

PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-30-R-33

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2007 Survey Report

Lake Welsh

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TABLE OF CONTENTS

Survey and management summary	2
Introduction.....	3
Reservoir description.....	3
Management history.....	3
Methods.....	4
Results and discussion.....	4
Fisheries management plan.....	6
Literature cited.....	7
Figures and tables.....	8-20
Water level (Figure 1).....	8
Reservoir characteristics (Table 1)	8
Harvest regulations (Table 2).....	9
Stocking history (Table 3).....	9
Aquatic vegetation survey (Figure 2, Table 4).....	10
Percent directed angler effort per species (Table 5).....	11
Total fishing effort and fishing expenditures (Table 6).....	11
Bluegill (Figure 3)	12
Redear sunfish (Figure 4)	13
Channel catfish (Figures 5-6; Table 7).....	14
Largemouth bass (Figures 7-9; Tables 8-9).....	16
Proposed sampling schedule (Table 10).....	20
Appendix A	
Catch rates for all species from all gear types	21
Appendix B	
Map of 2006-2007 sampling locations	22
Appendix C	
Map of 2006 fish attractor locations	23

SURVEY AND MANAGEMENT SUMMARY

Fish populations in Lake Welsh were surveyed in 2007 using electrofishing and in 2008 using gill nets. Anglers were surveyed from December 2007 to February 2008 with an access creel. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir description:** Lake Welsh is a 1,333-acre cooling reservoir for lignite-fueled power generation located on Swaunano Creek in the Big Cypress River Basin. The reservoir is located in Titus County. Habitat features consist of standing timber, rocky shoreline, riprap, and native aquatic plants.
- **Management history:** Important sport fish include largemouth bass and channel catfish. Largemouth bass have been managed under an 18-inch minimum length limit, 5 fish daily bag limit since September 1994. All other sport fishes in Lake Welsh have been managed with statewide regulations. Florida largemouth bass stockings in 1975 and 1976 were successful in establishing the Florida largemouth bass genetics in the population. Coontail was the most common aquatic plant in the lake although coverage was only about 10 acres. In 2006, fish attractors (approximately 300 recycled Christmas trees) were anchored at 4 locations in the reservoir.
- **Fish community:**
 - **Prey species:** Forage fish was limited to sunfish species. No threadfin shad or gizzard shad were collected. The electrofishing catch rate of all sunfish species in 2007 was relatively high with the majority of these fish available as prey.
 - **Catfishes:** Channel catfish were present in moderate numbers with fish from 13 to 27 inches collected during spring gill netting. Fish body condition was above average for most inch groups. Channel catfish were the second most sought after species in the winter creel survey.
 - **Largemouth bass:** Largemouth bass were relatively abundant and exhibited good size structure and adequate recruitment. Condition was average for most inch groups and growth was good with fish reaching legal-length (18 inches) during their third or fourth growing season. Largemouth bass was the most sought after species during the winter creel survey. During these months, anglers harvested approximately 1 fish/hour. The majority were caught during organized tournaments and were released following weigh-in.
- **Management strategies:** Conduct electrofishing surveys in 2009 and 2011, a gill netting survey in 2012, and an aquatic vegetation survey in 2011. An annual survey for waterhyacinth will also be conducted. Largemouth bass will continue to be managed under the current 18-inch minimum length limit. All other sport fish will continue to be managed under statewide harvest regulations.

INTRODUCTION

This document is a summary of fisheries data collected from Lake Welsh from June 2007 through May 2008. 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 fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2007 and 2008 data for comparison.

Reservoir description

Lake Welsh is a 1,333-acre impoundment constructed in 1976 on Swaunano Creek in the Cypress River Basin. It is located in Titus County approximately 10 miles southeast of Mt. Pleasant. The controlling authority is American Electric Power Company. Lake Welsh is a cooling reservoir for lignite-fueled power generation. It has a watershed of approximately 34 square miles and a shoreline length of 27 miles. Average annual water fluctuation was 1.9 feet (range = 1.0 - 2.9 feet) from 2001 to 2007; however, from 1999 and 2000, average annual water fluctuation was 4.1 feet (range = 4.0 – 4.3 feet) (Figure 1). Habitat features consist of standing timber, rocky shoreline, and native aquatic vegetation (Ryan and Brice 2004). Boat access consists of one public boat ramp. Bank fishing access is limited. Other descriptive characteristics for Lake Welsh are in Table 1.

Management history

Previous management strategies and actions: Management strategies and actions from the previous survey report (Ryan and Brice 2004) included:

1. Prepare news releases to inform anglers about fishing opportunities at Lake Welsh to promote utilization of the resource.
Action: News releases were sent to area news media informing the public of the fish attractor project conducted at Lake Welsh.
2. Meet with controlling authority to discuss access site improvements to help increase utilization.
Action: American Electric Power made improvements to the public access area of Lake Welsh. Improvements included a portable restroom, lighting, picnic tables, and a resurfaced parking lot.
3. Continue to manage largemouth bass under an 18-inch minimum length limit. Monitor the largemouth bass population with electrofishing biennially to ensure the population continues to benefit from the special harvest regulation.
Action: Electrofishing surveys were conducted in 2005 and 2007 to monitor the largemouth bass population and prey species.

Harvest regulation history: Largemouth bass have been managed under an 18-inch minimum length limit, 5 fish daily bag limit since September 1994. All other sport fishes in Lake Welsh have been managed with statewide regulations (Table 2).

Stocking history: In an effort to diversify the forage fish community, adult threadfin shad were stocked at a rate of 1.2 fish/acre in 1982. Florida largemouth bass were established in the reservoir from stockings in 1975 (55/acre) and 1976 (41/acre). Florida largemouth bass alleles have not dropped below 90% after stocking (Table 9). Channel catfish fingerlings were stocked in 1975 (49 fish/acre) and 1976 (38 fish/acre). Flathead catfish were stocked in 1978 (68 adults) and 1979 (3.6 fingerlings/acre). Blue catfish were stocked (1978; 25 fingerlings/acre), but a population did not establish. Black crappie were stocked from 1988 to 1990 at rates of 26-52 fingerlings/acre but a self-sustaining fishery never developed.

Vegetation/habitat history: Aquatic vegetation is present in low densities and covered <2% of the reservoir in 2007. Since the 1990s, coontail has been the dominant aquatic plant in the reservoir. Water hyacinth was documented at the boat ramp in fall 2007; physical removal was conducted by Texas Parks and Wildlife Department (TPWD) staff.

