PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-30-R-35

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2009 Survey Report

Georgetown Reservoir

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TABLE OF CONTENTS

Survey and management summary 2

Introduction 4

Reservoir description 4

Management history 4

Methods 5

Results and discussion 6

Fisheries management plan 8

Literature cited 10

Figures and tables 11-23
- Water level (Figure 1) 11
- Reservoir characteristics (Table 1) 11
- Harvest regulations (Table 2) 12
- Stocking history (Table 3) 13
- Habitat survey (Table 4) 14
- Gizzard shad (Figure 2) 15
- Bluegill (Figure 3) 16
- Channel catfish (Figure 4) 17
- White bass (Figure 5) 18
- Palmetto bass (Figure 6) 19
- Largemouth bass (Figures 7 and 8; Table 5) 20
- Proposed sampling schedule (Table 6) 23

Appendix A
- Catch rates for all species from all gear types 24

Appendix B
- Map of 2009-2010 sampling locations 25

Appendix C
- Water level and electrofishing catch rate of largemouth bass 14-inches and greater 1992 to 2009 26

Appendix D
- Largemouth bass caught in spring gill net surveys, spring 2002 and 2010 27

Appendix E
- Location of fish attractor sites 28

Appendix F
- Global positioning coordinates for fish attractor locations 29

SURVEY AND MANAGEMENT SUMMARY

Fish populations in Georgetown Reservoir were surveyed in 2009 using electrofishing and in 2010 using gill nets. This report summarizes the results of the surveys and contains a fisheries management plan for the reservoir based on those findings.

- **Reservoir Description:** Georgetown Reservoir is a 1,297 acre impoundment of the North San Gabriel River located in Williamson County, Texas. The dam was constructed in 1980 by the U.S. Army Corp of Engineers (USACE) for purposes of flood control, municipal water supply and recreation. Georgetown Reservoir is the drinking water supply for the cities of Georgetown and Round Rock, and the Brushy Creek Municipal Utility District.

- **Management history:** Important sport fish included white bass, largemouth bass, smallmouth bass, catfish species and palmetto bass. Palmetto bass were stocked annually starting in 2003. An angler attitude and opinion survey conducted from 2003 to 2004 indicated anglers supported further stockings of this species. Annual stockings of smallmouth bass were requested in the 2002 and 2006 fisheries management plans. This species was not regularly stocked due to inadequate hatchery production, but annual stockings were made from 2006 through 2008. Stockings of blue catfish were made in 2000 and 2001 in an attempt to establish a fishery for this species. A prior stocking in 1989 appeared to be unsuccessful in establishing a population. Largemouth bass have been managed since 1993 with a 14- to 18-inch slot-length limit. An analysis of that length limit change suggested it had been successful in increasing density and angler catch rate of bass greater than 14 inches in length. Angler harvest of sub-slot bass was not sufficient to improve growth under the slot length limit. Bass anglers surveyed who had been fishing the reservoir prior to implementation of this length limit indicated fishing quality had improved under the slot length limit. White bass were managed until September 2004 under a 12-inch minimum length limit. Trap netting for white crappie was not performed due to historically low catch rates and the high cost/benefit ratio associated with collecting these data.

- **Fish Community**
  - **Prey species:** Gizzard shad and sunfishes were the dominant prey species available. Threadfin shad were also available as forage.

  - **Catfishes:** Channel catfish were present in low density, but were still the dominant catfish species present. Blue catfish stocked in 2000 and 2001 were collected in the 2010 gill net survey. Natural reproduction of blue catfish was documented in 2010.

  - **Temperate basses:** White bass and palmetto bass were present in the reservoir although abundance of both species has declined since the last survey.

  - **Largemouth bass:** Largemouth bass abundance declined since the last survey. The population was dominated by individuals less than 14 inches in length. Growth and body condition were sub-optimal. According to the last creel survey conducted on the reservoir (2003-2004) anglers seeking largemouth bass and black basses accounted for 44.5% of the directed fishing effort.

  - **Smallmouth bass:** Only one smallmouth bass was collected in the 2009 electrofishing survey despite annual stocking the three previous years.

- **Management Strategies:** The reservoir should continue to be managed with existing harvest

regulations. Smallmouth and palmetto bass stockings should continue to be requested. Further evidence of natural reproduction of blue catfish and the status of the palmetto bass population should be documented with additional gill net surveys. Smallmouth bass abundance should be documented with additional spring and fall electrofishing surveys.

INTRODUCTION

This document is a summary of fisheries data collected from Georgetown Reservoir from 2009-2010. 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 is presented for comparison.

Reservoir Description

Georgetown Reservoir is a 1,297 acre impoundment of the North San Gabriel River located in Williamson County, Texas. The dam was constructed in 1980 by the U.S. Army Corp of Engineers (USACE) for purposes of flood control, municipal water supply and recreation. Georgetown Reservoir is the drinking water supply for the cities of Georgetown and Round Rock, and the Brushy Creek Municipal Utility District. It has a drainage area of only 246 square miles, a shoreline length of 21.6 miles, and a shoreline development index of 4.9. The basin is steep-sided with relatively few shallow coves and shoal areas. The reservoir lies within the Edwards Plateau vegetational area and land use has historically been ranching. Since 2000 the area has experienced tremendous population growth, primarily due to the development of residential neighborhoods. Population growth from 2000 to 2009 was 64% (249,979 in 2000; 410,686 in 2009) (United States Census Bureau 2009). Williamson County was listed among the top ten counties for annual population growth rate (21.5%) in the United States from 2000-2003 (U.S. Census Bureau 2009). Population growth in the reservoir watershed may ultimately increase primary productivity in the reservoir. Increased demand for drinking water from the reservoir will certainly have an impact on water level, especially during times of drought. Reservoir water level has historically fluctuated widely (Figure 1). The annual mean water level fluctuation since January 1994 was 18.6 feet (range 8.0 - 35.5 feet). In 2006 a raw water pipeline from Stillhouse Hollow Reservoir in Bell County to Georgetown Reservoir began operation to supplement the increased demand for drinking water in Willliamson County. The current water level operating plan for Lake Georgetown calls for the reservoir water level to be reduced to 672 msl (19 feet below conservation pool elevation) before any water is pumped from Stillhouse Hollow Reservoir (Carey Weber, USACE Georgetown Reservoir Manager, personal communication). Boat access consisted of three public boat ramps. Bank fishing access was good as the entire shoreline was USACE property. Four public fishing piers were available. The upper end of the reservoir had a hiking trail (The Good Water Trail) and primitive camping area (Camp Tejas), which allowed white bass anglers access to the upper end of the reservoir during the spring spawning migration. Other descriptive characteristics for Georgetown Reservoir are in Table 1.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Magnelia and De Jesus 2006) included:

1. Implement strategies for increasing the harvest of sub-slot largemouth bass based on results of a statewide survey of slot length limit reservoir anglers.
   Action: The statewide survey did not reveal any clear management strategy (e.g. increasing the daily bag limit, cleaning tables etc.) that would prompt anglers to retain more sub-slot largemouth bass. No action was taken.
2. Document natural reproduction of blue catfish.
   Action: Blue catfish collected in the 2010 gill net survey were aged to determine if they were from a stocked year class.
3. Continue stocking palmetto bass at 5/acre and promote the fishery.
   Action: Palmetto bass were stocked annually. The fishery was promoted using news releases and presentations to fishing clubs.
4. Continue requesting stockings of smallmouth bass.

Action: Smallmouth bass stockings were requested each year. Smallmouth bass were stocked in 2006, 2007 and 2008.

5. Improve angler catch rates through the use of fish attractors.
   Action: Since 2007 twenty-eight cedar tree fish attractor sites were installed in the reservoir (Appendices E and F).

Harvest regulation history: Sportfishes in Georgetown Reservoir were managed with statewide regulations with the exception of largemouth bass (Table 2). From 1986 to 1993, largemouth bass were managed with a 14-inch minimum length limit. A 14- to 18-inch slot length limit was implemented on September 1, 1993 to: increase abundance of bass greater than 14 inches in length; increase angler catches of bass greater than 14 inches in length; and, re-direct harvest at individuals less than 14 inches in length. Among all anglers attitudes surveyed more agreed than disagreed that fishing quality had improved for largemouth bass since implementation of the slot length limit (Magnelia and De Jesus 2006). White bass were managed under an experimental 12-inch minimum length limit from September 1, 1995 to September 1, 2004 in an attempt to increase density, help stabilize year-to-year fluctuations in year class strength and increase angler yield. An analysis of this regulation change suggested reservoir inflows during spawning periods were probably more influential in determining white bass density than angler harvest (TPWD, unpublished data). This regulation was rescinded in favor of the statewide 10-inch minimum length limit.

