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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2011 Survey Report

Lake Welsh

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July 31, 2012

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Lake Welsh were surveyed in 2011 using electrofishing and in 2012 using gill netting. 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. In 2011, fish attractors (sunken Christmas trees) were deployed at 6 locations in the reservoir.

- **Fish community:**
  - **Prey species:** Prey fish were limited to sunfish species. No threadfin shad or gizzard shad were collected. The electrofishing catch rate of all sunfish species in 2011 was higher than 2009 with the majority of these fish available as prey.

  - **Catfishes:** Channel catfish were present in high numbers with fish ranging from 8 to 25 inches collected during spring gill netting. Most catfish were above the minimum length limit, but few large fish were collected. Body condition was above average for most inch groups.

  - **Largemouth bass:** Largemouth bass were less abundant in 2011 than the 2009 and 2007 surveys, but exhibited good size structure and growth. Body condition was above average for most inch groups and initial growth was fast.

- **Management strategies:** Conduct electrofishing surveys in 2013 and 2015, a gill netting survey in 2016, and an aquatic vegetation survey in 2015. Additional vegetation surveys will be conducted from 2012-2014 and a winter quarter creel will be conducted from December 2015 through February 2016. 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 2011 through May 2012. 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 2011-2012 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 level fluctuation was 2.1 feet (range = 1.0 - 2.9 feet) from 2001 to 2011; however, during fall sampling, the water level was approx 4 feet below conservation pool (Figure 1). Habitat features consist of standing timber, rocky shoreline, and limited amounts of aquatic vegetation (Brice and Bister 2008). 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 (Brice and Bister 2008) included:

1. Continue to regulate largemouth bass harvest with an 18-inch minimum length limit. Monitor the largemouth bass population with electrofishing biennially (2009 and 2011) to ensure the population continues to benefit from the special harvest regulation.
   Action: Electrofishing surveys were conducted in 2009 and 2011 to monitor the largemouth bass population and prey species.

2. Monitor for non-native invasive aquatic plants during annual vegetation surveys. 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. Place signs at the boat ramp informing public of the risk of non-native invasive aquatic plants.
   Action: Annual aquatic vegetation surveys were conducted to monitor for non-native invasive aquatic species. A sign was placed at the boat ramp informing the public of the risk of non-native invasive aquatic plants.

3. Continue to provide news releases to the print and broadcast media. Continue to provide fisheries presentations to the public regarding issues/opportunities at Lake Welsh.
   Action: Press releases were provided to inform the public of the placement of fish attractors in Lake Welsh.

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: Adult threadfin shad were stocked at a rate of 1.2 fish/acre in 1982 (Table 3). Florida largemouth bass were established in the reservoir from stockings in 1975 (55 fish/acre) and 1976 (41 fish/acre). Florida largemouth bass alleles have not dropped below 89% after stocking (Table 5). 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 fish/acre). Blue catfish were stocked (1978; 25 fish/acre), but a

population did not establish. Black crappie were stocked from 1988 to 1990 at rates ranging from 26 to 52 fish/acre, but a self-sustaining fishery never developed.

Vegetation/habitat history: Aquatic vegetation is present in low densities and covered < 4% of the reservoir in 2011. Coontail was the dominant aquatic plant in the reservoir during the 1999, 2003, and 2007 vegetation surveys, but total aquatic vegetation coverage was always less than 5% (Ryan and Brice 2000, 2004; Brice and Bister 2008). Hydrilla was observed in the reservoir in low abundance 2009 and 2010, but coverage was sporadic and varied throughout the year. Water hyacinth was documented at the boat ramp in fall 2007; physical removal was conducted by Texas Parks and Wildlife Department (TPWD) staff.

Water Transfer: Lake Welsh receives supplemental water from Lake O' The Pines to help maintain necessary water levels to function as a cooling reservoir for the American Electric Power generation plant. This water transfer is within the Cypress River Basin.

METHODS

Fish were collected by electrofishing (1 hour at 12, 5-min 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, as the number of fish per net night (fish/nn). All survey sites (Appendix B) were randomly selected and were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). A vegetation/structural habitat survey and angler access survey were conducted in August 2011.

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), as defined by Guy et al. (2007)], and condition indices [relative weight (W_r)] were calculated for target fishes according to Anderson and Neumann (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. Average age at 14 inches was determined using otoliths for largemouth bass 13.0 to 14.9 inches in 2011 (N = 13). American Electric Power Company provided water level data.

RESULTS AND DISCUSSION

Habitat: Inundated timber covered 32.7% (436.3 acres) of the reservoir while Hydrilla covered 3.4% (45.3 acres) (Table 4). Due to low water levels and exposed littoral areas during the survey, no other aquatic vegetation was found. Water hyacinth, which was discovered at the boat ramp and eradicated in 2007, was not found in 2011. Due to the low abundance of habitat, recycled Christmas trees were deployed at 6 locations in the reservoir in 2011 (Appendix C). This was a cooperative project completed by American Electric Power, TPWD, and the City of Longview.

