PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-221-M-1

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2010 Survey Report

Aquilla Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Aquilla Reservoir were surveyed in 2010 using an electrofisher and trap nets and in 2011 using gill nets. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Aquilla Reservoir is a 2,366-acre impoundment supplied by Hackberry and Aquilla Creeks within the Brazos River Basin, Hill County. The reservoir was created in 1982 by the United States Army Corps of Engineers for municipal water supply and flood control. Aquilla is moderately productive, with water clarity ranging from 2 to 4 feet. Fish habitat at time of sampling consisted primarily of natural shoreline. Improved bank and boat access on the reservoir was good, but limited handicap-specific facilities were available.

- **Management history:** Important sport fish included largemouth bass, white bass, white crappie, and catfishes. The management plan from 2003 included an evaluation of the largemouth bass genetic composition, which was completed in 2006. A creel survey was conducted in fall 2006 and spring 2007; those data were included in the 2007 survey report. Several articles have been written to publicize Aquilla's fishery including an article in the Texas Parks and Wildlife magazine on jug lining for blue catfish in May 2007 and a news release titled "Fishing Lake Aquilla" published in local newspaper in August 2010. Exotic vegetation surveys were conducted annually to monitor hydrilla.

- **Fish Community**
  - **Prey species:** Threadfin and gizzard shad catch rates were similar to historical averages. Other forage species included bluegill, longear sunfish, green sunfish, and warmouth. Larger-sized sunfishes were not collected.

  - **Catfishes:** Blue and channel catfish catch rates were higher than historical averages. Blue catfish had excellent body condition and many approached the preferred length of 30-inches or more. Channel catfish conditions were variable ranging from poor to excellent. Aquilla anglers spend nearly 33% of their time targeting catfish species.

  - **White bass:** The white bass population was stable, yet catch rates were below historical averages. Body conditions were excellent. Aquilla anglers spend less than 2% of their time targeting white bass.

  - **Largemouth bass:** The **l**argemouth bass catch rate was the lowest it's been in three surveys, yet body conditions remained good. Largemouth bass start reaching the minimum length limit of 18 inches by age three indicating good growth. Aquilla anglers spend nearly 16% of their time targeting largemouth bass.

  - **White crappie:** White crappie were collected at historically high rates, and body condition was excellent. Aquilla anglers spend nearly 19% of their time targeting white crappie.

- **Management Strategies:** Propose changing the largemouth bass 18-inch minimum length limit back to the statewide 14-inch minimum length limit. Continue managing other species at Aquilla with existing regulations. Conduct general monitoring with electrofisher and trap nets in 2014 and gill nets in 2015. Survey exotic aquatic vegetation annually over the next 4 years.

INTRODUCTION

This document is a summary of fisheries data collected from Aquilla Reservoir in 2010-2011. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other species of fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2010-2011 data for comparison.

Reservoir Description

Aquilla Reservoir is a 2,366-acre reservoir located in Hill County, Texas. The reservoir was constructed in 1982 by the United States Army Corps of Engineers to serve as a source of municipal water and for flood control (Table 1). The reservoir is in the Blackland Prairie Ecological Area and land use around the reservoir is primarily agricultural. Aquilla is moderately productive, with water clarity ranging from 2 to 4 feet. The conservation pool is 537.5 feet above mean sea level, and the reservoir has a maximum and average depth of 59.5 and 16 feet respectively (Figure 1). Fish habitat at time of sampling consisted primarily of natural and rocky shoreline, with lots of standing timber; reservoir elevations were within a foot of conservation pool during sampling (Figure 1; Table 4). Vegetation of all types was scarce and only trace amounts of hydrilla was observed in 2010. There were two improved and one un-improved public boat ramps, so boat access was good (Appendix C). Bank access was adequate, with most anglers fishing along the shore near the Dairy Hill and Old School Boat Ramps. However, facilities allowing easy access to the waters edge were limited, as were handicap-specific facilities. Further information about Aquilla Reservoir and its facilities can be obtained by visiting the Texas Parks and Wildlife Department web page at www.tpwd.state.tx.us and navigating within the fishing link.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Tibbs and Baird 2006) included:

1. Prepare at least one news release highlighting angling opportunities at Aquilla.
   Action: Multiple articles have been written to publicize Aquilla's fishery – including a popular article in the Texas Parks and Wildlife magazine on jug lining for blue catfish in May 2007 (while the 2006 report was being written) and a news release titled Fishing Lake Aquilla published in the local Waco newspaper in August 2010.
2. Survey and map habitat/vegetation prior to 2011.
   Action: A complete habitat survey was performed during winter 2010 and noxious vegetation surveys are conducted annually.
3. Evaluate white crappie populations with trap nets during winter 2008 and 2010.
   Action: Both trap net surveys were completed as scheduled. Additional data were taken on crappie during the 2011 gill net sampling.

Harvest regulation history: Sportfishes in Aquilla Reservoir are currently managed with statewide regulations, except for the 18-inch minimum length limit on black bass (Table 2).

Stocking history: Aquilla has not been stocked with sportfish since 1985. The complete stocking history is in Table 3.

Vegetation/habitat history: Arrowhead, American lotus, and pondweed spp. have been observed on Aquilla in small amounts historically, and hydrilla has been present since 2002. Three acres of hydrilla were observed in 2004; however, that coverage was reduced to zero by 2007 due to high water. Only trace amounts have been observed during the 2008, 2009, and 2010 surveys.

Water Transfer: Aquilla is primarily used for municipal water supply, flood control, and public access for limited recreation such as hunting and fishing. There are currently two permanent pumping stations that utilize a common intake structure and transfer water to other sites. The first is operated by the City of Cleburne and transfers untreated water to Lake Pat Cleburne to be used for municipal water supply. The other is operated by the Aquilla Water Supply Corporation, which provides water supply to a large rural area. There is a study underway to possibly raise the conservation pool of Aquilla Reservoir to provide a more reliable water supply for long term regional needs. This re-allocation study is not yet complete. There is one additional proposal to transfer water from Whitney Reservoir to Aquilla for use by the City of Cleburne, but details of this proposal have not been finalized or approved. Golden algae obviously presents a unique set of concerns with these proposals.

