

PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-30-R-30

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2004 Survey Report

Buescher State Park Reservoir

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Executive Summary

Buescher State Park Reservoir was surveyed in Fall 2004, and Spring 2001, 2003, and 2004 using a boat electrofisher. This report summarizes the results of these surveys and contains a fisheries management plan for the reservoir based on those findings.

- **Reservoir Description:** Buescher State Park Reservoir is a 25-acre impoundment in Buescher State Park, located 1 mile north of Smithville, Texas, in Bastrop County. The reservoir was constructed in 1932 by the Civilian Conservation Corps. The reservoir was drained in 1971 and again in 1993 to repair and reseal the dam. The reservoir was refilled in 1995, but a severe drought during the late 1990s reduced the surface acreage to less than 2 acres in 2000. Run-off from heavy rainfall in November 2001 and July 2002 refilled the reservoir, but annual water-level fluctuations of 4 to 8 feet were common.
- **Reservoir access:** Bank fishing access was good, especially near the dam. This reservoir had no designated access for physically challenged persons nor did it offer boat-launching facilities. Use of gasoline-powered boat engines was prohibited. Small, portable watercraft could be launched with relative ease.
- **Water level augmentation:** Water level reductions severely hindered fisheries management efforts on the reservoir. A well on the east side produced approximately 90 gallons/minute of groundwater flow from a pipe opening approximately 75 yards inland from the reservoir's shoreline. Water from this well was used to maintain the reservoir's water level. However, the well's pump was antiquated (> 70 years). In addition, water leaving the pipe would soak into the ground as it flowed down hill, reaching the reservoir's shoreline at only 10 gallons/minute. The well's pump was replaced in 2003, and a new pipe was installed in 2004 to carry the water directly to the reservoir. An aerator was placed on the terminal end of the outflow pipe to oxygenate well water entering the reservoir.
- **Reservoir fertilization:** Applications of liquid fertilizer (10:34:0) were initiated in April 2002 to increase primary productivity. Three to six applications of 0.5 – 2.0 gallons per acre of fertilizer were applied between March and October, 2002 through 2004. An attempt was made to maintain water clarity, as measured by secchi depth, between 18 and 24 inches. However, growth of southern naiad prevented late season fertilizer applications in some years.
- **Aquatic vegetation/habitat:** Although no formal aquatic vegetation survey was conducted, southern naiad and *Chara sp.* were observed in shallow areas. Historically, Eurasian water-milfoil was present at problematic levels, requiring herbicide treatment as late as 1990. However, this species was only observed in minute amounts over the last four years. The extended duration of low water in the late 1990s likely limited aquatic plant growth.

Other than aquatic vegetation, fish habitat was limited to flooded terrestrial vegetation.

Artificial habitat structures, comprised of ½-inch irrigation hose cut into 2- to 4-foot sections and cemented into concrete blocks, were deployed in the reservoir. Six rows of three to six structures each were sunk perpendicular to the shoreline.

- **Prey species:** Bluegill CPUE in Fall 2004 (180.0/hour) was higher than in 1998 (90.0/hour) prior to fertilizing, but much lower than 1989 (1,583.7/hour) when aquatic vegetation coverage was high. Bluegill may have been underrepresented in the Fall 2004 survey because of poor sampling conditions (i.e., high, turbid water). Only two bluegill were collected in the Spring 2001 survey, which was after the drought-related water level reduction. After the reservoir refilled and was fertilized, bluegill relative abundance increased (Spring 2003 = 374.0/hour; Spring 2004 = 554.7/hour).

Redear sunfish were collected in Spring 2003 (24.0/hour). Redear sunfish were not stocked by TPWD. These fish may have arrived via run-off from nearby ponds or through introduction by anglers. Electrofishing surveys in 2004 collected these fish at higher rates (Spring = 61.3/hour; Fall = 40.0/hour) and at larger sizes (i.e., up to 10 inches in length) than 2003. Fertilization likely benefited the redear sunfish population as well.

Threadfin shad (N = 500) were stocked in May 2002. This stocking established a self-sustaining population as evidenced by electrofishing in Spring 2004 (224.0/hour) and Fall 2004 (85.0/hour).

- **Rainbow trout:** Rainbow trout have been stocked annually since 1984, and have been popular among anglers (Roger Shelton, Buescher State Park Manager, personal communication). Typically, between 1,000 and 5,000, 8- to 12-inch trout were stocked each December. Trout that are not harvested succumb to lethal water temperatures ($\geq 77^{\circ}$ F) by spring.
- **Catfishes:** Catfishes were not collected during electrofishing. However, advanced fingerling (approximately 9 inches in length) channel catfish are stocked each fall at 40 to 50 per surface acre.
- **Largemouth bass:** Largemouth bass electrofishing catch rate in Fall 2004 (81.3/hour) was likely reduced by high, turbid water compared to 1998 (152.0/hour). Review of fisheries data from 1998 led to proposing a 14- to 21-inch slot length limit in 1999 for largemouth bass. This regulation was implemented in 2000 to protect quality-size bass from harvest and allow selective harvest of abundant, sub-quality bass. By 2000, a severe drought reduced surface acreage to extremely low levels ($< 5\%$). Population density was reduced by Spring 2001 (38.0/hour). Thirty-nine largemouth bass measuring between 14 and 21 inches were translocated from Fayette County Reservoir to this reservoir in January 2002 to augment population numbers and improve size structure. This population rebounded with increased water level, fertilization, and increased prey density. Spring electrofishing surveys in 2003 and 2004 collected largemouth bass at 134.0/hour and 236.0/hour, respectively.

Size structure indices from 2004 surveys (Spring RSD14 = 65; Fall RSD14 = 64) indicate that fish larger than 14 inches comprised a large proportion of the population. Fish greater than 24 inches and 10 pounds were collected in two surveys since 2003.

Low water levels (1999 – 2001) contributed to crowded predator and prey populations. Under that scenario, largemouth bass reduced prey-fish densities to levels below those sufficient to maintain acceptable body condition (Spring 2001 mean $W_r = 77.7$; $SD = 14.1$; $N = 19$). Prey densities recovered after reservoir water level increased. In 2004, most largemouth bass exhibited good body condition (Fall 2004 mean $W_r = 97.8$; $SD = 8.6$; $N = 43$). Growth to 14 inches was moderate in Fall 2004. Largemouth bass at 14 inches averaged 2.5 years (range = 1 – 3; $N = 13$).

