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

Brady Creek Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations were surveyed in 2003, 2004, and 2006 using electrofishing and trap nets, and in 1999, 2003 and 2007 using gill nets. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** 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 2007, water level ranged from 0.5 to 15.8 feet below conservation pool elevation (1,743 feet above mean sea level). Boat and angler access was adequate with four public boat ramps. However, launching larger boats became difficult at two of the ramps and impossible at two others when water level was ≤1,733 feet above mean sea level. Primary habitat in 2006 was flooded terrestrial vegetation.

- **Management History:** Important sport fishes historically include largemouth bass, catfishes, crappie, and white bass. Angler harvest of all sport fishes is regulated according to statewide size and daily bag limits. Florida largemouth bass (FLMB), blue and channel catfish, smallmouth bass, and threadfin shad have been stocked. Most recently, FLMB fingerlings were stocked in spring 2007 to maintain the genetic introgression level of FLMB in the population.

- **Fish Community**
  - **Prey species:** Gizzard shad and bluegill formed the reservoir's forage base and are present in sufficient numbers and sizes. Threadfin shad were also present, but in low abundance.

  - **Catfishes:** Relative abundance of blue catfish increased slightly, whereas relative abundance of channel catfish was consistent during the survey period. Size structures of both catfish populations were adequate.

  - **White bass:** This species provides for a very limited fishery because of consistently low abundance.

  - **Largemouth bass:** Relative abundance of largemouth bass was considerably lower in 2006 compared to 2003 and 2004. Limited structural habitat caused by the prolonged period of low water has likely reduced population abundance. Genetic introgression of FLMB in the population remained above the 20% target level for FLMB alleles.

  - **White crappie:** Relative abundance of white crappie increased during the survey period; however few individuals exceeded the minimum size limit.

- **Management Strategies:** Encourage the City of Brady to lengthen the primary boat ramp and repair the associated courtesy dock to improve angler access under low water conditions. Stock FLMB fingerlings if the water level rises or is anticipated to rise to within three feet of conservation pool elevation.

INTRODUCTION

This document is a summary of Brady Creek Reservoir fisheries data collected from 2003 to 2007. 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. In some cases, historical data are presented with the 2003-2007 survey period 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, since 1999 (Figure 1). From 1999 to 2007, the maximum water level fluctuation was 15.4 feet, with water level ranging from 0.5 to 15.8 feet below conservation pool elevation. Launching larger boats became difficult when water level was ≤1,733 feet above mean sea level as two of the four public boat ramps do not extend into the water at that elevation. The other two boat ramps are in fair condition, but could be lengthened to facilitate use during low water periods. The courtesy docks are also in need of repair. In 2006, habitat consisted primarily of flooded dead terrestrial vegetation. A sparse amount of hydrilla was observed in 2006 near the boat ramp. 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 (Dennis and Driscoll 2002) included:

1. Continue to confer with City of Brady officials concerning access and fisheries management issues.
   Action: City of Brady officials were provided a copy of the 2002 management report and informed of the 2007 FLMB stocking.
2. Stock FLMB fingerlings at 100 fish/acre in 2004.
   Action: FLMB fingerlings were stocked in 2007 at 51 fish/acre. A reduced stocking rate was used because of the low water level.

Harvest regulation history: Since impoundment, harvest of all sport fishes was managed according to statewide regulations (Table 2).

Stocking history: Florida largemouth bass (FLMB), 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 maintain 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 in the reservoir. The complete stocking history is contained in Table 3.

Vegetation/habitat history: Historically, habitat at Brady Creek Reservoir consisted primarily of flooded terrestrial vegetation, with native submersed vegetation occupying <1 acre (Dennis and Driscoll 2002). Standing timber was also present in the upper end of the reservoir.

METHODS

All surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2005). Fishes were collected by electrofishing (1 hour at 12 5-minute stations), trap netting (5 net-nights at 5 stations) and gill 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 nets and trap nets, as the number of fish per net night (fish/nn). Electrofishing surveys were conducted during night time and sample station selection was random for all gear types (Appendix A).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Stock Density (PSD), Relative Stock Density (RSD)], and condition indices [relative weight (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 were determined using otoliths.

Genetic analysis of age-0 largemouth bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2005).

Littoral zone/physical habitat, vegetation, angler access, and facility surveys were conducted in accordance with Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2005).

RESULTS AND DISCUSSION

Habitat: In 2006, habitat at Brady Creek Reservoir consisted primarily of flooded terrestrial vegetation (Table 4). Native submersed vegetation occupied 12 acres, and a sparse amount of hydrilla was present near the boat ramp. Standing timber remains present in the upper end of the reservoir.

Prey species: Gizzard shad relative abundance fluctuated widely during the survey period with electrofishing CPUE increasing from 341 fish/h in 2003 to 801 fish/h in 2004, then decreasing to 80.0 fish/h in 2006 (Figure 2). However, gizzard shad IOV remained consistent ranging from 46.3 to 69.5, suggesting that about half of the individuals were of a size to be available to predators. Bluegill relative abundance declined throughout the survey period from a high of 291 fish/h in 2003 to a low of 40 fish/acre in 2006 (Figure 3). Nearly all bluegill were less than 6 inches total length, a sufficient size to be available to predators. Threadfin shad remained present in the reservoir, but in low abundance as electrofishing CPUE was 1.0 fish/h in 2006 (Appendix B).

Blue catfish: Relative abundance was greater in 2007 (4.0 fish/nn) than in 2003 (0.6 fish/nn) and 1999 (1.2 fish/nn). Size structure of the population was adequate in 2006 with TL of most fish $\geq$16 inches (Figure 4).

