PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-30-R-29

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2003 Survey Report

Livingston Reservoir

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EXECUTIVE SUMMARY

Livingston Reservoir was surveyed in 2003-2004 with electrofishing, trap nets, gill nets, a creel survey, a structural habitat/aquatic vegetation survey, and an angler access survey. This report summarizes the results of these surveys and comparisons are made to historical data (1990-2002). Based on this information, a management plan was developed for the reservoir.

- **Reservoir description:** Livingston Reservoir is located on the Trinity River in Trinity, Polk, San Jacinto, and Walker Counties, Texas lying within the Piney Woods Vegetational Area. Soil types are Kaufman-Trinity, Lufkin-Tabor, Bowie-Kirvin, and Susquehana Associations. Livingston Reservoir was constructed in 1969 by the Trinity River Authority (TRA) and the City of Houston to provide water for municipal, agricultural, and industrial purposes. Livingston Reservoir has a surface area of 90,000 acres, a drainage area of approximately 15,700 square miles, and a shoreline length of approximately 350 miles. Rainfall in the watershed averages 48.0 inches per year. There is considerable private and commercial real estate development, as well as Lake Livingston State Park and several TRA public parks, around the lower two-thirds of the reservoir.

- **Prey species:** Clupeids (threadfin & gizzard shad) continue to dominate the forage base in Livingston Reservoir. The electrofishing catch rate of both species combined in 2003 was 614.0 fish/hour; the highest combined catch rate for these species in over 14 years. Most gizzard shad in the sample were available as prey with over 75% under 7-inches total length.

  Sunfishes are the second most abundant prey species in Livingston Reservoir. Longear sunfish were the most abundant sunfish in the 2003 sample (117.5 fish/hour). In the fall of 1999 the catch rate of bluegill was 201.5 fish/hour but declined in 2003 to 75.0 fish/hour. Most individuals captured were less than 6-inches total length and were available as prey.

  Other prey species present in the 2003 sample were bullhead minnow (7.5/hour), inland silverside (4.0/hour), warmouth (7.0/hour), and redear sunfish (1.0/hour).

- **Catfishes:** Blue catfish continue to be the dominant catfish species, by number, in Livingston Reservoir. In 1999, the gill net catch rate was 19.6/net-night, the highest since 1992, and in 2004 the catch rate increased again to 23.9 fish/net-night. Length frequency data indicate good size distribution with fish as large as 31 inches in the sample. The Proportional Stock Density (PSD) of the sample was 11 in 1999; increasing to 14 in 2004. The condition (Wr) of the blue catfish was excellent across all size classes.

  Channel catfish are far less abundant than blue catfish in Livingston Reservoir. Only 34 individuals were captured in the 2004 gill net sample. This was, however, the highest number captured since 1991.

Anglers spent 29,392 hours seeking catfish at Lake Livingston, harvesting over 54,000 fish during the creel period from June 2003 to May 2004.

- **White bass and striped bass:** Gill net catch rates of white bass have been sporadic since 1991. The highest gill net catch rate was observed in 1996 (19.6/net-night), but in 1999, the catch dropped dramatically to 1.7 fish/net-night. In the spring of 2004, the catch rate rebounded to 11.3 fish/net-night.

  Although striped bass have been stocked into Livingston Reservoir almost every year since 1977, our monitoring has failed to detect the presence of a significant population. In 2004 the catch rate was only 2.4 fish/net-night, the highest ever observed. Striped bass stocked in the reservoir are thought to support a significant striped bass fishery in the tail water area below the dam. This same area is also used by TPWD to obtain large striped bass brood fish necessary to support statewide hatchery production of both striped bass and hybrid striped bass. It is also possible that some of the large striped bass in the tail water area are actually anadromous fish that, during spring, migrate into the area from the Gulf of Mexico. The striped bass that we do observe in the reservoir are in excellent condition growing to 18 inches at age 2.

  Although the intended effort of anglers seeking white bass is low (5,589 hours), the catch rate is very high (4.98 fish/angler hour). This indicates a small but very specialized group of anglers targeting white bass. Creel survey findings indicate that only a few anglers are targeting striped bass. The directed effort was estimated at only 228 hours during the creel period with just over 1,300 striped bass caught by all anglers combined.

- **Black bass:** Electrofishing catch rates of largemouth bass have always been low, usually 20 to 40 fish/hour in any given sample. Poor bass recruitment, due to the scarcity of rooted aquatic plants to provide adequate juvenile habitat, is the most probable cause for this low population density. Livingston Reservoir also collects a very high volume of silt that, over time, has contributed to the overall decline in habitat quality.

  A notable change in the size distribution of the largemouth bass samples has been observed since 1993. Both PSD and RSDp have declined in recent years. In 1999 and 2003, no bass longer than 14 inches (the minimum length limit) were captured, and only one bass over 14 inches was captured in 2001. Largemouth bass in Livingston Reservoir normally reach 14 inches after age 3.

  Over 43% (>34,000 hours) of the total directed angling effort at Livingston Reservoir targets largemouth bass, making it the most sought-after species in the reservoir. Directed angler catch rate was estimated at 0.53 fish/hour. Anglers harvested bass ranging in size from 12 to 22 inches, but harvest was low at 0.17 fish/hour.

  Florida largemouth bass fingerlings were stocked in 2000 and 2001 (over 1 million fish) in an attempt to increase the number of Florida genotypes in the

population. There has been no change in allele frequencies, and in 2003, no pure Florida largemouth were collected.

- **Crappie:** Trap net catches of white crappie have declined since 1991. The catch rate in 1991 was 15.7 fish/net-night, but by 1999 it had dropped to 1.1 fish/net-night. The trap net catch rate in 2003 was back up to 6.0 fish/net-night. Length frequency data suggest that a strong year class has recruited into the stock at Livingston Reservoir, probably from 2002. White crappies observed in our sample were in good condition. Black crappies occur very infrequently in trap net samples; only 10 were captured in 2003. Growth is good with crappie reaching 10 inches by age 2.

  Creel data indicated a very minimal fishery for crappies. Less than 2% of the intended effort was directed toward this species. Creel data were insufficient to generate estimates of directed catch and harvest rates. An estimated 2,931 white crappie were harvested by all anglers combined.

- **Management strategies:** Based on current information Livingston Reservoir should continue to be managed under current harvest regulations. Livingston Reservoir provides a very high quality blue catfish fishery, a somewhat sporadic white bass fishery, an underutilized striped bass fishery, and quality crappie and largemouth bass fisheries in creeks and other areas of the reservoir where littoral habitat is abundant. Strategies should be employed to increase utilization of the available fisheries through education while attempting to improve littoral habitat.

  Stocking of Florida largemouth bass has been less successful than desired. Future stocking requests should be based on and conducted only within known areas of littoral habitat.

  Habitat management at Livingston Reservoir has two major components; exotic vegetation control and littoral habitat enhancement. The TRA currently treats water hyacinth and water lettuce throughout the growing season to keep these species under control. TPWD has worked with Texas Black Bass Unlimited to plant native aquatic vegetation. Some success has been achieved; however, far more effort is needed to mitigate the results of siltation and turbidity. Future efforts toward habitat enhancement should be concentrated in creeks and backwater areas where these efforts have the best chance for success.

  The creation of a local lake management organization, similar to the Lake Conroe Restocking Association, could be of assistance in the creation of habitat enhancement projects, as well as in raising funds to purchase and stock advanced size crappie and/or Florida largemouth bass. The stocking of advanced size juvenile fish might artificially increase recruitment in limited areas of the reservoir.

INTRODUCTION

This document is a summary of fisheries data collected from Livingston Reservoir from June 2003 to May 2004; data from previous years are included for comparison. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other species of fishes was collected, this report deals primarily with major sport fishes and important prey species. Management strategies are included to address existing problems or opportunities.

Harvest regulations for Livingston Reservoir in 2003-2004.

Species	Bag Limit	Minimum-Maximum Length
Bass, Largemouth	5	14 - No Limit
Bass, Striped, its hybrids and subspecies	5	18 - No Limit
Bass, White	25	12 - No Limit
Catfish, Flathead	5	18 - No Limit
Catfish, Channel and Blue	50[a]	12 - No Limit
Crappie, White and Black	25	10 - No Limit

[a]Walker, San Jacinto, Trinity, and Polk Counties only.

METHODS

- Fishes were collected from randomly selected stations by electrofishing (2.0 hours at 24 5-minute stations), trap netting (15 net-nights at 15 stations), and gill netting (15 net-nights at 15 stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour of actual electrofishing and for trap nets and gill nets as the number of fish caught in one net set overnight. Largemouth bass electrophoresis samples were collected in accordance with the Fisheries Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2002).