Prey species: The forage fish community was limited to sunfish species. The electrofishing catch rate of all sunfish species combined (green sunfish, bluegill, longear sunfish, and redear sunfish) in 2011 was 1,185.0/h (Appendix A) which was 48% greater than 2009 and 22% greater than 2007. Bluegill (78.8%) and green sunfish (16.8%) comprised the majority of all forage fish with most ranging from 2-4 inches in length (Figure 2). Longear sunfish were present in relatively low numbers and made up only 4.2% of all sunfish collected while only two redear sunfish were collected (Figure 3). Although threadfin shad have been collected in past surveys (10.0/h in 2009) none were collected during the 2011 electrofishing survey. Summer fish kills that primarily affect shad have periodically occurred on Lake Welsh. Threadfin shad have not been collected in significant numbers since 2003 and gizzard shad have not been collected since 1993 (Appendix D).

Channel catfish: The gill net catch rate of channel catfish (Figure 4) in 2012 was 15.8/nn, which was

higher than the catch rate of 2008 (6.2/nn) but less than the catch rate of 2004 (25.4/nn). Body condition was above average with mean W_r for most inch groups above 90 (Figure 4). The majority of channel catfish collected were above the minimum length limit with most ranging from 13-18 inches, but only a few preferred length (>24 inches) fish were captured.

Largemouth bass: The electrofishing catch rate of largemouth bass in 2011 was 70.0/h (Figure 5). This catch rate was lower than that of 2009 (121.0/h) and 2007 (183.0/h). The number of stock-length ($\geq$8 inches) largemouth bass declined over the past three electrofishing surveys (2007, 175.0/h; 2009, 114.0/h; and 2011, 65.0/h). Recruitment was lower in 2011 compared to 2009 and 2007 with nearly half the number of largemouth bass in the 5-10 inch range. The decrease in recruitment could be a result of low water levels which reduced littoral habitat and likely decreased survival of age-0 bass. Additionally, capture efficiency of age-0 bass during electrofishing may have been reduced due to low water levels. Condition of largemouth bass was above average with mean W_r values above 110 for most length groups from 8-13 inches. Condition was above 90 for most other length groups, however, condition declined with increasing length (Figure 5). High condition values may be attributed to the high abundance of available forage fish. Growth of largemouth bass in Lake Welsh was fast. Average age at 14 inches (13.0 to 14.9 inches) was 1.6 years (N = 13; range = 0 to 3 years). In a 30-fish largemouth bass sample taken in 2011, 17% were pure Florida largemouth bass genotypes, which was much lower than the 2007 (53%) and 2005 (65%) genotype contributions (Table 5).

Fisheries management plan for Lake Welsh, Texas

Prepared – July 2012

ISSUE 1: An 18-inch minimum length limit (5 fish daily bag limit) was implemented in September 1994 to improve fishing quality. Lake Welsh largemouth bass have fast initial growth rates and above average condition. However, condition was only average for largemouth bass over 14 inches and catch rates of trophy bass were unknown.

MANAGEMENT STRATEGIES

1. Evaluate the prey base in 2013 and if needed, recommend stocking shad to improve the forage base and improve the condition of largemouth bass.
2. Conduct a winter quarter creel from December 2015 through February 2016 to monitor the fishery.
3. Continue to regulate largemouth bass harvest with an 18-inch minimum length limit.
4. Monitor largemouth bass population with electrofishing biennially (2013 and 2015) to ensure the population benefits from the special harvest regulation.

ISSUE 2: Hydrilla was present at the northern end of the reservoir, but current coverage was less than 4%. Waterhyacinth was discovered in waters adjacent to the public boat ramp in December 2007 and was removed by the TPWD along with American Electric Power. Other non-native invasive aquatic species such as giant salvinia remains a potential threat to Lake Welsh.

MANAGEMENT STRATEGIES

1. Monitor for non-native invasive aquatic plants during annual vegetation surveys.
2. Have American Electric Power conduct regular inspections of the Lake Welsh boat ramp for the presence of non-native invasive aquatic plants and report to TPWD if invasive plants are found.

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

MANAGEMENT STRATEGIES

1. Provide information related to fishing at Lake Welsh to print, broadcast, and social media.
2. Continue to provide fisheries presentations to the public regarding issues/opportunities at Lake Welsh.

ISSUE 4: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels 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 and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing and swimming. The financial costs of controlling 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 and literature so that they can educate their customers.
3. Educate the public about invasive species through the use of media and the internet.

