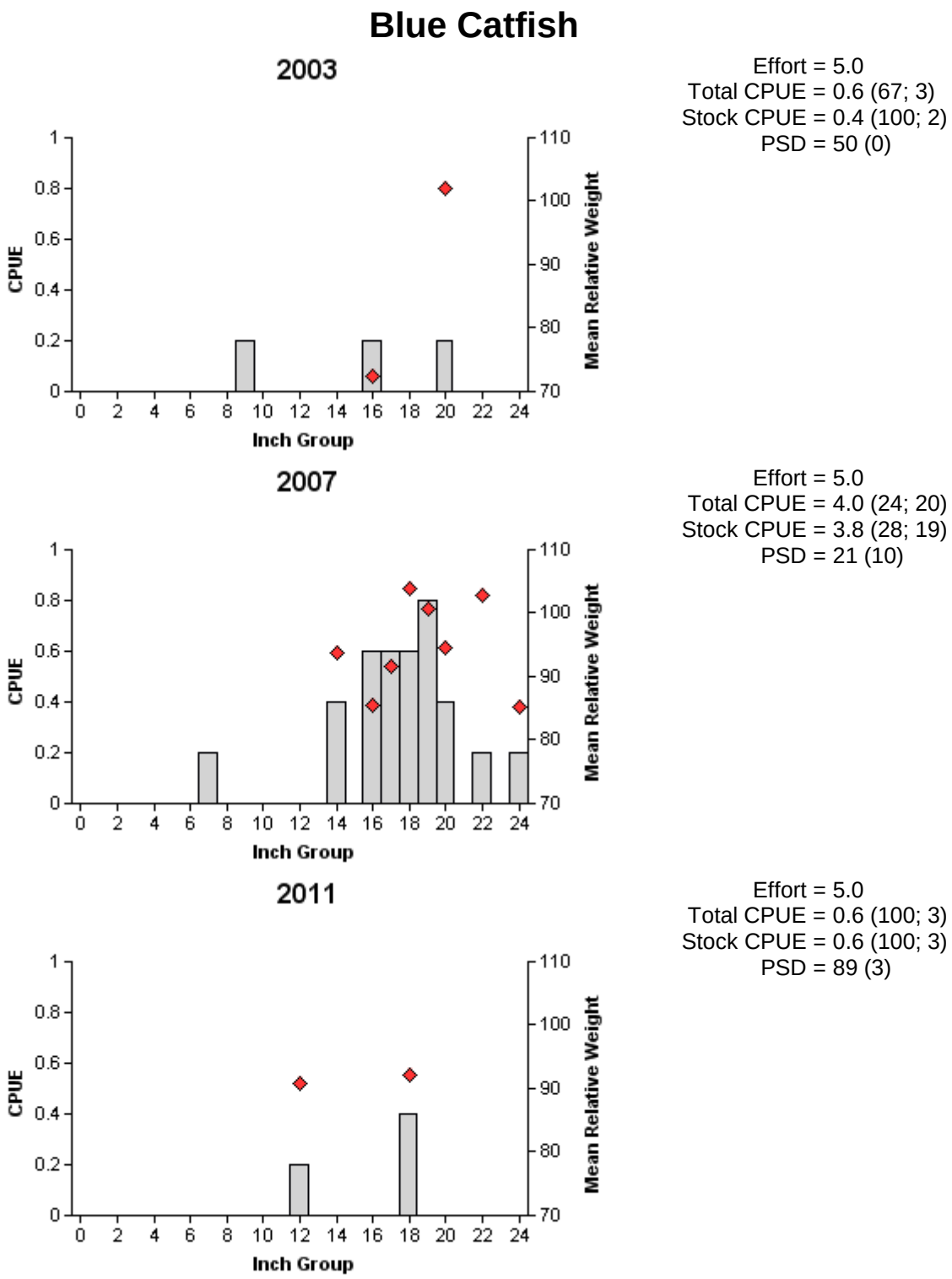


Figure 4. Number of blue catfish caught per net night (CPUE, bars) mean relative weight (diamonds), and population indices (RSE and N are in parentheses) for spring gill net surveys, Brady Creek Reservoir, Texas, 2003, 2007, and 2011. For PSD values, SE is provided in parentheses.