- **Management Strategies**

Based on current information, the reservoir should continue to be managed with existing harvest regulations. The largemouth bass population exhibited a wide range of sizes. Growth and body condition of largemouth bass was not adversely effected despite high densities. This reservoir offered anglers a chance to catch a trophy bass (> 24 inches; > 10 pounds). The prey base for largemouth bass appeared adequate to sustain the predator population at levels recently observed.

Fishing for channel catfish is popular among park visitors (Roger Shelton, Buescher State Park Manager; personal communication). Annual stockings of advanced fingerlings should continue.

Winter rainbow trout stockings create additional angling opportunities and increased park usage during a time with low park visitation. Winter trout stockings should continue.

Increased primary productivity through fertilization was key to developing dense bluegill and threadfin shad populations. High-density forage fish populations were critical for maintaining the quality bass population. Annual fertilization program should continue indefinitely. Fertilizer costs should continue to be shared among TPWD Inland Fisheries and State Park budgets. Fertilizer will be applied by Inland Fisheries personnel as needed between March and October each year.

Eurasian water-milfoil and southern naiad have grown to problematic levels in years past. Extended periods of water level reductions in the 1990s reduced the presence of Eurasian water-milfoil, but southern naiad still commonly grew in shallow-water areas. Late season fertilization applications were curtailed due to growth of southern naiad. Because water level fluctuations should be reduced in future years, a more favorable environment for aquatic plant growth might exist. Aquatic vegetation growth should be monitored annually. If aquatic vegetation coverage exceeds 20%, treatment options should be investigated.

Water level reductions have negatively impacted the reservoir's fish populations. Installation

of the new well pump and water delivery system helped alleviate drastic water level reductions by maintaining reservoir water level. During periods of drought, water level augmentation through pumping is encouraged.

Fish attractors deployed into the reservoir were prototypes of a newer design. The irrigation hose used for the original structures was not cemented into the concrete blocks and some of the hose was dislodged and lost. Better designed fish attractors should be added to those already deployed into the reservoir.

No effort was made to collect angler utilization data. Information such as directed angler effort for various species, angler catch and harvest rates, size distributions of angler catch and harvest, among other data would be valuable for better managing this small reservoir. Conducting a formal creel survey is unlikely. Creative alternatives for deriving similar information should be investigated. Possible alternatives include a volunteer angler creel reporting program and/or enlisting State Park staff to conduct fishing pressure counts.

Introduction

This document is a summary of fisheries data collected from Buescher State Park Reservoir from Spring 2001 to June 2005. Historical data are provided for comparative purposes. The purpose of the document is to provide fisheries information and make fisheries management recommendations to protect and improve the sport fishery. While information on other species of fishes was collected, this report deals primarily with important sport fish and prey species. Management strategies are included to address existing problems or opportunities.

Harvest regulations for Buescher State Park Reservoir in 2004.

Species	Bag Limit	Length Limit (inches)
Rainbow trout*	5	None
Largemouth bass	5**	14 – 21 slot
Channel catfish	5	None
Sunfish species	None	None

* Rainbow trout are stocked in late fall, and if not harvested, do not survive the summer.

** Bag limit for largemouth bass is 5, but only one of which can measure > 21 inches.

Methods

- Fishes were collected by fall electrofishing in 1989, 1998 and 2004, which consisted of either 0.5 hours (two, 15-minute stations) or 0.75 hours (three, 15-minute stations). This effort sampled the majority of shoreline, depending on water level. In Fall 2004, high water

flooded terrestrial vegetation, which limited access to shallow areas. In addition, turbid water reduced visibility of stunned fish, which decreased sampling efficiency. Fall 2004 electrofishing catch rates should be considered conservative estimates of relative abundance. Optional spring electrofishing surveys were conducted in years 2001, 2003, and 2004 in an attempt to better sample trophy-sized (> 21 inches) largemouth bass. Catch-per-unit-effort (CPUE) for electrofishing was recorded as the number of fish caught per hour of actual electrofishing. Largemouth bass electrophoresis samples were collected according to the Texas Parks and Wildlife Department Inland Fisheries Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2003).

- Sampling statistics (CPUE for various length categories), structural indices (Proportional Stock Density [PSD], Relative Stock Density [RSD]), and relative weight indices were calculated for target fishes according to Anderson and Neumann (1996).
- Otoliths were used to determine ages for largemouth bass. No age data were collected for catfish and sunfish species.
- Liquid fertilizer (10:34:0) was used for nutrient enrichment. Liquid fertilizer was diluted with water at an approximate ratio of 1 gallon fertilizer to 5-to-10 gallons of water. This solution was pumped into the prop wash of a boat and spread throughout the reservoir. Applications were conducted from March to September as needed. On each trip, secchi depths were recorded. Applications were terminated if secchi depths measured less than 18 inches or if shallow, submerged aquatic vegetation became abundant.
- Fish attractors were constructed by cutting 0.5-inch irrigation hose into 2- to 5-foot lengths, bundling the hose in groups of approximately 20 with electrical ties, and tying the bundles into concrete blocks. Attractors were deployed by sinking them in groups of approximately 5 per row, perpendicular to the shoreline.

Literature Cited

- Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 283-300 in B.R. Murphy and D. W. Willis, editors. Fisheries techniques. American Fisheries Society, Bethesda, Maryland.
- Bonds, C., and S. Magnelia. 2004. Statewide freshwater fisheries monitoring and management program. Survey report for Fayette County Reservoir, 2003. Texas Parks and Wildlife Department, Federal Aid Project F-30-R-29. 23 pages.

Physical and historical data for Buescher State Park Reservoir, Texas

Inland Fisheries water body code: 0120	IF District: 2C – San Marcos
Controlling authority: Texas Parks and Wildlife Department (TPWD)	
Acres: 25	
Water Uses: Recreation	
County: Bastrop	Location: 1 mile N of Smithville
Latitude: 29° 55'	Longitude: 96° 43'
Nearest major metropolitan area and distance: Austin – 43 miles	
Reservoir description: Tributary	River system: Colorado
Mean depth (ft): 6.0	Maximum depth (ft): 18.0
Shoreline development index: unknown	
Secchi disc range (ft): 1.5 – 3 feet	Conductivity (umhos/cm): 400
Constructed: 1932	Total alkalinity (ppm CaCO ₃): 115

Survey History:

Method	Year
Gill net	1989
Electrofischer (fall)	1989, 1998, 2004
Electrofischer (spring)	2001, 2003, 2004

Stocking history of Buescher State Park Reservoir, Texas.