4. Discuss invasive species when presenting to constituent and user groups.
5. Document existing and future inter-basin water transfers to facilitate potential invasive species responses.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes vegetation surveys (2012-2015), electrofishing surveys in 2013 and 2015, a gill net survey in 2016, and an access survey in 2016 (Table 6). Aquatic vegetation surveys are necessary to monitor for non-native invasive plants, hydrilla and water hyacinth, which were documented in fall 2007 and are present in other reservoirs in the area. Electrofishing in 2013 will be conducted to monitor the largemouth bass and prey fish populations. An angler creel survey will be conducted from December 2015 through February 2016 to monitor the fishery.

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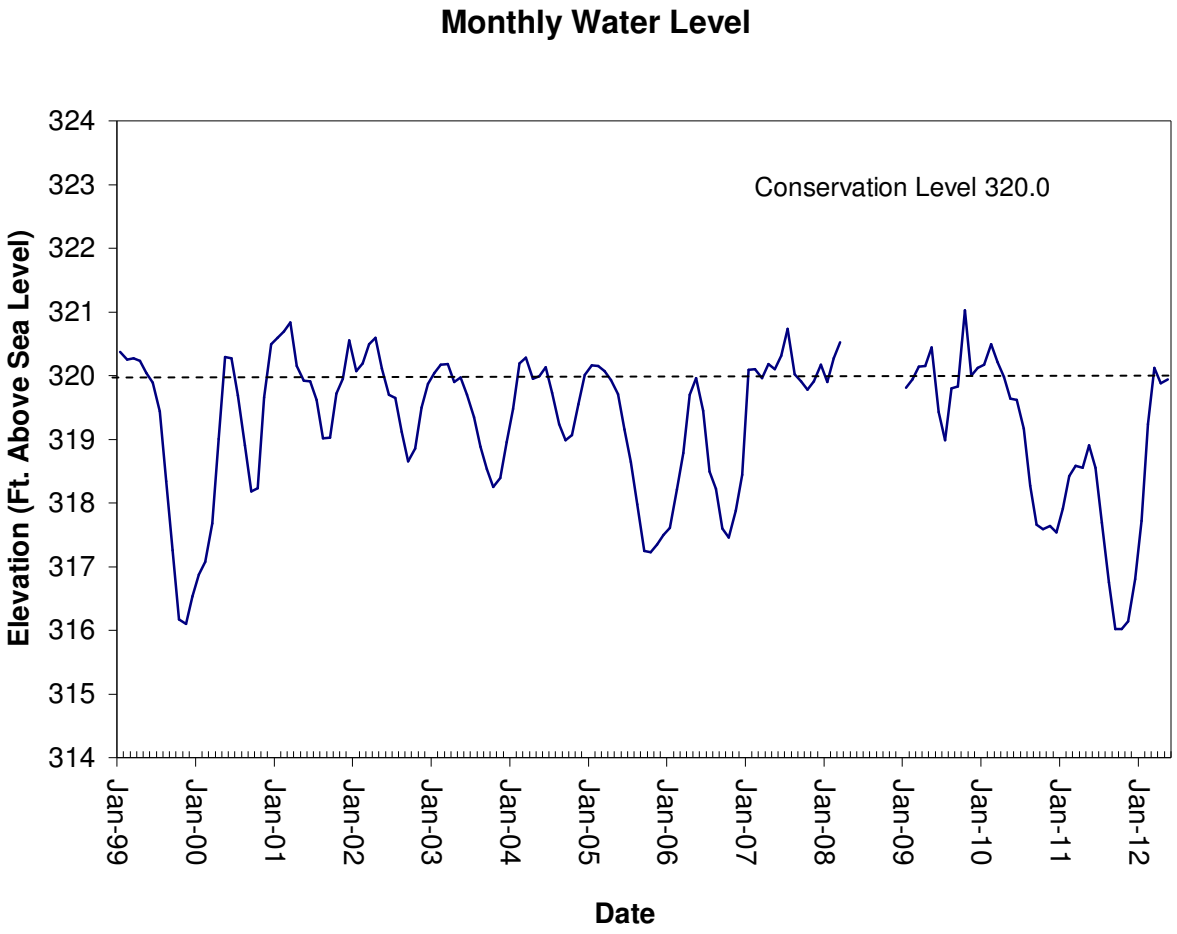


Figure 1. Average monthly water elevations in feet above mean sea level (MSL) recorded for Lake Welsh, Texas January 1999 to May 2012. Horizontal dashed-line denotes conservation pool level (378.0 msl).

