

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-30-R-32

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2006 Survey Report

Bastrop Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Bastrop Reservoir were surveyed in 2006 using electrofishing and in 2007 using gill nets. An angler creel survey was also conducted in 2004. This report summarizes the results of the surveys and contains a fisheries management plan for the reservoir based on those findings.

- **Reservoir Description:** Bastrop Reservoir is a 906-acre impoundment of Spicer Creek, a tributary of the Colorado River, and is located approximately 3 miles northeast of the City of Bastrop, Bastrop County, Texas. The dam was constructed in 1965 to supply water for cooling a natural-gas-fired power plant operated by the Lower Colorado River Authority (LCRA). The reservoir has a shoreline development index of 10.5, and lies within a unique ecological area known as the Lost Pines, a 70 square mile area of the Post Oak Savannah ecological area comprised of loblolly pine forests.
- **Management History:** Important sport fish include largemouth bass and catfishes. The Florida subspecies of largemouth bass was last stocked in Bastrop Reservoir in 1992 to increase Florida bass genetic influence. A 14- to 21-inch slot limit for largemouth bass with a 5 fish daily bag limit (one greater than 21 inches) was implemented in 1993.
- **Fish Community**
 - **Prey species:** Bluegill, threadfin shad, and redear sunfish were the dominant prey species available.
 - **Catfishes:** Channel catfish was the dominant species present. It was the second most sought after species by anglers at the reservoir. Flathead catfish were also present in lower density.
 - **Largemouth Bass:** Largemouth bass were abundant. It was the most sought after species by anglers at the reservoir. Anglers released most of all largemouth bass caught. Growth rates to 14 inches remained good, while large fish (≥ 21 inches) were rare.
- **Management Strategies**

Based on current information, alternate management schemes should be considered. The 14- to 21-inch slot length limit on largemouth bass has not helped increase the angler and electrofishing catch of bass ≥ 21 inches due to the poor growth once individuals enter the protected slot. Largemouth bass reach 14 inches between their second and third year of growth. However, after the third year, growth rates decrease considerably. Based on electrofishing results, only 3 to 4% of the population exceeds 18 inches (13.2% of the slot fish, based on 2006 electrofishing survey). Intraspecific competition may be contributing to slow growth of older fish. An alternate forage source should be investigated to help increase growth of these larger individuals, along with the promotion of harvest of sub-slot bass. Channel catfish are abundant, yet underutilized. Fishing opportunities for this species should be promoted to the public. Aquatic vegetation coverage, including hydrilla, typically varies among years. Aquatic plant coverage should be monitored annually. Aquatic plant coverage may help explain fisheries trends.

INTRODUCTION

This document is a summary of fisheries data collected from Bastrop Reservoir in 2006 and 2007. The purpose of the document is to provide fisheries information and make fisheries management recommendations to protect and improve the sport fishery. While information on other species of fishes was collected, this report deals primarily with major sport species and important prey species. Fisheries management strategies are included to address existing problems or opportunities. Historical data is presented with the 2006 and 2007 data for comparison.

Reservoir Description

Bastrop Reservoir is a stable-level 906-acre impoundment of Spicer Creek, a tributary of the Colorado River, and is located northeast of the City of Bastrop, Bastrop County, Texas. The dam was constructed in 1965 to supply water for cooling a natural-gas-fired power plant operated by the Lower Colorado River Authority (LCRA). The reservoir has a shoreline development index of 10.5, and lies within a unique ecological area known as the Lost Pines, a 70 square mile area of the Post Oak Savannah ecological area comprised of loblolly pine forests. Based on the most recent habitat survey in 1995, the most dominant littoral habitat type was flooded terrestrial vegetation (reservoir was probably slightly high during the survey), followed by native emergent vegetation and brush. Other shoreline habitat types included eroded bank, concrete, riprap, and standing timber/stumps. Submerged aquatic vegetation in 2006 consisted primarily of eel grass and hydrilla. Boat access consisted of 2 public boat ramps in two separate parks. Public bank access included a fishing pier and dock located in each park. Other descriptive characteristics for Bastrop Reservoir are listed in Table 1.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Bonds and Magnelia 2003) included:

1. Conduct a spring-quarter creel survey in 2004 to collect information on angler catch, harvest, and effort. Gather specific angler opinion information on acceptance of current and/or alternative size limits for largemouth bass.

Action: A spring-quarter creel/angler opinion survey was conducted in 2004 to gather angler information.

2. Conduct optional electrofishing surveys in fall 2003 and 2004, in addition to the regularly scheduled survey in fall 2006, to monitor the population characteristics of this fishery.

Action: Spring and fall bass-only electrofishing surveys were conducted in 2004.

3. Based on electrofishing and creel data collected in fall 2003 and spring 2004, respectively, consider recommending the 14-to 21-inch slot limit be changed to one of several alternative length limits.

Action: All information was gathered and a regulation change to a 14- to 18-inch slot was proposed to the TPWD fisheries staff in fall 2004. The proposal was rejected due to concerns about harvest of bass exceeding 18 inches.

4. Conduct annual aquatic vegetation surveys each summer through 2007.

Action: Aquatic vegetation surveys were conducted in summer 2003, 2004, 2005, and 2006.

5. Reduce trap-net sampling effort from 10 nets (5 mandatory + 5 optional) to the minimum required effort (N = 5). Conduct regularly scheduled trap-net survey in fall 2006.

Action: Trap net sampling was curtailed altogether due to poor historical crappie trap net catch rates and high cost/benefit ratio associated with this sampling.

6. Additional stocking of adult-size channel catfish is not warranted, as natural recruitment appears adequate to maintain the population. Conduct regularly scheduled gill-net survey in spring 2007 to assess the catfish population.

Action: A gill net survey was conducted in spring 2007 to evaluate the catfish population.

Harvest Regulation History: Sport fish in Bastrop Reservoir have been managed with statewide regulations, except for a special slot length limit regulation for largemouth bass (Table 2).

Stocking History: Bastrop Reservoir has not been stocked with any species since 1997, when channel catfish (CCF) were stocked to supplement the CCF population. Florida largemouth bass were introduced starting in 1983 to increase Florida largemouth bass genetic influence. The complete stocking history is in Table 3.

Aquatic Vegetation/habitat history: Bastrop Reservoir had a diverse and dynamic submersed aquatic vegetation community (Tables 4a-d). The presence of the exotic species *Najas minor* was reported to the United States Geological Survey in 2006 as a first documented occurrence in the state of Texas; even though, this species was previously reported in Bastrop Reservoir (Bonds and Magnelia 2003). Stands of bulrush accounted for approximately 2.9 shoreline miles (20.7% of the shoreline distance).

METHODS

Fishes were collected by electrofishing (1.5 hours at 18 5-min stations) and gill netting (5 net nights at 5 stations). Catch-per-unit-effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing, and for gill netting as the number of fish caught in one net set overnight (fish/nn). All survey sites were randomly selected and all surveys were conducted according to the Texas Parks and Wildlife Department Inland Fisheries Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual, revised 2005). Trap netting for white crappie was not performed due to historically low catch rates and high costs associated with collecting these data. A one quarter creel survey was conducted from March to May 2004. In addition to the creel survey an angler attitude and opinion survey was conducted to learn how anglers felt towards a probable largemouth bass regulation change. A short questionnaire (Appendix A) was developed and incorporated during creel interviews in order to measure preferences, and opinions of Bastrop Reservoir largemouth bass anglers regarding harvest regulations.

Sampling statistics (CPUE for various length categories) and structural indices [Proportional Stock Density (PSD), Relative Stock Density (RSD)] and condition indices [relative weights (Wr)] were calculated for target fishes according to Anderson and Neumann (1996). The Index of Vulnerability (IOV) was used to determine the percentage of gizzard shad vulnerable to predation (DiCenzo et al. 1996). Relative standard error (RSE = 100 x SE of the estimate/estimate) was calculated for all CPUE statistics and SE was calculated for structural indices and IOV. Ages were determined for largemouth bass in fall 2006 using otoliths from 13 individuals between 330 and 381 mm (category 2 age analysis; TPWD Procedures Manual, revised 2005). In spring 2004 ages were determined for largemouth bass using otoliths from 170 fish greater than 150 mm. Largemouth bass electrophoresis samples were collected according to the Texas Parks and Wildlife Department Inland Fisheries Assessment Procedures (TPWD, Inland Fisheries Division manual, revised 2005). Genotype identification of F1 and Fx hybrid largemouth bass was omitted in 2006 due to high probability of misidentification resulting from low numbers of loci available for analysis.

The last habitat survey of the reservoir was conducted in 1995. No major changes in structural shoreline habitat have occurred in the interim.

RESULTS AND DISCUSSION

Habitat: Littoral shoreline zone habitat consisted primarily of flooded terrestrial vegetation, emergent native aquatic vegetation, and brush (Table 5).

