

PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-30-R-29

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2004 Survey Report

Buffalo Springs Reservoir

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EXECUTIVE SUMMARY

Buffalo Springs Reservoir was surveyed in the fall of 2004 using trap nets and electrofishing and in the spring of 2005 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:** Buffalo Springs is a 225-acre reservoir that was impounded in 1960 on Yellowhouse Draw, a tributary of the North Fork of the Double Mountain Fork of the Brazos River, located 5 miles southeast of Lubbock, Texas. It is owned by the Lubbock County Water Control and Improvement District Number 1 and used for recreational purposes. Water levels are stable and nutrient levels are extremely high. A large portion of the fish habitat was cattail. Bank and boat access was good and handicap specific facilities were fair. The reservoir experienced a significant Prymnesium parvum (golden algae) kill during 2003 which had a major impact on the fisheries. The reservoir experienced another kill in 2005, but it was very minor and limited to a single small cove.
- **Prey species:** Electrofishing catch rate for gizzard shad in 2004 was 251/h, which was similar to 2002 at 311/h and 2000 at 253/h. The gizzard shad population had an index of vulnerability (IOV) of 88, indicating that 88% of the gizzard shad population was less than 8 inches in length and available to most predators.
The electrofishing catch rate for bluegill in 2004 was 280/h. Since the P. parvum bloom, the PSD has been <1 with no fish over 6 inches detected in the population. The reservoir was stocked with bluegill to supplement reproduction and speed forage base recovery.
- **Blue catfish:** Blue catfish were stocked in 2003 following the P. parvum fish kill. In 2005, they were collected in gill nets at a rate of 2.6/NN. Most fish collected were legal size (12 inches) or larger.
- **Channel catfish:** The gill net catch rate for channel catfish was 0.6/NN in 2005. This is much lower than previous samples and is likely due to a 2003 P. parvum fish kill. Prior to the kill catch rates were 10.0/NN in 2001 and 2.6/NN in 1998. The population size structure, as indexed by proportional stock density (PSD), in 2005 was 100.
- **White bass:** There were no white bass caught in gill nets in 2005. Prior to 2005 catch rates for white bass were 3.6/NN in 2001 and 6.4/NN in 1998. White bass size structure decreased from a PSD of 100 in 1998 to 89 in 2001. White bass were in good condition as mean Wr ranged from 95 and 111.
- **Striped bass:** The gill net catch rate for striped bass was 8.2/NN in 2005 and was similar to the 6 year average of 12.3/NN. Based on previous growth, the fish that were collected were likely from the 2003 and 2004 stockings.
- **Redbreast sunfish:** Since the P. parvum fish kill, we have not collected redbreast sunfish. Previous management plans called for publicizing this fish to anglers to increase use. The electrofishing catch rate for redbreast sunfish in 2002 was 293/h and was mainly fish 6 inches and longer. Future plans are to obtain adults from another source and reintroduce them to the reservoir.
- **Largemouth bass:** The 2004 electrofishing catch rate for largemouth bass (31/h) was lower than rates in 2000 (150/h) and 2002 (145/h), primarily due to the P. parvum fish kill in 2003. In 2004, the largemouth bass PSD was 38 and RSD-14 was 25. All sizes of fish are in good condition. Since the fish kill, approximately 75,000 Florida largemouth bass have been stocked.
- **White crappie:** The trap net catch rate for white crappie was 0.6/NN in 2004 with only 4 fish collected in 7 nets.
- **Management Strategies**
Based on current information, the reservoir should continue to be managed with existing regulations. Redbreast sunfish adults should be obtained from another source and stocked in an attempt to re-establish this quality population. Continue stocking striped bass to help control the gizzard shad population. Striped bass should be stocked on an alternating basis where they are stocked at a rate of 15/acre and 40/acre in two consecutive years and then have two years of no stockings. The reservoir should be monitored for P. parvum and associated fish kills. Mitigation of kills should be conducted as soon as practical.

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INTRODUCTION

This document is a summary of fisheries data collected from Buffalo Springs Reservoir in the fall of 2004 and the spring of 2005. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While data on other species of fish were collected, this report deals primarily with major sport fishes and important prey species. Management strategies are included to address existing problems or opportunities. Historical data is presented for comparison.

Status of Management Actions from 2001 (Van Zee 2001)

ISSUE 1 Redbreast sunfish and bluegill are attaining harvestable size in Buffalo Springs Reservoir but this fishery is not being utilized.

Management Action

1. The fishery was promoted verbally through the Buffalo Springs Reservoir staff and a news release was sent to the Lubbock Avalanche Journal.

ISSUE 2 Stock striped bass to help control overabundant gizzard shad population. Stock at an adjusted rate of 15/acre and 40/acre in two consecutive years and then have two years of no stockings.

Management Action

1. Stocking has been conducted as planned.

Harvest regulations for Buffalo Springs Reservoir.