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
Black crappie	1988	34,125	AFGL
	1989	36,769	AFGL
	1990	69,176	AFGL
	Total	140,070	
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	
Florida largemouth bass	1975	73,350	AFGL
	1976	55,000	AFGL
	Total	128,350	
Threadfin shad	1982	1,600	ADL
	Total	1,600	

Table 4. Survey of aquatic vegetation and structural habitat, Lake Welsh, Texas, August 2011. Surface area (acres) and percent of reservoir surface area was determined for dominant aquatic vegetation species and habitat structure. Survey was conducted when water levels were approximately 4 feet below conservation pool.

Shoreline habitat type	Shoreline Distance		Surface Area	
	Miles	Percent of total	Acres	Percent of reservoir surface area
Cement	1.7	6.3		
Riprap	0.9	3.3		
Natural shoreline	24.4	90.4		
Inundated timber			436.3	32.7
Hydrilla			45.3	3.4

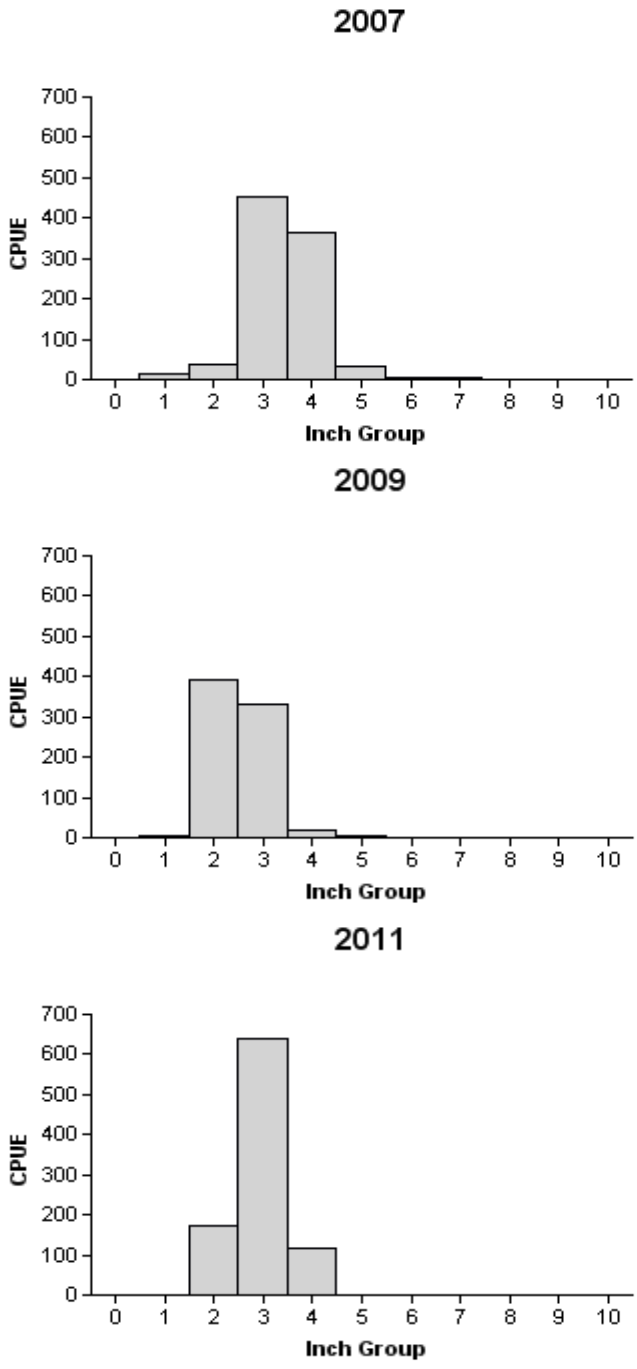
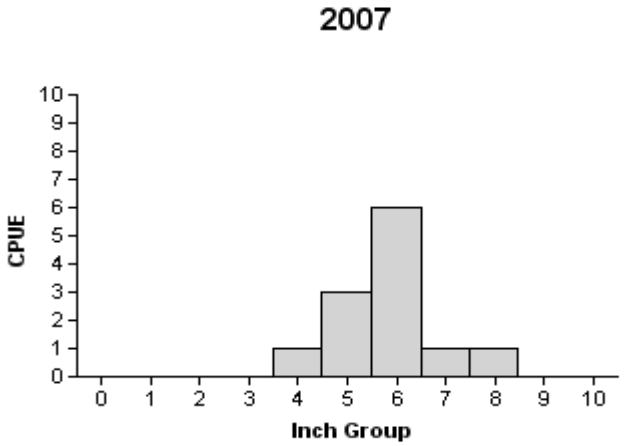
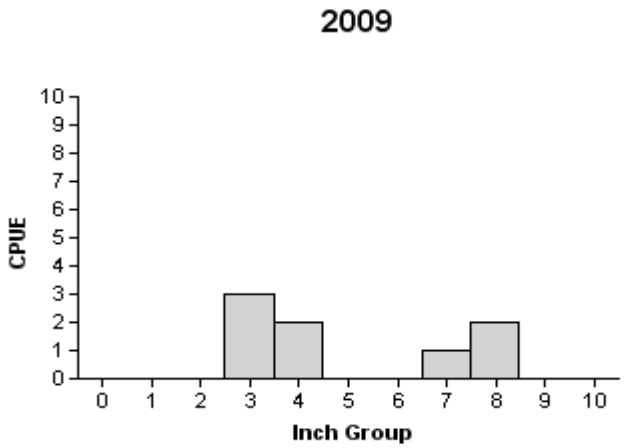


