

PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-30-R-30

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2004 Survey Report

**Texoma Reservoir**

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## Table of Contents

Executive Summary .....	3
Introduction .....	8
Methods .....	9
Acknowledgments .....	10
Literature Cited.....	10
Physical and Historical Data.....	11
Habitat Survey.....	12
Stocking History .....	13
Location of Sampling Sites.....	17
Species Information	
Gizzard shad .....	18
Bluegill.....	23
Blue catfish.....	24
Channel catfish.....	25
White bass.....	26
Striped bass.....	27
Smallmouth bass .....	35
Spotted bass .....	36
Largemouth bass .....	37
White crappie.....	38
Fisheries Management Plan.....	40
Appendices:	
Appendix A: Sampling catch statistics .....	42
Appendix B: Water chemistry profile, dam site station .....	43
Appendix C: Water chemistry profile, Willis Bridge station .....	44
Appendix D: Water chemistry profile, Newberry Creek station .....	45
Appendix E: Monthly average water level.....	46
Appendix F: Historical catch statistics, 1987-1992 .....	47
Appendix G: Historical catch statistics, 1993-1999.....	48
Appendix H: Historical catch statistics, 2000-2005.....	49
Appendix I: Largemouth bass electrophoresis results .....	50

Appendix J: Golden alga sampling results, 2004..... 52  
Appendix K: Golden alga sampling results, 2004-2005 ..... 53  
Appendix L: Location of sampling sites for golden alga, 2004-2005..... 54  
Appendix M: Striped bass February gill netting information, 1987-2005 ..... 55

## Executive Summary

Texoma Reservoir was surveyed in 2004 using trap nets and electrofisher, and in 2005 using gill nets. This report summarizes the results of these surveys and contains a management plan for the reservoir.

- **Reservoir description:** Texoma Reservoir, a 74,686-acre impoundment on the Red River, was constructed in 1944 by the U.S. Army Corps of Engineers and is located 75 miles north of Dallas-Fort Worth. Denison Dam impounds waters of the Red and Washita Rivers. Texoma Reservoir drains approximately 40,000 square miles in west Texas and central and western Oklahoma. The shoreline is 580 miles long and has a shoreline development index of 13.88. Water depth  $\leq$  15 feet accounts for approximately 40% of the reservoir. In 1992 the U.S. Army Corps of Engineers implemented a reservoir water-level management plan that was a consensus of the Texoma Reservoir Advisory Committee made up of various conservation/recreation agency personnel, area businesses, and chambers of commerce. The plan varies from the conventional reservoir conservation elevation (617-ft-msl) in that water level is allowed to drop to a level below conservation elevation during the spring and early fall. Reservoir level is then maintained above the conservation elevation during summer, late fall and early winter. Reservoir purpose(s) include flood control; hydropower generation; municipal, industrial, and agricultural water supply; and recreation. Boat access is adequate with 42 public ramps and bank access is available at 42 sites. Despite improvements in some public facilities, many areas around the lake that have been open to the public are now closed, are scheduled to be closed, or have been turned over to private concessionaires who either disallow angling or charge a fee. Boat ramps that were free now require a fee. Access to facilities for the physically challenged was provided. Fish habitat is primarily rock riprap, flooded boulders/rocks/stumps, boat docks, boat ramps, and standing timber.
- **Golden alga:** Golden alga *Prymnesium parvum* was discovered in Texoma Reservoir January 24, 2004 in the Lebanon Pool upstream on the Red River arm. Upon investigation, shortnose, longnose, and spotted gar were observed stressed or dead. Golden alga was found down lake to Briar Creek, but fish were dying only in the Lebanon Pool. The many reports received by Texas Parks and Wildlife Department (TPWD) and the Oklahoma Department of Wildlife Conservation (ODWC) between late January and early March were unconfirmed as related to golden alga. On March 6, 2004 four white crappie and one largemouth bass collected from Cedar Mills Resort on the Big Mineral Bay of Texoma Reservoir displayed injuries consistent with golden alga. On March 10, staff investigated and found dead, dying, and stressed threadfin shad, freshwater drum, bluegill, and crappie from Cedar Mills Resort to Highport Marina, described as the major kill zone. A count of the dead fish revealed that 95% were threadfin shad. The kill reached Lazy Acres Cove east of Highport Marina Bay and no further (Appendix

J). Dead and dying fish continued to be observed in the area from Cedar Mills Resort to Lazy Acres Cove until March 23/24. Apparently fish stopped dying shortly before March 25, because no freshly dead fish were observed on March 25, 2004. Overall estimates of the kill from January through March, 2004, indicated approximately one million fish, mostly threadfin shad, died. Additional water samples were collected and analyzed on April 12, 2004, from 21 sites from Denison Dam to the upper Red and Washita River arms (Appendix J and L). Results showed 0 to < 1 % golden alga.

After many meetings among Texas Parks and Wildlife Department (TPWD) and ODWC biologists and administrators a plan was implemented to start collecting water samples at 17 sites from Texoma Reservoir by October 18, 2004 (Appendix K and L). All samples were analyzed for golden alga cells and 8 samples were analyzed for toxin. The first round of cell counts and toxin analysis from October 18, 2004 revealed golden alga cells at 16 sites and toxin at nine sites upstream on the Red River arm from Preston Point (Appendix K and L), but no dead or stressed fish. Water samples collected November 17, 2004 revealed golden alga cells at 13 sites and measurable toxin at seven sites, but no dead or dying fish. By December 13, 2004, golden alga cells were found only at five sites and measurable toxin levels were found at 10 sites (two extra sites were sampled for toxin to identify lake-wide distribution, Appendix K). On January 10, 2005 golden alga cells were found at Cedar Mills and Highport Marina (Appendix L). On February 9, 2005 golden alga cells were found at Slickum Slough and Lebanon Pool (Appendix L), both sites being contiguous with Red River. On March 14, 2005 golden alga cells were found at only one site, Site 30 Lebanon Pool. There was the presence of toxin at some sites where no cells were observed. It was concluded the toxin was released into the water prior to the cells dying and a residual concentration was measured. Throughout the 2004-2005 season, no stressed or dead fish were observed.

In summary, the major difference in Texoma Reservoir during the event of 2004 versus the event of 2004-2005 was water level and inflow. In 2004, water level was low (Appendix E) with no inflow on either river system and in 2004-2005 water level was high (Appendix E) and there was inflow on both river systems. While we have no definitive data, except the presence of dead and dying fish in 2004 and no dead or dying fish in 2004-2005, we believe the severity of golden alga events may be linked to dilution of the toxin. In both events golden alga cells were present and in both events measurable toxin was present. There was an indirect impact to the sport fish community resulting from the kill of 2004. Although 95% of the dead fish were threadfin shad, they comprise a major source of prey for sport fishes in the reservoir. This indirect impact has not manifested itself in an overt decline in recreational angling activities, nor has it affected the abundance and health of the fisheries resources. Ironically, striped bass angling during and following the event

of 2004 was better than it had been for years according to anecdotal information from several fishing guides on the reservoir.

- Prey species:** The electrofishing catch rate of gizzard shad (221.5/hour) has been consistent since 1998. It was above the historic average (196.3/hour) for the reservoir and has provided a strong prey base since 1987. The historic average is based on 15 surveys from 1987 through 2004. The electrofishing catch rate of bluegill (151.5/hour) was slightly lower than the 2000 catch rate (165.5/hour) and lower than the historic average (265.3/hour), but still provided an excellent prey base for predator fish in the reservoir. In addition to abundance, the size range of prey species indicated their vulnerability to existing predators. The Index of Vulnerability (IOV) for gizzard shad was 68, down from 2000, but over one-half the gizzard shad population was vulnerable to predation. The average annual IOV for gizzard shad since 1987 was 65. The size mode of the bluegill population peaked out at 4 inches, which is ideal size prey for adult predators. The catch rate of threadfin shad (37.0/hour) was down from 2000 and below the historic average of 1,026.9/hour), but considering their sensitivity to low water temperatures during the winter, fluctuations in abundance in this reservoir are not uncommon. A note regarding the historic average: the highest electrofishing catch rate of threadfin shad in this reservoir (15,026.5/hour) occurred in 1989, mostly from the sample station in the Washita River arm at the east end of the Frisco Railroad bridge. Additional prey species include a variety of minnows and sunfishes.
- Catfishes:** The 2005 gill net catch rate of blue catfish was 0.8/net night. Since 1987 the highest catch rate of record 3.2/net night in 1988, most often the catch rate was < 1.0/net night. The historic average catch rate from 1987 through 2005 was 1.8/net night. The average relative weight was 94 and 100% of the sample population was  $\geq$  12 inches. The reservoir record and former world record blue catfish was 121.5 pounds and 58 inches long.

The 2005 gill net catch rate of channel catfish was 1.1/net night. The highest catch on record was 3.8/net night in 1988 and the historic average catch rate was 2.5/net night. The average relative weight was 100 and 35% of the sample population was  $\geq$  12 inches. The record channel catfish is 10.07 pounds and 27.5 inches long.

Flathead catfish were collected in Texoma Reservoir, but catch in gill nets seldom reaches 0.5/net night and the historic average catch rate from 1987 through 2005 was 0.2/net night. Anecdotal data from trotline anglers and an occasional rod and reel angler indicated an active flathead catfish fishery existed, but they are rarely collected in gill nets.

Despite an active recreational fishery for blue, channel, and flathead catfish, most continue to evade gill net capture.

- **Temperate basses:** The 2005 gill net catch rate of white bass was 4.5/net night, down from 6.7/net night in 2000 and lower than the historic average (5.0/net night) for this reservoir. Since 1987, annual white bass sample populations have varied from 11.1/net night down to 0.1/net night. Despite their fluctuation in abundance, they have consistently produced a good fishery. White bass exhibited excellent condition, evidenced by an average relative weight of 97. Fifty-three percent of the sample population was  $\geq 10$  inches. The reservoir record white bass was 3.41 pounds and 18 inches long.

Based on annual creel survey data collected between 1987 and 1999, striped bass was the most sought-after sport fish in Texoma Reservoir. Anecdotal data from local fishing guides, anglers, and concessionaires affirmed this species popularity. The gill net catch rate of striped bass was 22.3/net night, consistent with gill net catch rates over the past 19 years. The historic 19-year average gill net catch of striped bass was 18.7/net night. The body condition or relative weight of striped bass changed with season. For example, they were heavier at a given length in the winter than they were at the same given length in the summer. The average relative weight was 90 and 33% of the sample population was  $\geq 20$  inches. Annual statistics are tabulated in Appendix M. Anecdotally, striped bass angling continued to receive the bulk of directed angling effort and guided fishing trips for striped bass were very popular year-round on this reservoir. The reservoir record striped bass was 35.12 pounds and 39 inches long.

- **Black basses:** The smallmouth bass appeared to rebound with evidence of successful spawning in 2004. Although the electrofishing catch rate of smallmouth bass declined over the past 5 years (8.0/hour in 1999 to 3.5/hour in 2004), production of young fish in 2004 was encouraging. The historic electrofishing catch rate of smallmouth bass from 1987 through 2004 was 15.5 for this reservoir. Because it is a bi-state reservoir, not all fish caught in the reservoir are eligible for water body record status. The largest smallmouth bass on record (7.8 pounds) was caught in Oklahoma waters and is the State Record. The official water body record for Texas is 6.91 pounds and 24 inches long.

Spotted bass electrofishing catch rate has actually improved over the past 5 years (23.0/hour in 1999 to 42.0/hour in 2004) and there has been an increase in the numbers of fish  $\geq 14$  inches. The historic electrofishing catch rate of spotted bass from 1987 through 2004 was 33.1/hour for this reservoir. Recruitment of age-0 fish has been successful over the last five years. The average relative weight of spotted bass remained around 90 and an average of 6% of the sample population were legally harvestable. The reservoir record spotted bass is 4.38 pounds and 20.5 inches long.

The electrofishing catch rate of largemouth bass increased to 46.0/hour in 2004

from 38.5/hour in 2000. The historic electrofishing catch rate for largemouth bass from 1987 through 2004 was 99.6/hour for this reservoir. The catch of age-0 fish has declined since 1999, but was sufficient to provide a viable fishery. The average relative weight of largemouth bass was 96 and an average of 23% of the sample population was legally harvestable. The reservoir record largemouth bass is 11.82 pounds and 24.5 inches long.

Florida largemouth bass were first stocked in Texoma Reservoir in 1975. They were stocked 12 other years through 2004. Because of the reservoir size, we were never able to obtain 2.2 million fingerlings required to stock the entire reservoir at 25/acre. Beginning in 1996 we adopted the embayment stocking program whereby a smaller portion of a reservoir was stocked. Theoretically, the Florida largemouth bass establish in the small area and eventually immigrate into the entire reservoir. The first bay stocked was Little Mineral (2,200 acres) in 1996, 1997, and 1998 (Stocking History Table). Big Mineral Bay (6,400 acres) was stocked in 1999, 2000, and 2002 (Stocking History Table). Electrophoretic analysis of tissue from 89 age-0 largemouth bass, collected equally from the Little Mineral Arm, Big Mineral Arm, and main pool showed 17.6% Florida largemouth alleles and 0% pure Florida genotype. Appendix I contains tabulated electrophoretic data. Although the proportion of Florida largemouth alleles did not meet minimum criteria, they did establish in the targeted sites and they immigrated into the main body of the reservoir.

- **Crappie:** Although comprised of mostly age-0 fish, the 2004 trap net catch rate of white crappie (27.1/net night) reached an all-time high for Texoma Reservoir. The historic average catch rate of white crappie was 5.9/net night. The historic average is based on the average from 18 surveys from 1987 through 2004. Average relative weight was 100 and 15% of the sample population was  $\geq 10$  inches. The reservoir record white crappie is 3.23 pounds and 15.5 inches long.

Although low in numbers, black crappie were present in Texoma Reservoir. Low catches of black crappie precluded any meaningful data analysis. The reservoir record black crappie is 2.00 pounds and 14.88 inches.

- **Management strategies**

Based on current information, the reservoir should be managed with existing fish harvest regulations, which have been standardized with ODWC for the entire reservoir. The multiple-species fishery continued to produce excellent angling opportunities year-round. Participation in the golden alga monitoring program and the annual gill net assessment of the striped bass fishery with ODWC personnel should be continued. Since becoming established in Texoma Reservoir in 1983, smallmouth bass have selected habitat at specific sites around the reservoir. Based on past electrofishing surveys, smallmouth bass do not immigrate into other

areas of the reservoir. Random sampling has resulted in missing sites that hold smallmouth bass. Additional electrofishing is planned to target smallmouth bass habitat. While the largemouth bass CPUE is only one-half the historic average catch, the species continues to provide excellent angling opportunities. Evidence supporting the viability of the largemouth bass fishery is the many bass tournaments hosted on Texoma Reservoir. However, some productive sites may have been omitted in random sampling. Additional electrofishing is planned to target more productive largemouth bass habitat. New information pertaining to recreational angling on Texoma Reservoir should be updated on the Lake Texoma web page on the TPWD web site at [www.tpwd.state.tx.us](http://www.tpwd.state.tx.us).

### Introduction

This document is a summary of fisheries data collected from Texoma Reservoir in 2004-2005. The purpose of the document is to provide fisheries information and make management recommendations to protect and enhance the sport fishery. While information on other species of fishes was 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 are presented with the 2004-2005 data for comparison.

#### Harvest regulations for Texoma Reservoir, Texas-Oklahoma, 2004-2005.

Species	Bag Limit	Minimum Length (inches)
Bass, largemouth, smallmouth, and spotted	5 in aggregate	14
Bass, striped, its hybrids and subspecies	10 in aggregate	No limit – only two fish 20 inches or greater may be retained each day.
Bass, white	25	No Limit
Catfish, blue and channel	15	12
Catfish, flathead	5	20
Crappie, white and black	37	10
Walleye	5	18

## Methods

- Fish stocks were assessed by electrofishing (2 hours at 24 stations) in 2004, gill netting (30 net nights at 30 fixed stations, cooperative ongoing study with Oklahoma annually in 2001 through 2005, and 15 net nights at 15 stations in 2005), and trap netting (15 net nights at 15 stations) in 2004. Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour of actual electrofishing, and for gill and trap nets as the number of fish caught in one net set overnight. Fish stock assessments and largemouth bass electrophoresis samples were collected according to Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2004).
- Sampling statistics (CPUE for various length categories) and structural indices (Proportional Stock Density (PSD), Relative Stock Density-Preferred (RSD-P)), and relative weight ( $W_r$ ), were calculated for target fishes according to Anderson and Neumann (1996) and Muoneke and Pope (1999). Index of vulnerability (IOV) was calculated for gizzard shad according to DiCenzo et al. (1996).
- Tissue samples from 89 age-0 largemouth bass were collected, preserved, and transported for electrophoretic analysis according to Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2004).
- Water samples for golden alga analyses were collected monthly during January, February, and March during 2004 from 27 sites around the perimeter of Texoma Reservoir. All samples were analyzed for golden alga cells and selected sites were analyzed for toxin (Appendix G). Since golden alga was new to this reservoir, some of the sites were only sampled once. The goal was to identify the area of major golden alga impact and monitor the spread of cells and toxin. The cell count sample consisted of 100 ml of water in a contaminant-free glass sample bottle secured with a screw-cap. The toxin sample was collected in a contaminant-free 50 ml glass bottle with a neoprene septum because the toxin sample had to be air bubble-free and sealed. Samples were collected by TPWD personnel and shipped overnight to the Contaminant Specialist at TPWD Waco for cell counts and to the Chemist at TPWD San Marcos for toxin analysis. A chain-of-custody was maintained for all samples.

Water samples for golden alga analyses were collected monthly during October, November, and December, 2004 and January, February, and March, 2005 at 17 sites around Texoma Reservoir (Appendix K and L). Water samples for toxin analysis were collected at 8 of the sites (Appendix K). Water samples and sampling procedure(s) followed the practice established in January, 2004 presented in the paragraph above.

### Acknowledgments

The authors recognize Fish and Wildlife Technicians Todd R. Robinson and Bill Thornhill (TPWD) for their work on all surveys, data compilation and analysis, and report preparation. Randy Curry and Bob Wichers (ODWC) cooperated in conducting the annual gill-net surveys. A special thanks to contaminant specialist Joan Glass, Waco and chemist Pamela Hamlett of the A.E. Wood State Fish Hatchery in San Marcos for their work on the golden alga investigation.

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Survey of littoral zone and physical habitat types, Texoma Reservoir, Texas-Oklahoma, July, 2004. A linear shoreline distance (miles) was recorded for each habitat type found. Acreage is listed for aquatic vegetation and habitat types adjacent to shoreline.

Shoreline habitat type	Shoreline distance		Acreage
	Miles	Percent of total	
Rip rap	12.2	2.1	
Rocky or gravel shoreline	131.5	22.7	
Boulders	37.5	6.4	
Bulkhead	0.4	<0.1	
Indescript or featureless	<u>398.4</u>	68.7	
Total shoreline length:	580.0		
<u>Vegetation</u>			
Native emergent	29.0		70
Native floating	1.5		10
<u>Habitat adjacent to shoreline</u>			
Boat docks, piers, marinas	27.0		490
Dead trees, stumps	6.2		15

Stocking history of Texoma Reservoir, Texas-Oklahoma. Size categories are ADL for adult, SADL for sub-adult, FGL for fingerling, and FRY for fry.