Stocking history: Florida largemouth bass, blue catfish, palmetto bass and smallmouth bass were important species which were requested and/or stocked. A complete stocking history is in Table 3.

Aquatic vegetation/habitat history: Georgetown Reservoir has never supported aquatic vegetation. This was probably due to the widely fluctuating water level and rocky substrate. Shoreline habitat consisted primarily of rocky shoreline and rock bluffs. Some standing timber was available in main lake coves and the upper reaches of the reservoir.

METHODS

Fishes were collected by electrofishing (1.5 hours at 18 5-min stations) and gill netting (15 net nights at 15 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 were randomly selected and all surveys were conducted according to the Fishery Assessment Procedures Manual (TPWD, Inland Fisheries Division, unpublished manual revised 2008).

Sampling statistics (CPUE for various length categories) and structural indices [Proportional Size Distribution (PSD); as defined by Guy et al. (2007)], and condition indices [relative weights (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 for creel statistics and SE was calculated for structural indices and IOV. Ages were determined for largemouth bass, palmetto bass and blue catfish using otoliths. Otoliths were collected from thirteen largemouth bass between 14 and 16 inches from the electrofishing collection and all palmetto bass and blue catfish sampled from gill nets. Source for water level data was the USACE Fort Worth District Reservoir Control Office website.

RESULTS AND DISCUSSION

Habitat: Littoral zone habitat consisted primarily of rocks and rock bluff (Table 4). Standing timber provided cover. Stands of aquatic vegetation have never been documented. Twenty-eight fish attractors have been installed since 2007 which in addition to attracting adult fish provide additional cover. This program is part of a cooperative agreement between TPWD, the Sun City Hunting and Fishing Club and the Lake Georgetown USACE. Many of the original attractors installed in 2007 were refurbished in 2009 and/or 2010 (Appendices E and F).

Water Transfer: Georgetown Reservoirs primary use is for municipal water supply, recreation, and flood control. Water is transferred to Georgetown Reservoir from Stillhouse Hollow Reservoir to supplement the reservoirs capacity for supplying drinking water to the cities of Georgetown and Round Rock, and the Brushy Creek Municipal Utility District.

Prey species: Electrofishing catch rates of gizzard shad, bluegill and redbreast sunfish were 67.3/h, 10.7/h, and 12.0/h, respectively. Threadfin shad, longear sunfish, green sunfish, warmouth and redear sunfish were also available as forage. Index of vulnerability (IOV) for gizzard shad was higher than previous samples (Figure 2), indicating that 49.5% of gizzard shad were available to existing predators. Total CPUE for gizzard was considerably higher in 2009 compared to the 2001 and 2005 surveys (Figure 2). Threadfin shad CPUE (126.7/h) also increased from the 2005 survey (19.3/h). Total CPUE of bluegill in 2009 was much lower than total CPUE from surveys in 2005 and 2001, and size structure continued to be dominated by small individuals (Figure 3). The decrease in bluegill density is probably due to the falling and ultimately extremely low water level during most of 2008 and 2009 (Figure 1). Under these environmental conditions predation on juveniles was probably high.

Catfishes: The gill net catch rate of channel catfish was 0.4/nn in 2010, which was much lower than previous years (Figure 4). Blue catfish were most recently stocked in 2000 and 2001. Four blue catfish were collected in the 2010 gill net survey. Three of these individuals were from the 2000 and 2001 stockings. One individual was from the 2008 year class, indicating natural reproduction was taking place. Blue catfish reach sexual maturity at a large size (50% maturity at 26 inches) (Hale and Timmons 1988). Our experience in central Texas reservoirs is that blue catfish populations take 10-15 years to fully develop. Flathead catfish were present in low density. A previous creel survey (Magnelia and De Jesus 2006) indicated there was little directed effort for catfishes at Georgetown Reservoir.

White bass: The gill net catch rate of white bass was 1.6/nn in 2010 (Figure 5), which was much lower than previous years. Angler interest in this species on Lake Georgetown was high, especially during the spring creel quarter when white bass angling accounted for 37.9% of the angling effort (Magnelia and De Jesus 2006). A new reservoir record for this species was set in 2008 (2 pounds, 16.5 inches). Public access along the upper reaches of the reservoir via Camp Tejas and the Good Water Trail made this one of Central Texas' most accessible white bass fisheries for bank anglers. Decreased densities of these species is probably due to low flows in the San Gabriel River during the spring 2008 and 2009 spawning season, which probably produced week year classes. White bass year class strength may be largely determined by reservoir inflows during the spring white bass spawning period (DiCenzo and Duval 2002).

Palmetto bass: Based on a 2006 gill net survey stockings of this species had been successful in producing a fishery. New junior angler (4.4 pounds, 21.5 inches) and reservoir (9.0 pounds, 25.7 inches) records were established for this species in 2008 and 2009, respectively, indicating anglers are catching this species. The gill net catch rate of palmetto bass in 2010 was only 0.4/nn (N = 6) (Figure 6). Gill net effort was tripled in 2010 in order to better determine if stockings had been successful and document further expansion of the population. This 2010 total catch rate was much lower than the 2006 sample (Figure 6) and was disappointing considering this species has been annually stocked since 2003 (Table 3). Individuals collected in 2010 ranged from 11 to 17 inches in length. Not enough fish were caught to do meaningful age-and-growth analysis. Based on data collected in 2006 palmetto bass reached legal length

(18 inches) by age 2 (Magnelia and De Jesus 2006), which is similar to other palmetto and striped bass fisheries in Central Texas (Walter Long and Buchanan Reservoirs, respectively). While anglers supported future stockings of palmetto bass (Magnelia and De Jesus 2006) future gill net catch rates need to improve to justify further stockings of this species. Additional gill net sampling in spring 2012 is needed to further evaluate the status of the population.

Black basses: The total electrofishing catch rate of largemouth bass was 41.3/h in 2010, which was much lower than previous catch rates (Figure 7). The electrofishing catch rate of largemouth bass greater than 14 inches (CPUE14 = 1.3/h) was also much lower than previous estimates and much lower than the post-slot length limit mean CPUE14 of 10.8/h (N = 14, range = 1.3 – 34.0/h). The CPUE14 for the 2010 survey was one of the lowest recorded over an 18 year period (Appendix C). Low electrofishing catch rate for this species may be related to high water on the day of sampling, resulting in decreased electrofishing efficiency, rather than an actual reduction in abundance. The 2009 electrofishing survey was conducted when the reservoir was almost 6 feet above conservation pool elevation, inundating large amounts of terrestrial vegetation, decreasing electrofishing efficiency. Similarly, electrofishing in fall 2001 was conducted when the reservoir was 6.2 feet above conservation pool, and CPUE14 was extremely low (Appendix C and Bonds and Magnelia 2002). Gill net catch rate in 2002 indicated largemouth bass in the protected slot length category were indeed present (Appendix D), contradicting results from the 2001 electrofishing survey (Bonds and Magnelia 2002). This contradiction was less apparent in the 2010 gill net survey (Appendix D). Chronically low and highly fluctuating (annual mean = 18.6 feet) water levels on this reservoir (Figure 1) probably have had a negative effect on largemouth bass spawning success and recruitment. Low and/or rapidly declining water levels in 2005, 2006, 2008 and 2009 (Figure 1) may indeed be responsible for the extremely low catch rate encountered during the 2010 electrofishing survey. A strong year class appeared to be produced during high water conditions in 2007 (Figure 7). While these individuals should have reached 14 inches in length by 2010 we failed to collect them in the electrofishing survey. Because of the increased demand for drinking water in Williamson County, the reservoirs small watershed, and the current water level operating plan (reduction of the reservoir water level to 672 msl before pumping from Stillhouse Hollow Reservoir begins), rapidly decreasing and chronically low water levels will probably be the norm in the future. This may ultimately decrease overall abundance of largemouth bass and other species dependent on littoral zone habitat (Daugherty 2009).