Figure 2. Number of bluegill caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Welsh, Texas, 2007, 2009, and 2011.

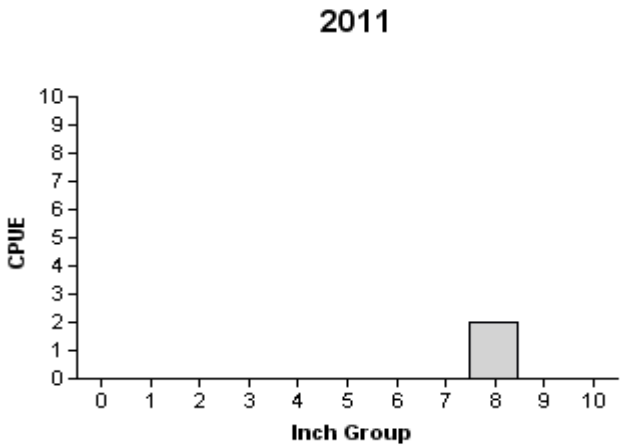
Redear sunfish



Effort =	1.0
Total CPUE =	12.0 (48; 12)
Stock CPUE =	12.0 (48; 12)
PSD =	17 (10.7)



Effort =	1.0
Total CPUE =	8.0 (50; 8)
Stock CPUE =	5.0 (36; 5)
PSD =	60 (22.9)



Effort =	1.0
Total CPUE =	2.0 (100; 2)
Stock CPUE =	2.0 (100; 2)
PSD =	100 (0)

Figure 3. Number of redear sunfish 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, Lake Welsh, Texas, 2007, 2009, and 2011.