Species	Year	Number	Size
Threadfin shad	1979	31,181	ADL
	1982	1,500	ADL
	1984	19,176	ADL
	1985	271,959	ADL
	2001	<u>11,300</u>	ADL
Species total:		335,116	
Channel catfish	1944	67,000	FGL
	1945	104,500	FGL
	1946	43,000	FGL
	1947	18,000	FGL
	1948	6,000	FGL
	1949	9,000	FGL
	1974	30,000	FGL
	1979	12,200	FGL
	1991	15,170	FGL
	1992	<u>59</u>	ADL
Species total:		304,929	
Striped bass	1965	138	ADL
	1967	200,000	FGL
	1968	5,000	FGL
	1969	284,614	FGL
	1970	77,640	FGL
	1971	96,839	FGL
	1972	208,340	FGL
	1973	141,612	FGL
	1974	548,898	FGL
	1977	1,600	FGL
	1984	490	FGL
	1985	<u>500</u>	FGL
	Species total:		1,565,671
Rock bass	1945	21,000	FGL
	1947	<u>4,000</u>	FGL
Species total:		25,000	

## Stocking history (continued):

Warmouth	1947	<u>4,000</u>	FGL
Species total:		4,000	
Bluegill	1945	22,400	FGL
	1948	15,500	FGL
	1949	18,000	FGL
	1951	4,000	FGL
	1979	<u>20,400</u>	FGL
Species total:		80,300	
Redear sunfish	1944	18,000	FGL
	1945	220,500	FGL
	1946	116,000	FGL
	1947	16,000	FGL
	1948	82,500	FGL
	1949	87,000	FGL
	1951	<u>4,000</u>	FGL
Species total:		544,000	
Smallmouth bass	1981	576,655	FGL
	1982	452,372	FGL
	1983	48,104	FGL
	1987	6,800	FGL
	1991	10,641	FGL
	1996	20,000	FGL
	1997	<u>19,210</u>	FGL
Species total:		1,133,782	
Largemouth bass	1944	225,000	FGL
	1945	61,000	FGL
	1946	7,000	FGL
	1947	14,500	FGL
	1948	28,000	FGL
	1949	459,000	FGL
	1951	34,000	FGL
	1953	142,000	FGL
	1954	8,000	FGL
	1980	<u>30,976</u>	FGL
Species total:		1,009,476	

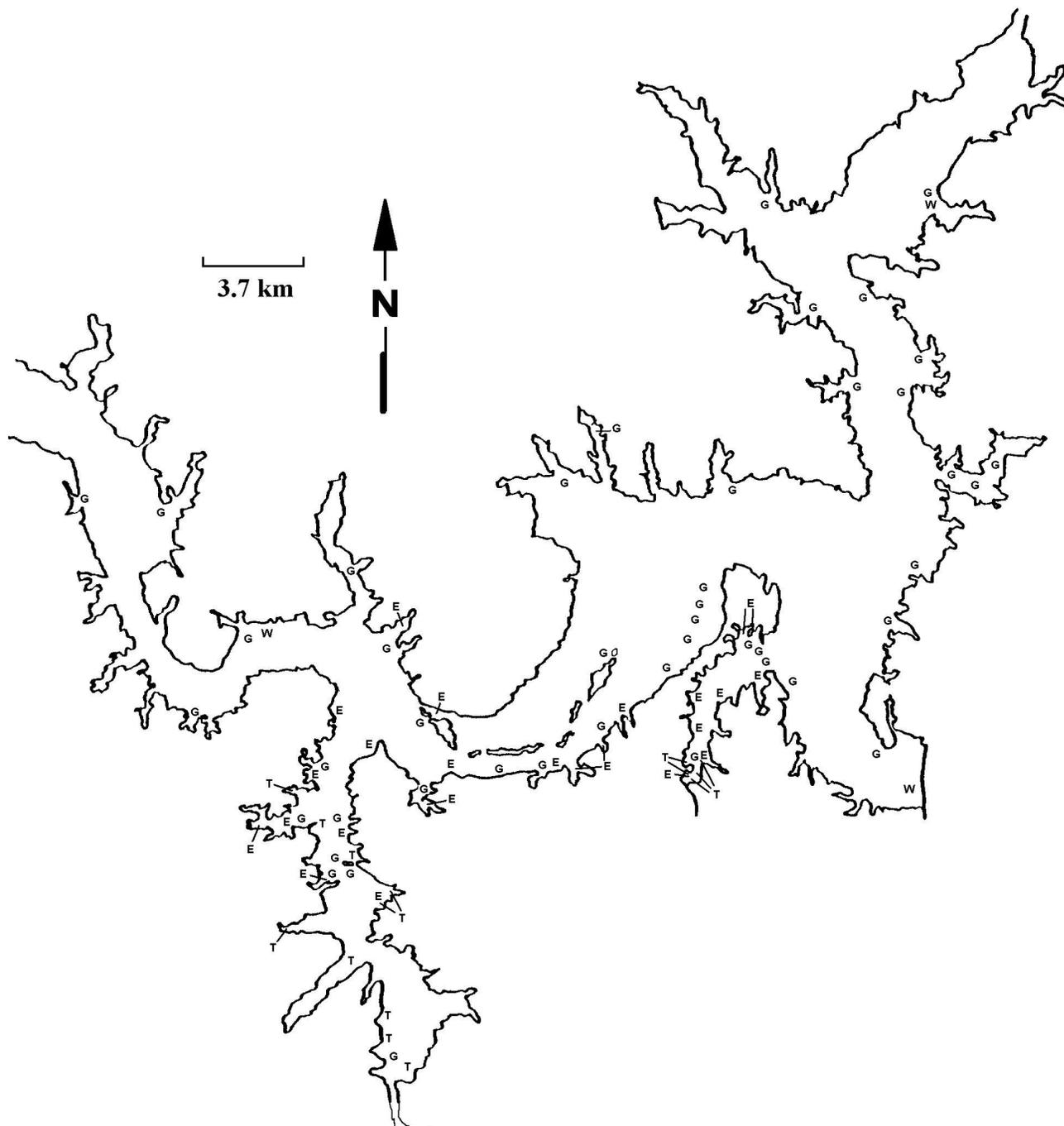
## Stocking history (continued):

White crappie	1945	3,000	FGL
	1946	28,000	FGL
	1948	11,100	FGL
	1953	<u>12,000</u>	FGL
Species total:		54,100	
Florida largemouth bass	1975	312,000	FGL
	1976	25,000	FGL
	1977	223,748	FGL
	1985	237,589	FGL
	1986	231,850	FGL
	1996	100,300	FGL
	1997	109,950	FGL
	1998	110,500	FGL
	1999	327,191	FGL
	2000	324,444	FGL
	2002	239,060	FRY
	2002	439,343	FGL
	2004	<u>234,537</u>	FGL
	Species total:		2,915,512
Walleye	1968	50,800	FGL
	1969	500,000	FRY
	1970	3,219,891	FRY
	1975	8,398,000	FRY
	1976	278,000	FGL
	1977	<u>2,261,000</u>	FRY
Species total:		14,707,691	
Other sunfishes	1945	<u>14,000</u>	FGL
Species total:		14,000	
Kemp's largemouth bass	1975	<u>80,000</u>	FGL
Species total:		80,000	
Coppernose bluegill	1944	<u>2,400</u>	FGL
Species total:		2,400	

## Stocking history (continued):

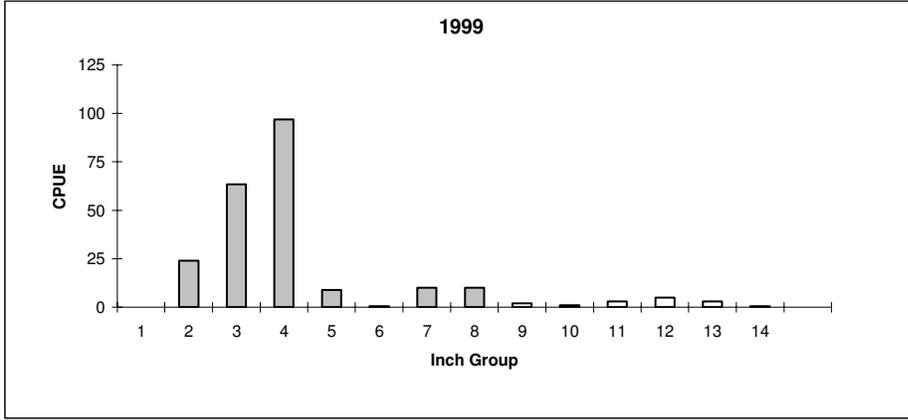
Paddlefish	1998	12	ADL
	1999	5,757	SADL
	2000	20,692	SADL
	2004	<u>24,463</u>	SADL
Species total:		50,924	

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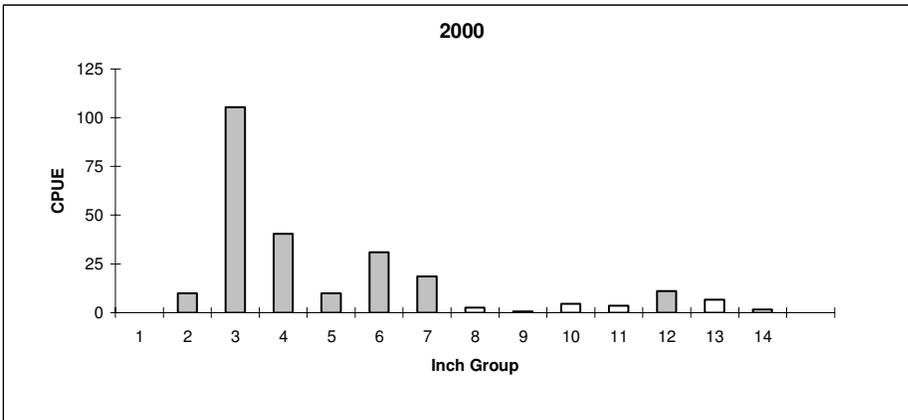


Location of sampling sites, Texoma Reservoir, Texas-Oklahoma, 2004-2005. Gill net, electrofishing, trap net, and water sample stations are indicated by G, E, T, and W, respectively.

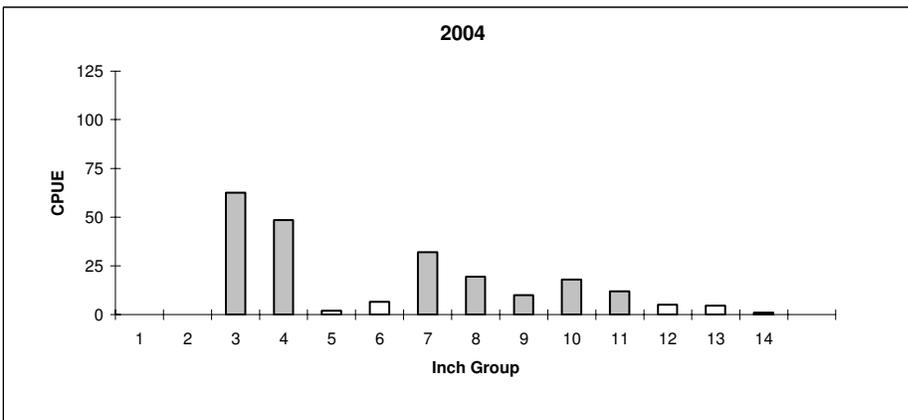
### Gizzard Shad



Effort = 2.0  
 Total CPUE = 228.5  
 Stock CPUE = 34.5  
 PSD = 33  
 IOV = 89



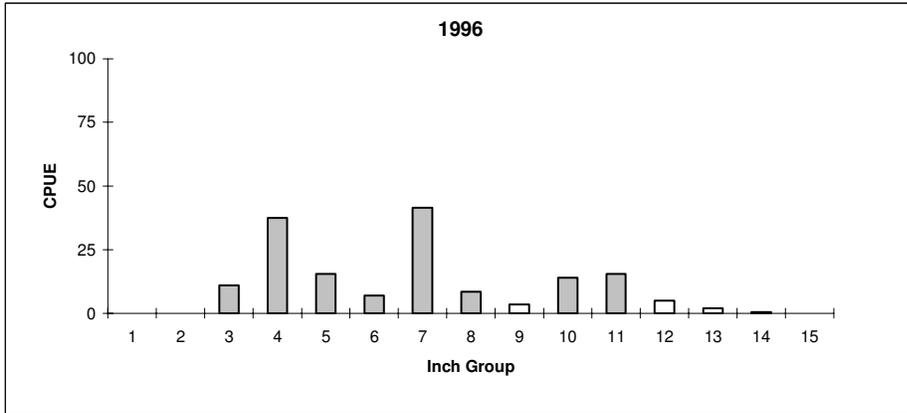
Effort = 2.0  
 Total CPUE = 245.5  
 Stock CPUE = 48.5  
 PSD = 46  
 IOV = 88



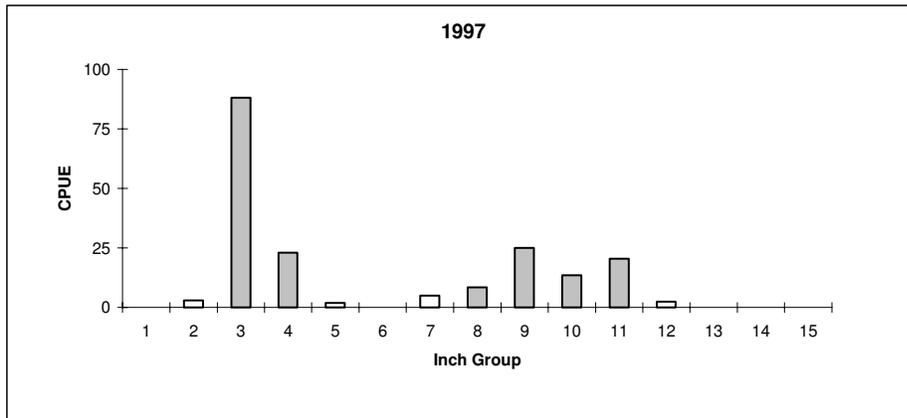
Effort = 2.0  
 Total CPUE = 221.5  
 Stock CPUE = 102.0  
 PSD = 22  
 IOV = 68

The number of gizzard shad caught per hour (CPUE, bars) and population indices for electrofishing survey, Texoma Reservoir, Texas-Oklahoma, September-October 1999, and October 2000 and 2004.

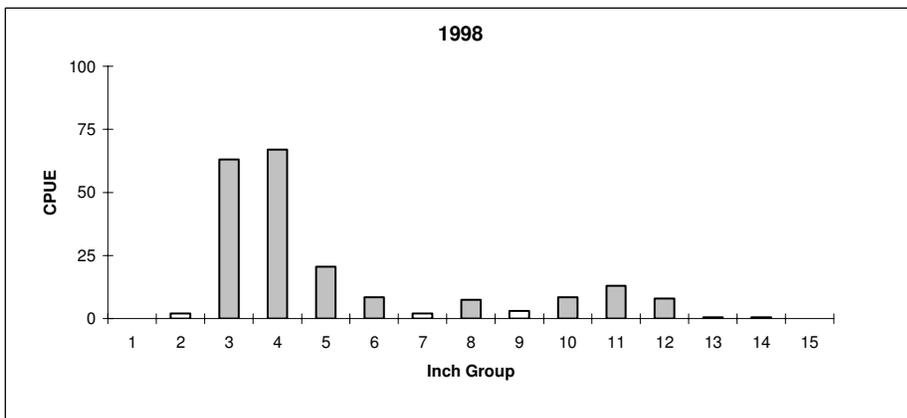
### Gizzard Shad



Effort = 2.0  
 Total CPUE = 161.5  
 Stock CPUE = 90.5  
 PSD = 25  
 IOV = 70



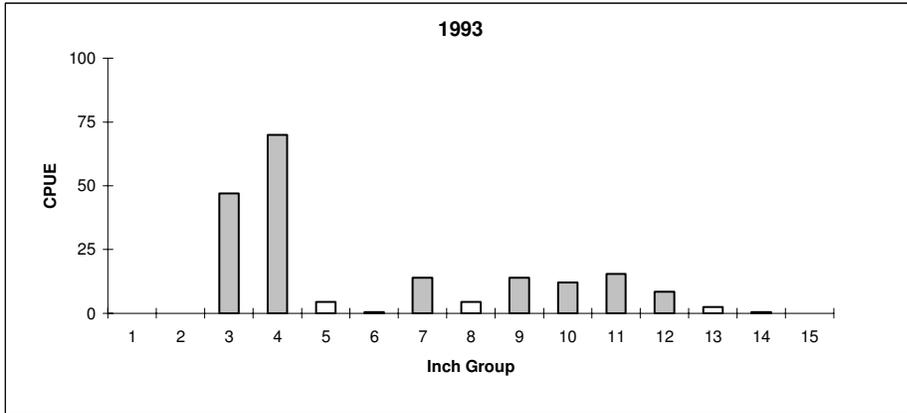
Effort = 2.0  
 Total CPUE = 191.0  
 Stock CPUE = 75.0  
 PSD = 31  
 IOV = 63



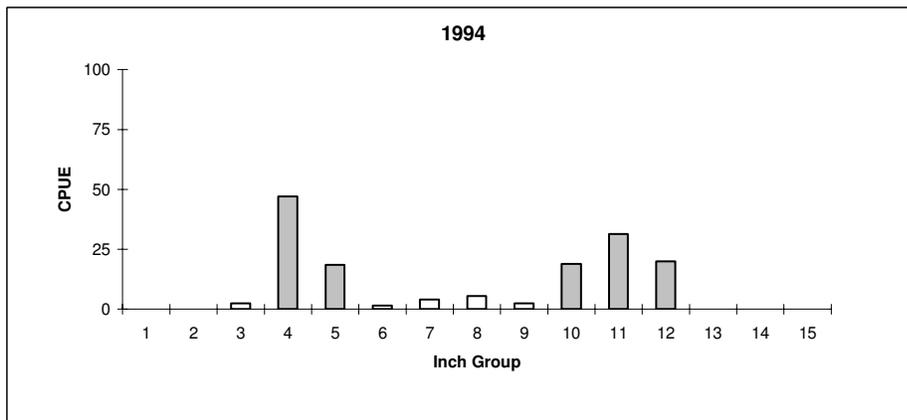
Effort = 2.0  
 Total CPUE = 204.0  
 Stock CPUE = 43.0  
 PSD = 51  
 IOV = 80

Comparison of the number of gizzard shad caught per hour (CPUE, bars) and population indices for electrofishing surveys, Texoma Reservoir, Texas-Oklahoma, October 1996, September 1997, and October 1998.