Channel catfish: Relative abundance remained consistent from 1999 to 2007 with gill net CPUE ranging from 2.8 to 3.8 fish/nn (Figure 5). Size structure of the population was also similar among years, with PSD ranging from 41-46.

White bass: This species is present in the reservoir, but provides for limited angling opportunities because of low relative abundance (Figure 6). Gillnet CPUE ranged from 0 to 1.0 fish/nn from 1999 to 2007.

Largemouth bass: Relative abundance of largemouth bass was considerably lower in 2006 (10 fish/h) than in 2004 (85.0 fish/h) and 2003 (111.0 fish/h). This decrease was likely caused by sparse structural

habitat and a prolonged period of low water level. Size structure of the population, however, has remained decent with PSD ranging from 40-44 (Figure 7). In 2003, largemouth bass growth was adequate with some age-2 and most age-3 individuals exceeding the 14-inch minimum length limit (Figure 8). Genetic introgression of FLMB into the population has remained consistent during the survey period, with FLMB alleles ranging from 63 to 68% from 2003 to 2006 (Appendix C). The FLMB stocking in 2007 may help increase the percent of pure Florida bass in the population closer to 20%, the targeted level. The largest documented largemouth bass caught from Brady Creek Reservoir was a 12.95 lb. fish caught in 1996.

White crappie: Relative abundance of this species in 2006 (20.0 fish/nn) was similar to in 2005 (21.8 fish/nn), and exceeded that in 2003 (14.4 fish/nn). Size structure of the population was similar among years with relatively few legally-harvestable size individuals present (Figure 9).

Fisheries Management Plan for Brady Creek, Texas

Prepared-July 2007

ISSUE 1: Low water level impacts angler access to the reservoir. When water level is ≤1,733 feet above mean sea level, only small lightweight boats can be launched into the reservoir.

MANAGEMENT STRATEGY

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.

ISSUE 2: Largemouth bass relative abundance has decreased considerably due to poor habitat caused by the prolonged period of low water level.

MANAGEMENT STRATEGY

1. 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.

SAMPLING SCHEDULE JUSTIFICATION:

Biennial electrofishing is necessary to monitor the largemouth bass population. Conduct largemouth bass-only electrofishing in 2008 in addition to standard all species sampling in 2010 (Table 5).

LITERATURE CITED

Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-482 in B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.

Dennis J. A., and J. A. Driscoll. 2002. Statewide freshwater fisheries monitoring and management program survey report for Brady Creek Reservoir, 2002. Texas Parks and Wildlife Department, Federal Aid Report F-30-R, Austin.

DiCenzo, V. J., M. J. Maceina, and M. R. Stimert. 1996. Relations between reservoir trophic state and gizzard shad population characteristics in Alabama reservoirs. North American Journal of Fisheries Management 16:888-895.

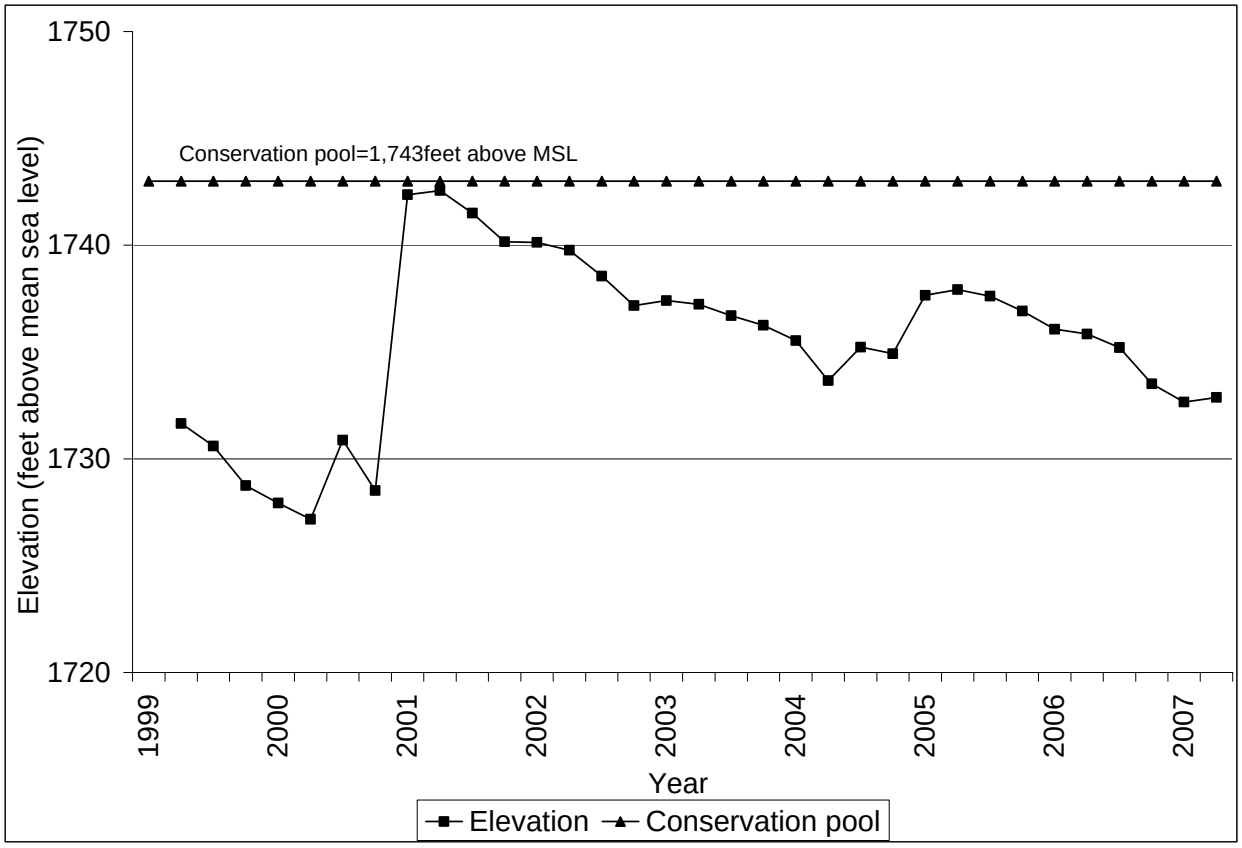


Figure 1. Quarterly water level elevations in feet above mean sea level recorded for Brady Creek Reservoir, Texas from 1999 to 2007. At conservation pool elevation, reservoir surface area is 2,021 acres.