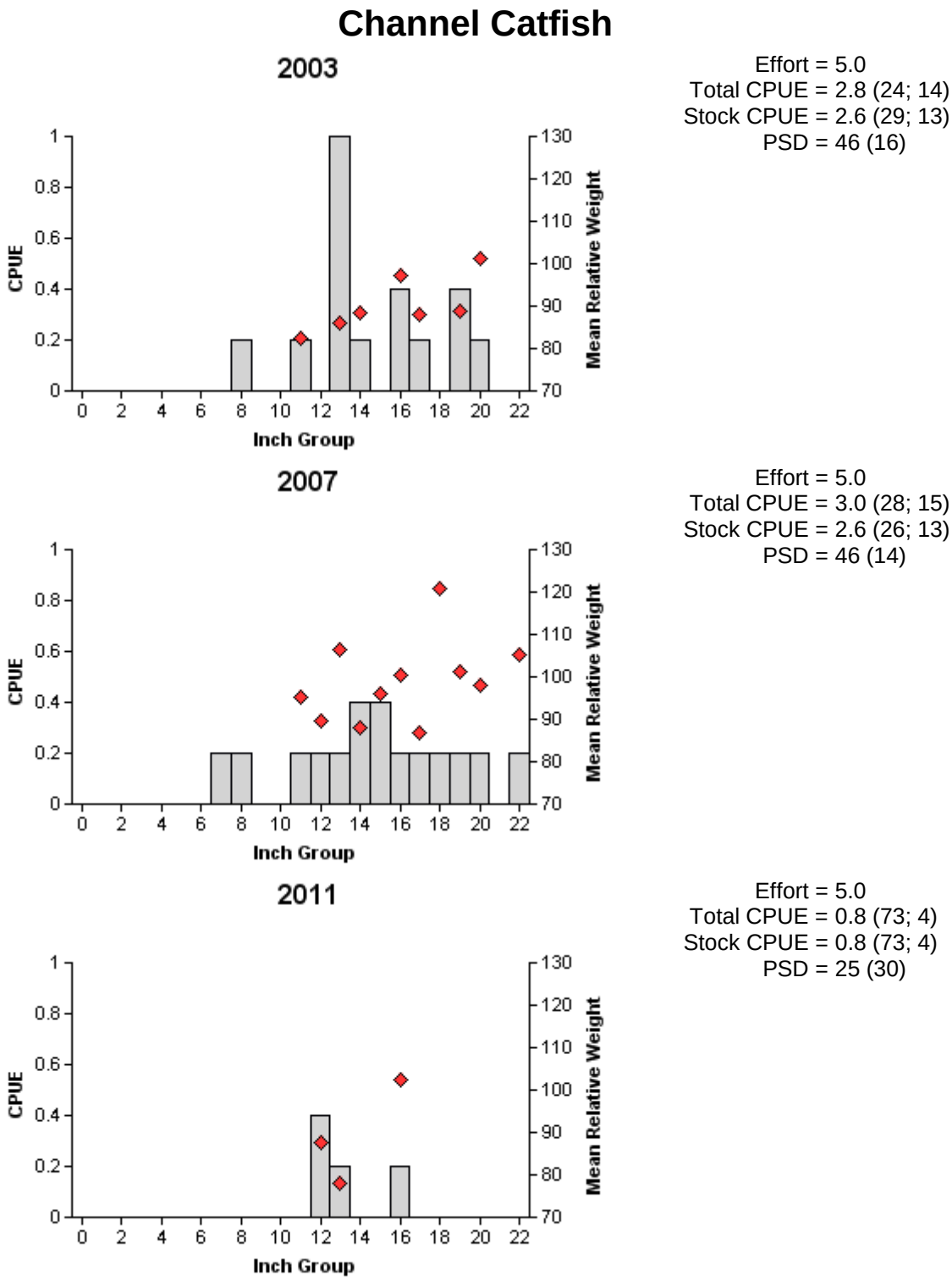


Figure 5. Number of channel catfish caught per net night (CPUE, bars) mean relative weight (diamonds), and population indices (RSE and N are in parentheses) for spring gill net surveys, Brady Creek Reservoir, Texas, 2003, 2007, and 2011. For PSD values, SE is provided in parentheses.