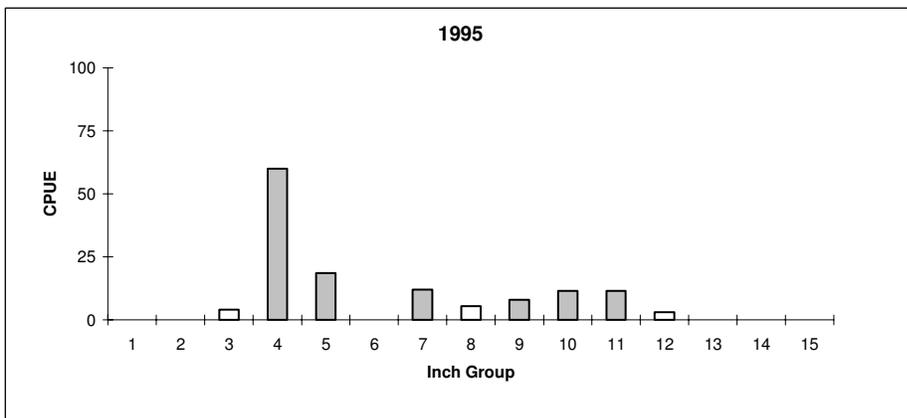
### Gizzard Shad



Effort = 2.0  
 Total CPUE = 193.5  
 Stock CPUE = 71.5  
 PSD = 38  
 IOV = 70



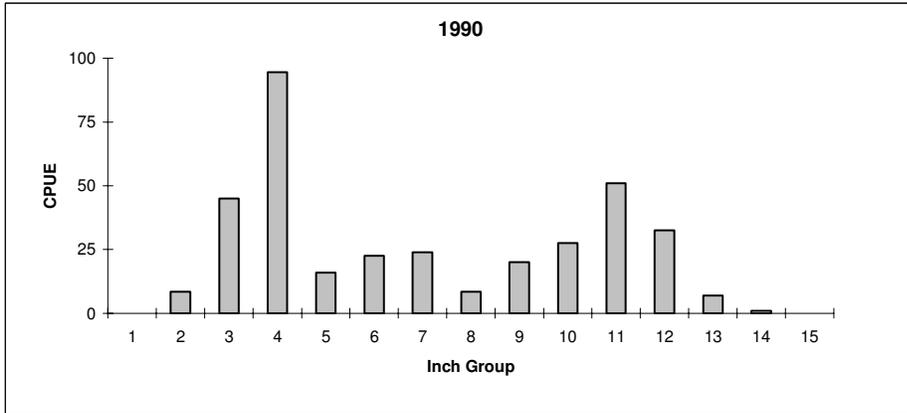
Effort = 2.0  
 Total CPUE = 152.0  
 Stock CPUE = 82.5  
 PSD = 62  
 IOV = 48



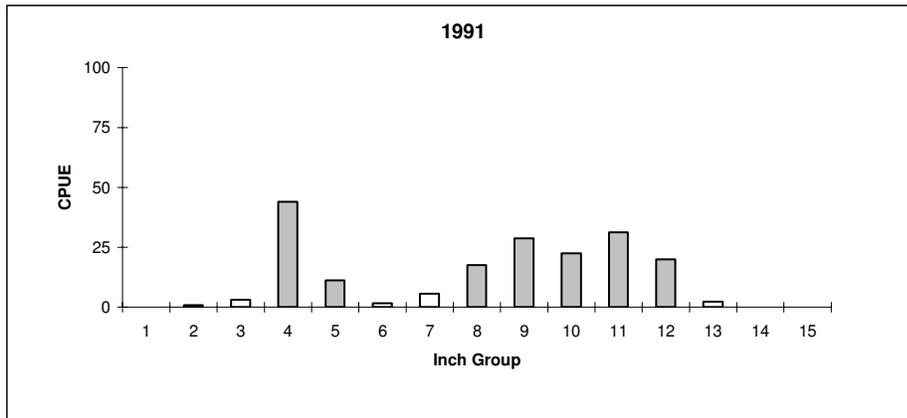
Effort = 2.0  
 Total CPUE = 134.0  
 Stock CPUE = 51.5  
 PSD = 28  
 IOV = 68

Comparison of the number of gizzard shad caught per hour (CPUE, bars) and population indices for electrofishing surveys, Texoma Reservoir, Texas-Oklahoma, September-October 1993, September 1994, and September 1995.

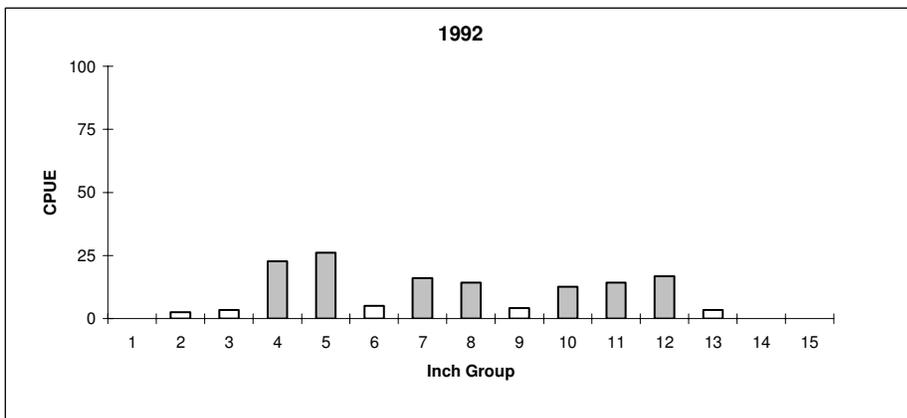
### Gizzard Shad



Effort = 2.0  
 Total CPUE = 358.0  
 Stock CPUE = 171.5  
 PSD = 53  
 IOV = 59



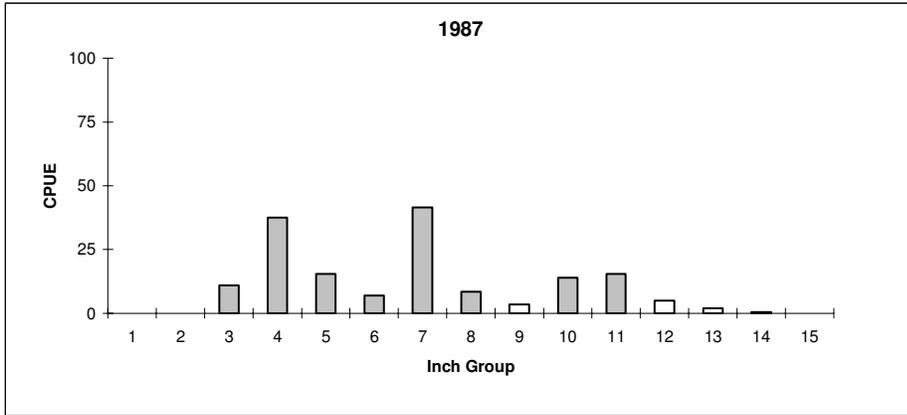
Effort = 1.3  
 Total CPUE = 188.8  
 Stock CPUE = 128.0  
 PSD = 42  
 IOV = 35



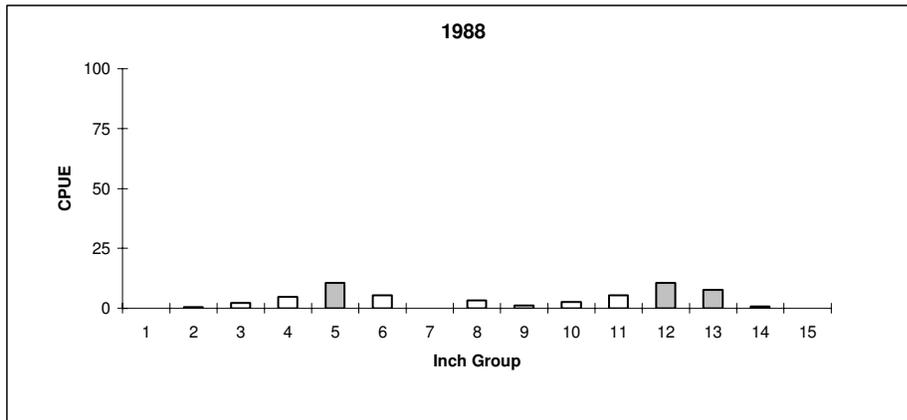
Effort = 1.8  
 Total CPUE = 141.5  
 Stock CPUE = 81.7  
 PSD = 42  
 IOV = 54

Comparison of the number of gizzard shad caught per hour (CPUE, bars) and population indices for electrofishing surveys, Texoma Reservoir, Texas-Oklahoma, October 1990, September-October 1991, and September 1992.

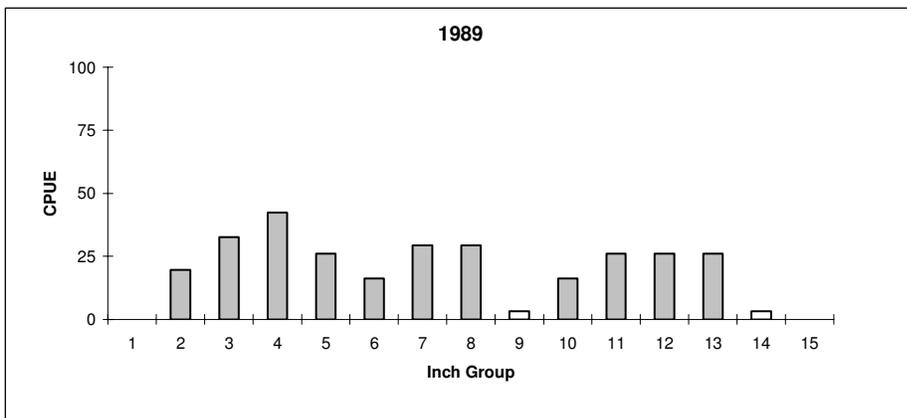
### Gizzard Shad



Effort = 2.5  
 Total CPUE = 173.6  
 Stock CPUE = 26.8  
 PSD = 22  
 IOV = 87



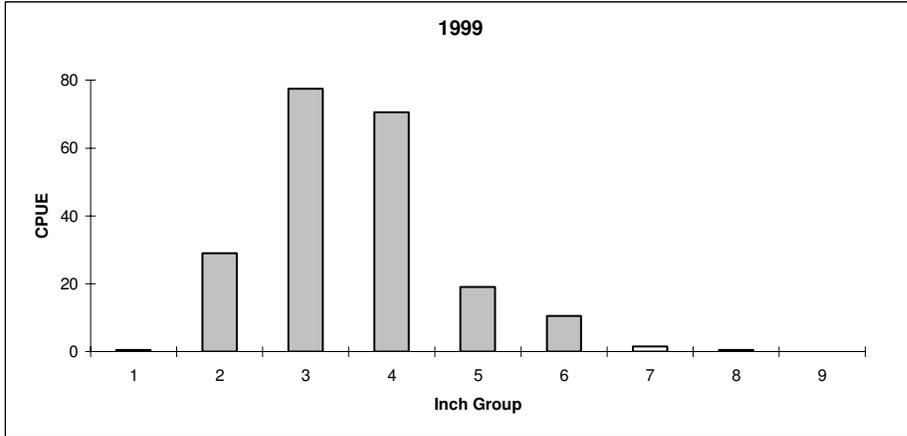
Effort = 2.8  
 Total CPUE = 54.5  
 Stock CPUE = 31.3  
 PSD = 78  
 IOV = 43



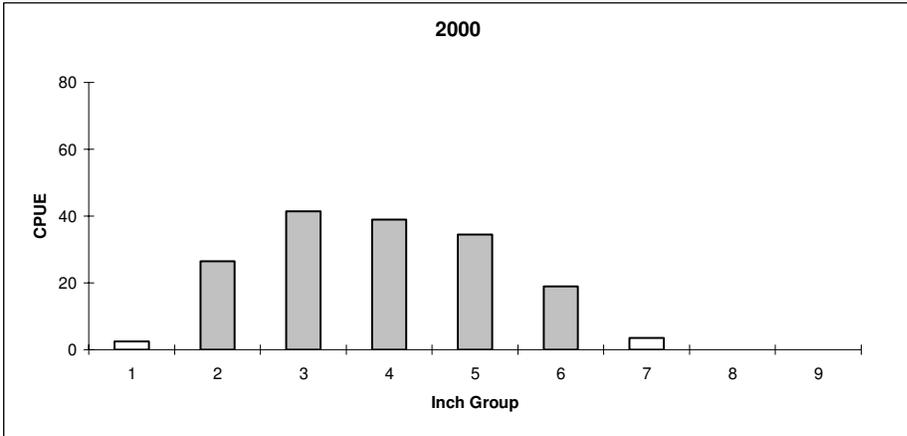
Effort = 2.0  
 Total CPUE = 296.5  
 Stock CPUE = 159.5  
 PSD = 51  
 IOV = 56

Comparison of the number of gizzard shad caught per hour (CPUE, bars) and population indices for electrofishing surveys, Texoma Reservoir, Texas-Oklahoma, October 1987 and 1988, and October-November 1989.

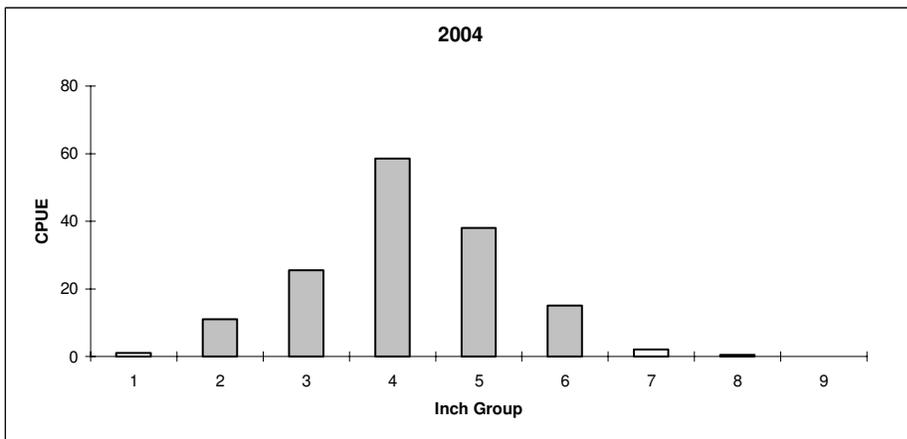
### Bluegill



Effort = 2.0  
 Total CPUE = 209.0  
 Stock CPUE = 179.5  
 PSD = 7  
 RSD-P = 0



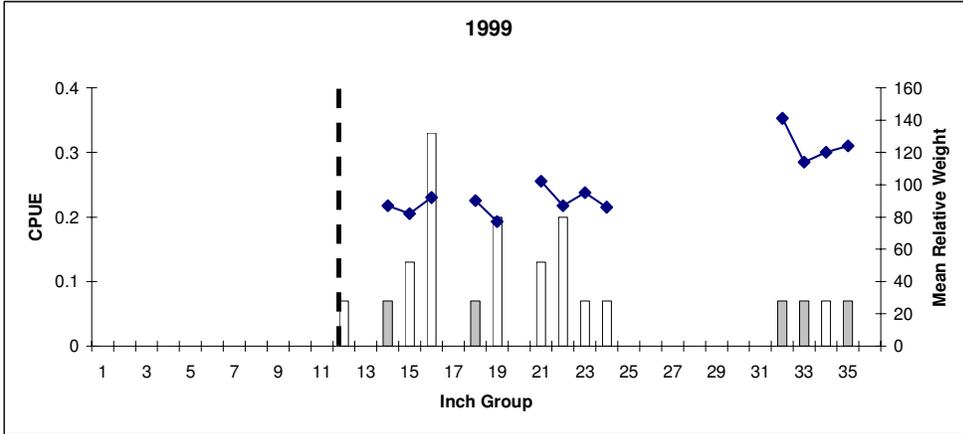
Effort = 2.0  
 Total CPUE = 165.5  
 Stock CPUE = 137.5  
 PSD = 16  
 RSD-P = 0



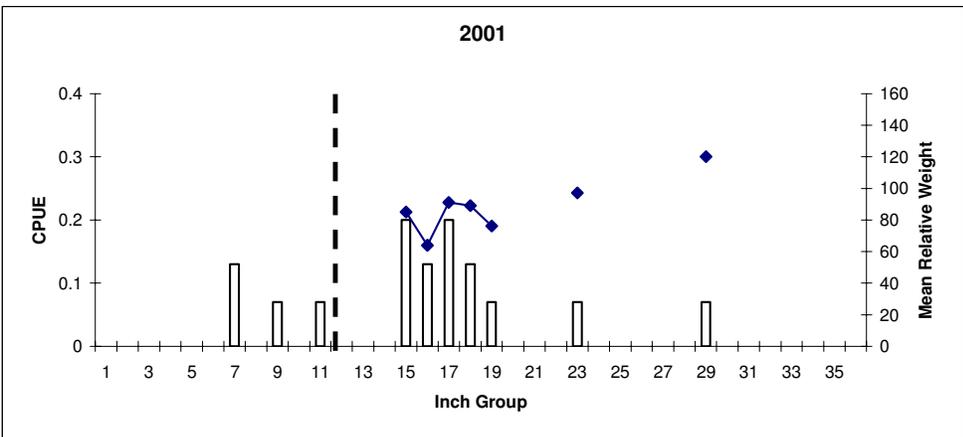
Effort = 2.0  
 Total CPUE = 151.5  
 Stock CPUE = 139.5  
 PSD = 13  
 RSD-P = 0

Comparison of the number of bluegill caught per hour (CPUE, bars) and population indices for electrofishing surveys, Texoma Reservoir, Texas-Oklahoma, September-October 1999 and October 2000 and 2004.