- Sampling statistics (CPUE for various length categories) and structural indices (Proportional Stock Density [PSD] and Relative Stock Density [RSD]) were calculated for target fishes according to Anderson and Neumann (1996).

- Ages were determined for white bass, striped bass, white crappie, black crappie and largemouth bass using otoliths. Mean length at age was calculated and compared to historical values.

- A roving creel survey (36 creel days) was conducted from June 2003 through May 2004 to assess angler use and catch in accordance with the Fisheries Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2002).

- A survey of structural habitat/aquatic vegetation and angler access was conducted in accordance with the Fisheries 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. American Fisheries Society, Bethesda, Maryland.

Physical and historical data for Livingston Reservoir, Texas, 2003-2004.

Inland Fisheries water body code: 0451 IF District: 3E - Bryan

Controlling authority: Trinity River Authority

Water Uses: Water supply, recreation, flood control, agricultural

Counties: Polk (location of dam), Trinity, San Jacinto, and Walker

Location: 5 miles NW of Livingston, Texas

Latitude: 30° 37' Longitude: 95° 01'

Nearest major metropolitan area and distance: Houston - 70 miles

Reservoir description: Main stream River: Trinity River

Mean depth (ft): 23.0 Maximum depth (ft): 77.0

Shoreline development index: 10.7 Watershed (mi^2): 15,789

Secchi disc range (ft): 2-4 Conductivity (µmhos/cm): 200-450

Size: 90,000 acres

Impounded: 1969

Access:	Boat:	Good
	Bank:	Fair
	Handicap:	Inadequate

Survey History:

Method	Year
Gill net	1975, 1981, 1982, 1988, 1989, 1990, 1991, 1992, 1993, 1996, 1999, 2004
Electrofishing	1986, 1988, 1989, 1990, 1991, 1993, 1996, 1999, 2003
Frame net	1988, 1989, 1990, 1991, 1993, 1996, 1999, 2003
Cove rotenone	1975, 1981, 1982
Creel survey	1991, 2003-2004
Habitat survey	1996, 1999

Survey of littoral zone and physical habitat types, Lake Livingston, Texas, September 2003. A linear shoreline distance (miles) was recorded for each habitat type found. Acreages are listed for dead timber/stumps.

	Shoreline Distance		
Habitat type	Miles	Percent of total	Acres
Bulkhead	14.19	4.6	
Concrete	5.91	1.9	
Dead trees	7.27	2.4	5,778*
Eroded bank	11.97	3.9	
Featureless	7.87	2.6	
Flooded terrestrial	24.41	8.0	
Native emergent	0.41	0.1	
Overhanging brush	3.41	1.1	
Rip rap	5.51	1.8	
Bulkhead/boat dock	106.24	35.1	
Bulkhead/overhanging brush	0.84	0.2	
Bulkhead/rip rap	0.13	<0.1	
Concrete/dead trees	0.56	0.1	
Eroded bank/dead trees	6.12	2.0	
Eroded bank/rock shoreline	0.53	0.1	
Featureless/boatdock	0.51	0.1	
Featureless/dead trees	1.23	0.4	
Flooded terrestrial/dead trees	8.96	2.9	
Flooded terrestrial/native floating	1.12	0.3	
Flooded terrestrial/overhanging brush	2.88	0.9	
Flooded terrestrial/water hyacinth	26.45	8.7	
Native emergent/water hyacinth	41.75	13.7	
Rip rap/boat dock	0.35	0.1	
Boat dock/flooded terr./water hyacinth	1.15	0.3	
Bulkhead/boat dock/dead trees	1.18	0.3	
Bulkhead/boat dock/rip rap	0.29	<0.1	
Bulkhead/boat dock/water hyacinth	1.78	0.5	
Eroded bank/dead trees/water hyacinth	0.75	0.2	
Eroded bank/rocky shoreline/dead trees	2.29	0.7	
Eroded bank/native emergent/water hyacinth	11.84	3.9	
Flooded terrestrial/dead trees/eroded bank	0.65	0.2	
Flooded terrestrial/dead trees/overhanging brush	3.21	1.0	
Flooded terrestrial/dead trees/rip rap	0.27	<0.1	
Flooded terrestrial/dead trees/water hyacinth	0.25	<0.1	
Flooded terrestrial/overhanging brush/eroded bank	0.30	<0.1	

* Constitutes standing timber in open water habitat both in and outside the littoral areas.

Survey of aquatic vegetation coverage, Lake Livingston, Texas, September 2003.

Vegetation type	Acres	Percent Coverage
Water hyacinth	300	0.33
Water lettuce	500	0.56
Native emergent	100	0.11

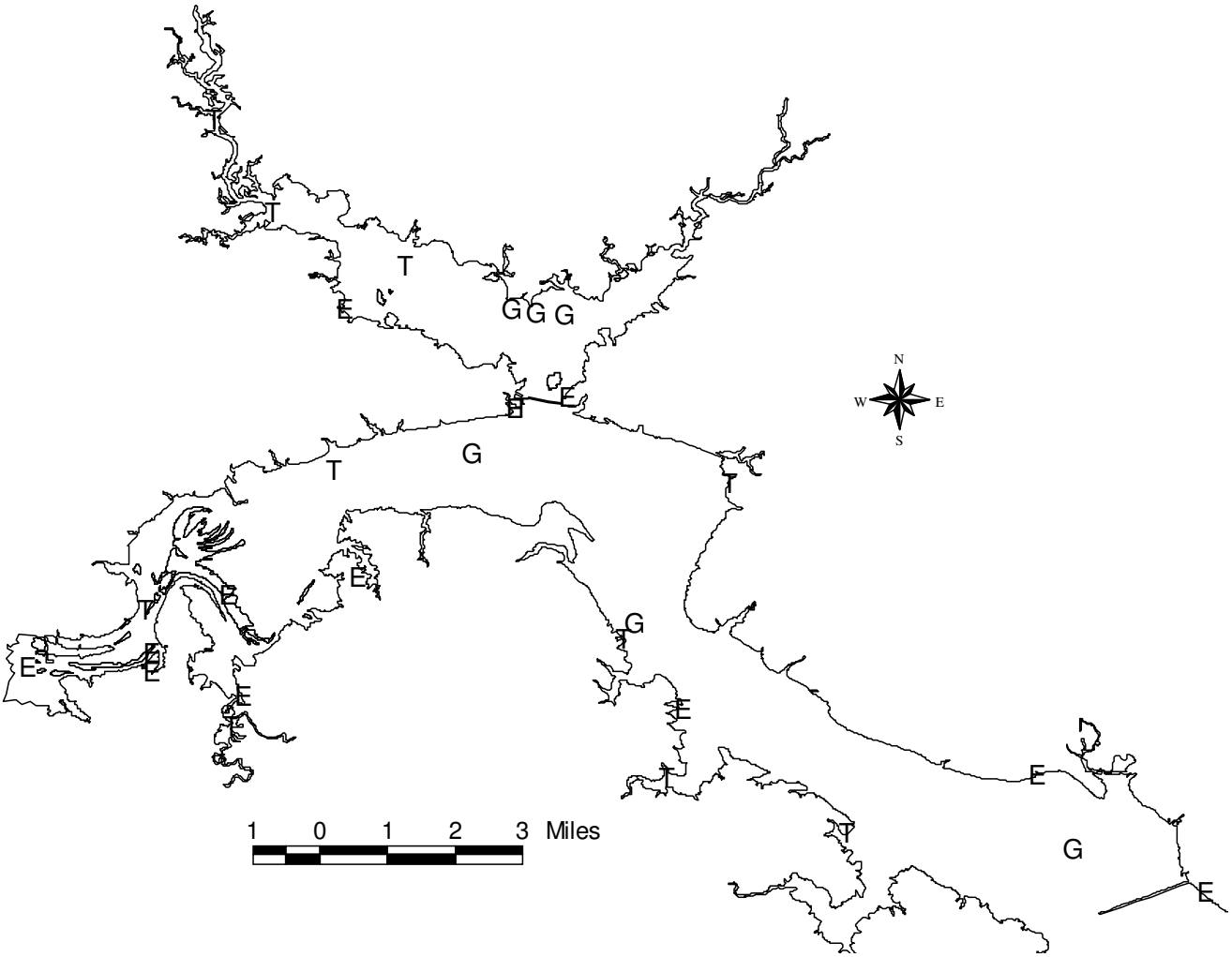
Stocking history of Livingston Reservoir, Texas. Size categories are FGL = 1-3 inches; FGL+ = 8-10 inches.