Table 1. Characteristics of Brady Creek Reservoir, Texas.

Characteristic	Description
Year constructed	1963
Controlling authority	City of Brady, Texas
County	McCullough
Reservoir type	Tributary
Shoreline Development Index	4.0
Conductivity	1,525 umhos/cm

Table 2. Harvest regulations for Brady Creek 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, largemouth	5	14 minimum
Crappie: white and black crappie, their hybrids and subspecies	25 (in any combination)	10 minimum

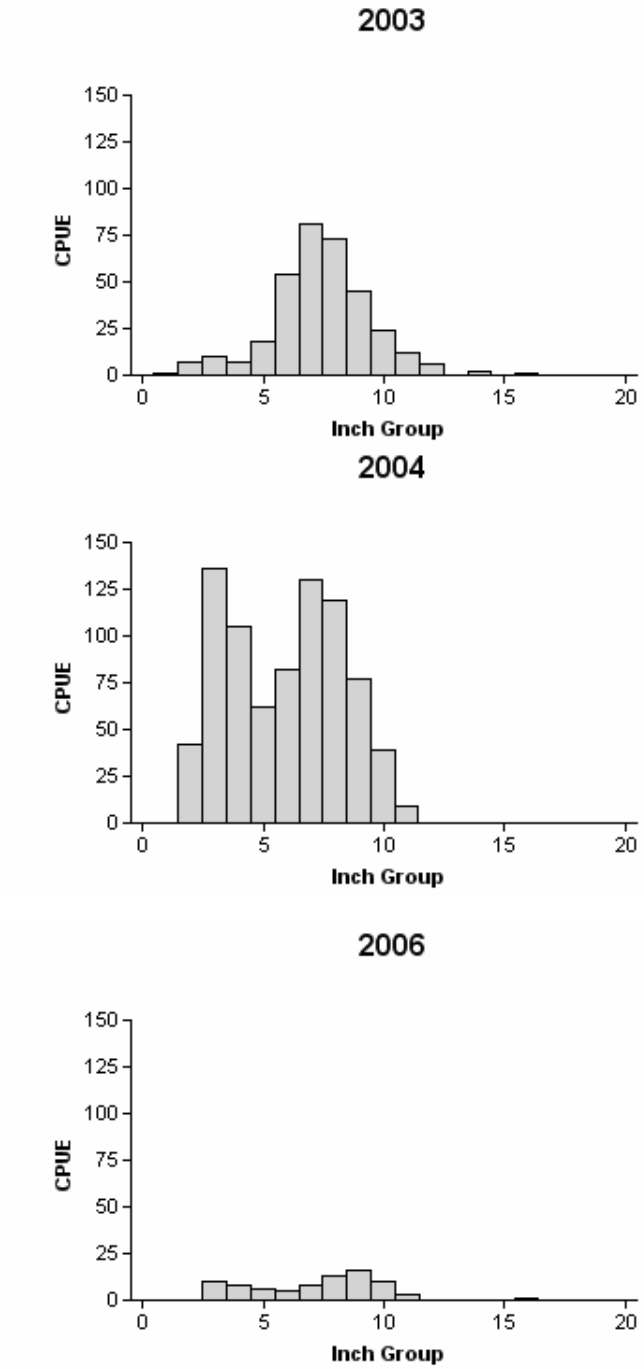
Table 3. Stocking history of Brady Creek Reservoir, Texas. Size categories are: FGL = 1-3 inches, ADL = adults, and NR = size not recorded.

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. Survey of littoral zone and physical habitat types, Brady Creek 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. Water level was 1,734 feet above mean sea level at time of sampling.

Shoreline habitat type	Shoreline Distance		Surface Area	
	Miles	Percent of total	Acres	Percent of reservoir surface area
Flooded dead terrestrial vegetation	8.8	30.0		
Flooded dead terrestrial vegetation with dead trees and stumps	10.4	35.6		
Flooded dead terrestrial vegetation with boat docks	0.9	3.1		
Flooded dead terrestrial vegetation with dead trees and stumps and native submerged vegetation	0.4	1.3		
Flooded dead terrestrial vegetation with boat docks and native submerged vegetation	0.7	2.5		
Flooded dead terrestrial vegetation and native submerged vegetation	4.6	15.6		
Rock or gravel	1.5	5.0		
Rock or gravel with boat docks	0.2	0.6		
Rock or gravel with native submerged vegetation	0.5	1.9		
Rip rap	0.5	1.9		
Rip rap with native submerged vegetation	0.2	0.6		
Rock bluff	0.2	0.6		
Rock bluff with boat docks	0.4	1.3		
Native submerged vegetation			12.2	0.6
Hydrilla			<0.1	<0.1