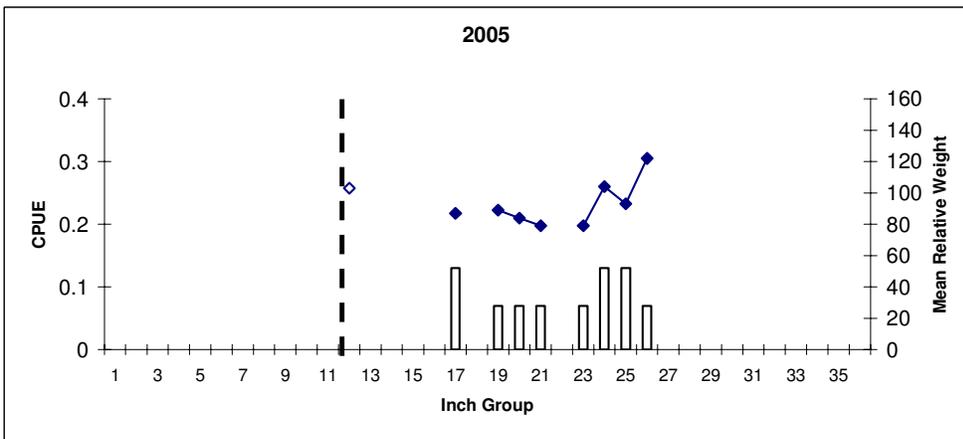
### Blue Catfish



Effort = 15  
 Total CPUE = 1.6  
 Stock CPUE = 1.6  
 PSD = 46  
 RSD-P = 17



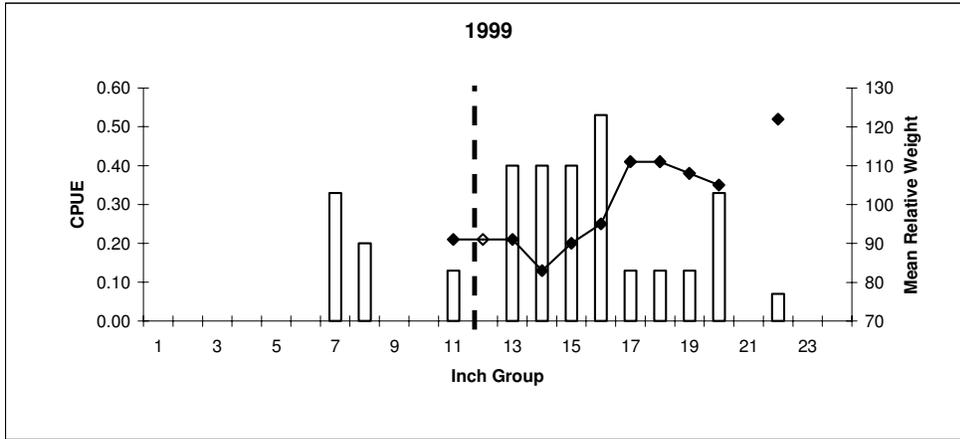
Effort = 15  
 Total CPUE = 1.1  
 Stock CPUE = 0.9  
 PSD = 15  
 RSD-P = 0



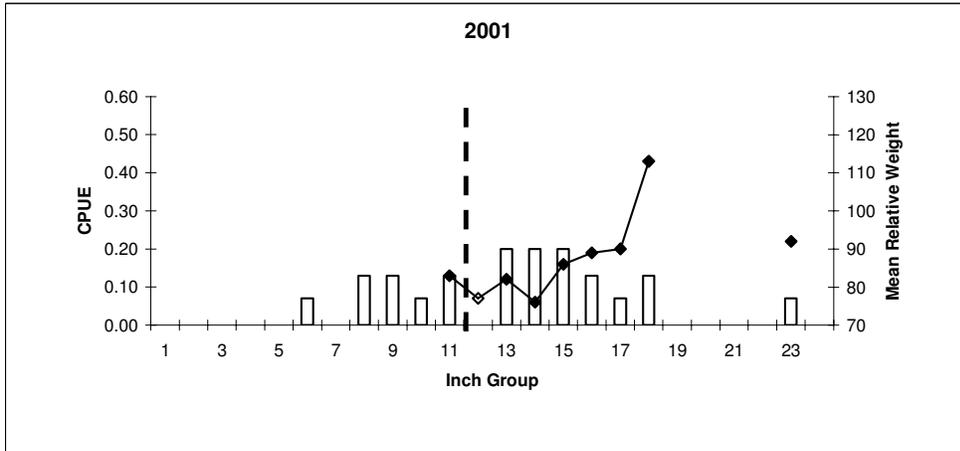
Effort = 15  
 Total CPUE = 0.8  
 Stock CPUE = 0.8  
 PSD = 67  
 RSD-P = 0

Comparison of the number of blue catfish caught per net night (CPUE, bars), mean relative weight (lines), and population indices for gill net collections, Texoma Reservoir, Texas-Oklahoma, May 1999, 2001, and 2005. Dashed lines indicate length limit at time of sample collection.

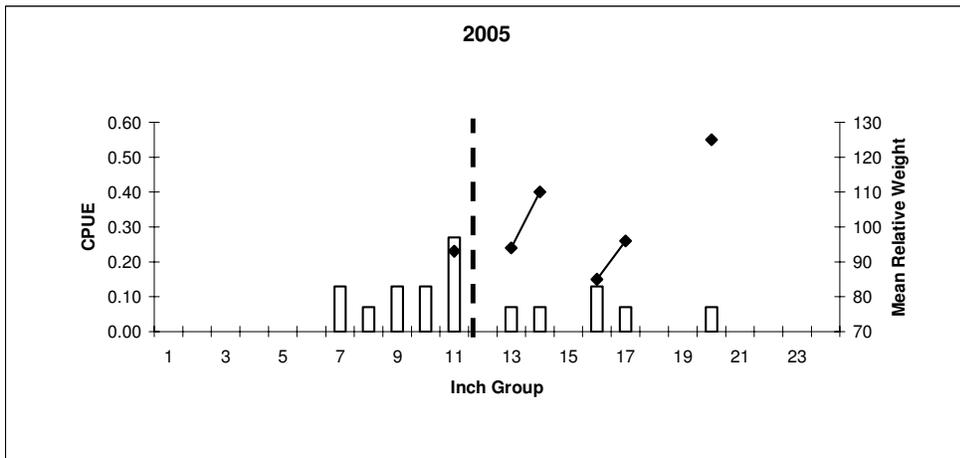
### Channel Catfish



Effort = 15  
 Total CPUE = 3.5  
 Stock CPUE = 3.0  
 PSD = 45  
 RSD-P = 0



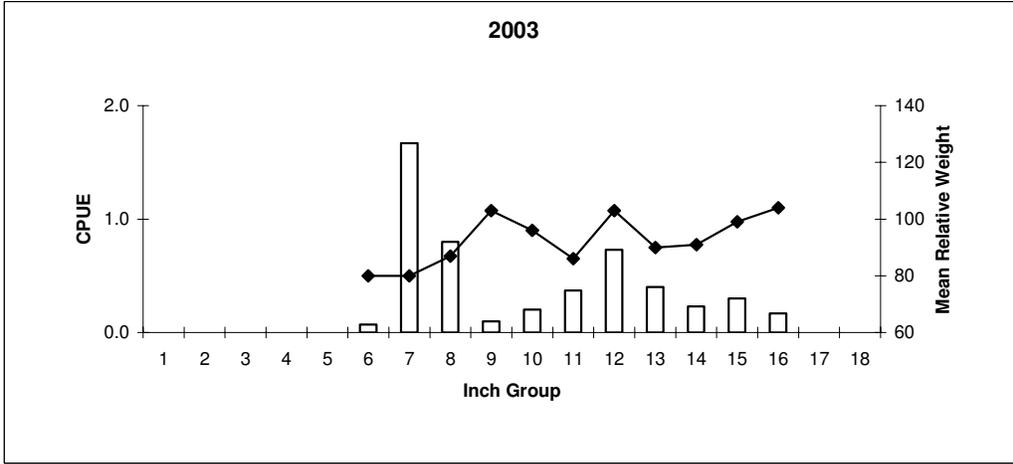
Effort = 15  
 Total CPUE = 1.7  
 Stock CPUE = 1.3  
 PSD = 30  
 RSD-P = 0



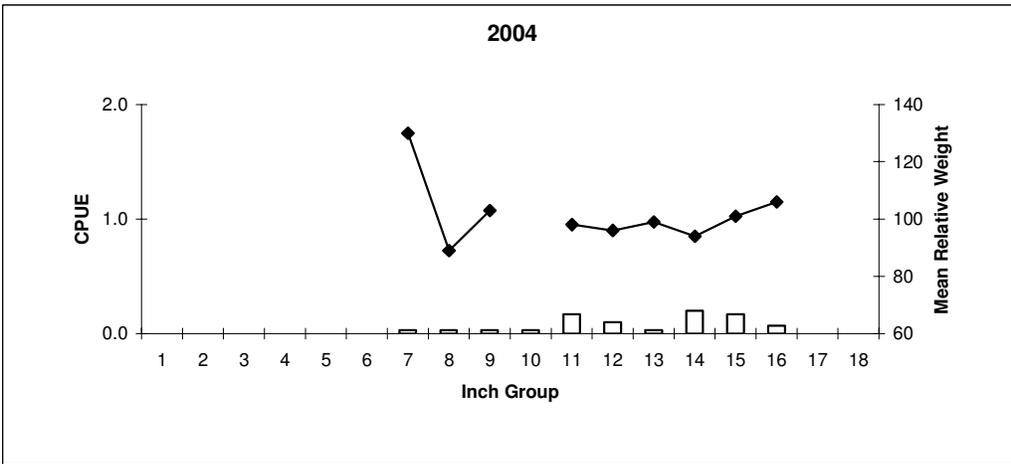
Effort = 15  
 Total CPUE = 1.1  
 Stock CPUE = 0.7  
 PSD = 40  
 RSD-P = 0

Comparison of the number of channel catfish caught per net night (CPUE, bars), mean relative weight (lines), and population indices for gill net collections, Texoma Reservoir, Texas-Oklahoma, May 1999, 2001, and 2005. Dashed lines indicate length limit at time of sample collection.

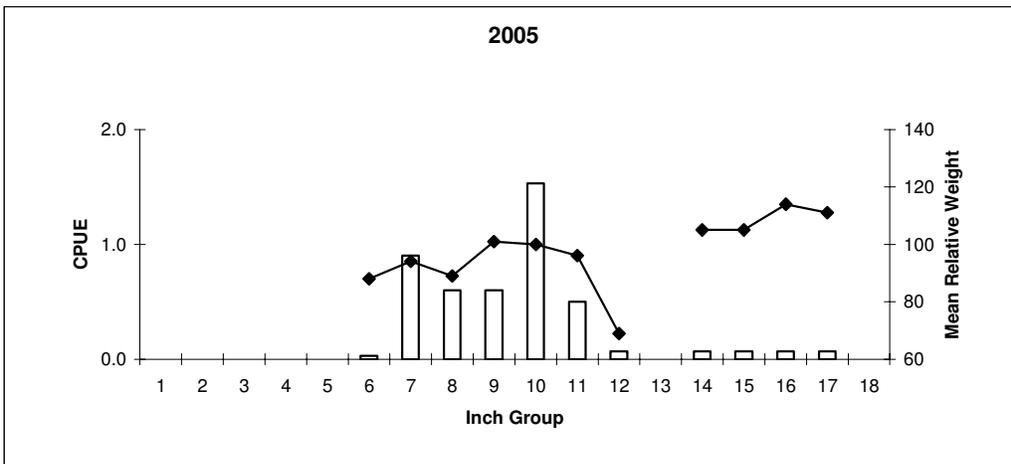
### White Bass



Effort = 30  
 Total CPUE = 5.0  
 Stock CPUE = 5.0  
 PSD = 50  
 RSD-P = 36



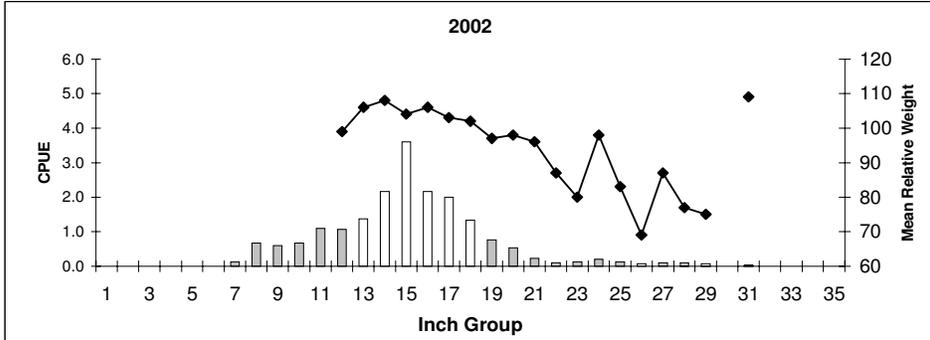
Effort = 30  
 Total CPUE = 0.9  
 Stock CPUE = 0.9  
 PSD = 92  
 RSD-P = 65



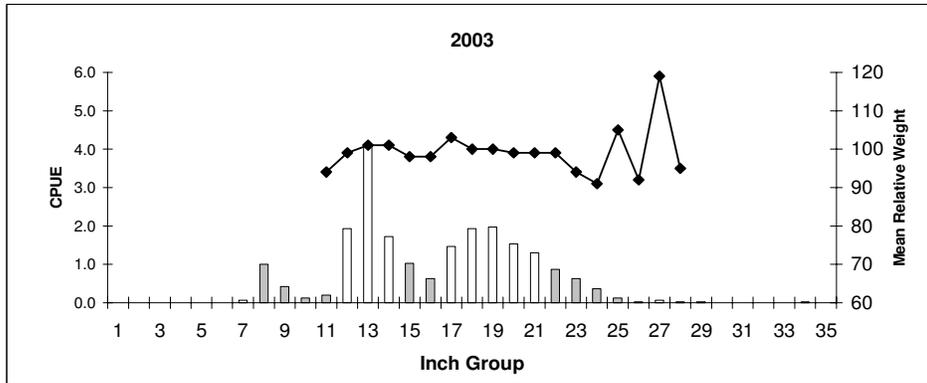
Effort = 30  
 Total CPUE = 4.5  
 Stock CPUE = 4.5  
 PSD = 66  
 RSD-P = 7

Comparison of the number of white bass caught per net night (CPUE, bars), mean relative weight (lines), and population indices for gill net collections, Texoma Reservoir, Texas-Oklahoma, May 2003, 2004, and 2005.

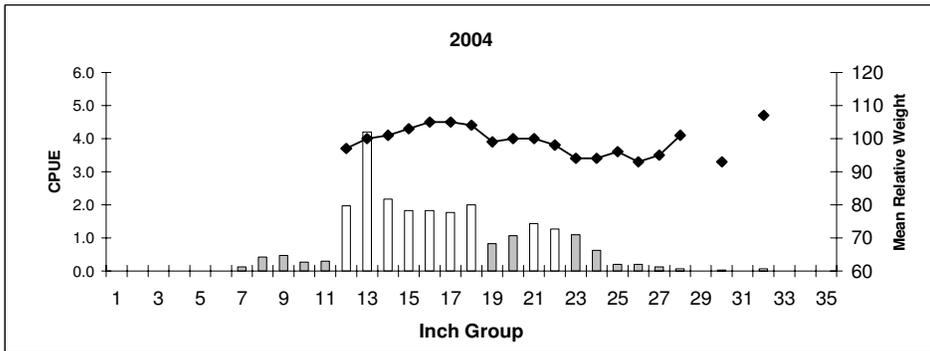
### Striped Bass



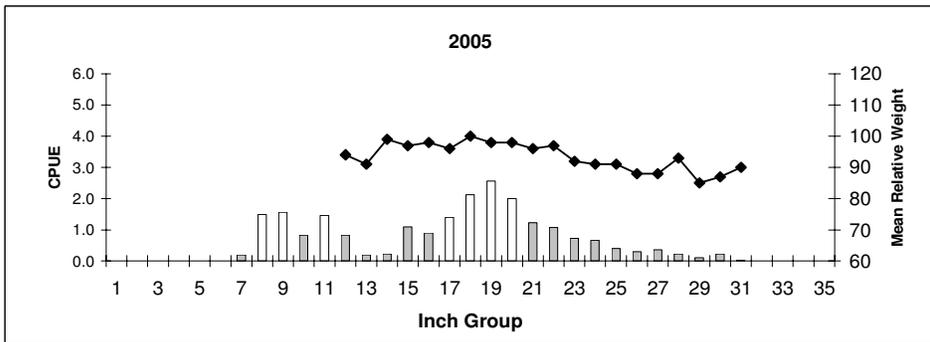
Effort = 30  
 Total CPUE = 19.3  
 Stock CPUE = 16.2  
 PSD = 11  
 RSD-P = 0



Effort = 30  
 Total CPUE = 21.7  
 Stock CPUE = 19.9  
 PSD = 25  
 RSD-P = 0



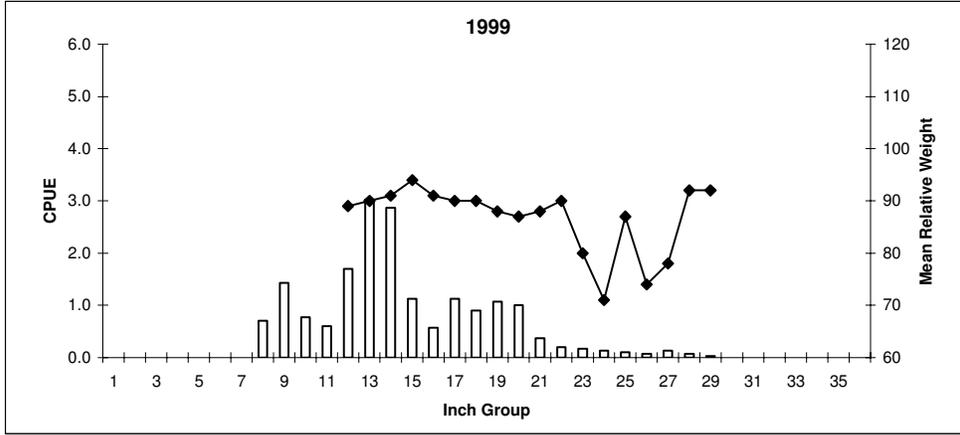
Effort = 30  
 Total CPUE = 24.4  
 Stock CPUE = 22.8  
 PSD = 27  
 RSD-P = 0



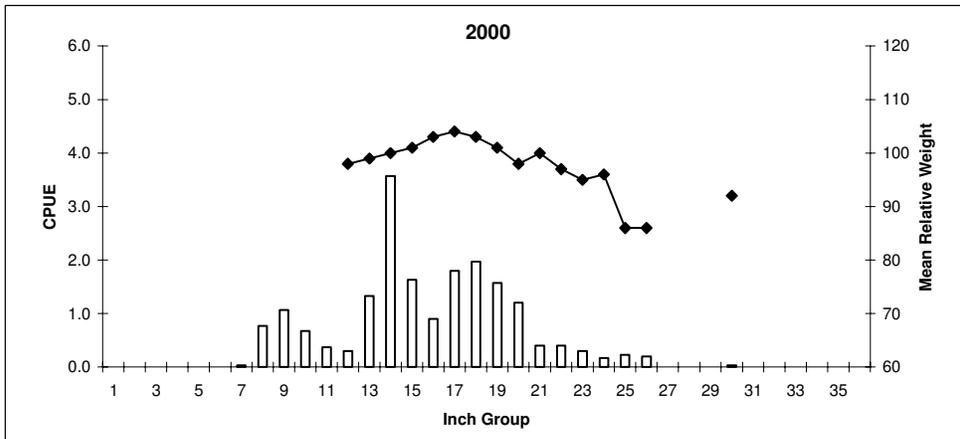
Effort = 30  
 Total CPUE = 22.3  
 Stock CPUE = 16.7  
 PSD = 44  
 RSD-P = 2

Number of striped bass caught per net night (CPUE, bars), mean relative weight (lines), and population indices for gill net collections, Texoma Reservoir, Texas-Oklahoma, February 2002-2005.