In 2009 largemouth bass in Georgetown Reservoir on average reached 12.8 inches at age-2, 13.5 inches at age 3 and 14.9 inches at age-4 (Figure 8). This was slower than the growth rate documented in November 2005 when a much more extensive age-and-growth analysis was conducted (Magnelia and De Jesus 2006). The calculated average age at 14 inches in length in November 2005 was 2.7 years (Magnelia and De Jesus 2006). When compared to values for the Edwards Plateau ecological area (Prentice 1987) this growth rate was below average. Largemouth bass growth rate might be increased through increased angler harvest of sub-slot bass, although no clear strategy has been identified for accomplishing this in Texas reservoirs (Bonds et al. 2008). The reservoir was stocked with the Florida sub-species of largemouth bass in 1986. Florida largemouth bass influence in 2005 was 59.4% (Table 5).

Only one smallmouth bass was caught in the 2009 electrofishing survey despite annual stockings the three previous years. A creel survey conducted from March 2003 to February 2004 indicated there was no directed effort for this species, although angler catches were documented (Magnelia and De Jesus 2006). Almost all smallmouth bass caught (estimated N = 846) were released (99.5%) (Magnelia and De Jesus 2006). This species has always persisted in the reservoir at low densities and it was thought a quality fishery might be developed, with regular supplemental stockings. The reservoir record 5.88 pound smallmouth bass was caught in 1990 indicating this species has the potential to grow to quality size in this reservoir. While anglers supported future stockings of smallmouth bass (Magnelia and De Jesus 2006) higher electrofishing catch rates are needed to justify further stockings. The aforementioned decrease in electrofishing sampling efficiency because of high water at the time of sampling and/or predation of stocked fish under low water conditions may have also have had a negative effect on the electrofishing catch rate for this species.

Fisheries management plan for Georgetown Reservoir, Texas

Prepared – July 2010.

ISSUE 1: Angler catch rates for largemouth bass on this reservoir have historically been low.

MANAGEMENT STRATEGY

1. The fish attractor program on this reservoir has been popular with anglers. Fish attractors should increase angler catch rates. New fish attractors sites should be added as needed. Existing fish attractors should be refurbished at least once every three years.

ISSUE 2: Blue catfish stocked in 2000 and 2001 have survived, but only one specimen collected in the 2010 gill net survey was the result of natural reproduction.

MANAGEMENT STRATEGIES

1. Age blue catfish taken from gill net surveys to further document natural reproduction.

ISSUE 3: Palmetto bass were annually stocked in this reservoir since 2003 to create a fishery for this species. The gill net catch rate for this species in 2006 indicated survival from stockings was adequate to accomplish this objective. Despite triple the sampling effort (15 net nights) only six individuals were caught in the 2010 gill net survey. Anglers supported further stockings of palmetto bass (Magnelia and De Jesus 2006). Anglers may be unaware this fishery exists.

MANAGEMENT STRATEGIES

1. Continue requesting stockings of palmetto bass at 5 per acre.
2. Conduct an additional gill net survey in spring 2012 to further determine the status of the palmetto bass population.
3. Promote the palmetto bass fishery through appropriate media outlets.

ISSUE 4: Anglers supported further stockings of smallmouth bass (Magnelia and De Jesus 2006). Only one smallmouth bass was collected in the 2009 electrofishing survey despite annual stockings the three previous years.

MANAGEMENT STRATEGIES

1. Continue to request stocking of smallmouth bass each year.
2. Conduct spring electrofishing specifically targeted for smallmouth bass.
3. If greater numbers of smallmouth bass are not collected in the next two electrofishing surveys consideration should be made to stop stocking this species.

ISSUE 5: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches and plugging engine cooling systems. Giant Salvinia (*Salvinia molesta*) and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Contact and educate marina owners about invasive species, and provide them with posters, literature, etc… so that they can in turn educate their customers.
3. Educate the public about invasive species through the use of media and the internet.
4. Make a speaking point about invasive species when presenting to constituent and user groups.
5. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule included additional electrofishing in fall 2011, additional gill netting in spring 2012 and mandatory monitoring in 2013/2014 (Table 19). Additional electrofishing in 2011 is necessary to continue monitoring the largemouth bass population and to determine if smallmouth bass stockings were successful. Additional gill netting is necessary to determine the status of the palmetto bass population. Trap net sampling for white crappie has been rescinded on this reservoir because of low historical trap net catches and low directed angler effort for this species.

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.

Bonds, C. C., and S. J. Magnelia. 2002. Statewide freshwater fisheries monitoring and management program survey report for Georgetown Reservoir, 2001. Texas Parks and Wildlife Department, Federal Aid Report F-30-R-27, Austin, TX.

Bonds, C. C., J. B. Taylor and J. Leitz. 2008. Practices and perceptions of Texas anglers regarding voluntary release of largemouth bass and slot length limits. Pages 219-230 *in* M.S. Allen, S. Sammons, and M.J. Maceina, editors. Balancing fisheries management and water uses for impounded river systems. American Fisheries Society, Symposium *62*, Bethesda, Maryland.

Daugherty, D.J. 2009. Effects of water level fluctuations on littoral habitat and angler access. Texas Parks and Wildlife Department, Federal Aid Report F-189-D, Austin, TX

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.

DiCenzo, V. J. and M. C. Duval. 2002. Importance of reservoir inflow in determining white bass year-class strength in three Virginia reservoirs. North American Journal of Fisheries Management 22:620-626.

Guy, C. S., R. M. Neumann, D. W. Willis, and R. O. Anderson. 2007. Proportional Size Distribution (PSD): A Further Refinement of Population Size Structure Index Terminology. Fisheries 32(7):348.

Hale, S. R. and T. J. Timmons. 1988. Spawning season and maturity of blue catfish in Kentucky Lake. Proceedings of the Annual Conference of the Southeast Association of Fish and Wildlife Agencies 42:128-132.

Magnelia, S. J. and M. J. De Jesus. 2006. Statewide freshwater fisheries monitoring and management program survey report for Georgetown Reservoir, 2006. Texas Parks and Wildlife Department, Federal Aid Report F-30-R-31, Austin, TX.

Prentice, J. A. 1987. Length-weight relationships and average growth rates of fishes in Texas. Texas Parks and Wildlife Department, Inland Fisheries Division Management Data Series No. 6, Austin, TX.

United States Census Bureau. 2009. Williamson County, Texas quick facts. Available on the world wide web at http://quickfacts.census.gov/qfd/states/48/48491.html

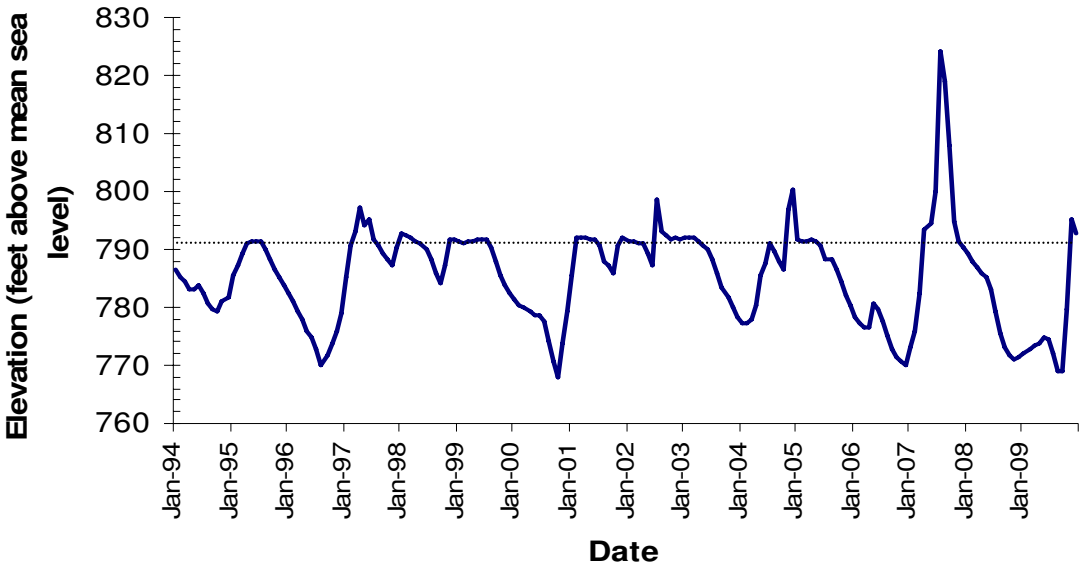


Figure 1. Monthly mean water level elevations in feet above mean sea level (msl) recorded for Georgetown Reservoir, Texas January, 1994 to December 2009. Dotted line is conservation pool elevation (791 msl).