Reservoir capacity: Aquilla was impounded in 1983. Original plans calculated the reservoir's capacity at conservation pool (537.5 feet above mean sea level) to be 52,400 acre-feet. Recent reservoir capacity comparisons conducted by the Texas Water Development Board (TWDB) found the 2008 capacity to be 44,566 acre-feet. Further research indicates 84 to 218 acre-feet of reservoir volume is lost each year due to erosion and sedimentation from its watershed. Pool reallocation, mentioned in the previous section, might temporarily offset immediate consequences to the fishery and provide a more reliable water supply; however it does not address the problems in the watershed. Erosion and sedimentation issues can be dealt with on a large scale by initiating best management practices (BMP's) throughout the watershed, and many agencies are already working toward this end. Additional information can be found at the following web link: http://www.tx.nrcs.usda.gov/technical/wrat/docs/ex_sum.pdf

METHODS

Fishes were collected with electrofisher (1 hour at 12, 5-min stations), gill nets (5 net nights at 5 stations), and trap nets (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 and trap nets, as the number of fish per net night (fish/nn). All survey sites were randomly selected and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2009). A vegetative habitat survey was conducted by boat during summer 2010 and a structural habitat survey was conducted in winter 2010 using satellite imagery according to the Habitat Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2009).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD)] and condition indices [relative weight (Wr)] were calculated for target fishes according to Anderson and Neumann (1996). Index of vulnerability (IOV) was calculated for gizzard shad (DiCenzo et al. 1996). Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE statistics and for creel statistics and SE was calculated for structural indices and IOV. Age and growth data were not collected in 2010 and 2011; however, age and growth data from other reports are included.

RESULTS AND DISCUSSION

Habitat: Littoral zone habitat consisted almost exclusively of natural shoreline (Table 4). Standing timber covered an estimated 35% of the reservoir or 830 acres. A habitat survey was conducted during winter 2010 using satellite imagery. No native or exotic vegetation was observed in summer 2010, although hydrilla has been observed in past surveys.

Creel: No creels were conducted during this survey period; however, creel data from fall 2006 and spring 2007 are included in this report.

Prey species: Threadfin and gizzard shad were collected by electrofisher at 49/h and 272/h respectively

in 2010, and these catch rates were similar to historical averages. The Index of vulnerability (IOV) for gizzard shad was good, and 84% of gizzard shad were available to existing predators as forage. Other important forage species collected were bluegill (78/h), longear sunfish (37/h), warmouth (3/h), and green sunfish (3/h). Panfish seldom reach preferred size classes in Aquilla, and few anglers actively seek them. (Figures 2 and 3; Appendices A and B).

Catfishes: Blue catfish were collected from gill nets at 8/nn in 2011; this catch rate equated to 40 collected individuals, and was higher than any previous Aquilla blue catfish survey on record. The proportional size distribution (PSD) for blue catfish is defined as the percentage of 12-inch and longer individuals which are also 20-inches and longer. Proportional size distribution values have remained similar over the past three surveys indicating acceptable recruitment, growth, and mortality. Many sampled individuals were in the quality size category of 20 inches or more. Body condition, expressed as relative weight (Wr), was good to excellent across all size classes (Figure 4; Appendices A and B).

Channel catfish were collected from gill nets at 5/nn in 2011; this catch rate equates to 25 collected individuals, and was also the highest on record for Aquilla channel catfish. The PSD for channel catfish is defined as the percentage of 11-inch and longer individuals which are also 16-inches and longer. Proportional size distribution values have fluctuated moderately over the past three surveys indicating uneven recruitment, growth, or mortality. Sampled channel catfish did not reach the preferred size category of 24 inches or more. Body condition was fair, varying greatly across size classes (Figure 5; Appendices A and B).

To date, no age and growth work has been performed on catfishes from Aquilla; however, similar length-at-age data from Limestone Reservoir, a reservoir with similar watershed characteristics, indicated blue and channel catfish approached quality size (20 and 16 inches respectively) in about six years (Tibbs and Baird, 2004). A recent creel survey on Aquilla found anglers targeting catfishes spent 4,013 hours fishing for the them, caught catfish at a rate of 0.4/h, and harvested 439 catfish from fall 2006 through spring 2007 (Tibbs and Baird, 2006).

White bass: White bass were collected using gill nets at 3.4/nn in 2011; this catch rate equated to 17 collected individuals, and was below the historical average for the species in Aquilla. The PSD for white bass has remained similar over the past three surveys. Twenty four percent of the sampled white bass reached the preferred size category of 12 inches or more, and body condition was excellent with relative weights ranging from 90 to 110 (Figure 6; Appendices A and B).

To date, no age and growth work has been performed on white bass from Aquilla; however, similar length-at-age data from Limestone Reservoir, a reservoir with similar watershed characteristics, indicated white bass approached legal size (10 inches) in their first year and preferred size (12 inches) by their second year (Tibbs and Baird, 2004). A recent creel survey on Aquilla found anglers targeting white bass spent 193 hours fishing for the species, caught white bass at a rate of 0.9/h, and harvested 112 white bass from fall 2006 through spring 2007 (Tibbs and Baird, 2006).

Largemouth bass: Largemouth bass were collected by electrofisher at 68/h in 2010; this catch rate equated to 68 collected individuals and was lower than the previous two surveys and the historical average for the reservoir. The proportional size distribution (PSD) for largemouth bass is defined as the proportion of 8-inch and longer individuals which are also 12-inches and longer within the population. Proportional size distribution remained poor and was similar to the PSD of 30 in 2006; this might be indicative of uneven recruitment, growth, or mortality. The proportion of individuals 14-inches and larger was identical to the 2006 survey, indicating no proportional changes in the larger size classes of the population. Body conditions ranged from 85 to 100. Modeling of the largemouth bass population in 2006 indicated a healthy population with good genetics and growth rates, and bass typically reached the minimum length limit of 18 inches by age three or four. (Figures 7 and 8; Table 5; Appendices A and B).

A recent creel survey on Aquilla found anglers targeting largemouth bass spent 1,959 hours fishing for the species, caught largemouth bass at a rate of 0.3/h, and harvested 112 largemouth bass from fall 2006 through spring 2007. Sixty-seven percent (n=3) of harvested largemouth bass observed during the creel were below the legal size limit of 18 inches (Tibbs and Baird, 2006).

White crappie: White crappie were collected from trap nets at 14.2/nn in 2010; this catch rate was the second highest on record for white crappie in the reservoir. The proportional size distribution (PSD) has remained good to excellent over the past three surveys. Over 40% of stock-sized fish (5 inches) and longer were also longer than the legal size of 10-inches. Many approached the memorable size category of 12 inches or more. Body conditions, expressed as relative weight (Wr), were excellent and ranged from 90 to 100. Modeling of the white crappie population in 2006 indicated crappie reach legal size by age one and memorable size by age two. (Figures 9 and 10; Appendices A and B).

A recent creel survey found anglers targeting white crappie spent 2,302 hours fishing for the species, caught white crappie at a rate of 0.7/h, and harvested 1,207 white crappie from fall 2006 through spring 2007 (Tibbs and Baird, 2006).

Fisheries management plan for Aquilla Reservoir, Texas

Prepared – July 2011

ISSUE 1: The minimum length limit for largemouth bass was increased to 18 inches On September 1, 1994. The goal of this regulation change was to provide additional protection of brood stock, improve densities, and maximize the trophy potential of the largemouth bass population. One year after the new regulation was imposed, PSD and PSD-14 values had actually declined rather than improved, length frequency data for 13-inch plus fish remained low, and data indicated angler harvest might still be occurring at 14 inches rather than 18 inches. Although strategies to improve angler awareness and compliance were initiated in 1995, PSD, PSD-14, and length frequency data from 2006 and 2010 were basically unchanged since 1995.