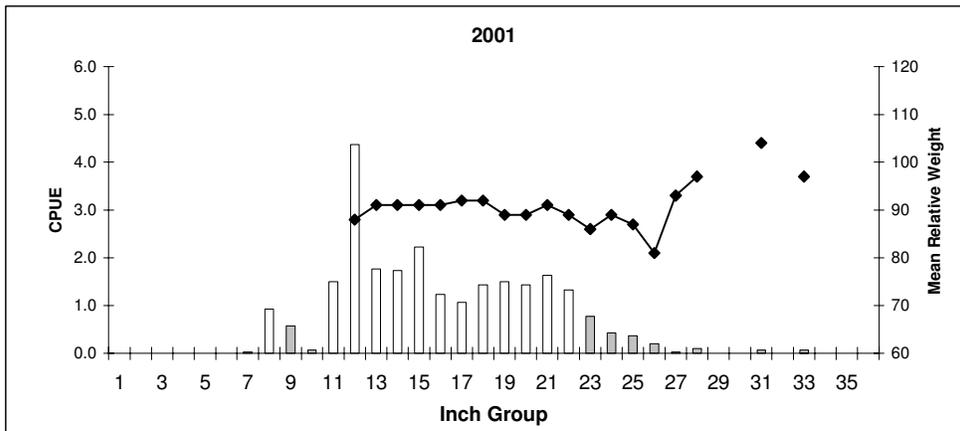
### Striped Bass



Effort = 30  
 Total CPUE = 18.2  
 Stock CPUE = 14.7  
 PSD = 15  
 RSD-P = 0



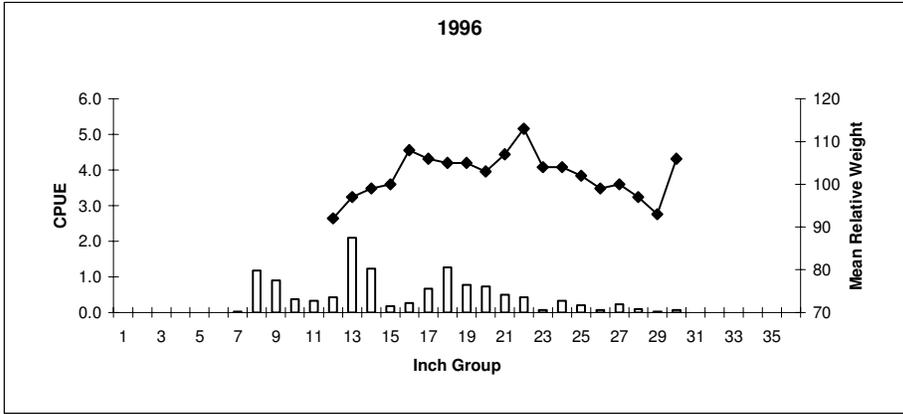
Effort = 30  
 Total CPUE = 18.9  
 Stock CPUE = 16.0  
 PSD = 18  
 RSD-P = 0



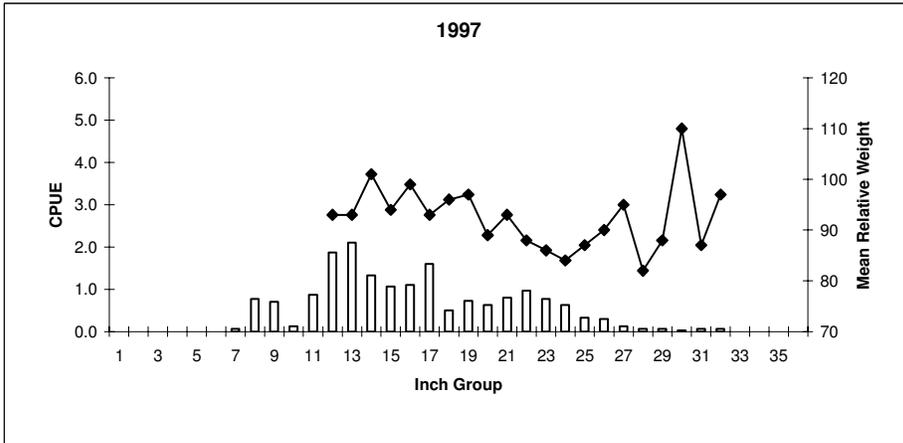
Effort = 30  
 Total CPUE = 24.9  
 Stock CPUE = 21.8  
 PSD = 30  
 RSD-P = 1

Number of striped bass caught per net night (CPUE, bars), mean relative weight (lines), and population indices for gill net collections, Texoma Reservoir, Texas-Oklahoma, February 1999 -2001.

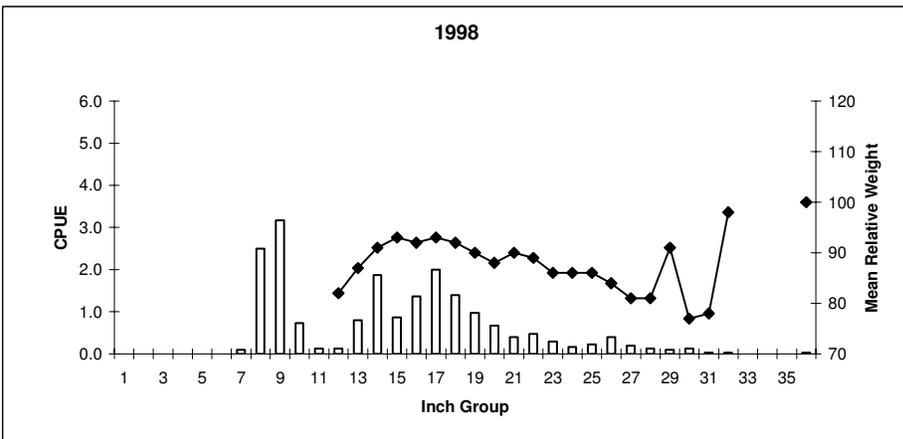
### Striped Bass



Effort = 30  
 Total CPUE = 12.5  
 Stock CPUE = 9.7  
 PSD = 29  
 RSD-P = 1



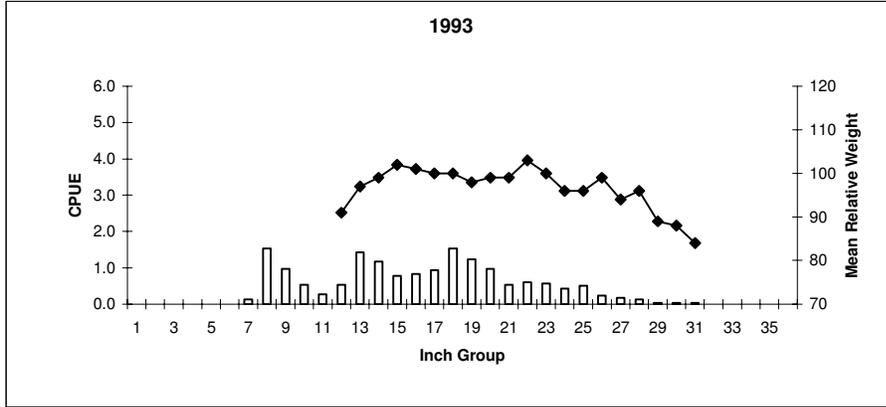
Effort = 30  
 Total CPUE = 17.7  
 Stock CPUE = 15.2  
 PSD = 32  
 RSD-P = 1



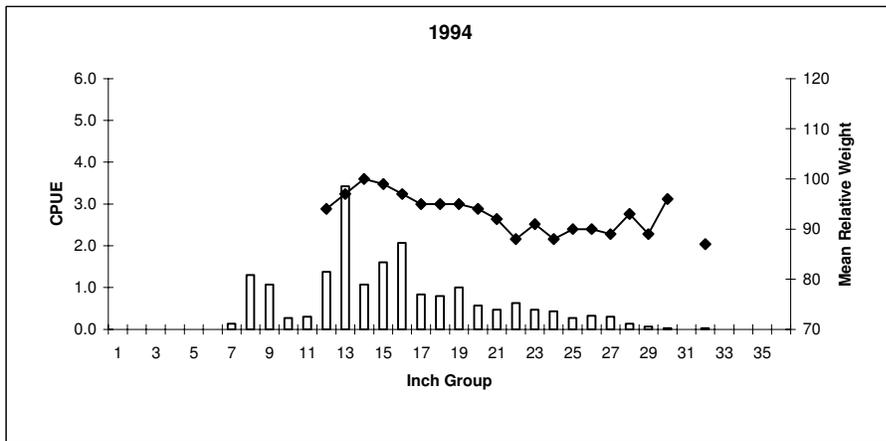
Effort = 30  
 Total CPUE = 19.3  
 Stock CPUE = 12.7  
 PSD = 26  
 RSD-P = 2

Comparison of the number of striped bass caught per net night (CPUE, bars), mean relative weight (lines), and population indices for gill net collections, Texoma Reservoir, Texas-Oklahoma, February 1996-1998.

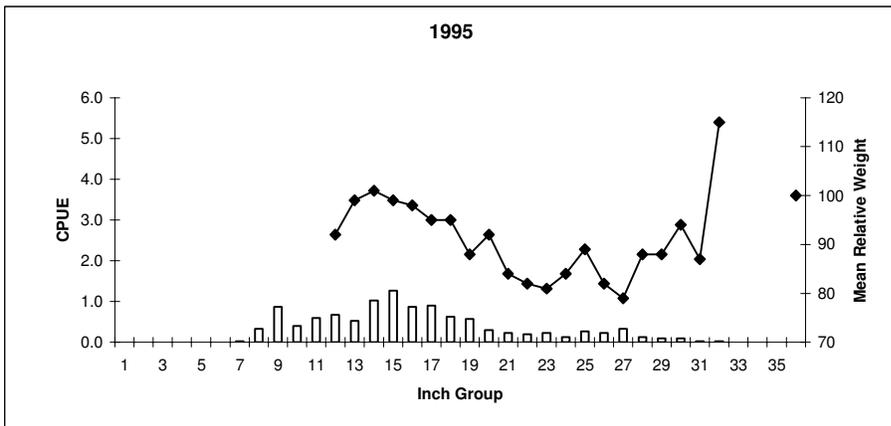
### Striped Bass



Effort = 30  
 Total CPUE = 16.1  
 Stock CPUE = 12.7  
 PSD = 33  
 RSD-P = 1



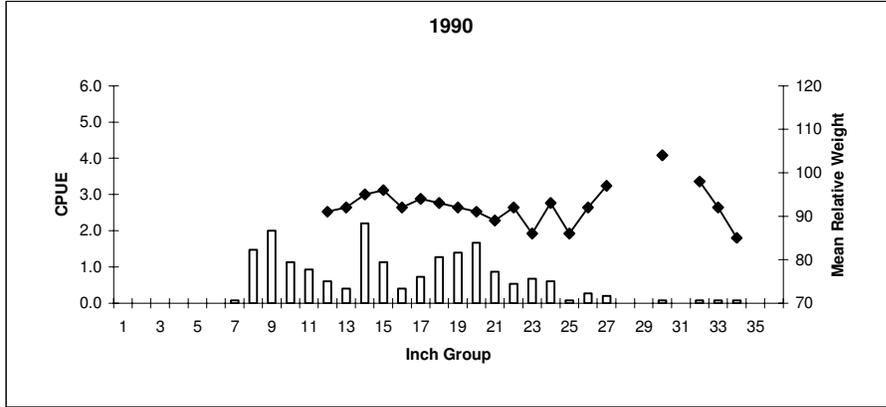
Effort = 30  
 Total CPUE = 19.0  
 Stock CPUE = 15.9  
 PSD = 23  
 RSD-P = 0



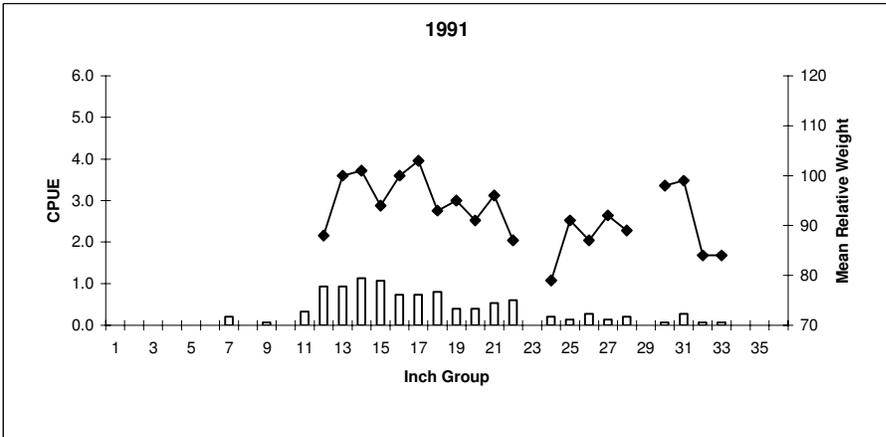
Effort = 30  
 Total CPUE = 11.0  
 Stock CPUE = 8.8  
 PSD = 27  
 RSD-P = 2

Comparison of the number of striped bass caught per net night (CPUE, bars), mean relative weight (lines), and population indices for gill net collections, Texoma Reservoir, Texas-Oklahoma, February 1993-1995.

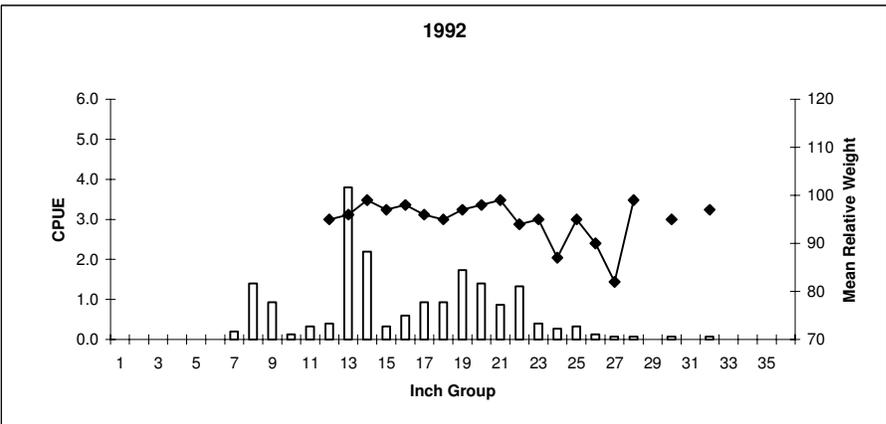
### Striped Bass



Effort = 15  
 Total CPUE = 18.9  
 Stock CPUE = 13.3  
 PSD = 39  
 RSD-P = 2



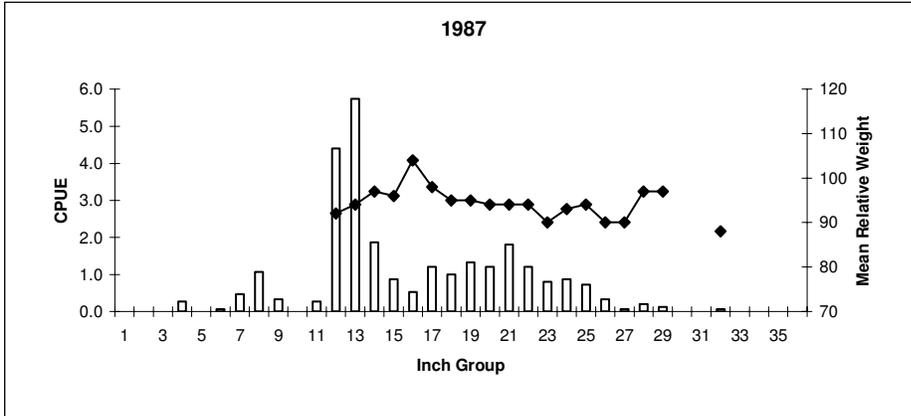
Effort = 15  
 Total CPUE = 10.3  
 Stock CPUE = 9.7  
 PSD = 30  
 RSD-P = 5



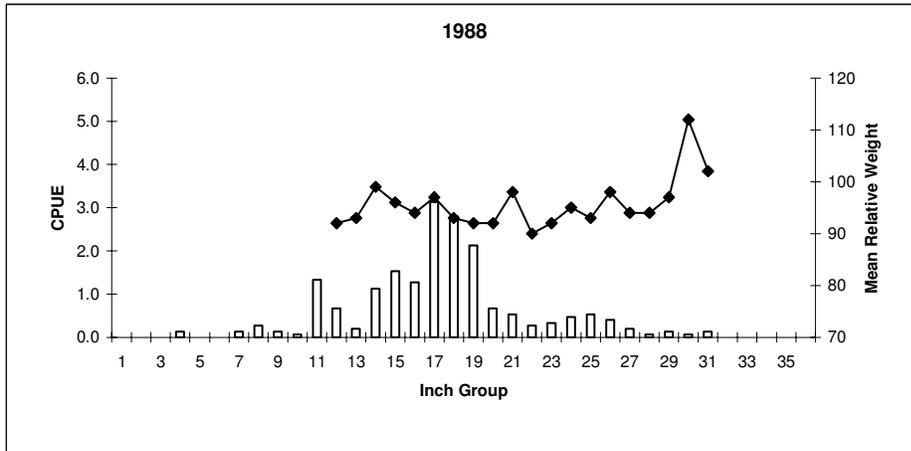
Effort = 15  
 Total CPUE = 18.9  
 Stock CPUE = 15.9  
 PSD = 31  
 RSD-P = 1

Comparison of the number of striped bass caught per net night (CPUE, bars), mean relative weight (lines), and population indices for gill net collections, Texoma Reservoir, Texas-Oklahoma, February 1990-1992.