Species	Year	Number	Size
Blue catfish	1969	159,800	FGL
Channel catfish	1969	634,905	FGL
	1970	254,000	FGL
	TOTAL	888,905	
Striped bass	1977	884,726	FGL
	1978	117,091	FGL
	1979	224,000	FGL
	1980	283,584	FGL
	1982	341,357	FGL
	1983	189,265	FGL
	1984	1,424,455	FGL
	1985	896,996	FGL
	1986	448,485	FGL
	1987	898,585	FGL
	1988	899,615	FGL
	1989	905,687	FGL
	1992	351,750	FGL
	1993	405,000	FGL
	1994	1,788,670	FGL
	1995	900,913	FGL
	1996	441,079	FGL
	1997	553,134	FGL
	1998	689,849	FGL
	1999	913,952	FGL
	2000	900,264	FGL
	2002	1,392,893	FGL
	2003	1,032,104	FGL
	2004	439,308	FGL
	TOTAL	17,322,762	
Largemouth bass	1969	1,018,400	FGL
Florida largemouth bass	1975	26,000	FGL
	1976	22,000	FGL
	1977	250,330	FGL
	1978	753,286	FGL

Stocking history of Livingston Reservoir, Texas (continued).

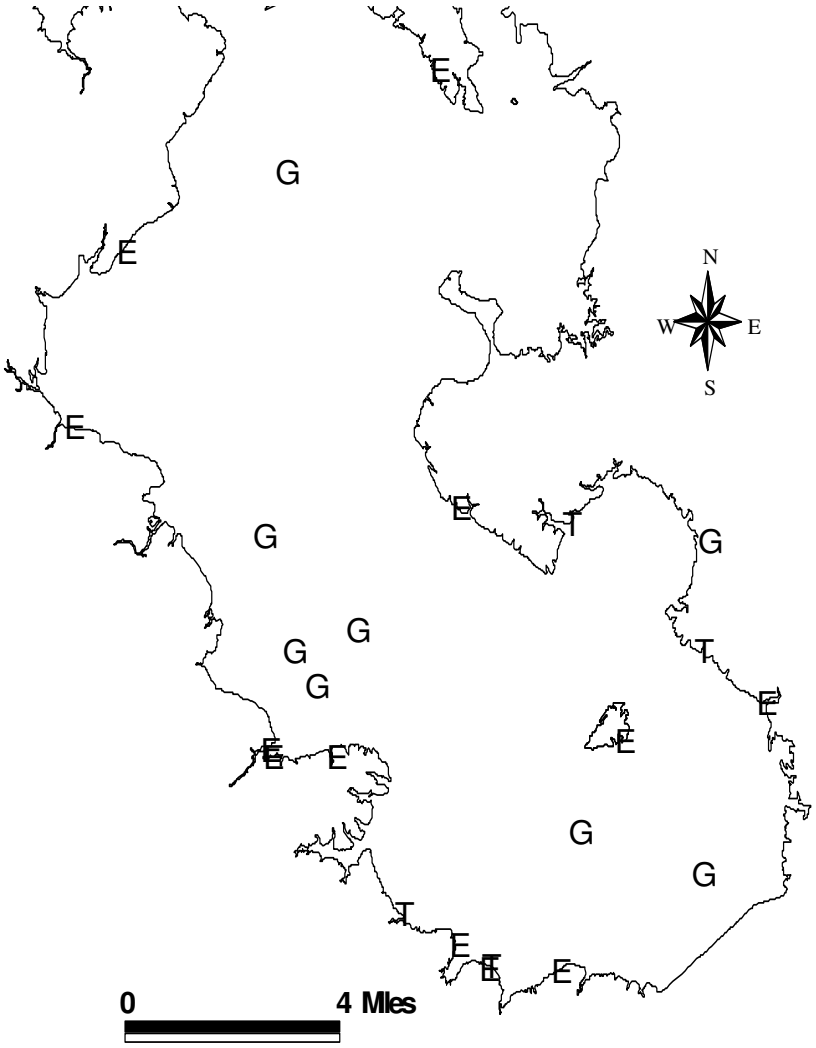
Species	Year	Number	Size
Florida largemouth bass	1996	889,304	FGL
	2000	501,639	FGL
	2001	500,018	FGL
	TOTAL	2,942,577	
Paddlefish	1990	63,232	FGL
	1991	34,132	FGL
	1992	5,136	FGL
	1993	28,003	FGL
	TOTAL	130,503	

Upper Livingston Reservoir

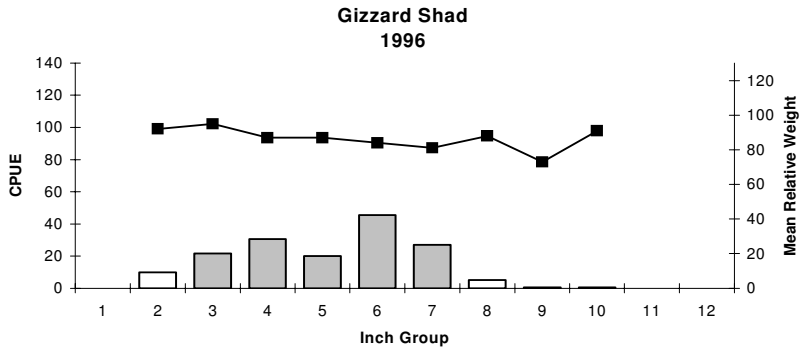


Location of sampling sites, upper Livingston Reservoir, Texas, 2003-2004. Gill net, electrofishing, and trap net stations are indicated by G, E, and T, respectively. Sampling sites were randomly selected.

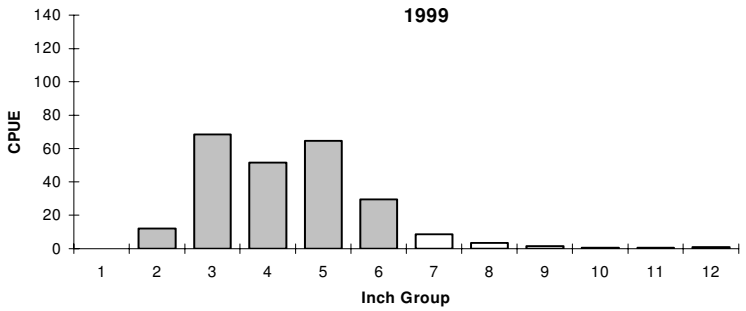
Lower Livingston Reservoir



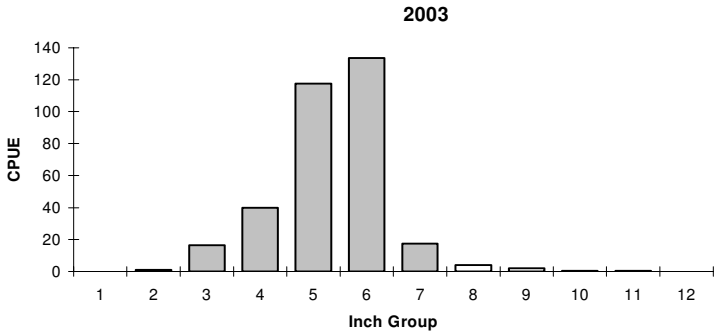
Location of sampling sites, lower Livingston Reservoir, Texas, 2003-2004. Gill net, electrofishing, and trap net stations are indicated by G, E, and T, respectively. Sampling sites were randomly selected.



