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

Lake Murvaul

Prepared by:

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EXECUTIVE SUMMARY

Lake Murvaul was surveyed within the period of June 2004 to May 2005 using electrofishing, gill netting, trap netting, a littoral zone habitat survey, an aquatic vegetation survey, and an angler access survey. Additional electrofishing surveys were conducted during fall 2001, 2002, and 2003. Roving creel surveys were also conducted March through May 2002 (9 days) and June 2003 through May 2004 (36 days). This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir description**: Lake Murvaul is located on Murvaul Creek in the Sabine River Basin. It was constructed by the Panola County Fresh Water Supply District in 1957 for municipal and industrial water supply and public recreation. The reservoir lies within the East Texas Timberlands Land Resource Area. It has a drainage area of approximately 115 square miles. The reservoir covers 3,820 acres and its shoreline length is 29 miles. Water levels are relatively stable; average annual fluctuation is 2 feet. Boating access is available at four parks; three public and one private. Structural habitat is comprised of inundated timber, brush, riprap, boat docks, and bulkhead. Aquatic macrophytes are present in moderate densities throughout the reservoir. Hydrilla, a non-native aquatic plant once covering approximately 27% of the reservoir surface area, was not found during the 2000 vegetation survey. However, only 2 acres of hydrilla was observed during the 2004 vegetation survey. American lotus is the dominant aquatic macrophyte species covering < 1% (93 acres) of the reservoir. Lake Murvaul received national recognition during the 1960s for its trophy native largemouth bass population. Following the introduction of Florida largemouth bass, Lake Murvaul anglers have continued catch large bass. From 1987 to 1997, six largemouth bass ≥13 lbs. have been entered into the TPWD ShareLunker Program. The current lake record is 14.87 lbs.

- **Prey species**: Gizzard shad, threadfin shad, sunfish species, and several species of minnows were present, which indicated good prey fish diversity. Electrofishing catch rates for gizzard shad and threadfin shad in 2004 were 197.0 fish/hour and 502.0 fish/hour, respectively. Index of vulnerability (IOV) for gizzard shad in 2004 indicated 54% of the population was available to existing predators. This was similar to 1997 (50%) but lower than 2000 (84%). Based on these data, moderate densities of clupeids were available as prey. Catch rates for combined sunfish species (redbreast sunfish, warmouth, bluegill, longear sunfish, and redear sunfish) in 2004 was 483.0 fish/hour, which was a substantial decrease compared to both 1997 (1,600 fish/hour) and 2000 (1,551 fish/hour). Size distributions of sunfishes indicated many small fish were available as prey for piscivores. Prey availability was adequate for adult largemouth bass as evidenced by mean relative weights in excess of 90 for most inch groups.

- **Catfishes**: The relative abundance of channel catfish has increased over the last 14 years from 6.6 fish/net night in 1991 to 21.2 fish/net night in 2005. Stock-size (≥11 inches) channel catfish have also shown an increase from 8.4 fish/net night in 1997 to 16.0 fish/net night in 2005. Recruitment of channel catfish has been consistent. Ryan and Brice (2001) reported growth of channel catfish as good; fish reach legal-size (12 inches) during their third growing season. Based on these data, high numbers of legal-size channel catfish are available for harvest. In 2003-20004, angling effort directed towards channel catfish (5.8 hours/acre) accounted for 25.1% of the total angling effort. Anglers targeting channel catfish caught and harvested 3.7

and 2.7 fish/hour, respectively. Only 1.0 flathead catfish/net night was collected during 2005 gill netting. Although present in low densities, flathead catfish contribute to the fishery at Lake Murvaul.

- **Sunfishes**: Electrofishing surveys indicate sunfishes (redbreast sunfish, bluegill, and redear sunfish) were available for angler harvest. According to Ryan and Brice (2001), redear sunfish and redbreast sunfish attain 6 inches during their third growing season and bluegill reach 6 inches during their fourth growing season. In 2003-20004, angling effort directed towards sunfish species (0.87 hours/acre) accounted for 3.8% of the total angling effort. Anglers targeting sunfish caught and harvested 5.3 and 3.0 fish/hour, respectively.

- **Black basses:** Prior to 1994, the largemouth bass population at Lake Murvaul could be characterized as low/moderate density with excellent growth. Following the unwarranted introduction and expansion of hydrilla, the population density of largemouth bass increased between 1991 and 1997. Electrofishing catch rates of largemouth bass reached its highest level in 1994 (237.3 fish/hour). However, the majority of these fish were sub stock-size (<8 inches). Therefore, a special 14-21 inch slot length limit was imposed in September 1999 with the objective of increasing the abundance of largemouth bass ≥14 inches, enhancing fishing quality, and possibly enhancing trophy fishing benefits. Following the decline of hydrilla in 1999-2000, electrofishing catch rates of largemouth bass reached a low of 50.0 fish/hour in 2002. However, recent electrofishing catch rates have increased to 77.0 fish/hour in 2003 and 92.0 fish/hour in 2004. Much of this increase can be attributed to reproductive success and subsequent recruitment of sub-stock fish, but the catch rate of slot-size bass (14-21 inches) has also increased from 16.0 fish/hour in 2001 to 31.0 fish/hour in 2003. Largemouth bass reach 14.0 inches during their second or third growing season indicating average growth compared to other district water bodies. Electrophoretic analysis of largemouth bass collected in 2004 indicated 39.0% Florida alleles, but only 6% of the sample was pure Florida largemouth bass. In 2003-2004, angler effort directed towards largemouth bass (6.3 hours/acre) accounted for 27.4% of the total angling effort. Anglers targeting largemouth bass caught and harvested 0.37 and 0.08 fish/hour, respectively.

- **Crappie:** White and black crappie are present at Lake Murvaul and provide a popular fishery. In 2003-2004, angler effort towards crappie species (2.18 hours/acre) accounted for 18.7% of the total angling effort. Anglers targeting crappie species caught 2.20 fish/hour and harvested 1.02 fish/hour. The estimated 506,138 crappies harvested by anglers had an RSE of 95, which indicated that the estimate was not very reliable. Catch rates for white and black crappie in trap net collections in 2004 were 5.0 and 3.6 fish/net night, respectively. These catch rates are very similar to the past three surveys conducted over a 10-year period. The catch rate of legal-size (≥ 10 inches) individuals was 5.0 fish/net night and 2.0 fish/net night for white crappie and black crappie, respectively indicating good numbers of fish are available for harvest. Based on growth estimates, white crappie and black crappie reach legal size during their second and third growing season, respectively.

- **Management Strategies**
  Based on these findings, the reservoir should be managed under current harvest regulations. The special 14-21 inch slot-length limit for largemouth bass is in its sixth year and will be

evaluated following fall electrofishing in 2005. Following this evaluation, fall electrofishing will be conducted every other year beginning in 2008. Because of the trophy potential of this reservoir, Florida largemouth bass will be requested to be stocked in 2006 and 2007 to increase the percentage of pure Florida largemouth bass in the population.

INTRODUCTION

This document is a summary of fisheries data collected from Lake Murvaul in 2004-2005. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other species of fish was collected, this report deals primarily with sport fishes and important prey species. Management strategies are included to address existing problems or opportunities.

Sportfish harvest regulations for Lake Murvaul as of September 1, 2004.