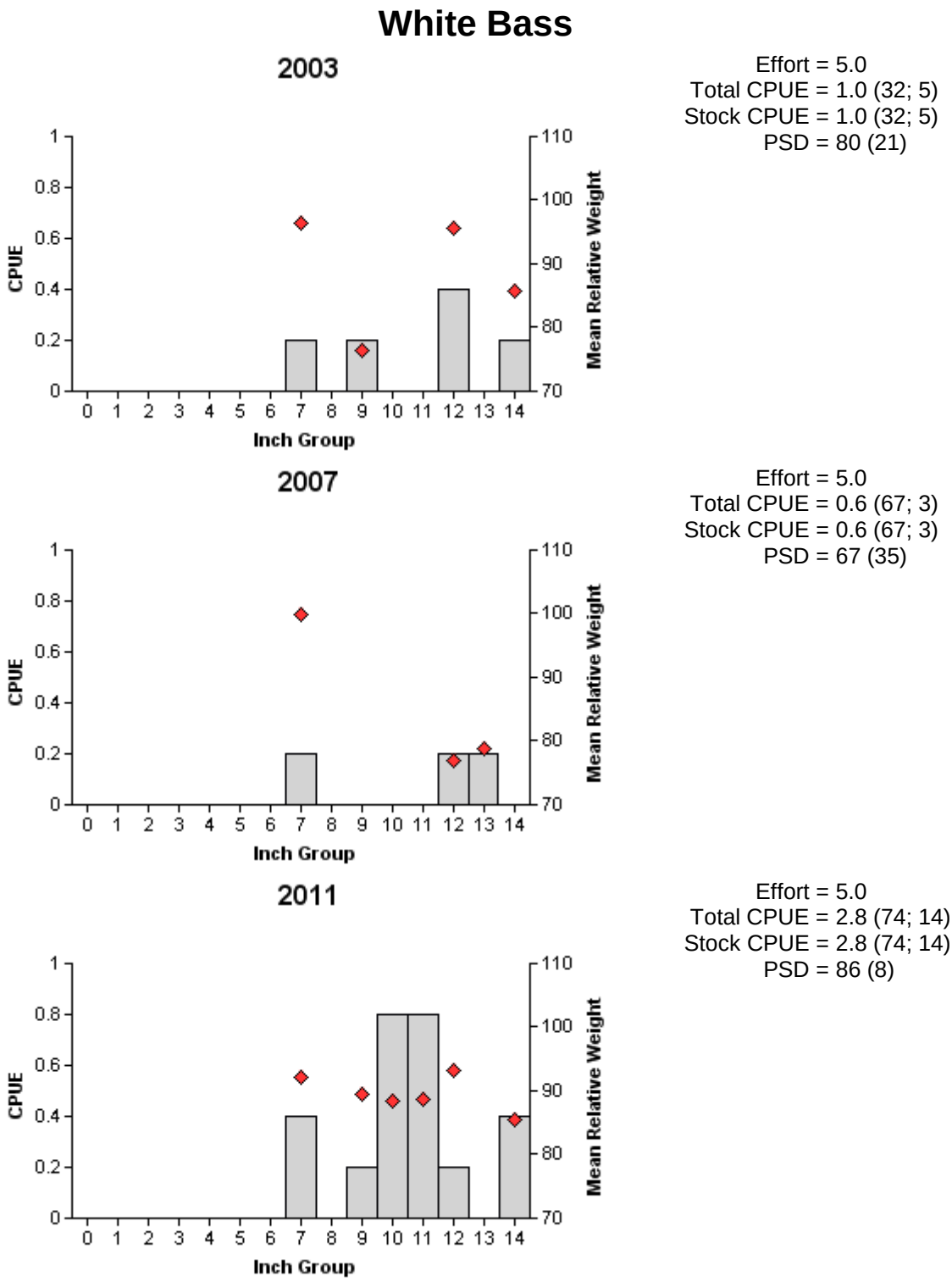


Figure 6. Number of white bass caught per net night (CPUE, bars) mean relative weight (diamonds), and population indices (RSE and N are in parentheses) for spring gill net surveys, Brady Creek Reservoir, Texas, 2003, 2007, and 2011. For PSD values, SE is provided in parentheses.