Effort = 2
N = 321
Total CPUE = 160.5
Stock CPUE = 33.0
PSD = 0

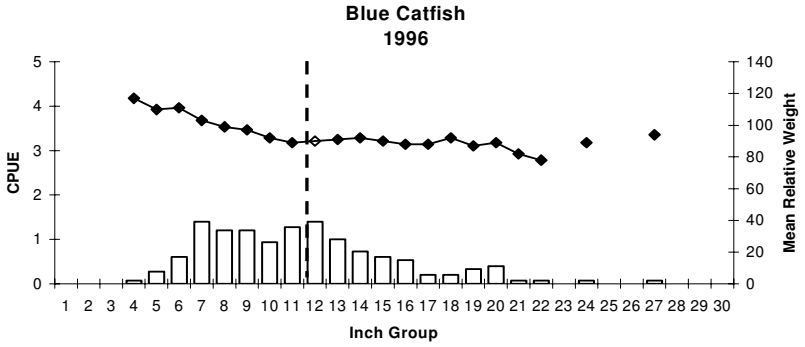


Effort = 2
N = 483
Total CPUE = 241.5
Stock CPUE = 15.5
PSD = 6

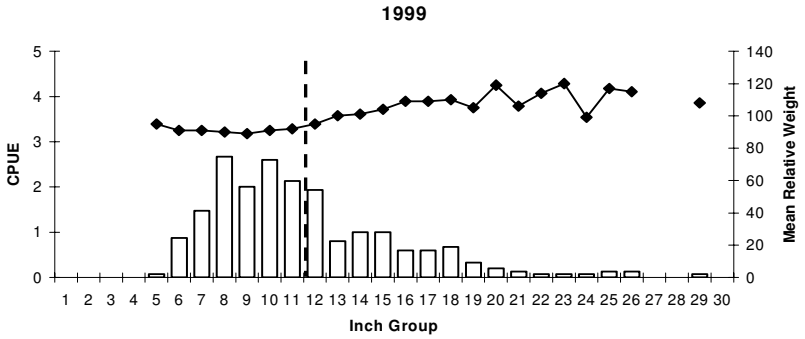


Effort = 2
N = 666
Total CPUE = 333.0
Stock CPUE = 24.5
PSD = 2

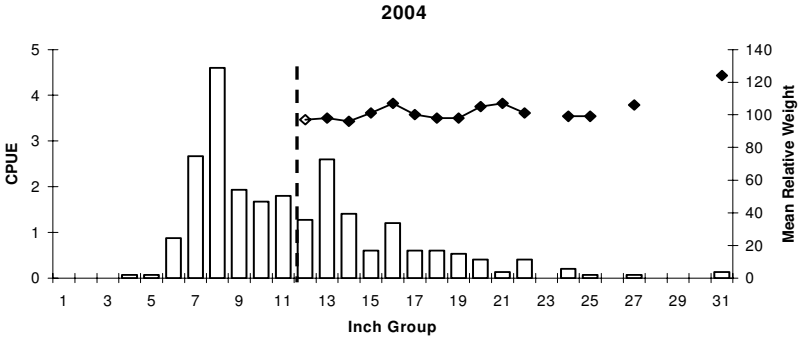
The number of gizzard shad caught per hour (CPUE, bars), mean relative weight, (lines), and population indices for fall electrofishing surveys, Livingston Reservoir, Texas. Mean relative weights were not calculated for this species after 1996.



Effort = 15
N = 189
Total CPUE = 12.6
Stock CPUE = 5.7
PSD = 12
RSD-P = 0

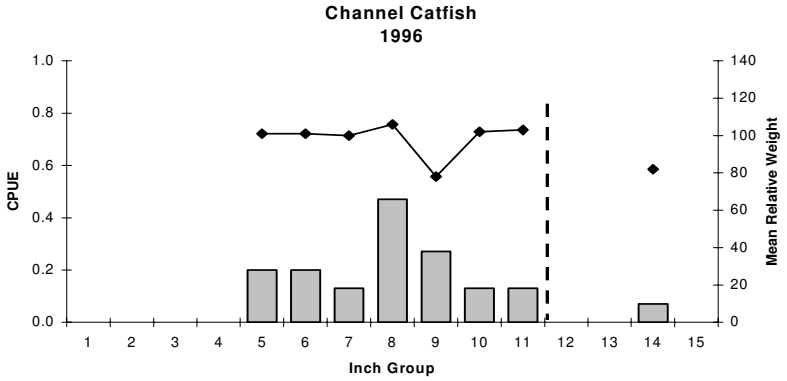


Effort = 15
N = 294
Total CPUE = 19.6
Stock CPUE = 7.8
PSD = 11
RSD-P = 0

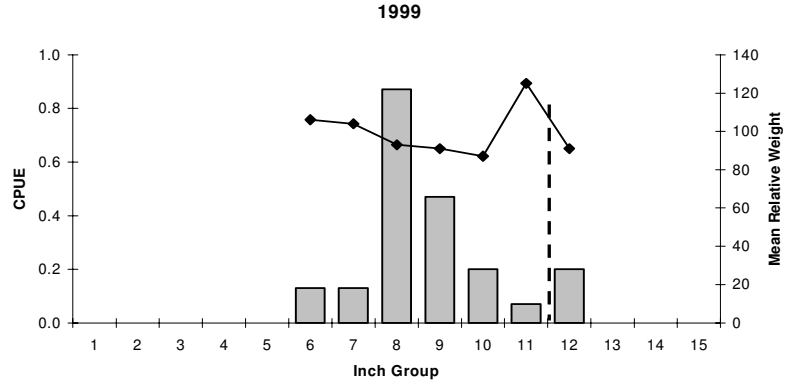


Effort = 15
N = 358
Total CPUE = 23.9
Stock CPUE = 10.2
PSD = 14
RSD-P = 0

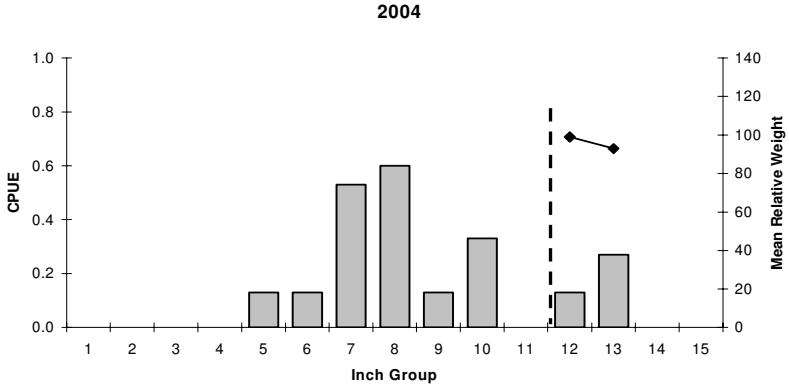
The number of blue catfish caught per net-night (CPUE, bars), mean relative weight, (lines), and population indices for spring gill net surveys, Livingston Reservoir, Texas. Broken vertical lines represent minimum legal length.



Effort = 15
N = 24
Total CPUE = 1.6
Stock CPUE = 0.2
PSD = 0
RSD-P = 0

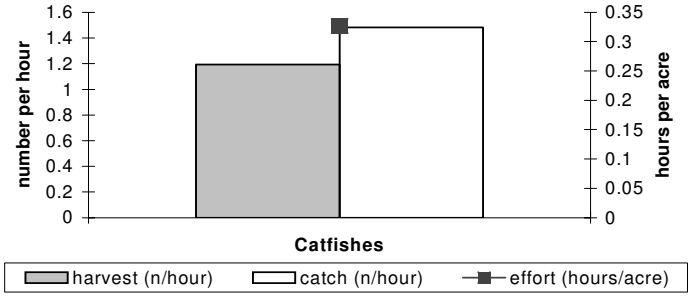


Effort = 15
N = 31
Total CPUE = 2.1
Stock CPUE = 0.3
PSD = 0
RSD-P = 0

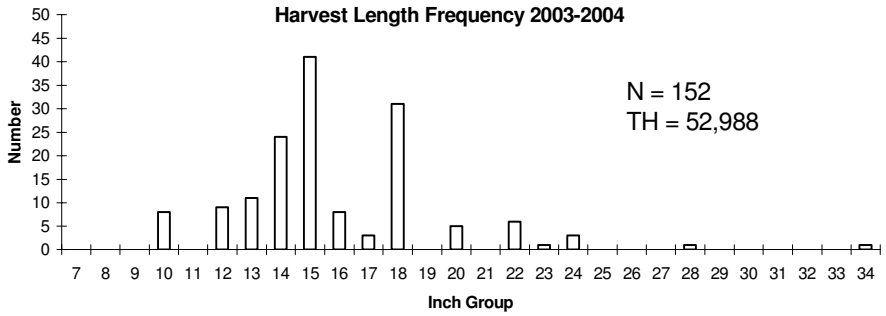


Effort = 15
N = 34
Total CPUE = 2.3
Stock CPUE = 0.4
PSD = 0
RSD-P = 0

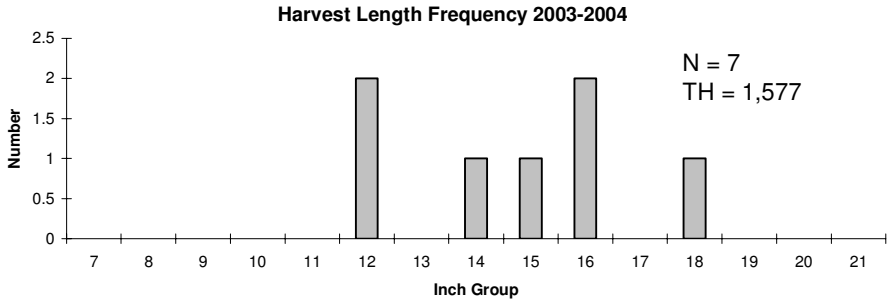
The number of channel catfish caught per net-night (CPUE, bars), mean relative weight, (lines), and population indices for spring gill net surveys, Livingston Reservoir, Texas. Broken vertical lines represent minimum legal length.