Table 1. Characteristics of Georgetown Reservoir, Texas.

Characteristic	Description
Year constructed	1980
Controlling authority	United States Army Corp of Engineers
County	Williamson
Reservoir type	Mainstream
Shoreline Development Index (SDI)	4.90
Conductivity	360 umhos/cm

Table 2. Harvest regulations for Georgetown 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, palmetto	5	18 minimum
Bass: smallmouth	5	14 minimum
Bass: largemouth	5	14 – 18 slot
Bass: spotted, Guadalupe	5 (in any combination)	No Limit
Crappie: white and black crappie, their hybrids and subspecies	25 (in any combination)	10 minimum

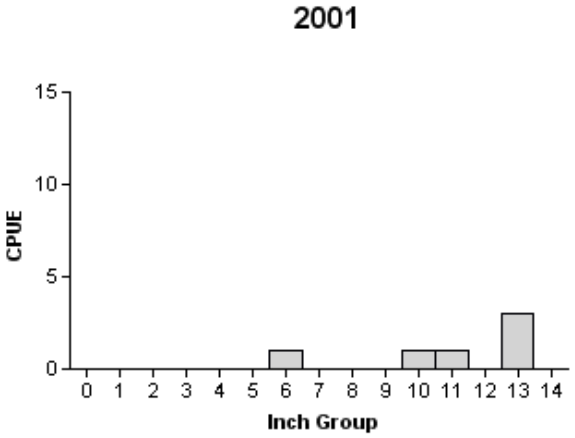
Table 3. Stocking history of Lake Georgetown, Texas. Life stages are fry (FRY), fingerlings (FGL), advanced fingerlings (AFGL), adults (ADL) and unknown (UNK). Life stages for each species are defined as having a mean length that falls within the given length range. For each year and life stage the species 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	1989	13,240	FGL	2.4
	2000	167,173	FGL	2.2
	2001	4,030	AFGL	10.6
	2001	131,019	FGL	2.1
	Total	315,462		
Channel catfish	1978	14,900	AFGL	7.9
	1978	98	UNK	UNK
	1979	40,000	AFGL	7.9
	Total	54,998		
Largemouth bass	1981	10,020	UNK	UNK
	Total	10,020		
Palmetto Bass (striped X white bass hybrid)	1980	13,000	UNK	UNK
	1982	13,179	UNK	UNK
	2003	6,485	FGL	1.5
	2004	6,494	FGL	1.6
	2005	6,475	FGL	1.5
	2006	6,487	FGL	1.8
	2007	5,495	FGL	1.7
	2008	6,734	FGL	1.5
	2009	7,595	FGL	1.5
	Total	71,944		
Smallmouth bass	1978	30,000	UNK	UNK
	1979	100,000	UNK	UNK
	1980	100,552	UNK	UNK
	1981	107,264	UNK	UNK
	1992	32,774	FGL	1.3
	1995	32,721	FRY	0.9
	2006	11,764	FGL	2.0
	2007	29,795	FGL	2.0
	2008	32,457	FGL	1.4
	Total	477,327		
Walleye	1981	2,000,000	FRY	0.2
	1983	2,514,729	FRY	0.2
	Total	4,514,729		

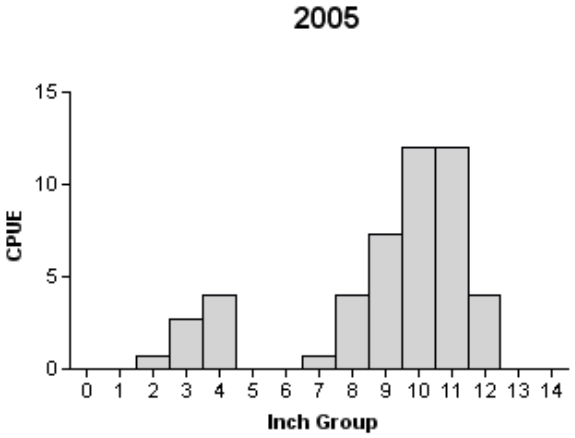
Table 4. Survey of littoral zone and physical habitat types, Georgetown Reservoir, Texas, 2005. A linear shoreline distance (miles) was recorded for each habitat type found. Surface area (acres) and percent of reservoir surface area was determined for each type of aquatic vegetation found. No aquatic vegetation has ever been documented.

Shoreline habitat type	Shoreline Distance		Surface Area	
	Miles	Percent of total	Acres	Percent of reservoir surface area
Concrete	0.06	0.28		
Eroded bank	0.86	3.96		
Riprap	0.41	1.88		
Rock bluff	7.26	33.51		
Rocky shoreline	7.61	35.13		
Sand	0.10	0.47		
Terrestrial vegetation	5.37	24.77		
Standing timber			410.60	31.66

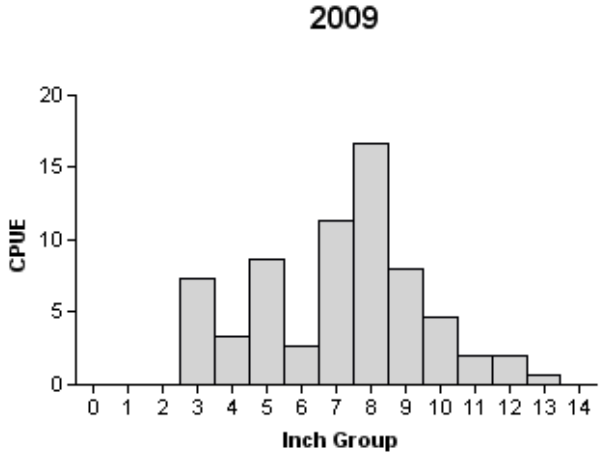
Gizzard Shad



Effort = 1.0
Total CPUE = 6.0(29; 6)
IOV = 16.7 (0.21)



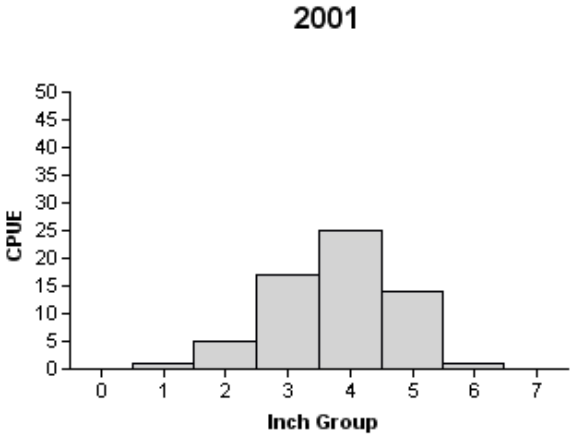
Effort = 1.5
Total CPUE = 47.3 (42; 71)
IOV = 16.9 (0.11)



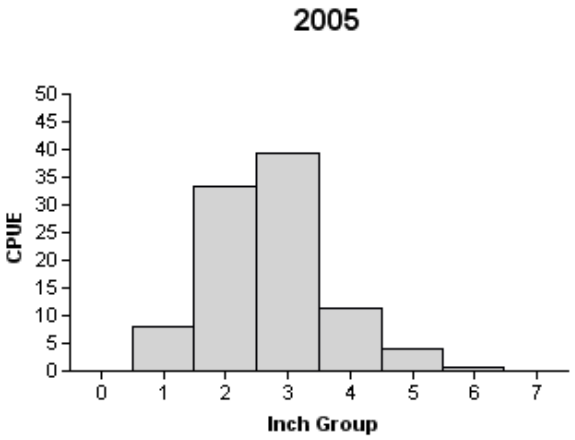
Effort = 1.5
Total CPUE = 67.3 (28; 101)
IOV = 49.5 (8.3)

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, Georgetown Reservoir, Texas, 2001, 2005 and 2009.