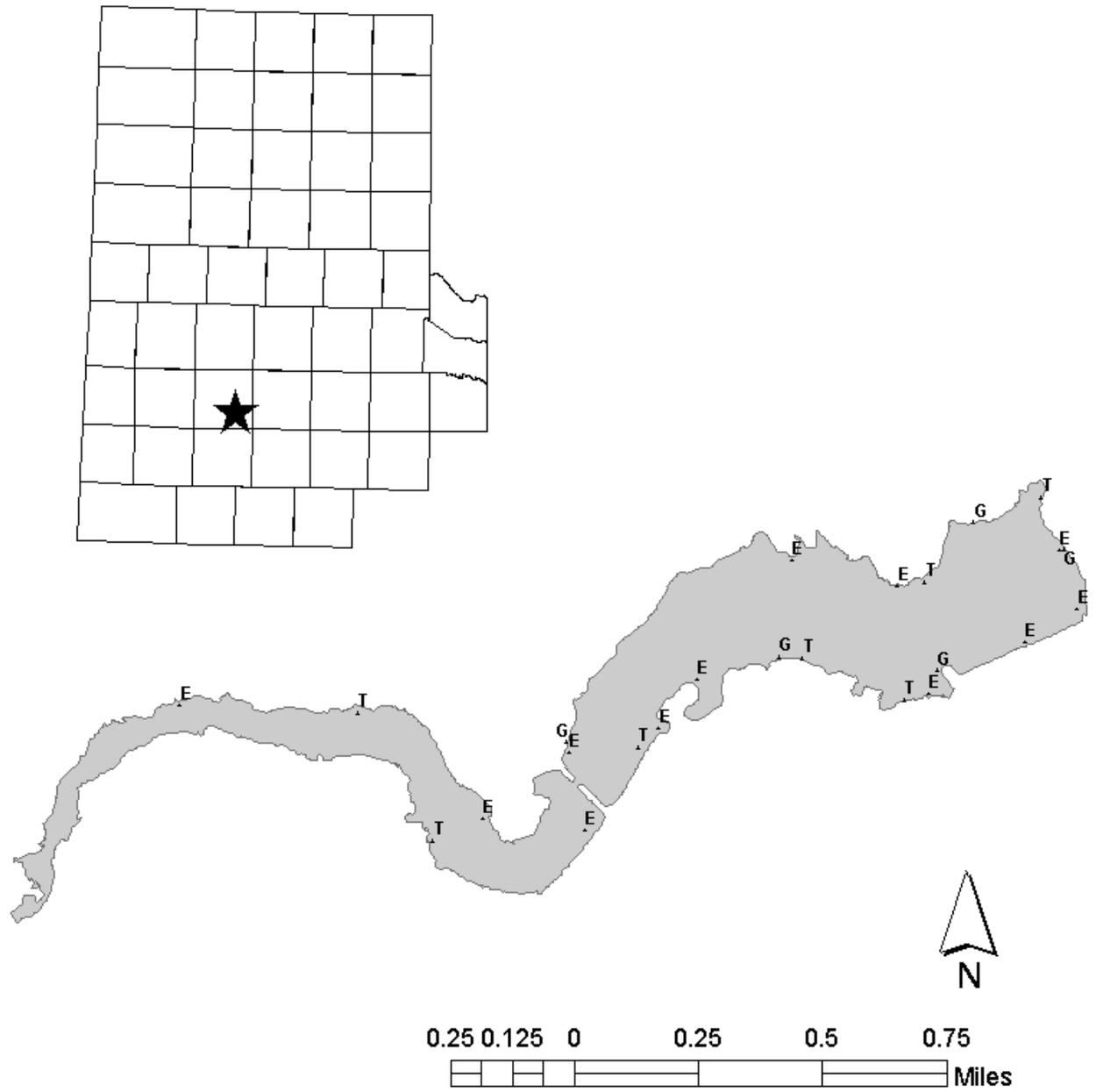
Species	Bag Limit	Minimum-Maximum Length (Inches)
Bass, Largemouth	5	14 – No Limit
Bass, Striped	5	18 – No Limit
Bass, White	25	10 – No Limit
Catfish, Flathead	5	18 – No Limit
Catfish, Blue and Channel	25	12 – No Limit
Crappie, White	25	10 – No Limit
Sunfish	No Limit	No Limit

METHODS

- Fishes were collected by fall electrofishing (1.0 hours at 12 5-minute stations), spring gill nets (5 stations), and fall trap nets (7 stations). Fish sampling was conducted at randomly selected sites. No significant man-made changes have occurred at the reservoir since 1998 (Van Zee 1999) so habitat surveys were not conducted.
- 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).
- The index of vulnerability (IOV; DiCenzo et al. 1996) was used to determine the percentage of the gizzard shad population most vulnerable to predation.
- Age and growth analysis was not conducted in 2005. Earlier samples were aged in accordance with TPWD (1993) fishery assessment procedures manual. Otoliths were used for white bass, striped bass, redbreast sunfish, bluegill, largemouth bass, and white crappie. In 2001, channel catfish were aged using otoliths while in previous years pectoral spines were used.
- All sampling was conducted according to Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2004).

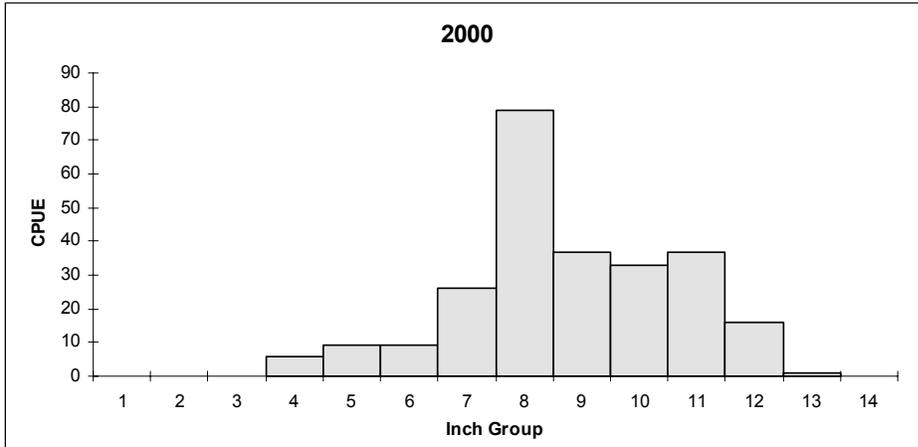
LITERATURE CITED

- 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, second edition. American Fisheries Society, Bethesda, Maryland.
- DiCenzo, V. J., M. J. Maccina, and M. R. Stimpert. 1996. Relations between reservoir trophic state and gizzard shad population characteristics in Alabama reservoirs. *North American Journal of Fisheries Management* 16:888-895.
- Schramm, H. L., Jr., J. E. Kraai, and C. R. Munger. 2000. Intensive stocking of striped bass to restructure a gizzard shad population in a eutrophic Texas reservoir. *Proceedings of the Annual Conference Southeastern Association of Fish and Wildlife Agencies* 53(1999):180-192.
- TPWD (Texas Parks and Wildlife Department). 1993 (revised 1998). Fishery assessment procedures. Texas Parks and Wildlife Department, Inland Fisheries Division. Austin.
- Van Zee, B. E. 1999. Statewide freshwater fisheries monitoring and management program survey report for: Buffalo Springs Reservoir, 1998. Texas Parks and Wildlife Department, Federal Aid In Sport Fish Restoration, Grant F-30-R, Performance Report, Austin.
- Van Zee, B. E. 2001. Statewide freshwater fisheries monitoring and management program survey report for: Buffalo Springs Reservoir, 2000. Texas Parks and Wildlife Department, Federal Aid In Sport Fish Restoration, Grant F-30-R, Performance Report, Austin.

