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

Worth Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Worth Reservoir were surveyed in 2006 using electrofishing and trap nets and in 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:** Worth Reservoir is a 3,489-acre impoundment, located on the West Fork Trinity River. The reservoir is located entirely in the city limits of Ft. Worth in Tarrant County and was constructed in 1914 by the City as a municipal water supply. The elongated and serpentine reservoir extends approximately 6 miles upstream from the dam. Shoreline length is approximately 36 miles. Many areas of the reservoir are very shallow and limit boat traffic. Angler and boat access was adequate. There was one handicap-accessible fishing pier on the reservoir. Fishery habitat was primarily rocky and gravel shoreline and boat docks. Worth Reservoir is currently under a fish-consumption advisory. The advisory was implemented by the Department of State Health Services (DSHS) in April 2000 because of elevated levels of polychlorinated biphenyls (PCBs) in fish tissues.

- **Management history:** Important sport fish include, largemouth bass, white crappie, white bass, and blue and channel catfish. All species have been managed with statewide regulations.

- **Fish Community**
  - **Prey species:** Gizzard and threadfin shad are in great abundance in the reservoir. Bluegills and longear sunfish are also very abundant as prey but few fish over 6 inches are available for anglers.

  - **Catfishes:** The blue catfish population is slightly above average in abundance with quality fish available for anglers. The catch rate of channel catfish increased greatly from the past sample. Flathead catfish are present but none were captured this past survey year.

  - **White bass:** White bass catch rates remained below the district average but an adequate population exists for anglers.

  - **Black basses:** The largemouth bass population has increased in abundance from the previous survey. However sized distribution is still poor. The spotted bass population has increased from the past survey with the size distribution being average.

  - **Crappie:** The white crappie population continued to be high in abundance with quality fish available for anglers. Black crappie are present but in very low abundance.

- **Management Strategies:** General monitoring with electrofishing, trap netting, and gill netting surveys will be conducted in 2010-2011. Conduct creel survey in 2010-2011 to obtain baseline angler catch and harvest information. Work closely with the City of Fort Worth during planning stages of possible future dredging project.

INTRODUCTION

This document is a summary of fisheries data collected from Worth Reservoir in 2006-2007. 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. Historical data are presented with the 2005-2006 data for comparison.

Reservoir Description

Worth Reservoir is a 3,489-acre impoundment, located on the West Fork Trinity River. The reservoir is located entirely in the city limits of Ft. Worth in Tarrant County and was constructed in 1914 by the City as a municipal water supply. The elongated and serpentine reservoir extends approximately 6 miles upstream from the dam. Shoreline length is approximately 36 miles. Many areas of the reservoir are very shallow and limit boat traffic. Angler and boat access was adequate. There was one handicap-accessible fishing pier on the reservoir. Fishery habitat was primarily rocky and gravel shoreline and boat docks. Worth Reservoir is currently under a fish-consumption advisory. The advisory was implemented by the Department of State Health Services (DSHS) in April 2000 because of elevated levels of polychlorinated biphenyls (PCBs) in fish tissues. Worth Reservoir is a eutrophic reservoir (Texas Commission on Environmental Quality 2005). Other descriptive characteristics for Worth Reservoir are in Table 1.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Brock 2001) included:

Promotion of the quality blue and channel catfish populations and encourage participation in the Angler Recognition Program.

Actions: Several new waterbody records were submitted for different species in Lake Worth including blue catfish. News releases were also written concerning the quality catfish species present in Worth Reservoir.

Continue communication with DSHS personnel, the United States Geological Survey (USGS), and the City of Fort Worth Environmental Division (Brock 2002) regarding the fish consumption advisory.

Actions: DSHS personnel have been contacted regarding possible increased testing of fish species by length class to allow possible harvest of some sport fish. However the increased testing is not being considered because of funding and possible public health concerns. Communication with all parties has continued and several meetings have been attended by district staff concerning future clean up of Worth Reservoir sediments and the status of contaminant levels in the fish tissue.

Harvest regulation history: Sport fish populations in Worth Reservoir have been managed with statewide regulations (Table 2).

Stocking history: The last stocking of Worth Reservoir occurred in 1999. The stocking consisted of 179,209 Florida largemouth bass. The complete stocking history is in Table 3.

Vegetation/habitat history: Worth Reservoir aquatic vegetation is currently composed mainly of sporadic stands of native shoreline emergent species.

METHODS

Fishes were collected by electrofishing (1.0 hours 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/hr) 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).

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 SE was calculated for structural indices and IOV. Age and growth analysis for largemouth bass was conducted with ages being determined using otoliths from all fish collected over stock size (TPWD, Inland Fisheries Division, unpublished manual revised 2005). Source for water level data was the United States Geological Survey website, and in cooperation with the Tarrant Regional Water District.

RESULTS AND DISCUSSION

Habitat: Littoral zone habitat consisted primarily of rocky habitat, gravel, and shoreline emergent aquatic vegetation (Table 4).

Prey species: The electrofishing catch rate of threadfin was below the district average of 229.0/hr in 2006 (149/hr). The gizzard shad electrofishing catch rate in 2006 of 480.0/hr was well above the district average of 266.0/hr and higher than the catch rate observed in 1998 (300.0/hr) and 2002 (380/hr) (Figure 2). Index of vulnerability for gizzard shad was high, indicating that 97% of gizzard shad captured in 2006 were available to existing predators; this was similar to IOV estimates in previous years. The electrofishing catch rate of bluegill in 2006 of 404.0/hr was higher than the previous two surveys in 1998 and 2002 and higher than the district average of 167.0/hr (Figure 3). The bluegill population does not contain large numbers of quality sized fish (>6 inches) as evident in PSD values. The longear sunfish catch rate observed in 2006 (334.0/hr) was also much higher than rates observed in 1998 and 2002 and above the district average of 88.0/hr (Figure 4).

Catfish: The gill netting catch rate of blue catfish in 2007 of 2.7/nn was above the district average of 1.7/nn and similar to the catch rate observed in 2003 (2.4/nn), (Figure 5). Size structure of the blue catfish population was very good as indicated by a PSD value of 77 and a RSDp value of 15 observed in 2007. The gill net catch rate of channel catfish was 12.4 /nn in 2007 which was higher than the previous samples (6.6/nn in 1998, 8.6/nn in 2003) (Figure 6). Although the 2007 catch rate was well above the district average 5.7/nn, size structure remained average as indicated by a PSD value of 37.

