PERFORMANCE REPORT

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FEDERAL AID PROJECT F-221-M-1

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2010 Survey Report

Lavon Reservoir

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July 31, 2011

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Lavon Reservoir were surveyed in 2010 using an electrofisher and trap nets and in 2011 using gill nets. Habitat was surveyed in 2010. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir description:** Lavon Reservoir is a 21,400-acre impoundment located on the East Fork Trinity River approximately 8 miles east of McKinney. Since July 2007 water level has fluctuated 5 feet above and below conservation elevation (492 feet above mean sea level) with the current level dropping. Lavon Reservoir has moderate productivity. Habitat features consisted mainly of riprap along the dam and railroad bridges, dead trees and stumps, and rocky shoreline. Standing dead timber was the major habitat feature.

- **Management history:** Important sport fishes included blue and channel catfish, white bass, largemouth bass, and white crappie. The management plan from the 2006 survey report included investigating the resumption of striped bass stocking to augment recreational angling and develop a potential brood fish source. Since the last reporting, 216,090 striped bass fingerlings were stocked in 2008. Despite marginal success in establishing striped bass after the 1996 stocking, there has been minimal evidence of establishing striped bass since 1999. Annual stocking of fingerlings from 2004 through 2008 have been unsuccessful.

- **Fish community**

  - **Prey species:** Threadfin shad continued to be present, but showed a decline in abundance. Electrofishing catch of gizzard shad catapulted into an all-time high abundance. Almost all of the gizzard shad (99%) were available as prey to most sportfishes. As with gizzard shad, the electrofishing catch of desirable prey-size bluegill was at an all-time high. There were also good numbers of harvestable-size bluegill. Longear sunfish is quickly becoming a major prey species.

  - **Catfishes:** Gill net catch of blue catfish was high with over one-half of the sampled population being legal size and in excellent condition. Recruitment was good and they appeared to out-compete channel catfish both in 2009 and 2011. Gill net catch of channel catfish increased from previous surveys. Flathead catfish were present in the reservoir; two were collected.

  - **Temperate basses:** Gill net catch of white bass and striped bass was low, despite the surge in abundance of white bass in the supplemental sample of February, 2009. Striped bass abundance has been consistently very low since 2007.

  - **Largemouth bass:** The electrofishing catch of largemouth bass was an all-time high, with excellent recruitment and good body condition. Almost one-fifth of the sample population was legal size and larger.

  - **Crappies:** Despite a decline in numbers, the trap netting catch of white crappie was good. Body condition was excellent, recruitment was good, and almost one-half of the sample population was legal size and larger. As in 2006, black crappie were present.

- **Management strategies:** Conduct general monitoring with electrofisher, trap nets, and gill nets in 2014-2015. Publicize improvements of the largemouth bass, blue catfish, and channel catfish populations. Inform the Lavon Reservoir U.S. Army Corps of Engineers personnel about new exotic species threats to Texas waters, and work with them to display appropriate signage, educate constituents, and understand appropriate enforcement actions. Continue to monitor zebra mussel monitoring sites.

INTRODUCTION

This document is a summary of fisheries data collected from Lavon Reservoir in 2010-2011. 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. Historical data are presented with the 2010-2011 data for comparison.

Reservoir Description

Lavon Reservoir is a 21,400-acre impoundment constructed in 1953 on the East Fork Trinity River. It is located in Collin County approximately 8 miles east of McKinney and is operated and controlled by the U.S. Army Corps of Engineers (USACOE). The original dam impounded 11,080 acres of water. In 1974 the dam was raised 12 feet and increased the surface area of the reservoir to 21,400 acres. Primary project purposes are municipal and industrial water supply, flood control, and recreation. To augment municipal and industrial water, Lavon Reservoir is permitted for 85 MGD of water pumped via Sister Grove Creek from Lake Texoma. This inter-basin water transfer was halted August, 2009 after live zebra mussels that infested Lake Texoma in April, 2009 were found in Sister Grove Creek. Lavon Reservoir also receives outfall from a regional sewage treatment facility. Lavon Reservoir was mesotrophic with a mean TSI chl-*a* of 39.30 (Texas Commission on Environmental Quality 2002). Habitat at time of sampling consisted of dead trees, rocks and boulders, riprap, but mostly rocky interspersed with bare soil shoreline. There were isolated patches of native submerged and emergent vegetation. Native aquatic plants present were pondweed, water willow, and buttonbush. Water level has been low and unstable since July 2007 (Figure 1). At its lowest point in the time period between July 2007 and January 2011, the reservoir was only 5 feet below conservation elevation of 492 feet above mean sea level. Bank fishing access was available at all USACOE recreation areas and other shoreline areas accessible from public roads. Other descriptive characteristics for Lavon Reservoir are in Table 1.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Hysmith and Moczygemba 2007) included:

1. Recommended continuation of striped bass fingerling stocking at 10/acre annually to augment recreational angling opportunities and develop a source of striped bass brood stock for future fish hatchery production.
   Action: A total of 339,114 striped bass fingerlings were stocked in 2007 and 216,090 in 2008.
2. Monitor striped bass population with a gill netting survey in 2009.
   Action: A gill netting survey was conducted in February 2009. Only two striped bass were collected and future striped bass stockings were discontinued.
3. Update the Lavon Reservoir web page as required.
   Action: Submitted updates as appropriate.

Harvest regulation history: Sportfishes in Lavon Reservoir are currently managed with statewide regulations (Table 2).

Stocking history: Lavon Reservoir was last stocked in 2007 and 2008 with striped bass at 13/acre. The complete stocking history is in Table 3.

Vegetation/habitat history: Lavon Reservoir supported limited aquatic vegetation (Table 4). The bulk of native vegetation consisted of pondweed, buttonbush, and water willow. Historically, native vegetation was more diverse and consisted of narrow leaved cattail, black willow, smartweed, water willow, knotgrass, duckweed, and water primrose in addition to current species (Hysmith and Moczygemba 1980). Historically, as well as currently, flooded timber provided the bulk of fishery habitat in Lavon Reservoir (Table 4; Hysmith and Moczygemba 1980).

Water Transfer: Lavon Reservoir is primarily used for municipal water supply, recreation, and to a lesser extent, flood control. Water is pumped into Lavon Reservoir from Texoma, Cooper, Tawakoni, and Fork Reservoirs and from the wetland project near Seagoville. Water is pumped out of Lavon Reservoir by North Texas Municipal Water District.

As a result of recent water transfer from Texoma Reservoir to Lavon Reservoir, zebra mussels have established in Sister Grove Creek. The water transfer begins at Wisdom Cove on Texoma Reservoir. The creek serves as the water transfer conduit into Lavon Reservoir. Because of the threat to Lavon Reservoir, Portland samplers were installed to monitor infestation of zebra mussels both in the reservoir and the creek. In an effort to eliminate zebra mussels from Sister Grove Creek multiple treatments with potassium chloride were conducted. Following the treatment process, colonies of live zebra mussels were still present.

METHODS

Fishes were collected by electrofishing (2 hours at 24 5-min stations), gill netting (15 net nights at 15 stations), and trap netting (15 net nights at 15 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 and trap nets, as the number of fish caught per net night (fish/nn). Survey sites were randomly selected and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2009). Habitat and vegetation surveys were also conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2009).

Sampling statistics (CPUE for various length categories) and structural indices [Proportional Size Distribution (PSD)] as defined by Guy et al. (2007) and condition indices [relative weight (Wr)] were calculated for target fishes according to Anderson and Neumann (1996). Index of vulnerability (IOV) was calculated for gizzard shad (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 for channel and blue catfish, largemouth bass, and white crappie were determined using Category 2 protocol according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2009). The manual specifies largemouth bass, but we adapted the protocol to include channel and blue catfish and white crappie.

RESULTS AND DISCUSSION

Habitat: Littoral zone habitat consisted primarily of gravel, rocks, and boulders and dead timber with some native aquatic vegetation (Table 4).

Prey species: Electrofishing CPUE of gizzard shad and bluegill were 2,450.0/h and 283.5/h, respectively (Figures 2 and 3). This was an all-time high abundance for gizzard shad and a record-setting IOV of 99%. This catch was also an all-time high abundance for bluegill. Despite an apparent increase in mean size of bluegill, almost one-half the sample population was $\leq$ 4 inches, ideal prey-size. Longear sunfish were almost as abundant as bluegill in 2010 (Appendix A) and because of their small average size they were excellent prey. The electrofishing CPUE for threadfin shad was 170.5/h (Appendix A).