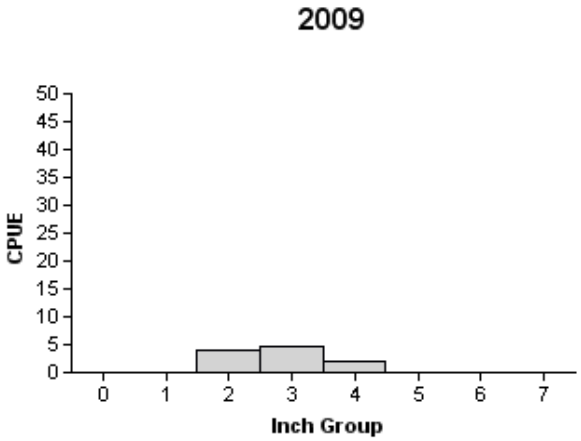
Bluegill



Effort = 1.0
Total CPUE = 63.0 (44; 63)
PSD = 2.0 (0.01)



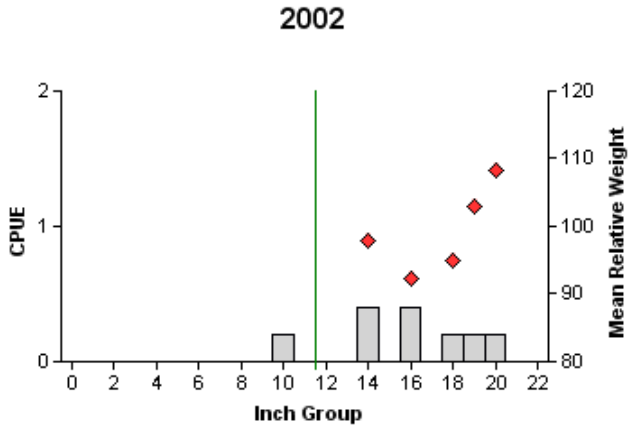
Effort = 1.5
Total CPUE = 96.7 (25; 145)
PSD = 1.0 (0.01)



Effort = 1.5
Total CPUE = 10.7 (27; 16)
PSD = 0 (58.2)

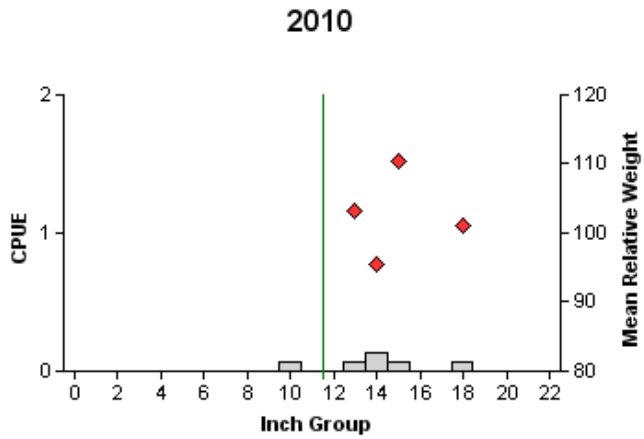
Figure 3. Number of bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Georgetown Reservoir, Texas, 2001, 2005 and 2009.

Channel Catfish



Effort =	5
Total CPUE =	1.6 (20; 8)
CPUE-12 =	1.4 (27; 7)
PSD =	71.0 (0.10)

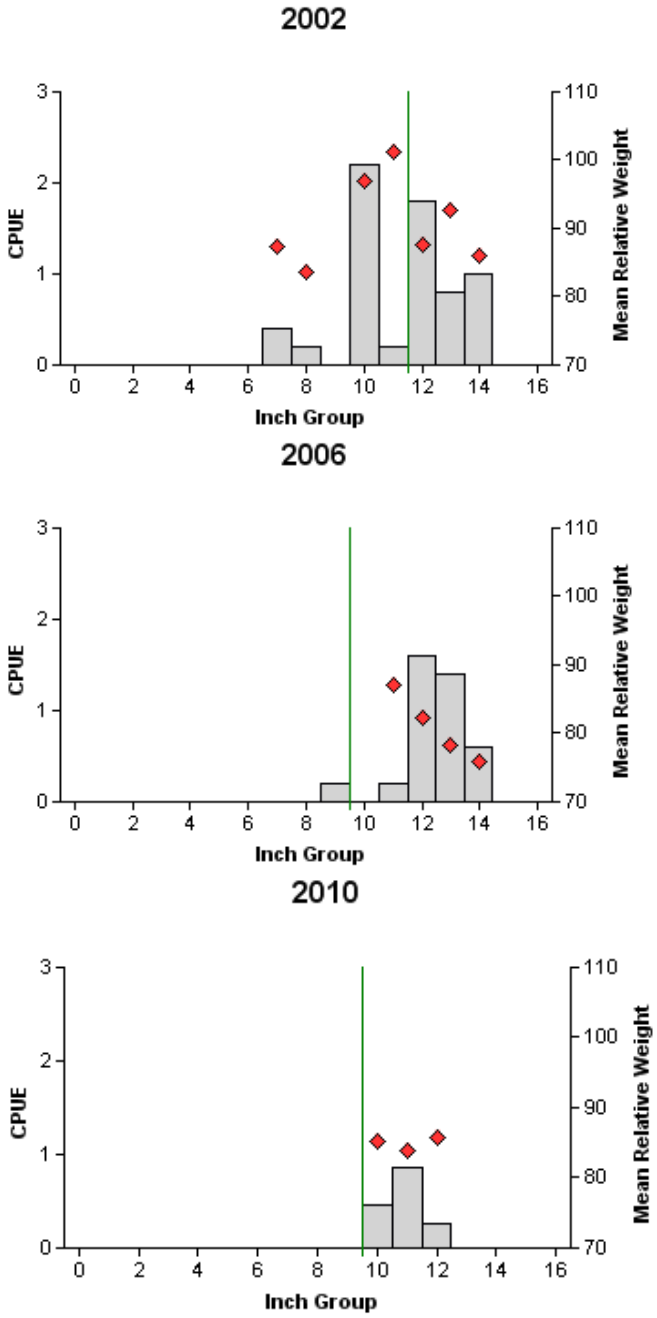
Effort =	5
Total CPUE =	1.8 (21; 9)
CPUE-12 =	1.8 (21; 9)
PSD =	100.0 (0)



Effort =	15
Total CPUE =	0.4 (41; 6)
CPUE-12 =	0.3 (48; 5)
PSD =	20 (14.3)

Figure 4. Number of channel catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Georgetown Reservoir, Texas, 2002, 2006 and 2010. Vertical line represents minimum length limit at the time of the survey.

White Bass



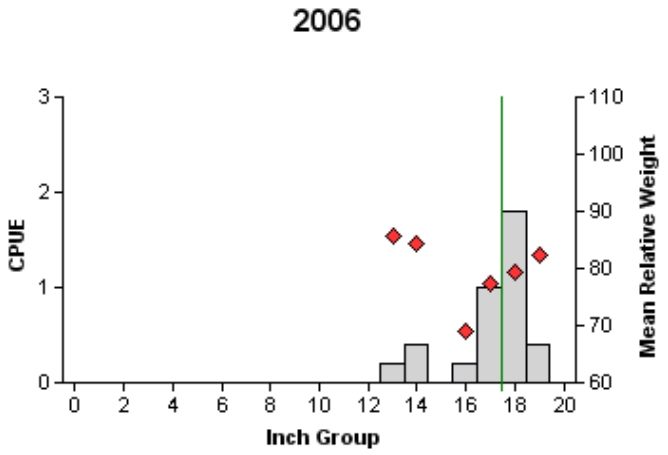
Effort =	5
Total CPUE =	6.6 (56; 33)
CPUE-10 =	6.0 (57; 30)
PSD-10 =	91.0 (0.04)

Effort =	5
Total CPUE =	4.0 (38; 20)
CPUE-10 =	3.8 (40; 19)
PSD-10 =	95.0 (0.05)

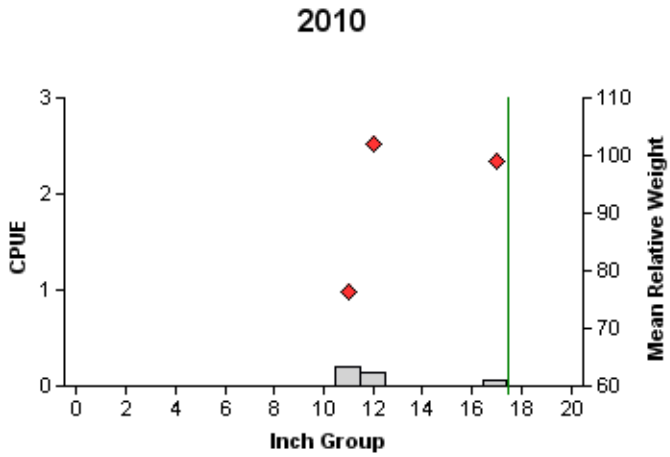
Effort =	15
Total CPUE =	1.6 (39; 24)
CPUE-10 =	1.6 (39; 24)
PSD-10 =	100 (0)

Figure 5. Number of white bass caught per net night (CPUE) and population indices (RSE and N are in parentheses) for spring gill net surveys, Georgetown Reservoir, Texas, 2002, 2006 and 2010. Vertical line represents minimum length limit at the time of the survey.