White bass: The gill netting catch rates of white bass have historically been well below the district average of 7.9/nn. The 2007 survey was no exception with a catch rate of 2.8/nn observed (Figure 7). Size structure of the population was above average as indicated by the PSD value of 93.

Black basses: The total electrofishing catch rate of spotted bass in 2006 of 38.0/hr was much higher than the catch rate observed in 2002 and higher than the district average of 25.0/hr (Figure 8). Size structure of the spotted bass population was average as indicated by a PSD value of 23. The total electrofishing catch rate of largemouth bass rebounded somewhat in 2006 with a catch rate of 118.0/hr (Figure 9). This is much higher than the catch rate observed in 2002 (43.0/hr) and near the district average of 126.0/hr. The size structure of the population continues to be poor as indicated by a PSD value of 18. Growth of largemouth bass in Worth Reservoir remains average with fish reaching 14 inches after age 2 (Figure 10). Body conditions in 2006 were at or above optimal for most size classes of fish. Florida largemouth bass influence was low as Florida alleles were 33.0% in 2006 and Florida genotype was 0 (Table 5). This is similar to the Florida largemouth bass alleles in 2002 (27.9%).

White crappie: The trap netting catch rate of white crappie was 14.4/nn in 2006, which is similar to the district average of 16.1/nn and similar to the previous surveys (Figure 11). The size structure of the population is very good as indicated by a PSD value of 90. The black crappie trap netting catch rate was very low at 0.8/nn.

Fisheries management plan for Worth Reservoir, Texas

Prepared – July 2007.

ISSUE 1: A fish consumption advisory was implemented on Worth Reservoir in 2000 due to elevated levels of various chemicals in fish tissue.

MANAGEMENT STRATEGIES

1. Continue communication with DSHS, USGS, and the City of Fort Worth's Environmental Division regarding future testing of fish tissue and possible removal of contaminated sediments.
2. Continue informing and educating the public regarding the fish consumption advisory and catch and release opportunities.

ISSUE 2: No current creel data are available for Worth Reservoir. Anecdotal evidence indicates increased tournament and largemouth bass fishing activities.

MANAGEMENT STRATEGY

1. Conduct annual creel on Worth Reservoir starting June 2010.

SAMPLING SCHEDULE JUSTIFICATION

General monitoring of sport fish species with electrofishing, trap netting, and gill netting will be conducted every 4 years with an annual creel being conducted in 2010-2011.

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.

Brock, R. 2002. Statewide freshwater fisheries monitoring and management program survey report for Worth Reservoir, 2001. Texas Parks and Wildlife Department, Federal Aid Report F-30-R, Austin.

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

Texas Commission on Environmental Quality. 2005. Trophic classification of Texas reservoirs.. Austin, TX. 15 pp

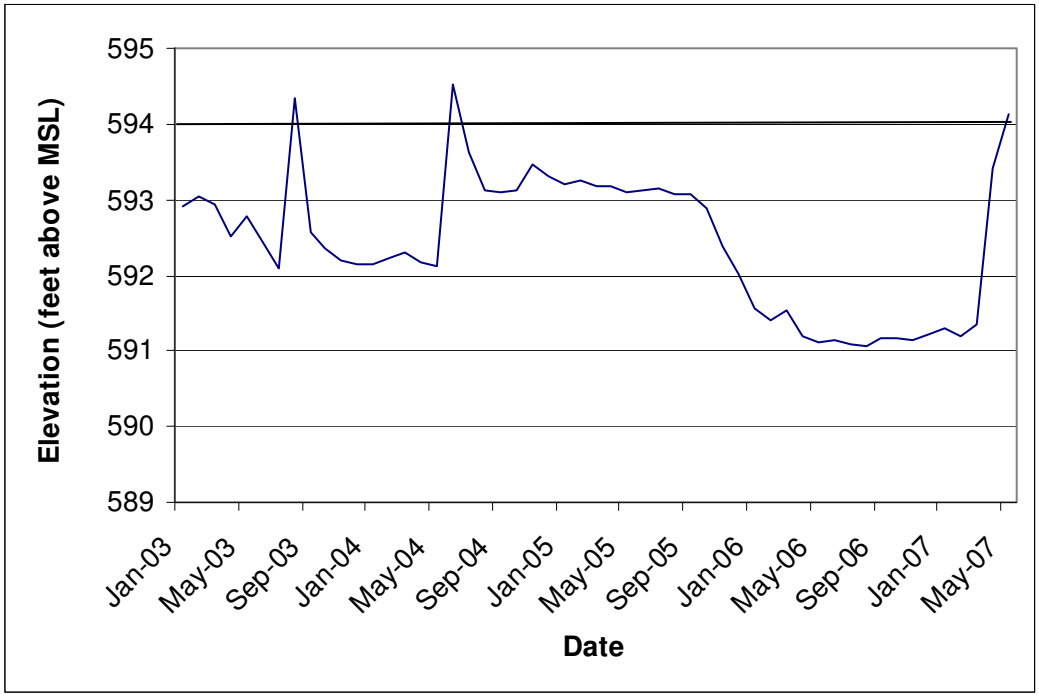


Figure 1. Mean monthly water level elevations in feet above mean sea level (MSL) recorded for Worth Reservoir, Texas from January 2003-May 2007. Conservation pool is 594 feet above MSL.

Table 1. Characteristics of Worth Reservoir, Texas.

Characteristic	Description
Year Constructed	1912
Controlling authority	City of Fort Worth
Counties	Tarrant
Reservoir type	Mainstream Trinity River
Conductivity	375 umhos/cm

Table 2. Harvest regulations for Worth Reservoir.

