

PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-30-R-31

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2005 Survey Report

Alvarado Park Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Alvarado Park Reservoir were surveyed in 2005 using electrofishing and trap nets and in 2006 using gill nets. No angler creel was performed during the survey period. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir description:** Alvarado Park Reservoir is a 507-acre impoundment located within the city of Alvarado, Johnson County, Texas. We were unable to obtain the conservation pool elevation from the city of Alvarado and there is no elevation monitoring system in place. However, the reservoir was three to five feet low during the sampling period. Alvarado Park Reservoir is eutrophic with steady productivity. Habitat features consisted of boat docks, bulkheading, and overhanging brush. Aquatic vegetation was limited to shoreline stands of cattail (*Typha* spp.) and bulrush (*Scirpus* spp.).
- **Management history:** Important sport fish include white bass, largemouth bass, and channel catfish. The 2002 management plan included an additional gill net sample in spring 2004. The 2004 sample was meant to 1) monitor a potential declining channel catfish population, and 2) collect blue catfish which had not been collected prior - despite consecutive fingerling stockings in 2000 and 2001. Largemouth bass have always been managed under statewide regulations. The 1995 and 1998 survey reports identified possible recruitment issues in legal-sized bass. The 2002 survey report verified those findings and suggested that angler harvest might be regulating the abundance of legal-sized fish. A 14-18" slot limit, five fish daily bag regulation was suggested in the 2002 survey report to protect adult fish to 18", as was a creel to survey attitudes and opinions of local anglers. It was later decided that a creel on Alvarado Park Lake would not be cost-effective.
- **Fish community**
 - **Prey species:** Threadfin shad are currently the dominant forage species in the reservoir. Electrofishing catch of gizzard shad was up from the previous survey, and nearly three-fourths of the gizzard shad present were available as prey to sport fish. Electrofishing catch of bluegill was moderately high, while redear, longear, warmouth, and green sunfish also contributed to the prey base.
 - **Catfishes:** The channel catfish catch increased during spring 2004 and 2006, and no longer seems to be declining. Few blue catfish were collected, indicating that the 2000 and 2001 stockings were ineffective. Flathead catfish were present in low numbers.
 - **Temperate bass:** White bass have maintained a high-density population since the 1998 survey. Most fish in the population are available for harvest.
 - **Largemouth bass:** Largemouth bass were relatively abundant and in good condition. Recruitment remained good, however the catch rate of legal-sized fish remained low in fall 2005.
 - **White crappie:** White crappie were present in low numbers and catch rates have remained considerably reduced since the 2001 survey. Low water levels and reduced availability of cattail and bulrush vegetation may account for part of the low catch rate for this species.
- **Management strategies:** Conduct electrofishing and trap net survey in 2007 to monitor the largemouth bass and white crappie populations, and general monitoring with trap net, gill net, and electrofishing surveys in 2009-2010. Conduct aquatic vegetation survey if required and an updated habitat survey prior to the next survey report.

INTRODUCTION

This document is a summary of fisheries data collected from Alvarado Park Reservoir in 2005-2006. 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 with the 2005-2006 data for comparison.

Reservoir description

Alvarado Park Reservoir is a 507-acre impoundment constructed in 1966. It is located in Johnson County within the city of Alvarado and is operated and controlled by the same. Primary water uses include municipal water supply and recreation. Alvarado Park Reservoir is eutrophic with Secchi readings generally less than two feet. Habitat consists of boat docks, bulk heading, overhanging brush, cattail and bulrush. Mean and maximum depths are six and 20 feet respectively. Water elevation data is currently not collected by the controlling authority. Boat access consists of a single public boat ramp, and bank fishing access is poor due to the majority of the reservoir's shoreline being privately owned. There is no public handicap access. Other descriptive characteristics for Alvarado Park Reservoir are in Table 1.

Management history

Previous management strategies and actions: Management strategies and actions from the previous survey report (Baird and Tibbs 2002) included:

1. Conduct supplemental gill net survey in spring 2004.

Action: A supplemental gill net survey was conducted in spring 2004 to collect information on the possible declining channel catfish fishery and to monitor the success or failure of the blue catfish fingerlings stocked in 2000 and 2001. The standard gill net survey showed little change in the channel catfish fishery and two legal-sized blue catfish were collected. As of May 2006, the channel catfish population in Alvarado Park Reservoir seems to have rebounded nicely with fish in the preferred category more plentiful than in any other recent survey. The success of the blue catfish fingerling stockings is still questionable since few individuals have been collected in the last two surveys.

2. Conduct an angler creel survey to see if attitudes and opinions of anglers would support a 14"-18" slot regulation for largemouth bass.

Action: An angler creel survey and 14"-18" slot regulation was suggested in the last survey report to learn about the attitudes and opinions of the local anglers, and protect adult bass to larger size and reduce numbers of sub-14" fish through angler harvest. Several options were discussed to collect angler information. A creel survey was rejected due to the typical low numbers of anglers utilizing the fishery, its physical distance from the Inland Fisheries (IF) Management office, and increased cost of fuel. A mail-out survey, although appealing, was also rejected due to the loss of IF's human dimensions coordinator. Upon further discussion, it was decided to hold-off on the creel survey and new regulation until better data could be collected on the fishery.

Harvest regulation history: Sportfishes in Alvarado Park Reservoir have always been, and remain, managed with statewide regulations (Table 2).

Stocking history: Alvarado Park Reservoir has not been stocked since the introduction of blue catfish fingerlings in 2000 and 2001. Few stockings were conducted prior to 2000. Florida largemouth bass were stocked at 100 fish/acre in both 1997 and 1998, channel catfish were stocked at nearly 50 fish/acre in 1990, and Coppernose bluegill were stocked at 50 fish/acre in 1983. The complete stocking history is in Table 3.