METHODS

Fishes were collected by electrofishing (1 hour at 12 5-min stations) and gill netting (5 net nights at 5 stations). An access angler creel survey was conducted from December 2007 to February 2008. 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, as the number of fish per net night (fish/nn). All survey sites were randomly selected and 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 relative weight (W_r) were calculated for target fishes according to Anderson and Neumann (1996). Relative standard error ($RSE = 100 \times SE$ of the estimate/estimate) was calculated for all CPUE statistics and for creel statistics and SE was calculated for structural indices and IOV. Ages for largemouth bass were determined using otoliths from 30 randomly-selected fish ranging from 8-19 inches. American Electric Power Company provided water level data.

RESULTS AND DISCUSSION

Habitat: Structural habitat consisted primarily of inundated timber (Ryan and Brice 2004). Native aquatic vegetation covered <2% (24.2 acres) of the reservoir (Figure 2). Coontail was the dominant species (10.4 acres; Table 4); however, waterhyacinth was discovered at the ramp during later sampling. Water hyacinth was physically removed. Due to the low abundance of habitat, approximately 300 fish attractors made from recycled Christmas trees were anchored at 4 locations in the reservoir in 2006 (Appendix C). This was a cooperative project completed by American Electric Power, TPWD, and the City of Longview.

Creel: Directed angling effort (Table 5) was highest for largemouth bass (98.7%), followed by channel catfish (1.3%). Total fishing effort for all species at Lake Welsh was 13,106 hours and anglers spent an estimated \$106,050 on direct expenditures during the three month creel period (Table 6).

Prey species: The forage fish community was limited to sunfish species. The electrofishing catch rate of all sunfish species combined (green sunfish, warmouth, bluegill, longear sunfish, and redear sunfish) in 2007 was 971.0/h which was 84% greater than 2003 and 32% greater than 1999. Although threadfin shad have been collected in high numbers in recent years (Ryan and Brice 2004) none were collected during the 2007 electrofishing survey. Gizzard shad have not been collected since 1993 (Ryan and Brice 2004).

Channel catfish: The gill net catch rate of channel catfish (Figure 5) in 2007 was 6.2/nn, which was considerably less than the catch rate of 2004 (25.4/nn) but similar to the catch rate of 1999 (4.3/nn). Body condition was good with mean W_r for most inch groups ≥ 100 (Figure 5). Creel surveys (February 2008) indicated that directed effort for catfish was 0.13 hours/acre (Table 7). Anglers targeting channel catfish caught and harvested 0.23 fish/h (Table 7). Total catfish harvest was 0.64 fish/acre (Table 7). Harvested fish observed during the creel survey ranged from 14 to 16 inches (Figure 6).

Largemouth bass: The electrofishing catch rate of largemouth bass in 2007 was 183.0/h (Figure 7). This catch rate was higher than that of 2005 (111.0/h) and 2003 (93.0). The number of stock-length (≥ 8 inches) largemouth bass increased over the past three electrofishing surveys (2003, 63.0/h; 2005, 93.0/h; and 2007, 175.0/h). Condition of largemouth bass was good with mean W_r values from 90 to 100 for most inch groups (Figure 7). Growth of largemouth bass was good with fish reaching legal-length (18 inches) during their third to fifth growing season (Figure 8). Creel surveys (December 2007 through

February 2008) indicated that anglers targeting black bass fished 9.71 hours/acre (Table 8). Anglers targeting black bass caught 0.8 fish/h (Table 8). For all anglers combined, total black bass harvest was 0.26 fish/acre. Observed harvest (all anglers) of largemouth bass ranged in length from 18 to 19 inches in length (Figure 9). Anglers released 65% of the legal-length (18 inches) largemouth bass that they caught (Table 8). In a 30-fish age-0 largemouth bass sample taken in 2006, 53% were pure Florida largemouth bass genotypes (Table 9).

Fisheries management plan for Lake Welsh, Texas

Prepared – July 2008

ISSUE 1: An 18-inch minimum length limit (5 fish daily bag limit) was implemented in September 1994 to improve fishing quality. Data indicate the regulation has been effective in meeting that objective.

MANAGEMENT STRATEGY

1. Continue to regulate largemouth bass harvest with an 18-inch minimum length limit.
2. Monitor the largemouth bass population with electrofishing biennially (2009 and 2011) to ensure the population continues to benefit from the special harvest regulation.

ISSUE 2: Waterhyacinth was discovered in waters adjacent to the public boat ramp at Lake Welsh in December 2007. TPWD along with American Electric Power conducted an immediate survey where all waterhyacinth was removed.

MANAGEMENT STRATEGY

1. Monitor for non-native invasive aquatic plants during annual vegetation surveys.
2. During times of high angling effort (winter months), have American Electric Power conduct inspections of Lake Welsh for the presence of non-native invasive aquatic plants.
3. Place signs at the boat ramp informing public of the risk of non-native invasive aquatic plants.

ISSUE 3: Anglers and other stakeholders need to be informed about fisheries management activities, fishing opportunities, and other issues at Lake Welsh.

MANAGEMENT STRATEGIES

1. Continue to provide news releases to the print and broadcast media.
2. Continue to provide fisheries presentations to the public regarding issues/opportunities at Lake Welsh

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes additional vegetation surveys (2008-2010), an additional electrofishing survey in 2009, and standard vegetation, electrofishing, and gill net surveys in 2011/2012. Additional aquatic vegetation surveys are necessary to monitor for non-native invasive plants which were documented in fall 2007 and are present in other reservoirs of the area. Supplemental electrofishing in 2009 will be conducted to monitor the largemouth bass and prey fish populations.

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.
- Ryan, M. J., and M. W. Brice. 2004. Statewide freshwater fisheries monitoring and management program survey report for Lake Welsh, 2003. Texas Parks and Wildlife Department, Federal Aid Report F-30-R, Austin.