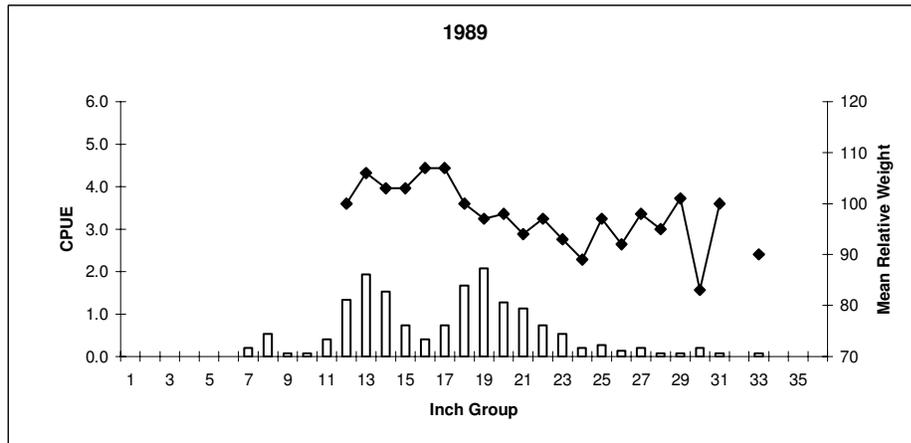
### Striped Bass



Effort = 15  
 Total CPUE = 26.8  
 Stock CPUE = 24.3  
 PSD = 30  
 RSD-P = 0



Effort = 15  
 Total CPUE = 18.7  
 Stock CPUE = 16.7  
 PSD = 23  
 RSD-P = 1



Effort = 15  
 Total CPUE = 16.6  
 Stock CPUE = 15.3  
 PSD = 32  
 RSD-P = 2

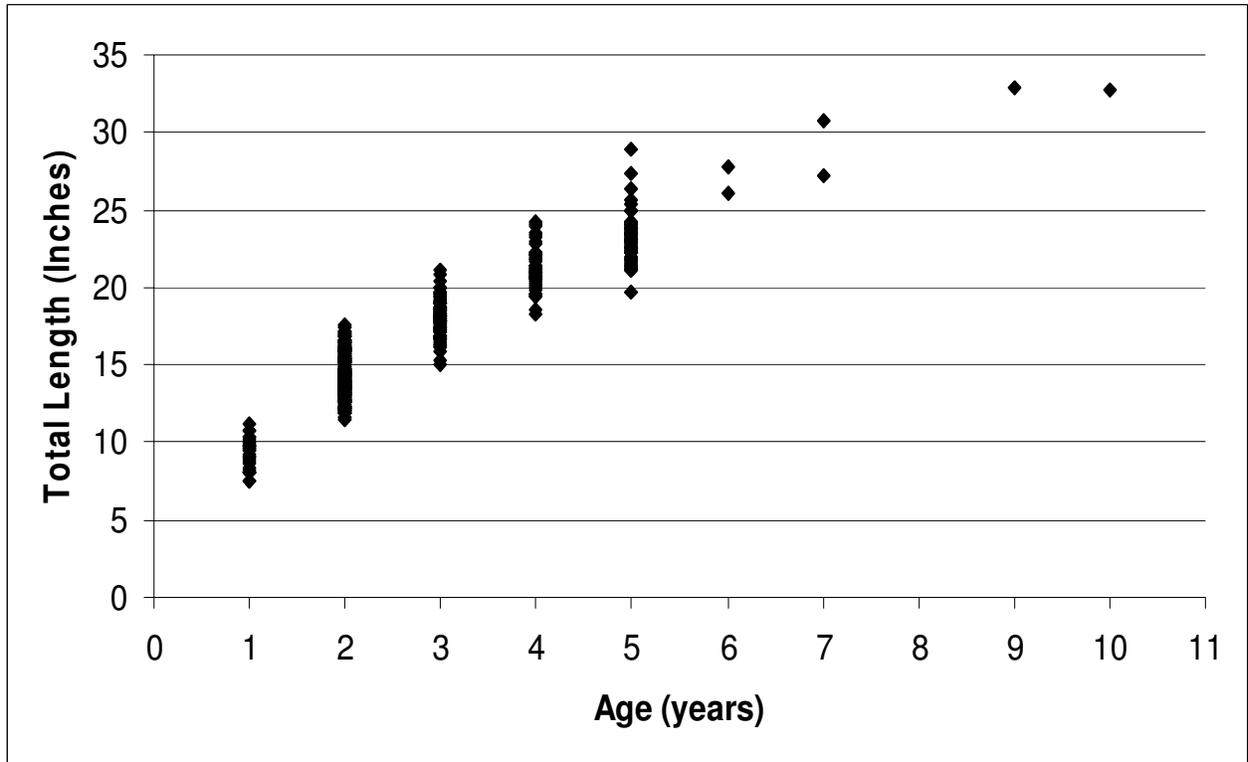
Comparison of the number of striped bass caught per net night (CPUE, bars), mean relative weight (lines), and population indices for gill net collections, Texoma Reservoir, Texas-Oklahoma, February 1987-1989.

Age and average length at capture for striped bass (sexes combined) collected by gill netting, Lake Texoma, Texas-Oklahoma, spring 1996-2001, 2003, and 2004. Otoliths were used for aging. Sample sizes are in parentheses.

Year	Length (inches) at age									
	1	2	3	4	5	6	7	8	9	10
1996	11.7 (8)	15.9 (13)	18.9 (20)	27.7 (9)						
1997	12.6 (42)	15.5 (34)	21.2 (29)	23.6 (9)	26.9 (6)		29.8 (1)			
1998	9.1 (16)	14.0 (12)	18.1 (17)	20.5 (8)	26.3 (18)	27.2 (8)	29.1 (2)	36.8 (1)		
1999		14.0 (20)	17.5 (15)	20.7 (17)	22.6 (4)	25.4 (7)	28.0 (1)			
2000	10.4 (15)	14.3 (45)	18.5 (49)	21.4 (8)	24.1 (13)	23.5 (1)	30.4 (1)			
2001	8.7 (6)	14.3 (51)	18.7 (12)	21.8 (35)	22.8 (6)	25.2 (3)	29.0 (3)		33.7 (1)	
2003 <sup>a</sup>	10.1 (10)	13.7 (223)	18.1 (129)	21.0 (150)	23.2 (16)	25.9 (8)				
2004 <sup>b</sup>	9.3 (31)	14.1 (264)	18.0 (125)	21.2 (51)	23.2 (49)	27.0 (2)	29.0 (2)		32.9 (1)	32.7 (1)

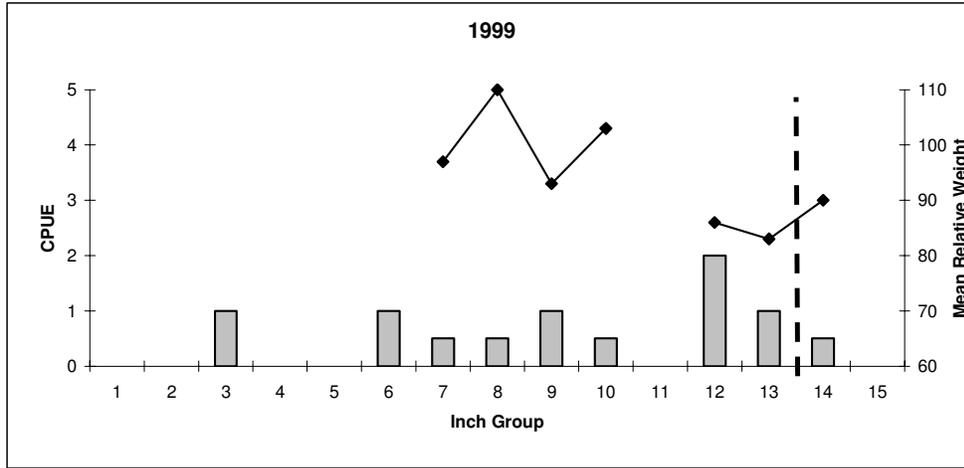
<sup>a</sup> Combined data from TPWD and ODWC.

<sup>b</sup> Data collected by ODWC.

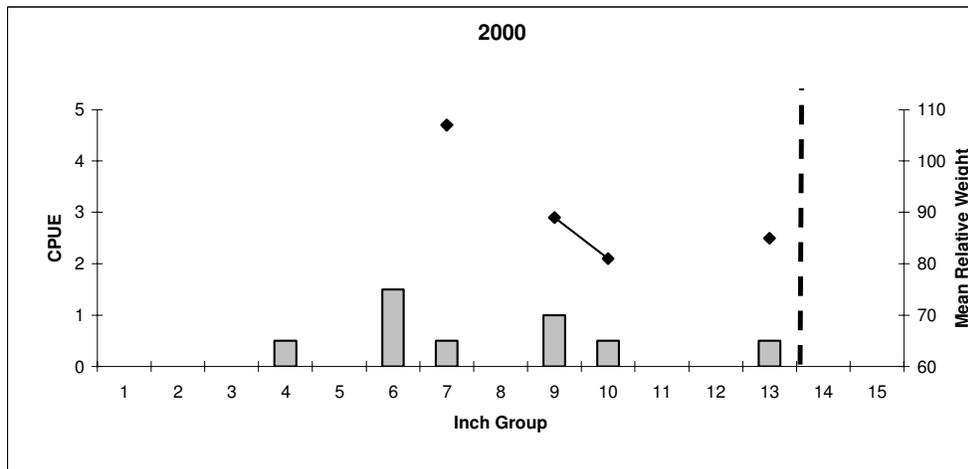


Age distribution of striped bass from 7.5 to 32.9 inches (N=526) collected from a winter gill survey, Texoma Reservoir, Texas-Oklahoma, 2004. Data provided by Oklahoma Department of Wildlife Conservation.

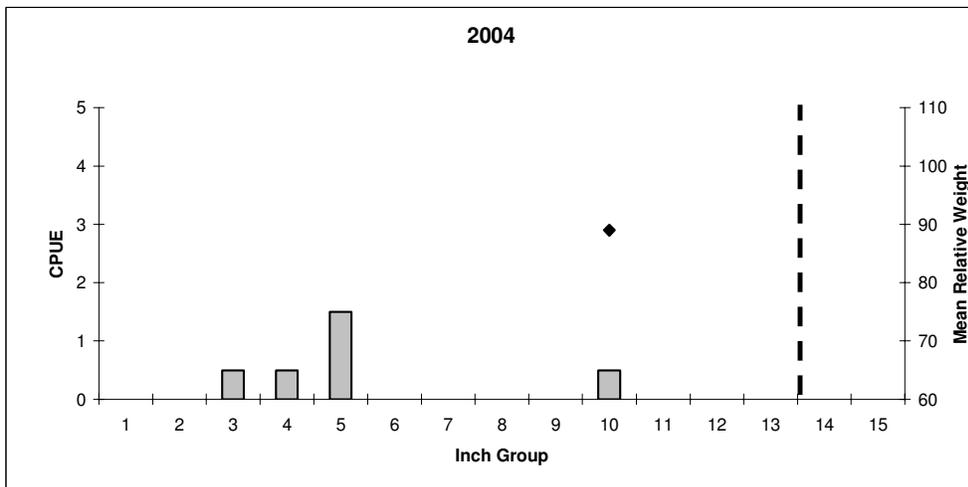
### Smallmouth Bass



Effort = 2.0  
 Total CPUE = 8.0  
 Stock CPUE = 6.0  
 PSD = 58  
 RSD-P = 8



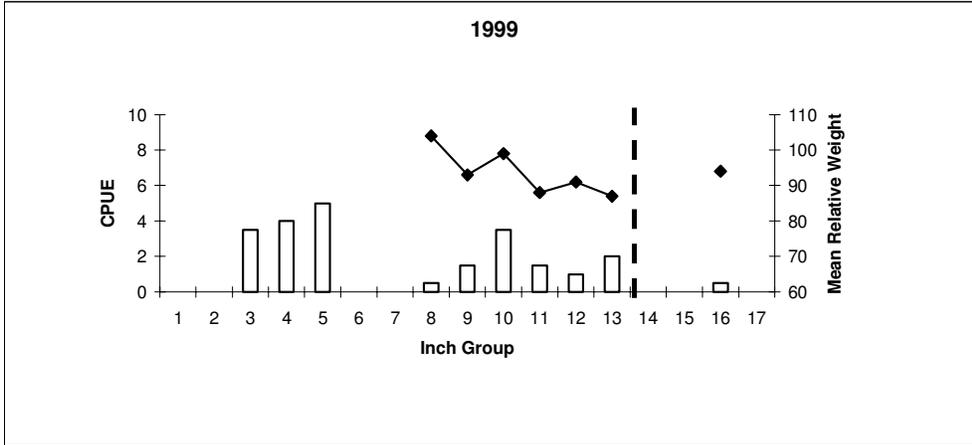
Effort = 2.0  
 Total CPUE = 4.5  
 Stock CPUE = 2.5  
 PSD = 20  
 RSD-P = 0



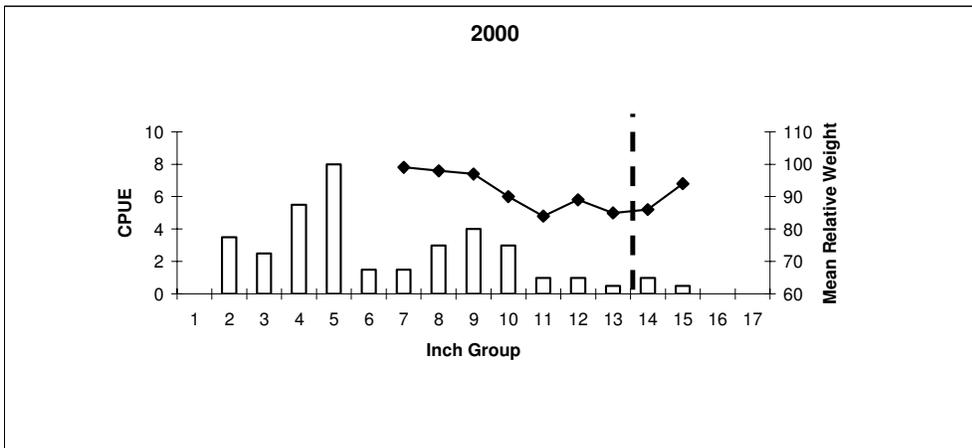
Effort = 2.0  
 Total CPUE = 3.5  
 Stock CPUE = 0.5  
 PSD = 0  
 RSD-P = 0

Comparison of the number of smallmouth bass caught per hour (CPUE, bars), mean relative weight (lines), and population indices for electrofishing surveys, Texoma Reservoir, Texas-Oklahoma, October 1999, 2000 and 2004. Dashed lines indicate length limit at time of sample collection.

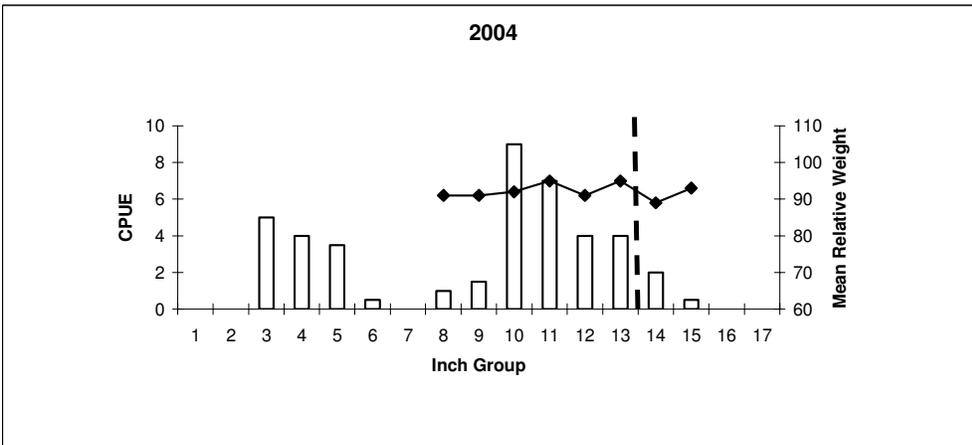
### Spotted Bass



Effort = 2.0  
 Total CPUE = 23.0  
 Stock CPUE = 10.5  
 PSD = 48  
 RSD-P = 5



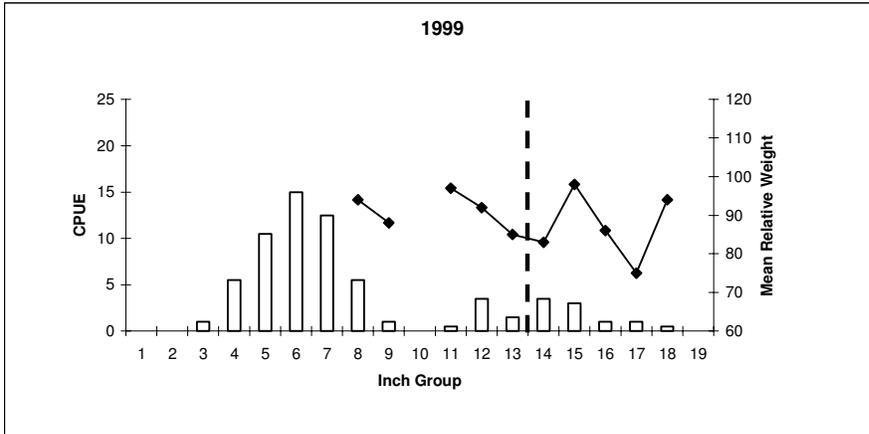
Effort = 2.0  
 Total CPUE = 36.5  
 Stock CPUE = 15.5  
 PSD = 26  
 RSD-P = 10



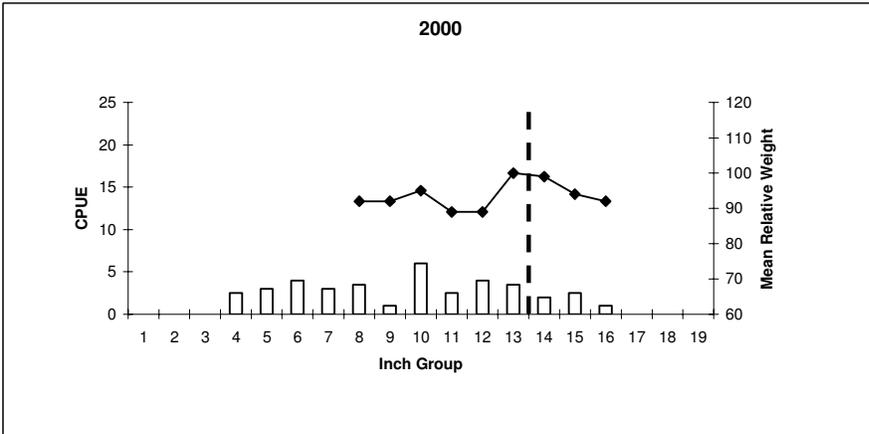
Effort = 2.0  
 Total CPUE = 42.0  
 Stock CPUE = 29.0  
 PSD = 60  
 RSD-P = 9

Comparison of the number of spotted bass caught per hour (CPUE, bars), mean relative weight (lines), and population indices for electrofishing surveys, Texoma Reservoir, Texas-Oklahoma, September-October 1999, and October 2000 and 2004. Dashed lines indicate length limit at time of sample collection.