Gizzard Shad



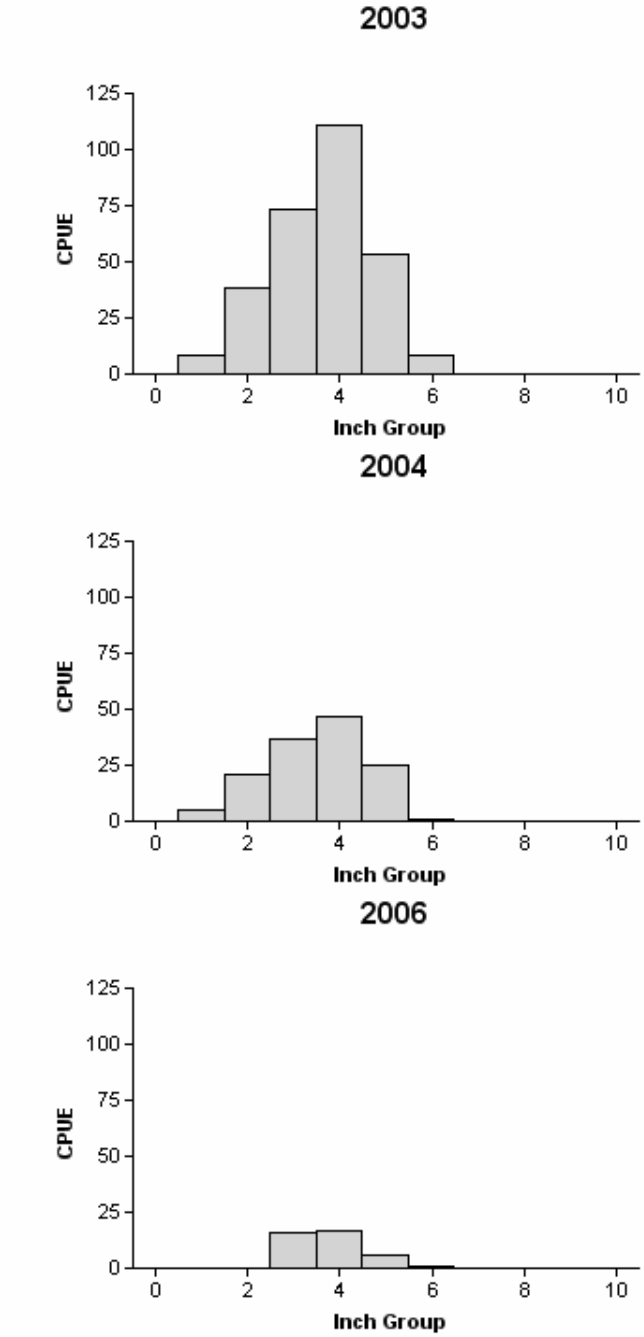
Effort = 1.0
Total CPUE = 341.0 (31; 341)
IOV = 52 (5)

Effort = 1.0
Total CPUE = 801.0 (20; 801)
IOV = 70 (10)

Effort = 1.0
Total CPUE = 80.0 (29; 80)
IOV = 46 (11)

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, Brady Creek Reservoir, Texas, 2003, 2004, and 2006.

Bluegill



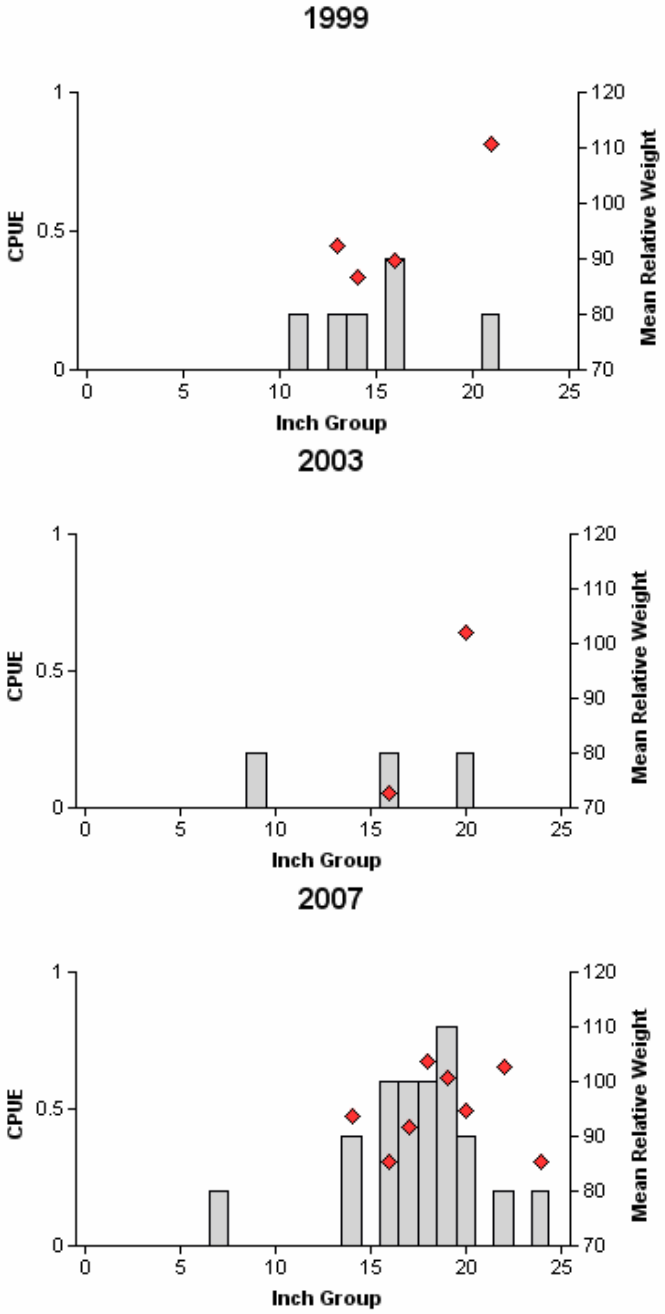
Effort = 1.0
Total CPUE = 291.0 (23; 291)
PSD = 3 (1)

Effort = 1.0
Total CPUE = 136.0 (21; 136)
PSD = 1 (1)

Effort = 1.0
Total CPUE = 40.0 (37; 40)
PSD = 2 (3)

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, Brady Creek Reservoir, Texas, 2003, 2004, and 2006.