Monthly Water Level

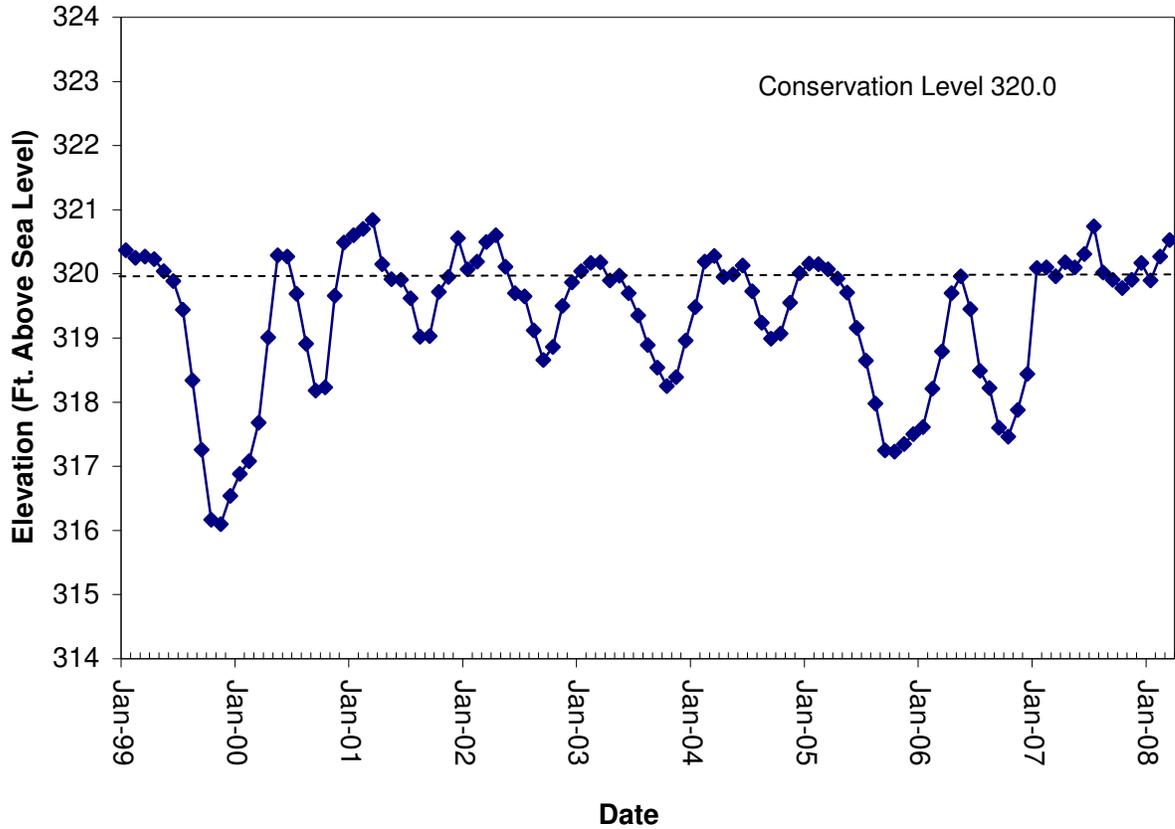


Figure 1. Average monthly water elevations in feet above mean sea level (MSL) recorded for Lake Welsh, Texas January 1999 to March 2008. Horizontal dashed-line denotes conservation pool level (378.0 msl).

Table 1. Characteristics of Lake Welsh, Texas.

Characteristic	Description
Year constructed	1976
Controlling authority	American Electric Power Company
County	Titus
Reservoir type	Tributary, cooling
Shoreline development index (SDI)	5.3
Conductivity	480 umhos/cm

Table 2. Harvest regulations for Lake Welsh, Texas.

Species	Bag Limit	Minimum-Maximum Length (inches)
Channel and blue catfish, their hybrids and subspecies	25 (in any combination)	12 - No Limit
Catfish, flathead	5	18 - No Limit
Bass, largemouth	5	18 - No Limit

Table 3. Stocking history of Lake Welsh, Texas. Size categories are fingerlings (FGL; 1-3 inches), advanced fingerlings (AFGL; 8 inches) and adults (ADL).

Species	Year	Number	Size
Threadfin shad	1982	1,600	ADL
	Total	1,600	
Blue catfish	1978	33,230	AFGL
	Total	33,230	
Channel catfish	1975	64,115	AFGL
	1976	50,000	AFGL
	Total	114,115	
Flathead catfish	1978	68	ADL
	1979	4,800	AFGL
	Total	4,868	
Black Crappie	1988	34,125	AFGL
	1989	36,769	AFGL
	1990	69,176	AFGL
	Total	140,070	
Florida largemouth bass	1975	73,350	AFGL
	1976	55,000	AFGL
	Total	128,350	

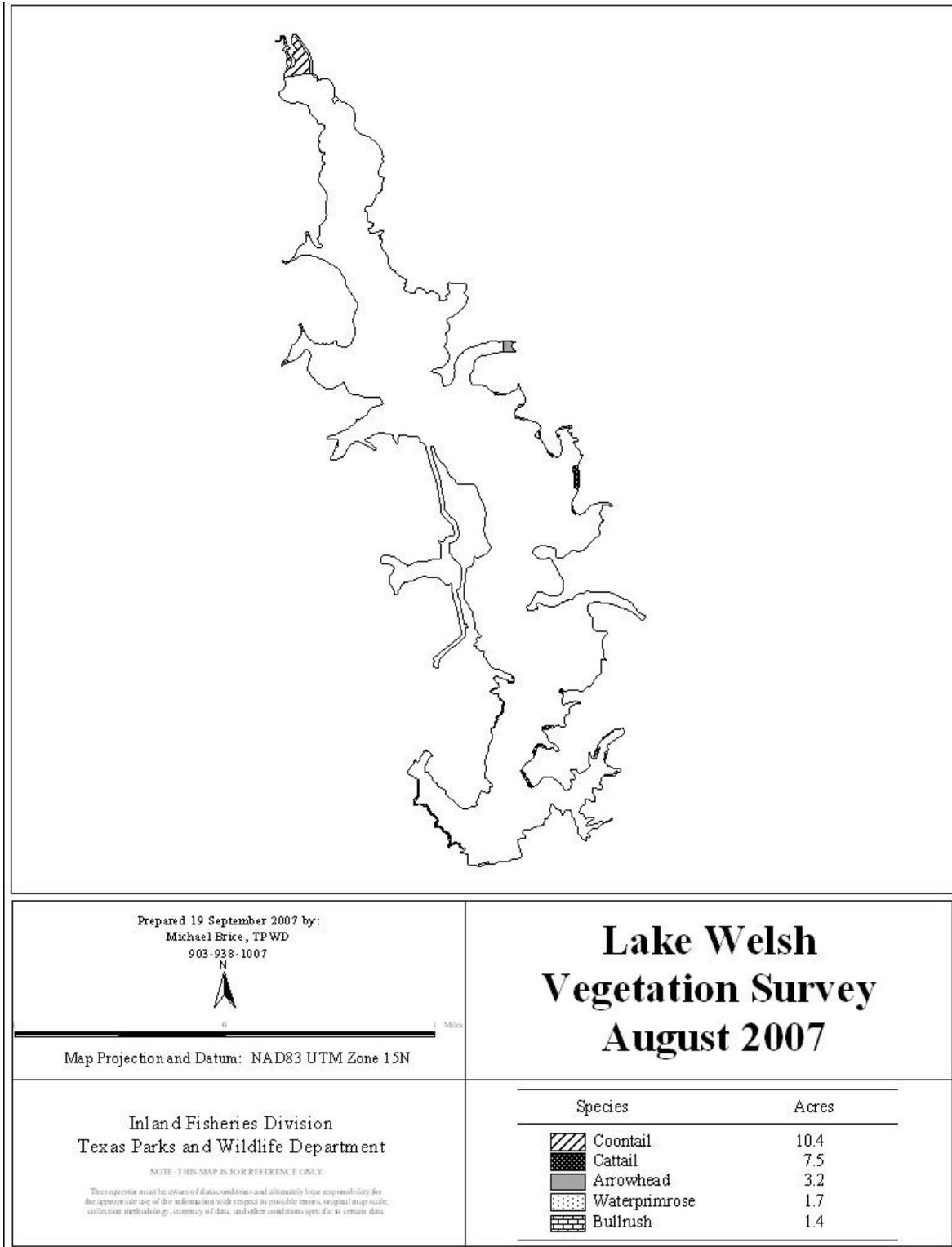


Figure 2. Results of aquatic vegetation survey conducted at Lake Welch, Texas September 2007.