Species	Daily Bag Limit	Minimum-Maximum Length (inches)
Catfish, Blue and Channel	25	12 – No limit
Catfish, Flathead	5	18 - No limit
Sunfishes	None	No limit
Bass, Spotted	5[1]	No limit
Bass, Largemouth	5[1]	14 – 21 slot limit[2]
Crappie, White and Black	25	10 - No limit

[1]Aggregate bag limit for black basses. Only 1 bass ≥21 inches may be retained each day.
[2]Length limit for largemouth bass changed from 14-inch minimum length limit to a 14-21 inch slot length limit 9/1/1999

METHODS

- Fishes were collected by electrofishing (1.0 hours at 12 stations), spring gill netting (5 net nights at 5 stations), and fall trap netting (5 net nights at 5 stations). Sampling stations were randomly selected. Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour of actual electrofishing, and for gill netting and trap netting as the number of fish caught in one net set overnight in accordance with Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2002).
- Sampling statistics (CPUE for various length categories) and structural indices (Proportional Stock Density [PSD], Relative Stock Density [RSD], and Relative Weight [Wr]) were calculated, when appropriate, for target fishes according to Anderson and Neumann (1996). Index of vulnerability (IOV) was calculated for gizzard shad (DiCenzo et al. 1996).
- Ages were determined for largemouth bass, and crappie using otoliths. Mean age at legal length at time of capture was calculated for each species.
- Liver samples from young-of-year largemouth bass were collected in accordance with Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2002).

- A roving creel survey was conducted March through May 2002 (9 days) and June 2003 through May 2004 (36 days) to assess angler use, catch, and harvest in accordance with Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2002).
- A habitat survey, an aquatic vegetation survey, and an angler access facility survey was conducted in accordance with Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2002).

LITERATURE CITED

Anderson, R. and R. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-482 in B. R. Murphy and D. W. Willis, editors. Fisheries techniques 2nd edition. American Fisheries Society, Bethesda, Maryland.

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

Ryan, M. J. and M. W. Brice. 2001. Statewide freshwater fisheries monitoring and management program survey report for: Lake Murvaul, 2000. Texas Parks and Wildlife Department, Federal Aid in Sport Fish Restoration, Grant F-30-R, Performance Report. 36 pp.

Physical and historical data for Lake Murvaul, Texas, 2004.

Inland Fisheries Water Body Code: 0519

IF District 3-A, Marshall

Controlling authority:
Panola County Fresh Water Supply District No.1

Acres: 3,820

County: Panola

Constructed for: Municipal/industrial water supply, recreation

Location: 35 miles from Marshall-Longview MSA

Longitude: -94° 03'
Latitude: 32° 25'

Reservoir description: Mainstream

Mean depth (ft): 12.0

River system: Murvaul Creek in Sabine River Basin

Shoreline length (mi): 29.2
Shoreline development ratio: 6.7:1.0
Secchi disc range (ft): 2-4
Constructed: 1958

Maximum depth (ft): 36.0

Watershed (mi^2): 115

Conductivity: 212 (umhos/cm)

Access: Boat: Adequate
Bank: Adequate

Survey history for Lake Murvaul, Texas.

Method	Year
Gill netting	1958-1964 1977 1984 1988 1991 1994 1997 2001 2005
Electrofishing – spring	1977 1981 1984 1986 1994
Electrofishing – fall	1983 1988 1991 1994 1995 1997 1999-2004
Trap net	1988 1991 1994 1997 2000 2004
Cove rotenone	1977 1984
Creel survey	1984 2000 2002 2003-2004
Habitat survey	1977 1985 1994 1997 2000 2004
Vegetation survey	1993 1994 1997 2000 2004

Habitat survey of littoral zone and physical habitat types, Lake Murvaul, Texas, September 2004. A linear shoreline distance was recorded for each habitat type found.

Habitat type	Shoreline distance (miles)	Percent of total
Bulkhead / Boat Dock	2.69	9.2
Bulkhead / Boat Docks / Native Submerged	3.91	13.4
Bulkhead	0.06	0.2
Cut Bank / Overhanging Brush	0.64	2.2
Cut Bank / Overhanging Brush / Boat Docks	0.88	3.0
Concrete	0.12	0.4
Eroded Bank / Boat Docks	0.70	2.4
Eroded Bank / Dead Trees / Native Submerged	0.12	0.4
Eroded Bank	0.47	1.6
Eroded Bank / Native Submerged	0.09	0.3
Eroded Bank / Overhanging Brush	10.02	34.3
Eroded Bank / Overhanging Brush / Dead Trees	4.64	15.9
Eroded Bank / Overhanging Brush / Native Submerged	1.23	4.2
Rip Rap	2.80	9.6
Rocky Shore	0.79	2.7
Swimming Area	0.09	0.3
Total	29.25	100.0

Survey of aquatic vegetation, Lake Murvaul, Texas, September 2004. Acreage of each species and percent coverage of total reservoir surface acres (3,820) are presented.

Species	Acreage	Percent of total
American lotus	93.30	2.44
Buttonbush	10.00	0.26
Elephant ear	0.20	0.01
Giant bullrush	2.00	0.05
Hydrilla	2.00	0.05
Waterprimrose	1.00	0.03
Smartweed	0.10	< 0.01
Water pennywort	0.10	< 0.01
Total	108.70	2.84

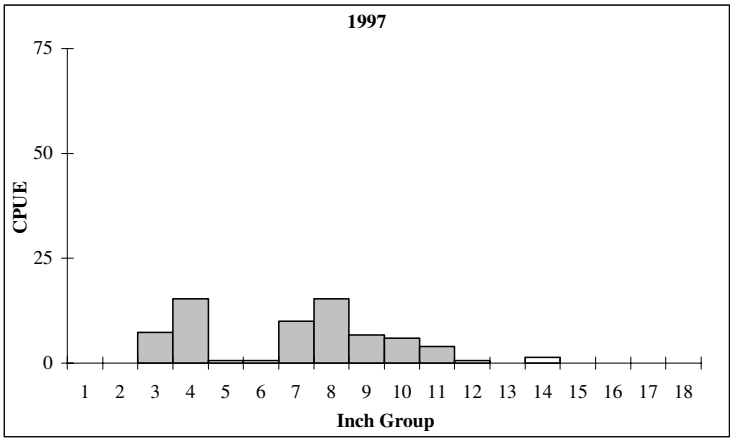
Stocking history of Lake Murvaul, Texas. Size categories are ADL for adult and FGL for fingerling.

Species	Year	Number	Size
Channel catfish	1967	3,000	FGL
	1968	6,000	FGL
	1969	5,000	FGL
	1973	5,740	FGL
	1979	181,084	FGL
	Species Total	200,824	
Northern largemouth bass	1972	10,000	FGL
	Species Total	10,000	
Florida largemouth bass	1972	200	ADL
	1980	380	ADL
	1989	6	ADL
	1997	95,235	FGL
	1998	95,000	FGL
	1999	102,680	FGL
	Species Total	293,501	

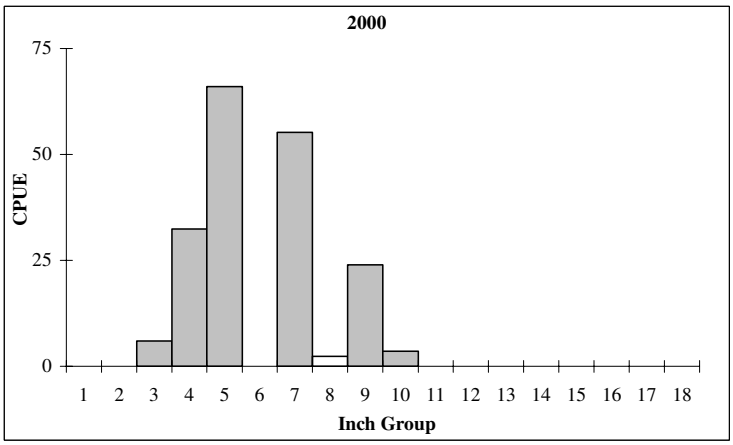
Lake Murvaul

Loation of fish community sampling stations, Lake Murvaul, Texas 2004-2005. Sampling stations are designated by an E for electrofishing, a G for gill netting, and T for trap netting.