Catfishes: The gill net CPUE of blue catfish was 15.1/nn in 2011, consistent with estimates of relative abundance back to 2007 (Figure 4). Relative weight ranged from 85 to 110, increasing with size; a trend repeated from 2007 (Figure 4). Blue catfish grew to 12 inches in 3 years (N = 13; range = all fish = 3 years) and 65% of the sample population was $\geq$12 inches.

The gill net CPUE of channel catfish was 3.7/nn in 2011, highest on record (Figure 5 and Appendix C). Recruitment of sub-stock fish was excellent; however, body condition was not so good with relative weights ranging from less than 80% to almost 90%. Channel catfish grew to 12 inches in 4 years (N = 4; range = 3 to 4 years) slower than blue catfish. Thirty-one percent of the sample population was $\geq$ 12 inches.

Temperate basses: The gill net CPUE of white bass was 2.0/nn in 2011 (Figure 6), below the average CPUE for this reservoir (Appendix C). White bass grew to 10 inches in 2 years (N = 4; range = 1 to 2) and 70% of the sample population was ≥ 10 inches.

The gill net CPUE of striped bass was 0.2/nn in 2011 (Figure 7), similar to catches 2007 and 2009. Historically, gill net CPUE has never been high (Appendix C) and probably indicates striped bass are not going to establish in Lavon Reservoir, therefore, stocking was discontinued.

Largemouth bass: The electrofishing CPUE of largemouth bass was 114.5/h in 2010, an all-time high abundance (Figure 8, Appendix C). There was excellent recruitment of sub-stock fish and an average relative weight of 90 indicated a majority of the largemouth bass were in good condition. Growth was excellent with fish reaching legal size in 2 years (N = 14; range 2 to 3 years). Seventeen percent of the sample population was ≥ 14 inches.

Crappies: The trap net CPUE of white crappie was 9.8/nn in 2010 (Figure 9), below the reservoir average and way below sample results since 1999 (Appendix C). Size structure was great as shown by high PSD's, which has been consistently high in previous surveys. Forty-five percent of the sample population was ≥ 10 inches and they reach legal size in 1 year (N = 13; range = 1 to 2). High relative weights are the norm for white crappie in Lavon Reservoir and 2010 was no exception (Figure 9).

Although low in abundance, black crappie showed up in 2006 and in 2010 (Appendix C).

Fisheries management plan for Lavon Reservoir, Texas

Prepared – July 2011.

ISSUE 1: The sport fishery in Lavon Reservoir, especially blue and channel catfish, and largemouth bass has continued to improve.

MANAGEMENT STRATEGY

1. Incorporate these improvements on the TPWD web site.

ISSUE 2: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches and plugging engine cooling systems. Giant Salvinia (*Salvinia molesta*) and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state. Zebra mussels have been found in Sister Grove Creek, a tributary to Lavon Reservoir and water conduit for water transfer from Texoma Reservoir, where zebra mussels have established. Portland samplers have been deployed in Lavon Reservoir and Sister Grove Creek.

MANAGEMENT STRATEIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Contact and educate marina owners about invasive species, and provide them with posters, literature, etc… so that they can in turn educate their customers.
3. Educate the public about invasive species through the use of media and the internet.
4. Make a speaking point about invasive species when presenting to constituent and user groups.
5. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.
6. Monitor Portland samplers deployed in Lavon Reservoir and Sister Grove Creek.

SAMPLING SCHEDULE JUSTIFICATION:

Conduct general monitoring surveys in 2014 – 2015 with electrofishing, trap netting, and gill netting equipment. Access and habitat surveys will also be conducted.