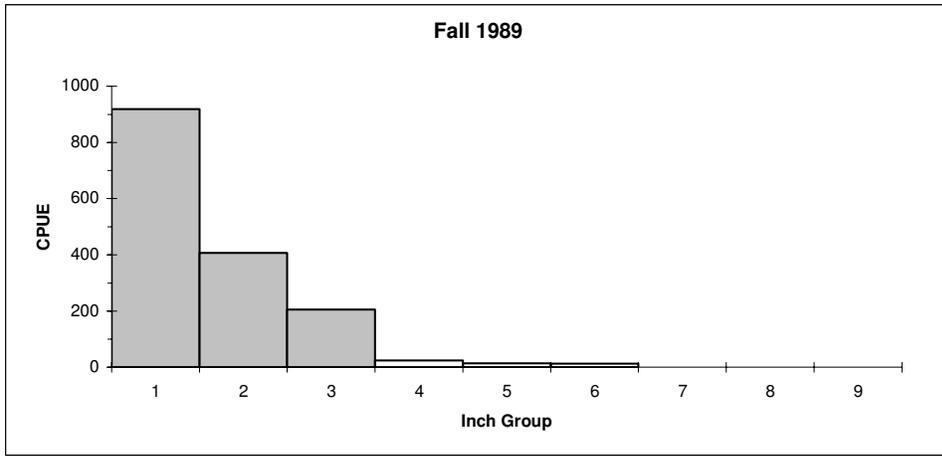
Species	Year	Number	Size
Threadfin shad ^a	2002	<u>500</u>	Adult
	Species total	500	
Rainbow trout	1983	4,163	Adult
	1984	10,181	Adult
	1985	12,107	Adult
	1986	12,117	Adult
	1987	7,072	Adult
	1988	10,083	Adult
	1989	6,038	Adult
	1990	3,782	Adult
	1991	1,804	Adult
	1992	3,805	Adult
	1994	5,026	Adult
	1995	2,016	Adult
	1996	1,517	Adult
	1997	1,501	Adult
	1998	1,520	Adult
	1999	1,511	Adult
	2000	1,516	Adult
	2001	1,503	Adult
2002	1,833	Adult	
2003	1,537	Adult	
2004	<u>1,000</u>	Adult	
	Species total	91,632	
Channel catfish	1969	2,300	Advanced fingerling ^b
	1970	1,000	Advanced fingerling
	1975	500	Advanced fingerling
	1979	1,024	Advanced fingerling
	1980	148	Advanced fingerling
	1982	1,250	Advanced fingerling

Stocking history of Buescher State Park Reservoir, Texas, continued.

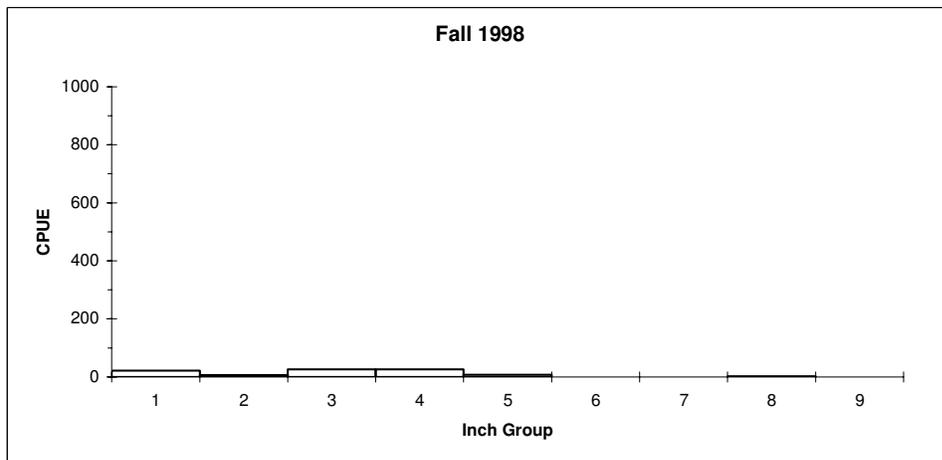
Species	Year	Number	Size
	1986	1,020	Advanced fingerling ^b
	1987	5,098	Advanced fingerling
	1989	2,500	Advanced fingerling
	1990	25,105	Advanced fingerling
	1991	2,500	Advanced fingerling
	1993	1,080	Advanced fingerling
	1994	1,038	Advanced fingerling
	1995	1,032	Advanced fingerling
	1996	1,285	Advanced fingerling
	1997	1,215	Advanced fingerling
	1998	1,020	Advanced fingerling
	1999	1,034	Advanced fingerling
	2000	1,052	Advanced fingerling
	2001	1,026	Advanced fingerling
	2002	1,028	Advanced fingerling
	2003	1,025	Advanced fingerling
	2004	<u>1,026</u>	Advanced fingerling
	Species total	55,306	
Northern largemouth bass	1982	2,200	Fingerling
	1983	<u>60</u>	Adult
		2,260	
Florida largemouth bass ^c	2002	<u>39</u>	Adult
	Species total	39	
Bluegill X green sunfish	1999	<u>9,108</u>	Fingerling
	Species total	9,108	

^aThreadfin shad were obtained from Buchanan Reservoir. ^bAdvanced fingerlings measured approximately 9 inches. ^cFlorida largemouth bass were transplants from Fayette County Reservoir where the largemouth bass population contained high Florida bass genetic influence (Bonds and Magnelia 2004).