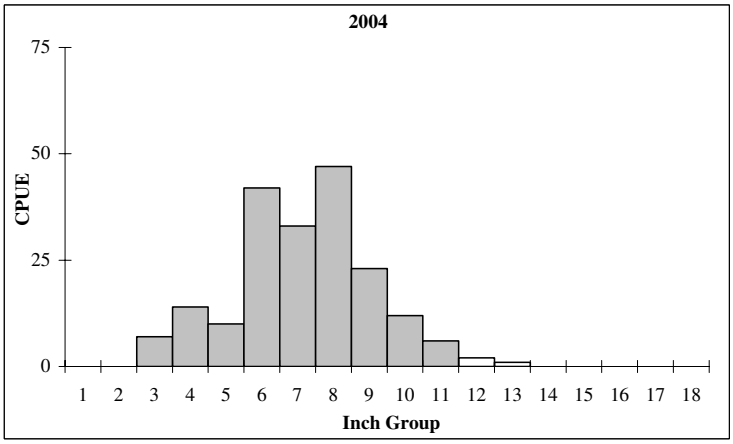
Gizzard Shad



Effort = 1.50 hr.
Total CPUE = 68.0
Stock CPUE = 44.0
PSD = 14
IOV= 50



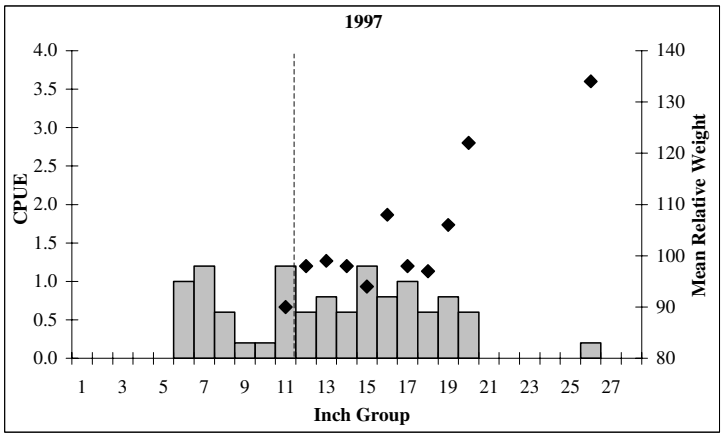
Effort = 0.83 hr.
Total CPUE = 189.6
Stock CPUE = 85.2
PSD = 0
IOV= 84



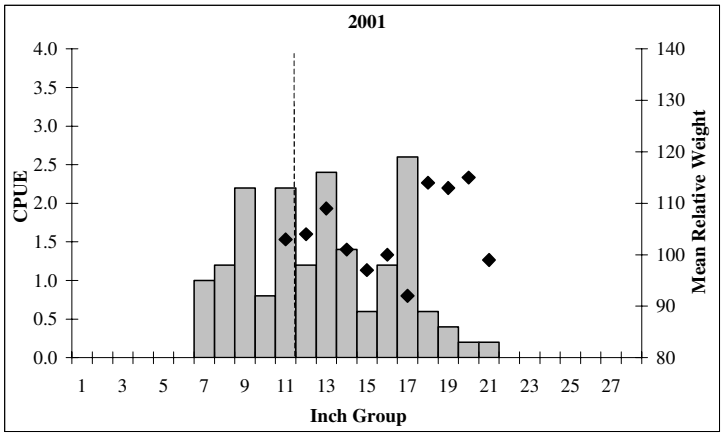
Effort = 1.00 hr.
Total CPUE = 197.0
Stock CPUE = 124.0
PSD = 100
IOV= 54

Number of gizzard shad caught per hour (CPUE, bars) and population indices for fall electrofishing collections, Lake Murvaul, Texas, October 1997, 2000, and 2004.

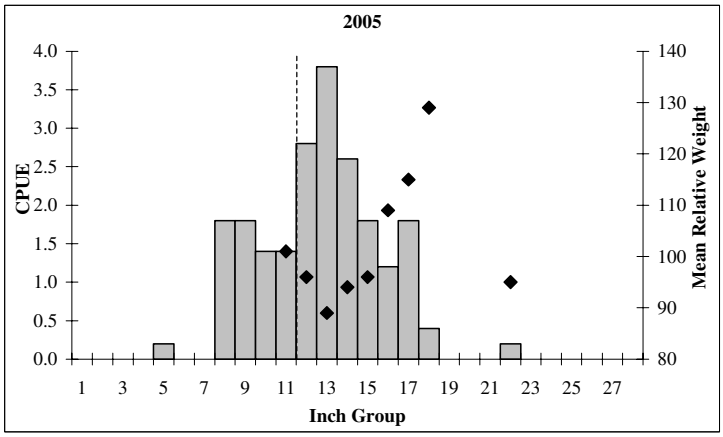
Channel Catfish



Effort = 5 net-nights
Total CPUE = 11.6
Stock CPUE = 8.4
PSD = 48
RSD-P = 2

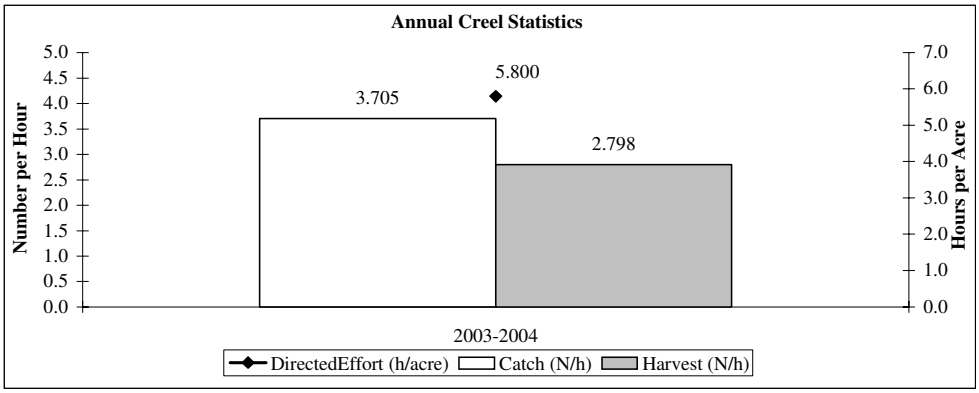


Effort = 5 net-nights
Total CPUE = 18.2
Stock CPUE = 13.0
PSD = 40
RSD-P = 0

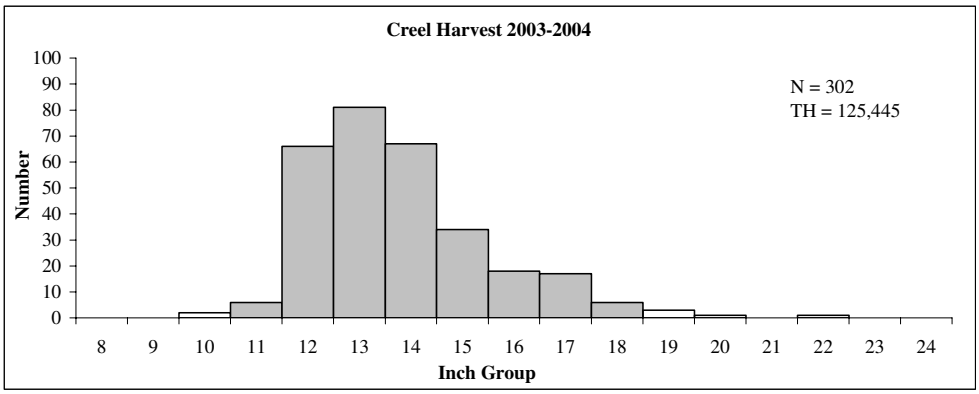


Effort = 5 net-nights
Total CPUE = 21.2
Stock CPUE = 16.0
PSD = 22
RSD-P = 0

Number of channel catfish caught per net-night (CPUE, bars), mean relative weight (diamonds), and population indices for spring gill netting surveys, Lake Murvaul, Texas, April 1997, 2001, and 2005. Dashed-line indicates minimum length-limit at the time of the survey.