MANAGEMENT STRATEGY

1. Propose removing the 18-inch minimum length limit on largemouth bass, and implement the statewide 14-inch minimum length limit (5-fish daily bag) regulation starting September 1, 2012.

ISSUE 2: Although Hydrilla has only been observed in the reservoir in trace amounts since 2008, there is a good chance it will return and begin to spread.

MANAGEMENT STRATEGIES

1. Continue monitoring the reservoir for noxious vegetation annually through 2015.
2. Share coverage information with the U.S. Army Corps of Engineers and interested constituents as needed or requested.

ISSUE 3: Aquilla Reservoir has never supported much native vegetation; however, hydrilla has been present since its discovery in 2002. High water levels from heavy rains during summer 2007 caused most of the hydrilla to die; only trace amounts of hydrilla were observed during the 2008, 2009, and 2010 surveys. Several campaigns have been initiated around the state to introduce or reintroduce native aquatic vegetation into public reservoirs to improve fishery habitat and water quality. Given the decline of standing timber habitat, sparse aquatic vegetation coverage, and recent sedimentation of the upper ends of the reservoir, Aquilla is a good candidate for native aquatic vegetation

introduction.

MANAGEMENT STRATEGIES

1. Form a partnership with the U.S. Army Corps of Engineers and interested constituent/user groups to introduce native vegetation into Aquilla.
2. Request appropriate species of native vegetation from the Texas Freshwater Fisheries Center (TFFC) aquatic plant nursery, and plant vegetation when available.
3. Monitor the spread/growth of native vegetation plantings on an annual basis pending observations; review the program at the next report writing and make recommendations.

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 (*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 U.S. Army Corps of Engineers to post appropriate signage at access points around the reservoir.
2. Educate the public about invasive species through the use of media and the internet.
3. Make a speaking point about invasive species when presenting to constituent and user groups.
4. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.

ISSUE 5: Recent studies indicate Aquilla Reservoir could be losing as much as 218 acre-feet of volume each year through erosion and sedimentation from within its watershed. This relatively rapid loss of fisheries habitat is the single most important issue facing Aquilla's fishery. Other federal and state agencies are already actively engaged in this issue – although for reasons not concerning fish and wildlife.

MANAGEMENT STRATEGIES

1. Share information on Aquilla with the TPWD watershed coordinator, Gary Garrett, along with TPWD partnerships such as the Southeastern Aquatic Resources Partnership (SARP), and Reservoir Fisheries Habitat Partnership (RFHP).
2. Propose funding from SARP and RFHP to perform best management practice (BMP) work within this watershed, based on its relative small size (255 square miles), and the fact that it's one of at least four major reservoirs within the Blackland Prairie Ecological Region severely affected by erosion and sedimentation (Mexia, Fort Parker, and Limestone).

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes electrofisher and trap net sampling in 2014 and gill net sampling in 2015 (Table 6).

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.

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

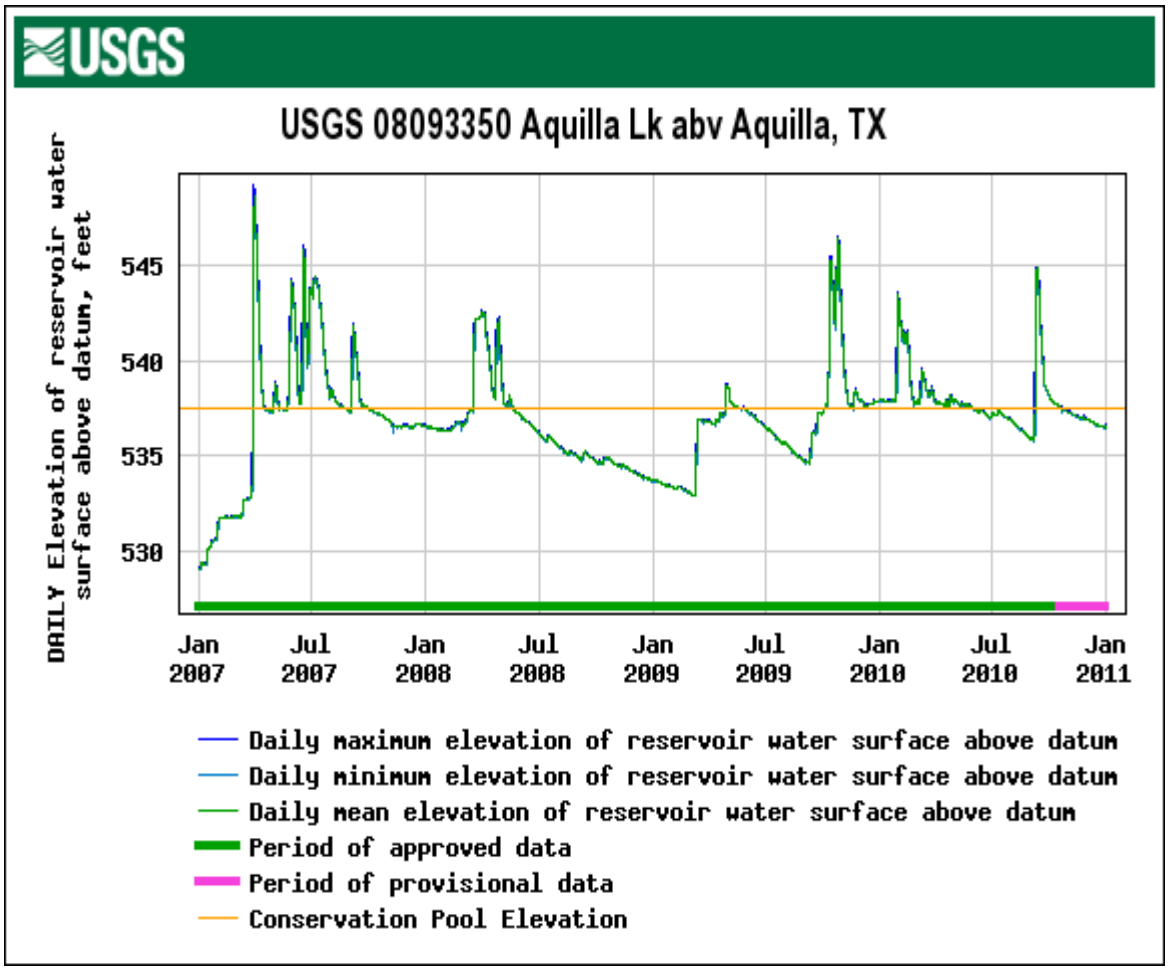


Figure 1. Daily mean water levels for Aquilla Reservoir from January 1, 2007 through January 1, 2011. Conservation pool level is 537.5 feet above mean sea level. Figure from the USGS website.