Species	Bag limit	Length limit (inches)
Catfish: channel, blue, their hybrids and subspecies	25	12 minimum
Catfish: flathead	5	18 minimum
Bass, white	25	10 minimum
Bass: spotted	5 In any combination	none
Bass: largemouth		14 minimum
Crappie: white and black, their hybrid and subspecies	25	10 minimum

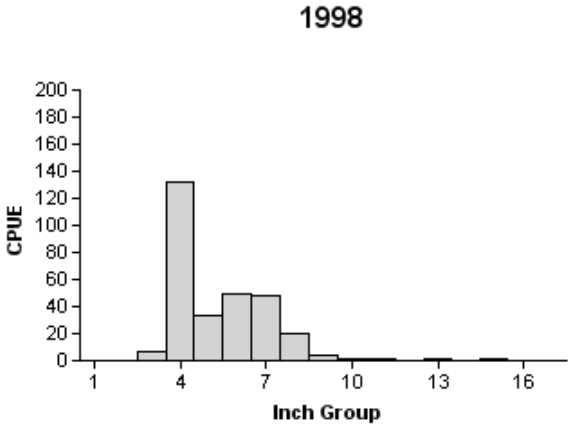
Table 3. Stocking history of Worth, Texas. Life stages are fry (FRY), fingerlings (FGL), advanced fingerlings (AFGL), adults (ADL) and unknown (UNK). Life stages for each species are defined as having a mean length that falls within the given length range. For each year and life stage the species mean 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.

Species	Year	Number	Life Stage	Mean TL (in)
Blue catfish	1990	36,465	FGL	2.0
	Total	36,465		
Channel catfish	1972	35,000	AFGL	7.9
	Total	35,000		
Florida Largemouth bass	1975	150,012	FRY	1.0
	1991	178,173	FGL	1.2
	1994	178,606	FGL	1.3
	1999	179,209	FGL	1.3
	Total	686,000		
Green sunfish x redear sunfish	1972	15,000		UNK
	Total	15,000		
Largemouth bass	1967	200,000	UNK	UNK
	1969	200,000	UNK	UNK
	1971	50,000	UNK	UNK
	1980	85	UNK	UNK
	Total	450,085		
Palmetto Bass (striped X white bass hybrid)	1978	12,666	UNK	UNK
	1979	1,093,000	FRY	0.4
	1981	948,550	FRY	0.4
	Total	2,054,216		
Threadfin shad	1984	1,000	AFGL	3.0
	Total	1,000		

Table 4. Survey of littoral zone and physical habitat types, Worth 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
Bluff	0.3			
Cut bank	0.3			
Concrete	1.3			
Gravel	6.8			
Rip rap	1.5			
Bulkhead	0.9			
Native emergent	4.7		72	2
Boulders	2.8			
Overhanging brush	2.0			
Standing timber			112	3
Nondescript	6.4			

Gizzard Shad



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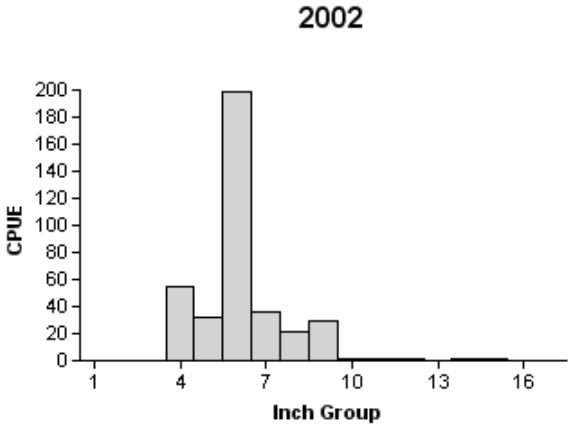
Stock CPUE = 77.0 (28; 77)
IOV = 90.33 (2.8)



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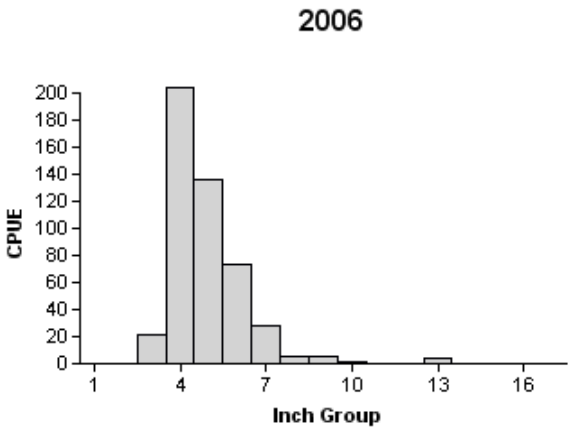
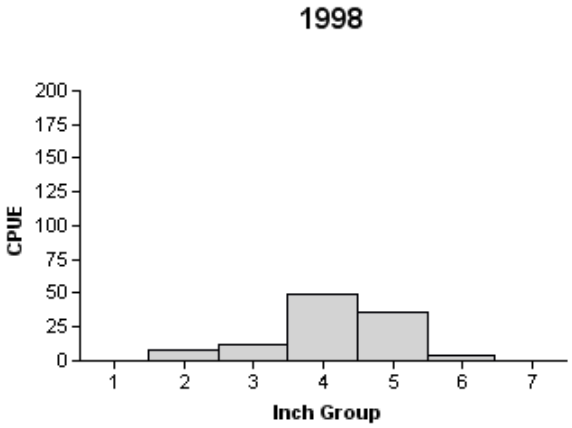
Stock CPUE = 94.0 (28; 94)
IOV = 84.74 (4.1)



Effort = 1.0
Total CPUE = 480.0 (55; 480)
Stock CPUE = 45.0 (19; 45)
IOV = 96.46 (1.9)

Figure 2. Number of gizzard shad caught per hour (CPUE; bars) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Worth Reservoir, Texas, 1998, 2002, and 2006.

Bluegill



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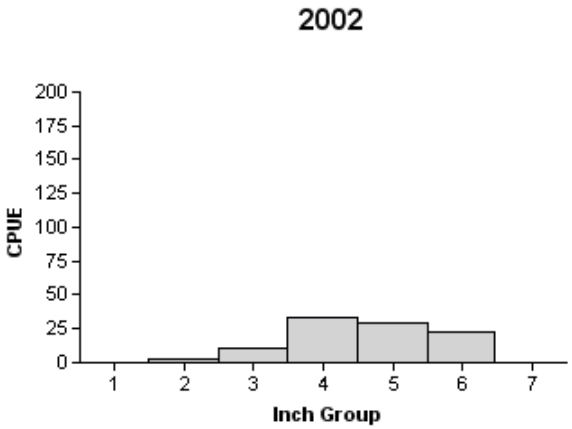
Stock CPUE = 101.0 (29; 101)
PSD = 4 (2.1)