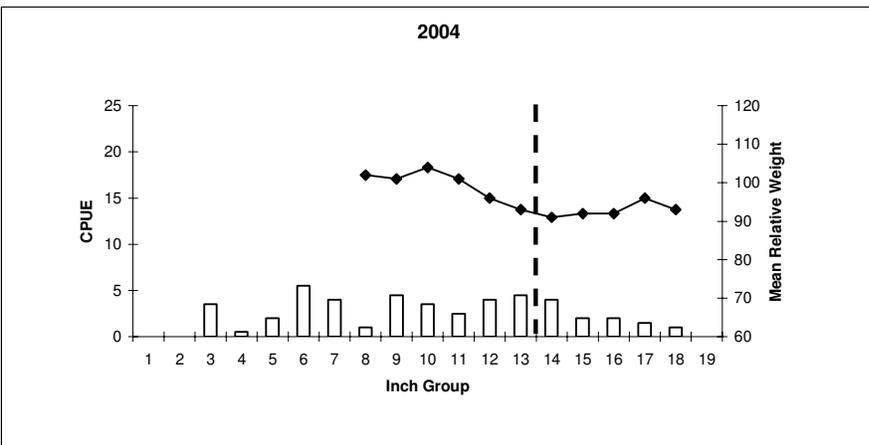
### Largemouth Bass



Effort = 2.0  
 Total CPUE = 65.5  
 Stock CPUE = 21.0  
 PSD = 67  
 RSD-P = 26  
 %FLMB ALLELES = 20.0  
 %FLMB = 9.4



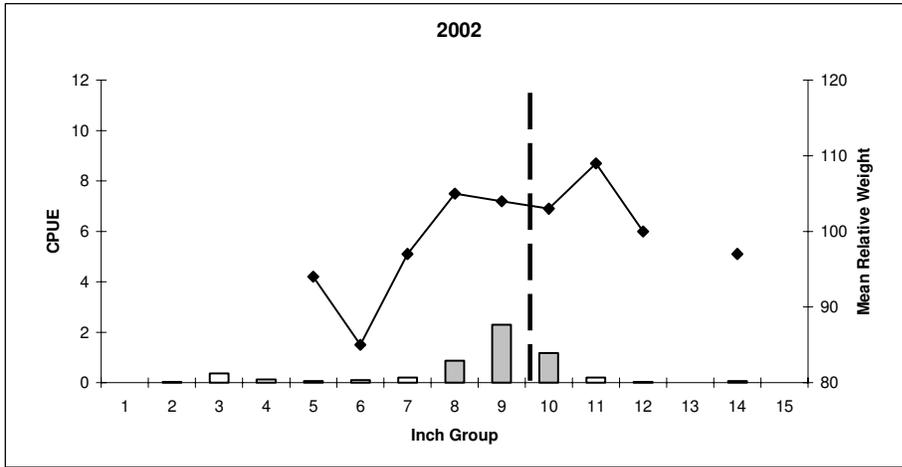
Effort = 2.0  
 Total CPUE = 38.5  
 Stock CPUE = 26.0  
 PSD = 50  
 RSD-P = 13  
 %FLMB ALLELES = 30.3  
 %FLMB = 15.1



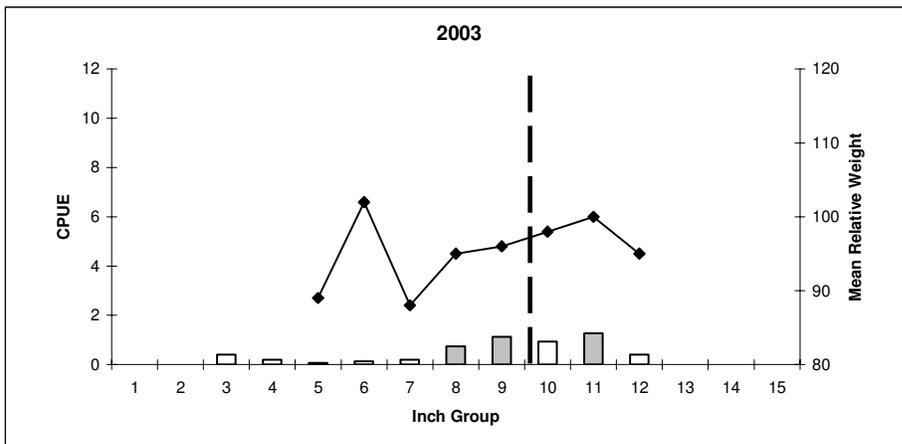
Effort = 2.0  
 Total CPUE = 46.0  
 Stock CPUE = 30.5  
 PSD = 62  
 RSD-P = 21  
 %FLMB ALLELES = 17.6  
 %FLMB = 0

Comparison of the number of largemouth bass caught per hour (CPUE, bars), mean relative weight (lines), and population indices for electrofishing surveys, Texoma Reservoir, Texas-Oklahoma, September-October 1999 and October 2000 and 2004. "%FLMB ALLELES" equals percent of Florida bass alleles in a sample of the largemouth bass population. "%FLMB" equals percent of pure Florida bass in a sample of the largemouth bass population. Dashed lines indicate length limit at time of sample collection.

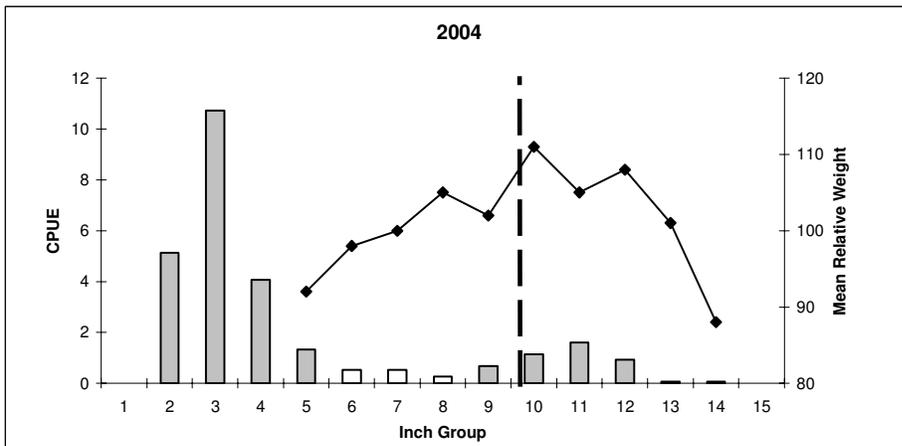
### White Crappie



Effort = 30  
 Total CPUE = 5.5  
 Stock CPUE = 5.0  
 PSD = 93  
 RSD-P = 29



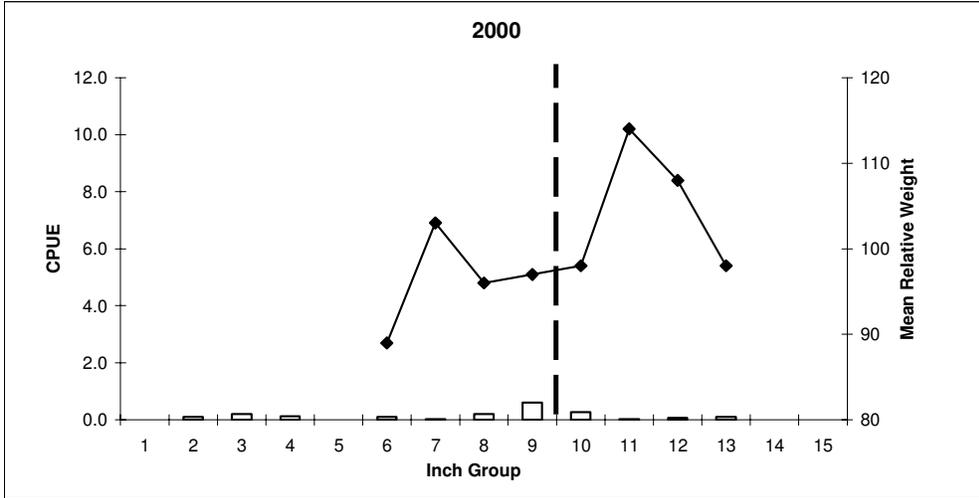
Effort = 15  
 Total CPUE = 5.5  
 Stock CPUE = 4.9  
 PSD = 92  
 RSD-P = 53



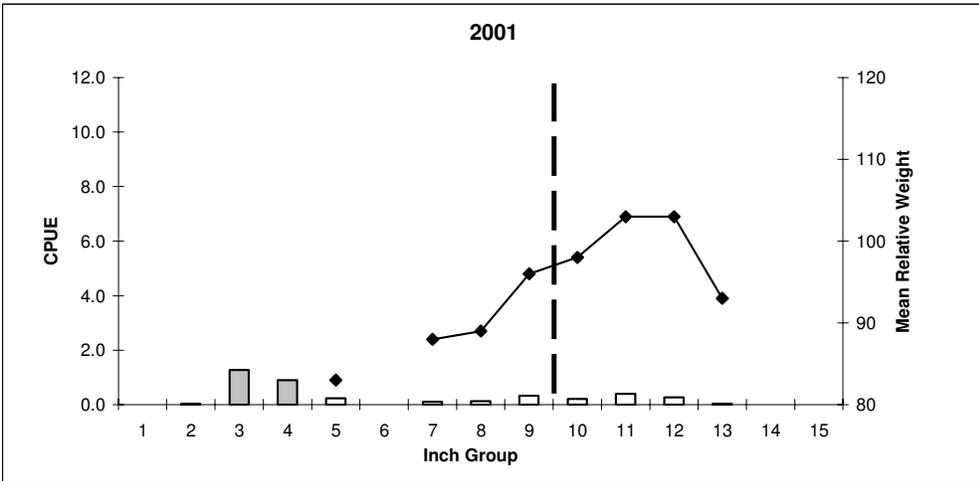
Effort = 15  
 Total CPUE = 27.1  
 Stock CPUE = 7.1  
 PSD = 66  
 RSD-P = 53

Comparison of the number of white crappie caught per net night (CPUE, bars), mean relative weight (lines), and population indices for trap net surveys, Texoma Reservoir, Texas-Oklahoma, December 2002, November-December 2003, and December 2004. Dashed lines indicate length limit at time of sample collection.

### White Crappie



Effort = 30  
 Total CPUE = 1.8  
 Stock CPUE = 1.4  
 PSD = 90  
 RSD-P = 33



Effort = 30  
 Total CPUE = 3.9  
 Stock CPUE = 1.7  
 PSD = 80  
 RSD-P = 53

Comparison of the number of white crappie caught per net night (CPUE, bars), mean relative weight (lines), and population indices for trap net surveys, Texoma Reservoir, Texas-Oklahoma, December 2000, and November-December 2001. Dashed lines indicate length limit at time of sample collection.

## FISHERIES MANAGEMENT PLAN FOR TEXOMA RESERVOIR, TEXAS-OKLAHOMA

Prepared –July 2005.

- |                       |   |
|-----------------------|---|
| Issue 1               | <p>Texoma Reservoir supports a popular and valuable striped bass fishery that contributes over \$22 million annually to the local economy (Schoor et al. 1995). Fisheries managers in Texas and Oklahoma need to monitor this important fishery annually.</p>   |
| Management Strategies | <ol style="list-style-type: none"> <li>1. Conduct annual gill net surveys at 30 established stations. Oklahoma Department Wildlife Conservation (ODWC) personnel will conduct gill net surveys at 15 stations on the Oklahoma side of the reservoir while Texas Parks and Wildlife Department (TPWD) personnel will conduct gill net surveys at 15 stations on the Texas side.</li> <br/> <li>2. Resulting data will be shared, analyzed, and presented at a regularly scheduled meeting of TPWD and ODWC to discuss fisheries management on Texoma Reservoir.</li> </ol> |
| Issue 2               | <p>Golden alga, <i>Prymnesium parvum</i> was discovered in Texoma Reservoir in January 2004. A fish kill occurred in the Lebanon Pool and in March 2004 a fish kill occurred near Highport Marina. Evidence of golden alga disappeared by the end of March 2004. Although golden alga cells and toxin were discovered again in the fall and winter of 2004 and 2005 and in a much larger area of the reservoir, no fish kill occurred.</p>  |
| Management Strategies | <ol style="list-style-type: none"> <li>1. Monitor the golden alga/toxin through water samples collected from October through March, 2005 through 2009.</li> <br/> <li>2. Establish a protocol with ODWC for collecting and transporting water samples to TPWD laboratories in Waco and San Marcos, TX.</li> <br/> <li>3. Investigate fish kills suspected to have been caused by golden alga as appropriate.</li> <br/> <li>4. Attend work sessions related to golden alga.</li> </ol>  |

Issue 3	The decline in the electrofishing catch rate of smallmouth bass may be a result of random sample site selection bypassing smallmouth bass habitat.
Management Strategy	Conduct additional electrofishing for smallmouth bass during the fall of 2005 targeting smallmouth bass habitat.
Issue 4	Despite evidence that the largemouth bass population in this reservoir continues to produce a viable fishery there is concern that recent CPUE's have been only one-half the historic average CPUE.
Management Strategy	Conduct additional electrofishing for largemouth bass during the fall of 2005 targeting more productive largemouth bass habitat.
Issue 5	Changes in existing recreational opportunities need to be communicated to the public.
Management Strategy	Updating the Texoma Reservoir (Lake Texoma) web page on the TPWD web site with current information will be ongoing.

## Appendix A:

Number (N) and catch rate (CPUE) of all species collected from all gear types from Texoma Reservoir, Texas-Oklahoma, 2004-2005. Gill net and trap net CPUE is the number of fish per net night, while electrofisher CPUE is the number of fish per hour. Only targeted species were recorded from electrofishing.

Species	Gill Net February 2004		Gill Net February 2005		Gill Net May 2005		Trap Net 2004		Electrofishing 2004	
	N	CPUE	N	CPUE	N	CPUE	N	CPUE	N	CPUE
Longnose gar	3	0.1								
Goldeye	90	3.0	24	0.8	2	0.1				
Gizzard shad	249	8.3	342	11.4	161	10.7	147	9.8	443	221.5
Threadfin shad					6	0.4	4.5	0.3	74	37.0
Common carp	3	0.1	6	0.2	2	0.1	2	0.1		
River carpsucker	4	1.3	30	1.0	32	2.1	6	0.4		
Smallmouth buffalo	51	1.7	21	0.7	89	5.9	3	0.2		
Bigmouth buffalo					2	0.1				
Black buffalo					2	0.1				
Spotted Sucker	3	0.1					2	0.1		
Blue catfish	9	0.3	6	0.2	12	0.8				
Channel catfish	54	1.8	48	1.6	17	1.1	2	0.1		
Flathead catfish	3	0.1			3	0.2				
White bass	27	0.9	135	4.5	2	0.1				
Striped bass	732	24.4	669	22.3	140	9.3	8	0.5		
Green Sunfish							2	0.1	35	17.5
Warmouth							3	0.2	5	2.5
Orangespotted sunfish									1	0.5
Bluegill					2	0.1	404	26.9	303	151.5
Longear sunfish							68	4.5	83	41.5
Redear sunfish							5	0.3	15	7.5
Smallmouth bass									6	3.0
Spotted bass	6	0.2	18	0.6					84	42.0
Largemouth bass			3	0.1	3	0.2			77	46.0
White crappie	12	0.4	18	0.6	9	0.6	407	27.1		
Black crappie							3	0.2		
Freshwater drum	9	0.3	3	0.1	11	0.7	53	3.5		

## Appendix B:

Water sample parameters for Texoma Reservoir, Texas-Oklahoma, July 21, 2004. Sample station located at dam site.

Depth (m)	Temp (°C)	D.O. (ppm)	Chlorides (ppm)	Conductivity (µmhos/cm)	Alkalinity (ppm)	Total Dissolved Solids (ppm)	pH
Surface	28.7	7.6	332	1780	101	1157.0	7.3
1.0	28.7	7.5					
2.0	28.7	7.0					
3.0	28.5	6.6					
4.0	28.4	5.8					
5.0	28.4	5.7					
6.0	28.1	4.5					
7.0	27.9	4.3	331	1800	102	1170.0	7.8
8.0	27.5	3.2					
9.0	27.4	2.9	332	1800	104	1170.0	7.8
10.0	27.2	2.4					
11.0	27.1	2.2					
12.0	26.8	1.9					
13.0	26.2	1.7					
14.0	25.7	0.7					
15.0	25.4	0.4					
16.0	24.8	0.2					
17.0	24.6	0.0					
18.0	24.2	0.0					
19.0	23.9	0.0					
20.0	23.6	0.0					
21.0	23.5	0.0					
22.0	23.2	0.0					
23.0	22.4	0.0	333	1818	117	1181.7	7.5

Water sample parameters for Texoma reservoir, Texas-Oklahoma, July 21, 2004. Sample station located at Willis Bridge.

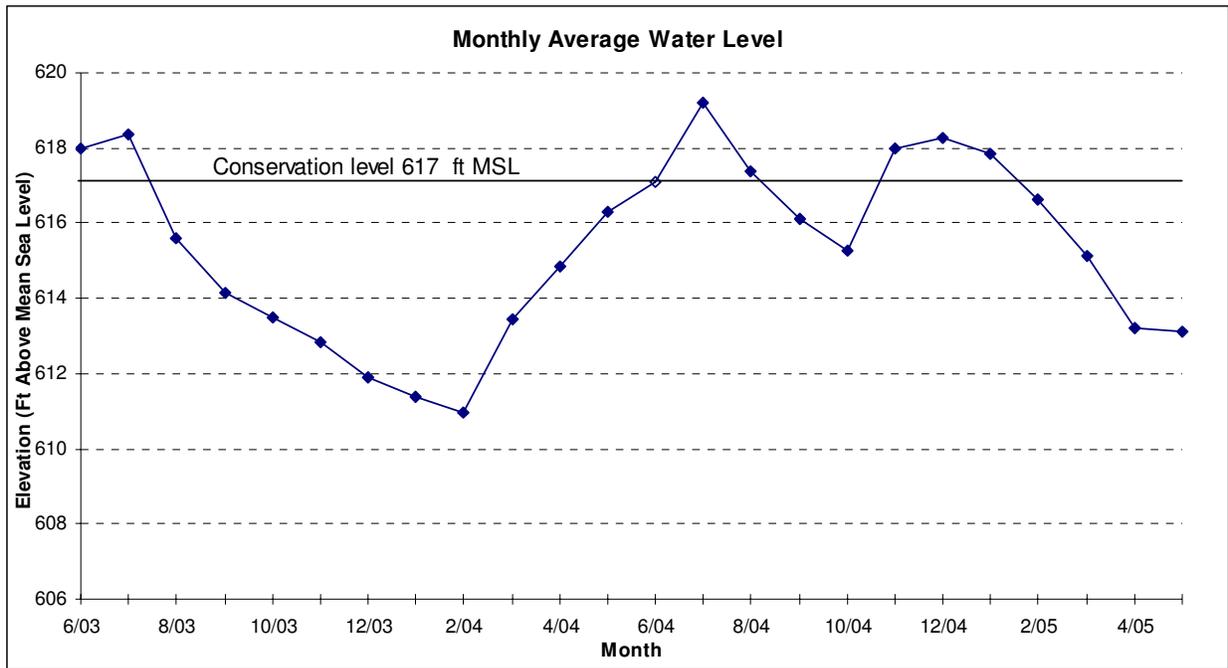
Depth (m)	Temp (°C)	D.O. (ppm)	Chlorides (ppm)	Conductivity (µmhos/cm)	Alkalinity (ppm)	Total Dissolved Solids (ppm)	pH
Surface	30.5	9.3	361	1716	91	1115.4	7.4
1.0	30.5	9.0					
2.0	30.2	8.8					
3.0	29.7	8.3					
4.0	29.6	8.2					
5.0	29.5	7.6					
6.0	29.5	6.5					
7.0	29.4	6.2					
8.0	29.2	5.4					
9.0	29.1	5.0	366	1820	94	1183.0	8.1
10.0	28.5	2.7					
11.0	28.0	2.0	372	1846	100	1199.9	7.9
12.0	27.3	0.2					
13.0	27.1	0.0					
14.0	26.6	0.0					
15.0	26.3	0.0	404	2001	108	1300.6	7.5

## Appendix D:

Water sample parameters for Texoma Reservoir, Texas-Oklahoma, July 21, 2004. Sample station located at Newberry Creek.