Creel Survey: A spring-quarter creel survey was conducted from March–May 2004. Percent directed fishing effort was highest for largemouth bass (68.7%; 95.4% were boat anglers), followed by anglers fishing for any species (22.0%; 67.7% were bank anglers), and channel catfish (3.7%) (Table 6). Directed effort for largemouth bass was 17.4 h/acre for the quarter. Most (89.3%) of the largemouth bass caught were released. Of the largemouth bass released, 24.5% were less than 14 inches, 75.2% were from 14 to 21 inches and only 0.002% exceeded 21 inches in length. Of the largemouth bass harvested 7.1% were from 14 to 18 inches (illegal harvest). For anglers targeting largemouth bass the catch rate was 0.77/h. Channel catfish angling accounted for 3.7% of total angling effort, with the effort evenly distributed between boat and bank anglers. Of the channel catfish caught 41.2% were harvested. Anglers catch and harvest rates for channel catfish were 0.43/h and 0.51/acre, respectively. Total fishing effort for all species at Bastrop Reservoir was 23,034 h (25.3 h/acre) from March 2004 through May 2004.

Economic Impact: An estimated \$80,832 in direct expenditures was made by anglers fishing Bastrop Reservoir between March and May, 2004. Twenty-eight percent of anglers traveling to the reservoir were from the local area (<10 miles). Most (80%) anglers traveling to the reservoir came from within a 60-mile radius (30% from the Austin area).

Angler Attitudes and Opinions: One hundred fifteen anglers were interviewed during the 2004 creel survey and asked about largemouth bass regulations and possible regulation change options. Of the responding anglers, 64.3% favored largemouth bass length limits which differed from the statewide length limit (Table 7); meanwhile, 67.8% favored the current slot length limit (Table 8), regardless of tournament bass fishing experience (Table 9). When presented with alternative length limits for Bastrop Reservoir, most anglers (31.3%) preferred a 14- to 18-inch slot length limit (Table 10), followed by keeping the current regulation (17.4%), then catch-and-release (9.6%) (Table 11). This confirmed support for an alternate length limit to the current slot length limit.

Prey species: Gizzard shad, threadfin shad, bluegill, and redear sunfish electrofishing catch rates were 1.3/h, 67.3/h, 174.7/h, and 56.0/h, respectively. Index of Vulnerability (IOV) for gizzard shad indicated none of the gizzard shad were vulnerable to existing predators. This was no different from the IOV estimate in 2002. Gizzard shad electrofishing CPUE has consistently decreased since 1998 (Figure 1). Total CPUE of bluegill in 2006 was slightly improved over 2002. Size structure continued to be dominated by small individuals, < 5 inches (Figure 2).

Channel catfish: The 2007 gill net catch rate for channel catfish was 7.6/nn, which is similar to the 7.4/nn average for the last 3 surveys. Most individuals sampled fell within the 15- to 20-inch range (Figure 3). The spring-quarter 2004 creel survey directed effort for channel catfish was 862 h (0.95 h/acre) (Table 12). Angler catch rate was estimated at 0.43/h, with a harvest rate of 0.51/acre. Harvested individuals ranged between 12 and 22 inches (Figure 4).

Flathead catfish: The gill net catch rate for flathead catfish was 2.0/nn in 2007, which was higher than the 2002 survey. The flathead catfish population showed an improvement in relative abundance of large individuals (> 30 inches) (Figure 5).

Largemouth bass: The electrofishing catch rate of stock-length largemouth bass was 70/h in 2006, similar to 2002 (71/h). Size structure has remained similar since 2001. The catch rate of largemouth

bass greater than 14 inches (CPUE₁₄) was 35.3/h in 2006, slightly above the 32/h average during the last 3 surveys (Figure 6). The last three electrofishing surveys have failed to collect a single bass >21 inches in length (Figures 6 and 7). Directed angling effort for largemouth bass was 15,814 h (17.4 h/acre) (Table 13). Largemouth bass was the most popular species, accounting for 69% of the total angling effort. Angler catch rate was 0.77/h, with anglers releasing 89.3% of the fish caught. Of all largemouth bass harvested (N=42), 92.9% (N=39) were below the slot, while 7.1% (N=3) were within the slot (illegal harvest) (Figure 8). No fish above the slot were recorded harvested. Of all legal bass caught, 29.8% were harvested. This percentage was much higher than other Central Texas slot length limit reservoirs; Fayette County Reservoir (3.1%) (TPWD, unpublished data), Georgetown (3.8%) (Magnelia and De Jesus 2006), and Walter E. Long (5.5%) (Magnelia and De Jesus 2007). This higher harvest percentage may reflect harvest from one fishing guide on the reservoir who regularly harvests sub-slot length bass.

Growth of largemouth bass in Bastrop Reservoir has not improved since 2002. Average age at 14 inches was between 2 and 3 years (N = 13; range = 1 – 3 years) (Figure 9). Results were similar to age and growth analysis conducted during spring 2004 (N = 170; 1 – 7 years) (Figure 10). Body condition (Wr) in 2006 was excellent (relative weights over 100) for nearly all size classes of fish, and was better than body condition from previous surveys (Figure 6). Florida largemouth bass alleles decreased to 74.0% from 86.4% in 2002. Three pure Florida largemouth bass were present in the 2006 sample, down from 16 in 2002 (Table 14).

Fisheries management plan for Bastrop Reservoir, Texas

Prepared - July 2007.

ISSUE 1 Bastrop Reservoir has developed a good catfish population, but directed angling effort was low. The 2004 spring creel survey revealed that 6.3% of the angler effort was directed at catfish.

MANAGEMENT STRATEGY

1. Promote the catfish fishery in Bastrop Reservoir using news releases.

ISSUE 2 Largemouth bass growth after age 3 was poor, with few fish in older age classes growing beyond 18 inches. No bass collected during electrofishing surveys in 1998, 2002, 2004, and 2006 exceeded 21 inches, and no harvest of bass > 21 inches was observed in the spring 2004 creel survey. Of the bass released during the creel survey, only 0.002% exceeded 21 inches. This indicated bass were not reaching 21 inches in length before natural mortality occurred. Slow growth may be due to intraspecific competition and/or lack of large forage items. A proposed regulation change to a 14- to 18- inch slot length limit was declined in 2005 due to the concern of opening quality fish (>18 inches) to harvest. In 2006, only 6.7% of the adult population was \geq 18 inches, and would therefore be available for harvest under a 14- to 18-inch slot length limit. Since the slot-length limit regulation was implemented in 1993, a mean of 14.1% of slot fish (14- to 21-inches) in electrofishing surveys were \geq 18 inches (Appendix B). The management philosophy when the 14- to 21-inch slot length limit was implemented was quality bass fishing with enhanced trophy potential. Age-and-growth, angler catch and electrofishing data since the regulation change indicated there was little potential for trophy (>21 inches) bass in this reservoir.

MANAGEMENT STRATEGY

1. Investigate the feasibility of introducing a larger forage species with the objective of improving the growth of bass >18 inches.
2. Promote the harvest of sub-slot bass on Bastrop Reservoir using signage at the two boat ramps.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule will constitute mandatory sampling in 2010/2011, with additional bass-only electrofishing survey during fall 2008 to further evaluate population size structure and growth (Table 15). Due to poor historic sampling returns for crappie, and cost efficiency, trap netting will be removed from the sampling schedule at Bastrop Reservoir.

LITERATURE CITED

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Table 1. Characteristics of Bastrop Reservoir, Texas

Characteristic	Description
Year constructed	1965
Controlling authority	LCRA
Counties	Bastrop
Reservoir type	Power plant cooling reservoir
Shoreline development index (SDI)	10.5
Conductivity	1,273 umhos/cm

Table 2. Harvest regulations for Bastrop Reservoir.

Species	Bag limit	Length limit (inches)
Bass: largemouth	5*	14- to 21-inch slot
Catfish: channel and blue catfish	25	12 minimum
Flathead catfish	5	18 minimum

*Only 1 may be over 21 inches.

Table 3. Stocking history of Bastrop, Texas. Life stages are fry (FRY), fingerlings (FGL), advanced fingerlings (AFGL), adults (ADL) and unknown (UNK). Life stages for each species are defined as having a mean length that falls within the given length range. For each year and life stage the species mean total length (Mean TL; in) is given. For years where there were multiple stocking events for a particular species and life stage the mean TL is an average for all stocking events combined.

Species	Year	Number	Life Stage	Mean TL (in)
Black crappie x White crappie	1993	90,400	FRY	0.9
	1994	110,753	FRY	0.9
	1995	103,738	FRY	0.9
	Total	304,891		
Blue catfish	1969	4,425	UNK	UNK
	1970	4,615	UNK	UNK
	1971	4,644	UNK	UNK
	Total	13,684		
Channel catfish	1969	5,517	AFGL	7.9
	1970	4,683	AFGL	7.9
	1971	4,610	AFGL	7.9
	1982	500	UNK	UNK
	1990	6,208	ADL	11.2
	1997	8,300	AFGL	7.0
	Total	29,818		
Florida Largemouth bass	1983	41,713	FGL	2.0
	1984	17,056	FGL	3.0
	1990	90,551	FRY	0.8
	1991	771	ADL	9.0
	1991	90,872	FGL	1.3
	1992	59,509	FGL	1.1
	1992	31,101	FRY	0.9
	Total	331,573		
Green sunfish x redear sunfish	1972	1,980		UNK
	Total	1,980		
Kemp's Largemouth bass	1985	46,314		1.0
	1986	45,400		1.0
	Total	91,714		
Palmetto Bass (striped X white bass hybrid)	1972	1,800	FGL	1.5
	1973	9,760	FGL	1.5
	1974	10,400	UNK	UNK
	1975	9,086	UNK	UNK
	Total	31,046		
Peacock bass	1978	519		UNK
	1979	3,234		UNK
	Total	3,753		
White crappie	1992	94,577	FRY	0.6
	Total	94,577		

Table 4a. Aquatic plants observed during aquatic vegetation surveys, Bastrop Reservoir, Texas, September 2003. Surface area (acres) and percent reservoir coverage were determined for each plant species.