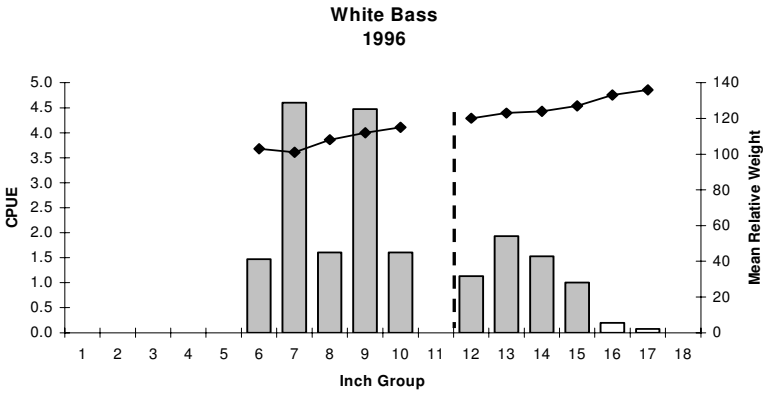
Annual creel statistics for angler seeking catfishes at Livingston Reservoir, Texas. Creel period was June 2003 through May 2004.



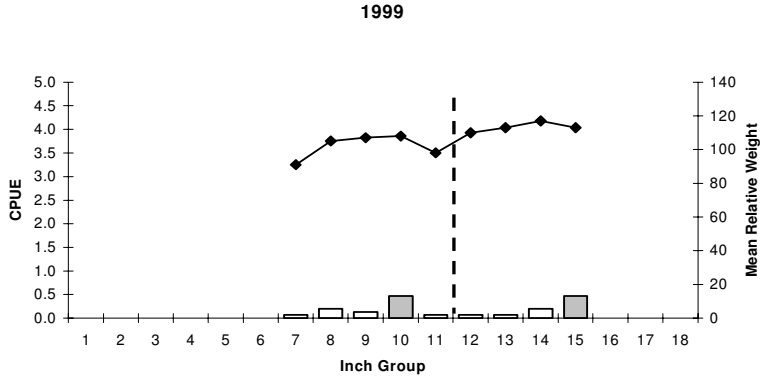
Length frequency and number (N) of harvested blue catfish observed during creel surveys and total estimated harvest (TH) of blue catfish for all anglers combined at Livingston Reservoir, Texas. Creel period was June 2003 through May 2004. The minimum length limit is 12 inches.



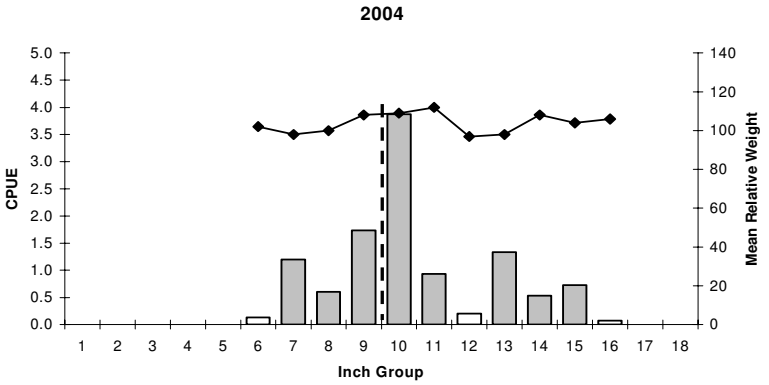
Length frequency and number (N) of harvested channel catfish observed during creel surveys and total estimated harvest (TH) of channel catfish for all anglers combined at Livingston Reservoir, Texas. Creel period was June 2003 through May 2004. The minimum length limit is 12 inches.



Effort = 15
N = 294
Total CPUE = 19.6
Stock CPUE = 19.6
PSD = 61
RSD-P = 30



Effort = 15
N = 26
Total CPUE = 1.8
Stock CPUE = 1.8
PSD = 85
RSD-P = 46



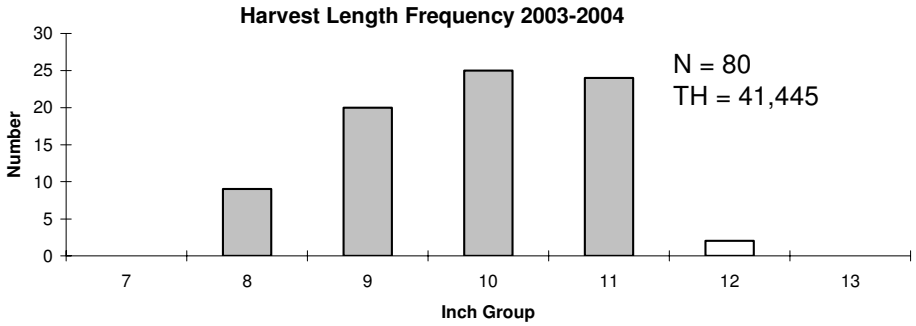
Effort = 15
N = 170
Total CPUE = 11.3
Stock CPUE = 11.3
PSD = 83
RSD-P = 25

The number of white bass caught per net-night (CPUE, bars), mean relative weight, (lines), and population indices for spring gill net surveys, Livingston Reservoir, Texas. Broken vertical lines represent minimum legal length.

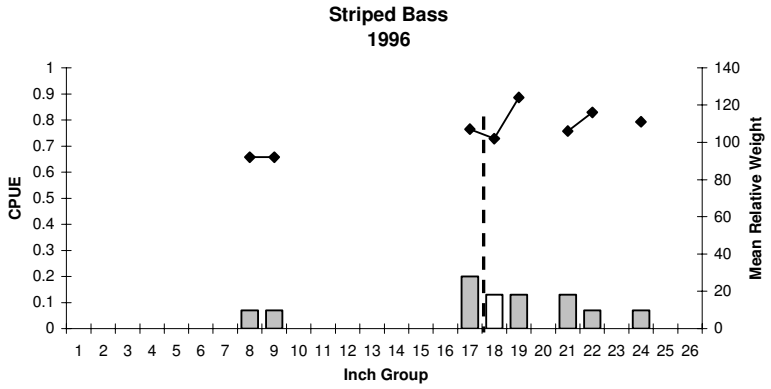
Mean lengths (inches) by age at capture for white bass (sexes combined) collected in spring gill net surveys, Livingston Reservoir, Texas, 1999 and 2004. Sample sizes are in parentheses.

	Age (years)			
Year	1	2	3	4
1999	10.3	10.3	12.9	15.3
	(1)	(9)	(7)	(3)
2004	9.3	13.7	14.6	
	(27)	(6)	(8)	

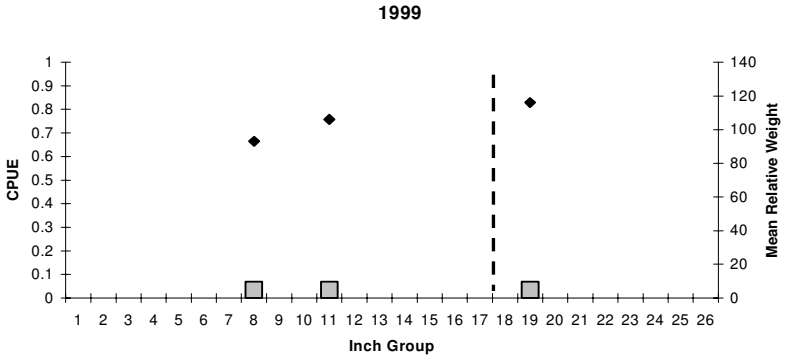
Annual creel statistics for angler seeking white bass at Lake Livingston, Texas, June 2003 through May 2004.