Vegetation/habitat history: Alvarado Park Reservoir supported numerous species of aquatic vegetation in past surveys. Mitchell (1995) reported Black Willow, Cattail, Smartweed, Bulrush, Water-primrose, Spikerush, Water net, and pondweed. The most recent survey reported Cattail *Typha* sp., Bulrush *Scirpus* sp., Black Willow *Salix* sp., and water willow *Justicia americana* (Baird and Tibbs 2002). Bulkheading, boat docks, and other common anthropogenic activities may have disrupted habitat where previously reported aquatic species had been. No nuisance species have ever been observed.

METHODS

Fishes were collected by electrofishing (1 hour at 12 5-min stations), gill netting (5 net nights at 5 stations), and trap netting (5 net nights at 5 stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/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 2002).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Stock Density (PSD), Relative Stock Density (RSD)], and condition indices [relative weight (*W_r*)] 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. Fish aging became optional in 2004, and no new age and growth data were collected from the 2005/2006 survey. The most recent age and growth information for Alvarado Park Reservoir can be found in Baird and Tibbs (2002). There are currently no water elevation data available.

RESULTS AND DISCUSSION

Habitat: The most recent littoral zone habitat survey was conducted in 1998 and consisted primarily of boat docks, bulkheading, rip-rap, overhanging brush, and native emergent vegetation (Mitchell and DiCenzo 1998).

Creel: A creel was not conducted during this survey period; therefore no creel data are available for Alvarado Park Reservoir to date.

Prey species: Electrofishing catch rates of threadfin and gizzard shad were 2,081.0/h and 168.0/h, respectively. Threadfin CPUE was more than four times that of the previous survey, while CPUE for gizzard shad decreased. Index of vulnerability (IOV) for gizzard shad, although lower than the previous two surveys, was still high indicating 79% were available to existing predators (Figure 1). Total CPUE of bluegill (241.0/h, Figure 2), longear (84.0/h, Figure 3), and other sunfishes contributed considerably to the forage base as well. Panfish in the preferred category and higher are still lacking from Alvarado Park Reservoir.

Catfishes: The gill net catch rate of channel catfish was 5.0/nn in 2006, and higher than the previous two surveys (Figure 4). Supplemental gill netting in spring 2004 netted a CPUE of 3.4/nn. Size structure of the channel catfish population has improved slightly, as illustrated by increased recruitment and larger individuals approaching memorable (28 inches and greater) size classes. Only three blue catfish have been collected in the past two spring gill netting surveys, possibly indicating poor stocking success in 2000 and 2001 (Figure 5). None the less, a very low density blue catfish population seems to exist, and future surveys will continue to monitor this.

White bass: The gill net catch rate of white bass was 28.2/nn in 2006 (Figure 6). Catch rates indicated white bass continue to be the dominant predator in the reservoir, and the fishery for this species is among

the best in the district. Gill netting surveys commonly collect fish 15 inches and larger, with high relative weights averaging between 100 and 110.

Largemouth bass: The electrofishing catch rate of largemouth bass was 124.0/h in 2005, well below the 305.0/h collected in 2001 (Figure 7), and low for the district overall. Proportional stock density (PSD's) calculated from the past three surveys (15, 27, and 25 respectively) indicate an unbalanced population with a high proportion of smaller individuals. Acceptable PSD's range from 40 to 70. There are currently no creel data available. Body condition remained good for all length classes, yet few individuals recruit beyond the legal length limit of 14 inches. Florida largemouth bass influence has remained relatively constant with Florida alleles ranging from 34 to 42% and Florida genotypes from 3 to 10% (Table 4).

White crappie: The trap net catch rate of white crappie was 2.6/nn in 2005. Although up from the 2001 survey (0.6/nn), this catch rate is far below that from 1998 (51.6/nn) (Figure 8). Crappie recruitment is typically cyclic in nature and not a concern at present. Although the population density was low, a high PSD (i.e., 54) illustrated a balanced population. Relative weights for all size classes surpassed 100, indicative of healthy fish.

Fisheries management plan for Alvarado Park Reservoir, Texas

Prepared – July 2006.

ISSUE 1: Recruitment of legal-sized largemouth bass to the fishery remains a problem, and the cause is unknown due to lack of creel information.

MANAGEMENT STRATEGIES

1. Conduct a creel survey to assess the habits, attitudes, and opinions of largemouth bass anglers on Alvarado Park Reservoir in spring 2007.
2. Perform a supplemental electrofishing survey in fall 2007 to collect additional data on the largemouth bass fishery.

ISSUE 2: Catch rates of white crappie have fallen dramatically since 1998, and are considerably lower than historical rates.

MANAGEMENT STRATEGIES

1. Perform a supplemental trap netting survey in winter 2007 to collect additional data on the white crappie fishery.

ISSUE 3: Previous survey reports for Alvarado Park Reservoir lack elevation data.

MANAGEMENT STRATEGIES

1. Contact controlling authority, City of Alvarado, to begin negotiating installment of a permanent gauging station.
2. Pending these negotiations, contact other potentially interested agencies (e.g., USGS, TCEQ) for same.

ISSUE 4: Previous stockings of blue catfish in 2000 and 2001 failed to produce a fishery in the short term.

MANAGEMENT STRATEGY

1. Stock blue catfish at 100 fish/acre for two more consecutive years.
2. Continue routine gill net monitoring to determine if blue catfish begin to recruit.

ISSUE 5: An updated physical habitat survey has not been conducted for Alvarado Park Reservoir since 1998.

MANAGEMENT STRATEGY

1. Perform a physical habitat survey prior to next report period using current technology.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes supplemental trap net sampling in 2007, supplemental electrofishing in 2007, and mandatory monitoring in 2009/2010 (Table 5). Additional trap net sampling in 2007 is necessary to evaluate questionable recruitment within the white crappie population. Additional electrofishing in 2007 is necessary to maintain consistent trend data for this largemouth bass fishery. Gill net surveys are only necessary every four years at this point to ensure presence or absence of channel catfish, flathead catfish, white bass, and to evaluate the presence/absence of introduced blue catfish. An updated physical habitat survey will be performed in 2007/2008.