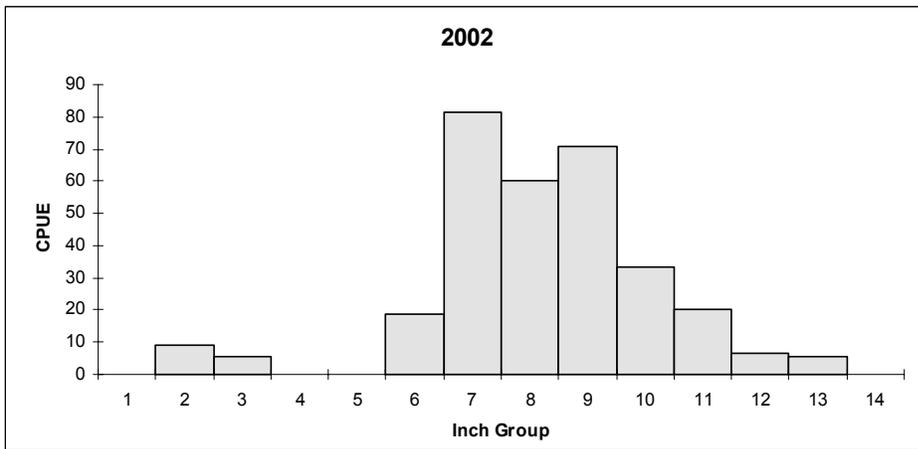


Location of sampling sites, Buffalo Springs Reservoir, Texas, 2004 - 2005. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively.

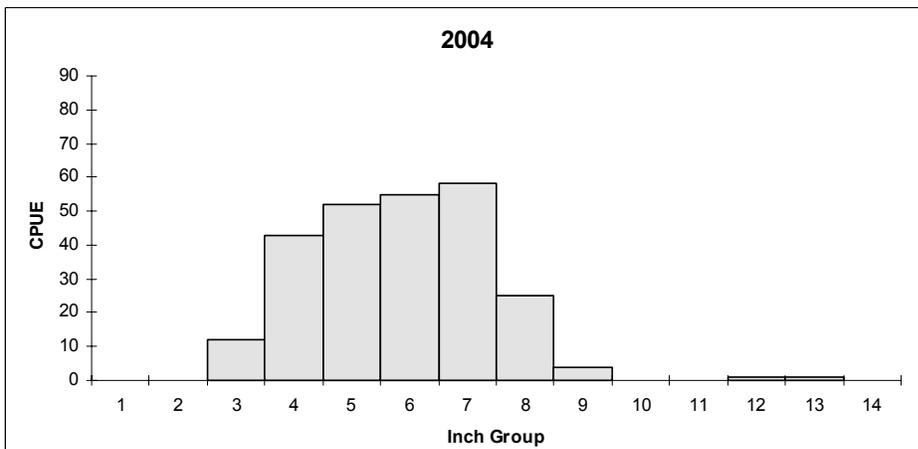
8
Gizzard Shad



Effort = 1.00
 Total CPUE = 253.0
 Stock CPUE = 229.0
 PSD = 24
 IOV = 20



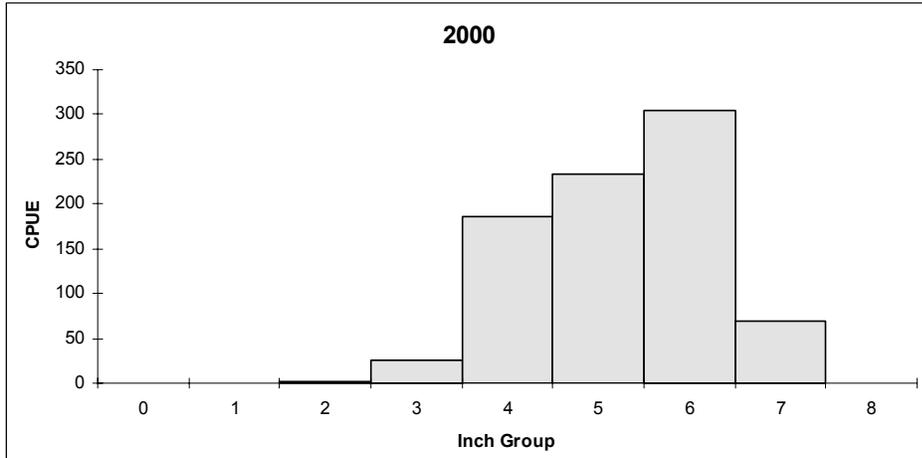
Effort = 0.75
 Total CPUE = 310.7
 Stock CPUE = 277.3
 PSD = 11
 IOV = 49