Table 1. Characteristics of Aquilla Reservoir, Texas.

Characteristic	Description
Year Constructed	1982
Controlling authority	United States Army Corps of Engineers
County	Hill
Reservoir type	Tributary

Table 2. Harvest regulations for Aquilla Reservoir.

Species	Bag Limit	Minimum-Maximum Length (inches)
Catfish: channel and blue catfish, their hybrids and subspecies	25 (in any combination)	12 - No Limit
Catfish, flathead	5	18 - No Limit
Bass, white	25	10 - No Limit
Bass: largemouth	5	18 - No Limit
Crappie: white or black	25 (in any combination)	10 - No Limit

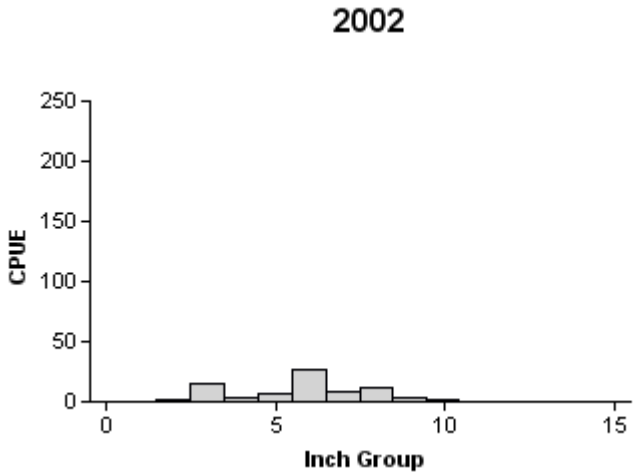
Table 3. Stocking history of Aquilla, Texas. Life stages are fry (FRY), fingerlings (FGL), advanced fingerlings (AFGL), adults (ADL) and unknown (UNK). Life stages for each species are defined as having a mean length that falls within the given length range. For each year and life stage the species mean 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	1983	33,261	UNK	UNK
	Total	33,261		
Coppernose bluegill	1984	165,000	AFGL	2.0
	Total	165,000		
Florida Largemouth bass	1982	31,900	FGL	2.0
	1983	164,000	FRY	1.0
	1984	164,753	FGL	2.0
	1985	72,559	FRY	1.0
	Total	433,212		

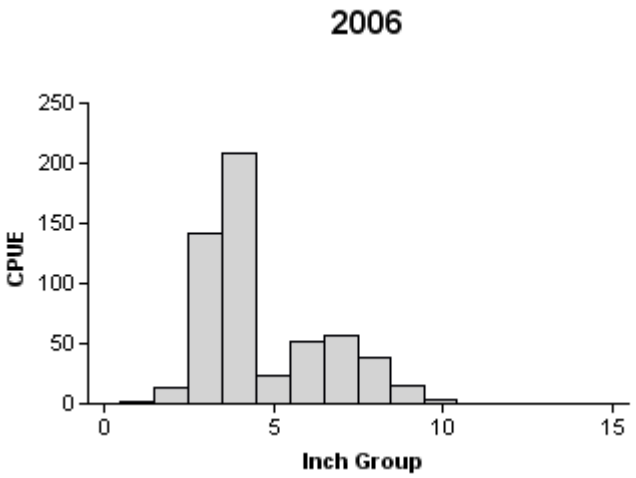
Table 4. Survey of littoral zone and physical habitat types, Aquilla Reservoir, Texas, 2010. Linear shoreline distance (miles) and percent of linear shoreline distance was recorded for each habitat type greater than one percent; otherwise noted as trace. Percent of total shoreline distance is blank for boat docks/piers because they were dually coded with adjacent habitat; counts are given instead. Survey was conducted using 2010 NAIP, 1-meter resolution satellite imagery.

	Shoreline Distance	
Shoreline habitat type	Miles	Percent of total
Natural shoreline	48.1	98.9
Bulkhead		trace
Rocky shoreline (rocks > 4”)		trace
Piers and Boat Docks		N=2

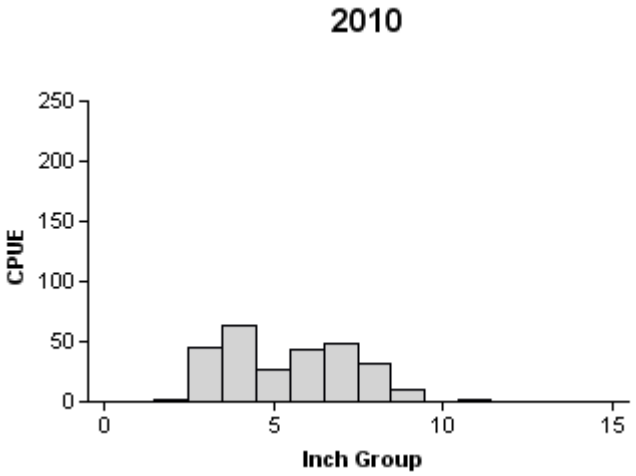
Gizzard Shad



Effort = 1.0
Total CPUE = 77.0 (30; 77)
Stock CPUE = 25.0 (27; 25)
IOV = 79 (5.6)



Effort = 1.0
Total CPUE = 554.0 (23; 554)
Stock CPUE = 114.0 (24; 114)
IOV = 90 (3.9)



Effort = 1.0
Total CPUE = 272.0 (18; 272)
Stock CPUE = 91.0 (18; 91)
IOV = 84 (3.6)

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, Aquilla Reservoir, Texas, 2002, 2006, and 2010.