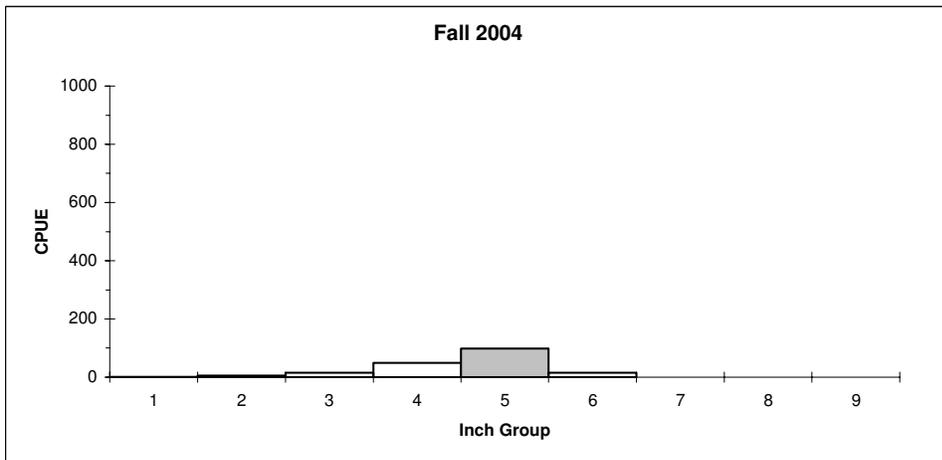
Bluegill



Effort = 0.50
 Total CPUE = 1,583.7
 Stock CPUE = 257.3
 PSD = 5
 RSD-8 = 0



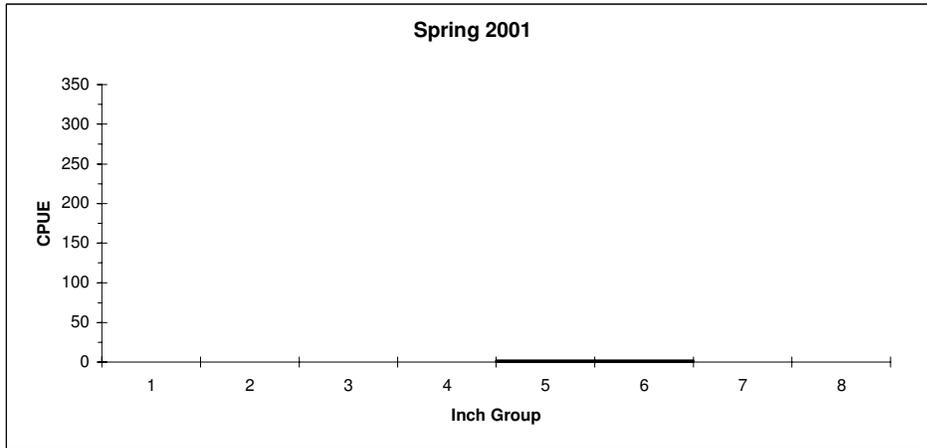
Effort = 0.50
 Total CPUE = 90.0
 Stock CPUE = 62.0
 PSD = 3
 RSD-8 = 3



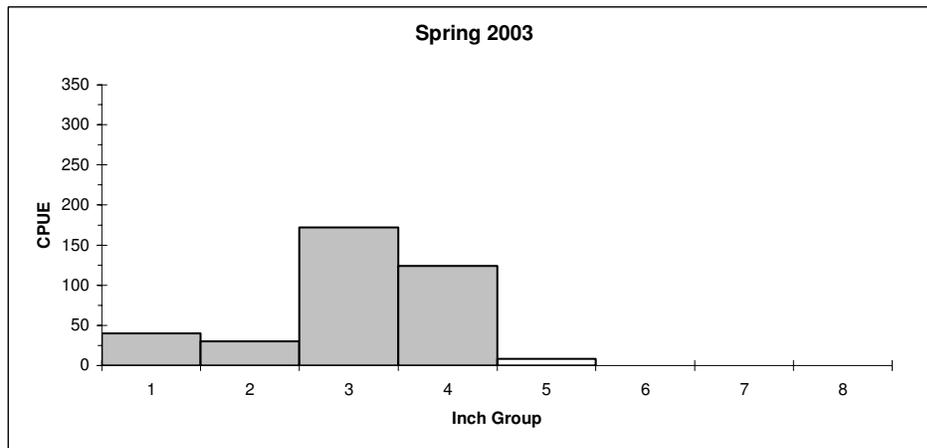
Effort = 0.75
 Total CPUE = 180.0
 Stock CPUE = 173.3
 PSD = 9
 RSD-8 = 0

Comparison of the number of bluegill caught per hour (CPUE, bars) and population indices for fall electrofishing surveys, Buescher State Park Reservoir, Texas, 1989, 1998, and 2004.