Common Name	Scientific name	Acres	% coverage
Eel grass	<i>Vallisneria americana</i>	14.46	1.67
Hydrilla	<i>Hydrilla verticillata</i>	121.63	14.06
Marine naiad	<i>Najas marina</i>	29.29	3.39
Milfoil	<i>Myriophyllum sp.</i>	6.83	<1
Pondweed	<i>Potamogeton sp.</i>	5.65	<1
Total		177.86	20.56

Table 4b. Aquatic plants observed during aquatic vegetation surveys in Bastrop Reservoir, Texas, September 2004. Surface area (acres) and percent reservoir coverage were determined for each plant species.

Common Name	Scientific name	Acres	% coverage
Eel grass	<i>Vallisneria americana</i>	51.71	5.98
Hydrilla	<i>Hydrilla verticillata</i>	182.79	21.13
Milfoil	<i>Myriophyllum sp.</i>	14.97	1.73
Pondweed	<i>Potamogeton sp.</i>	4.90	<1
Musk grass	<i>Chara sp.</i>	21.57	2.49
Coontail	<i>Ceratophyllum demesum</i>	1.11	<1
Southern naiad	<i>Najas guadalupensis</i>	15.40	1.78
Water stargrass	<i>Heteranthura dubia</i>	2.63	<1
Total		295.08	34.11

Table 4c. Aquatic plants observed during aquatic vegetation surveys in Bastrop Reservoir, Texas, September 2005. Surface area (acres) and percent reservoir coverage were determined for each plant species.

Common Name	Scientific name	Acres	% coverage
Eel grass	<i>Vallisneria americana</i>	79.27	9.14
Hydrilla	<i>Hydrilla verticillata</i>	49.13	5.67
Pondweed	<i>Potamogeton sp.</i>	0.99	<1
Musk grass	<i>Chara sp.</i>	20.30	2.33
Coontail	<i>Ceratophyllum demesum</i>	1.49	<1
Water stargrass	<i>Heteranthura dubia</i>	0.80	<1
Mix ¹		2.19	<1
Mix ²		7.13	<1
Mix ³		3.16	<1
Total		164.42	18.97

¹ *V. Americana*, *C. demesum*, *H. dubia*

² *V. Americana*, *Chara sp.*, *C. demesum*, *Myriophyllum sp.*

³ *V. Americana*, *H. verticillata*, *Potamogeton sp.*, *H. dubia*.

Table 4d. Aquatic plants observed during aquatic vegetation surveys in Bastrop Reservoir, Texas, September 2006. Surface area (acres) and percent reservoir coverage were determined for each plant species.

Common Name	Scientific name	Acres	% coverage
Eel grass	1. <i>Vallisneria americana</i>	60	7.0
Hydrilla	2. <i>Hydrilla verticillata</i>	12	1.0
Pondweed	3. <i>Potamogeton sp.</i>	0.03	<1
Musk grass	4. <i>Chara sp.</i>	30	3.0
Slender naiad	5. <i>Najas minor</i>	6	1.0
Southern naiad	6. <i>Najas guadalupensis</i>	2	<1
Mix ¹		1	<1
Mix ²		1	<1
Mix ³		2	<1
Mix ⁴		31	4.0
Mix ⁵		19	2.0
Mix ⁶		3	<1
Mix ⁷		7	1.0
Total		174	20.0

¹ *V. americana*, *H. verticillata*, *Chara sp.*

² *V. americana*, *H. verticillata*

³ *V. americana*, *Potamogeton sp.*, *N. minor*

⁴ *V. americana*, *H. verticillata*, *N. minor*

⁵ *V. americana*, *H. verticillata*, *N. Minor*, *Myriophyllum sp.*

⁶ *H. verticillata*, *Potamogeton sp.*, *N. minor*, *Myriophyllum sp.*

⁷ *V. americana*, *Chara sp.*, *N. minor*

Table 5. Survey of structural habitat types, Bastrop Reservoir, Texas, 1995. A linear shoreline distance (miles) was recorded for each habitat type found.

Structural habitat type	Shoreline distance	
	Miles	Percent of total
Brush	2.6	18.6
Eroded bank	1.5	11.7
Flooded terrestrial vegetation	4.8	34.3
Riprap	0.5	3.6
Concrete	1.2	8.6
Standing timber/stumps	0.4	2.9
Native emergent vegetation (Bulrush)	<u>2.9</u>	<u>20.7</u>
Total	13.9	100

Table 6. Percent directed angler effort by species for Bastrop Reservoir, Texas, March, 2004 to May, 2004.

Species	Percentage
Catfishes	2.60
Panfish (<i>Lepomis</i> spp.)	2.65
Largemouth bass	68.70
Any species	22.04
Common carp	0.32
Channel catfish	3.74

Table 7. Opinions of Bastrop Reservoir anglers for alternative length limits for largemouth bass in general. Sample sizes are indicated in parentheses below each percentage.

Statement	Highly Favor	Favor	Opposed	Highly Opposed	No Opinion
What is your opinion of length limits for largemouth bass, which differ from the statewide 14-inch minimum length limit?	31.3 (36)	33.0 (38)	13.9 (16)	3.5 (4)	18.3 (21)

Table 8. Opinions of Bastrop Reservoir anglers concerning the 14- to 21-inch slot length limit on largemouth bass at Bastrop Reservoir. Sample sizes are in parentheses below each percentage.

Statement	Highly Favor	Favor	Opposed	Highly Opposed	No Opinion
What is your opinion of the current 14- to 21-inch slot length limit on largemouth bass at Lake Bastrop?	28.7 (33)	39.1 (45)	21.8 (25)	1.7 (2)	8.7 (10)

Table 9. Opinion of Bastrop Reservoir anglers concerning the 14- to 21-inch slot length limit for largemouth bass, based on bass tournament participation. Highly favor and Favor responses were combined as Favor. Highly opposed and Opposed responses were combined as opposed.

Statement: What is your opinion of the current 14- to 21-inch slot length limit on largemouth bass at Lake Bastrop?	Favor	Opposed	No Opinion
No tournaments fished within past 12 months	45	18	9
Between 1 and 11 tournaments fished within past 12 months	27	9	1
Over 12 tournaments fished within past 12 months	6	0	0

Table 10. Preferences (%) among Bastrop Reservoir anglers for alternative largemouth bass length limits. Sample sizes are in parentheses below each percentage.

Statement	14-inch minimum	18-inch minimum	14- to 18- inch slot	NOTA*	No opinion
Lake Bastrop is currently being managed for trophy bass, but has not produced the size we had expected. We are considering modifying the current regulation for largemouth bass on Lake Bastrop. If an alternative length limit for largemouth bass on Lake Bastrop was proposed, which option would you most favor?	11.3 (13)	5.2 (6)	31.3 (36)	38.3 (44)	13.9 (16)

*NOTA = None of the Above

Table 11. Within the "NOTA" response from Table 10, percentage of Bastrop Reservoir anglers identifying largemouth bass length limit alternative they would prefer. Percentages of the total sample are in parentheses below. Questions asked showed in Appendix A.

Statement	Keep same	Catch & Release	14- to 24- inch slot	Other
If "None of the above", what limit would you want?	45.5 (17.4)	25.0 (9.6)	13.6 (5.2)	15.9 (6.1)