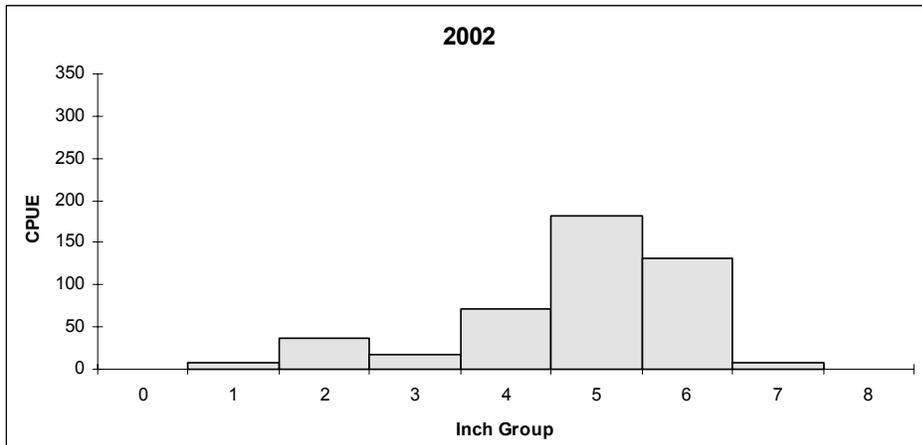
Effort = 1.00
 Total CPUE = 251.0
 Stock CPUE = 89.0
 PSD = 2
 IOV = 88

Comparison of the number of gizzard shad caught per hour (CPUE) and population indices for fall electrofishing surveys, Buffalo Springs Reservoir, Texas.

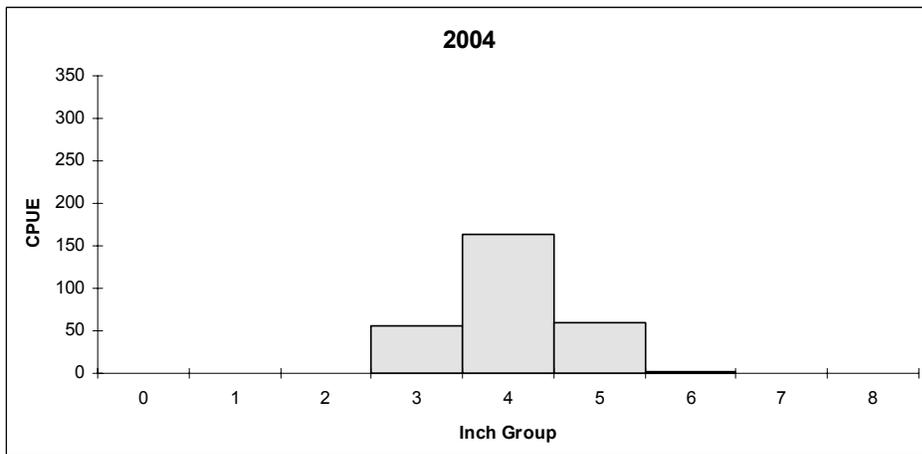
9
Bluegill



Effort = 1.00
 Total CPUE = 820.0
 Stock CPUE = 818.0
 PSD = 46
 RSD-8 = 0



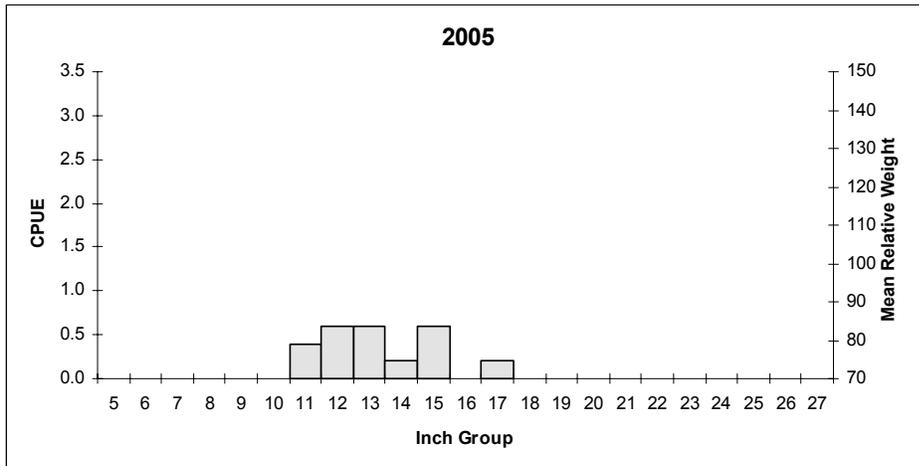
Effort = 0.75
 Total CPUE = 454.7
 Stock CPUE = 410.7
 PSD = 34
 RSD-8 = 0



Effort = 1.00
 Total CPUE = 280.0
 Stock CPUE = 280.0
 PSD = 1
 RSD-8 = 0

Comparison of the number of bluegill caught per hour (CPUE) and population indices for fall electrofishing surveys, Buffalo Springs Reservoir, Texas.

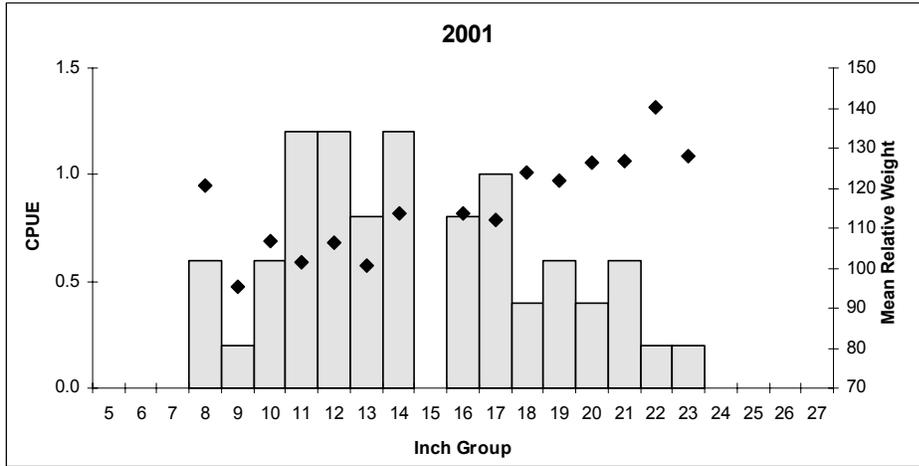
10
Blue Catfish



Effort = 5
Total CPUE = 2.6
Stock CPUE = 2.2
PSD = 0

Number of blue catfish caught per net night (CPUE) and population indices for spring gill net surveys, Buffalo Springs Reservoir, Texas.