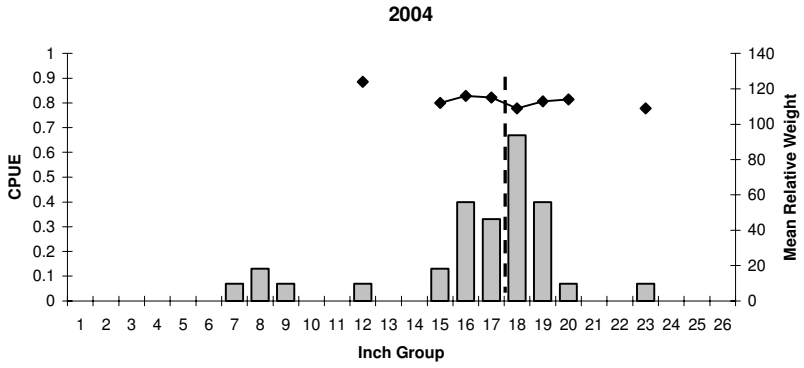
Length frequency and number (N) of harvested white bass observed during creel surveys and total estimated harvest (TH) of white bass for all angler combined at Livingston Reservoir, Texas. Creel period was June 2003 through May 2004. The minimum length limit is 10 inches.



Effort = 15
N = 13
Total CPUE = 0.9
Stock CPUE = 0.7
PSD = 36
RSD-P = 0



Effort = 15
N = 3
Total CPUE = 0.2
Stock CPUE = 0.1
PSD = 0
RSD-P = 0

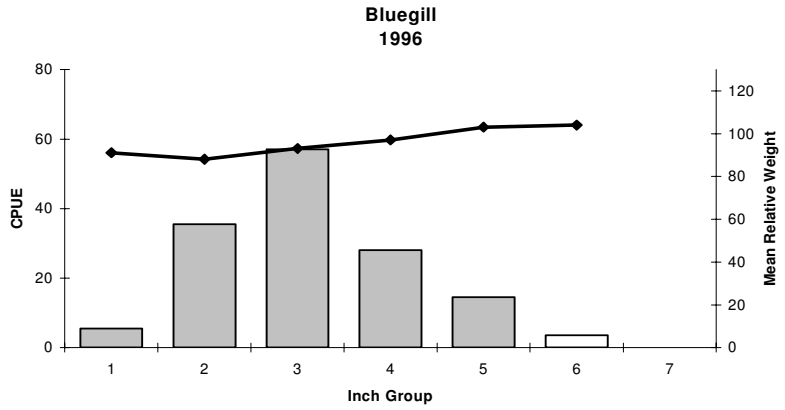


Effort = 15
N = 36
Total CPUE = 2.4
Stock CPUE = 2.1
PSD = 7
RSD-P = 0

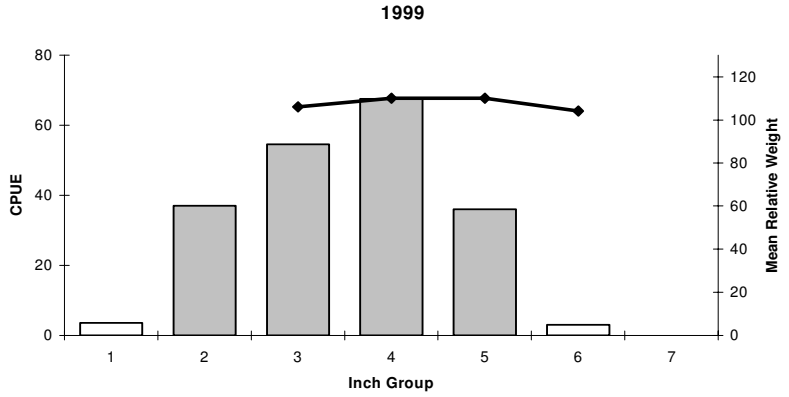
The number of striped bass caught per net-night (CPUE, bars), mean relative weight (lines), and population indices for spring gill net surveys, Livingston Reservoir, Texas. Broken vertical lines represent minimum legal length.

Mean lengths (inches) by age at capture for striped bass (sexes combined) collected in fall electrofishing surveys, Livingston Reservoir, Texas, 2004. Sample sizes are in parentheses.

	Age (years)		
Year	1	2	3
2004	9.3 (5)	18.0 (19)	19.1 (4)



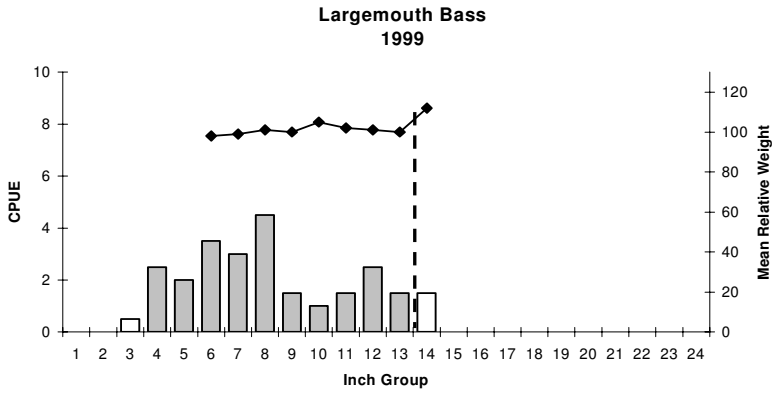
Effort = 2
N = 288
Total CPUE = 144.0
Stock CPUE = 103.0
PSD = 3
RSD-P = 0



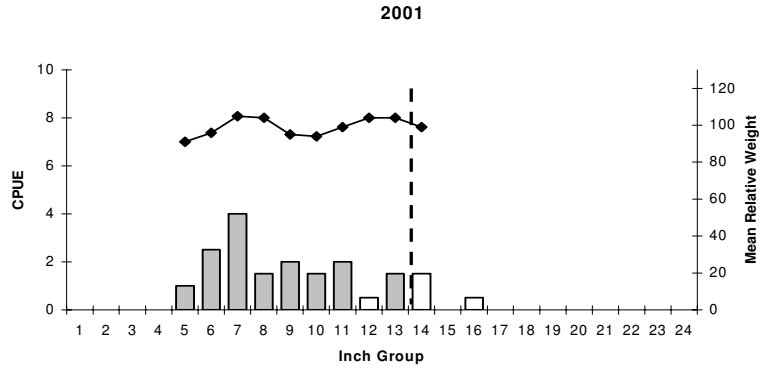
Effort = 2
N = 403
Total CPUE = 201.5
Stock CPUE = 161.0
PSD = 2
RSD-P = 0

Effort = 2
N = 150
Total CPUE = 75.0
Stock CPUE = 50.0
PSD = 2
RSD-P = 0

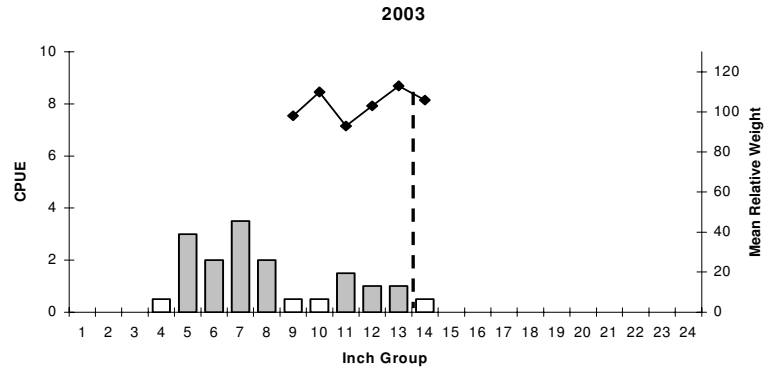
The number of bluegill caught per hour (CPUE, bars), mean relative weight (lines), and population indices for fall electrofishing surveys, Livingston Reservoir, Texas.