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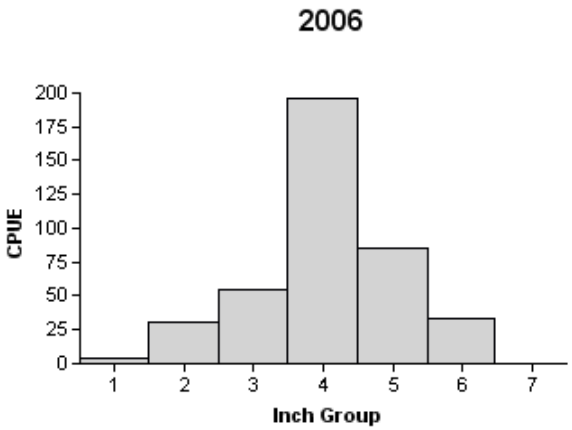
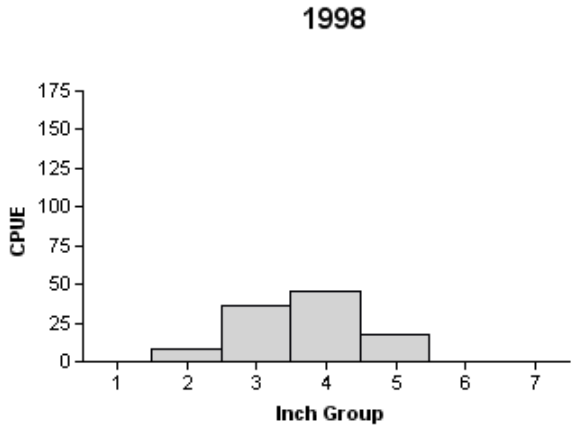
Stock CPUE = 97.0 (29; 97)
PSD = 24 (5.6)



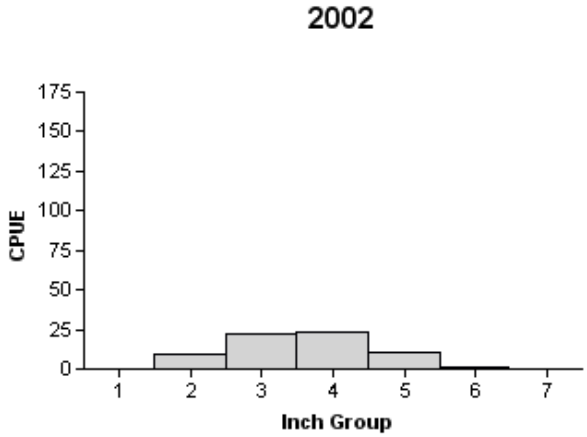
Effort = 1.0
Total CPUE = 404.0 (18; 404)
Stock CPUE = 369.0 (18; 369)
PSD = 9 (1.4)

Figure 3. Number of bluegill caught per hour (CPUE; bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Worth Reservoir, Texas, 1998, 2002, and 2006.

Longear Sunfish



Effort = 1.0
Total CPUE = 108.0 (27; 108)
Stock CPUE = 108.0 (27; 108)



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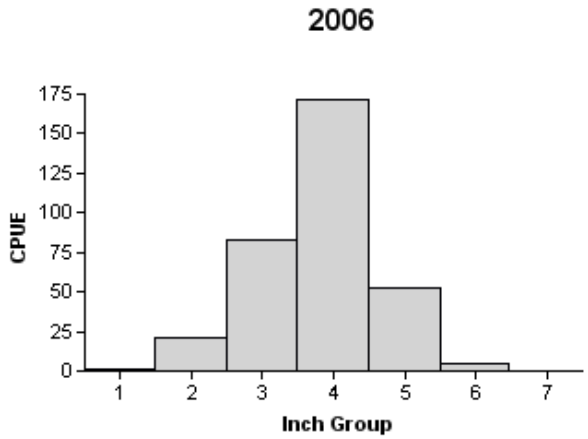
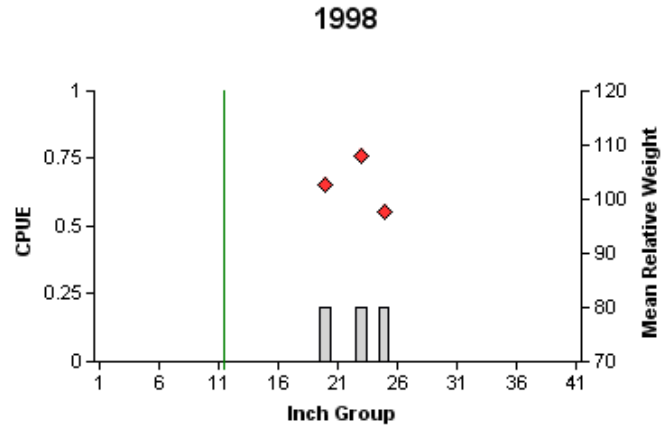
Stock CPUE = 66.0 (36; 66)



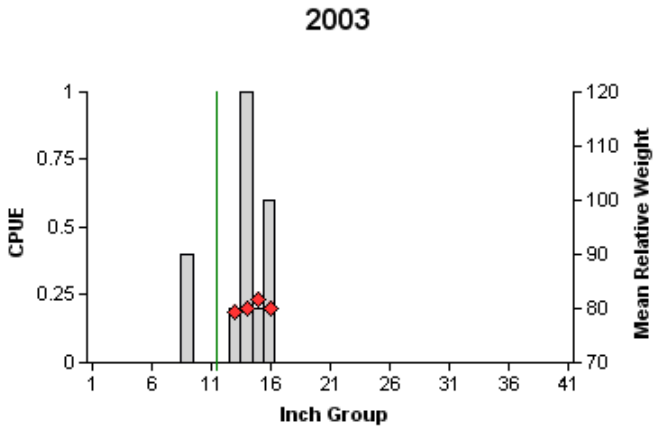
Effort = 1.0
Total CPUE = 334.0 (22; 334)
Stock CPUE = 334.0 (22; 334)

Figure 4. Number of longear sunfish caught per hour (CPUE;bars) (RSE and N for CPUE) for fall electrofishing surveys, Worth Reservoir, Texas, 1998, 2002, and 2006.