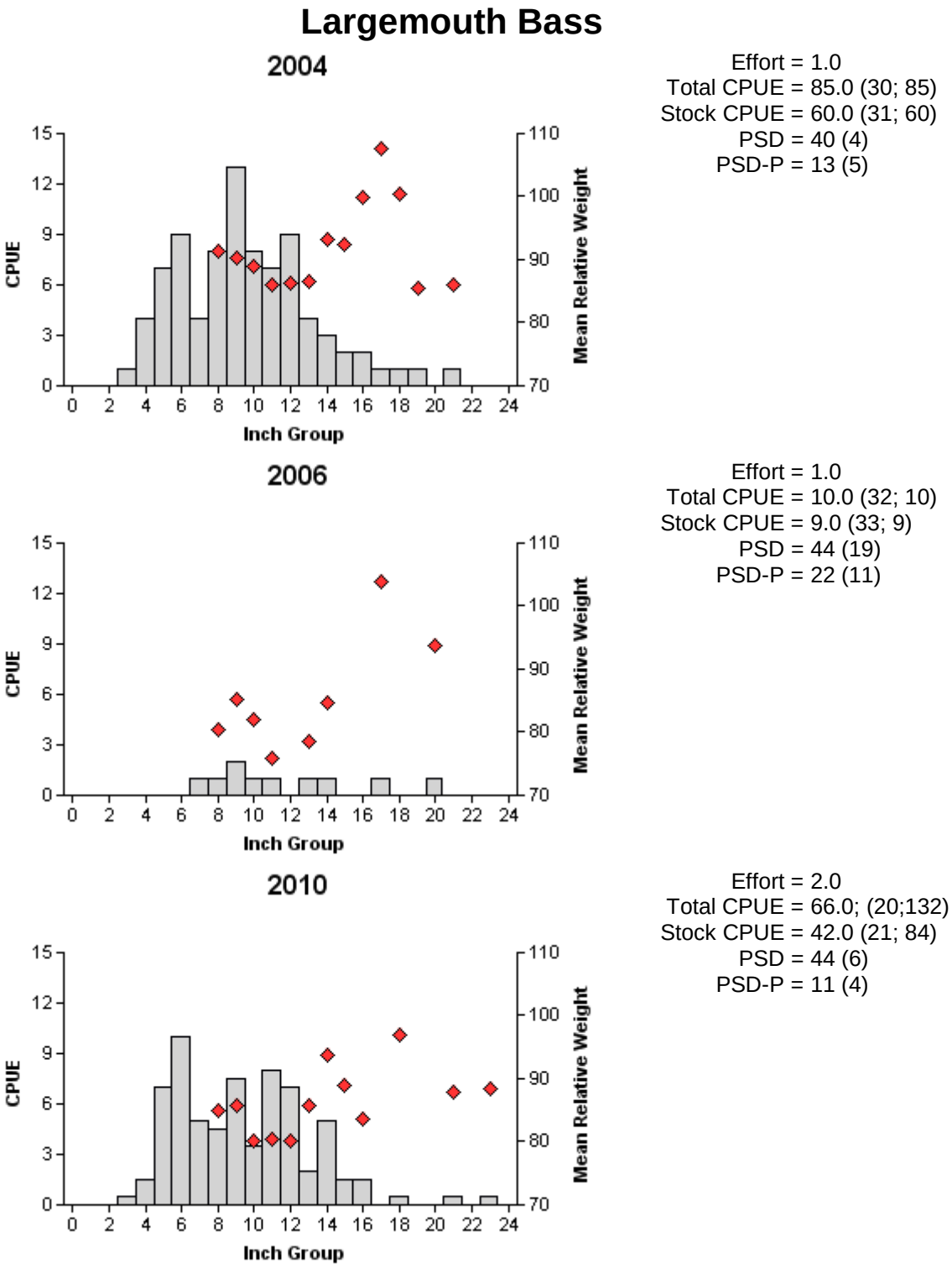


Figure 7. Number of largemouth bass caught per hour (CPUE, bars) mean relative weight (diamonds), and population indices (RSE and N are in parentheses) for fall electrofishing surveys, Brady Creek Reservoir, Texas, 2004, 2006, and 2010. RSE is used for CPUE values and SE is used for PSD values.