Table 4. Survey of aquatic vegetation, Lake Welsh, Texas, August 2007. Surface area (acres) and percent of reservoir surface area was determined for dominant aquatic vegetation species.

Species	Acres	Percent of reservoir surface area
Coontail	10	0.8
Cattail	8	0.6
Arrowhead	3	0.2
Water primrose	2	0.1
Bullrush	1	0.1
Total	24	1.8

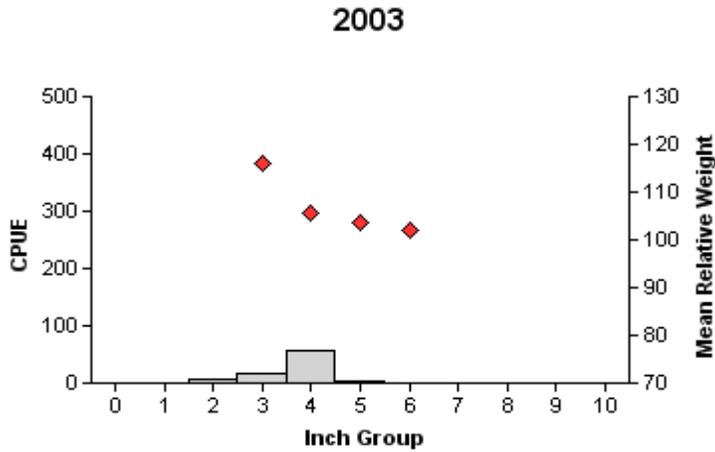
Table 5. Percent directed angler effort by species for Lake Welsh, Texas, December 2007–February 2008.

Species	Year
	2007- 2008
Largemouth bass	98.7
Channel catfish	1.3

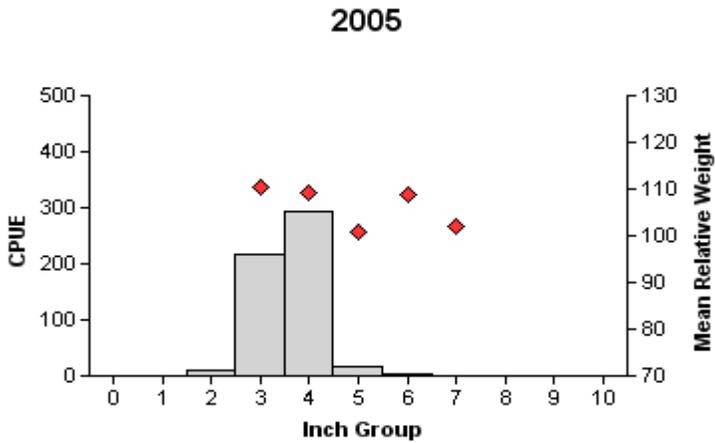
Table 6. Total fishing effort (h) for all species and total directed expenditures at Lake Welsh, Texas, December 2007- February 2008.

Creel Statistic	Year
	2007 - 2008
Total fishing effort	13,106
Total directed expenditures	\$106,050

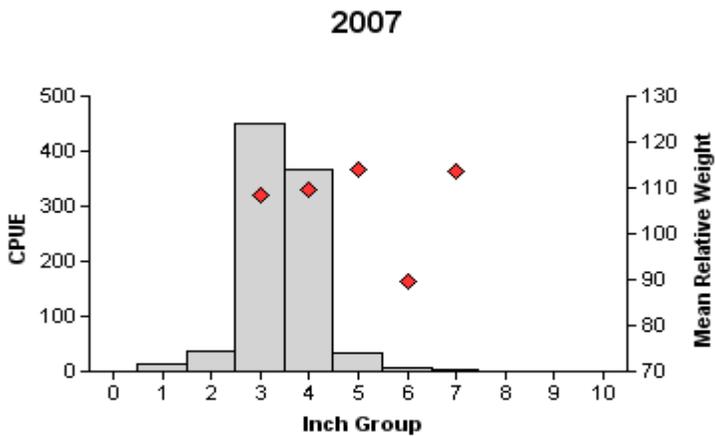
Bluegill



Effort = 1.0
 Total CPUE = 86.0 (25; 86)
 Stock CPUE = 80.0 (28; 80)
 PSD = 1 (1.2)
 RSD-P = 0 (0)



Effort = 1.0
 Total CPUE = 538.0 (30; 538)
 Stock CPUE = 527.0 (30; 527)
 PSD = 1 (0.4)
 RSD-P = 0 (0)



Effort = 1.0
 Total CPUE = 912.0 (16; 912)
 Stock CPUE = 862.0 (17; 862)
 PSD = 1 (0.5)
 RSD-P = 0 (0)

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 size structure are in parentheses) for fall electrofishing surveys, Lake Welsh, Texas, 2003, 2005, and 2007.