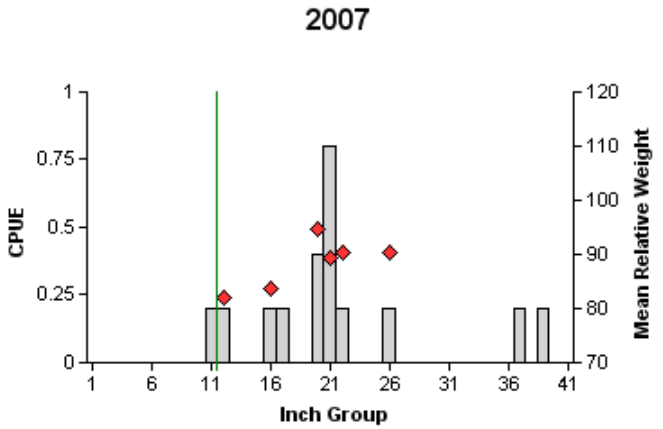
Blue Catfish



Effort = 5.0
Total CPUE = 0.6 (41; 3)
Stock CPUE = 0.6 (41; 3)
PSD = 100 (0)
RSD-P = 0 (0)



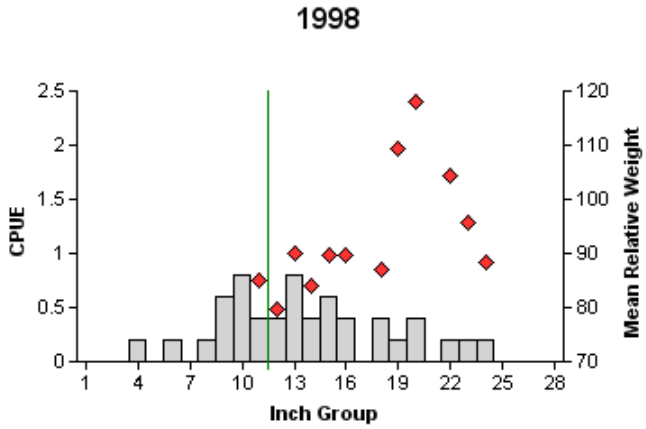
Effort = 5.0
Total CPUE = 2.4 (36; 12)
Stock CPUE = 2.0 (32; 10)
PSD = 0 (74.2)
RSD-P = 0 (0)



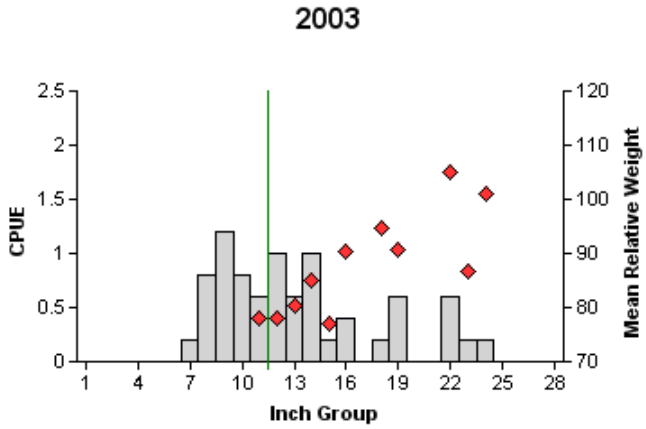
Effort = 5.0
Total CPUE = 2.8 (43; 14)
Stock CPUE = 2.6 (45; 13)
PSD = 77 (4.3)
RSD-P = 15 (9.7)

Figure 5. Number of blue catfish caught per net night (CPUE; bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Worth Reservoir, Texas, 1998, 2003, and 2007. Vertical line represents length limit at time of sampling.

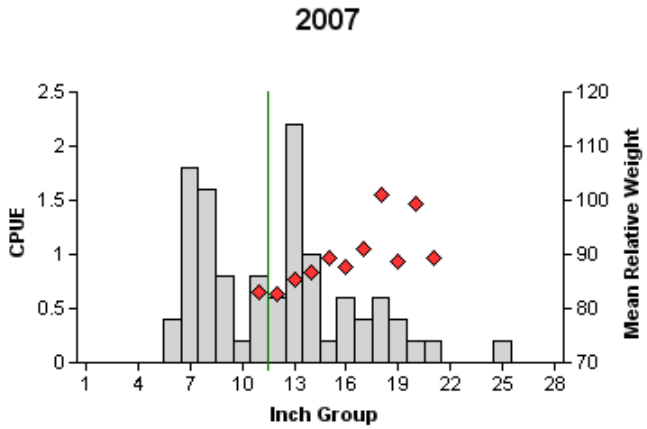
Channel Catfish



Effort = 5.0
Total CPUE = 6.6 (18; 33)
Stock CPUE = 4.6 (23; 23)
PSD = 43 (4.4)
RSD-12 = 91 (9.7)



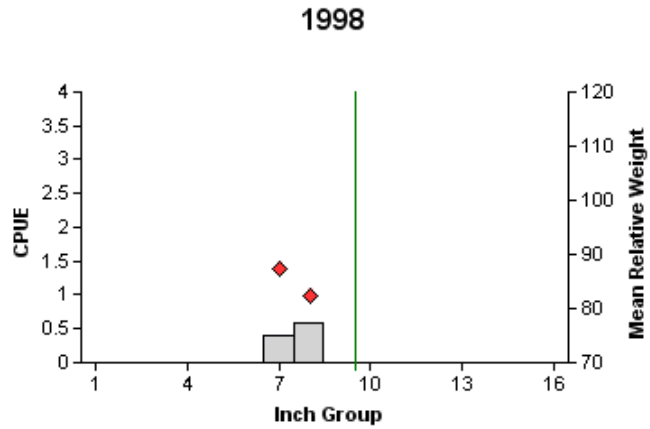
Effort = 5.0
Total CPUE = 8.6 (19; 43)
Stock CPUE = 5.6 (26; 28)
PSD = 39 (13.3)
RSD-12 = 89 (5.2)



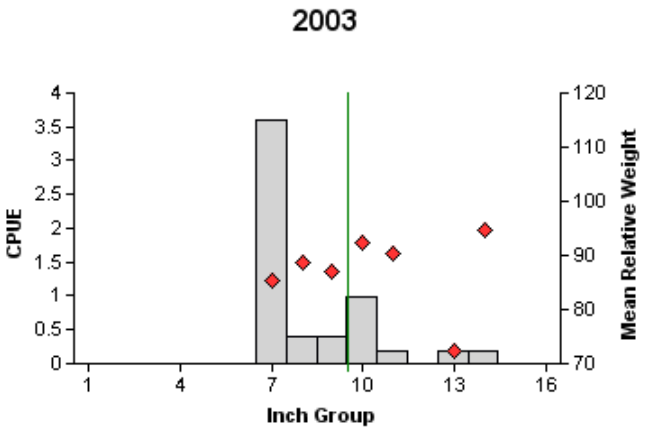
Effort = 5.0
Total CPUE = 12.4 (19; 62)
Stock CPUE = 7.6 (24; 38)
PSD = 37 (11)
RSD-12 = 89 (5.7)

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 spring gill net surveys, Worth Reservoir, Texas, 1998, 2003, and 2007. Vertical line represents length limit at time of sampling.