Effort = 2
N = 51
Total CPUE = 25.5
Stock CPUE = 14.0
PSD = 39
RSD-P = 0
% FLMB = 3.0



Effort = 2
N = 37
Total CPUE = 18.5
Stock CPUE = 11.0
PSD = 36
RSD-P = 5
% FLMB = 0.0

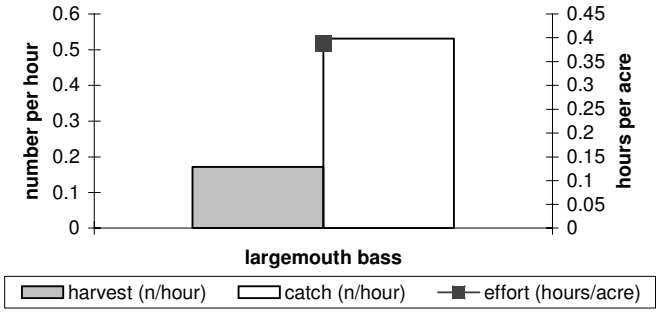


Effort = 2
N = 32
Total CPUE = 16.0
Stock CPUE = 7.0
PSD = 36
RSD-P = 0
% FLMB = 0.0

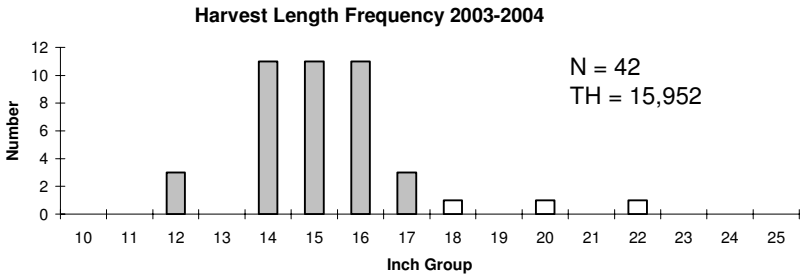
The number of largemouth bass caught per hour (CPUE, bars), mean relative weight (lines), and population indices for fall electrofishing surveys, Livingston Reservoir, Texas. % FLMB = percent of pure Florida largemouth bass present in a subsample. Broken vertical lines represent minimum legal length.

Mean lengths (inches) by age at capture for largemouth bass (sexes combined) collected in fall electrofishing surveys, Livingston Reservoir, Texas, 1999, 2001 and 2003. Sample sizes are in parentheses.

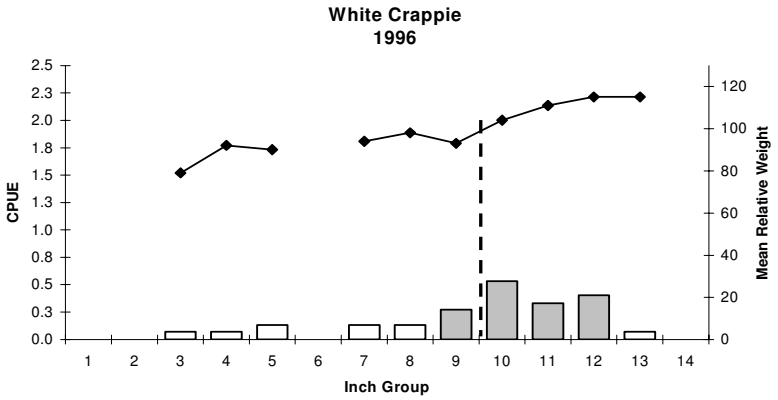
	Age (years)			
Year	0	1	2	3
1999	6.6	11.0	13.3	13.7
	(26)	(8)	(9)	(1)
2001	7.2	11.4	14.4	
	(18)	(15)	(3)	
2003	6.8	11.4	12.0	
	(21)	(6)	(4)	



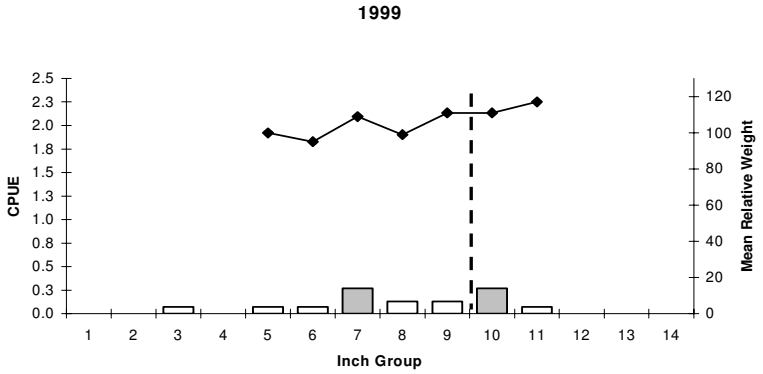
Annual creel statistics for anglers seeking largemouth bass at Livingston Reservoir, Texas. Creel period was June 2003 through May 2004.



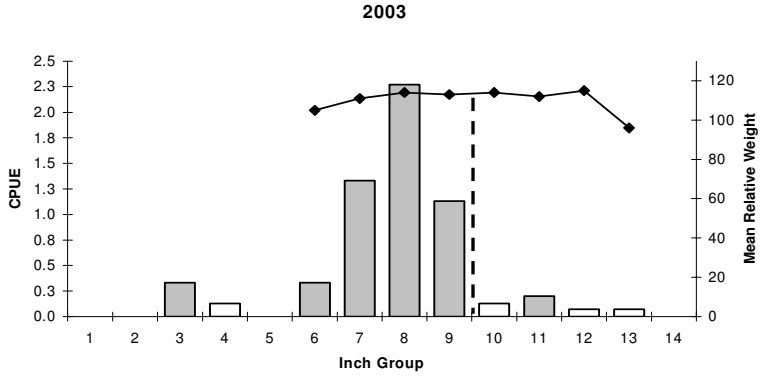
Length frequency and number (N) of harvested largemouth bass observed during creel surveys and total estimated harvest (TH) of largemouth bass for all anglers combined at Livingston Reservoir, Texas. Creel period was June 2003 through May 2004. The minimum length limit is 14 inches.



Effort = 15
N = 32
Total CPUE = 2.1
Stock CPUE = 2.0
PSD = 87
RSD-P = 67



Effort = 15
N = 16
Total CPUE = 1.1
Stock CPUE = 1.0
PSD = 59
RSD-P = 34

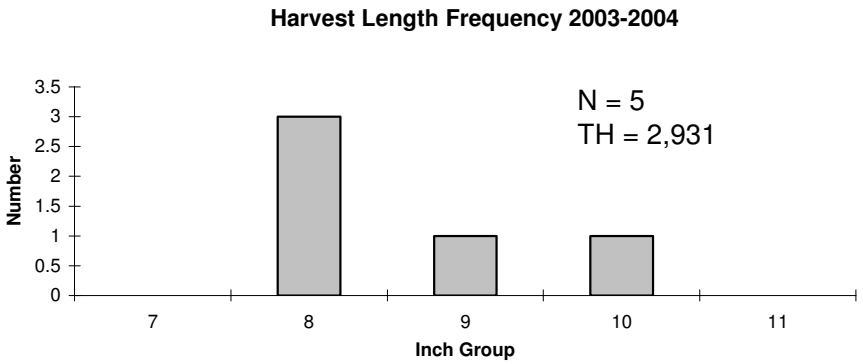


Effort = 15
N = 90
Total CPUE = 6.0
Stock CPUE = 5.5
PSD = 70
RSD-P = 8

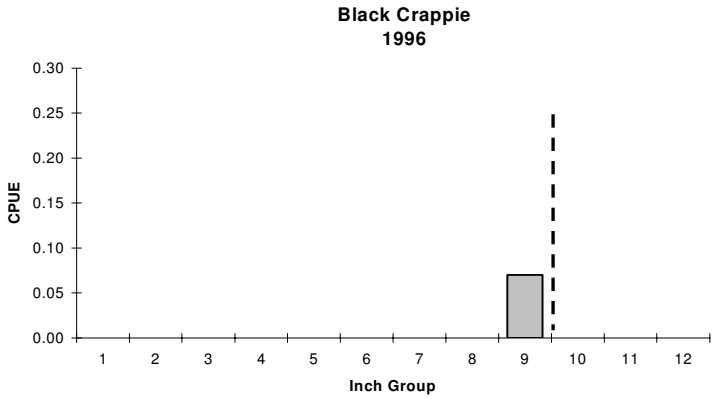
The number of white crappie caught per net-night (CPUE, bars), mean relative weight (lines), and population indices for trap frame net surveys, Livingston Reservoir, Texas. Broken vertical lines represent minimum legal length.

Mean lengths (inches) by age at capture for white crappie (sexes combined) collected in fall trap nets, Livingston Reservoir, Texas, 1999 and 2003. Sample sizes are in parentheses.

	Age (years)		
Year	0	1	2
1999	6.9 (8)	10.3 (7)	
2003	6.5 (16)	9.0 (14)	9.6 (5)



Length frequency and number (N) of harvested white crappie observed during creel surveys and total estimated harvest (TH) of white crappie for all anglers combined at Livingston Reservoir, Texas. Creel period was June 2003 through May 2004. The minimum length limit is 10 inches.



Effort = 15
N = 1
Total CPUE = 0.1
Stock CPUE = 0.1
PSD = 0
RSD-P = 0

Effort = 15
N = 6
Total CPUE = 0.4
Stock CPUE = 0.2
PSD = 67
RSD-P = 33

Effort = 15
N = 10
Total CPUE = 0.7
Stock CPUE = 0.6
PSD = 78
RSD-10 = 33

The number of black crappie caught per net-night (CPUE, bars), mean relative weight (lines), and population indices for fall frame net surveys, Livingston Reservoir, Texas. Sample size was insufficient in 1996 to evaluate relative weight. Broken vertical lines represent minimum legal length.