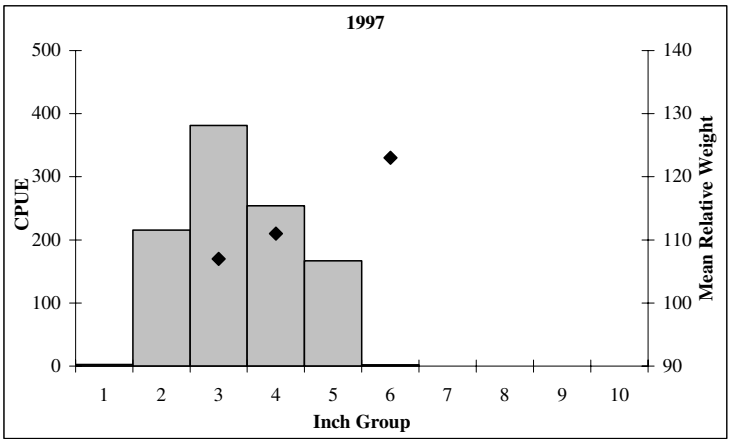


Creel statistics for anglers seeking channel catfish at Lake Murvaul, Texas. Creel surveys were conducted from June 2003 through May 2004.

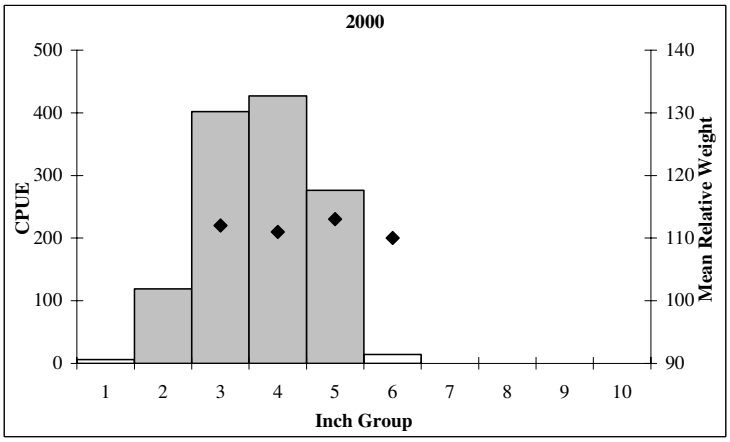


Length frequency distribution and number (N) of channel catfish measured in the creel and total estimated harvest (TH) for all anglers on Lake Murvaul, Texas, June 1, 2003 through May 31, 2004. Minimum legal length was 12 inches.

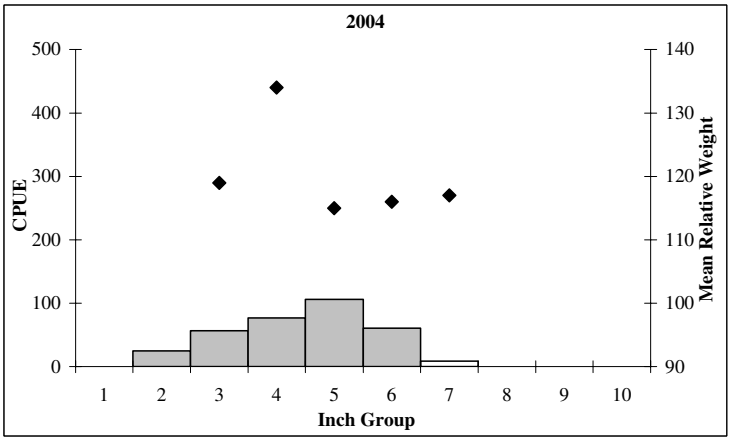
Bluegill



Effort = 1.50 hr.
Total CPUE = 1022.0
Stock CPUE = 804.0
PSD = 0
RSD-P = 0



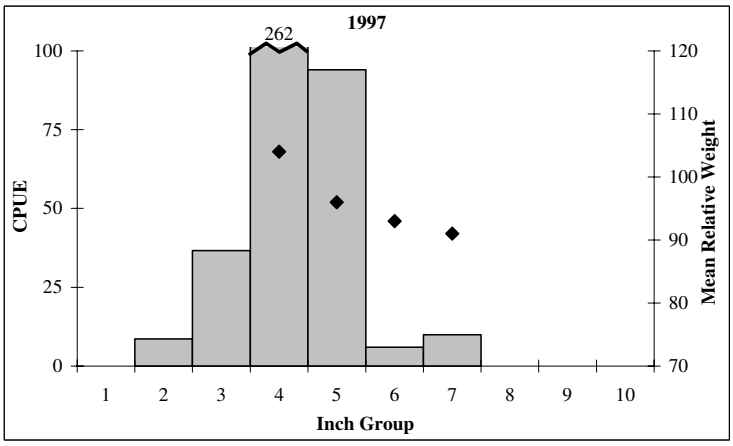
Effort = 0.83 hr.
Total CPUE = 1244.4
Stock CPUE = 1119.6
PSD = 1
RSD-P = 0



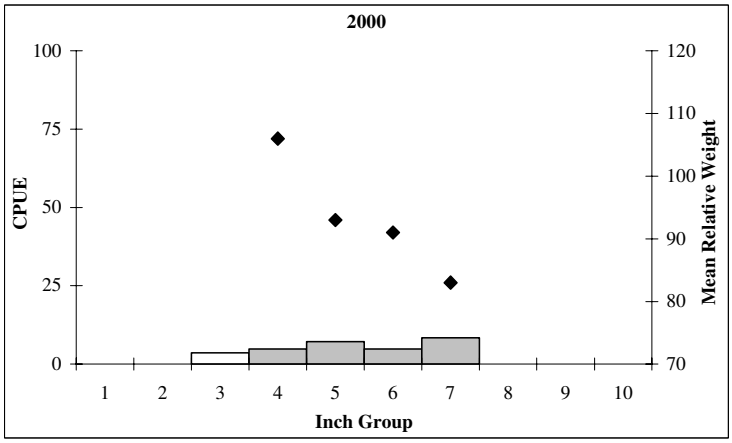
Effort = 1.00 hr.
Total CPUE = 335.0
Stock CPUE = 310.0
PSD = 23
RSD-P = 0

Number of bluegill caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices for fall electrofishing collections, Lake Murvaul, Texas, October 1997, 2000, and 2004.

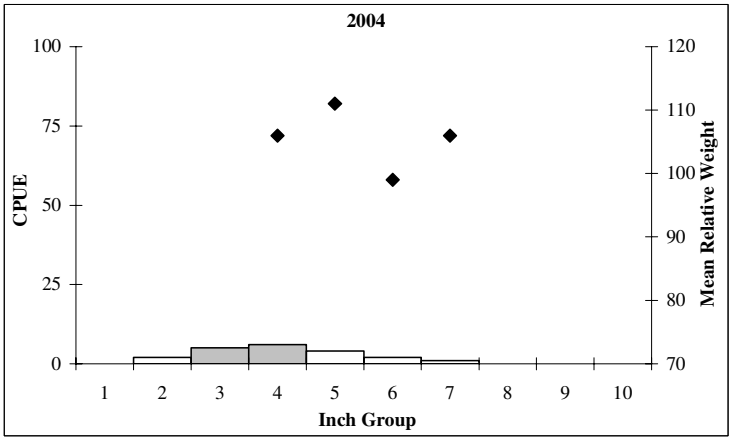
Redear Sunfish



Effort = 1.50 hr.
Total CPUE = 417.3
Stock CPUE = 372.0
PSD = 3
RSD-P = 0



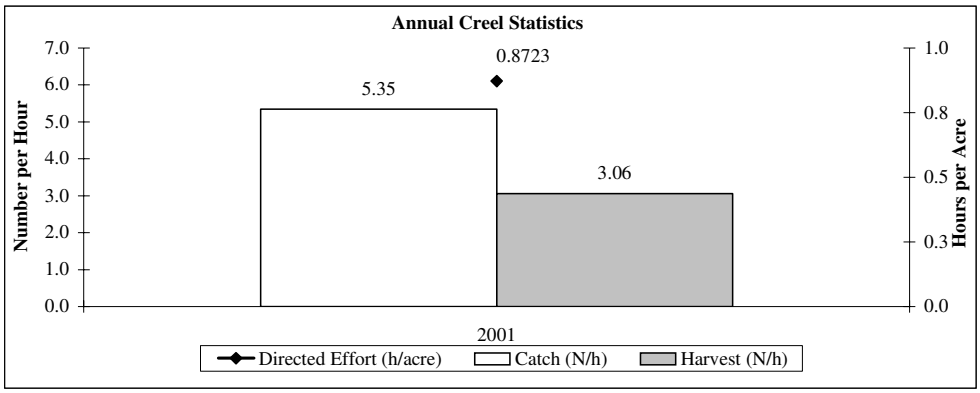
Effort = 0.83 hr.
Total CPUE = 28.8
Stock CPUE = 25.2
PSD = 33
RSD-P = 0