Bluegill

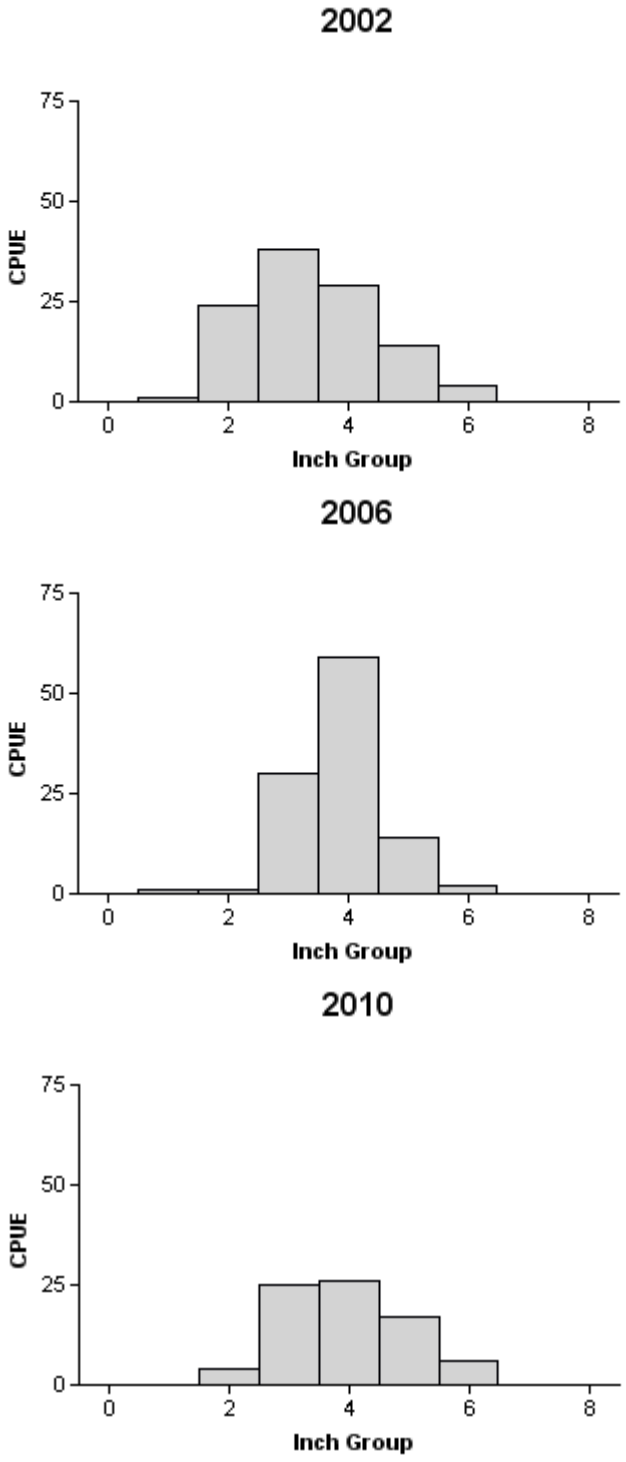


Figure 3. Number of bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Aquilla Reservoir, Texas, 2002, 2006, and 2010.

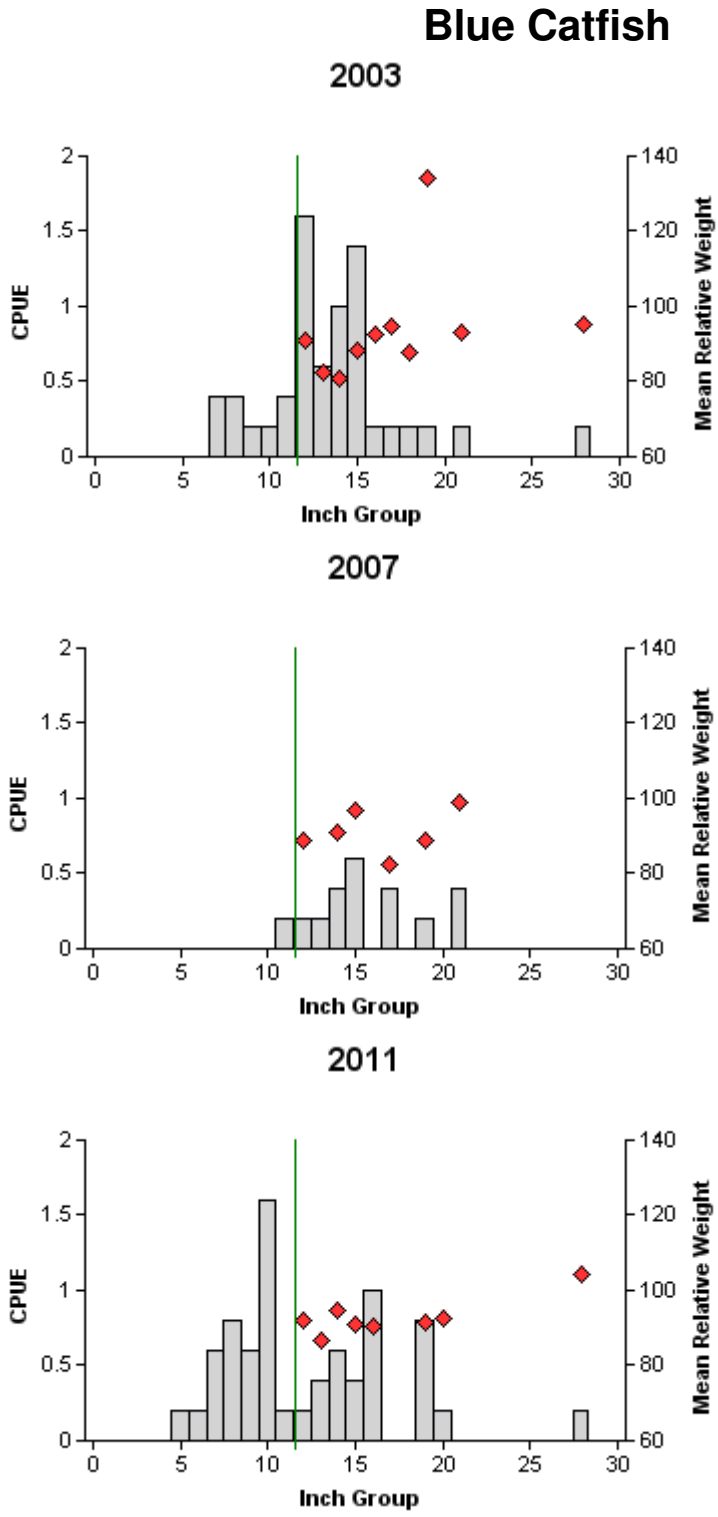


Figure 4. Number of blue catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Aquilla Reservoir, Texas, 2003, 2007, and 2011.