Table 6. Results of genetic analysis of largemouth bass collected by electrofishing during fall from Brady Creek Reservoir, Texas, in 2003, 2004, 2006, and 2010. Intergrade fish are those with both Florida largemouth bass (FLMB) and northern largemouth bass (NLMB) genes. Genetic analysis procedures changed from electrophoresis to micro satellite DNA in 2005. Thus, the percent FLMB genotype estimates later than 2004 should not be compared with previous estimates.

		Number of fish by genotype				
Year	Sample size	FLMB	Intergrade	NLMB	% FLMB alleles	% FLMB genotype
2003	28	3	25	0	67	12
2004	30	7	23	0	68	23
2006	30	2	28	0	63	7
2010	30	0	30	0	65	0

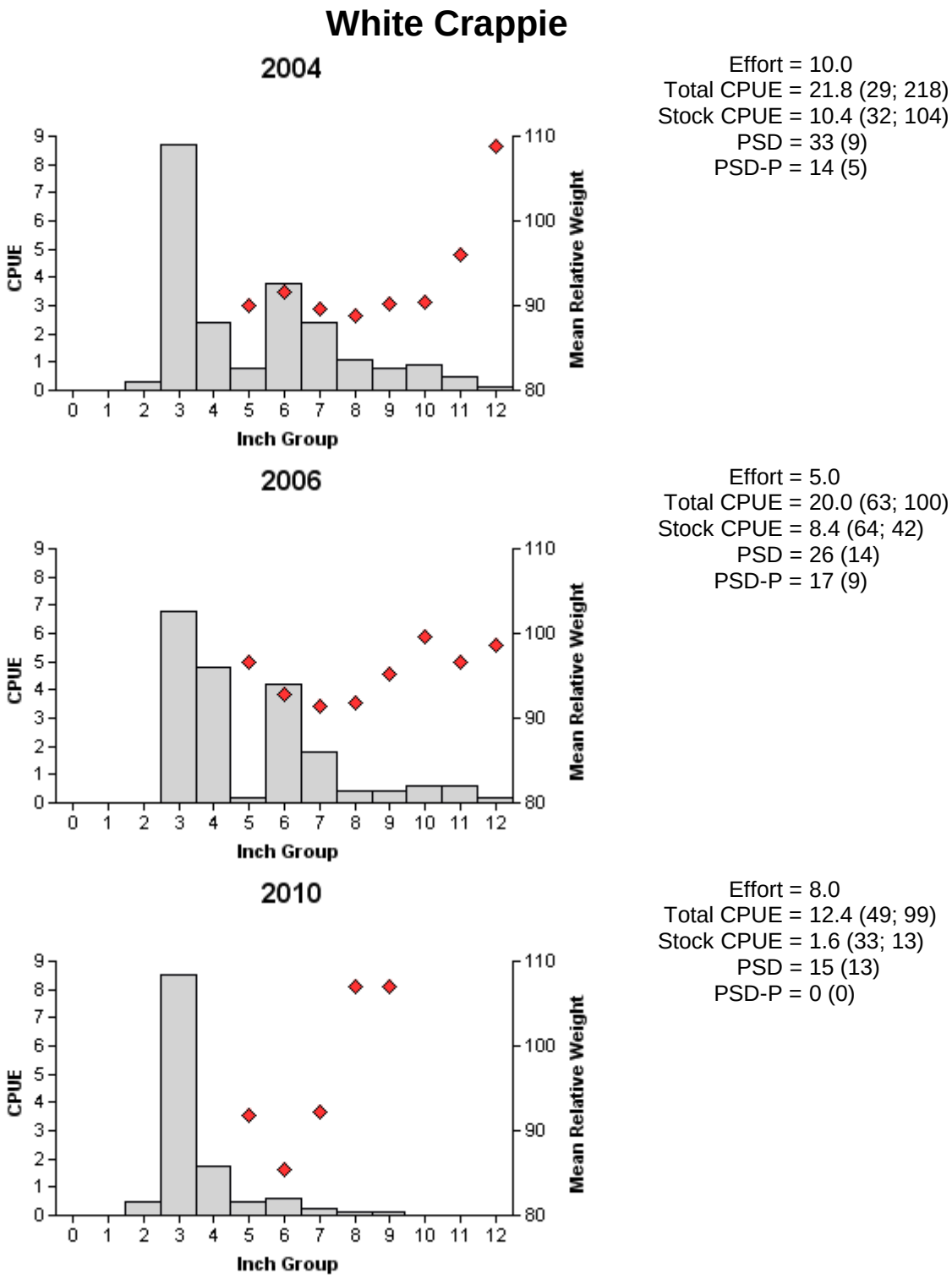


Figure 8. Number of white crappie caught per net night (CPUE) and population indices (RSE and N are in parentheses) for fall trap net surveys, Brady Creek Reservoir, Texas, 2004, 2006, and 2010.

White Crappie

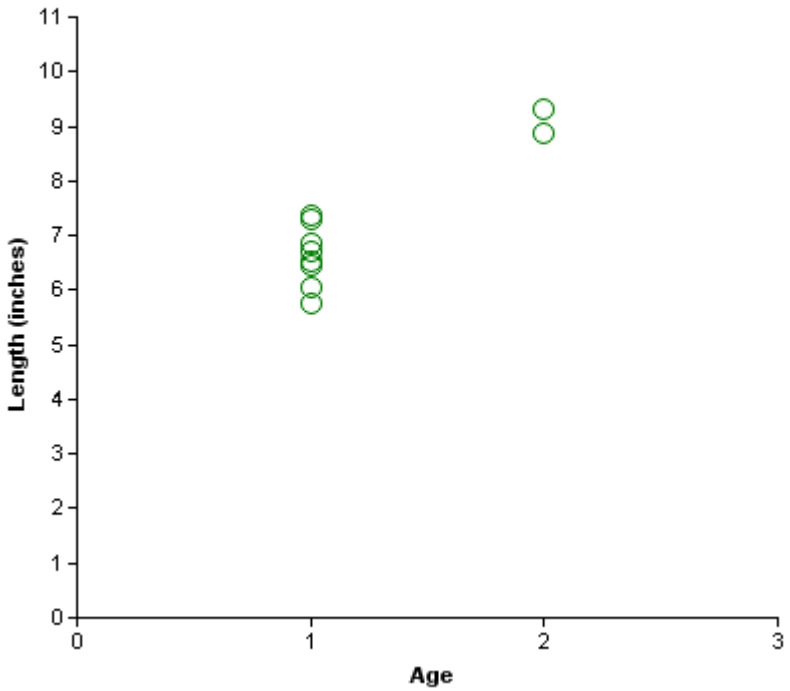
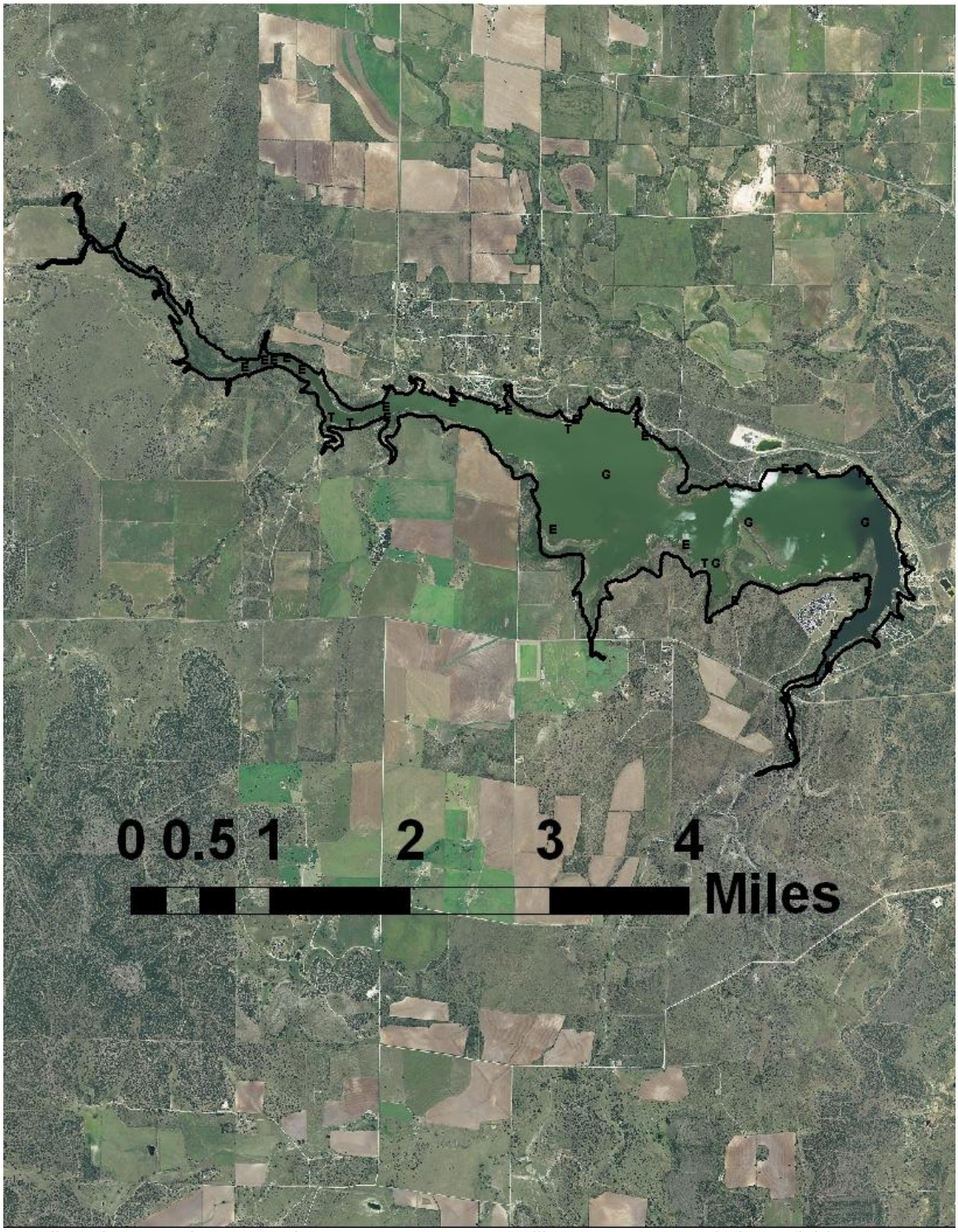