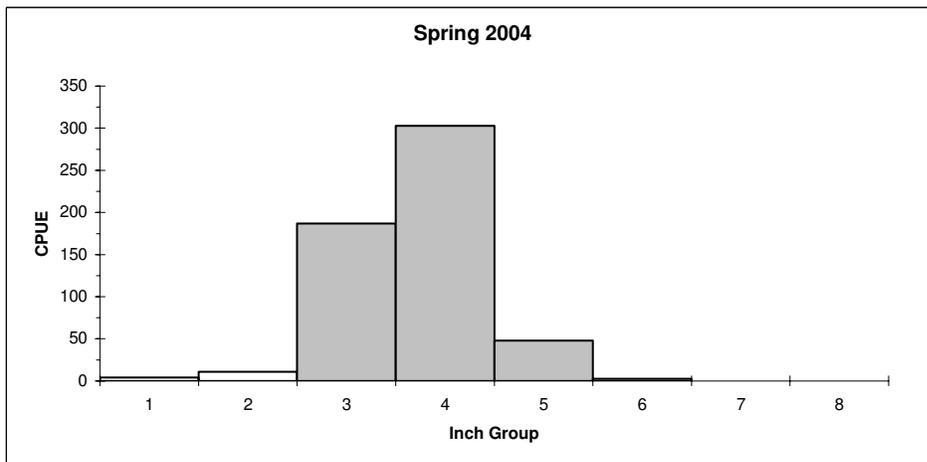
Bluegill



Effort = 0.50
 Total CPUE = 4.0
 Stock CPUE = 4.0
 PSD = 50
 RSD-8 = 0



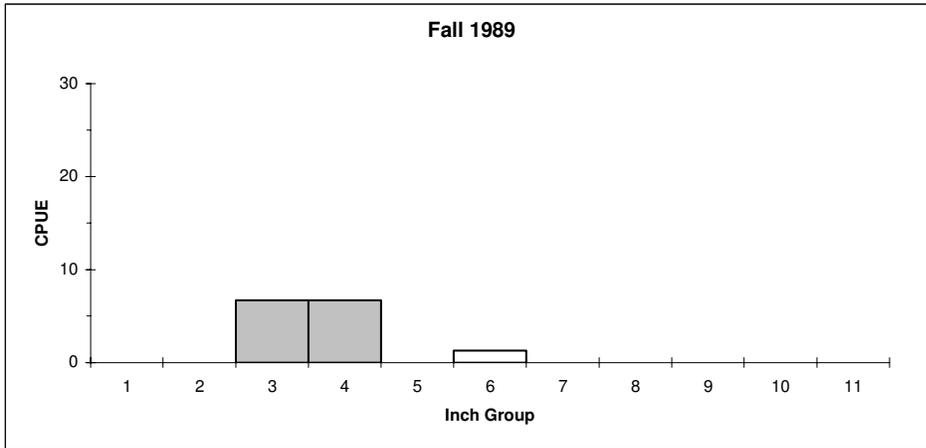
Effort = 0.50
 Total CPUE = 374.0
 Stock CPUE = 304.0
 PSD = 0
 RSD-8 = 0



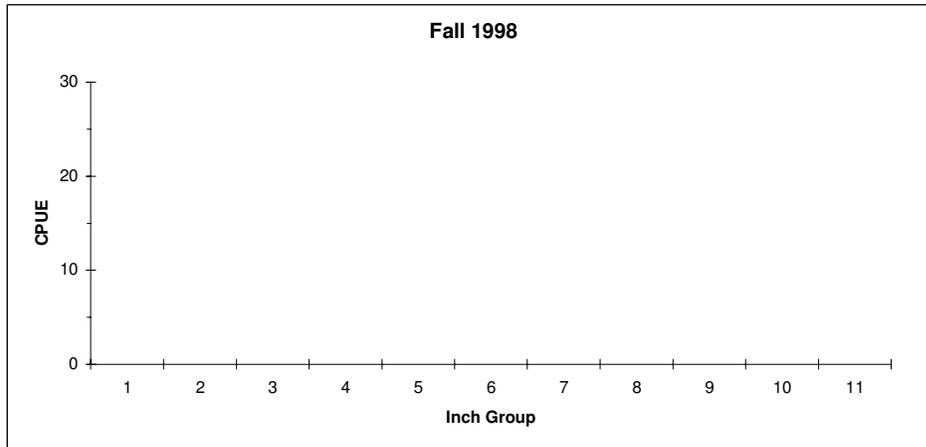
Effort = 0.75
 Total CPUE = 554.7
 Stock CPUE = 540.0
 PSD = 0
 RSD-8 = 0

Comparison of the number of bluegill caught per hour (CPUE, bars) and population indices for spring electrofishing surveys, Buescher State Park Reservoir, Texas, 2001, 2003, and 2004.

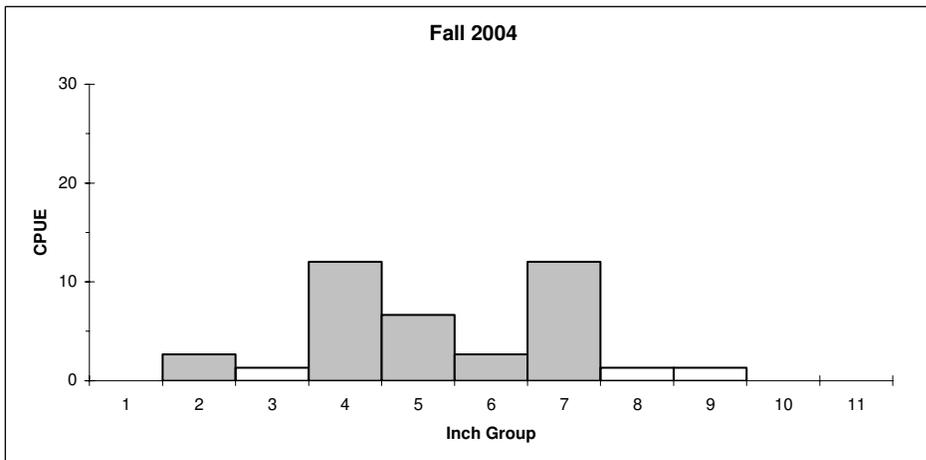
Redear Sunfish



Effort = 0.75
 Total CPUE = 14.7
 Stock CPUE = 8.0
 PSD = 19
 RSD-8 = 0



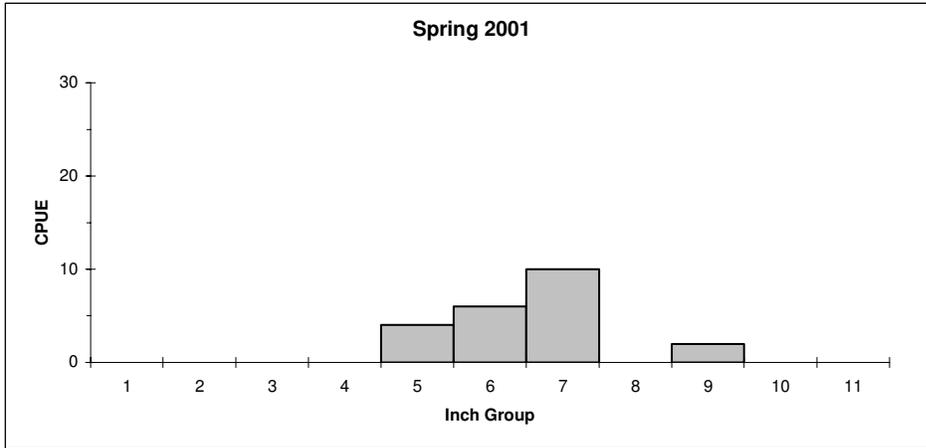
Effort = 0.50
 Total CPUE = 0.0
 Stock CPUE = 0.0
 PSD = NA
 RSD-8 = NA