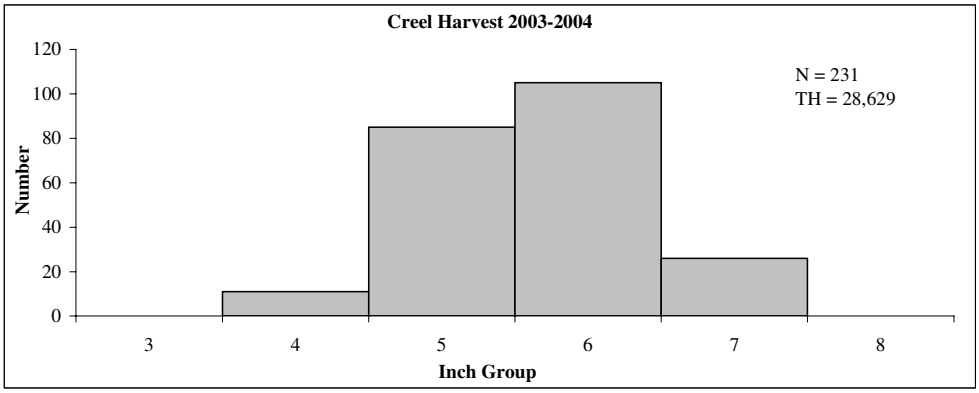
Effort = 1.00 hr.
Total CPUE = 20.0
Stock CPUE = 13.0
PSD = 8
RSD-P = 0

Number of redear sunfish caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices for fall electrofishing collections, Lake Murvaul, Texas, October 1997, 2000, and 2004.

Sunfish

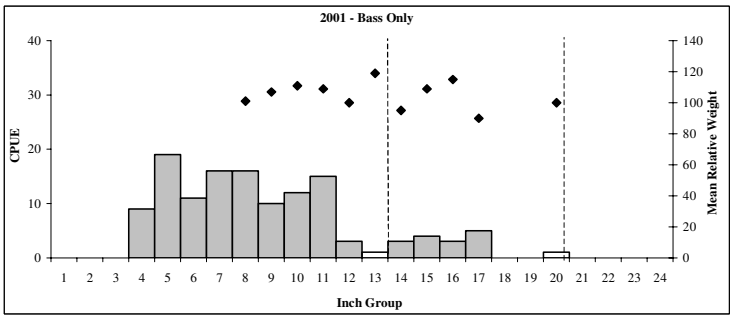


Creel statistics for anglers seeking sunfish species at Lake Murvaul, Texas. Creel surveys were conducted from June 2003 through May 2004.

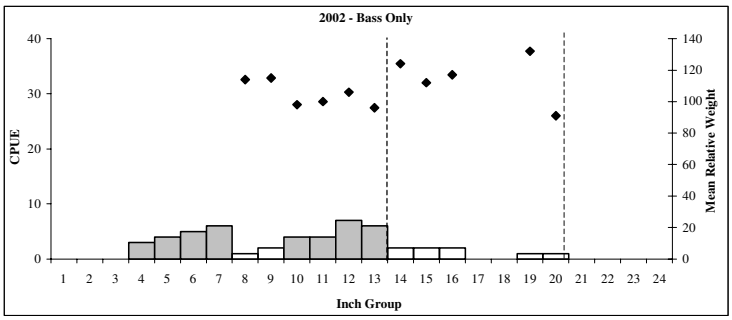


Length frequency distribution and number (N) of sunfish species measured in the creel and total estimated harvest (TH) for all anglers on Lake Murvaul, Texas, June 1, 2003 through May 31, 2004.

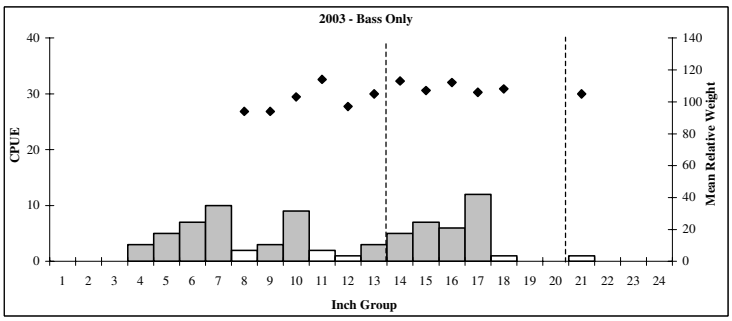
Largemouth Bass



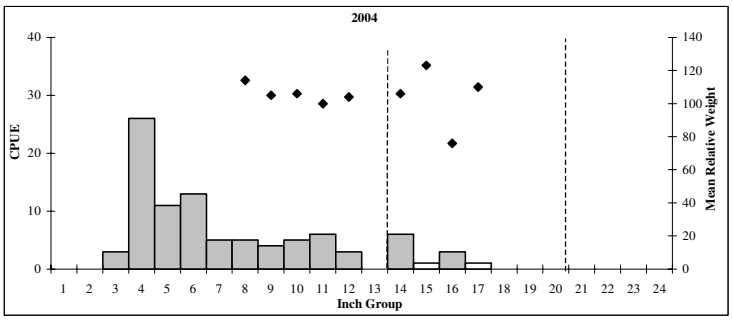
Effort = 1.0 hr.
Total CPUE = 128.0
Stock CPUE = 73.0
PSD = 27
RSD-P = 19
% FLMB Alleles = 37.4
% FLMB Genotype = 2.3