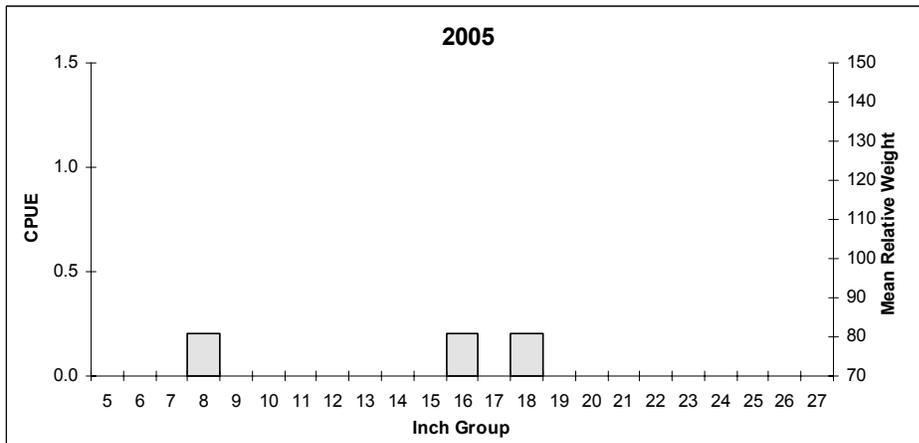
11
Channel Catfish



Effort = 5
 Total CPUE = 10.0
 Stock CPUE = 8.6
 PSD = 49
 RSD-12 = 86

2003
 No sample collected due to Prymnesium parvum bloom.

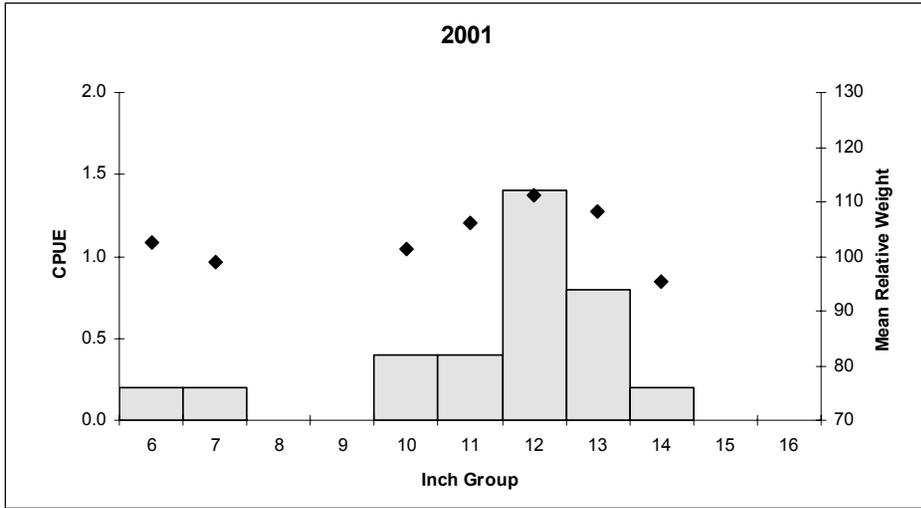
Effort = 0
 Total CPUE =
 Stock CPUE =
 PSD =
 RSD-12 =



Effort = 5
 Total CPUE = 0.6
 Stock CPUE = 0.4
 PSD = 100
 RSD-12 = 100

Comparison of the number of channel catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices for spring gill net surveys, Buffalo Springs Reservoir, Texas.

12
White Bass

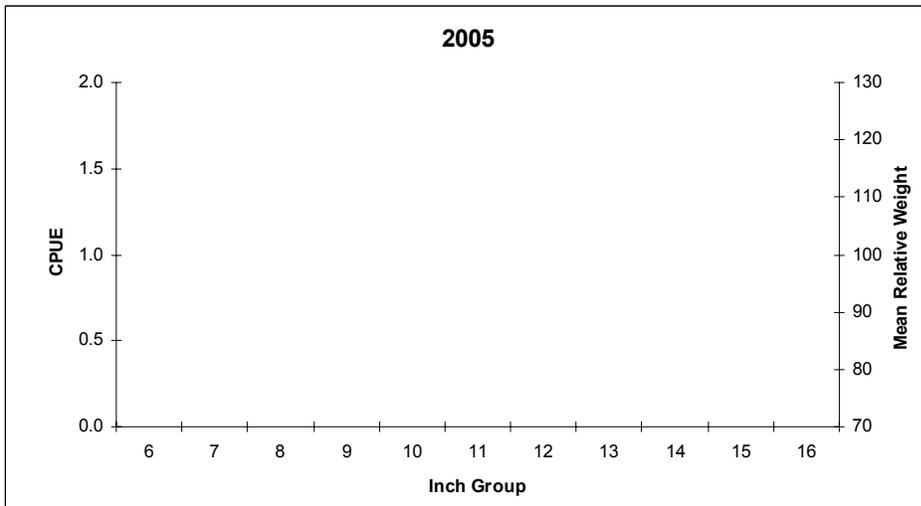


Effort = 5
 Total CPUE = 3.6
 Stock CPUE = 3.6
 PSD = 89
 RSD-10 = 89

2003

No sample collected due to Prymnesium parvum bloom.