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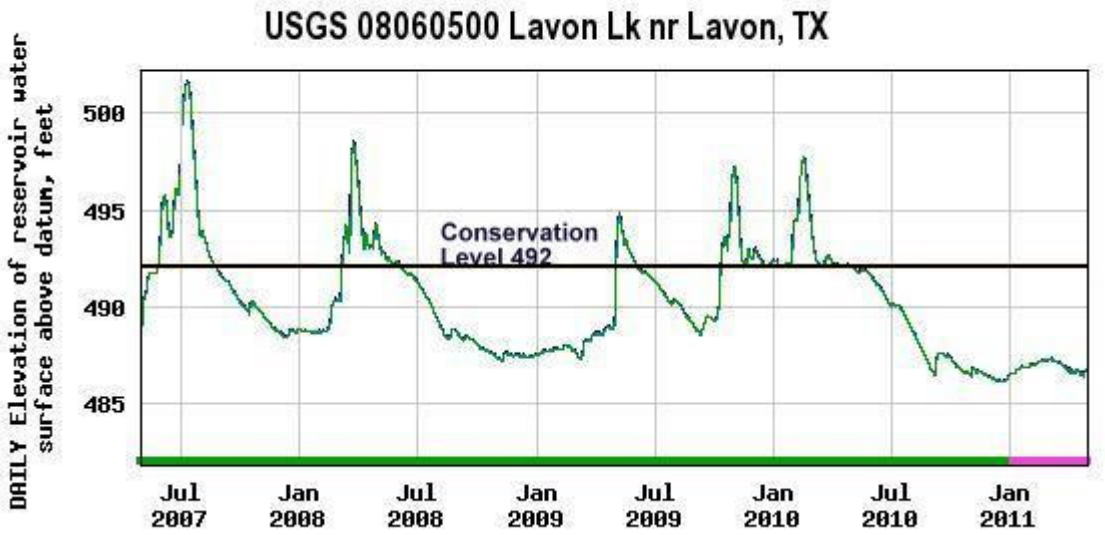


Figure 1. Monthly average water level elevations in feet above mean sea level (MSL) recorded for Lavon Reservoir (U.S. Geological Survey. 2011. USGS real time water data for USGS 08060500 Lavon Lake near Lavon, Texas. http://waterdata.usgs.gov/nwis), Texas, May 2007-Aril 2011.

Table 1. Characteristics of Lavon Reservoir, Texas.

Characteristic	Description
Year constructed	1953
Controlling authority	U.S. Army Corps of Engineers
Counties	Collin
Reservoir type	Mainstream
Shoreline development index	5.9
Conductivity	286 µmhos/cm

Table 2. Harvest regulations for Lavon Reservoir.

Species	Bag Limit	Length (inches)
Catfish: channel and blue catfish, their hybrids and subspecies	25 (in any combination)	12 minimum
Catfish, flathead	5	18 minimum
Bass, white	25	10 minimum
Bass, striped	5	18 minimum
Bass, largemouth	5	14 minimum
Crappie: white and black crappie, their hybrids and subspecies	25 (in any combination)	10 minimum

Table 3. Stocking history of Lavon Reservoir, 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)
Blue catfish	1989	214,259	FGL	2.6
	1997	214,106	FGL	2.0
	1998	214,588	FGL	2.2
	Total	642,953		
Channel catfish	1954	20,000	AFGL	7.9
	1971	26,700	AFGL	7.9
	Total	46,700		
Florida Largemouth bass	1988	67,226	FGL	2.0
	1988	361,652	FRY	1.0
	1997	250,800	FGL	1.2
	2004	539,664	FGL	1.5
	2005	535,577	FGL	1.5
	Total	1,754,919		
Largemouth bass	1954	1,027,000	FRY	0.7
	1968	177,100	UNK	UNK
	Total	1,204,100		
Mixed largemouth bass	1988	98,860		1.0
	Total	98,860		
Palmetto Bass (striped X white bass hybrid)	1976	39,200	FGL	UNK
	Total	39,200		
Striped bass	1989	213,826	FGL	1.4
	1994	428,402	FGL	1.3
	2004	19,241	FGL	1.9
	2005	107,008	FGL	1.6
	2006	216,086	FGL	1.8
	2007	339,114	FGL	1.5
	2008	216,090	FGL	1.6
	Total	1,539,767		
Threadfin shad	1980	8,250	AFGL	2.9
	1984	2,000	AFGL	3.0
	Total	10,250		

Table 3 continued.

Species	Year	Number	Life Stage	Mean TL (in)
Walleye	1976	86,000	FRY	0.2
	Total	86,000		
White bass	1957	330	ADL	UNK
	Total	330		

Table 4. Survey of shoreline habitat and littoral and pelagic habitat types, Lavon Reservoir, Texas, 2010. A linear shoreline distance (miles) and percent of total was recorded for each shoreline habitat type found. Surface area (acres) and percent of total was determined for each type of littoral and pelagic habitat type found.