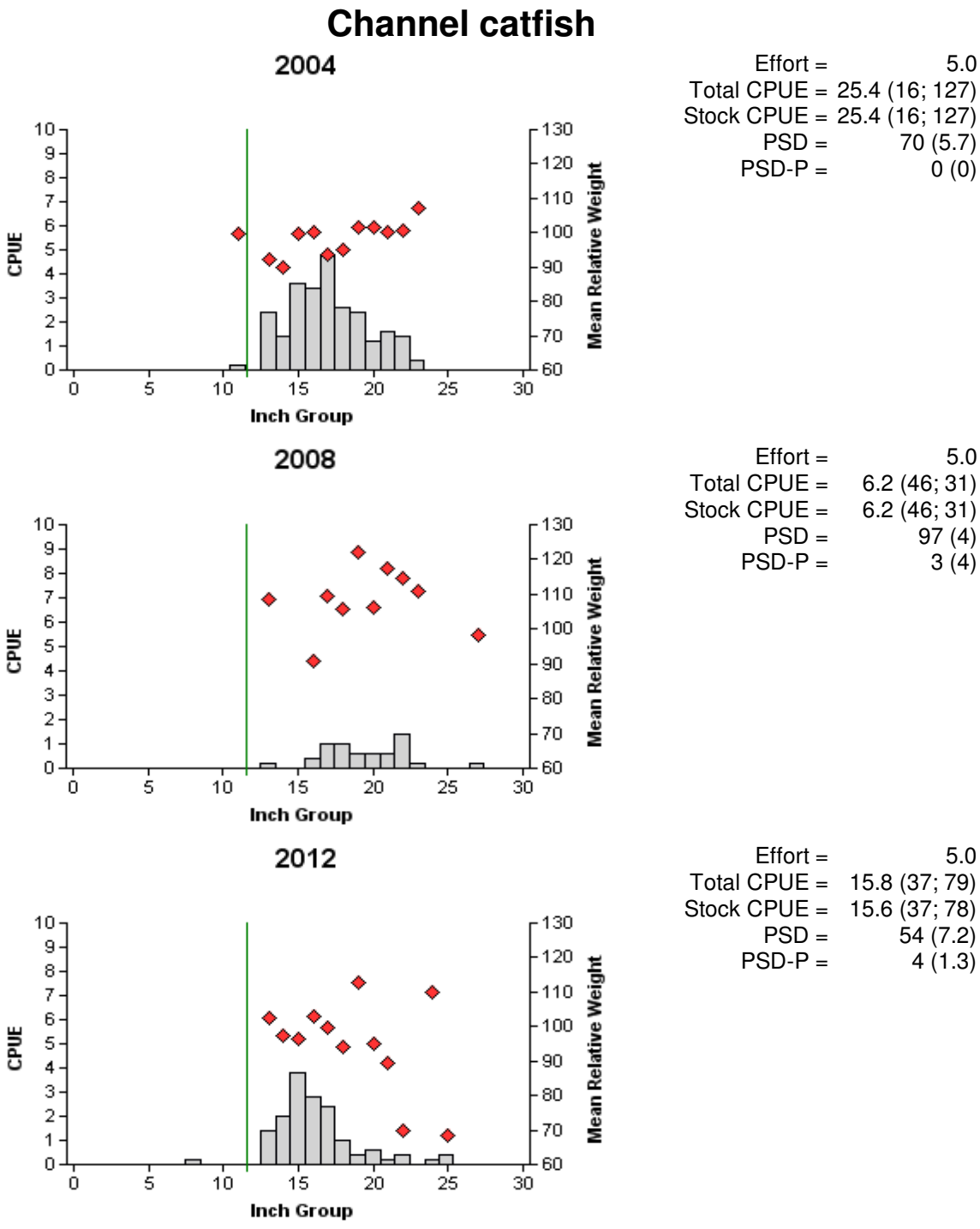


Figure 4. Number of channel catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Welsh, Texas, 2004, 2008, and 2012. Vertical lines indicate minimum length limit.

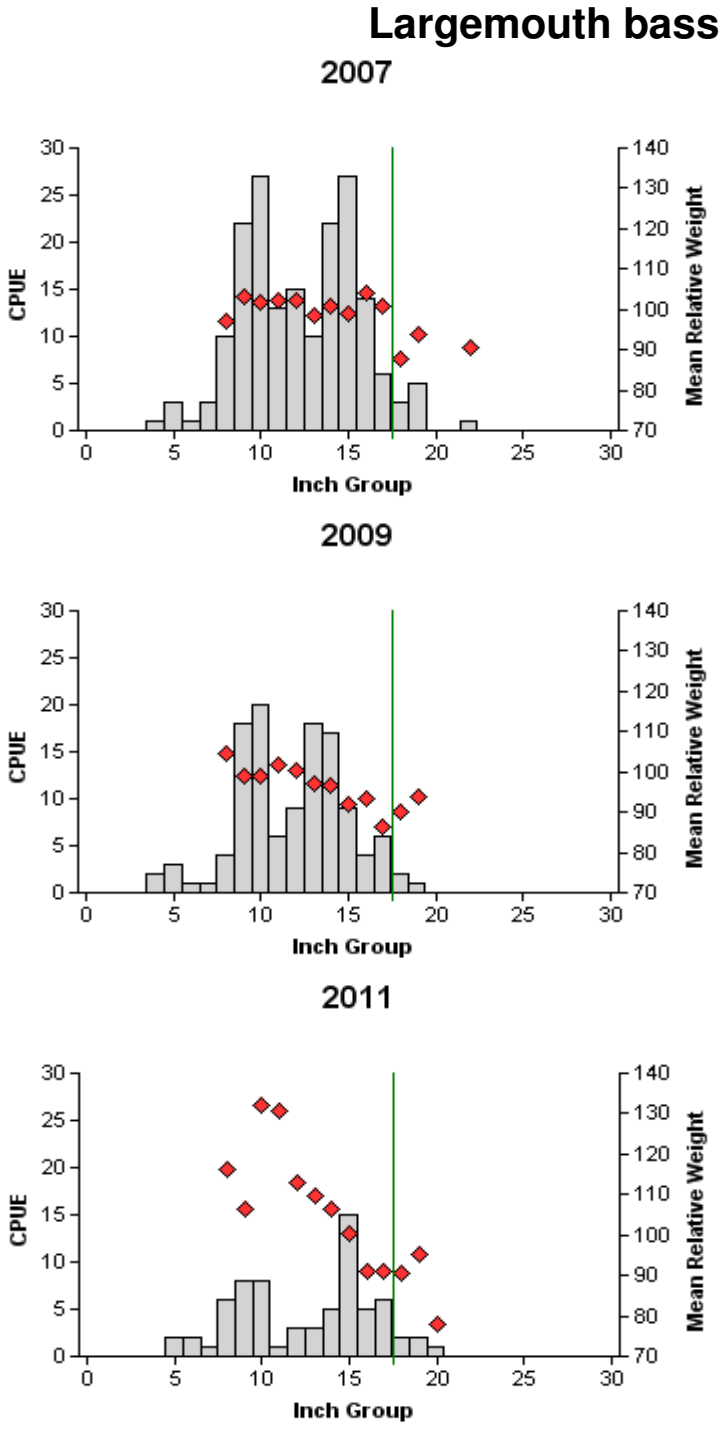


Figure 5. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Welsh, Texas, 2007, 2009, and 2011. Vertical lines indicate minimum length limit.