Depth (m)	Temp (°C)	D.O. (ppm)	Chlorides (ppm)	Conductivity (µmhos/cm)	Alkalinity (ppm)	Total Dissolved Solids (ppm)	pH
Surface	30.6	10.7	105	878	103	570.7	8.6
1.0	30.4	10.5					
2.0	30.1	9.7					
3.0	30.1	9.5					
4.0	30.1	9.4	100	840	105	546.0	8.5
5.0	29.3	6.3					
6.0	28.6	3.5	105	923	110	600.0	8.3
7.0	28.4	1.7					
8.0	28.2	1.1					
9.0	27.9	0.9					
10.0	27.6	0.2					
11.0	27.2	0.1					
12.0	26.9	0.0					
13.0	26.1	0.0	217	1300	117	845.0	7.3

## Appendix E:



Monthly average water level elevations in feet above mean sea level (MSL) recorded for Texoma Reservoir, Texoma-Oklahoma, June 2003-May 2005.

## Appendix F:

Historical catch rates of targeted species by gear type for Texoma Reservoir, Texas-Oklahoma, 1987 – 1992.

		Year					
		1987 <sub>a b</sub>	1988 <sub>a b</sub>	1989 <sub>b</sub>	1990 <sub>b</sub>	1991 <sub>b</sub>	1992 <sub>b</sub>
Gill Netting <sub>c</sub> Winter; Spring	Blue catfish	0.9; 1.7	0.1; 3.2	0.0; 2.8	0.5	0.7	1.2
	Channel catfish	0.9; 4.2	0.4; 3.8	0.4; 1.9	2.5	1.0	1.1
	Flathead catfish	0.1; 0.3	0.0; 0.5	0.0; 0.1	0.0	0.1	0.0
	White bass	4.2; 1.5	3.0; 1.8	3.0; 2.9	5.1	4.1	9.3
	Striped bass	26.8; 10.5	18.7; 14.0	16.6; 8.1	18.9	10.3	18.9
	Palmetto bass	0.0; 0.0	0.0; 0.0	0.1; 0.0	0.0	0.0	0.0
Electrofishing <sub>d</sub> Spring; Fall	Gizzard shad	54.2; 173.6	290.0; 54.6	348.5; 296.5	358.0	112.0; 188.8	295.6; 141.5
	Threadfin shad	9.8; 1.6	0.4; 6.6	19.0; 15026.5	45.5	46.5; 56.0	103.3; 27.9
	Green sunfish	11.3; 11.2	12.8; 6.9	29.5; 40.0	20.0	17.5; 22.4	19.1; 18.6
	Warmouth	1.8; 3.6	1.6; 2.6	8.5; 7.5	10.5	4.0; 11.2	7.1; 4.4
	Orangespotted sunfish	0.0; 0.4	0.4; 0.4	1.0; 0.0	0.0	0.5; 0.0	1.1; 0.0
	Bluegill sunfish	87.7; 167.2	157.6; 169.1	233; 641.0	459.0	257.5; 548.0	252.5; 268.8
	Longear sunfish	22.9; 35.6	25.2; 40.7	47.0; 118.0	77.0	35.0; 112.0	74.3; 47.5
	Redear sunfish	2.6; 4.0	2.0; 2.2	1.5; 11.0	4.5	5.0; 5.6	3.8; 8.2
	Smallmouth bass	2.6; 1.2	2.4; 1.5	3.5; 14.5	29.0	17.5; 28.0	12.6; 29.5
	Spotted bass	9.1; 17.2	5.2; 17.5	16.5; 24.5	40.5	28.0; 58.4	31.7; 38.2
Trap Netting	Largemouth bass	14.6; 66.0	47.6; 44.4	73.0; 248.5	117.0	62.0; 224.0	92.9; 133.3
	White crappie	2.9	2.2	7.3	6.0	7.8	6.5
	Black crappie	0.1	0.0	0.0	0.1	0.2	<0.1

<sub>a</sub> Electrofishing was conducted with a Coffelt VVP-15 pulsator. Electrofishing in all other years was conducted with a Smith-Root 5.0 GPP (Gas Powered Pulsator).

<sub>b</sub> Electrofishing, gill netting, and trap netting sampling sites were subjectively selected.

<sub>c</sub> Gill netting, 1987 – 1989, was conducted in winter and spring. Gill netting in all other years was conducted in winter.

<sub>d</sub> Electrofishing, 1987 - 1989, 1991, and 1992 was conducted in spring and fall. Electrofishing in 1990 was conducted in fall.

## Appendix G:

Historical catch rates of targeted species by gear type for Texoma Reservoir, Texas-Oklahoma, 1993 – 1999.

		Year						
		1993 <sub>a</sub>	1994 <sub>a</sub>	1995 <sub>a</sub>	1996 <sub>b</sub>	1997 <sub>b</sub>	1998 <sub>b</sub>	1999 <sub>b</sub>
Gill Netting <sub>c</sub> Winter; Spring	Blue catfish	1.3	0.3	1.0	1.3	0.1	0.3; 1.1	0.6; 1.6
	Channel catfish	1.6	1.2	2.1	1.1	0.7	1.1; 1.3	1.8; 3.5
	Flathead catfish	<0.1	0.3	<0.1	0.0	<0.1	0.2; 0.3	<0.1; 0.1
	White bass	8.7	6.1	3.2	11.1	2.6	10.3; 1.3	2.2; 0.9
	Striped bass	16.1	19.0	11.0	12.5	17.7	19.3; 3.3	18.2; 3.1
	Palmetto bass	0.0	<0.1	0.0	0.0	0.0	0.0; 0.0	0.0; 0.0
Electrofishing <sub>d</sub> Spring; Fall	Gizzard shad	215.5; 193.5	211.5; 152.0	134.0	161.5	191.0	204.0	228.0
	Threadfin shad	103.0; 20.5	22.5; 6.0	121.0	3.5	5.5	11.0	35.5
	Green sunfish	10.0; 11.5	48.5; 21.5	13.5	4.0	0.0	17.5	23.0
	Warmouth	1.5; 10.5	10.5; 6.0	3.0	1.0	0.5	1.0	2.5
	Bluegill sunfish	181.5; 259.0	261.0; 295.5	315.0	110.0	127.5	92.5	209.0
	Longear sunfish	17.0; 38.5	26.5; 44.0	28.5	24.5	35.5	8.5	57.0
	Redear sunfish	7.5; 12.5	4.0; 8.0	5.5	7.5	9.0	0.5	1.0
	Smallmouth bass	22.0; 31.5	27.0; 33.5	27.0	9.0	2.5	9.5	8.0
	Spotted bass	21.0; 41.0	25.5; 53.0	42.5	21.5	19.5	21.0	23.0
	Largemouth bass	72.5; 116.0	76.5; 96.5	155.5	40.5	65.0	37.5	65.5
Trap Netting	White crappie	7.3	5.8	10.1	1.6	1.0	1.3	2.7
	Black crappie	0.2	0.0	0.2	0.0	0.3	0.0	0.1

<sub>a</sub> Electrofishing, gill netting, and trap netting sampling sites were subjectively selected.

<sub>b</sub> Electrofishing and trap netting sampling sites were randomly selected, and gill netting sampling sites were subjectively selected.

<sub>c</sub> Gill netting in 1998 and 1999 was conducted in winter and spring. Gill netting in all other years was conducted in winter.

<sub>d</sub> Electrofishing in 1993 and 1994 was conducted in spring and fall. Electrofishing in all other years was conducted in fall.

## Appendix H:

Historical catch rates of targeted species by gear type for Texoma Reservoir, Texas-Oklahoma, 2000 - 2005.

		Year					
		2000	2001	2002	2003	2004	2005
Gill Netting Winter; Spring	Blue catfish	0.3	0.8; 1.1	0.4	0.2	0.3	0.2; 0.8
	Channel catfish	0.8	2.2; 1.7	1.6	2.0	1.8	1.6; 1.1
	Flathead catfish		0.2		0.1	0.1	0.0; 0.2
	White bass	6.7	2.4; 0.9	1.9	5.0	0.9	4.5; 0.1
	Striped bass	18.9	24.9; 10.7	19.3	21.7	24.4	22.3; 9.3
	Palmetto bass		0.1				
Electrofishing	Gizzard shad	245.5				221.5	
	Threadfin shad					37.0	
	Green sunfish	25.0				17.5	
	Warmouth	5.0				2.5	
	Bluegill sunfish	166.5				151.5	
	Longear sunfish	57.5				41.5	
	Redear sunfish	2.0				7.5	
	Smallmouth bass	4.5				3.0	
	Spotted bass	36.5				42.0	
	Largemouth bass	38.5				46.0	
Trap Netting	White crappie	1.8	3.9	5.5	5.5	27.1	
	Black crappie	0.2	0.0	0.0	0.2	0.2	

## Appendix I:

Largemouth bass electrophoresis results for Texoma Reservoir, Texas-Oklahoma, 1988, 1995, 1998, 1999, 2000, 2002, 2003, and 2004.

Year Florida Bass Stocked	Year Collected	% Northern Alleles	% Florida Alleles	% F <sub>x</sub> N F <sub>1</sub>	% F <sub>x</sub> N F <sub>x</sub>	% Pure Northern	% Pure Florida	Sample Size
2000	2004	82.4	17.6	10.1	36.0	53.9	0.0	89
1999	2003	79.3	20.7	18.0	25.8	51.7	4.5	89
1998	2002	92.3	7.7	1.6	18.0	80.4	0.0	61
1997	2000	69.7	30.3	8.2	26.0	50.7	15.1	74
1996	1999	80.0	20.0	15.6	9.4	65.6	9.4	32
1986	1999 (age1)	73.9	26.1	13.6	4.6	63.6	18.2	22
1985	1998	80.0	20.0	3.3	26.7	60.0	10.0	30
1977	1995	98.8	1.2	2.5	0.0	97.5	0.0	40
1976	1988	95.0	5.0	1.4	15.7	82.9	0.0	70
1975								

Largemouth bass electrophoresis results for Little Mineral Arm, Texoma Reservoir, Texas-Oklahoma, 1998, 1999, 2002, 2003, and 2004.

Year Florida Bass Stocked	Year Collected	% Northern Alleles	% Florida Alleles	% F <sub>x</sub> N F <sub>1</sub>	% F <sub>x</sub> N F <sub>x</sub>	% Pure Northern	% Pure Florida	Sample Size
1998	2004	83.1	16.9	13.8	37.9	48.3	0.0	29
1997	2003	90.0	10.0	13.3	16.7	70.0	0.0	30
	2002	97.5	2.5	5.0	0.0	95.0	0.0	20
	1999(age 1)	79.4	20.6	5.9	0.0	76.5	17.6	17
	1998	78.7	21.3	0.0	29.6	59.3	11.1	27

## Appendix I (continued):

Largemouth bass electrophoresis results for Big Mineral Arm, Texoma Reservoir, Texas-Oklahoma, 1999 and 2000.

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Year Florida Bass Stocked	Year Collected	% Northern Alleles	% Florida Alleles	% F <sub>x</sub> N F <sub>1</sub>	% F <sub>x</sub> N F <sub>x</sub>	% Pure Northern	% Pure Florida	Sample Size
2000	2004	82.5	17.5	30.0	13.3	56.7	0.0	30
1999	2003	61.9	38.1	34.5	24.1	27.6	13.8	29
	2002	96.4	3.6	0.0	14.3	85.7	0.0	21
	2000	56.8	43.2	6.1	39.4	30.3	24.2	33
	1999	80.0	20.0	15.6	9.4	65.6	9.4	32
	1999 (age1)	55.0	45.0	40.0	20.0	20.0	20.0	5

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## Appendix J:

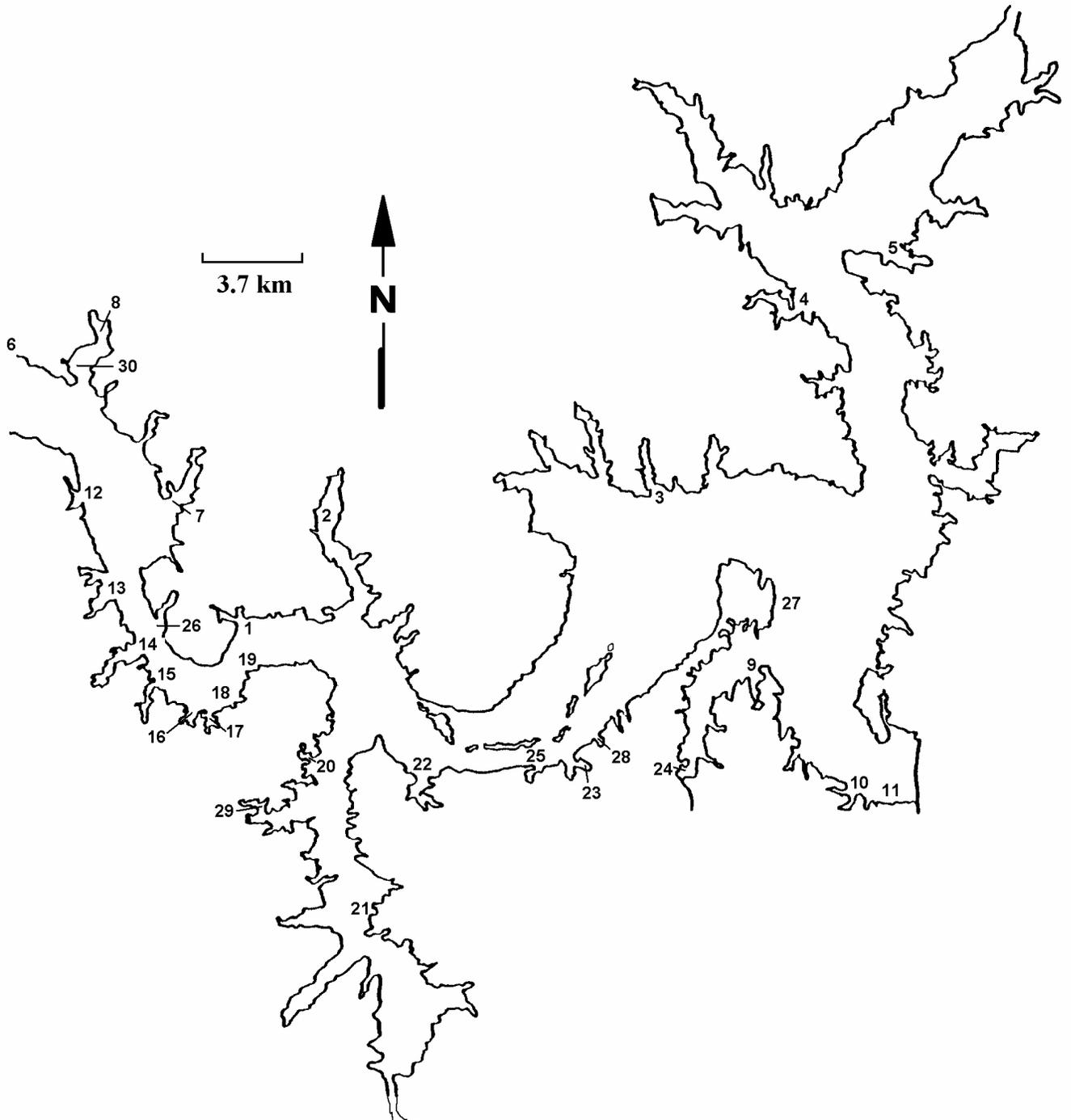
Cells counts (cells/ml) and toxin (ppm) for golden alga samples collected from Texoma reservoir, Texas-Oklahoma, 2004. Dead fish found Jan., Feb., and Mar.

Sample Sites (#)	Jan 30 2004		Feb 23 2004		Mar 3 2004		Mar 10 2004		Apr 12 2004	
	Cells/ml	Toxin	Cells/ml	Toxin	Cells/ml	Toxin	Cells/ml	Toxin	Cells/ml	Toxin
East Keeton Creek (1)	18,000		14,000		16,000		16,000		10,000	
Buncombe Creek (2)	4,000		10,000		22,000		22,000	22.6	0	
Soldier's Creek (3)	0		0		2,000		2,000	23.2	0	
Catfish Bay Marina (4)	0		0		0		0	12.9	0	
Johnson Creek (5)	0		0		0		0		0	
Wilson Creek (6)	6,000		0		0		0		0	
Briar Creek (7)	503		34,000		0		0		0	
Hauani Creek (8)	0		144,000		0		0		0	
Grandpappy Point (9)	0		0		0		0		0	
Eisenhower State Park (10)	0		0		0		0		0	
Denison Dam Ramp (11)	0		0		0		0		0	
Slicum Slough (12)	18,000		38,000	4.1	38,000		38,000	4.1	0	
Sheppard Annex (13)	12,000		32,000	5.4	32,000		32,000	5.4	0	
Rock Creek (14)	20,000		16,000	7.5	16,000		16,000	7.5	2,000	
Paw Paw Creek (15)	12,000		30,000	7.2	30,000		30,000	7.2	0	
Hills Cove (16)	16,000		12,000	7.4	12,000		12,000	7.4	0	
Cedar Bayou (17)	18,000		18,000	6.3	18,000	52,000	18,000	6.3	0	
No Name Cove (18)	4,000		26,000	7.9	26,000		26,000	7.9	0	
Juniper Point (19)	4,000		44,000	6.6	44,000		44,000	6.6	0	
Cedar Mills (20)	0		16,000	3.7	16,000		22,000	22.6	0	
Flowing Wells (21)	12,000		26,000	6.4	26,000		26,000	6.4	0	
Mill Creek (22)	6,000		28,000	3.6	28,000		20,000	23.9	0	
Highport Marina (23)	2,000		12,000	1.8	12,000		16,000	24.1	0	
Simmons Shores (24)	0		0		0		26,000	16.1	0	
Between Highport & Mill Creek (25)							0			
Red River, 10 mi. W. of Spanish Fort <sup>a</sup>							10,000			
Red River, 1.5 mi. from Hwy. 89 <sup>a</sup>							26,000			
Love Valley <sup>a</sup>							20,000			
Across from Rock Creek in OK (26)										
Preston Point (27)									0	
1 Cove East of Highport Marina (28)									0	
Walnut Creek (29)									0	
Lebanon Pool (30)	32,000								2,000	

<sup>a</sup> Sample site above the reservoir.<sup>b</sup> Toxin levels were not measured.



Appendix L:



Location of sampling sites for golden alga cells and toxin, Texoma Reservoir, Texas-Oklahoma, 2004-2005

## Appendix M:

Catch per unit of effort (CPUE) (#/net-night) of striped bass and percent of the sample  $\geq 20$  inches total length collected by gill nets from Texoma Reservoir, February 1987 – 2005.

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Year	CPUE	% $\geq 20$ inches
2005	22.3	33.0
2004	24.4	25.4
2003	19.8	25.3
2002	16.2	10.5
2001	24.9	25.1
2000	18.9	15.5
1999	18.2	12.8
1998	19.3	17.1
1997	17.7	27.0
1996	12.5	22.0
1995	11.0	21.0
1994	19.0	20.0
1993	16.1	26.0
1992	18.9	26.0
1991	10.3	29.0
1990	18.9	27.0
1989	16.6	30.0
1988	18.7	20.0
1987	26.8	28.0

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