Redear sunfish

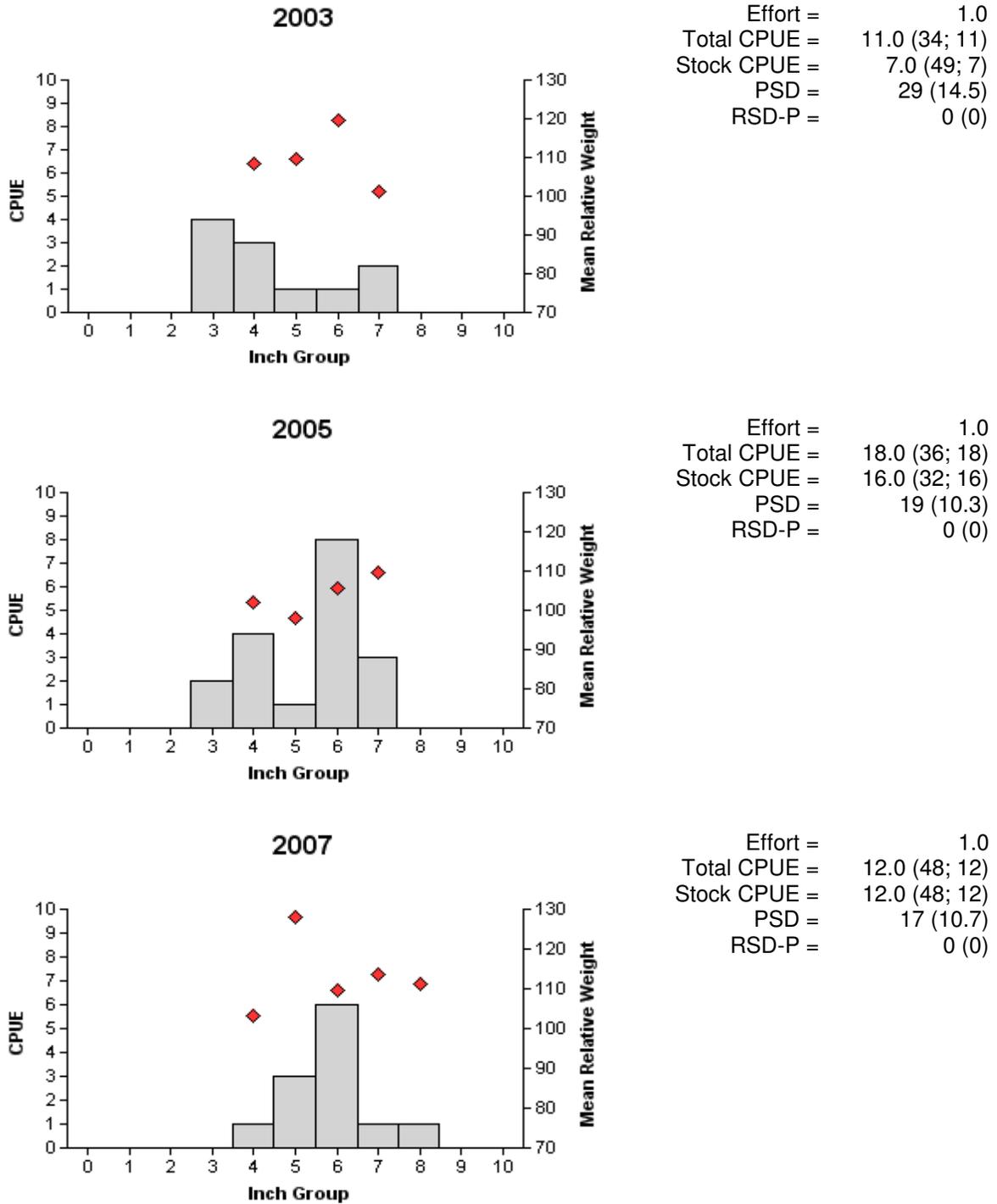


Figure 4. Number of redear sunfish caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Welsh, Texas, 2003, 2005, and 2007.

Channel catfish

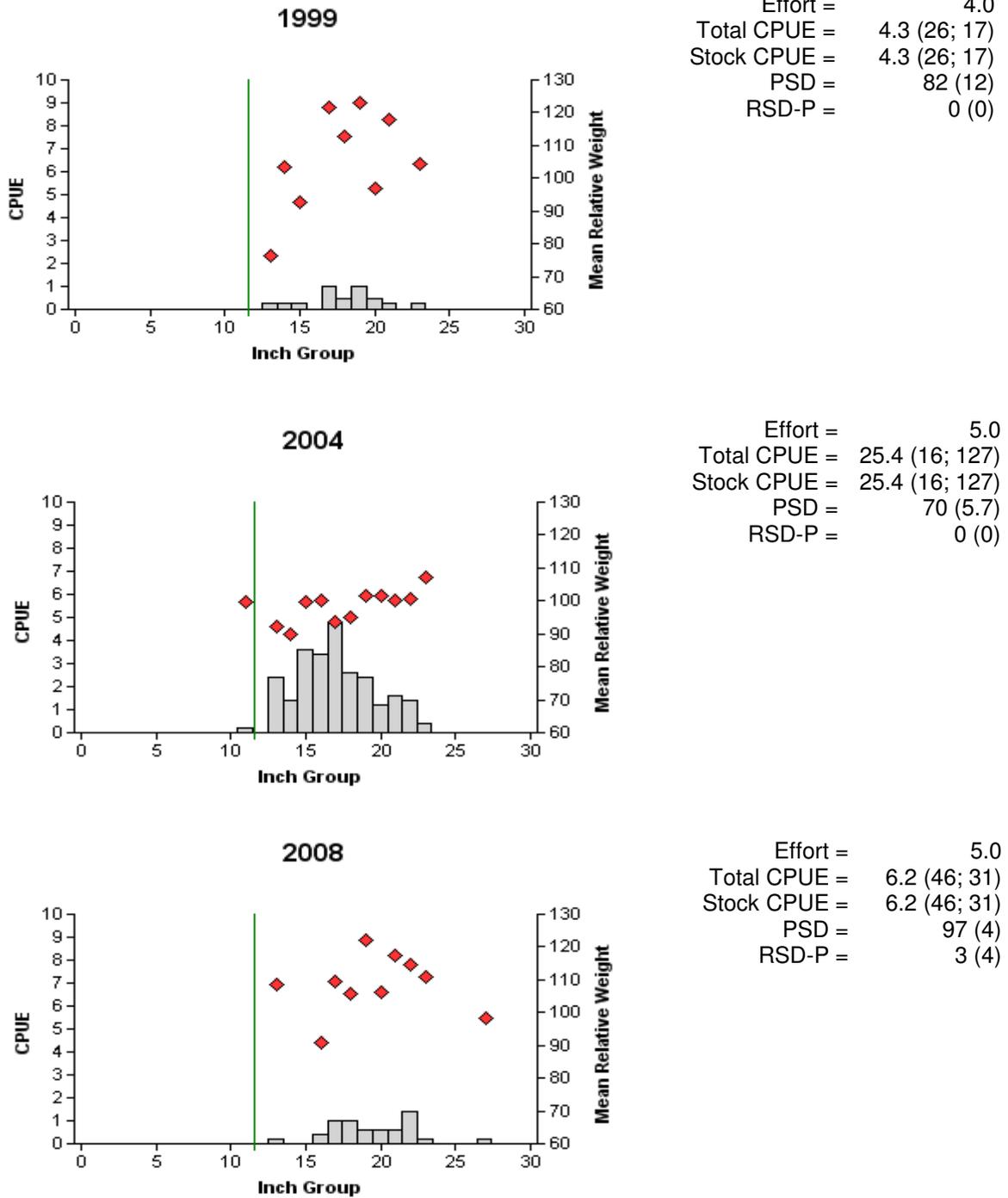


Figure 5. Number of channel catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Welsh, Texas, 1999, 2004, and 2008. Vertical lines indicate minimum length limit.