Effort = 1.0 hr.
Total CPUE = 50.0
Stock CPUE = 32.0
PSD = 66
RSD-P = 19

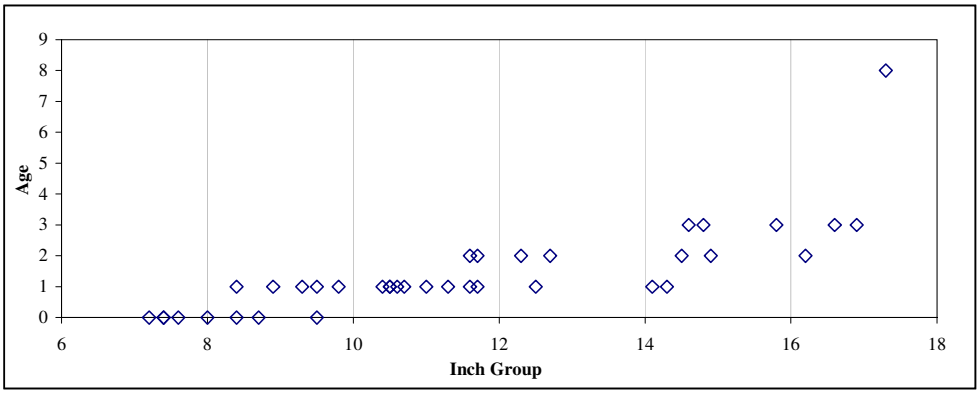


Effort = 1.0 hr.
Total CPUE = 77.0
Stock CPUE = 52.0
PSD = 69
RSD-P = 52

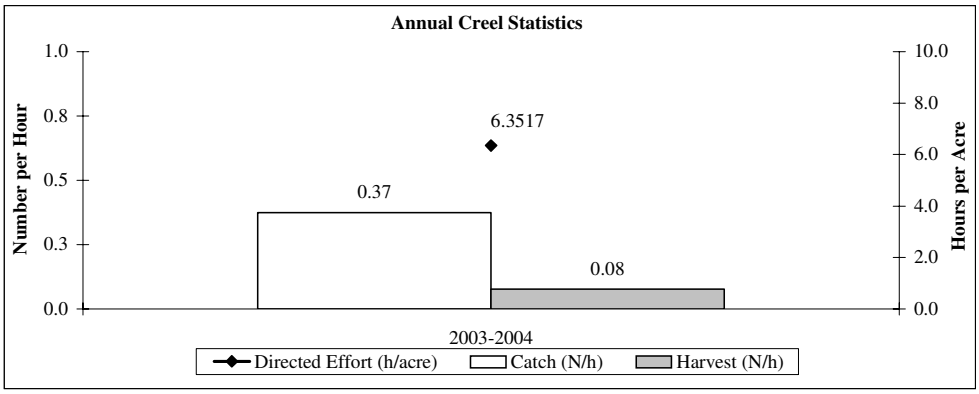


Effort = 1.0 hr.
Total CPUE = 92.0
Stock CPUE = 34.0
PSD = 41
RSD-P = 15
% FLMB Alleles = 39.0
% FLMB Genotype = 6.0

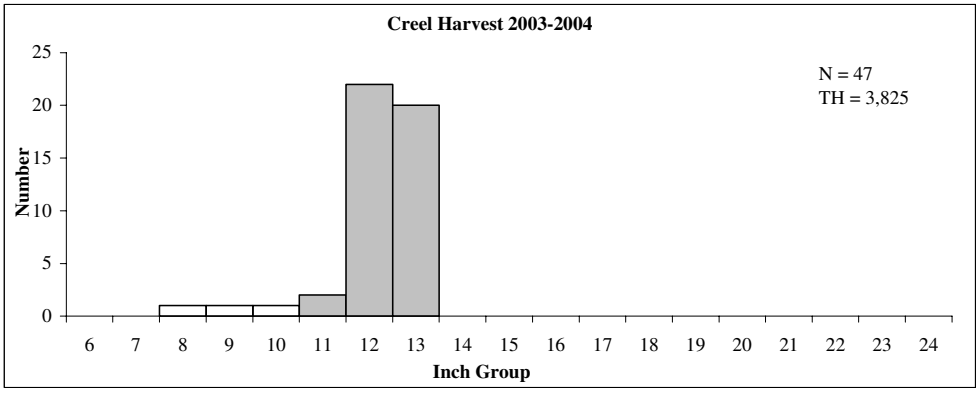
Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices for fall electrofishing collections, Lake Murvaul, Texas, October 2001, 2003, and 2004, and November 2002. %FLMB Alleles = percent of Florida largemouth bass alleles present in a sub-sample of age-0 fish. % FLMB Genotype = percent pure Florida largemouth bass present in a sub-sample of age-0 fish. Dashed-line indicates minimum length-limit at the time of the survey.



Age distribution of 7.0-18.0-inch largemouth bass collected from fall electrofishing, Lake Murvaul, Texas, 2004.

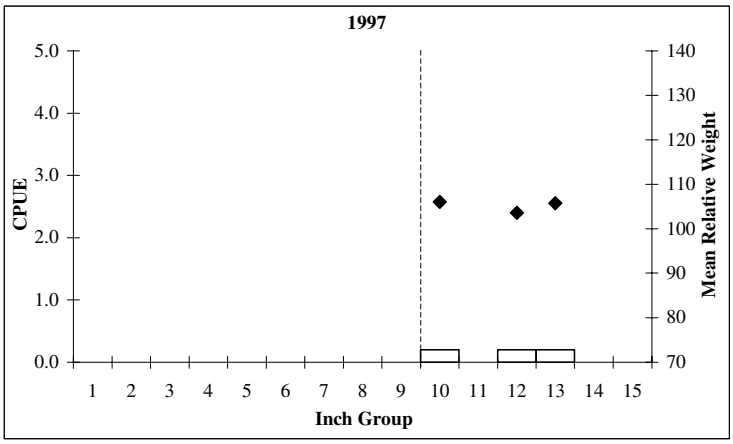


Creel statistics for anglers seeking largemouth bass at Lake Murvaul, Texas. Creel surveys were conducted from June 2003 through May 2004.

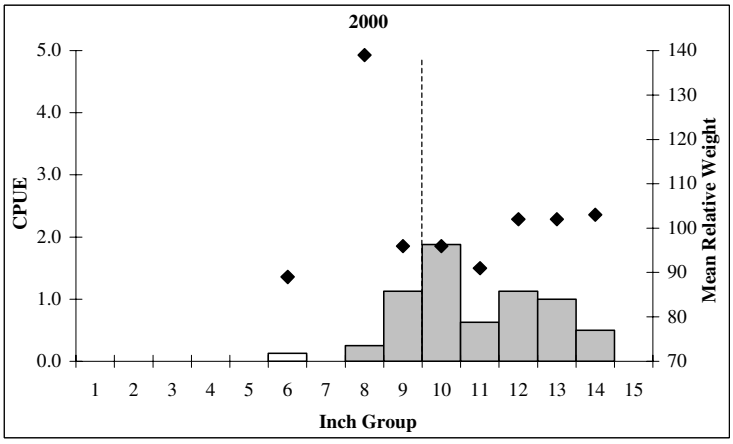


Harvested largemouth bass observed (bars) during creel surveys, June 2003 through May 2004 at Lake Murvaul, Texas, all anglers combined. N=total number observed and TH = estimated total harvest.