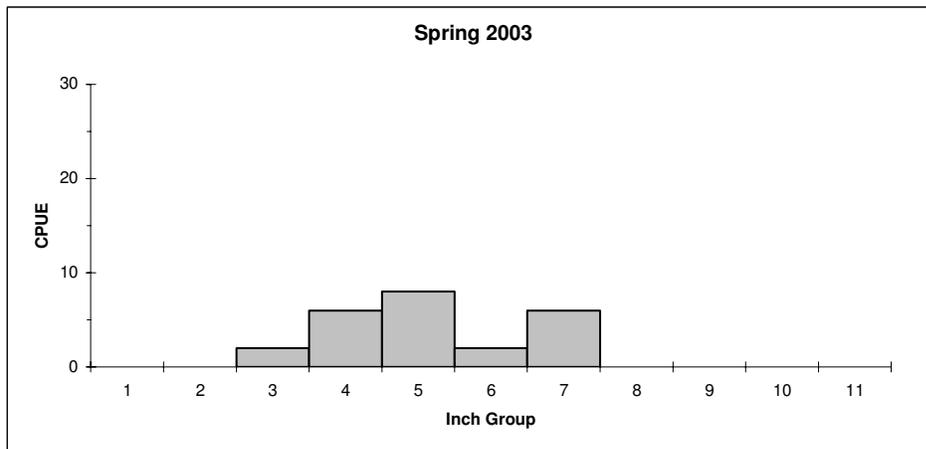
Effort = 0.75
 Total CPUE = 40.0
 Stock CPUE = 36.0
 PSD = 41
 RSD-8 = 7

Comparison of the number of redear sunfish caught per hour (CPUE, bars) and population indices for fall electrofishing surveys, Buescher State Park Reservoir, Texas, 1989, 1998, and 2004.

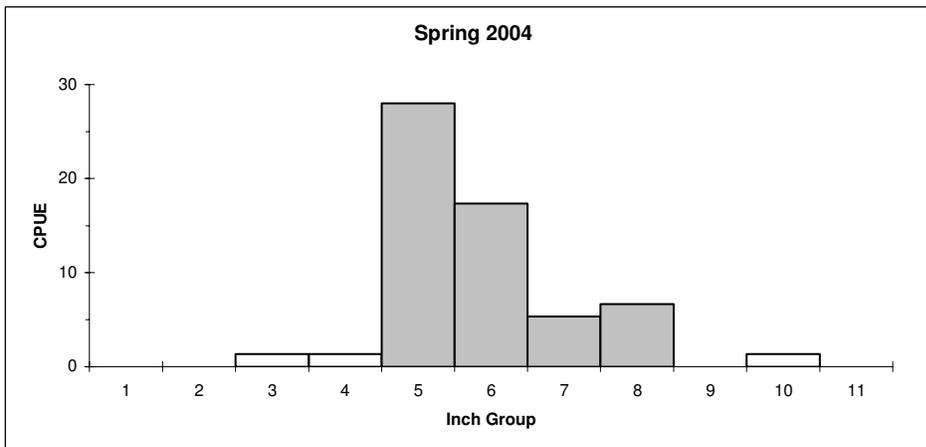
Redear Sunfish



Effort = 0.50
 Total CPUE = 22.0
 Stock CPUE = 22.0
 PSD = 55
 RSD-8 = 9



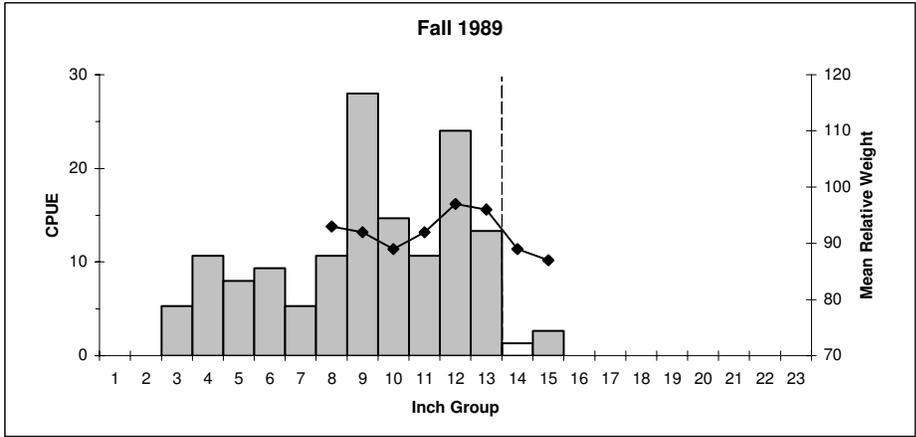
Effort = 0.50
 Total CPUE = 24.0
 Stock CPUE = 23.0
 PSD = 27
 RSD-8 = 0



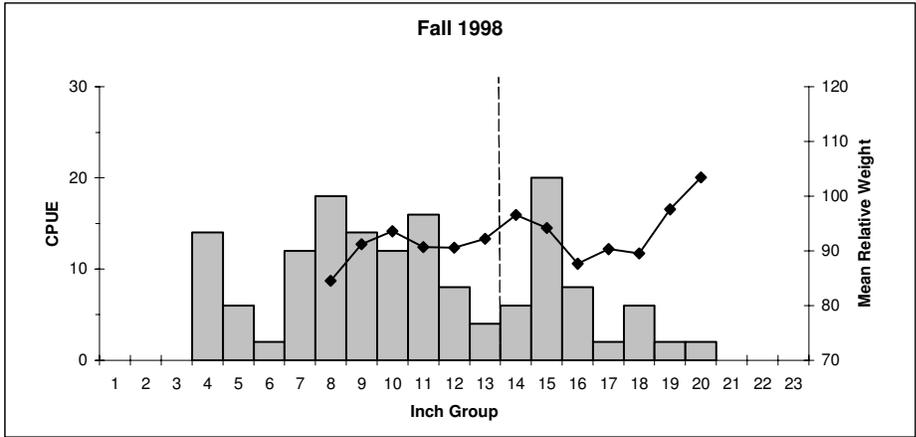
Effort = 0.75
 Total CPUE = 61.3
 Stock CPUE = 60.0
 PSD = 22
 RSD-8 = 13

Comparison of the number of redear sunfish caught per hour (CPUE, bars) and population indices for spring electrofishing surveys, Buescher State Park Reservoir, Texas, 2001, 2003, and 2004.