Gizzard Shad

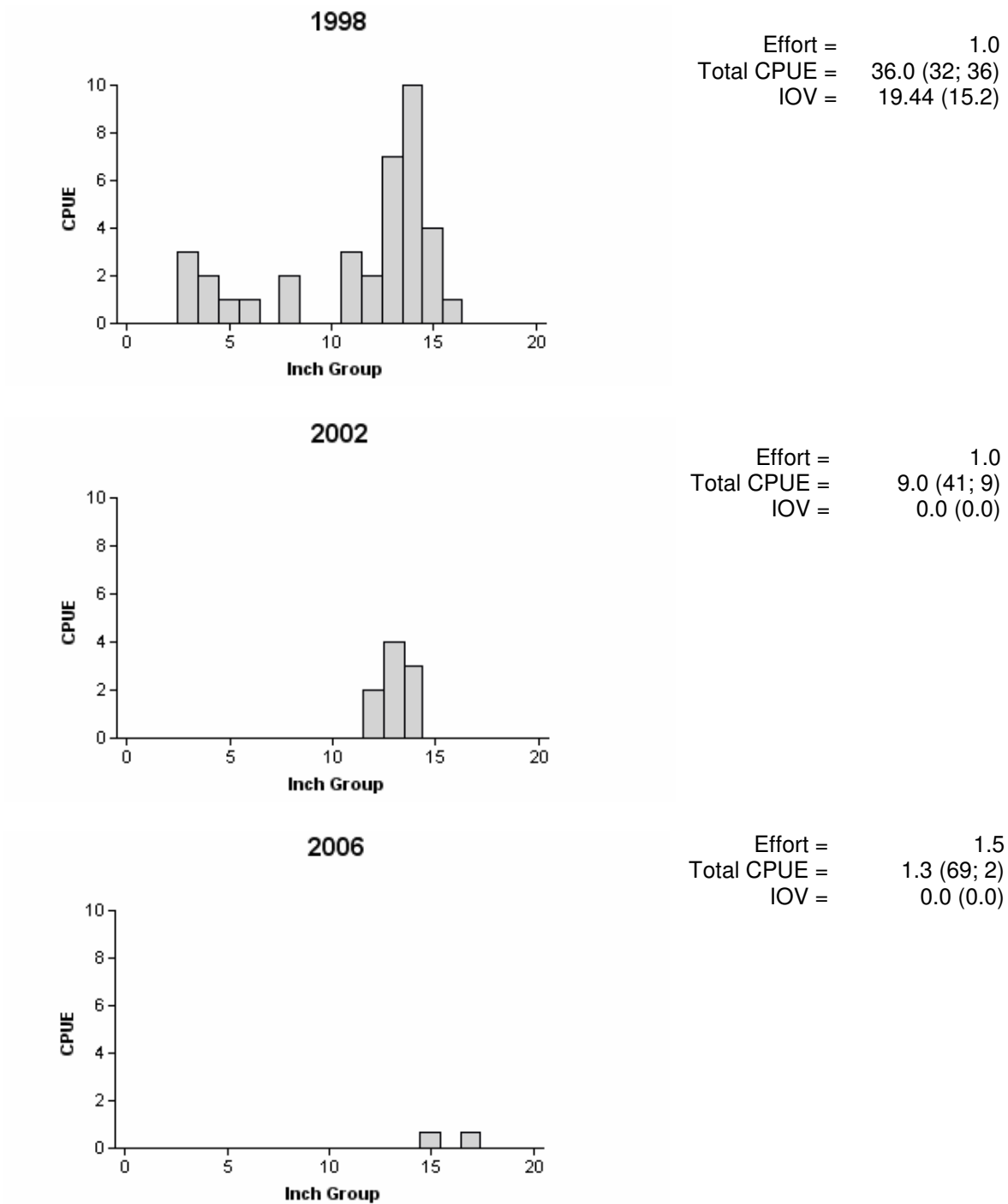


Figure 1. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Bastrop Reservoir, Texas, 1998, 2002 and 2006.

Bluegill

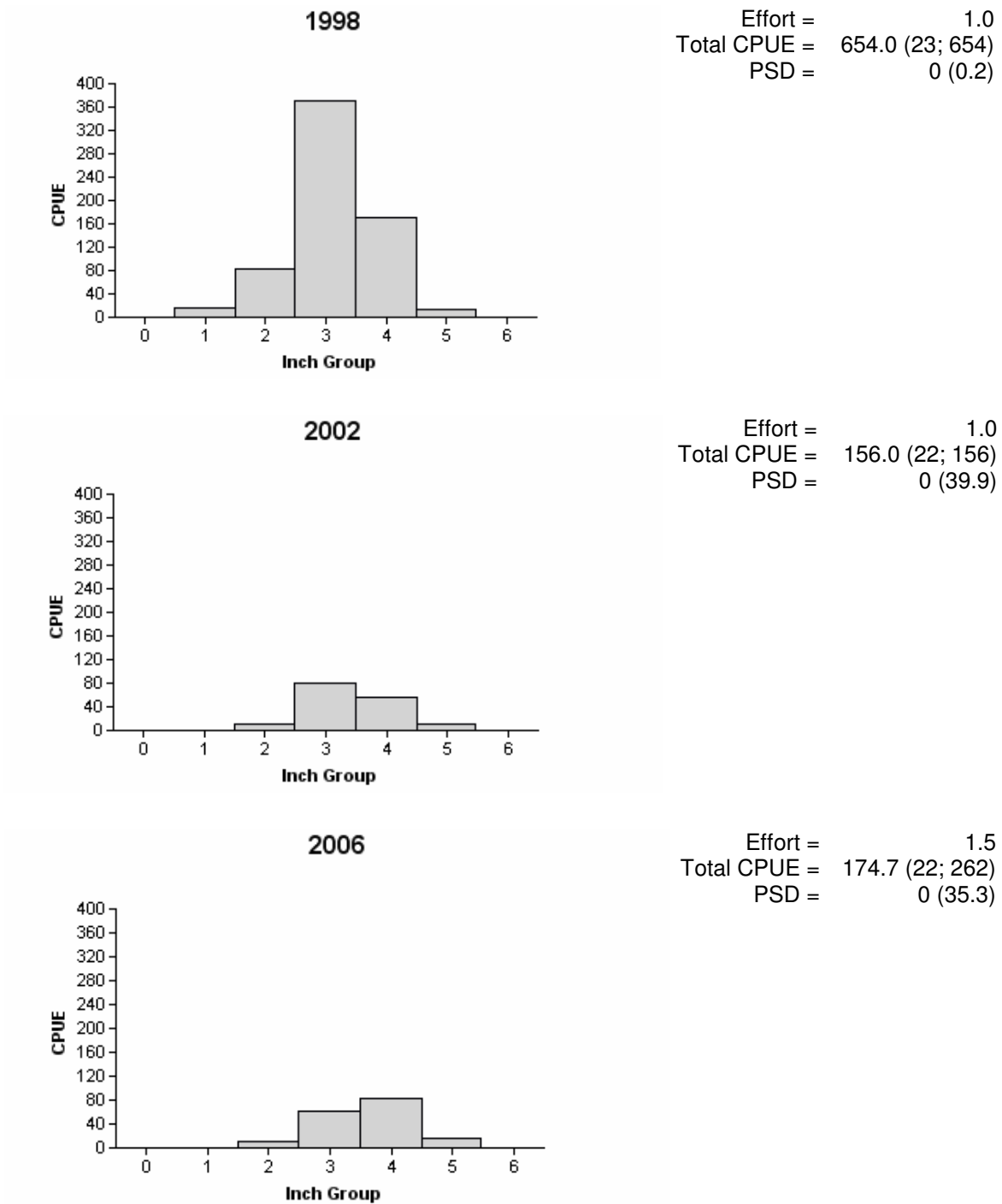


Figure 2. Number of bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Bastrop Reservoir, Texas, 1998, 2002 and 2006.

Channel Catfish

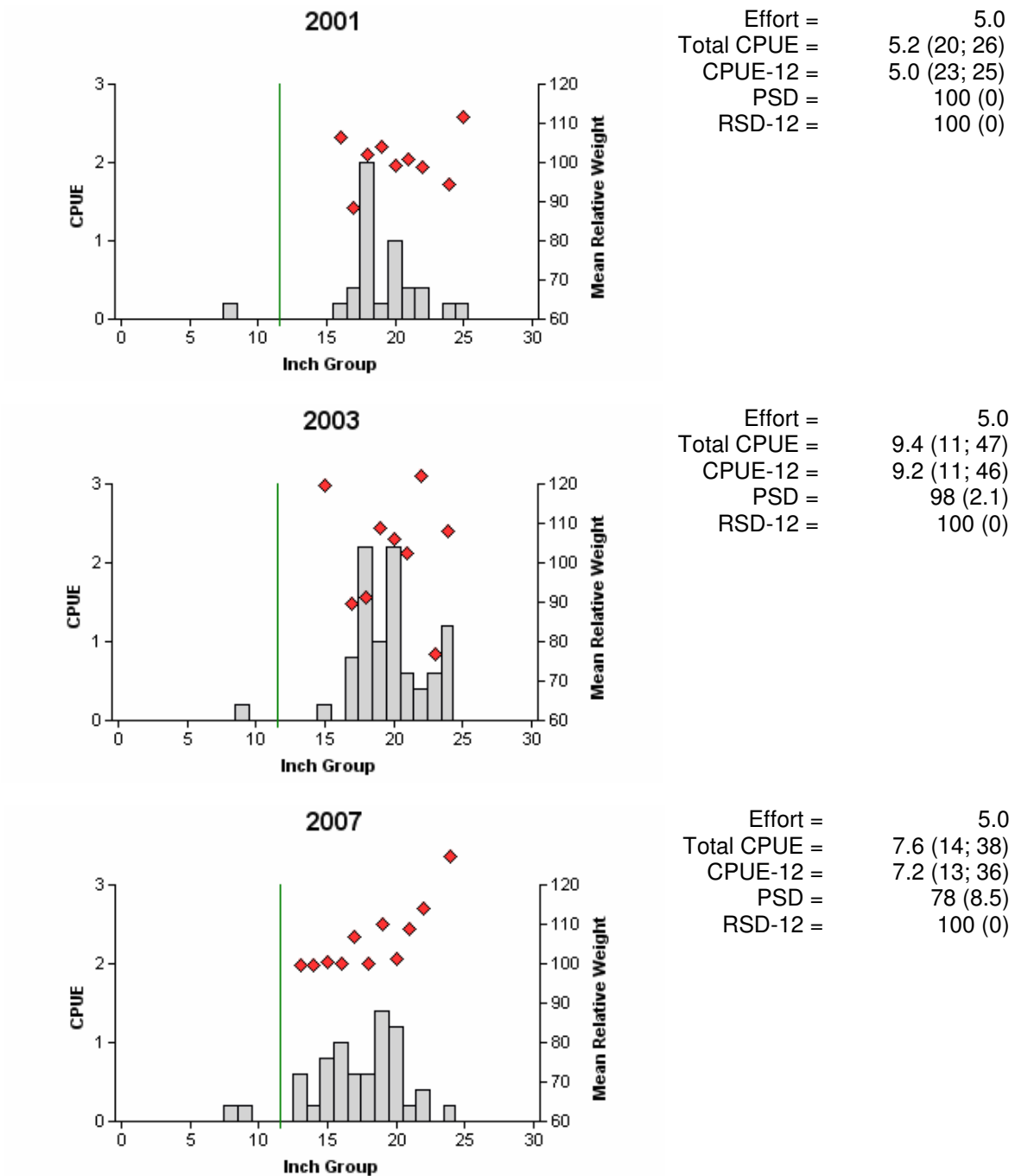


Figure 3. Number of channel catfish caught per hour (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill netting surveys, Bastrop Reservoir, Texas, 2001, 2003 and 2007. Minimum length limit is indicated by vertical line.