Channel catfish

Table 7. Creel survey statistics for channel catfish at Lake Welsh Springs, Texas from December 2007-February 2008 where total catch per hour is for anglers targeting catfish and total harvest is the estimated number of catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year	
	2007 - 2008	
Directed effort (h)	168.44 (96)	
Directed effort/acre	0.13 (96)	
Total catch per hour	0.23 (77)	
Total harvest	855 (98)	
Harvest/acre	0.64 (98)	
Percent legal released	0.0	

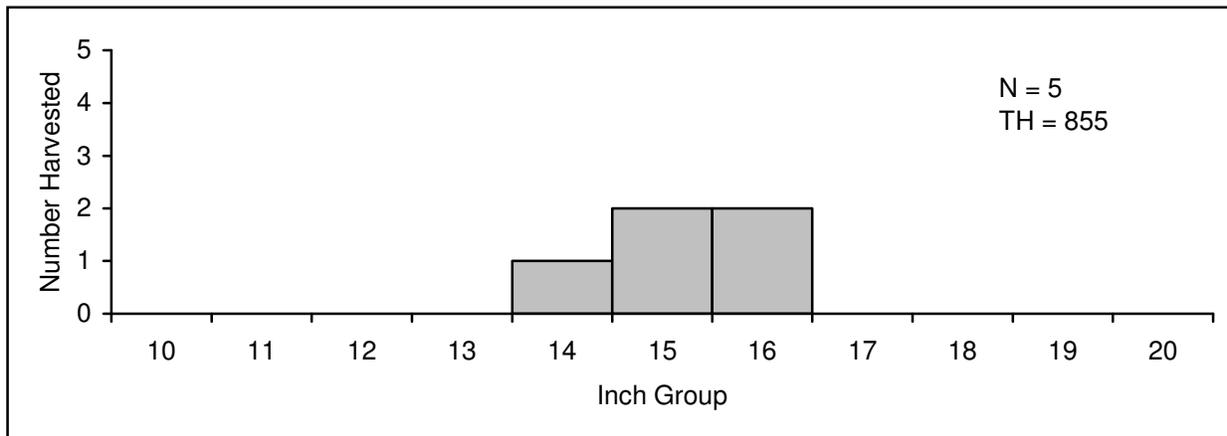


Figure 6. Length frequency of harvested channel catfish observed during creel surveys at Lake Welsh, Texas, December 2007-February 2008, all anglers combined. N is the number of harvested channel catfish observed during creel surveys, and TH is the total estimated harvest of catfish for the creel period.

Largemouth bass

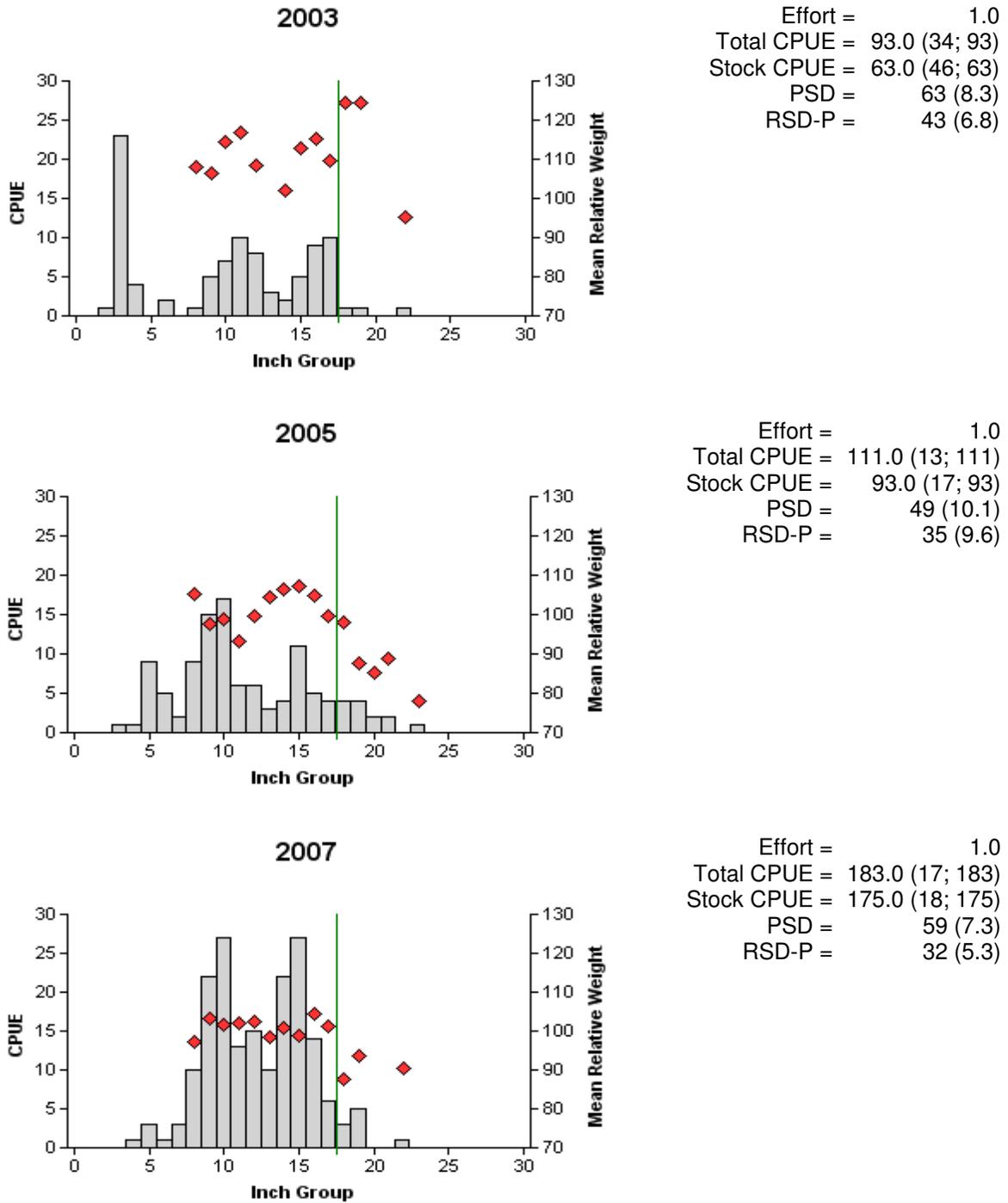


Figure 7. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Welsh, Texas, 2003, 2005, and 2007. Vertical lines indicate minimum length limit.