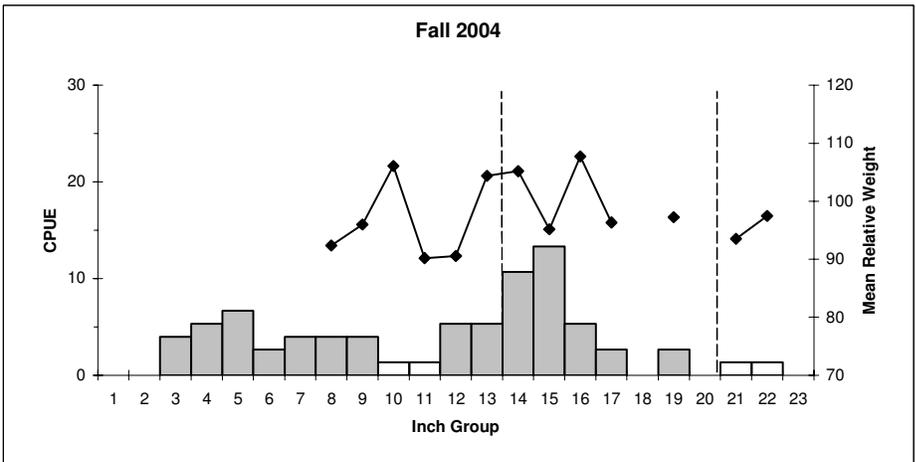
Largemouth Bass



Effort =	0.75
Total CPUE =	144.0
Stock CPUE =	105.3
CPUE ≥ 14" =	4.0
PSD =	39
RSD-14 =	4
% FLMB alleles =	74.6
% pure FLMB =	47.0



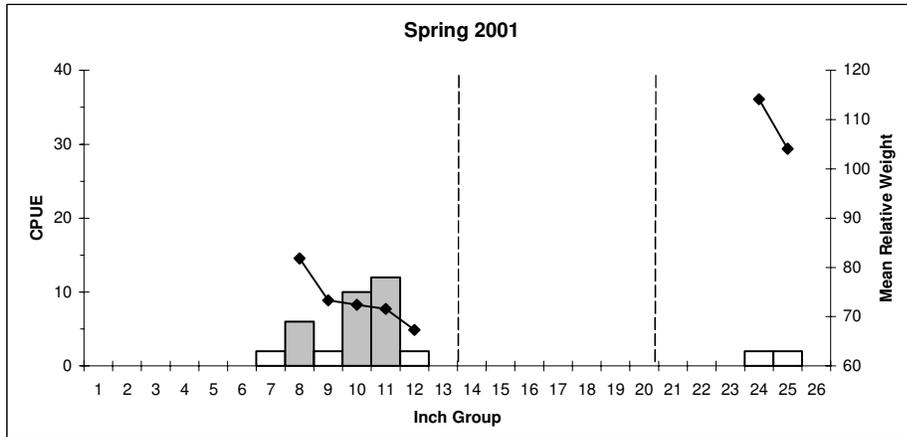
Effort =	0.50
Total CPUE =	152.0
Stock CPUE =	135.0
CPUE ≥ 14" =	46.0
PSD =	49
RSD-14 =	39
% FLMB alleles =	90.0
% pure FLMB =	65.5



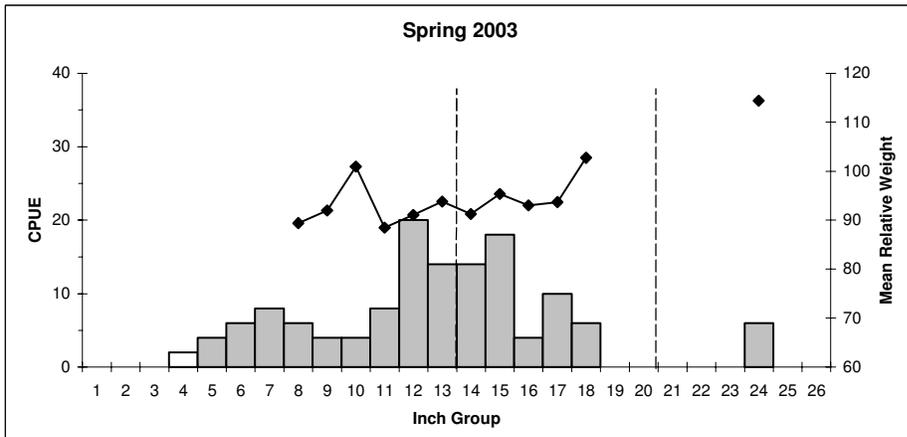
Effort =	0.75
Total CPUE =	81.3
Stock CPUE =	58.7
CPUE ≥ 14" =	37.3
PSD =	82.0
RSD-14 =	64.0
% FLMB alleles =	87
% pure FLMB =	47

Comparison of the number of largemouth bass caught per hour (CPUE, bars), mean relative weight (lines), and population indices for fall electrofishing surveys, Buescher State Park Reservoir, Texas, 1989, 1998, and 2004. Dashed lines represent length limit demarcations.

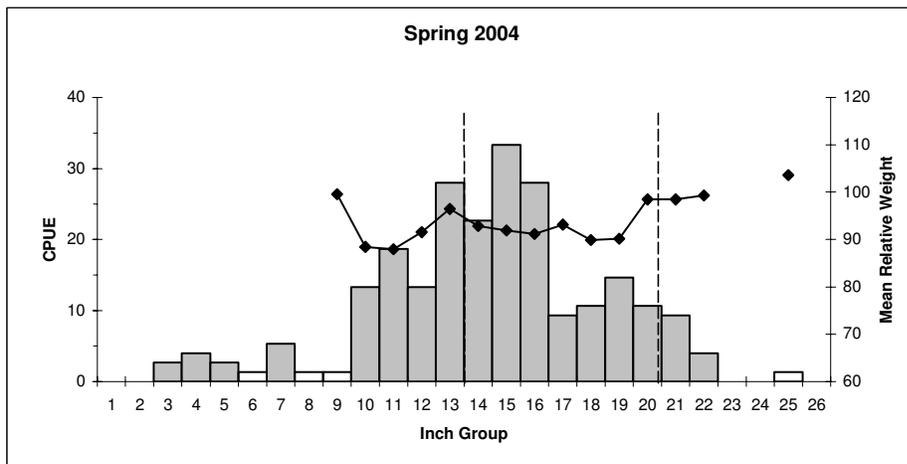
Largemouth Bass



Effort = 0.50
 Total CPUE = 38.0
 Stock CPUE = 37.0
 PSD = 17
 RSD-14 = 11



Effort = 0.50
 Total CPUE = 134.0
 Stock CPUE = 124.0
 PSD = 81.0
 RSD-14 = 51.0



Effort = 0.75
 Total CPUE = 236.0
 Stock CPUE = 220.0
 PSD = 84.0
 RSD-14 = 65.0

Comparison of the number of largemouth bass caught per hour (CPUE, bars), mean relative weight (lines), and population indices for spring electrofishing surveys, Buescher State Park Reservoir, Texas, 2001, 2003, and 2004. Dashed lines represent the lower and upper boundaries of the slot-length limit.