Figure 9. Age of white crappie collected in trap nets, Brady Creek Reservoir, Texas, 2010. Sample size is 10 fish.

Table 8. Proposed sampling schedule for Brady Creek Reservoir, Texas. Gill netting surveys are conducted in the spring, electrofishing and trap netting surveys are conducted in the fall, and vegetation and access surveys are conducted in the summer. Standard survey denoted by S and additional survey denoted by A.

Survey Year	Electrofisher	Trap Net	Gill Net	Creel Survey	Vegetation Survey	Access Survey	Report
Fall 2011-Spring 2012							
Fall 2012-Spring 2013							
Fall 2013-Spring 2014							
Fall 2014-Spring 2015	S		S		S	S	S

Appendix A



Location of sampling sites, Brady Reservoir, Texas, 2010-2011. Gill net, trap net, and electrofishing stations are indicated by Gs, Ts, and Es, respectively. Aerial photography was obtained from the Texas Natural Resources Information Systems website.

Appendix B

Number (N) and catch rate (CPUE) of all species collected from all gear types from Brady Creek Reservoir, Texas, 2010-2011. Effort was 5.0 net-nights for gill netting, 8.0 net nights for trap netting, and 2.0 hours for electrofishing.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Longnose gar	44	8.8				
Gizzard shad	102	20.4	4	0.5	252	126.0
Threadfin shad			25	3.1	3	1.5
Common carp	6	1.2				
River carpsucker	19	3.8				
Smallmouth buffalo	9	1.8				
Blue catfish	3	0.6				
Channel catfish	4	0.8				
Flathead catfish	2	0.4				
White bass	14	2.8	1	0.1		
Redbreast sunfish					88	44.0
Green Sunfish					4	2.0
Warmouth			0.3	2	13	6.5
Orangespotted sunfish			17	2.1		
Bluegill	3	0.6	908	113.5	190	95.0
Longear sunfish			46	5.8	15	7.5
Redear sunfish					3	1.5
Largemouth bass	1	0.2			132	66.0
White crappie	35	7.0	99	12.4		
Freshwater drum	56	11.2				