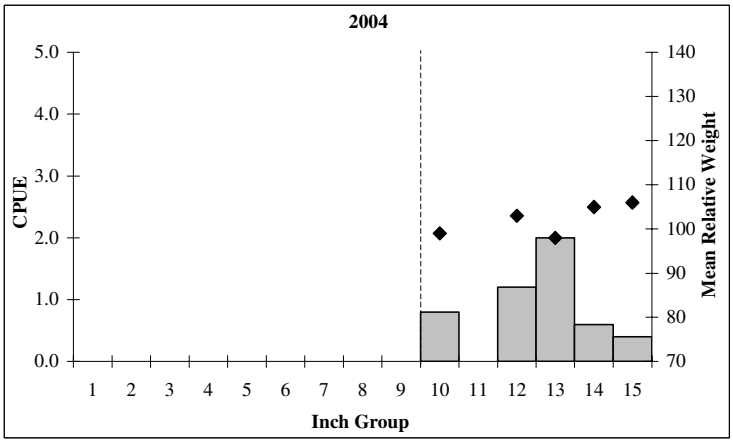
White Crappie



Effort = 5 net-nights
Total CPUE = 0.6
Stock CPUE = 0.6
PSD = 100
RSD-P = 100

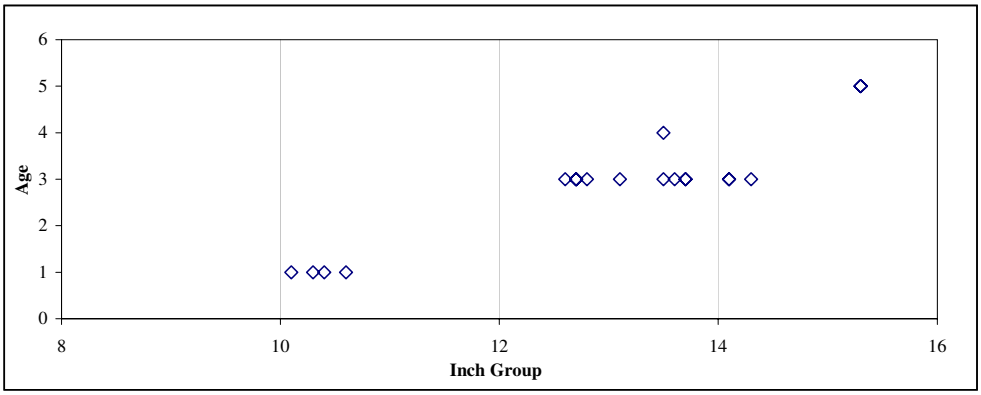


Effort = 8 net-nights
Total CPUE = 6.6
Stock CPUE = 6.6
PSD = 98
RSD-P = 77



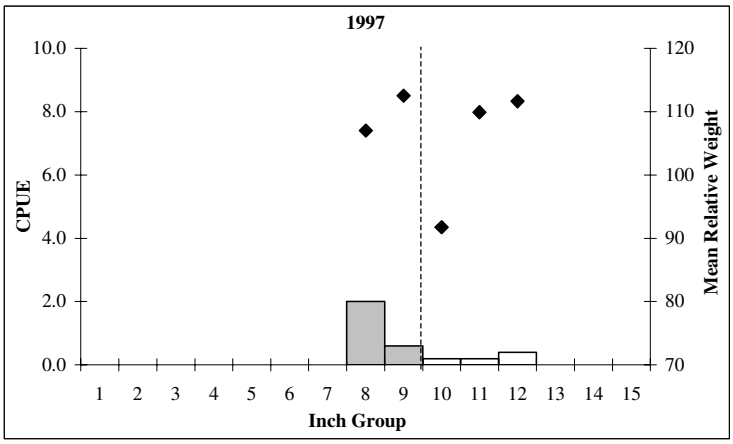
Effort = 5 net-nights
Total CPUE = 5.0
Stock CPUE = 5.0
PSD = 100
RSD-P = 100

Number of white crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices for fall trap netting collections, Lake Murvaul, Texas, November 1997 and 2000, and December 2004. Dashed-line indicates minimum length-limit at the time of the survey.

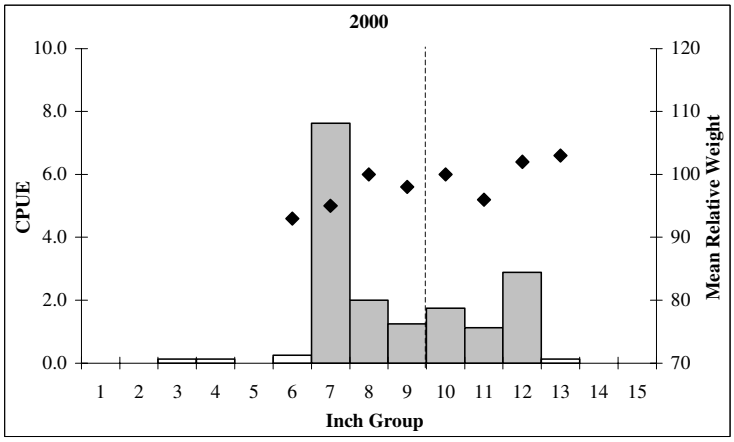


Age distribution of 10.0-16.0-inch white crappie collected from fall trap netting, Lake Murvaul, Texas, 2004.

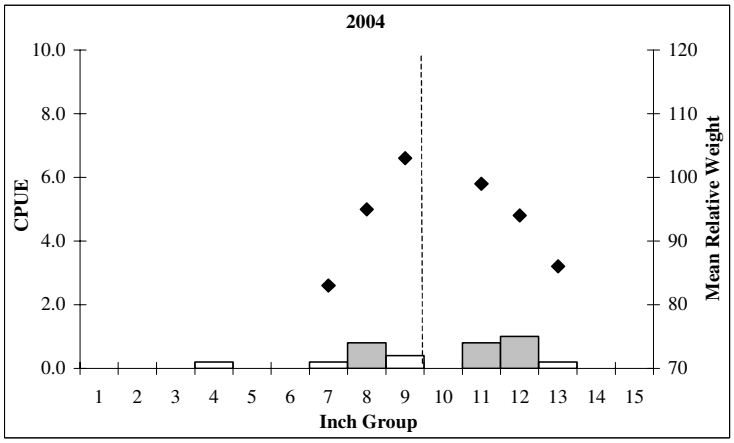
Black Crappie



Effort = 5 net-nights
Total CPUE = 3.4
Stock CPUE = 3.4
PSD = 100
RSD-P = 24

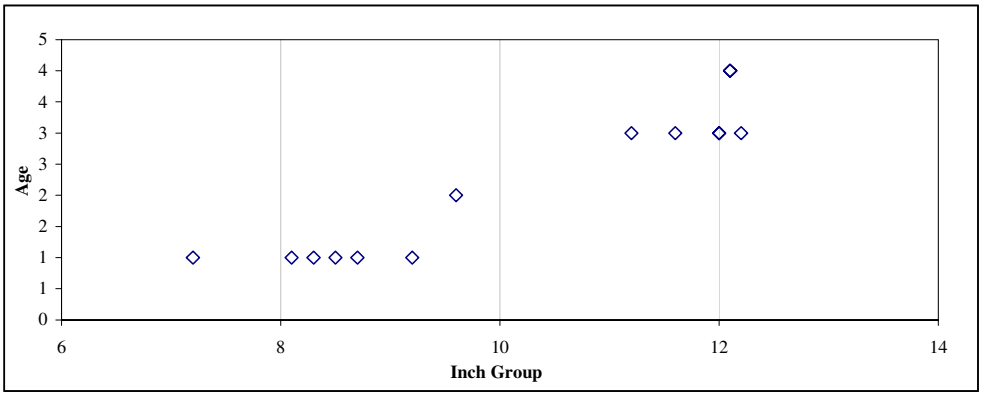


Effort = 8 net-nights
Total CPUE = 17.25
Stock CPUE = 16.99
PSD = 54
RSD-P = 35



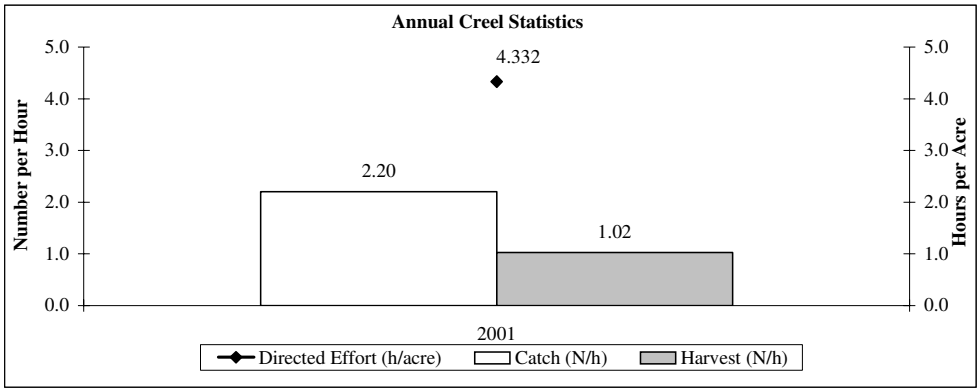
Effort = 5 net-nights
Total CPUE = 3.6
Stock CPUE = 3.4
PSD = 94
RSD-P = 58

Number of black crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices for fall trap netting collections, Lake Murvaul, Texas, November 1997 and 2000, and December 2004. Dashed-line indicates minimum length-limit at the time of the survey.