	Shoreline distance		Surface area	
	Miles	% of total	Coverage (acres)	% of total
Shoreline habitat type				
Bulkhead	0.1	0.1		
Rocky shoreline	79.7	65.9		
Natural shoreline	41.2	34.0		
Littoral and pelagic habitat type				
Standing timber, stumps			10,700	50.0
Native emergent[a]			44	0.2
Native submersed[b]			10	<0.1
Open water			10,546	49.3
Piers, boat docks, marinas			100	0.5

[a] Common buttonbush and Water-willow

[b] Muskgrass and Pondweed

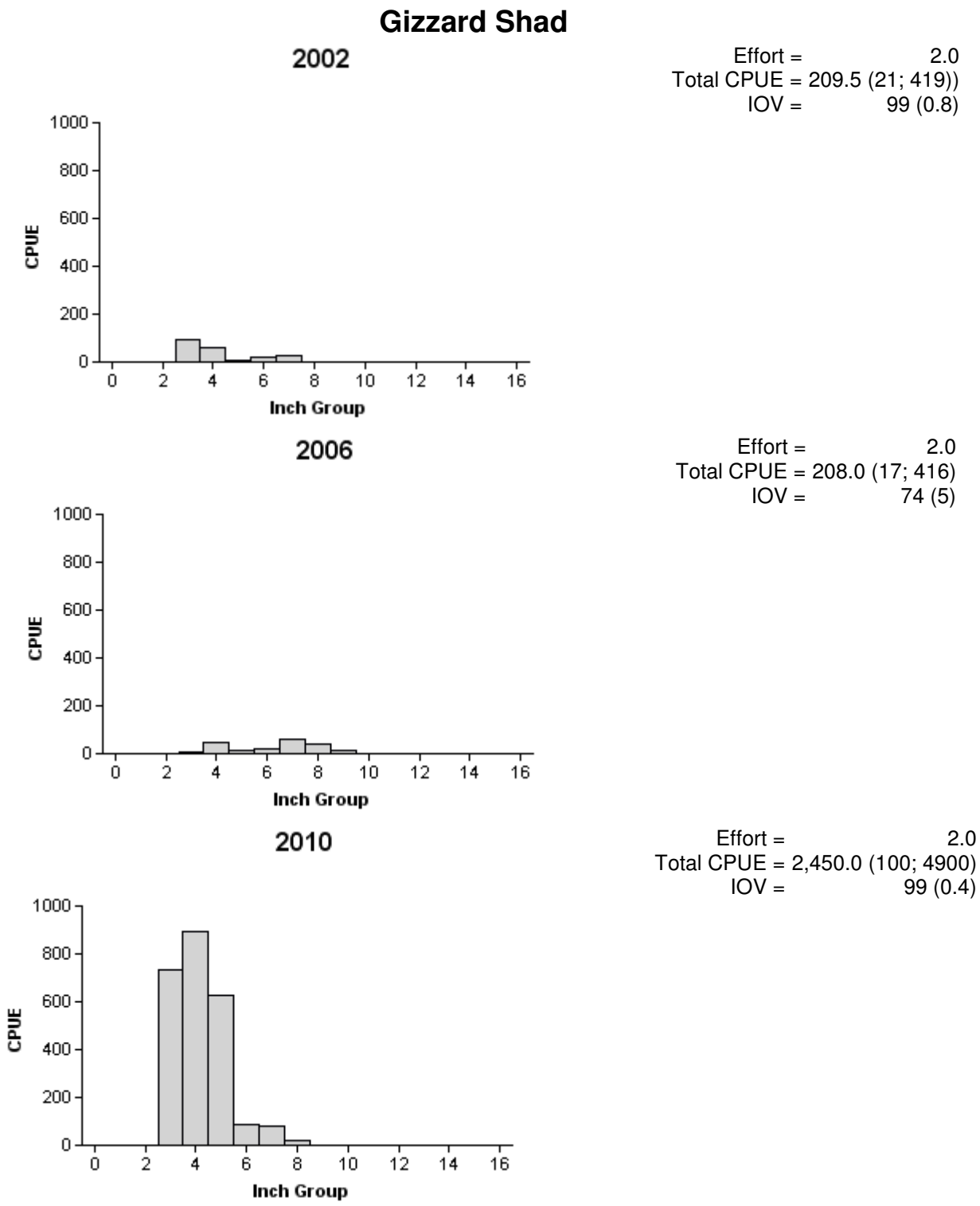


Figure 2. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Lavon Reservoir, Texas, 2002, 2006, and 2010.