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- 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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- Mitchell, J. 1995. Statewide freshwater fisheries monitoring and management program survey report for Alvarado Park Reservoir, 1994. Texas Parks and Wildlife Department, Federal Aid Report F-30-R, Austin.
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Table 1. Characteristics of Alvarado Park Reservoir, Texas.

Characteristic	Description
Year Constructed	1966
Controlling authority	City of Alvarado
County	Johnson
Reservoir type	Tributary
Shoreline Development Index (SDI)	1.5
Conductivity	363 umhos/cm

Table 2. Harvest regulations for Alvarado Park 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, largemouth	5	14" minimum
Crappie, White	25	10" minimum

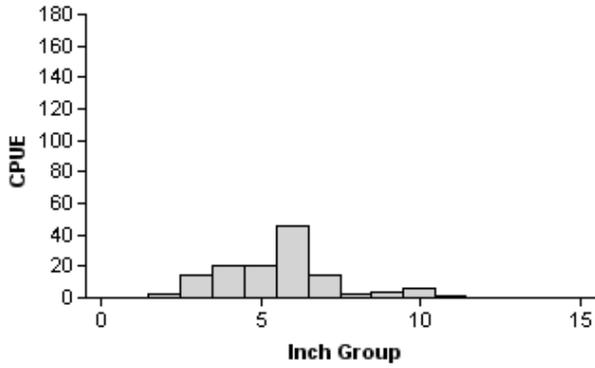
Table 3. Stocking history of Alvarado Park Reservoir, Texas. Size Categories are: FRY =<1 inch; FGL = 1-3 inches; AFGL = 8 inches, and ADL = adults.

Species	Year	Number	Size
Coppernose bluegill	1983	27,000	
Blue catfish	2000	85,700	FGL
	2001	50,600	FGL
	Total	136,300	
Channel catfish	1990	26,039	FGL
Florida largemouth bass	1997	50,857	FGL
	1998	51,495	FGL
	Total	102,352	

Gizzard Shad

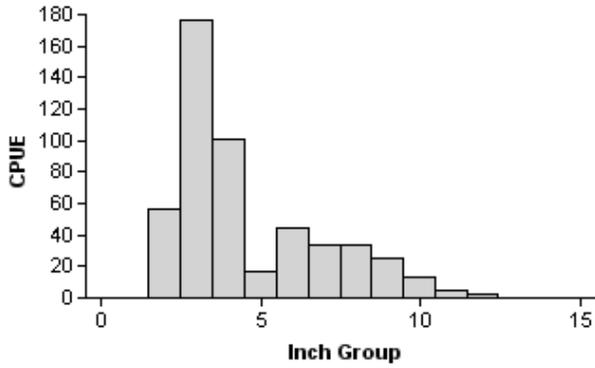
1998

Effort = 1.0
 Total CPUE = 134.0 (17; 134)
 IOV = 89.55 (0.03)



2001

Effort = 1.0
 Total CPUE = 510.0 (18; 510)
 IOV = 84.31 (0.04)



2005

Effort = 1.0
 Total CPUE = 168.0 (17; 168)
 IOV = 78.57 (0.06)

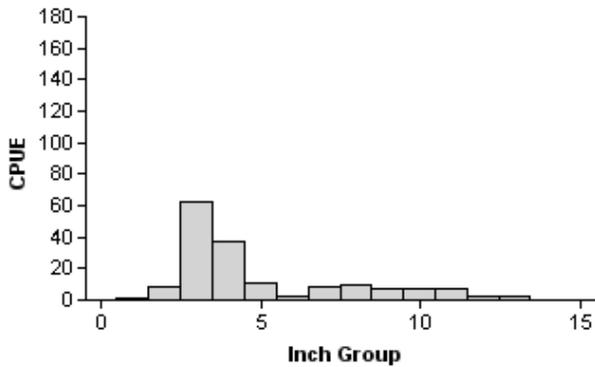
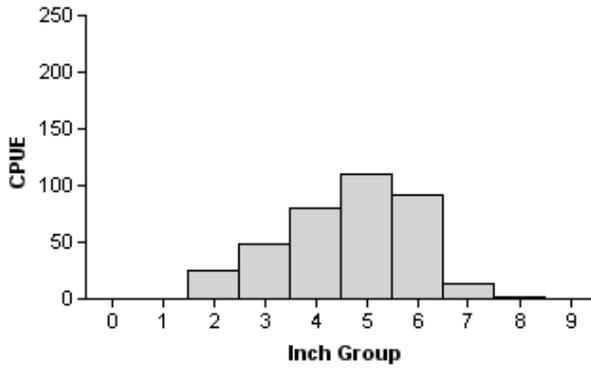


Figure 1. Number of gizzard shad caught per hour (CPUE) (RSE and N in parentheses) and population indices (SE in parentheses) for fall electrofishing surveys, Alvarado Park Reservoir, Texas.

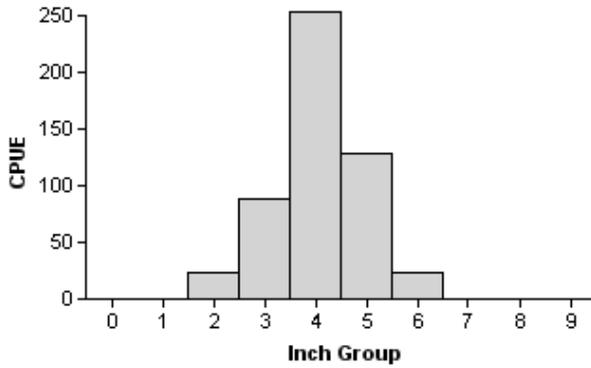
Bluegill

1998



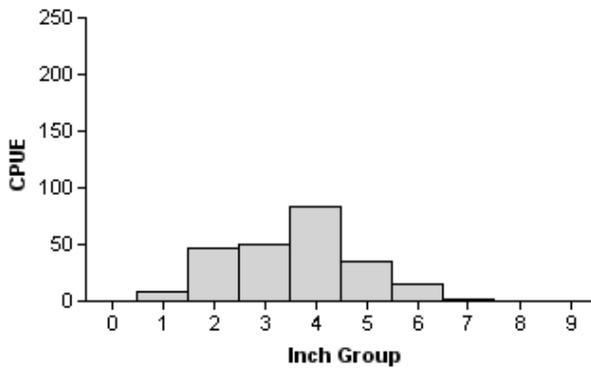
Effort = 1.0
 Total CPUE = 369.0 (44; 369)
 Stock CPUE = 344.0 (45; 344)
 PSD = 31.0 (0.07)