Blue Catfish



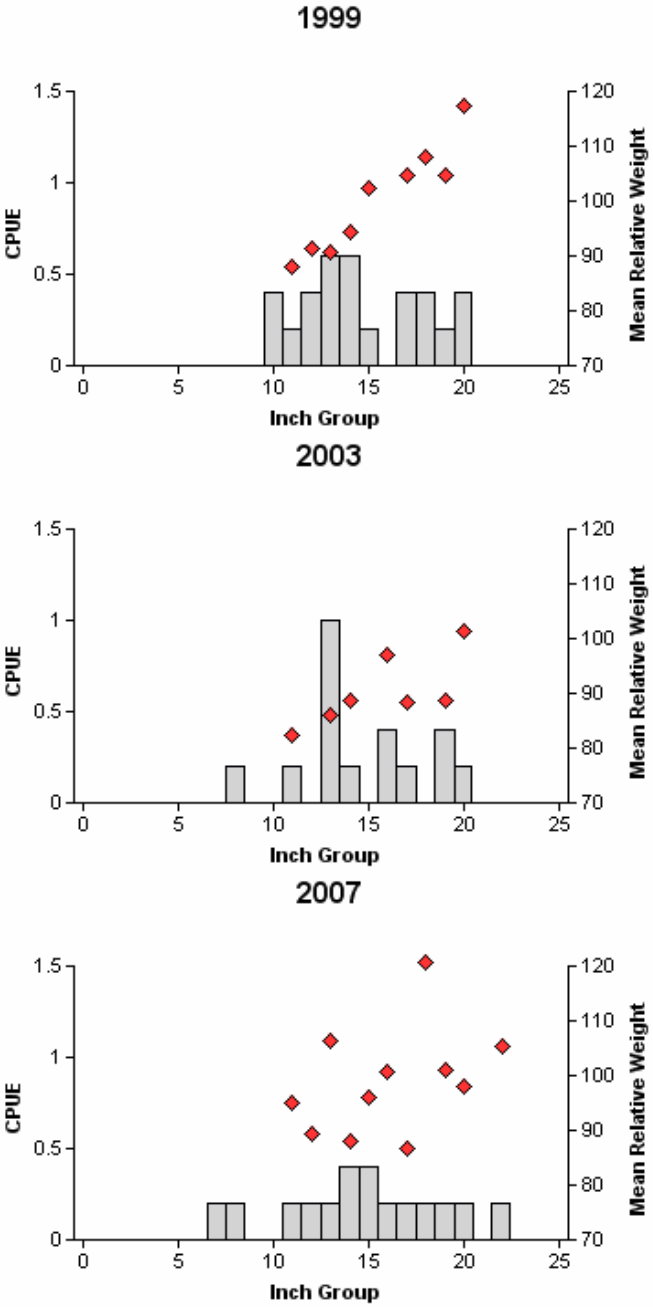
Effort = 5
Total CPUE = 1.2 (67; 6)
PSD = 20 (13)

Effort = 5
Total CPUE = 0.6 (67; 3)
PSD = 50 (0)

Effort = 5
Total CPUE = 4.0 (24; 20)
PSD = 21 (10)

Figure 4. Number of blue catfish caught per net night (CPUE), 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, Brady Creek Reservoir, Texas, 1999, 2003, and 2007.

Channel Catfish



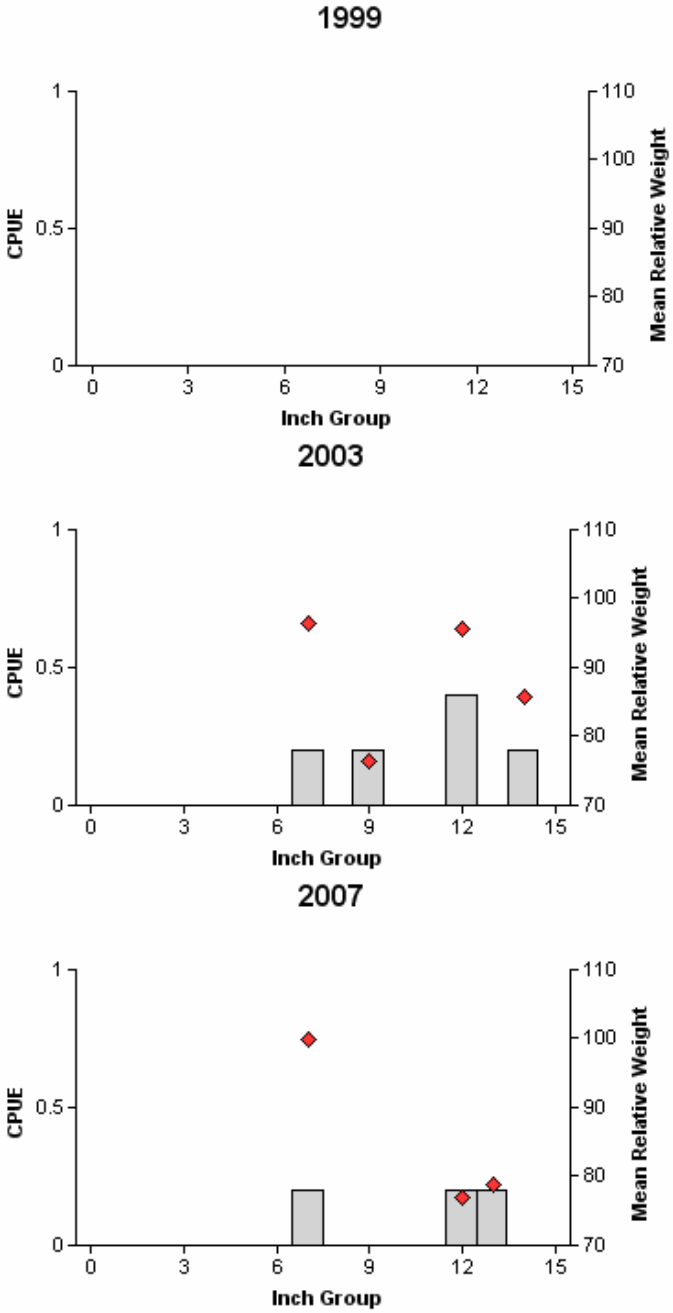
Effort = 5
Total CPUE = 3.8 (35; 19)
PSD = 41 (10)