Channel Catfish

Table 12. Creel survey statistics for channel catfish at Bastrop Reservoir from March 2004 through May 2004 where total catch per hour is for anglers targeting channel catfish and total harvest is the estimated number of channel catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year
	2004
Directed effort (h)	862.37 (43.9)
Directed effort/acre	0.95 (43.9)
Total catch per hour	0.43 (62.5)
Total harvest	463.74 (47.6)
Harvest/acre	0.51 (47.6)
Percent legal released	60.07

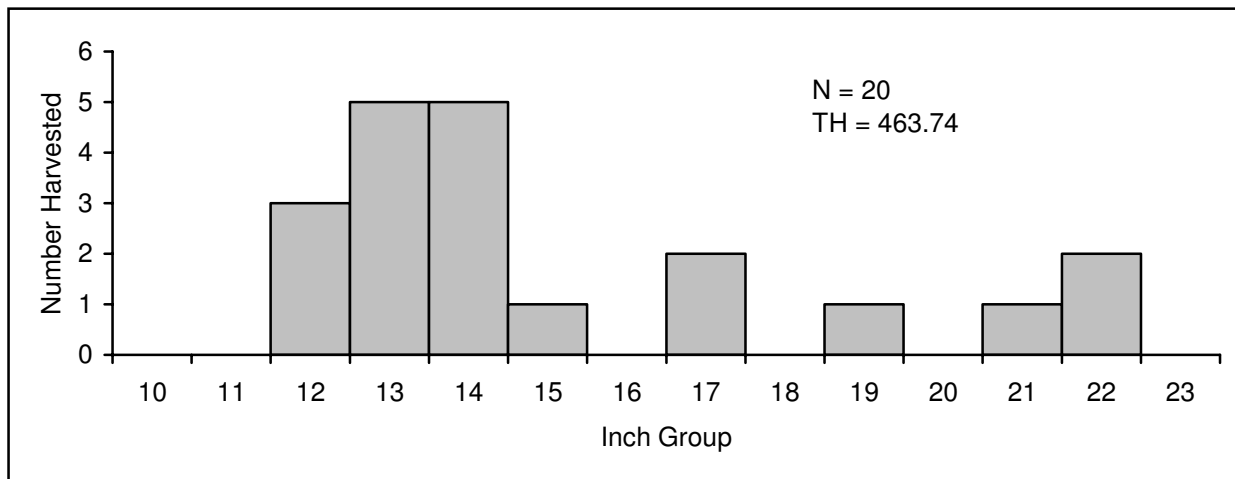


Figure 4. Length frequency of harvested channel catfish observed during creel surveys at Bastrop Reservoir, Texas, March 2004 through May 2004, all anglers combined. N is the number of harvested channel catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

Flathead Catfish

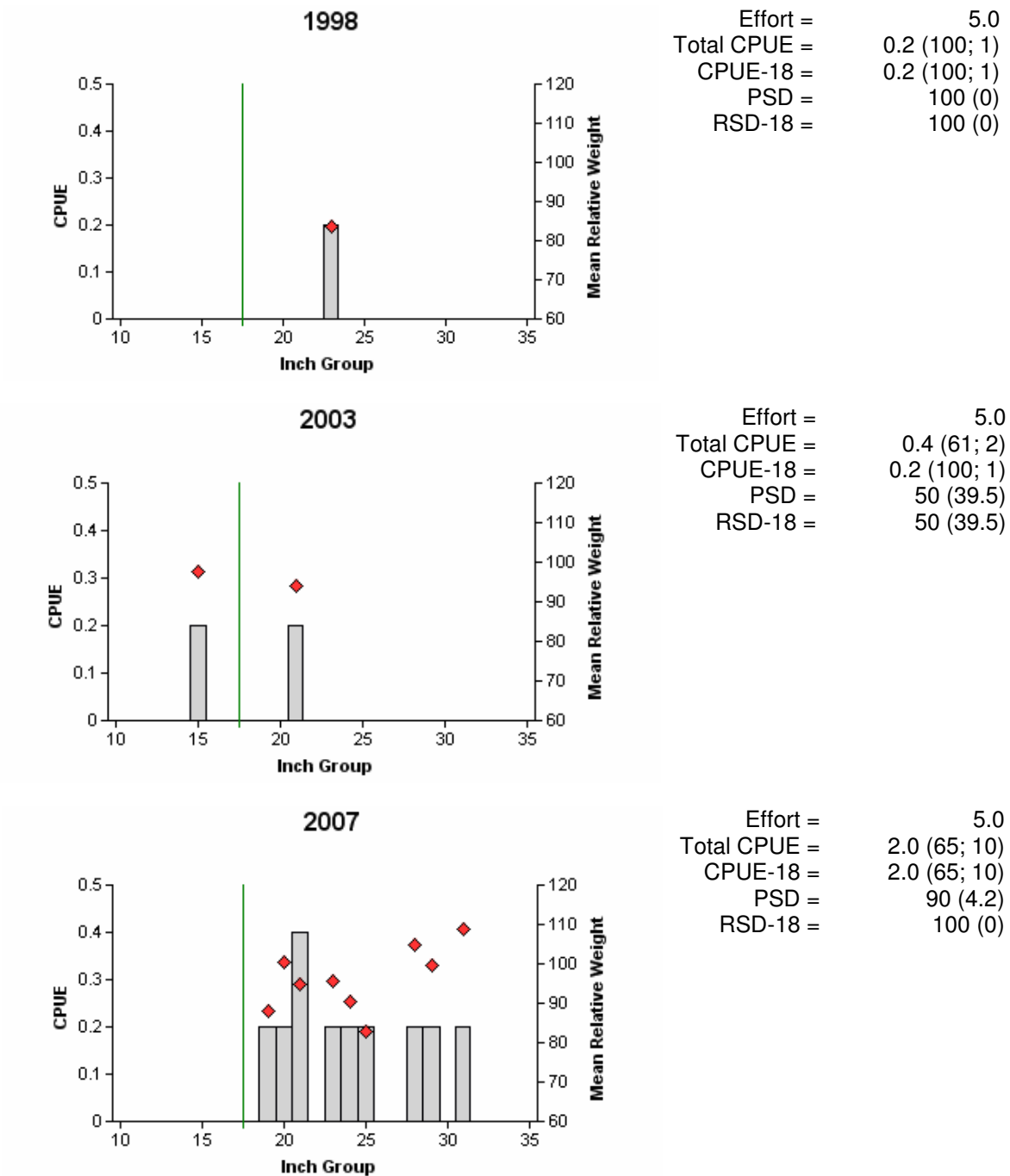


Figure 5. Number of flathead catfish caught per hour (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Bastrop Reservoir, Texas, 1998, 2003 and 2007. Minimum length limit is indicated by the vertical line.