2001



Effort = 1.0
 Total CPUE = 518.0 (21; 518)
 Stock CPUE = 494.0 (21; 494)
 PSD = 5.0 (0.01)

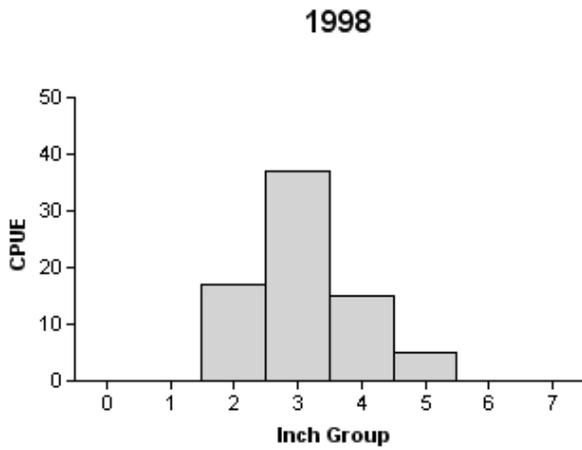
2005



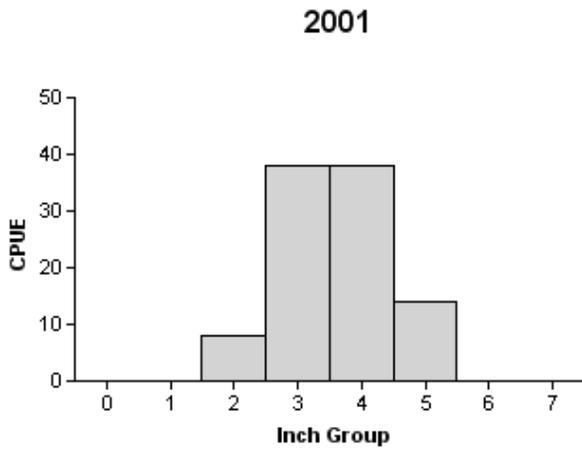
Effort = 1.0
 Total CPUE = 241.0 (33; 241)
 Stock CPUE = 185.0 (44; 185)
 PSD = 9.0 (0.02)

Figure 2. Number of bluegill caught per hour (CPUE) (RSE and N in parentheses) and population indices (SE in parentheses) for fall electrofishing surveys, Alvarado Park Reservoir, Texas.

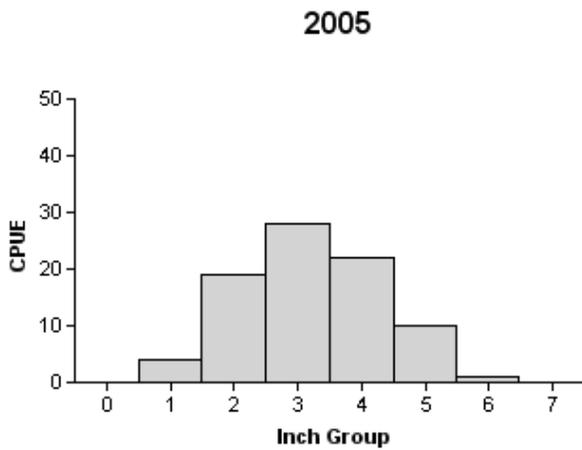
Longear



Effort = 1.0
 Total CPUE = 74.0 (24; 74)
 Stock CPUE = 74.0 (24; 74)
 PSD = 100.0 (0)



Effort = 1.0
 Total CPUE = 98.0 (37; 98)
 Stock CPUE = 98.0 (37; 98)
 PSD = 100.0 (0.00)



Effort = 1.0
 Total CPUE = 84.0 (45; 84)
 Stock CPUE = 84.0 (45; 84)
 PSD = 100.0 (0)

Figure 3. Number of longear caught per hour (CPUE) (RSE and N in parentheses) and population indices (SE in parentheses) for fall electrofishing surveys, Alvarado Park Reservoir, Texas.