Largemouth bass

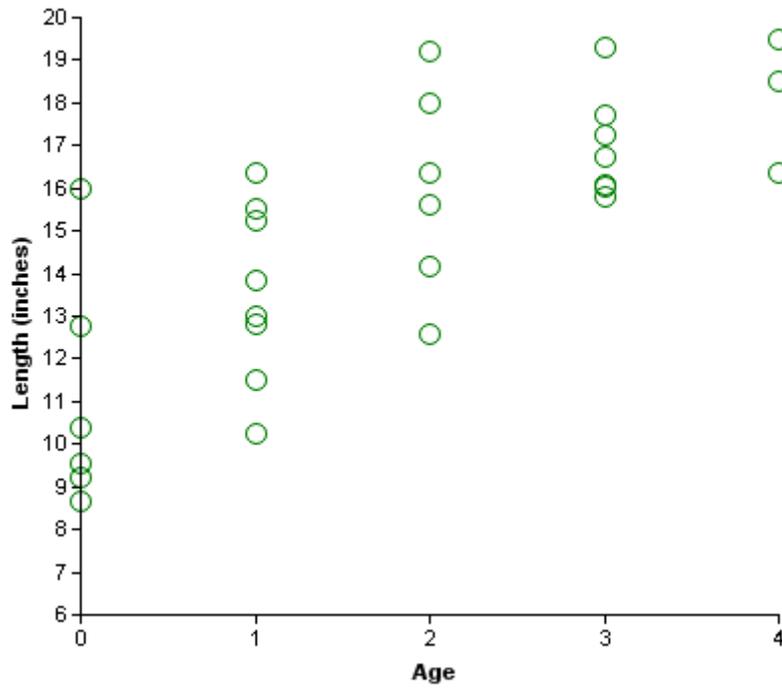


Figure 8. Length at age for largemouth bass collected by electrofishing at Lake Welsh, Texas, November 2007.

Largemouth bass

Table 8. Creel survey statistics for largemouth bass at Lake Welsh, Texas from December 2007 - February 2008, 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	
	2007 - 2008	
Directed effort (h)	12,937.19 (53)	
Directed effort/acre	9.71 (53)	
Total catch per hour	0.80 (9)	
Total harvest	342 (98)	
Harvest/acre	0.26 (98)	
Percent legal released	65	

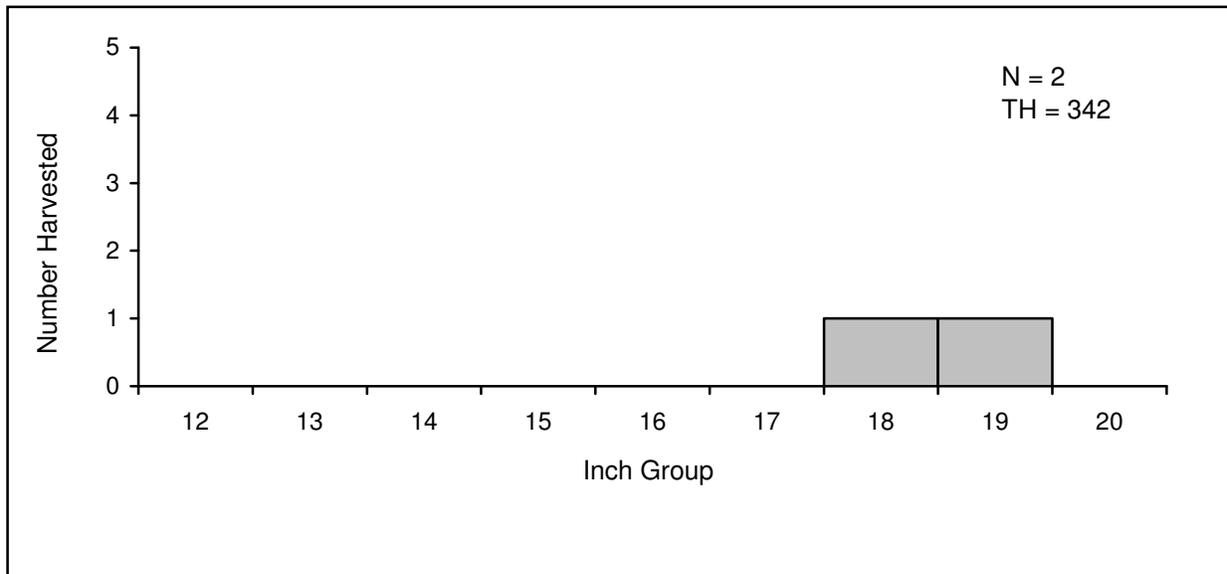


Figure 9. Length frequency of harvested largemouth bass observed during creel surveys at Lake Welsh, Texas, December 2007-February 2008, all anglers combined. N is the number of harvested largemouth bass observed during creel surveys, and TH is the total estimated harvest for the creel period. Fish observed were from live-release tournaments.

Largemouth bass

Table 9. Results of genetic analysis of largemouth bass collected by fall electrofishing, Lake Welsh, Texas, 1989, 1991, 1996, 1999, 2005, and 2007. Largemouth bass genetics were assessed with micro-satellite DNA analysis in 2007 and 2005 and with electrophoresis in 1989, 1991, 1996, and 1999. FLMB = Florida largemouth bass, NLMB = Northern largemouth bass, F1 = first generation hybrid between a FLMB and a NLMB, Fx = second or higher generation hybrid between a FLMB and a NLMB.

Year	Sample size	Genotype				% FLMB alleles	% pure FLMB
		FLMB	F1	Fx	NLMB		
1989	25	12	3	12	0	100.0	48.0
1991	30	14	1	15	0	100.0	46.7
1996	26	16	4	6	0	100.0	61.5
1999	8	5	0	3	0	90.6	62.5
2005	60	39	^a	^a	0	93.5	65.0
2007	30	16	^a	^a	0	93.0	53.0

^a Determination of hybrid status not conducted.