Palmetto Bass



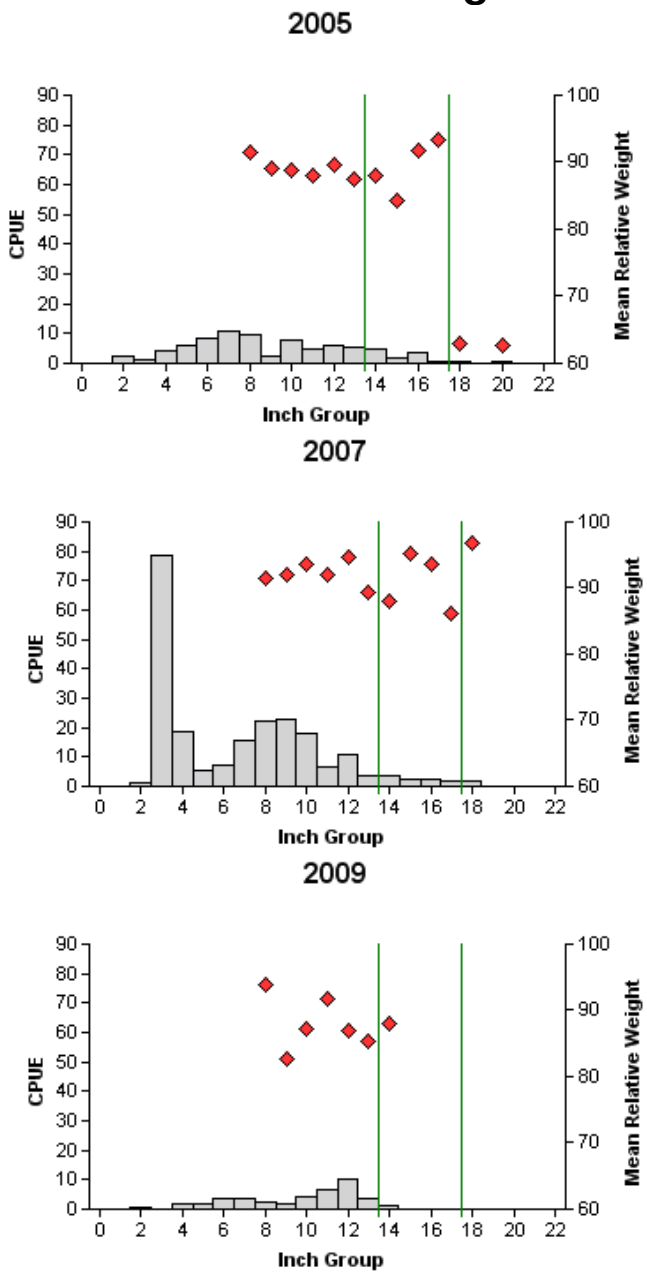
Effort =	5
Total CPUE =	4.0 (85; 20)
CPUE-18 =	2.2 (100; 1.1)
RSD-18 =	55.0 (0.08)



Effort =	15
Total CPUE =	0.4 (84; 6)
CPUE-18 =	0.0 (0; 0)
RSD-18 =	0 (0)

Figure 6. Number of palmetto bass caught per net night (CPUE) and population indices (RSE and N are in parentheses) for spring gill net surveys, Georgetown Reservoir, Texas, 2006 and 2010. Vertical line represents minimum length limit at the time of the survey.

Largemouth Bass



Effort =	1.5
Total CPUE =	81.3 (12; 122)
Stock CPUE =	48.0 (20; 72)
CPUE-14 =	12.0 (31; 18)
RSD-14 =	25.0 (0.05)

Effort =	1.5
Total CPUE =	222.7 (13; 334)
Stock CPUE =	96.0 (16; 144)
CPUE-14 =	12.7 (24; 19)
RSD-14 =	13.0 (3.4)

Effort =	1.5
Total CPUE =	41.3 (18; 62)
Stock CPUE =	30.0 (21; 45)
CPUE-14 =	1.3 (69; 2)
RSD-14 =	4 (3)

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, Georgetown Reservoir, Texas, 2005, 2007 and 2009. Vertical lines represent slot length limit at the time of the survey.

Table 5. Results of genetic analysis of largemouth bass collected by fall electrofishing, Georgetown Reservoir, Texas, 2001 and 2005. 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. Genetic analysis was optional in 2009 and no analysis was performed.

		Genotype					
Year	Sample size	FLMB	F1	Fx	NLMB	% FLMB alleles	% pure FLMB
2001	29	7	10	12	0	70.7	24.1
2005	30	16	0	14	0	59.4	10.0

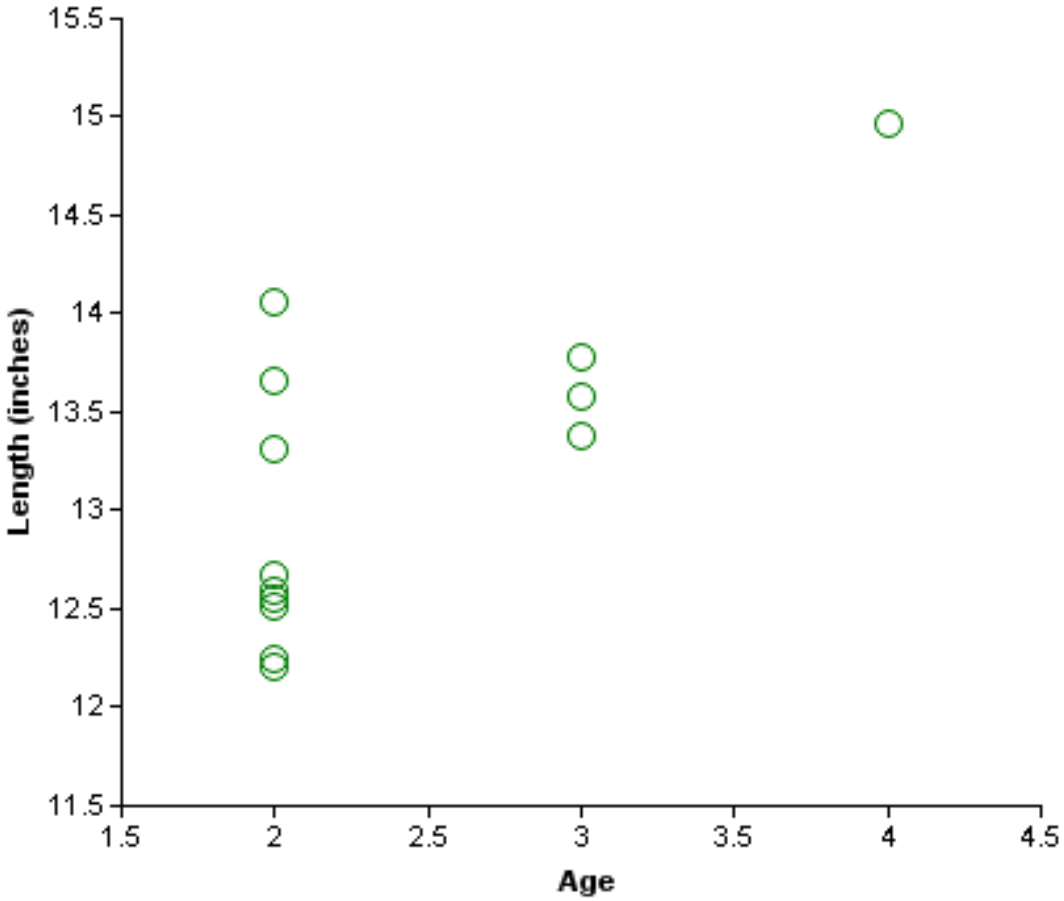


Figure 8. Length at age for largemouth bass collected by electrofishing, Georgetown Reservoir, November 2009 (N = 13).