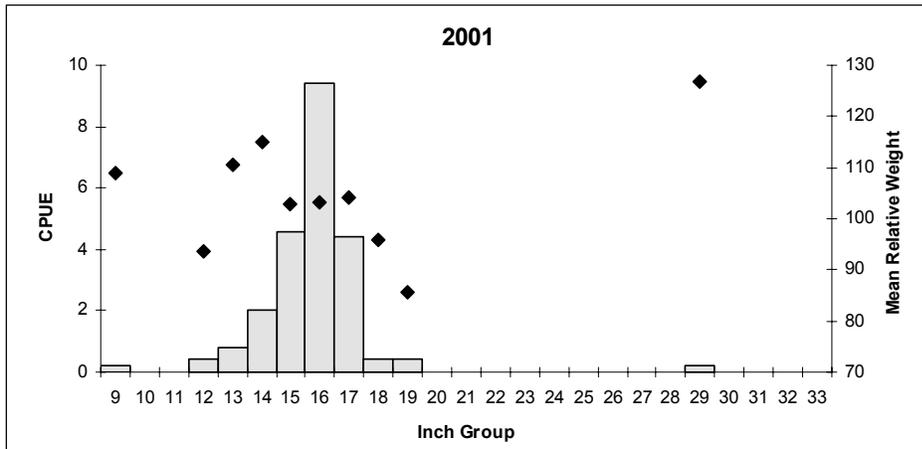
Effort = 0
 Total CPUE =
 Stock CPUE =
 PSD =
 RSD-10 =



Effort = 5
 Total CPUE = 0.0
 Stock CPUE = 0.0
 PSD = N/A
 RSD-10 = N/A

Comparison of the number of white bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices for spring gill net surveys, Buffalo Springs Reservoir, Texas.

13
Striped Bass

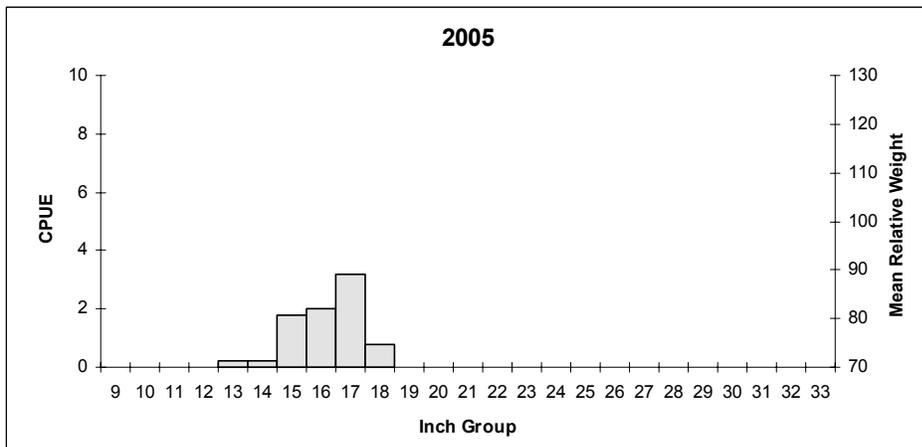


Effort = 5
 Total CPUE = 22.8
 Stock CPUE = 22.6
 PSD = 1
 RSD-18 = 4

2003

No samples collected due to Prymnesium parvum bloom.

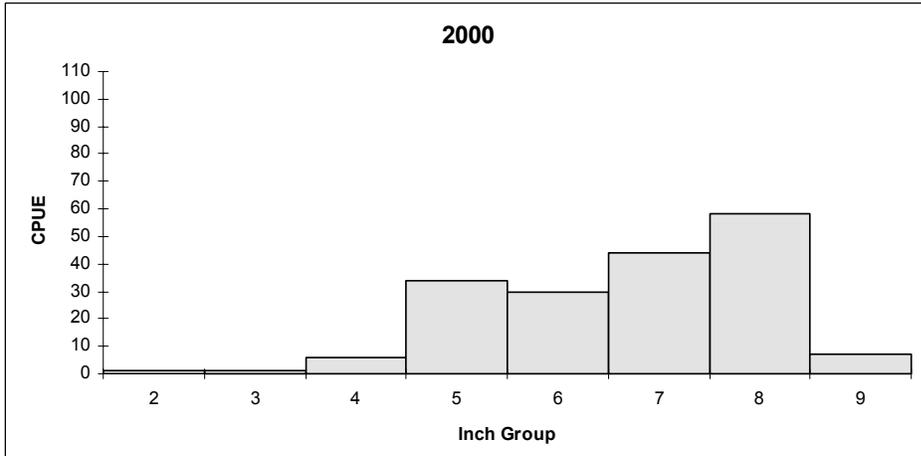
Effort = 0
 Total CPUE =
 Stock CPUE =
 PSD =
 RSD-18 =



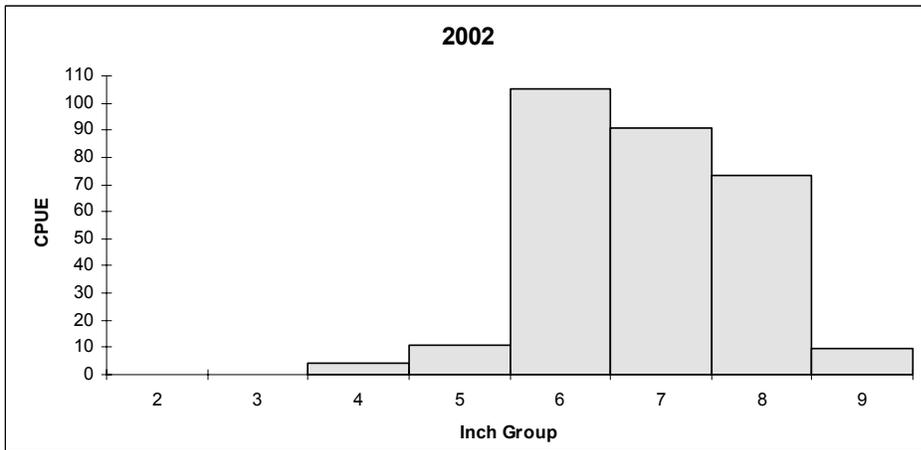
Effort = 5
 Total CPUE = 8.2
 Stock CPUE = 8.2
 PSD = 0
 RSD-18 = 10

Comparison of the number of striped bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices for spring gill net surveys, Buffalo Springs Reservoir, Texas.