White Bass



Effort = 5.0
Total CPUE = 1.0 (45; 5)
Stock CPUE = 1.0 (45; 5)
PSD = 0 (67.1)



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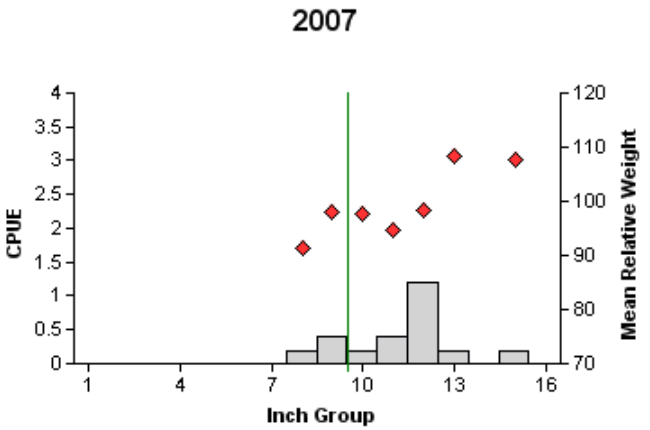
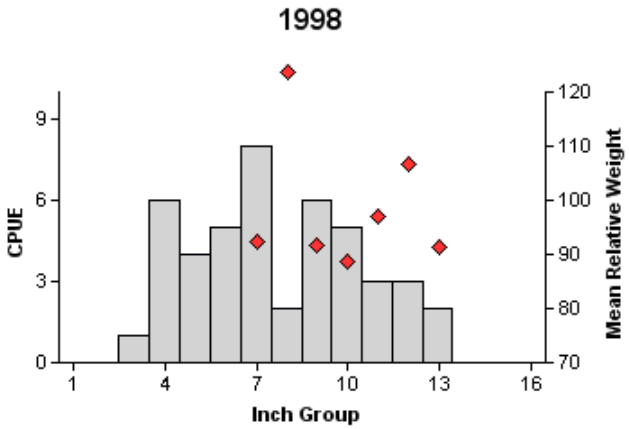
Stock CPUE = 6.0 (33; 30)
PSD = 33 (16.3)



Effort = 5.0
Total CPUE = 2.8 (41; 14)
Stock CPUE = 2.8 (41; 14)
PSD = 93 (6.3)

Figure 7. 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, Worth Reservoir, Texas, 1998, 2003, and 2007. Vertical line represents length limit at time of sampling.

Spotted Bass



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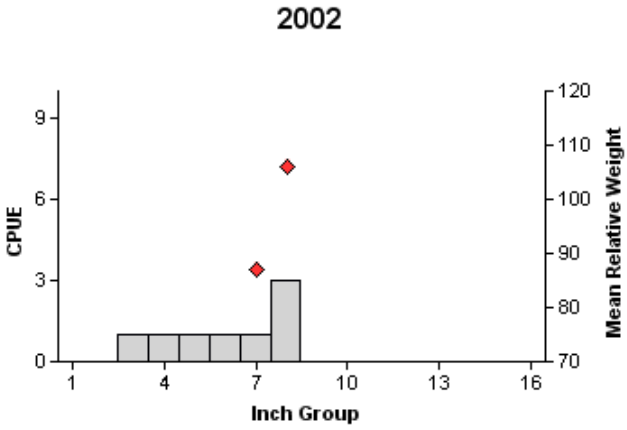
Stock CPUE = 29.0 (30; 29)
PSD = 28 (8.5)



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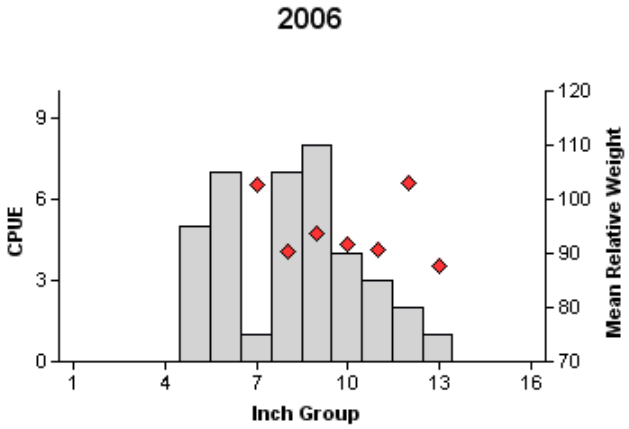
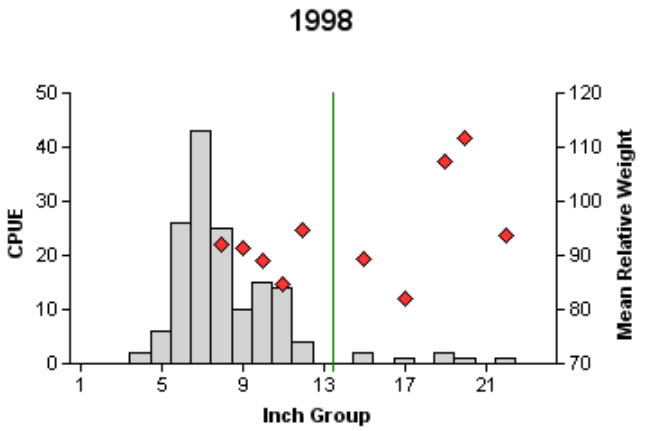
Stock CPUE = 4.0 (56; 4)
PSD = 0 (110.8)