Largemouth bass

Table 5. Results of genetic analysis of largemouth bass collected by fall electrofishing, Lake Welsh, Texas, 1989, 1991, 1996, 1999, 2005, 2007, and 2011. Largemouth bass genetics were assessed with micro-satellite DNA analysis in 2011, 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. Fish collected in 2011 were of various ages.

		Genotype					
Year	Sample size	FLMB	F1	Fx	NLMB	% FLMB alleles	% pure FLMB
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]	21	0	93.5	65.0
2007	30	16	[a]	14	0	93.0	53.0
2011	30	5	0	25	0	89.0	17.0

[a] Determination of hybrid status not conducted.

Table 6. 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.

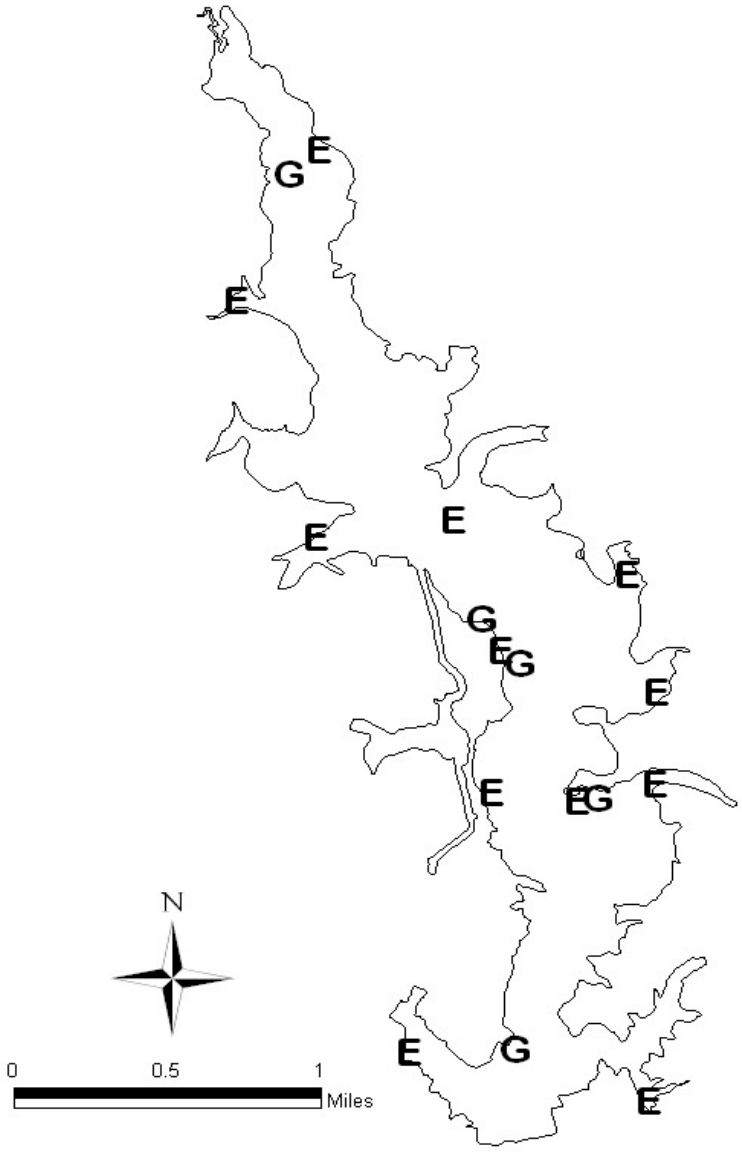
Survey Year	Vegetation	Electrofisher	Gill net	Access	Creel	Report
2012 - 2013	A					
2013 - 2014	A	A				
2014 - 2015	A					
2015 - 2016	S	S	S	S	A	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from gill netting and electrofishing from Lake Welsh, Texas, 2011-2012.