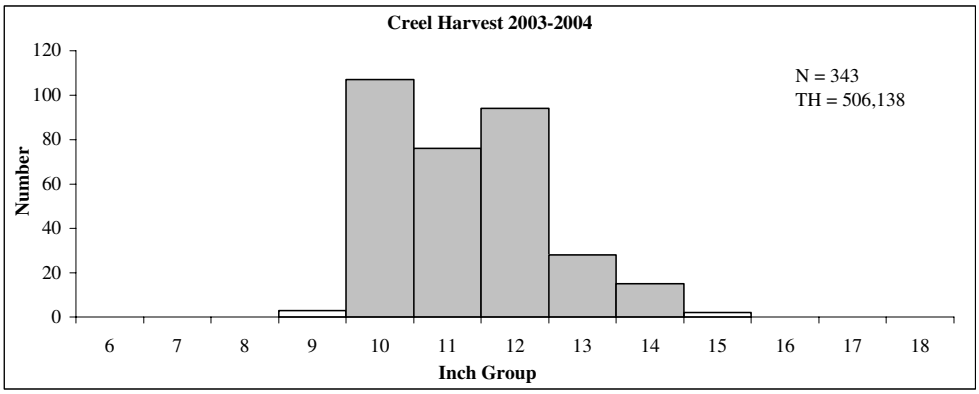


Age distribution of 7.0-13.0-inch black crappie collected from fall trap netting, Lake Murvaul, Texas, 2004.

Crappie



Creel statistics for anglers seeking crappie species at Lake Murvaul, Texas. Creel surveys were conducted from June 2003 through May 2004.



Harvested crappie species (white and black crappie combined) observed (bars) during creel surveys, June 2003 through May 2004 at Lake Murvaul, Texas, all anglers combined. N=total number observed and TH = estimated total harvest.

Fishery Management Plan
Lake Murvaul, Texas

Prepared – July 2005

ISSUE 1 A special 14-21 inch slot length harvest regulation was imposed for largemouth bass at Lake Murvaul in September 1999. The regulation was implemented to increase abundance of ≥14-inch largemouth bass, improve fishing quality, and possibly enhance trophy-fishing benefits. The largemouth bass population should be monitored in order to continually evaluate effects of this special regulation. Creel surveys should be conducted to determine changes in angler utilization and fishing success.

MANAGEMENT STRATEGIES

1. Conduct a supplemental fall electrofishing survey in 2005 and review special slot-length limit regulation in 2006.
2. Conduct fall electrofishing every other year beginning in 2008.
3. Conduct a roving creel survey (spring quarter) in 2006 to monitor angler utilization and fishing success.

ISSUE 2 The Lake Murvaul largemouth bass population has trophy potential. Anglers have submitted 6 largemouth bass > 13 pounds to the ShareLunker program since 1987 and the lake record is 14.87 pounds. However, only 6% of fish submitted for electrophoretic sampling were pure Florida largemouth bass, which is below the 20% target for lakes with trophy potential. Therefore, stocking of Florida largemouth bass should be continued to enhance the genetics of the largemouth bass population.

MANAGEMENT STRATEGIES

1. Request Florida largemouth bass stocking for 2006 and 2007 at 50 fish/acre.
2. Monitor largemouth bass allele frequency through fall electrophoretic sampling in 2010.

ISSUE 3 Efforts to provide fishing information have been made and need to be continued to maximize angler utilization of the resource.

MANAGEMENT STRATEGIES

1. Provide seasonal news releases informing anglers on fishing techniques, catch locations, and species-specific regulations.
2. Provide Panola Freshwater District personnel and private marinas with fishery information; regulation posters, lake brochures, and angler recognition program procedures.

Appendix 1

Number and catch rate (CPUE) of fish species collected by all gear types from Lake Murvaul, Texas, 2004-2005.

	Gill Netting		Trap Netting*		Electrofishing	
Species	N	CPUE	N	CPUE	N	CPUE
Spotted gar	5	1.0				
Gizzard shad	156	31.2			197	197.0
Threadfin shad					502	502.0
Common carp	2	0.4				
Golden shiner	1	0.2			9	9.0
Bullhead minnow					1	1.0
Lake chubsucker	2	0.4			2	2.0
Spotted sucker	1	0.2				
Channel catfish	106	21.2				
Flathead catfish	5	1.0				
Yellow bass	233	46.6			137	137.0
Redbreast sunfish					16	16.0
Warmouth					1	1.0
Bluegill	8	1.6			335	335.0
Longear sunfish					110	110.0
Redear sunfish					20	20.0
Spotted sunfish					1	1.0
Largemouth bass	12	2.4			92	92.0
White crappie	17	3.4	25	5.0		
Black crappie	4	0.8	18	3.6	3	3.0
Logperch					3	3.0

*Data recorded for crappie species only.

Appendix 2

Number of target species caught per net night during spring gill netting, Lake Murvaul, Texas, April 1991, 1994, 1997, 2001, and 2005. Sampling effort was 5 net nights each year.

Species	1991	1994	1997	2001	2005
Channel catfish	6.6	7.2	11.6	18.2	21.2

Number of target species caught per net night during trap netting, Lake Murvaul, Texas, October 1988, November 1991, 1997, and 2000, and December 1994 and 2004. Sampling effort was 10 net nights in 1988, 8 net nights in 2000, and 5 net nights in 1991, 1994, 1997, and 2004.

Species	1988	1991	1994	1997	2000	2004
White crappie	1.4	4.0	7.6	0.6	6.6	5.0
Black crappie	2.0	0.6	3.6	3.4	17.2	3.6

Number of target species caught per hour during fall electrofishing, Lake Murvaul, Texas, October 1988, 1994, 1995, 1997, 1999-2001, 2003, and 2004, and November 1991 and 2002. Sampling effort was 1.5 hours 1988-1997 and 1.0 hour 1999-2004.

Species	1988	1991	1994	1995*	1997	1999*	2000	2001*	2002*	2003*	2004
Gizzard shad	10.0	48.0	50.0		66.0		189.6				197.0
Threadfin shad	44.7	54.0	64.0		193.3		1130.0				502.0
Bluegill	70.7	892.0	1026.0		922.6		1184.0				335.0
Longear sunfish	2.7	70.0	144.7		210.7		302.0				110.0
Redear sunfish	20.0	170.0	405.3		410.0		30.0				20.0
Largemouth bass	46.7	90.7	237.3	197.3	227.3	120.0	191.0	128.0	50.0	77.0	92.0

*Bass only survey

Appendix 3

Summary of electrophoretic analyses of young-of-year largemouth bass collected during fall electrofishing from Lake Murvaul, Texas.

		Genotype					
Year	Sample size	Florida	F1	Fx	Northern	% FLMB alleles	% Pure FLMB
1991	30	0	4	21	5	35.0	0.0
1995	30	2	12	8	8	35.8	6.6
1997	41	2	8	28	3	37.2	4.9
1999	16	4	3	6	3	50.0	25.0
2000	26	0	8	14	4	36.5	0.0
2001	30	0	9	16	5	36.5	0.0
2004	50	3	4	35	8	39.0	6.0

Appendix 4

Access and facility information for Lake Murvaul, Texas. BR = boat ramp, FP = fishing pier, and J = jetty

Facility Type (BR, FP, J)	Location	Latitude	Longitude	Fee charged (Yes/No)	Number of boat ramp lanes	Boat ramp parking capacity	ADA Accommodations (Yes/No)	Bank fishing (Yes/No)
BR, FP	Rosa L. Jones Park	32° 02.69	94° 28.45	No	1	10	No	Yes
BR, FP	Dotson Crossing Ramp	32° 02.02	94° 28.93	No	2	15	No	No
BR	Across from Lakeside Grocery	32° 01.99	94° 29.01	No	1	10	No	No
BR, FP	Murvaul Marina	32° 02.48	94° 25.79	Yes	3	40	Yes	Yes