Effort = 5
Total CPUE = 2.8 (24; 14)
PSD = 46 (16)

Effort = 5
Total CPUE = 3.0 (2;15)
PSD = 46 (14)

Figure 5. Number of channel catfish caught per net night (CPUE), 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, Brady Creek Reservoir, Texas, 1999, 2003, and 2007.

White Bass



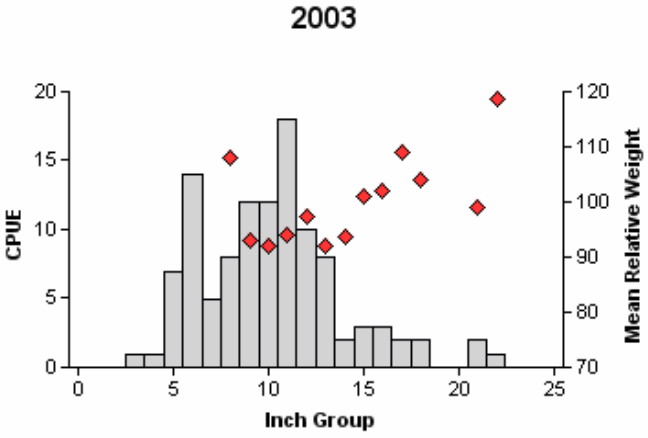
Effort = 5
Total CPUE = 0 (0)

Effort = 5
Total CPUE = 1.0 (32; 5)
PSD = 80 (21)

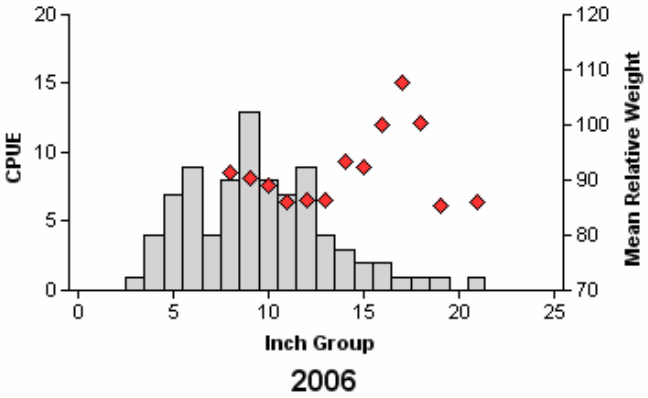
Effort = 5
Total CPUE = 0.6 (67; 3)
PSD = 67 (35)

Figure 7. Number of white bass caught per net night (CPUE), 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, Brady Creek Reservoir, Texas, 1999, 2003, and 2007.

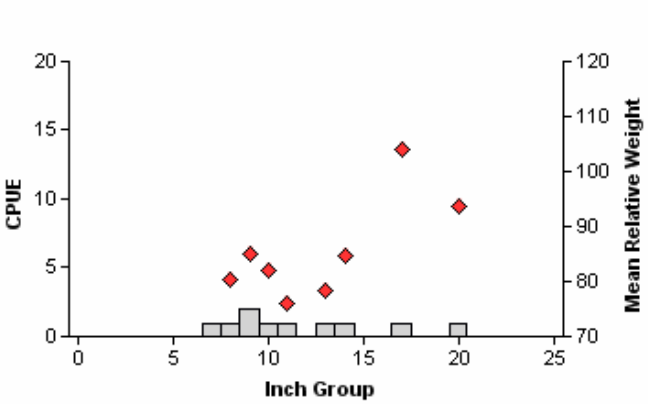
Largemouth Bass



Effort = 1.0
Total CPUE = 111.0 (23; 111)
Stock CPUE = 83.0 (24; 83)
PSD = 40 (9)



Effort = 1.0
Total CPUE = 85.0 (30; 85)
Stock CPUE = 60.0 (31; 60)
PSD = 40 (4)



Effort = 1.0
Total CPUE = 10.0 (32; 10)
Stock CPUE = 9.0 (33;9)
PSD = 44 (19)

Figure 8. 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, Brady Creek Reservoir, Texas, 2003, 2004, and 2006.