Channel catfish

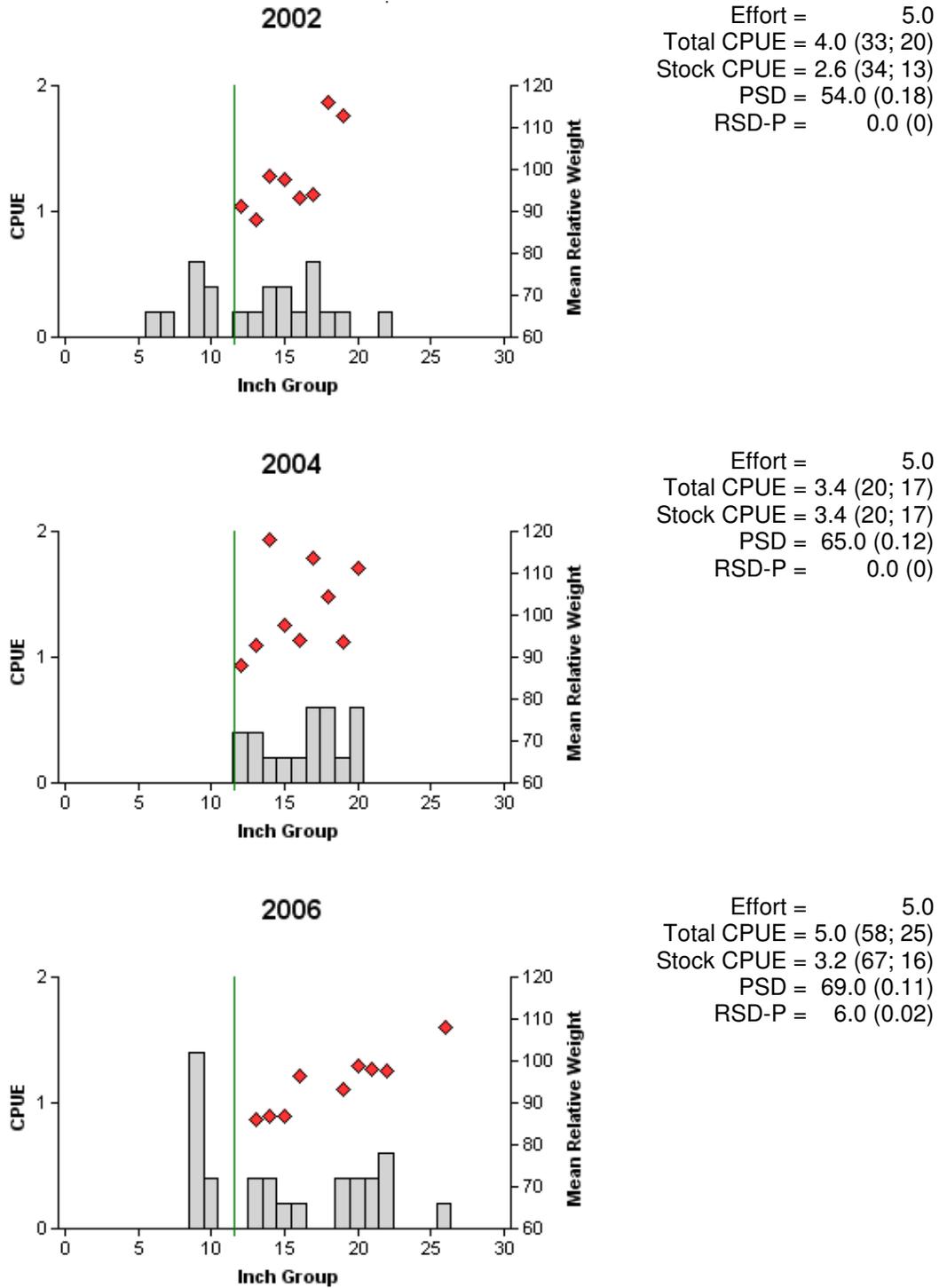


Figure 4. Number of channel catfish caught per net-night (CPUE) (RSE and N in parentheses) and population indices (SE in parentheses) for spring gill net surveys, Alvarado Park Reservoir, Texas. The vertical line represents the minimum length limit at the time of the survey.

Blue Catfish

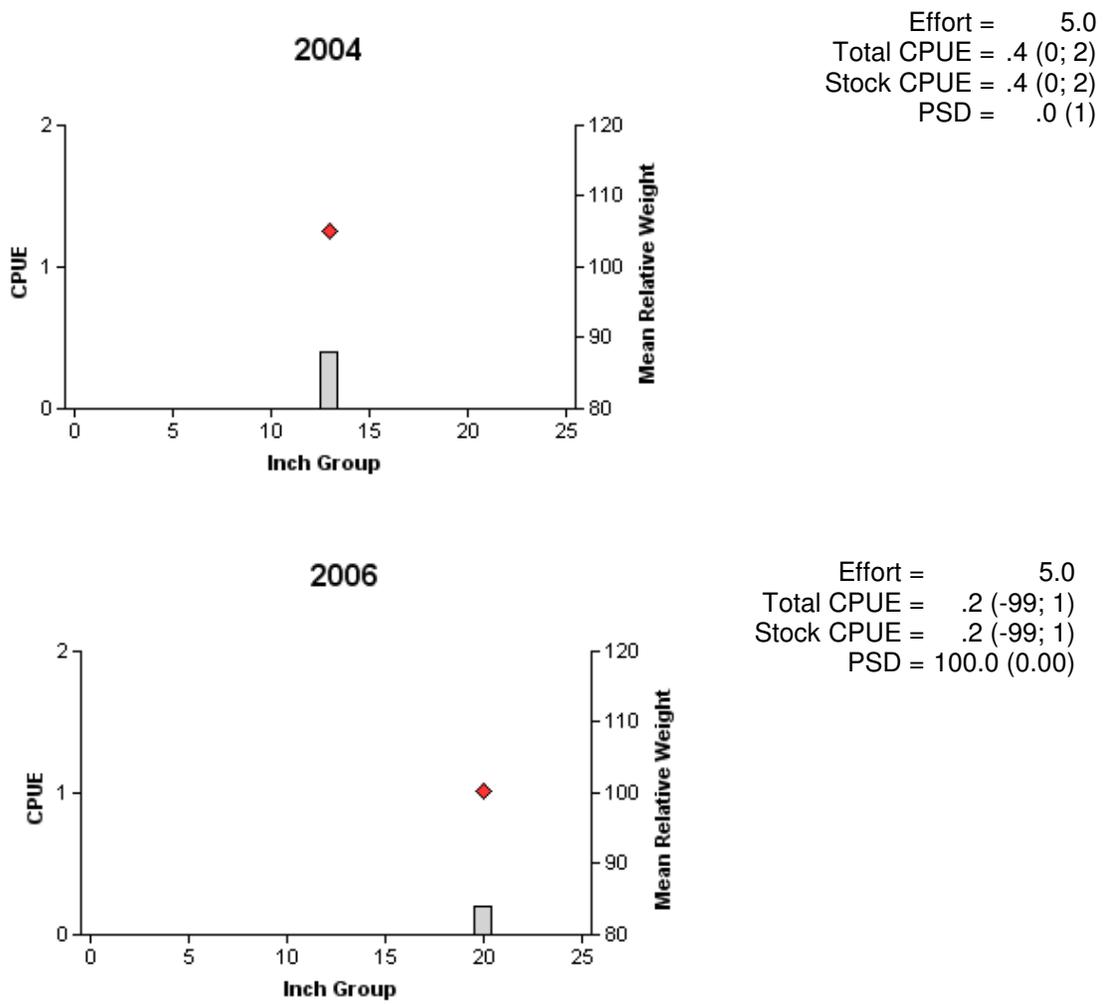


Figure 5. Number of blue catfish caught per net-night (CPUE) (RSE and N in parentheses) and population indices (SE in parentheses) for spring gill net surveys, Alvarado Park Reservoir, Texas.