Mean lengths (inches) by age at capture for black crappie (sexes combined) collected in fall trap nets, Livingston Reservoir, Texas, 1999 and 2003. Sample sizes are in parentheses.

	Age (years)		
Year	0	1	2
1999	5.0	9.4	
	(4)	(2)	
2003	5.3	8.7	10.2
	(2)	(4)	(3)

Fisheries Management Plan
Livingston Reservoir, Texas

Prepared - June 2004.

ISSUE 1 Littoral habitat degradation and siltation have contributed to a decline in sport fish populations at Livingston Reservoir.

MANAGEMENT STRATEGIES

1. Continue cooperative effort begun with the U.S. Army Corps of Engineers, the Trinity River Authority, and Texas Black Bass Unlimited to establish native aquatic plants in Livingston Reservoir. Efforts should be made to establish native plants in backwater areas where the possibility for success is maximal. Also explore other habitat enhancement options using artificial materials in areas where the introduction of aquatic plants would not be feasible.

ISSUE 2 Livingston Reservoir has a popular largemouth bass fishery with over 42% of intended angling effort directed at this species.

MANAGEMENT STRATEGIES

1. Continue to monitor the largemouth bass population every two years with standard electrofishing surveys. Sample 24 5-minute stations chosen randomly.

2. Monitor population genetics every two years by collecting in the fall at least 30 age-0 largemouth bass for electrophoretic analysis.

3. Collect a supplemental sample of at least 30 age-0 largemouth bass for electrophoresis in 2004 from areas where Florida largemouth bass were stocked in 2000 and 2001 to determine if stockings have had a local genetic affect.

4. When criteria are met, request stockings of Florida largemouth bass fingerlings for specific areas where appropriate habitat is available.

ISSUE 3 Many striped bass stocked in Livingston Reservoir make their way into the tail water area below the dam and help provide brood fish for the hatchery program. There is a marginal fishery for striped bass in the reservoir itself and a popular fishery for them below the dam.

MANAGEMENT STRATEGIES

1. Continue stocking striped bass into Livingston Reservoir annually at a stocking rate of 10 fish/acre.

2. Continue monitoring the striped bass population every four years with standard spring gill net surveys.

3. Continue to use the tail water area below Livingston Dam as a striped bass brood stock procurement area for the hatchery program.

4. In summer of 2004, develop a striped bass fact sheet for posting /distribution at Livingston Reservoir area businesses. Include information on the reservoir and tailrace striped bass populations, our brood stock and striped bass production efforts, and methods for fishing for striped bass in the reservoir.

ISSUE 4 Although many access points are available on Livingston Reservoir, few of them offer handicapped access.

MANAGEMENT STRATEGIES

1. In 2004 meet with the Trinity River Authority to discuss this issue and see if possibilities exist for increasing handicapped access at Livingston Reservoir.

ISSUE 5 Livingston Reservoir is infested with the exotic plants water hyacinth and water lettuce at levels that impede access.

MANAGEMENT STRATEGIES

1. At present, Trinity River Authority is monitoring and treating these exotic species effectively. We will assist them with monitoring and treatment when needed if resources are available.

2. Conduct vegetation surveys every four years.

Appendix I

Number (N) and catch rate (CPUE) from all gear types, Livingston Reservoir, Texas, fall 2003 through spring 2004. Target species only are reported for gill nets and frame nets.

	Fall Electrofishing (2 hours)		Fall Trap Net (15 net-nights)		Spring Gill Net (15 net-nights)	
Species	N	CPUE	N	CPUE	N	CPUE
Gizzard shad	666	333.0				
Threadfin shad	564	282.0				
Bullhead minnow	15	7.5				
Inland silverside	8	4.0				
Blue catfish					358	23.9
Channel catfish					34	2.3
White bass					170	11.3
Striped bass					36	2.4
Warmouth	14	7.0				
Orangespotted sunfish	1	0.5				
Bluegill	150	75.0				
Longear sunfish	235	117.5				
Redear sunfish	2	1.0				
Largemouth bass	32	16.0				
White crappie			90	6.0		
Black crappie			10	0.7		

Appendix 2

Summary of electrophoretic analyses of largemouth bass collected during fall electrofishing surveys at Livingston Reservoir, Texas.

Year	Sample Size	Genotype Florida	F1	Fx	Northern	% FLMB alleles	% pure FLMB
1991	30	1	3	10	16	26.7	3.3
1996	29	4	2	8	15	27.6	13.8
1999	33	1	1	3	19	18.2	3.0
2001	17	0	1	12	4	30.8	0.0
2003	21	0	2	9	10	22.6	0.0

APPENDIX 3

Angler access survey information from Livingston Reservoir, Texas 2004.

Boat ramp	Latitude/ Longitude	Use fee?	Boat lanes	Parking capacity	Accommodations for challenged?	Bank fishing?	Improvements
Parr's Marina & Campground	30.97145° -95.33245°	Y	2	20	N	N	
Paul Cauthan Public Ramp	30.96715° -95.33082°	N	2	20	N	Y	
White Rock City Marina	30.96029° -95.33927°	Y	2	50	N	Y	
Harbor's Point Resort		N	2	n/a	N	Y	
Gilmore's Marina	30.91694° -95.27086°	Y	2	20	Y	Y	Need parking lot
Gallaway's Marina	30.91252° -95.27262°	Y	2	30	N	Y	
Ed's Marina	30.90742° -95.30683°	Y	2	20	N	Y	
Riverside Public Ramp	30.85729° -95.39918°	N	2	10	N	Y	
Bethy Creek Resort	30.84952° -95.38360°	Y	1	15	N	Y	Parking lot needs work
Cove Marina	30.85450° -95.34472°	Y	1	20	N	Y	Need parking lot
Waterwood RV Park	30.82802° -95.23962°	Y	3	50	N	Y	
Nick's Pit Stop	30.83150° -95.14954°	Y	1	5	N	n/a	Needs renovation
Patrick's Ferry	30.79622° -95.16199°	N	2	20	N	n/a	
Lakeside RV Resort	30.81176° -95.12770°	Y	2	50	N	Y	Parking lot needs repair
Broken Bow Marina	30.84171° -95.07937°	Y	1	6	N	Y	Parking lot needs paving
Tripple Creek Marina	30.83472° -95.07491°	Y	2	5	N	N	Parking lot needs paving
Kickappo Marina	30.81176° -95.07929°	Y	1	20	N	Y	Parking lot needs paving
Sandy Creek Marina	30.80760° -95.07358°	Y	1	n/a	n/a	Y	Parking lot needs paving
Hilton K on the Lake	30.81069° -95.09723°	Y	2	50	N	n/a	
Point Blank Public Ramp	30.74447° -95.20803°	N	2	10	N	Y	Parking improvements

APPENDIX 3 continued

Angler access survey information from Livingston Reservoir, Texas 2004.

Boat ramp	Latitude/ Longitude	Use fee?	Boat lanes	Parking capacity	Accommodations for challenged?	Bank fishing?	Improvements
Scenic Cove Marina	30.77356° -95.05388°	Y	2	15	N	Y	
Penwaugh Marina	30.73820° -95.05783°	Y	2	10	N	N	Needs renovation
Blanchard Public Ramp	30.73468° -95.08744°	Y	1	25	N	Y	Parking lot needs repair
Holiday Shores Marina	30.68816° -95.16340°	Y	1	4	N	N	Needs renovation
Tigerville TRA Park	30.71451° -95.05234°	N	1	30	N	Y	
Beacon Bay Marina	30.68851° -95.03045°	Y	2	25	N	N	Parking lot & ramp repair needed
Wolf Creek Marina	30.66361° -95.14830°	Y	2	25	N	Y	
Cape Royal Marina	30.65469° -95.12169°	Y	1	50	n/a	n/a	
Indian Creek Marina	30.64284° -95.14006°	Y	1	4	N	Y	Water too shallow at ramp
Pier 1514 Marina	30.62696° -95.10984°	Y	2	5	N	Y	
Lake Livingston State Park	30.65898° -95.00522°	Y	6	75	N	Y	Parking lot needs paving
3278 Marina	30.61315° -95.04727°	Y	2	30	N	Y	
Hart's Creek Marina	30.85394° -95.21198°	Y	n/a	n/a	n/a	N	