Largemouth bass

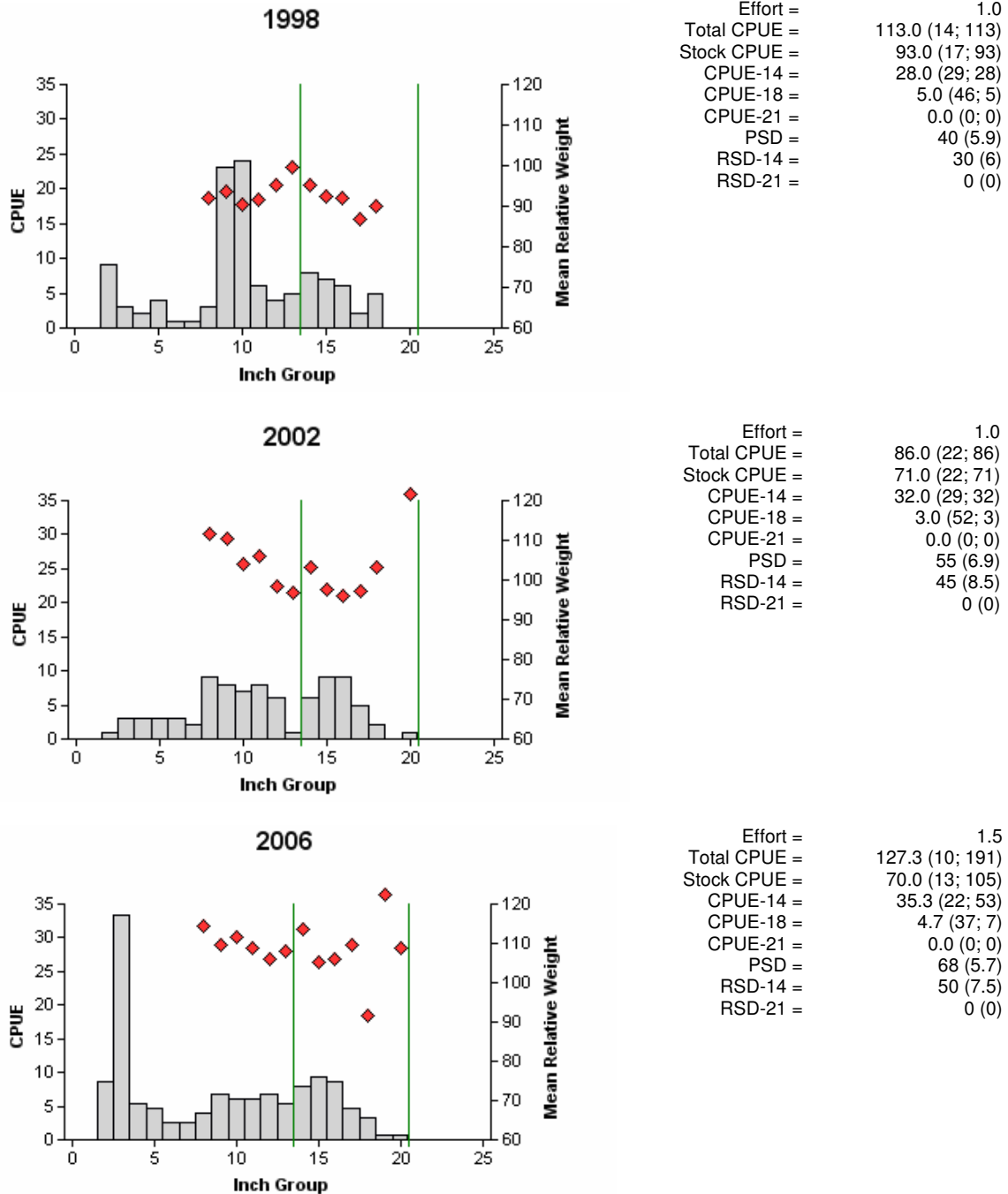


Figure 6. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Bastrop Reservoir, Texas, 1998, 2002 and 2006. Slot length limit indicated by vertical lines.

Largemouth bass

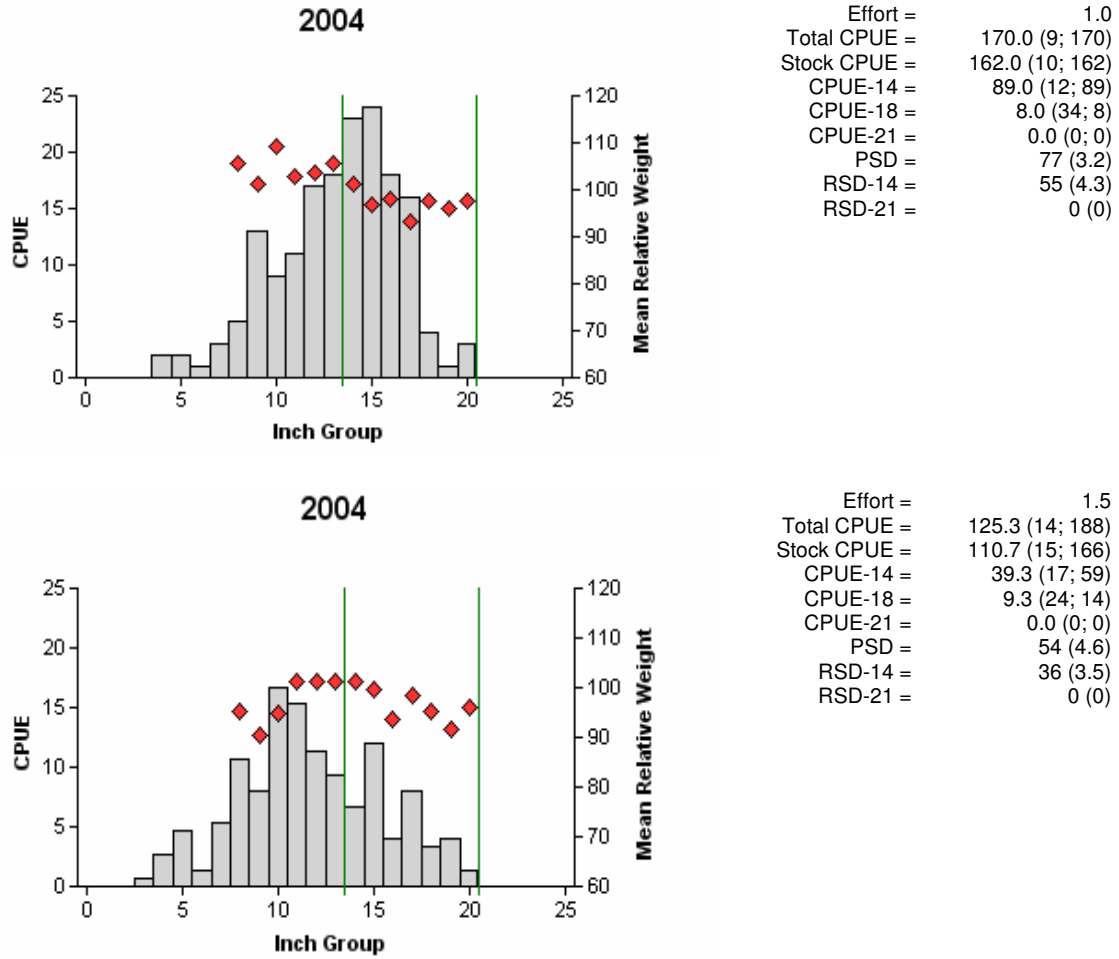


Figure 7. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for bass-only electrofishing surveys, Bastrop Reservoir, Texas, Spring (top) and Fall (bottom) 2004. Slot length limit indicated by vertical lines.

Largemouth bass

Table 13. Creel survey statistics for largemouth bass at Bastrop Reservoir from March 2004 through May 2004 where total catch per hour is for anglers targeting channel catfish and total harvest is the estimated number of channel catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year	
	2004	
Directed effort (h)	15,814.00	(14.8)
Directed effort/acre	17.40	(14.8)
Total catch per hour	0.77	(18.6)
Total harvest	973.86	(33.9)
Harvest/acre	1.07	(33.9)
Percent legal released	70.22	

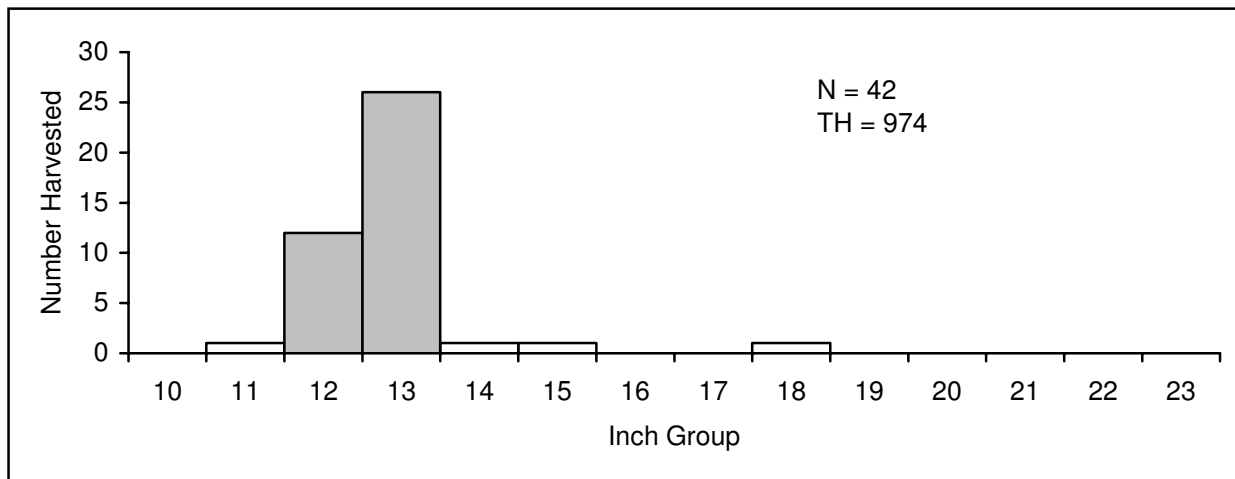


Figure 8. Length frequency of harvested largemouth bass observed during creel surveys at Bastrop Reservoir, Texas, March 2004 through May 2004, all anglers combined. N is the number of harvested channel catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