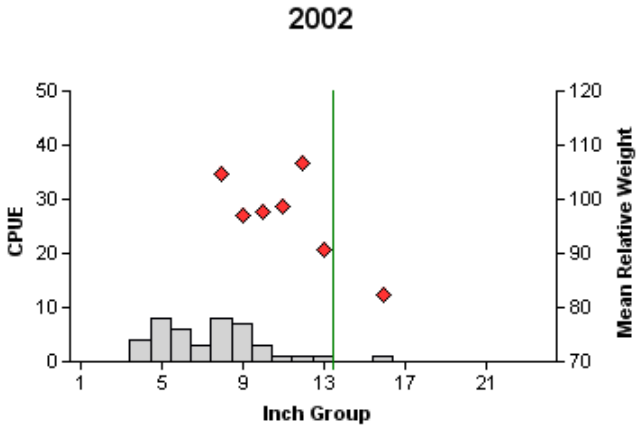
Effort = 1.0
Total CPUE = 38.0 (27; 38)
Stock CPUE = 26.0 (28; 26)
PSD = 23 (8.4)

Figure 8. Number of spotted 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, Worth Reservoir, Texas, 1998, 2002,and 2006.

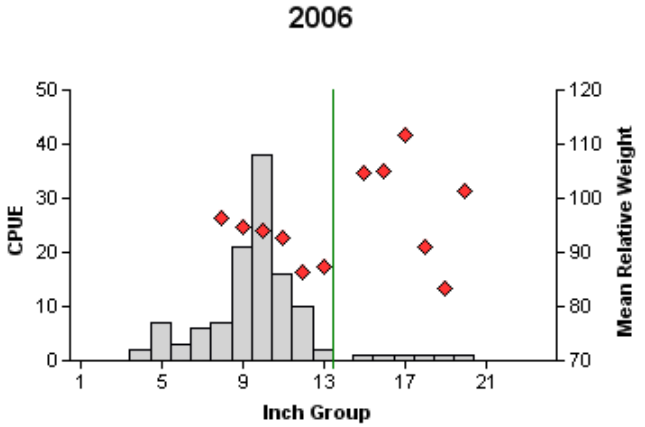
Largemouth Bass



Effort = 1.0
Total CPUE = 152.0 (22; 152)
Stock CPUE = 75.0 (31; 75)
PSD = 15 (4.2)
RSD-14 = 9 (3)



Effort = 1.0
Total CPUE = 43.0 (25; 43)
Stock CPUE = 22.0 (34; 22)
PSD = 14 (7.2)
RSD-14 = 5 (4.6)



Effort = 1.0
Total CPUE = 118.0 (16; 118)
Stock CPUE = 100.0 (16; 100)
PSD = 18 (3.4)
RSD-14 = 6 (1.9)

Figure 9. 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, Worth Reservoir, Texas, 1998, 2002,and 2006. Vertical lines represent length limit at time of sampling.

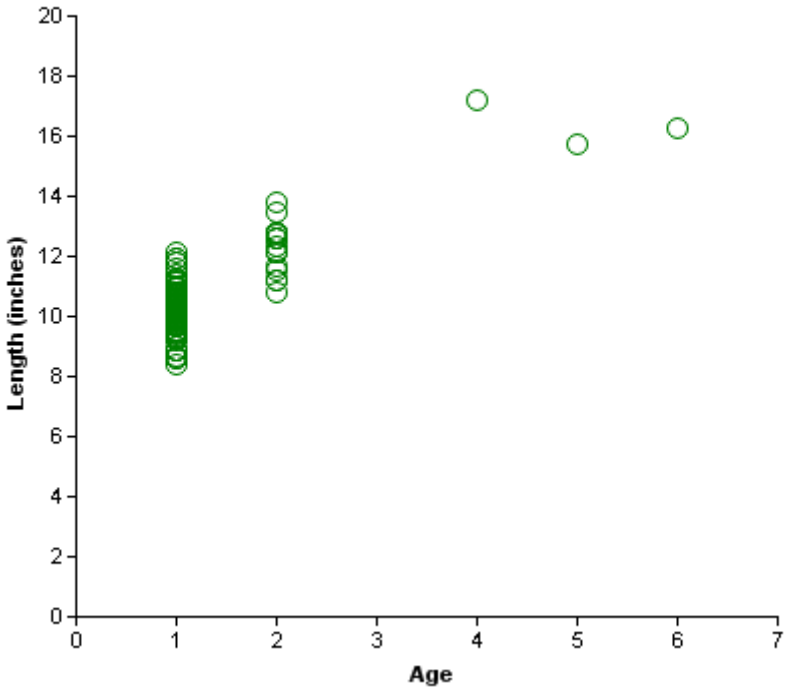
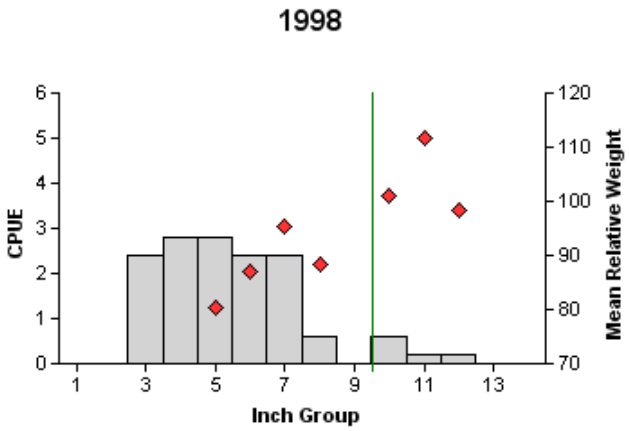


Figure 10. Length at age for largemouth bass (sexes combined) collected from electrofishing at Worth Reservoir, Texas, for fall 2006 (N=96).