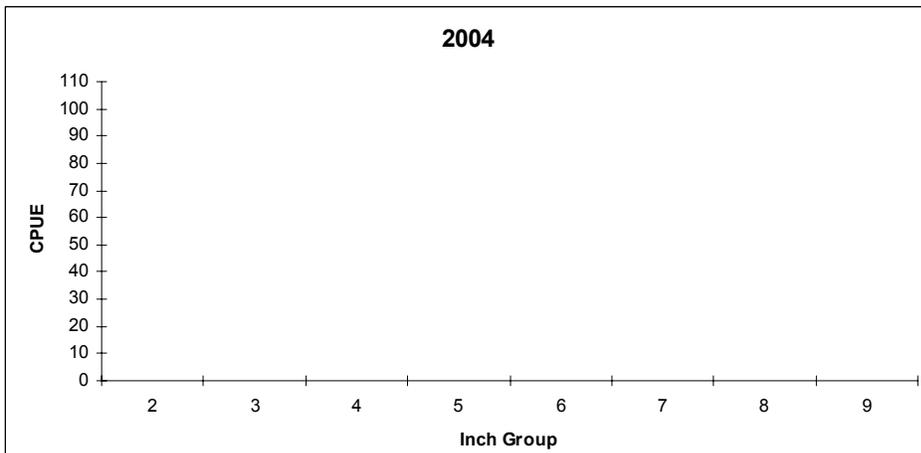
Redbreast Sunfish



Effort = 1.00
 Total CPUE = 181.0
 Stock CPUE = 180.0
 PSD = 77
 RSD-8 = 36



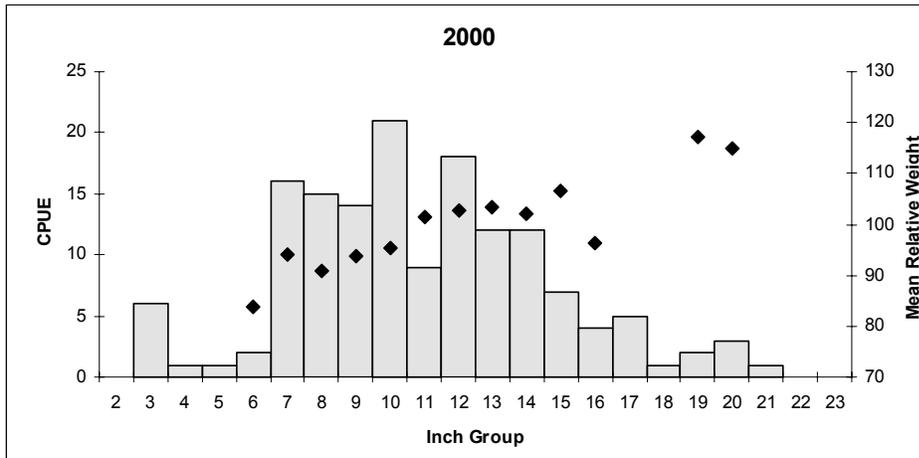
Effort = 0.75
 Total CPUE = 293.3
 Stock CPUE = 293.3
 PSD = 95
 RSD-8 = 28



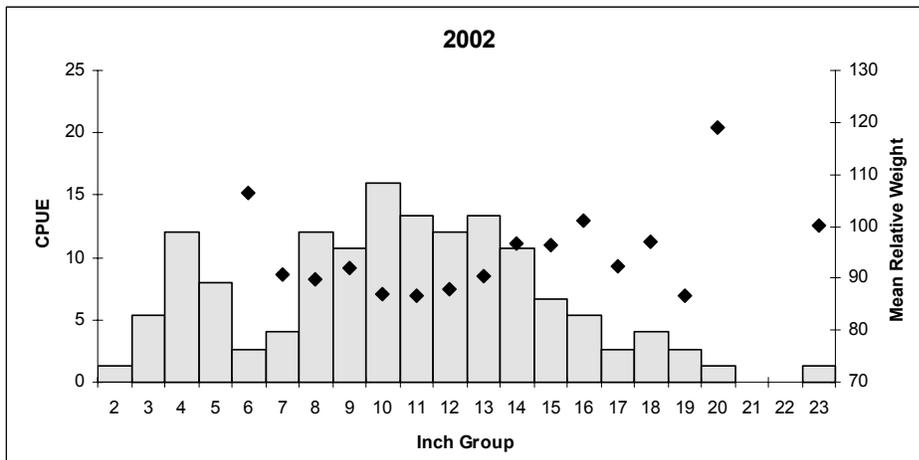
Effort = 1.00
 Total CPUE = 0.0
 Stock CPUE = 0.0
 PSD = N/A
 RSD-8 = N/A

Comparison of the number of redbreast sunfish caught per hour (CPUE, bars) and population indices for fall electrofishing surveys, Buffalo Springs Reservoir, Texas. Stock, quality, and preferred length categories for bluegill were used to calculate the stock density indices.

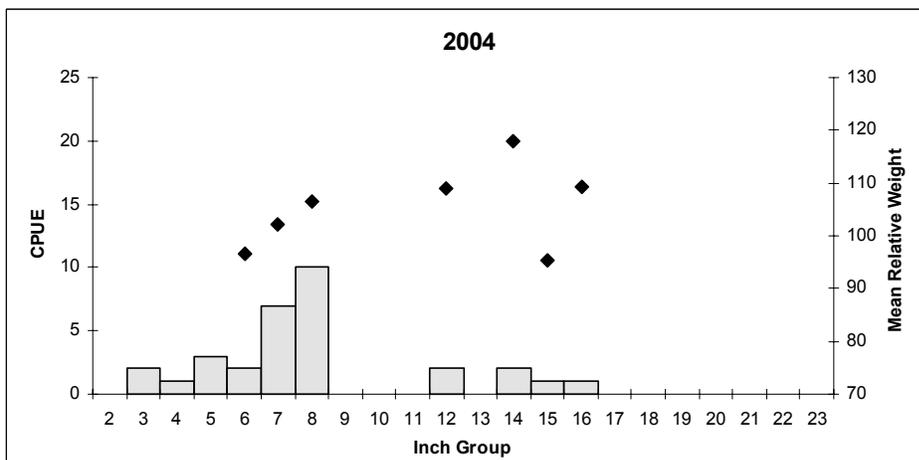
Largemouth Bass



Effort = 1.00
 Total CPUE = 150.0
 Stock CPUE = 124.0
 PSD = 52
 RSD-14 = 28
 % FLMB Alleles = 83
 % FLMB Genotype = 59