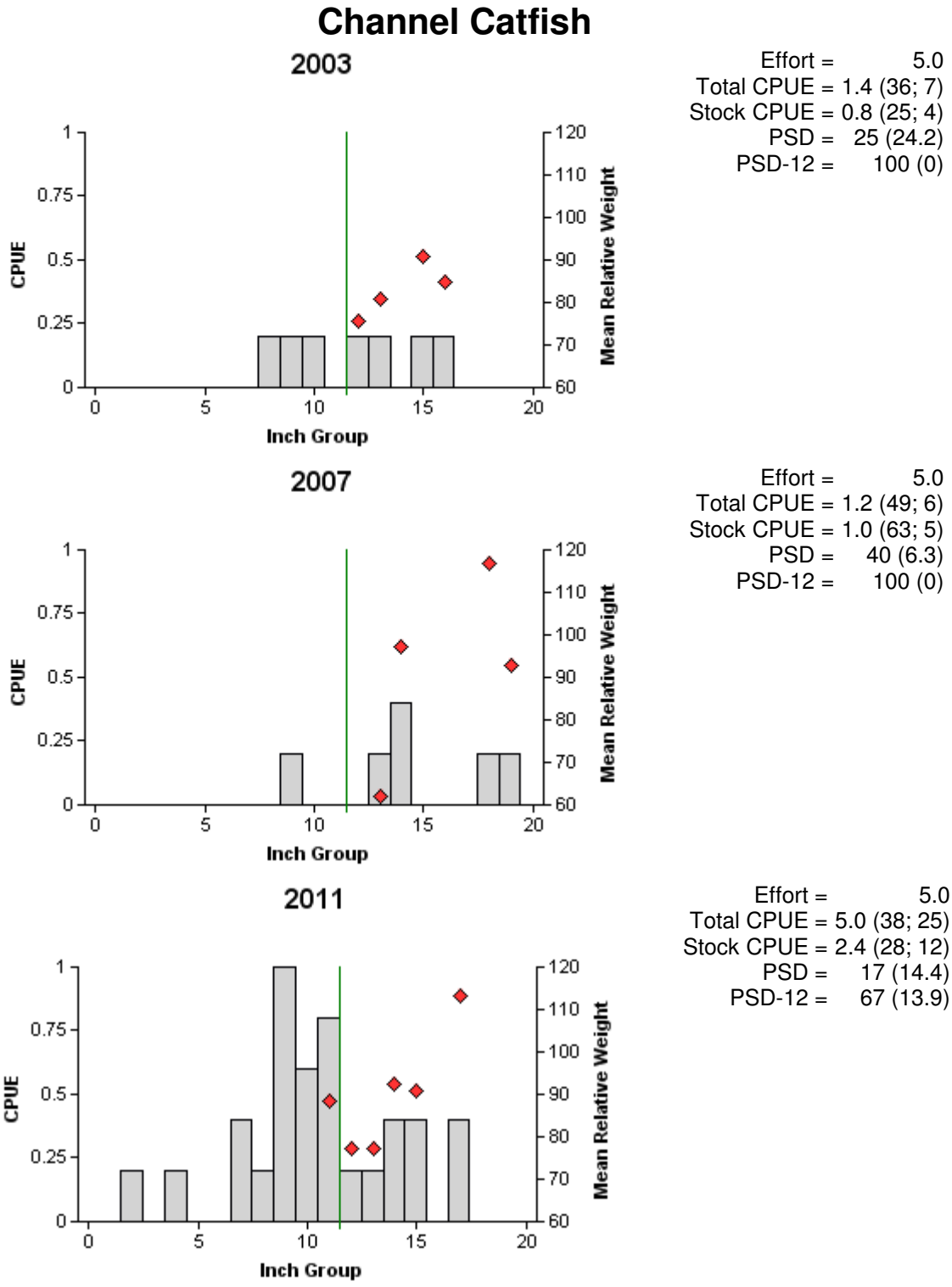


Figure 5. Number of channel catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Aquilla Reservoir, Texas, 2003, 2007, and 2011.

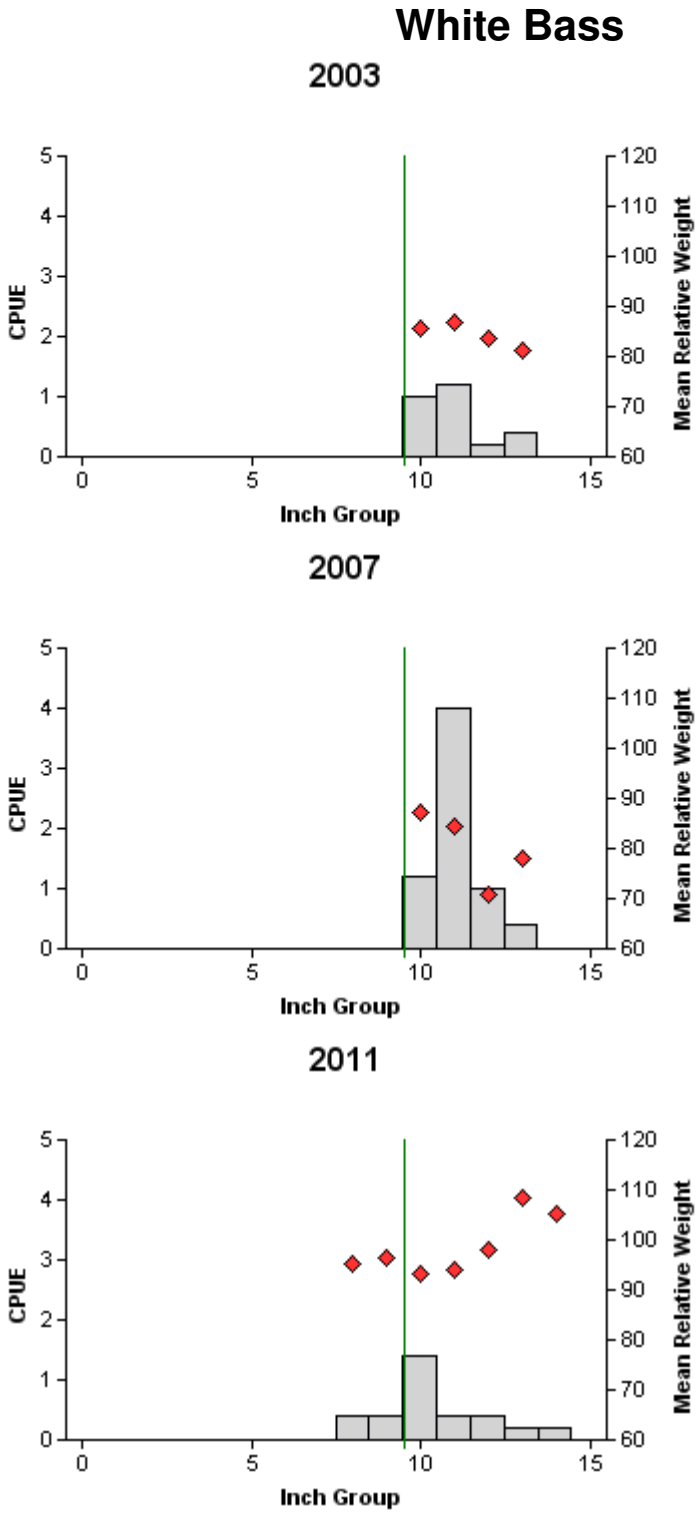


Figure 6. Number of white bass caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Aquilla Reservoir, Texas, 2003, 2007, and 2011.