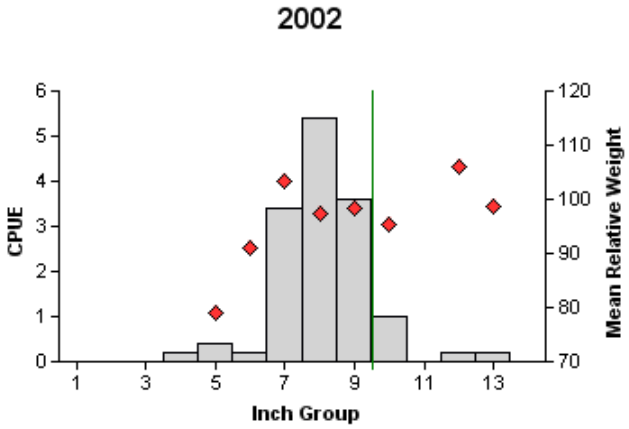
Table 5. Results of genetic analysis of largemouth bass collected by fall electrofishing, Worth Reservoir, Texas, 2006. FLMB = Florida largemouth bass, NLMB = Northern largemouth bass, F1 = first generation hybrid between a FLMB and a NLMB, Fx = second or higher generation hybrid between a FLMB and a NLMB.

Year	Sample size	Genotype			% FLMB alleles
		% FLMB	% NLMB	% Fx	
2006	40	0	20	80	33.0

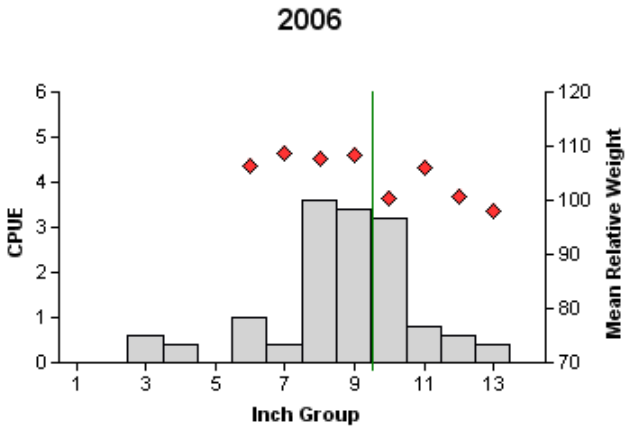
White Crappie



Effort = 5.0
Total CPUE = 14.4 (38; 72)
Stock CPUE = 9.2 (31; 46)
CPUE-10 = 1.0 (45; 5)
PSD = 17 (4.2)
RSD-10 = 11 (6.2)



Effort = 5.0
Total CPUE = 14.6 (39; 73)
Stock CPUE = 14.4 (41; 72)
CPUE-10 = 1.4 (70; 7)
PSD = 72 (5.7)
RSD-10 = 10 (5.5)



Effort = 5.0
Total CPUE = 14.4 (41; 72)
Stock CPUE = 13.4 (39; 67)
CPUE-10 = 5.0 (49; 25)
PSD = 90 (2.4)
RSD-10 = 37 (7.9)

Figure 11. 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, Worth Reservoir, Texas, 1998, 2002, and 2006. Vertical line represents length limit at time of sampling.

Table 6. Proposed sampling schedule for Worth Reservoir, Texas. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. Standard surveys are denoted by S and additional surveys denoted by A.

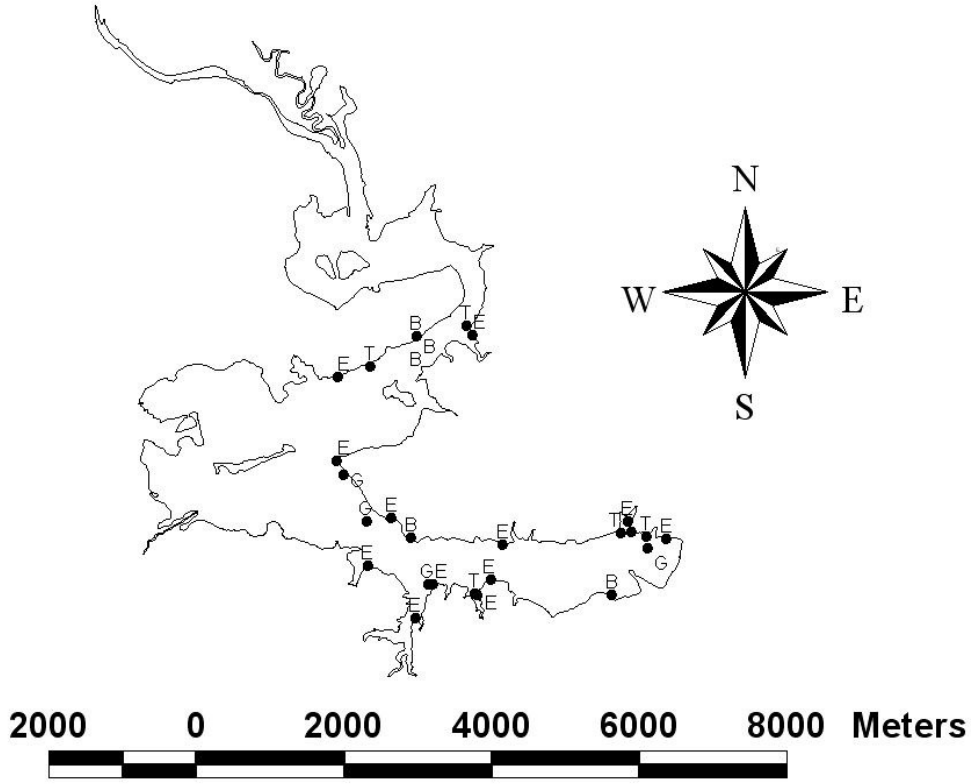
Survey Year	Electrofisher	Trap Net	Gill Net	Creel Survey	Report
Fall 2007-Spring 2008					
Fall 2008-Spring 2009					
Fall 2009-Spring 2010					
Fall 2010-Spring 2011	S	S	S	A	S

APPENDIX A

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

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Longnose gar	2	0.4				
Gizzard shad	46	9.2			480	480.0
Threadfin shad					149	149.0
Common carp	5	1.0				
River carp sucker	1	0.2				
Smallmouth buffalo	39	7.8				
Blue catfish	14	2.8				
Channel catfish	62	12.4				
White bass	14	2.8				
Redbreast sunfish					2	2.0
Bluegill					404	404.0
Longear sunfish					334	334.0
Redear sunfish					18	18.0
Spotted bass					38	38.0
Largemouth bass					118	118.0
White crappie			72	14.4		
Black crappie			4	0.8		
Freshwater drum	1	0.2				

APPENDIX B



Location of sampling sites, Worth Reservoir, Texas, 2006-2007. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively. Boat ramps are indicated with a B. Water level was approximately 2.5 ft below conservation pool at time of sampling.