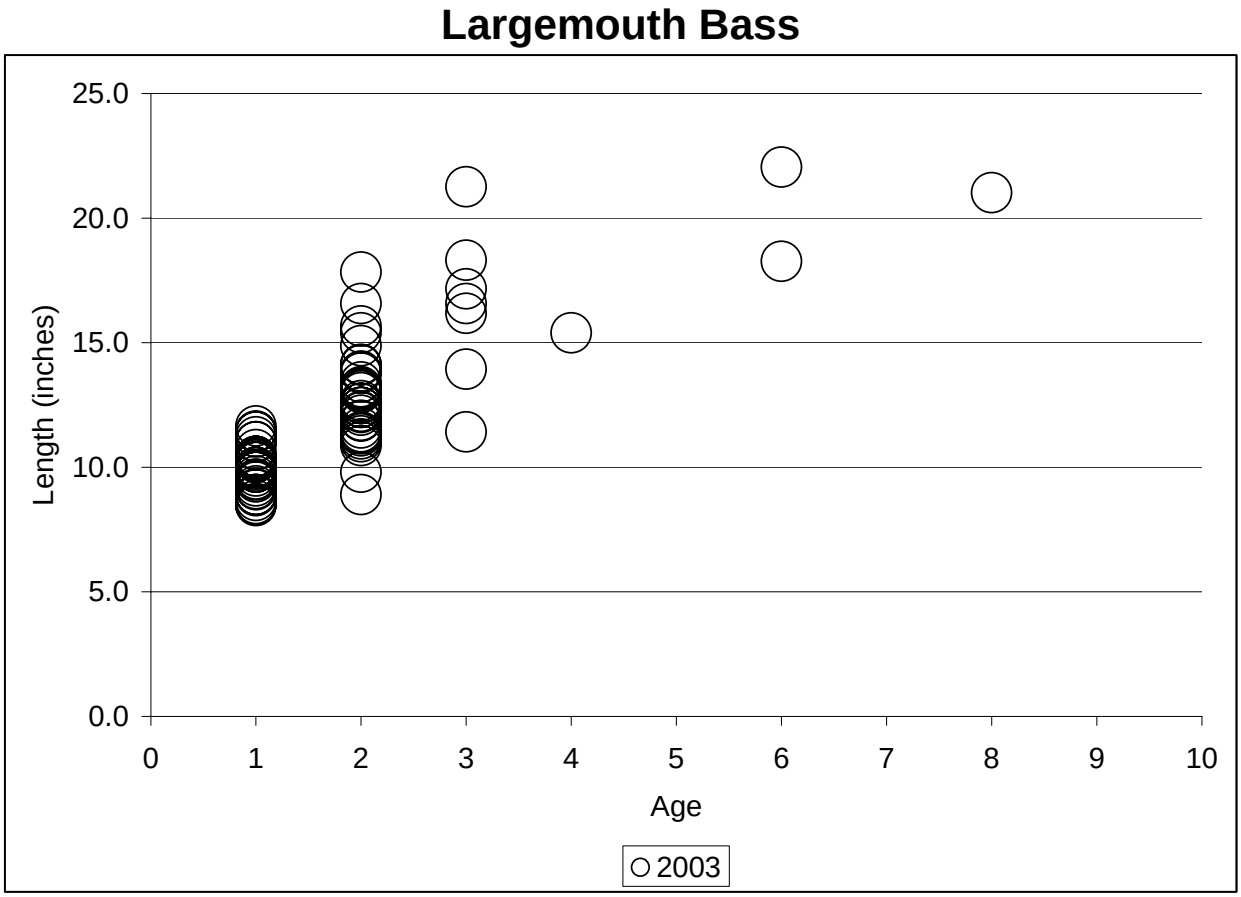
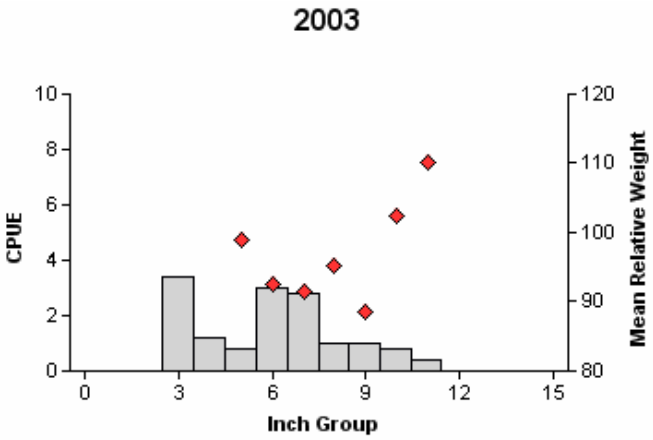
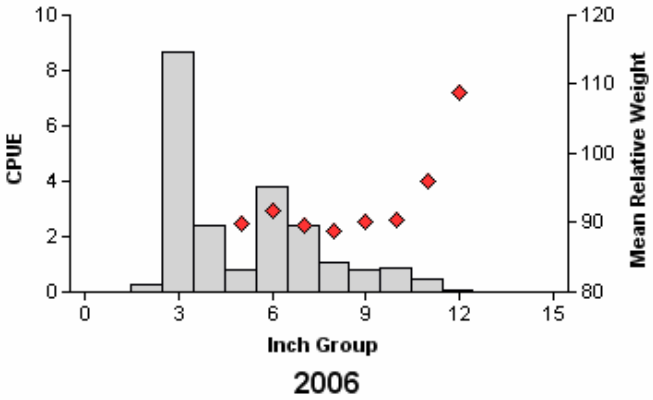


Figure 9. Total length of largemouth bass (inches) by age collected by electrofishing from Brady Creek Reservoir, Texas, 2003.