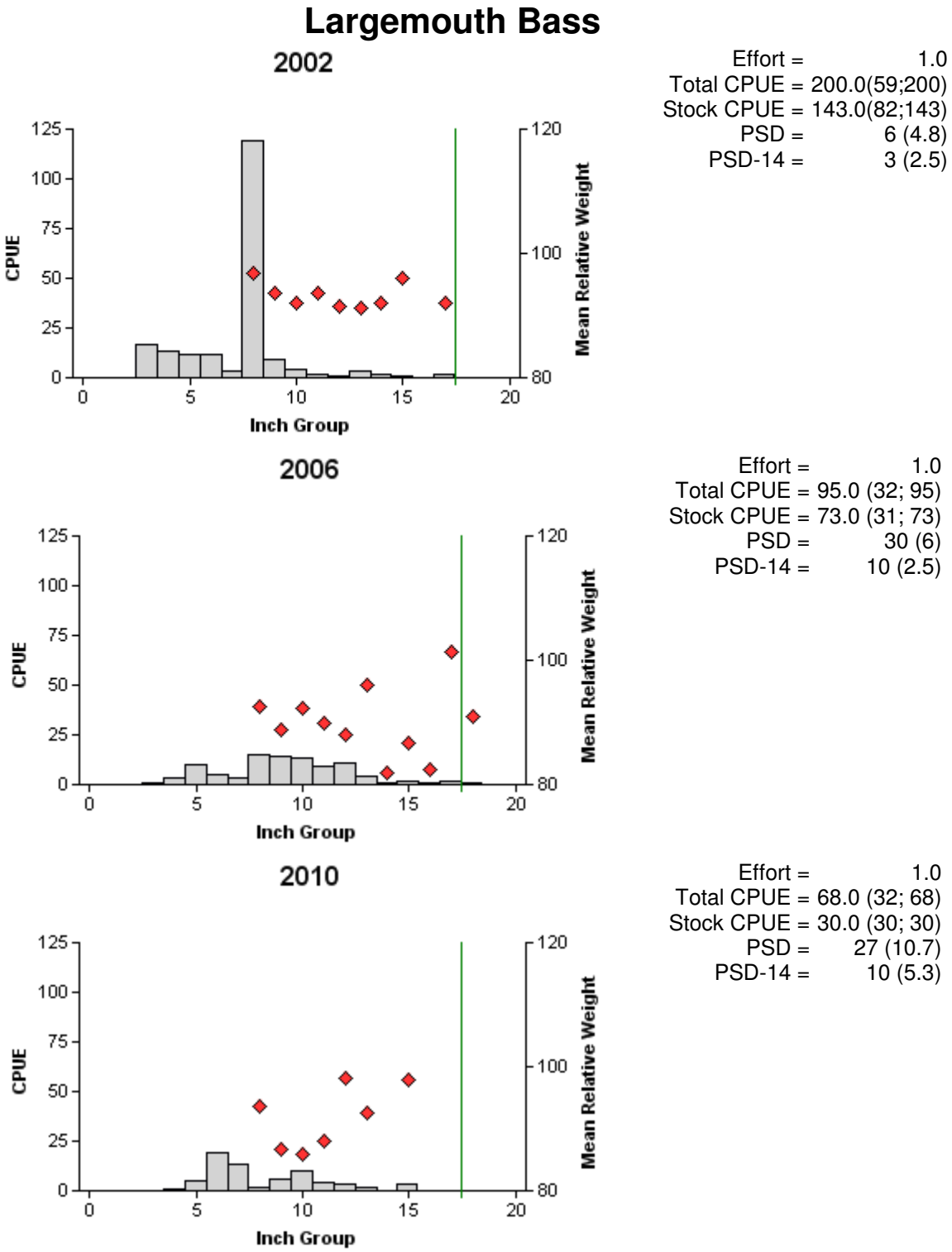


Figure 7. Number of largemouth bass caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Aquilla Reservoir, Texas, 2002, 2006, and 2010.

Table 5. Results of genetic analysis of largemouth bass collected by fall electrofishing in Aquilla Reservoir, Texas, 2000, 2002, and 2006. Analysis conducted in 2004 or earlier are based on Allozyme testing, while later analysis are based on Microsatellite DNA testing. Genetic information was not collected during the 2010 electrofishing season. FLMB = Florida largemouth bass, NLMB = Northern largemouth bass, Hybrid = bass with both FLMB and NLMB alleles.

		Genotype				
Year	Sample size	%FLMB	%Hybrid	%NLMB	% FLMB alleles	% Northern alleles
2000	30	25	71	4	56	44
2002	30	3	80	17	42	58
2006	30	7	93	0	59	41

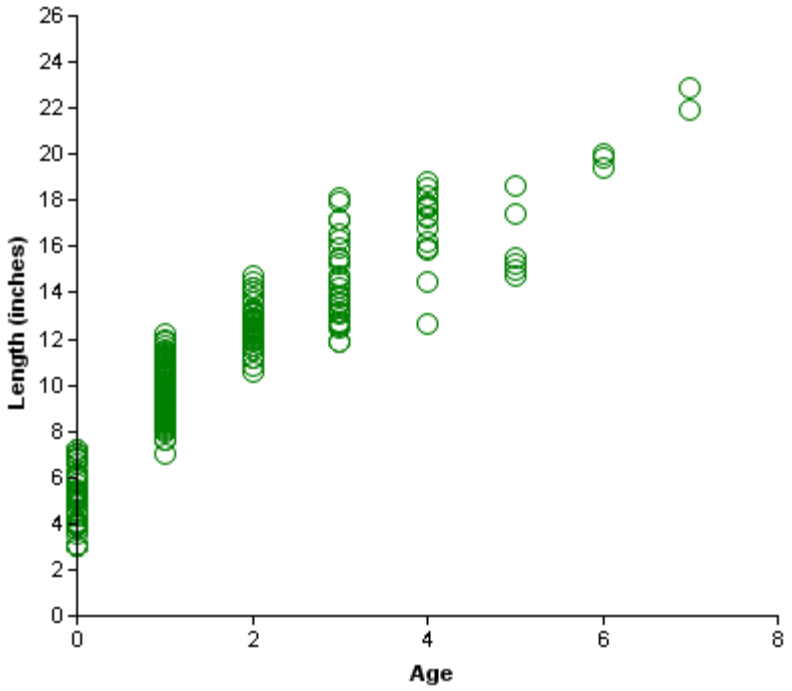


Figure 8. Length at age for largemouth bass collected by electrofisher at Aquilla Reservoir, Texas, fall, 2006.