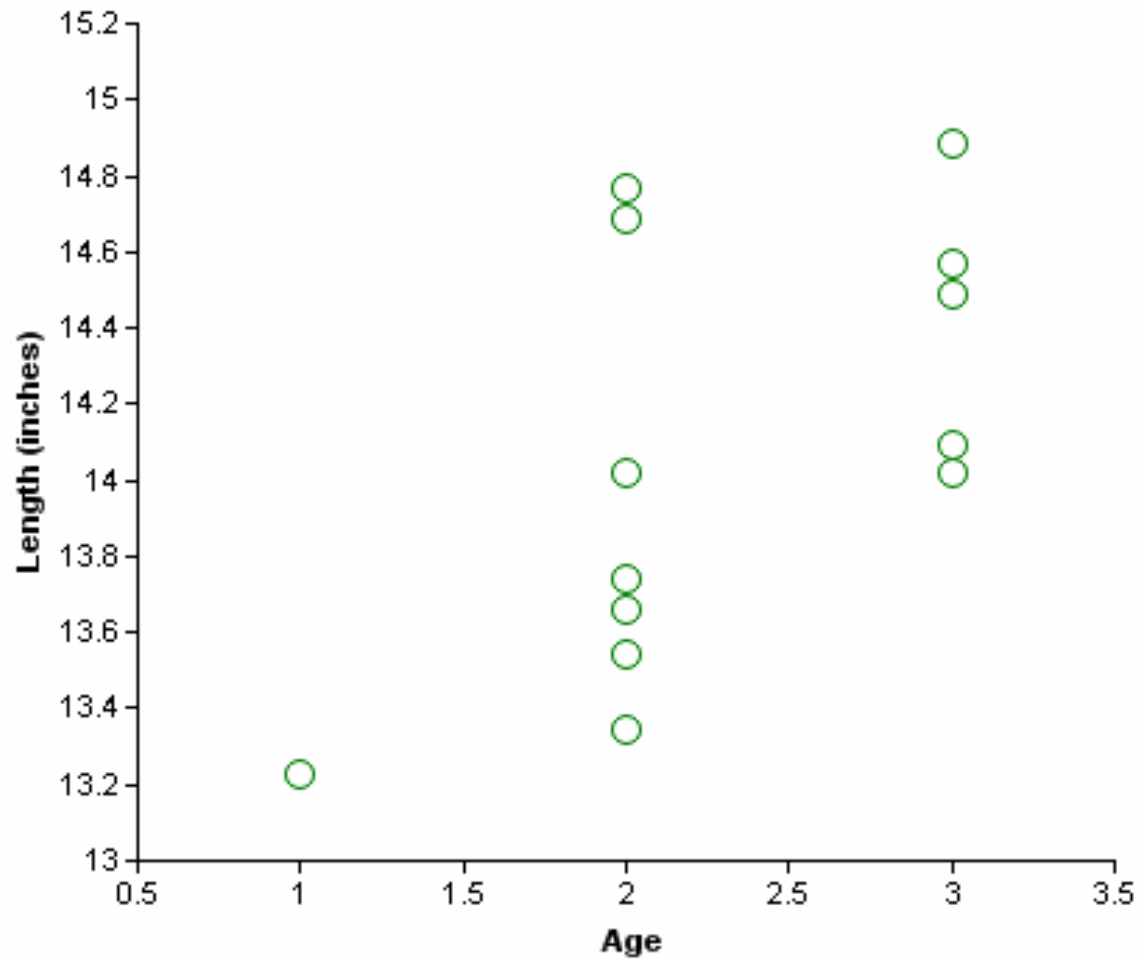


Figure 9. Length at age for largemouth bass collected by electrofishing at Bastrop Reservoir, Texas, October 2006 (N=13).

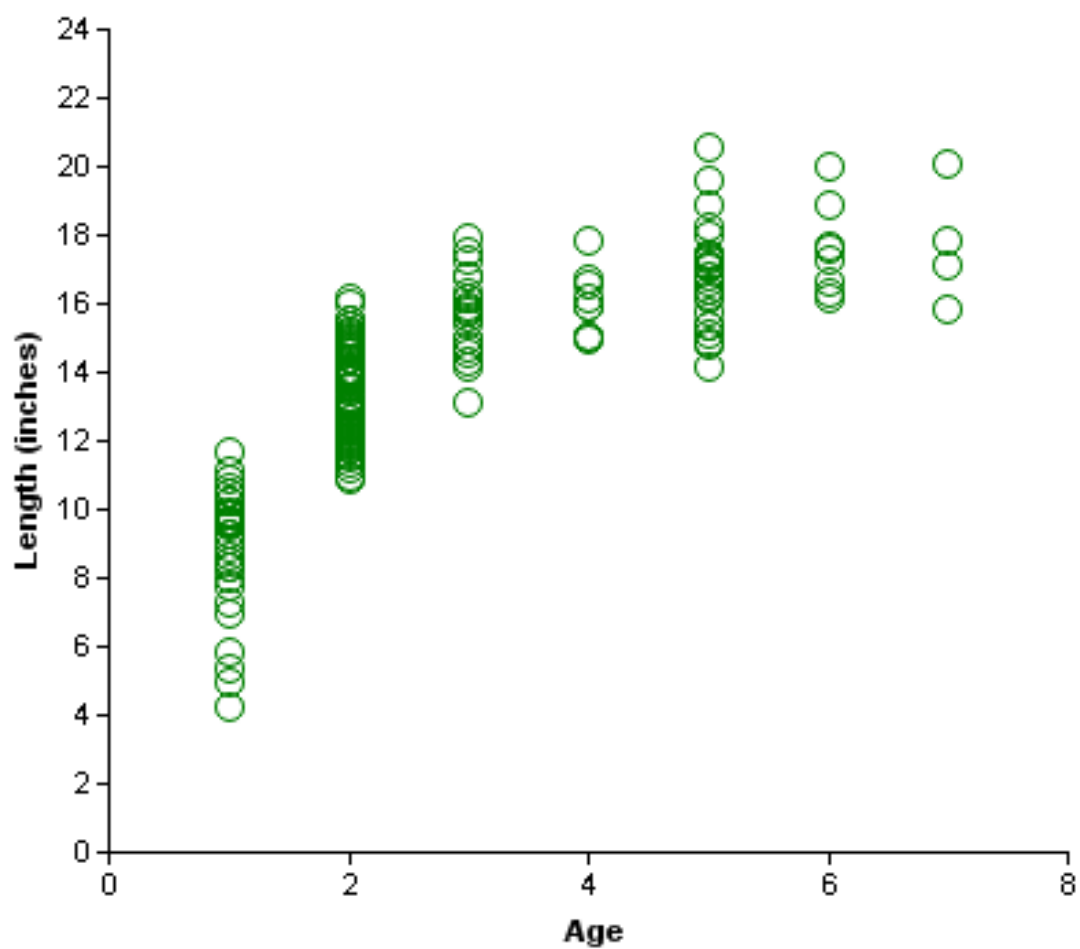


Figure 10. Length at age for largemouth bass collected by electrofishing at Bastrop Reservoir, Texas, March 2004 (N = 170).

Table 14. Results of genetic analysis of largemouth bass collected by electrofishing, Bastrop Reservoir, Texas, 1998, 2002 and 2006. FLMB = Florida largemouth bass, NLMB = northern largemouth bass, F1 = first generation hybrid between a FLMB and NLMB, Fx = second or higher generation hybrid between FLMB and NLMB.

Year	Sample size	Genotype				% FLMB alleles	% pure FLMB
		FLMB	F1	Fx	NLMB		
1998	30	3	9	18	0	64.7	10
2002	29	16	1	12	0	86.4	55.2
2006	30	3	N/A*	N/A*	0	74	10

*Not available

Table 15. Proposed sampling schedule for Bastrop Reservoir, Texas. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. Standard survey denoted by S, and additional survey denoted by A.

Survey Year	Electrofisher	Gill Net	Creel Survey	Report
Fall 2007-Spring 2008				
Fall 2008-Spring 2009	A			
Fall 2009-Spring 2010				
Fall 2010-Spring 2011	S	S		S

Appendix A

Questionnaire used to gather angler attitudes and opinions of Bastrop Reservoir largemouth bass anglers. The survey was conducted during a creel survey conducted between March 2004 and May 2004.