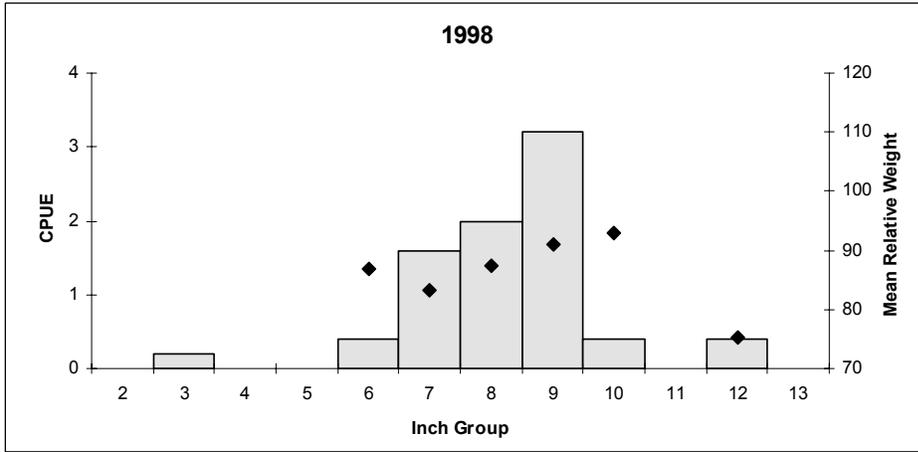
Effort = 0.75
 Total CPUE = 145.3
 Stock CPUE = 112.0
 PSD = 54
 RSD-14 = 31
 % FLMB Alleles = 84
 % FLMB Genotype = 10



Effort = 1.00
 Total CPUE = 31.0
 Stock CPUE = 16.0
 PSD = 38
 RSD-14 = 25
 % FLMB Alleles = N/A
 % FLMB Genotype = N/A

Comparison of the number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices for fall electrofishing surveys, Buffalo Springs Reservoir, Texas.

16
White Crappie



Effort = 5
 Total CPUE = 8.2
 Stock CPUE = 8.0
 PSD = 75
 RSD-10 = 10



Effort = 5
 Total CPUE = 4.2
 Stock CPUE = 4.2
 PSD = 19
 RSD-10 = 10



Effort = 7
 Total CPUE = 0.6
 Stock CPUE = 0.3
 PSD = 50
 RSD-10 = 50

Comparison of the number of white crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices for fall trap net surveys, Buffalo Springs Reservoir, Texas.

Fisheries Management Plan
Buffalo Springs Reservoir, Texas

Prepared – June 2005.

ISSUE 1 Redbreast sunfish had developed a quality population of large fish. No redbreast sunfish have been collected in sampling following the Prymnesium parvum fish kill in spring 2003.

MANAGEMENT STRATEGIES

1. Obtain adult redbreast sunfish from an alternate source and stock in Buffalo Springs to re-establish the population.
2. Monitor the success of re-establishment through standard electrofishing surveys.

ISSUE 2 Striped bass are an important top level predator in Buffalo Springs Reservoir and they provide additional recreation to anglers. Historically, Buffalo Springs was characterized as having an overabundant gizzard shad population, comprised mostly of adult shad too large to be used as prey. However, Schramm, et al. (2000) found that the gizzard shad population in Buffalo Springs could be restructured to one that was more conducive to predation by stocking large numbers of striped bass. Striped bass do not reproduce in Buffalo Springs and stocking is required to maintain their abundance.

MANAGEMENT STRATEGIES

1. Stock fingerling striped bass on an alternating basis where they are stocked at a rate of 15/acre and 40/acre in two consecutive years and then have two years of no stockings.

ISSUE 3 The reservoir experienced a severe fish kill in 2003 due to P. parvum and another very minor kill was suspected in 2005.

MANAGEMENT STRATEGIES

1. Develop contacts with reservoir management authority to monitor for fish kills.
2. Collect spring water samples to test for P. parvum.

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APPENDIX A

Table 1. Catch per unit effort (number per net night for gill and trap nets and number per hour for electrofishing) of all species collected from all gear types from Buffalo Springs Reservoir, Texas. Trap net and electrofishing surveys were conducted in the fall of 2004 and gill net surveys were conducted in the spring of 2005.

Species	Electrofishing	Trap Net	Gill Net
Gizzard shad	251.0	0.3	25.2
Common carp	404.0	7.9	36.2
Blue catfish			2.6
Black Bullhead		10.3	8.2
Channel catfish		1.4	0.6
Striped bass	39.0	0.1	8.2
Green sunfish	341.0		3.6
Bluegill	280.0	9.9	1.0
Longear sunfish	4.0	0.1	
Largemouth bass	31.0		2.0
White crappie		0.6	

APPENDIX B

Table 1. Proposed sampling schedule for Buffalo Springs Reservoir. Trap net and electrofishing surveys are conducted in the fall while gill net surveys are conducted in the spring. The letter S indicates standard sampling.

Sampling Year	Electrofishing	Trap Net	Gill Net	Report
Fall 2005-Spring 2006				
Fall 2006-Spring 2007	S		S	
Fall 2007-Spring 2008				
Fall 2008-Spring 2009	S	S	S	S