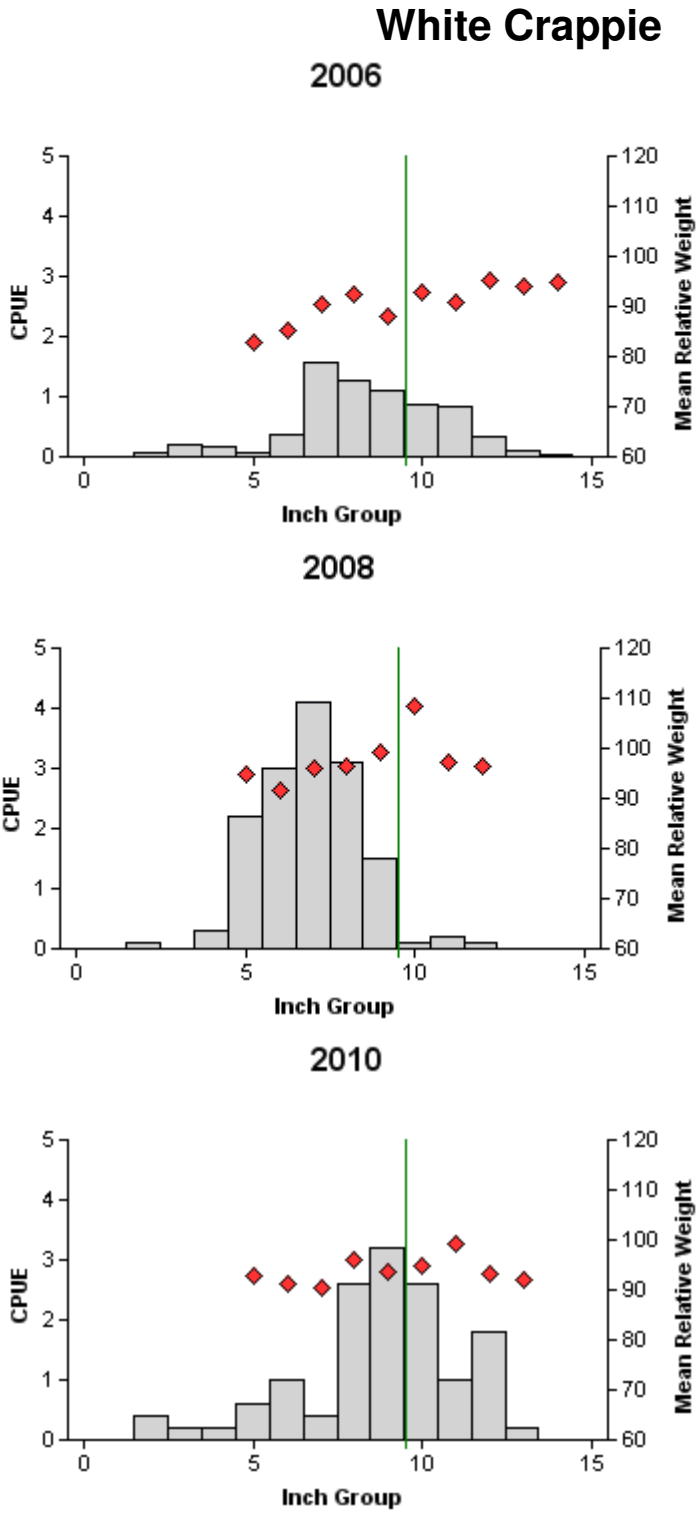


Figure 9. Number of white crappie caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Aquilla Reservoir, Texas, 2006, 2008, and 2010.

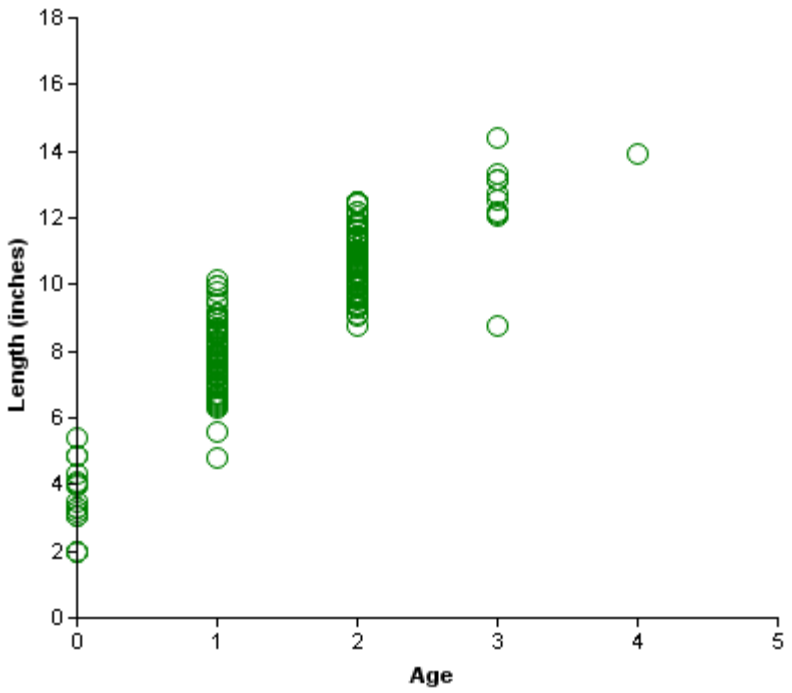


Figure 10. Length at age for white crappie collected with trap nets at Aquilla Reservoir, Texas, 2006.

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

Survey Year	Electrofisher	Trap Net	Gill Net	Creel Survey	Vegetation Survey	Access Survey	Report
Fall 2011-Spring 2012							
Fall 2012-Spring 2013							
Fall 2013-Spring 2014							
Fall 2014-Spring 2015	S	S	S		S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Aquilla Reservoir, Texas, 2010-2011. Asterisk denotes collection by a non-standard gear.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					272	272.0
Threadfin shad					49	49.0
Blue catfish	40	8.0				
Channel catfish	25	5.0				
White bass	17	3.4				
Green sunfish					3	3.0
Warmouth					3	3.0
Bluegill					78	78.0
Longear sunfish					37	37.0
Largemouth bass					68	68.0
White crappie	106	*21.2	71	14.2		
Black crappie	4	*0.8				

APPENDIX B

Catch rates (CPUE) of targeted species by gear type for standard surveys on Aquilla Reservoir, Texas, 1998 to present. All stations were randomly selected. Electrofishing stations were shocked with a 5.0 Smith-Root GPP (Gas Powered Pulsator) until 2010, when a 7.5 Smith-Root GPP was used. Species averages are in bold. Asterisk denotes collection by a non-standard gear.

Gear	Species	1998	2000	2002	2003	2006	2007	2008	2010	2011	Avg.
Electrofisher											
	Largemouth bass	58.0	116.0	200.0		95.0			68.0		**107.4**
	Gizzard shad	228.0	227.0	77.0		554.0			272.0		**271.6**
	Threadfin shad	32.0	34.0	94.0		91.0			49.0		**60.0**
	Bluegill sunfish	25.0	44.0	110.0		107.0			78.0		**72.8**
	Longear sunfish								37.0		**37.0**
	Green sunfish								3.0		**3.0**
	Warmouth								3.0		**3.0**
Gill nets											
	Blue catfish	2.2			7.4		2.6			8.0	**5.1**
	Channel catfish	2.0			1.4		1.2			5.0	**2.4**
	White bass	3.8			2.8		6.6			3.4	**4.2**
Trap nets											
	White crappie	12.0		8.4		3.6			14.2		**9.6**
	Black crappie							0.1		0.8	**0.5**

APPENDIX C

Location of sampling sites, Aquilla Reservoir, Texas, 2010-2011. Standard electrofishing, trap netting, and gill netting stations are indicated by circles, squares, and triangles respectively. Water level was near full pool at time of sampling.