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

Survey Year	Electrofisher	Trap Net	Gill Net	Creel Survey	Report
Fall 2010-Spring 2011	A				
Fall 2011-Spring 2012	A		A		
Fall 2012-Spring 2013					
Fall 2013-Spring 2014	S		S		S

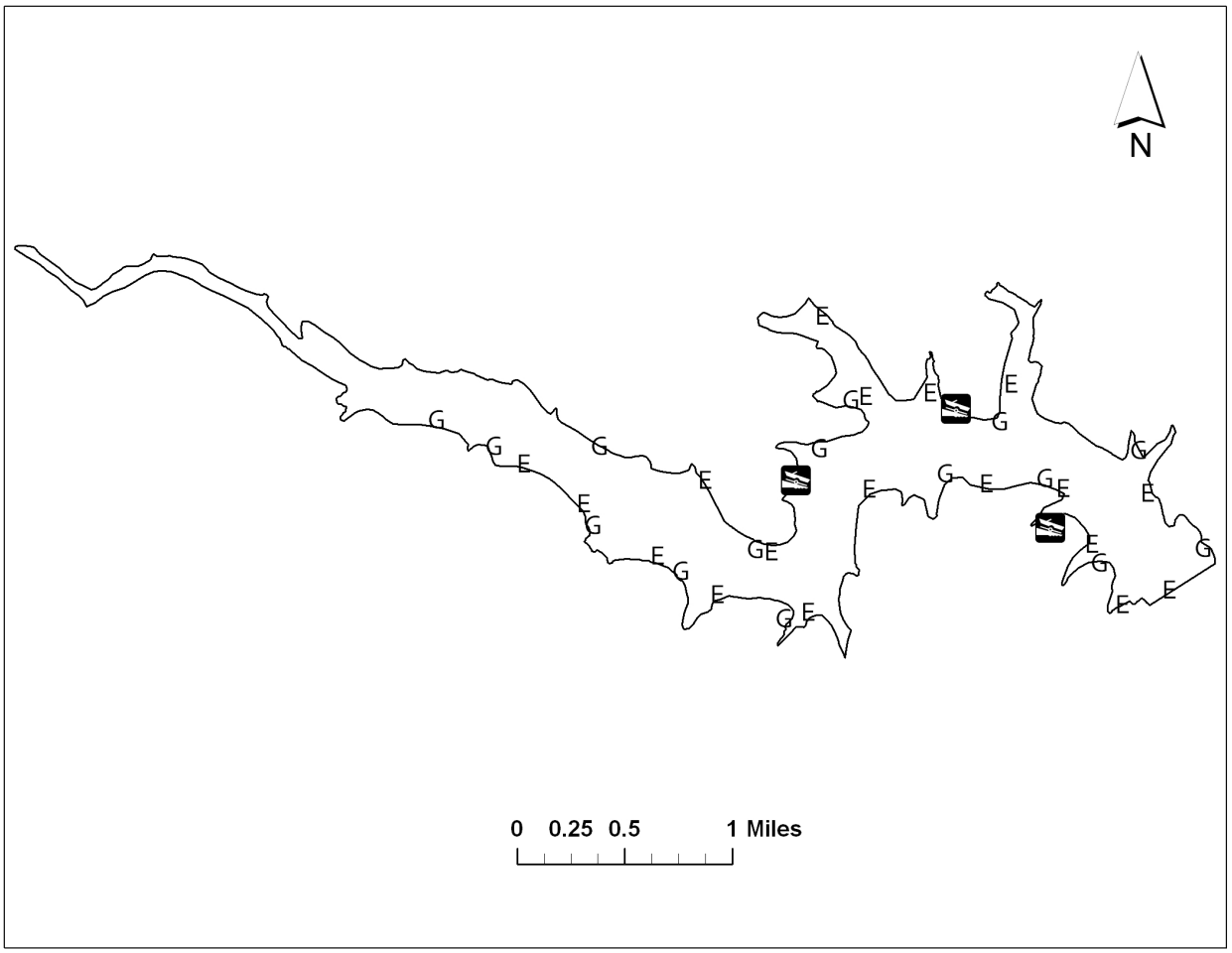
Appendix A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Georgetown Reservoir, Texas, 2009-2010.

Species	Gill Netting		Electrofishing	
	N	CPUE	N	CPUE
Gizzard shad			101	67.3
Threadfin shad			190	126.7
Blue catfish	4	0.3		
Channel catfish	6	0.4		
Flathead catfish	5	0.3		
White bass	24	1.6		
Palmetto bass	6	0.4		
Redbreast sunfish			18	12.0
Green sunfish			2	1.3
Warmouth			1	0.7
Bluegill			16	10.7
Longear sunfish			5	3.3
Smallmouth bass			1	0.7
Largemouth bass	29	1.9	62	41.3

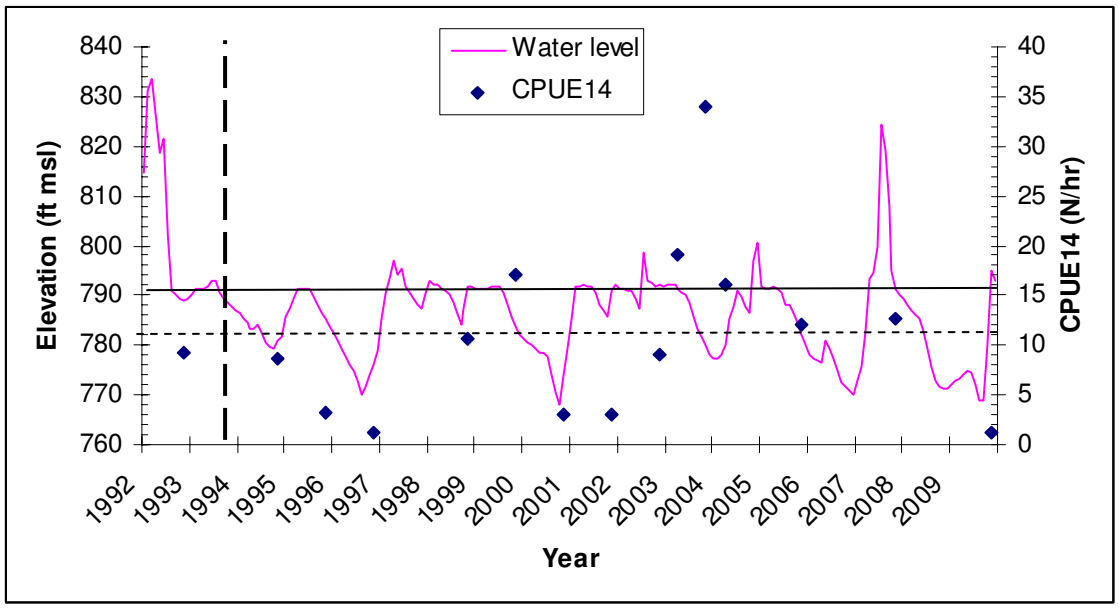
Appendix B

Location of sampling sites, Georgetown Reservoir, Texas, 2009-2010. Gill net and electrofishing stations are indicated by G and E, respectively. Boat ramps are indicated by . Water level was 796.58 feet above mean sea level (msl) for electrofishing and 794.94 msl for gill netting. Conservation pool level is 791.00 msl.



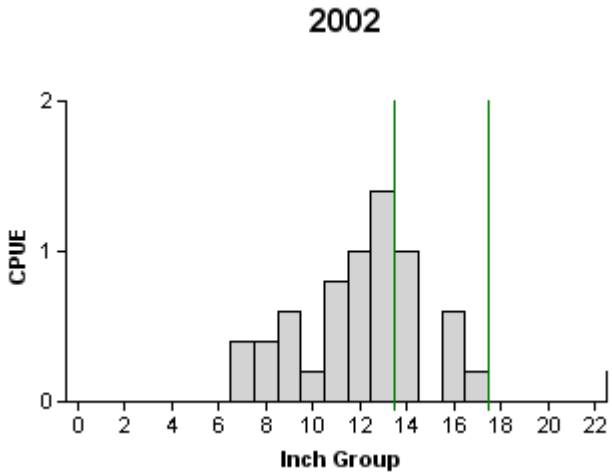
Appendix C

Monthly mean water level (feet above mean sea level (ft msl)) and catch rate of largemouth bass 14 inches and greater (CPUE14) from electrofishing surveys 1992 to 2009, Georgetown Reservoir, Texas. Vertical line represents date of implementation (September 1, 1993) of the 14- to 18-inch slot length limit. Horizontal solid line represents pool elevation (791 ft msl). Horizontal dashed line represents mean CPUE14 for all surveys (N = 15, 10.7/hour).