White Bass

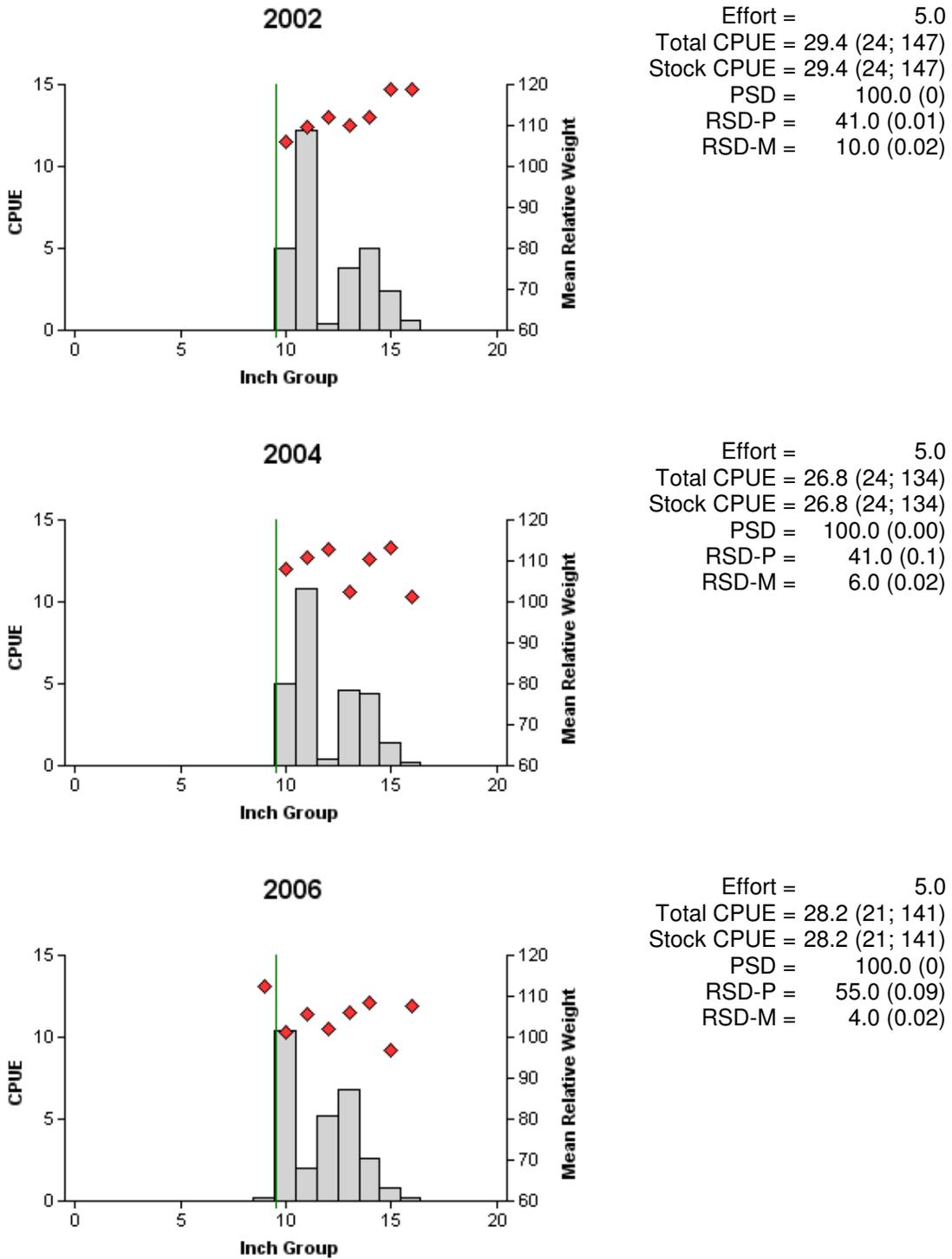


Figure 6. Number of white bass caught per net-night (CPUE) (RSE and N in parentheses) and population indices (SE in parentheses) for spring gill net surveys, Alvarado Park Reservoir, Texas. The vertical line represents the minimum length limit at the time of the survey.