**Fisheries Management Plan
Buescher State Park Reservoir, Texas**

Prepared – July 2005.

Issue 1 This reservoir supports an excellent fishery for largemouth bass. However, no data exist describing angler utilization.

Management
Strategy

1. Investigate alternative methods for obtaining angler creel information, such as a volunteer angler reporting program and angler counts by TPWD State Park staff.

Issue 2 Reproduction and recruitment of channel catfish is limited.

Management
Strategy

1. Continue to annually stock advanced fingerling channel catfish.

Issue 3 The winter trout fishery is reportedly popular with anglers. Park attendance during winter months has increased due to winter rainbow trout stocking.

Management
Strategy

1. Continue to annually stock adult rainbow trout each winter.

Issue 4 This reservoir has a high quality bass population. Adequate prey is required for maintaining that population. Nutrient enrichment through application of liquid fertilizer appears to have increased prey fish numbers and size.

Management
Strategies

1. Continue liquid fertilizer applications as needed during each growing season (March – September).
2. Monitor water clarity monthly and attempt to maintain secchi depths between

18 and 24 inches.

3. Monitor growth of southern naiad, *Chara sp.*, and filamentous algae. Terminate fertilizer applications if aquatic plant growth exceeds 10% of reservoir's surface area.

Issue 5 Low water levels have negatively impacted fish populations and angling opportunities in past years.

Management
Strategy

1. Pump well water into the reservoir during extended periods of drought to maintain water levels.

Issue 6 Problematic growth of aquatic plants have required herbicide treatments in past years (Aquathol K & Aquathol G; 1989, 1990), primarily to control Eurasian water-milfoil. Herbicide treatments coupled with low water levels have probably limited the growth of this species in recent years, although it remained present in trace amounts. Southern naiad displaced Eurasian water-milfoil as the dominant, submerged aquatic plant. Because future water level should be more consistent, the growing environment for aquatic plants will be more favorable.

Management
Strategies

1. Conduct annual aquatic vegetation surveys.
2. Investigate treatment options if total aquatic vegetation coverage exceeds 20% surface coverage.

Issue 7 Artificial fish attractors deployed in the reservoir quickly degraded due to the loss of irrigation hose from the concrete blocks.

Management
Strategy

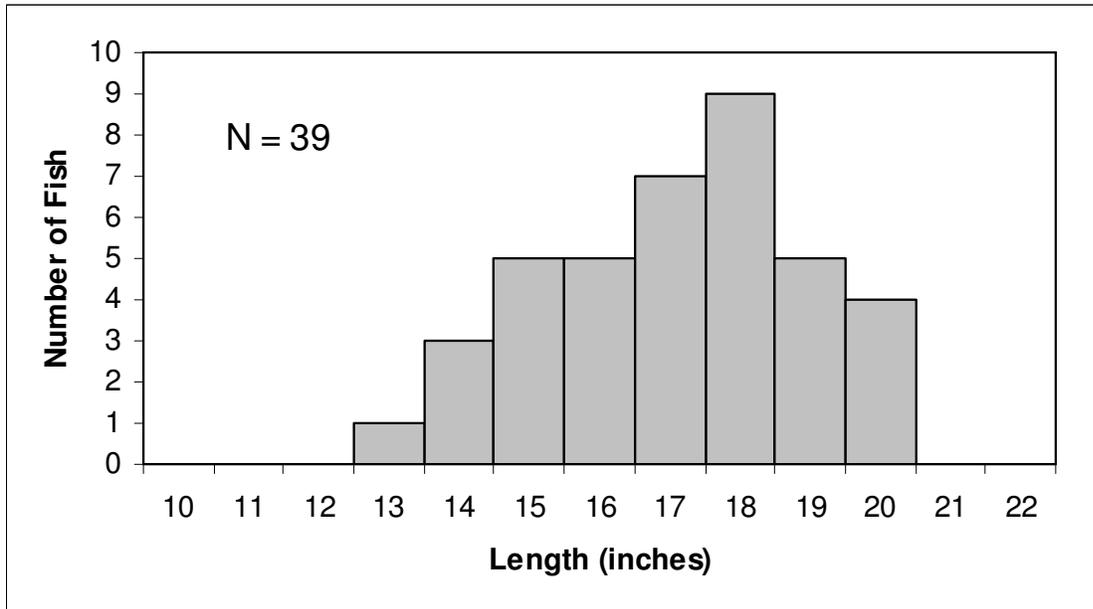
1. Construct newly designed fish attractors (using concrete to anchor hose pieces into blocks) and deploy in the reservoir.

Appendix A:

Number (N) and catch rate (CPUE) of all species collected by electrofishing from Buescher State Park Reservoir, Texas, 2001 through 2004.

Species	Spring 2001		Spring 2003		Spring 2004		Fall 2004	
	N	CPUE	N	CPUE	N	CPUE	N	CPUE
Threadfin shad					168	224.0	64	85.3
Golden shiner							1	1.3
Black bullhead					4	5.3		
Green sunfish			2	4.0	3	4.0		
Bluegill	2	4.0	187	374.0	416	554.7	140	186.7
Redear sunfish	11	22.0	12	24.0	46	61.3	30	40.0
Spotted sunfish					1	1.3		
Largemouth bass	19	38.0	67	134.0	177	236.0	61	81.3
White crappie					2	2.7	2	2.7

Appendix B:



Number and sizes of largemouth bass translocated from Fayette County Reservoir to Buescher State Park Reservoir, January 2002.