Table 10. Proposed sampling schedule for Lake Welsh, Texas. Gill netting surveys are conducted in the spring, vegetation surveys are conducted in the summer, and electrofishing and trap netting surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

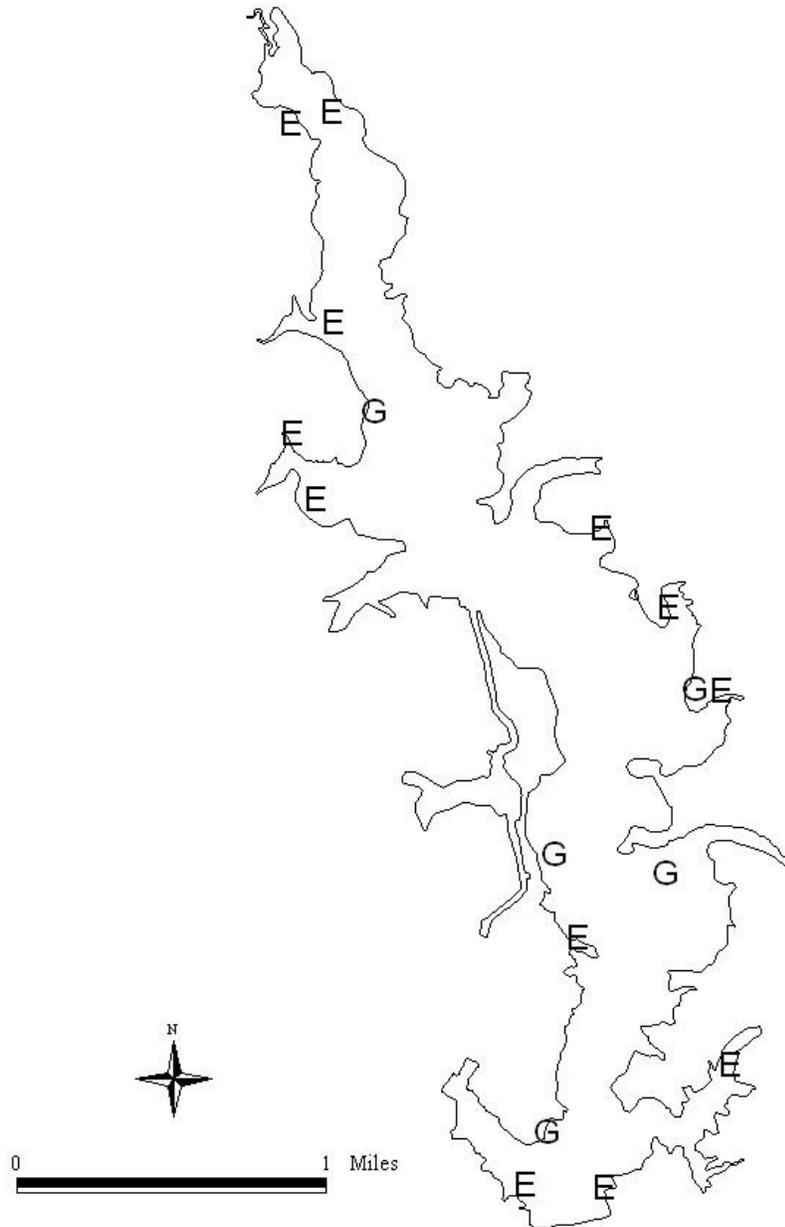
Survey Year	Vegetation	Electrofisher	Gill net	Report
Summer 2008 - Spring 2009	A			
Summer 2009 - Spring 2010	A	A		
Summer 2010 - Spring 2011	A			
Summer 2011 - Spring 2012	S	S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from gill netting and electrofishing from Lake Welsh, Texas, 2007-2008.

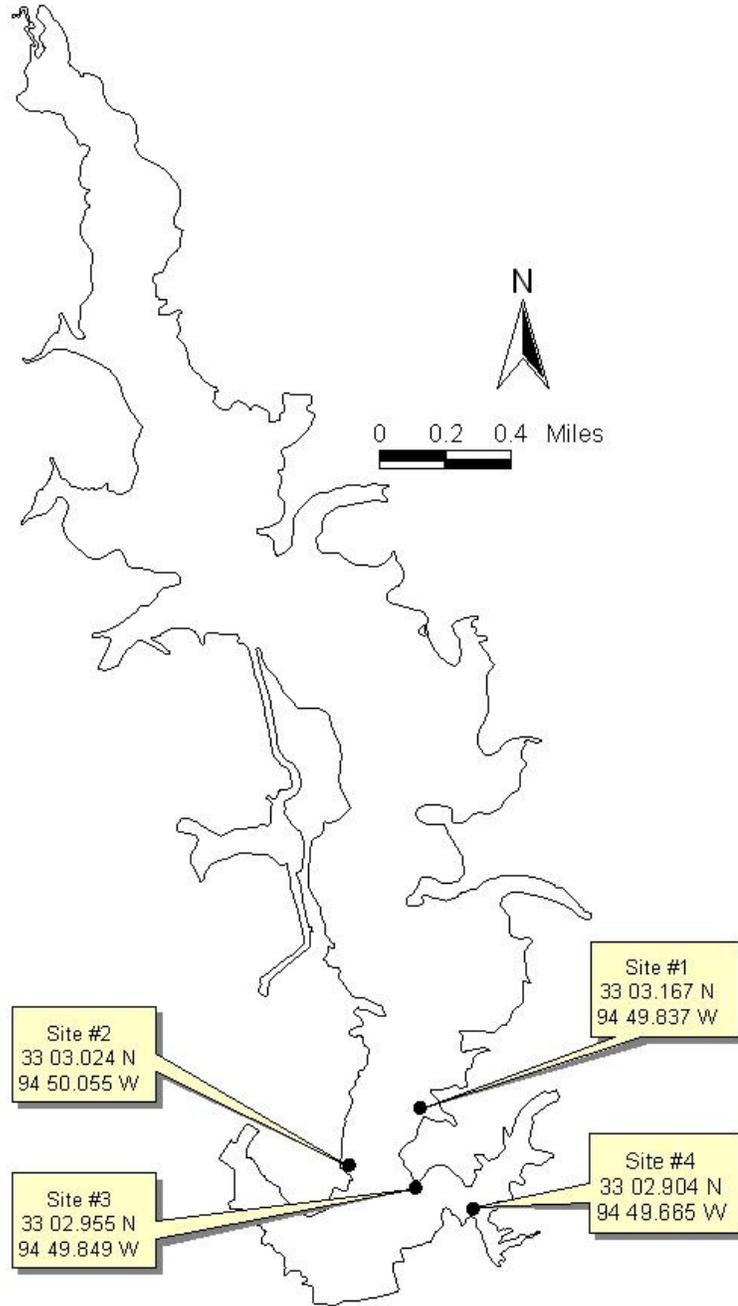
Species	Gill Netting		Electrofishing	
	N	CPUE	N	CPUE
Channel catfish	31	6.2		
Green sunfish			12	12.0
Bluegill			912	912.0
Longear sunfish			35	35.0
Redear sunfish			12	12.0
Largemouth bass			183	183.0

APPENDIX B



Location of sampling sites, Lake Welsh, Texas, 2007-2008. Gill net and electrofishing stations are indicated by G and E, respectively.

APPENDIX C



Location of fish attractors, Lake Welch, Texas, 2007-2008.