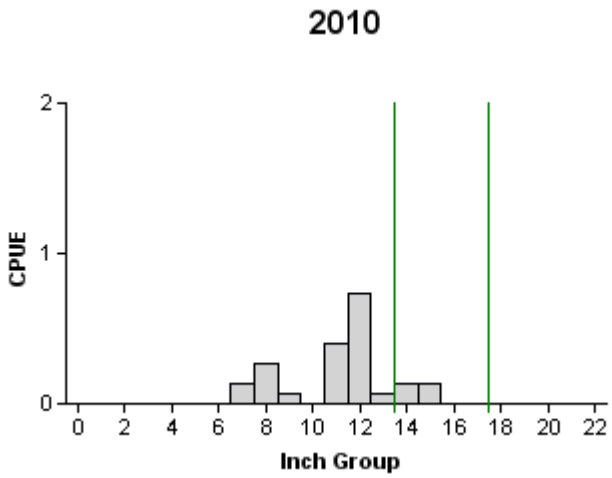


Appendix D

Largemouth bass caught in spring gill net surveys, Lake Georgetown, TX, 2002 and 2010. Vertical lines represent length limit (14-18 inch slot length limit) at the time of the survey.



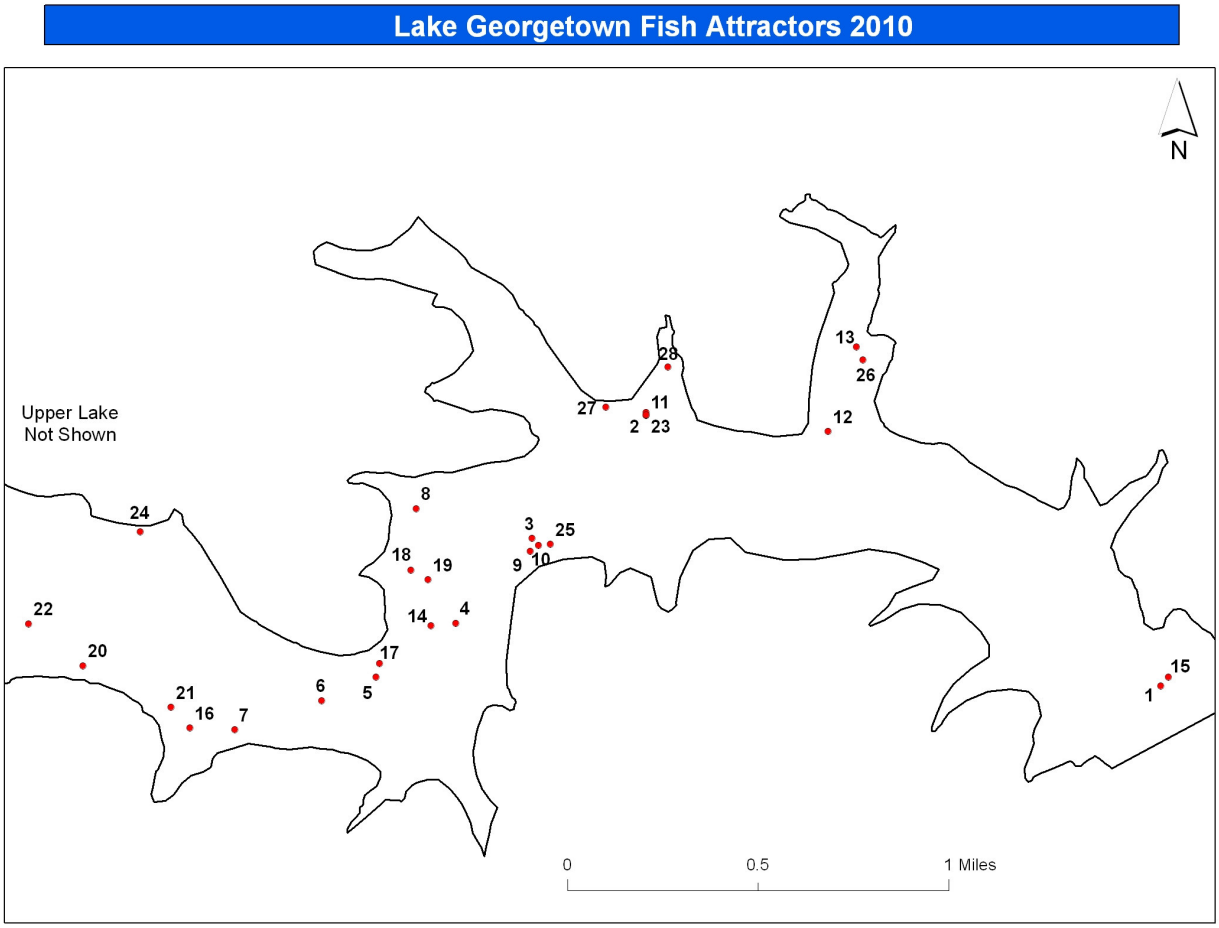
Effort = 5.0
Total CPUE = 6.8 (26; 34)
CPUE-14 = 2.0 (65; 10)
PSD-14 = 31 (15.8)



Effort = 15.0
Total CPUE = 1.9 (24; 29)
CPUE-14 = 0.3 (44; 4)
PSD-14 = 15 (4.2)

Appendix E

Location of fish attractor sites, Lake Georgetown, TX.



Appendix F

Global positioning coordinates (Lat/Long), attractor site descriptions, year installed and year refurbished for fish attractor sites, Lake Georgetown, TX. Site numbers correspond to sites identified in Appendix E.

Lake Georgetown Fish Attractors

January 14, 2010

Site #	Lat/Long		Attractor Description	Year Installed	Refurbished
1	N	30 40.196 °	Point in northwest corner of dam	2007	
	W	-97 43.503 °			
2	N	30 40.812 °	Rock finger next to extremely deep water; across from Jim Hogg boat ramp	2007	
	W	-97 44.676 °			
3	N	30 40.532 °	Point next to ledge	2007	
	W	-97 44.937 °			
4	N	30 40.339 °	Point next to ledge at Russell Park	2007	2010
	W	-97 45.111 °			
5	N	30 40.217 °	Flat on south side of Russell Park	2007	2010
	W	-97 45.292 °			
6	N	30 40.162 °	Mid-river high spot next to river channel south of Russell Park	2007	
	W	-97 45.417 °			
7	N	30 40.096 °	High spot next to river channel edge	2007	2010
	W	-97 45.614 °			
8	N	30 40.601 °	Drop off at point north of Russell Park Ramp that enters small cove	2008	2009
	W	-97 45.201 °			
9	N	30 40.504 °	Drop off on main river channel ledge	2008	
	W	-97 44.941 °			
10	N	30 40.517 °	Main lake point inshore of #9 brushpile	2008	
	W	-97 44.923 °			
11	N	30 40.821 °	Pond dam close to #2 brushpile	2008	
	W	-97 44.678 °			
12	N	30 40.777 °	Ledge on backside of main lake point	2008	2010
	W	-97 44.262 °			
13	N	30 40.969 °	Secondary point near confluence of creek channels	2008	2009
	W	-97 44.198 °			
14	N	30 40.333 °	Flat near beach	2008	2009
	W	-97 45.167 °			
15	N	30 40.216 °	Rocky ledge near dam	2008	
	W	-97 43.486 °			
16	N	30 40.101 °	Point near cove upriver	2008	2010
	W	-97 45.717 °			
17	N	30 40.247 °	Rock flat	2008	2009
	W	-97 45.284 °			
18	N	30 40.460 °	Drain in sand flat	2008	2009
	W	-97 45.213 °			
19	N	30 40.438 °	Flat near Russell Park ramp	2009	2010
	W	-97 45.174 °			
20	N	30 40.242 °	Channel swing near steep bank	2009	2010
	W	-97 45.961 °			
21	N	30 40.147 °	Edge of point at river channel drop	2009	2010
	W	-97 45.760 °			
22	N	30 40..338 °	Creek/River channel intersection	2009	
	W	-97 46.085 °			
23	N	30 40.814 °	Near brushpiles #2 and #11	2009	
	W	-97 44.677 °			
24	N	30 40.519 °	Mainlake point flat	2009	
	W	-97 44.896 °			
25	N	30 40.939 °	Edge of creek channel across from #10 brushpile	2009	
	W	-97 44.183 °			
26	N	30 40.548 °	Rockpile on edge of old road	2009	
	W	-97 45.830 °			
27	N	30 40.832 °	Ledge west of Jim Hogg boat ramp	2010	
	W	-97 44.769 °			
28	N	30 40.923 °	Jim Hogg boat ramp cove on secondary point	2010	
	W	-97 44.628 °			