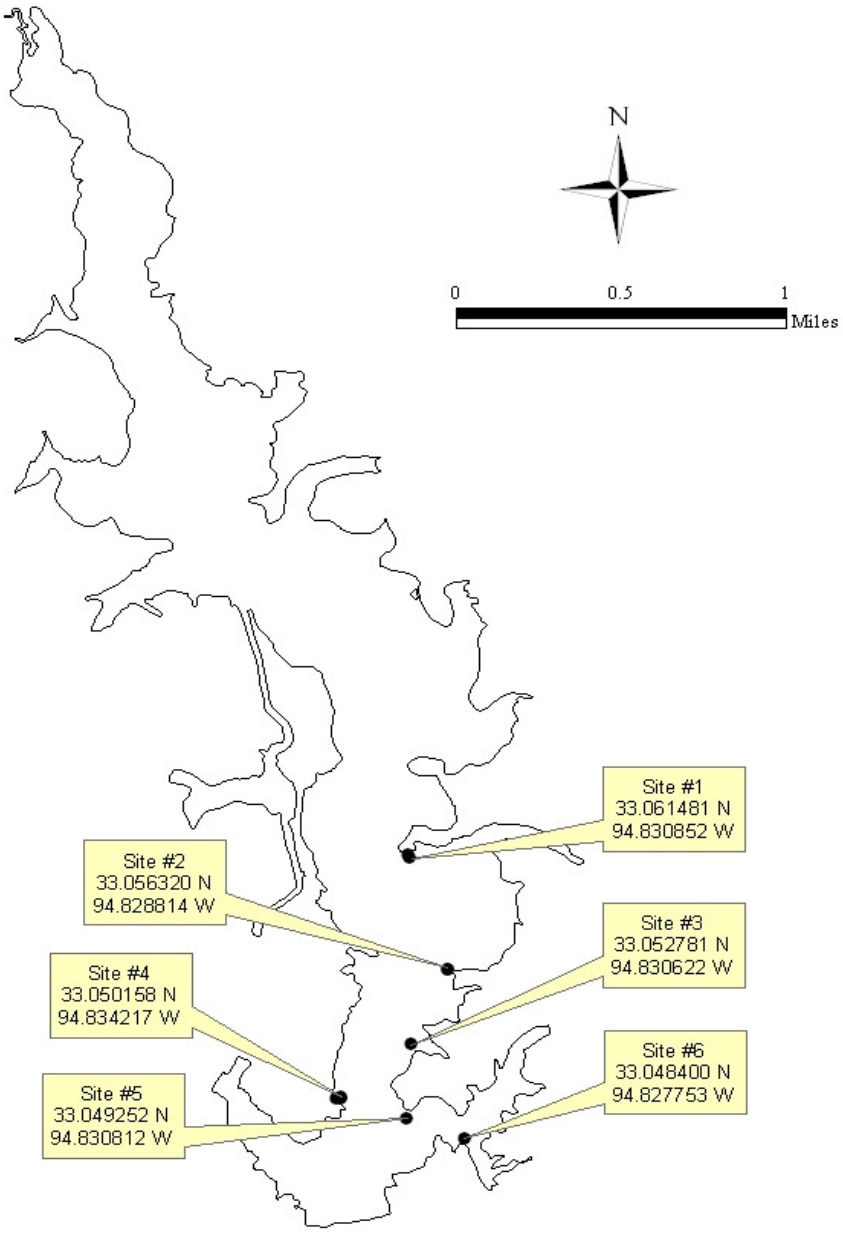
Species	Gill Netting		Electrofishing	
	N	CPUE	N	CPUE
Channel catfish	79	15.8		
Green sunfish			199	199.0
Bluegill			934	934.0
Longear sunfish			50	50.0
Redear sunfish			2	2.0
Largemouth bass			70	70.0

APPENDIX B



Location of sampling sites, Lake Welsh, Texas, 2011-2012. Gill net and electrofishing stations are indicated by G and E, respectively.

APPENDIX C



Location of fish attractors, Lake Welsh, Texas, 2011.

APPENDIX D

Number of target fish caught per net night during spring gill netting, Lake Welsh, Texas, from 1996-2012. 125 ft gill net, 1”-3” bar mesh was used from1996-2012. Sampling effort was 5 net-nights in each year.

Species	1996	1999	2004	2008	2012
Channel catfish	7.8	3.4	25.4	6.2	15.8
Flathead catfish	0.2				

Number of target fish caught per hour during fall electrofishing, Lake Welsh, Texas, from 1996-2012. Sampling effort was 1.0 hour from 1999-2011 and 1.5 hours in 1996.

Species	1996	1999	2001	2003	2005	2007	2009	2011
Threadfin shad	43.3	29.0	209.0	279.0			10.0	
Green Sunfish	6.7		38.0	4.0	9.0	12.0	17.0	199.0
Warmouth			1.0	1.0				
Bluegill	992.7	130.0	643.0	86.0	538.0	912.0	756.0	934.0
Longear Sunfish	545.3	9.0	114.0	54.0	64.0	35.0	22.0	50.0
Redear Sunfish	29.3	1.0	9.0	11.0	18.0	12.0	8.0	2.0
Redspotted Sunfish			10.0		5.0			
Largemouth bass	96.6	25.0	65.0	93.0	111.0	183.0	121.0	70.0