Largemouth Bass

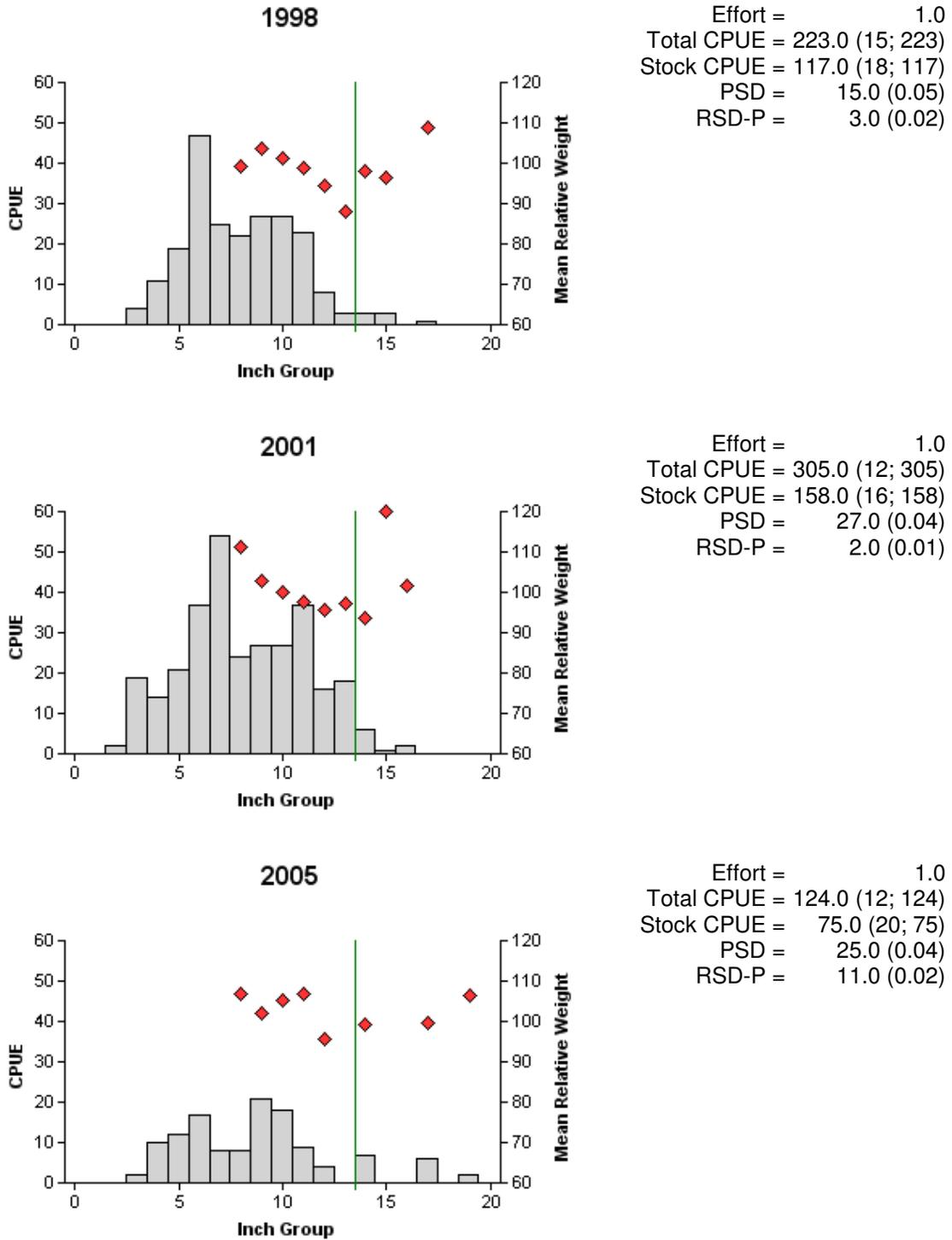


Figure 7. Number of largemouth bass caught per hour (CPUE) (RSE and N in parentheses) and population indices (SE in parentheses) for fall electrofishing surveys, Alvarado Park Reservoir, Texas. The vertical line represents the minimum length limit at the time of the survey.

Table 4. Results of genetic analysis of largemouth bass collected by fall electrofishing, Alvarado Park Reservoir, Texas, 1998, 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.

Year	Sample size	Genotype				% FLMB alleles	% pure FLMB
		FLMB	F1	Fx	NLMB		
1998	30	4	8	13	5	41.7	13.3
2001	30	3	8	14	5	35.8	10
2005	30	2	1	25	2	49.5	7