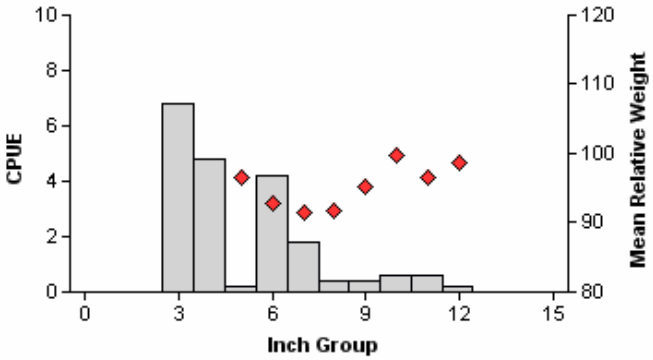
White Crappie



Effort = 5
Total CPUE = 14.4 (41:72)
PSD = 33 (19)



Effort = 10
Total CPUE = 21.8 (29; 218)
PSD = 33 (9)



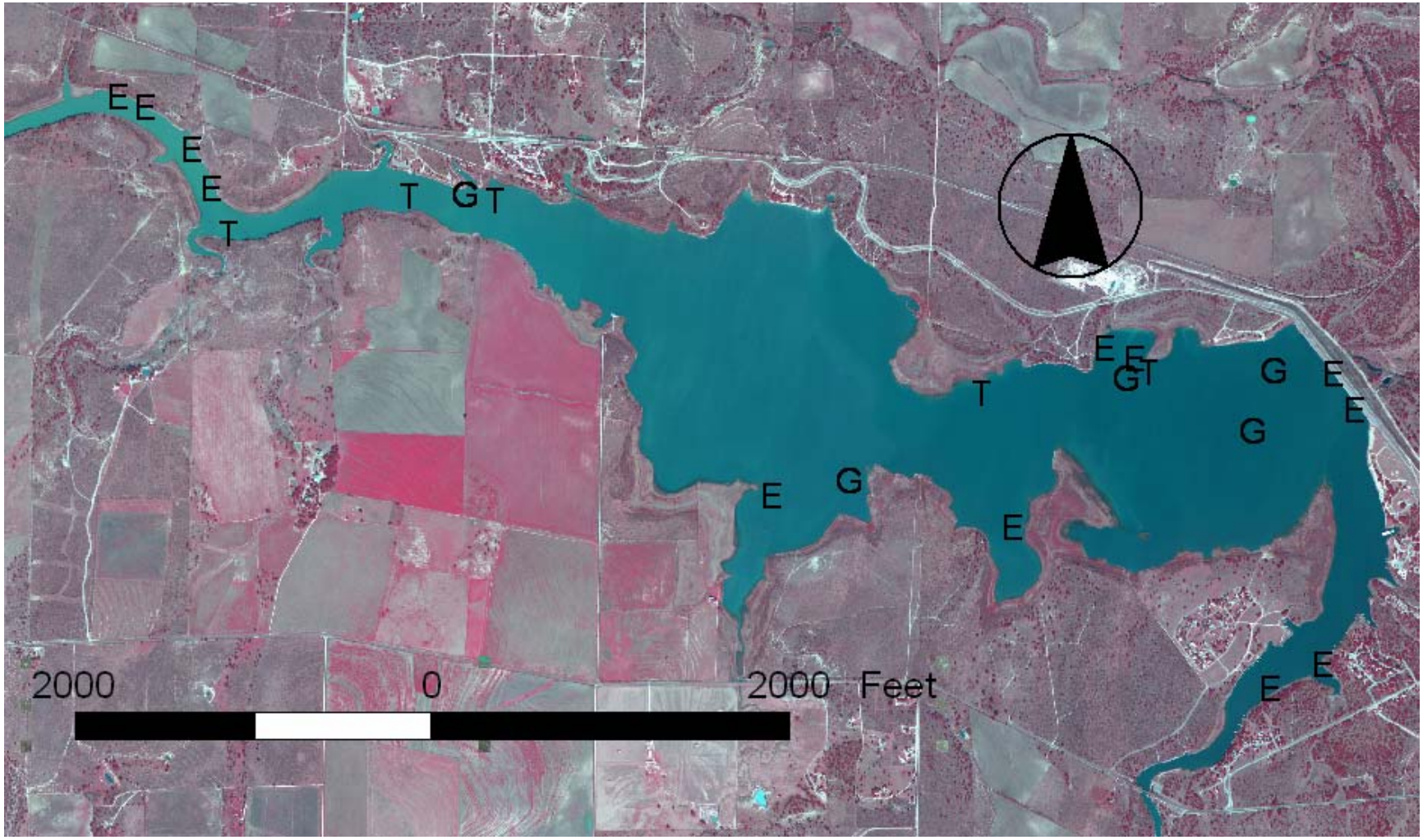
Effort = 5
Total CPUE = 20.0 (63; 100)
PSD = 26 (14)

Figure 10. Number of white crappie caught per net night (CPUE, bars), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Brady Creek Reservoir, Texas, 2003, 2004, and 2006.

Table 5. Proposed sampling schedule for Brady Creek Reservoir, Texas. Gill netting surveys are conducted in the spring, whereas 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	Creel Survey	Report
Fall 2007-Spring 2008					
Fall 2008-Spring 2009	A				
Fall 2009-Spring 2010					
Fall 2010-Spring 2011	S	S	S		S

APPENDIX A



Location of sampling sites, Brady Reservoir, Texas, 2006-2007. Gill net, trap net, and electrofishing stations are indicated by G, T, and E, respectively. The aerial photography is from 2004.

APPENDIX B

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

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					80	80.0
Threadfin shad					1	1.0
Blue catfish	20	4.0				
Channel catfish	15	3.0				
Flathead catfish	2	0.4				
White bass	3	0.6				
Redbreast sunfish					16	16.0
Warmouth					2	2.0
Bluegill					40	40.0
Largemouth bass					10	10.0
White crappie			100	20.0		

APPENDIX C

Results of electrophoretic analysis of age-0 largemouth bass collected by electrofishing during fall from Brady Creek Reservoir, Texas, in selected years from 2003 to 2006. Intergrades are fish with both Florida largemouth bass (FLMB) and northern largemouth bass (NLMB) genes.

		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

* Age-0 through age-3 fish used in the sample.