Additional Spring 2004 Bastrop Creel Interview Questions

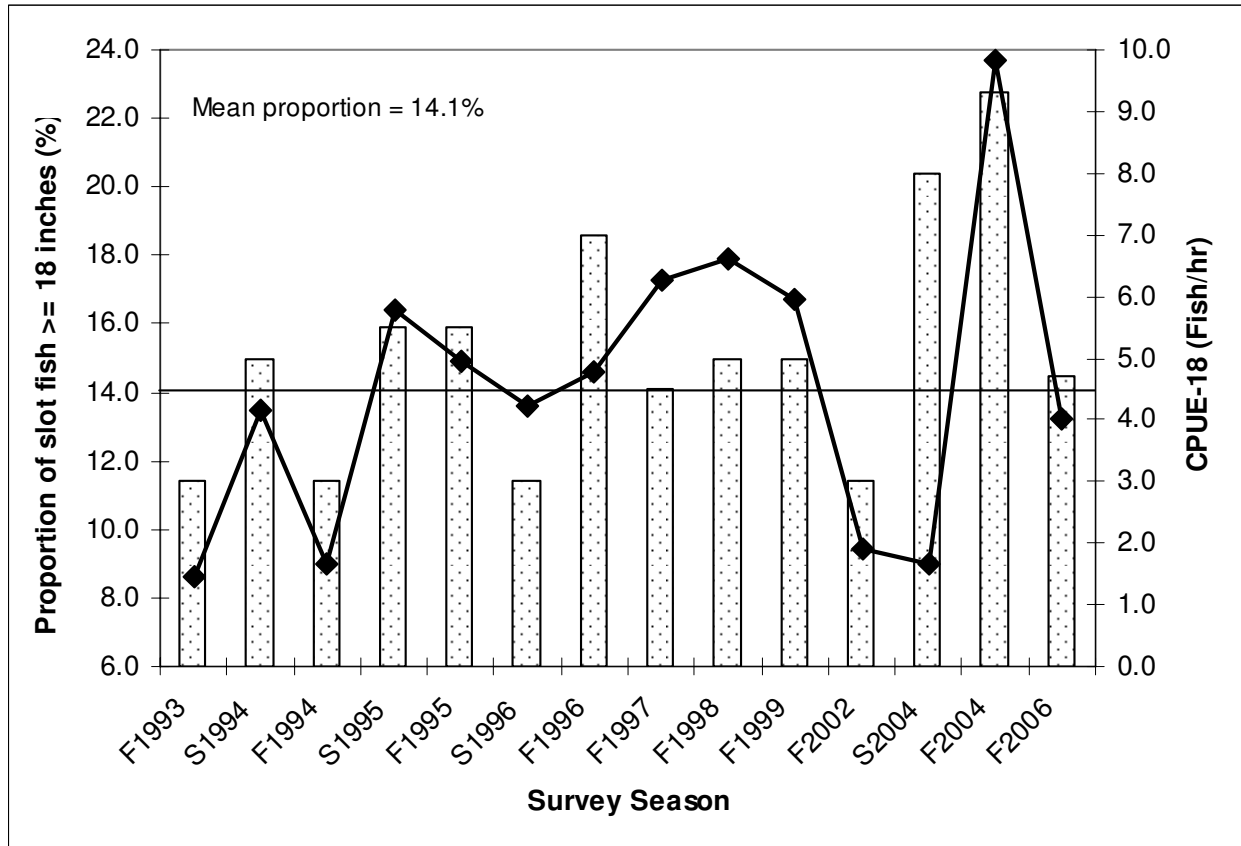
1. Have you been interviewed by Inland Fisheries staff on Lake Bastrop this spring?
If yes, interview is terminated.

We are interested in your opinion on largemouth bass management on Lake Bastrop. Would you be willing to answer a few additional questions?

2. How many days have you fished here for largemouth bass in the past 12 months? _____
 3. How many bass fishing tournaments have you fished in the last 12 months? _____
How many of these tournaments have been on Lake Bastrop? _____
 4. What is your opinion of length limits for largemouth bass, which differ from the statewide 14-inch minimum length limit?
 - a. Highly in favor
 - b. In favor
 - c. Opposed
 - d. Highly opposed
 - e. No opinion
 5. What is your opinion of the current 14 to 21 inch slot-length limit on largemouth bass at Lake Bastrop?
 - a. Highly in favor
 - b. In favor
 - c. Opposed
 - d. Highly opposed
 - e. No opinion
 6. Lake Bastrop is currently being managed for trophy bass, but has not produced the size bass we had expected. We are considering modifying the current regulation for largemouth bass on Lake Bastrop. If an alternative length limit for largemouth bass on Lake Bastrop was proposed which option would you most favor?
 - a. **14 inch minimum-length limit.** *This regulation is designed to provide anglers with a good opportunity to catch high numbers of fish less than 15 inches and some quality size fish, but only a slight chance of catching trophy-sized fish.*
 - b. **18 inch minimum-length limit.** *This regulation provides anglers the same opportunity to catch high numbers of fish less than 15 inches as the 14 inch limit but may slightly increase the chance of catching some quality or trophy-sized fish.*
 - c. **14-18 inch slot-length limit.** *This regulation provides anglers with opportunity to catch (and harvest) a limit of fish less than 14 inches and may slightly increase the chance of catching some quality or trophy-sized fish but requires immediate release of all fish between 14 inches and 18 inches.*
 - d. None of the above – *What limit would they want?* _____
 - e. No opinion
-

Appendix B

Proportion (%) of slot length (14- to 21-inches) largemouth bass that were ≥ 18 inches (diamonds) and CPUE18 (bars) from all electrofishing surveys conducted since the implementation of the slot-length limit regulation in 1993. Spring and fall surveys are denoted by the letter "S" and "F" before the sample year. The mean proportion is indicated by the horizontal line. Mean CPUE18 was 5.1/h.

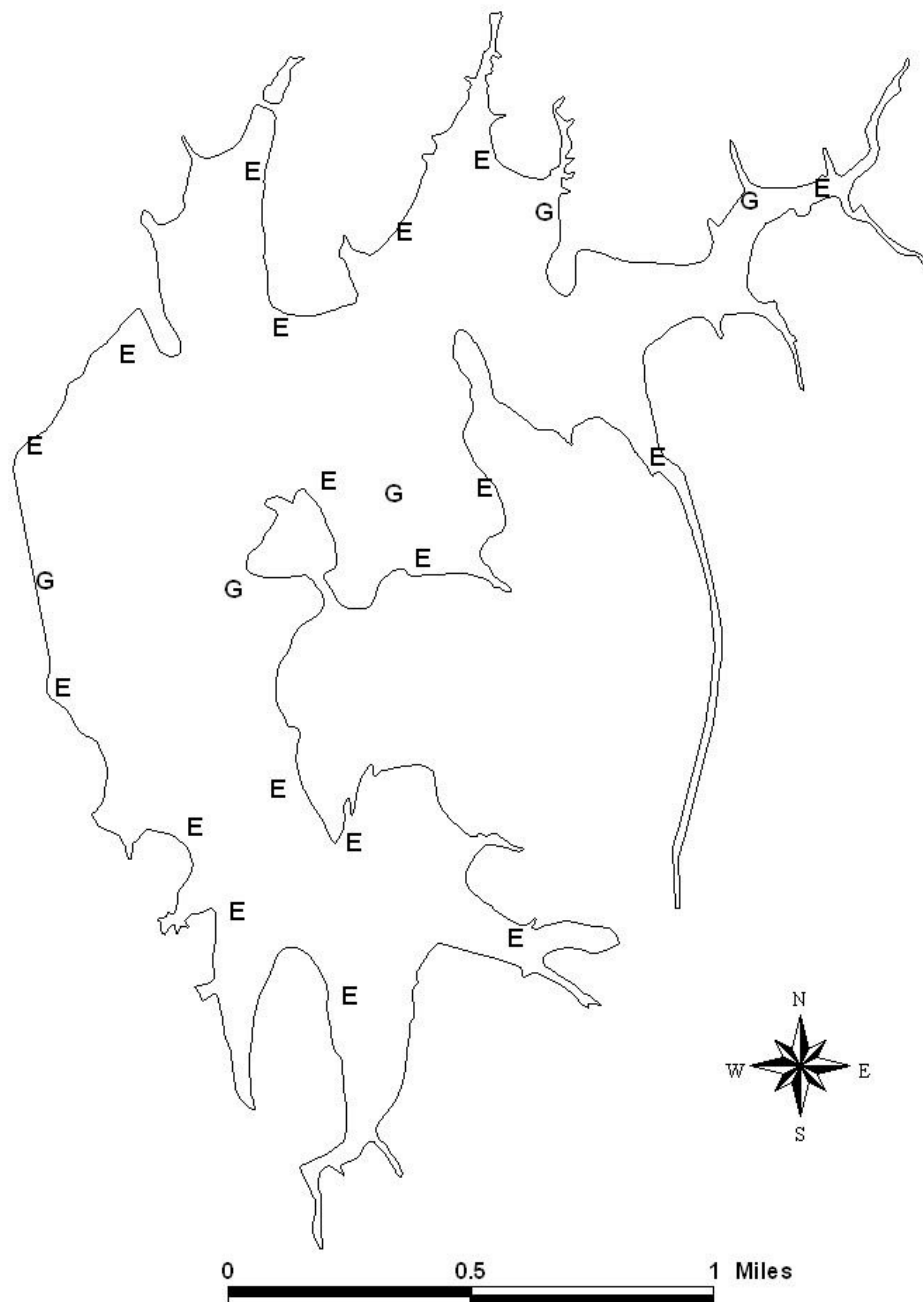


Appendix C

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Bastrop Reservoir, Texas, 2006 and 2007.

Species	Gill Netting		Electrofishing	
	N	CPUE	N	CPUE
Gizzard shad	102	20.4	2	1.3
Threadfin shad			101	67.3
Inland silverside			1	0.7
Blacktail shiner			8	5.3
Channel catfish	38	7.6		
Flathead catfish	10	2.0		
Green sunfish			6	4.0
Warmouth			1	0.7
Bluegill			262	174.7
Longear sunfish			14	9.3
Redear sunfish			84	56.0
Spotted sunfish			18	12.0
Largemouth bass			191	127.3
Rio Grande cichlid			28	18.7

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Appendix D



Location of sampling sites, Bastrop Reservoir, Texas, 2006-2007. Gill netting and electrofishing stations indicated by G and E, respectively.