White Crappie

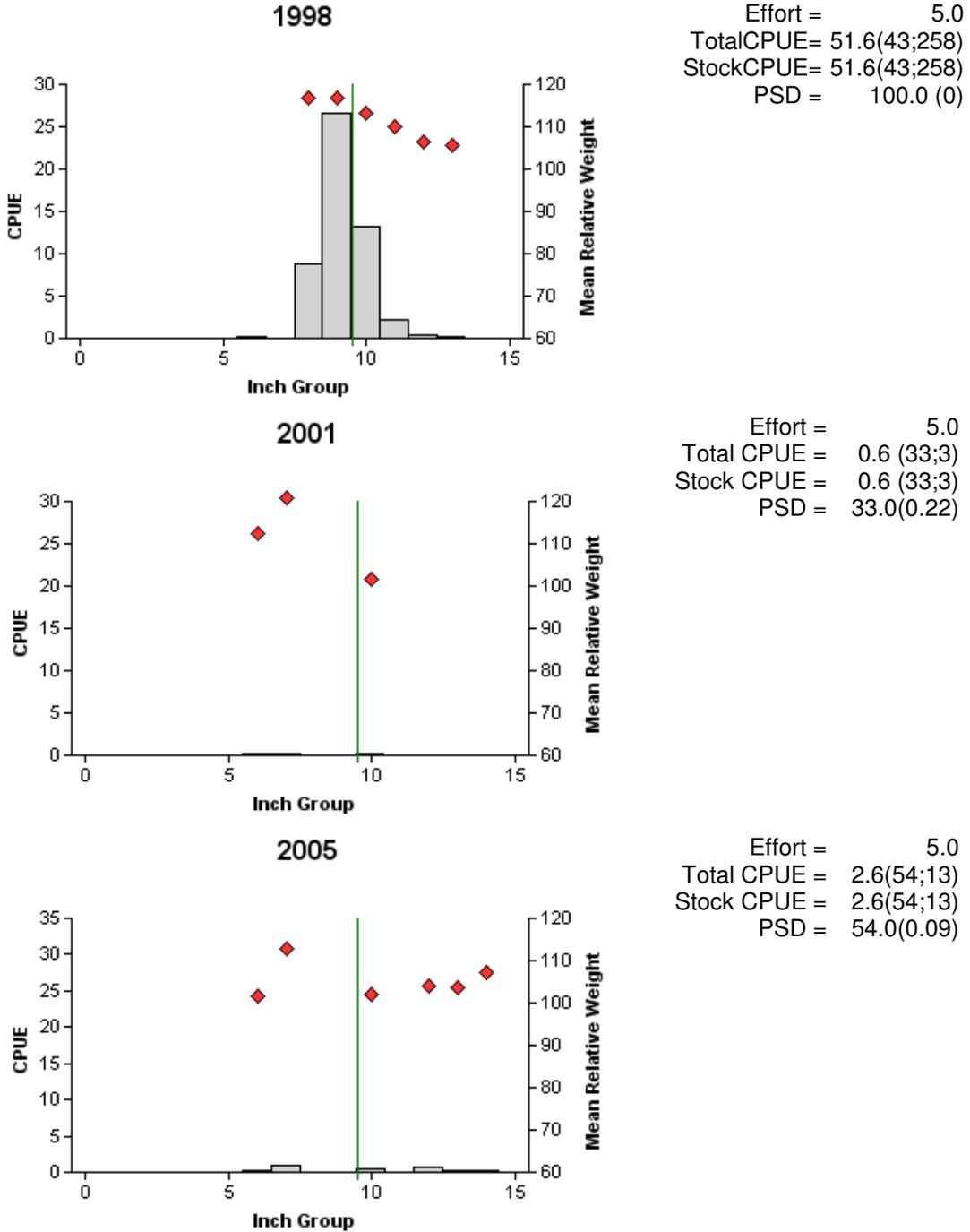


Figure 8. Number of white crappie caught per net-night (CPUE) (RSE and N in parentheses) and population indices (SE in parentheses) for fall trap net surveys, Alvarado Park Reservoir, Texas. The vertical line represents the minimum length limit at the time of the survey.

Table 5. Proposed sampling schedule for Alvarado Park 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.

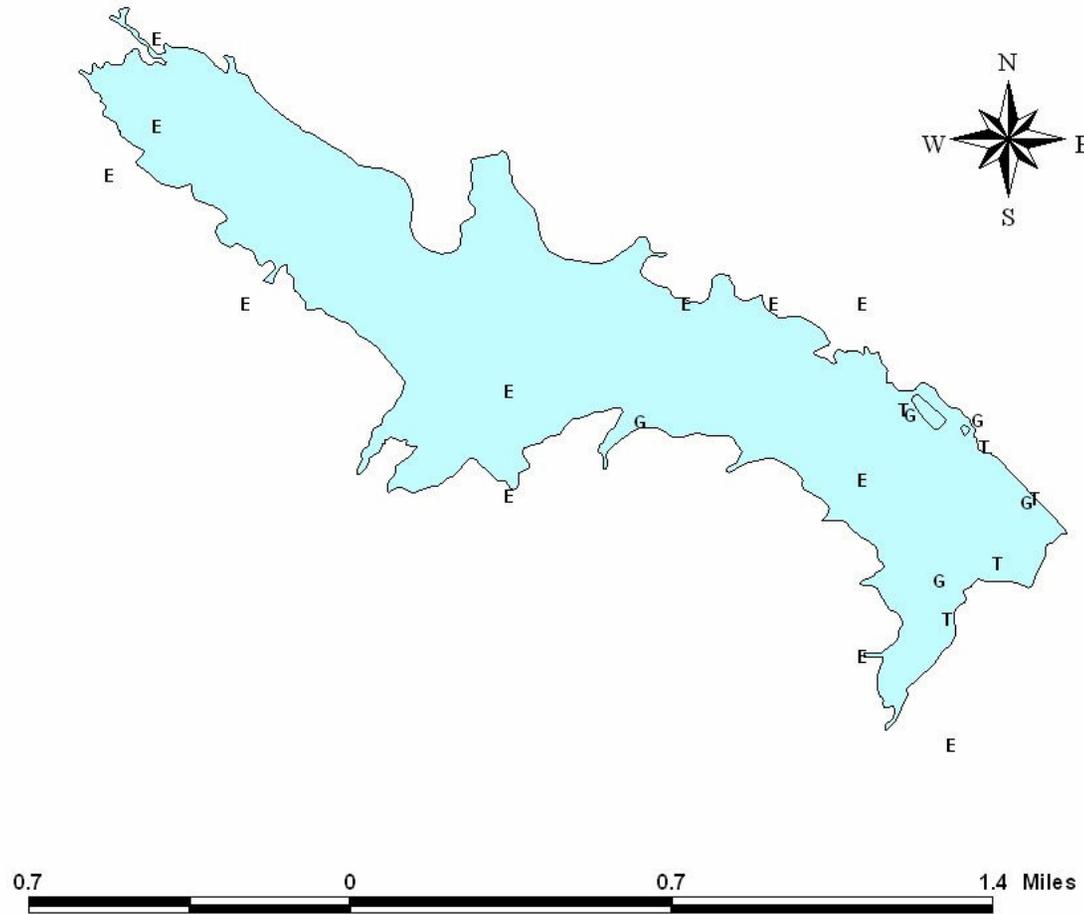
Survey Year	Electrofisher	Trap Net	Gill Net	Creel Survey	Report
Fall 2006-Spring 2007				A	
Fall 2007-Spring 2008	A	A			
Fall 2008-Spring 2009					
Fall 2009-Spring 2010	S	S	S		S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Alvarado Park Reservoir, Texas, 2005-2006.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					168	168.0
Threadfin shad					2801	2801.0
Channel catfish	25	5.0				
Blue catfish	1	0.2				
Flathead catfish	2	0.4				
White bass	141	28.2				
Green sunfish					8	8.0
Warmouth					7	7.0
Bluegill					241	241.0
Longear sunfish					84	84.0
Redear sunfish					14	14.0
Largemouth bass					124	124.0
White crappie			13	2.6		

APPENDIX B



Location of sampling sites, Alvarado Park Reservoir, Texas, 2005-2006. Trap netting, gill netting, and electrofishing stations are indicated by T, G, and E, respectively. Water level data is unavailable. Symbols outside the reservoir are correct however the shape file is currently obsolete.