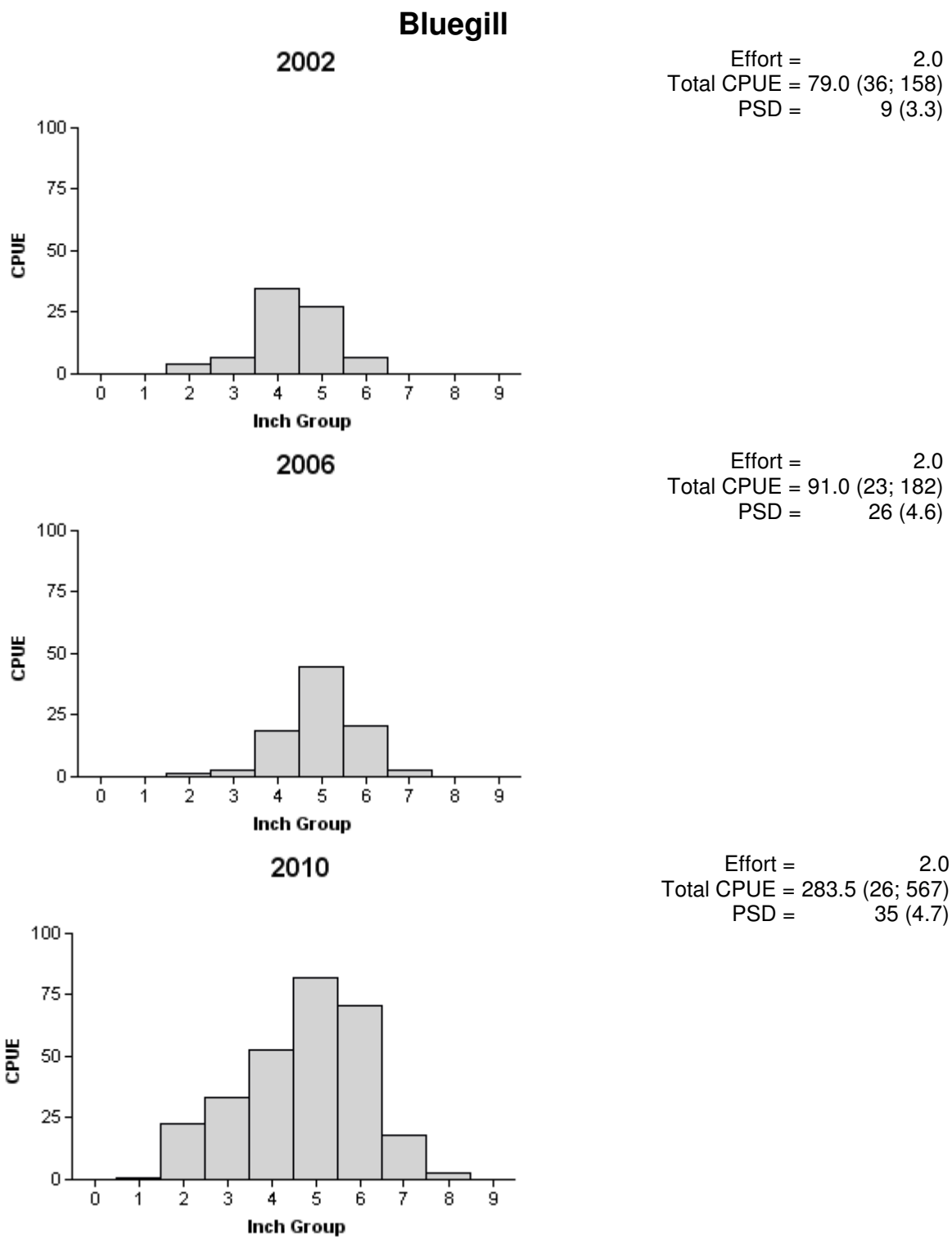


Figure 3. Number of bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lavon Reservoir, Texas, 2002, 2006, and 2010.

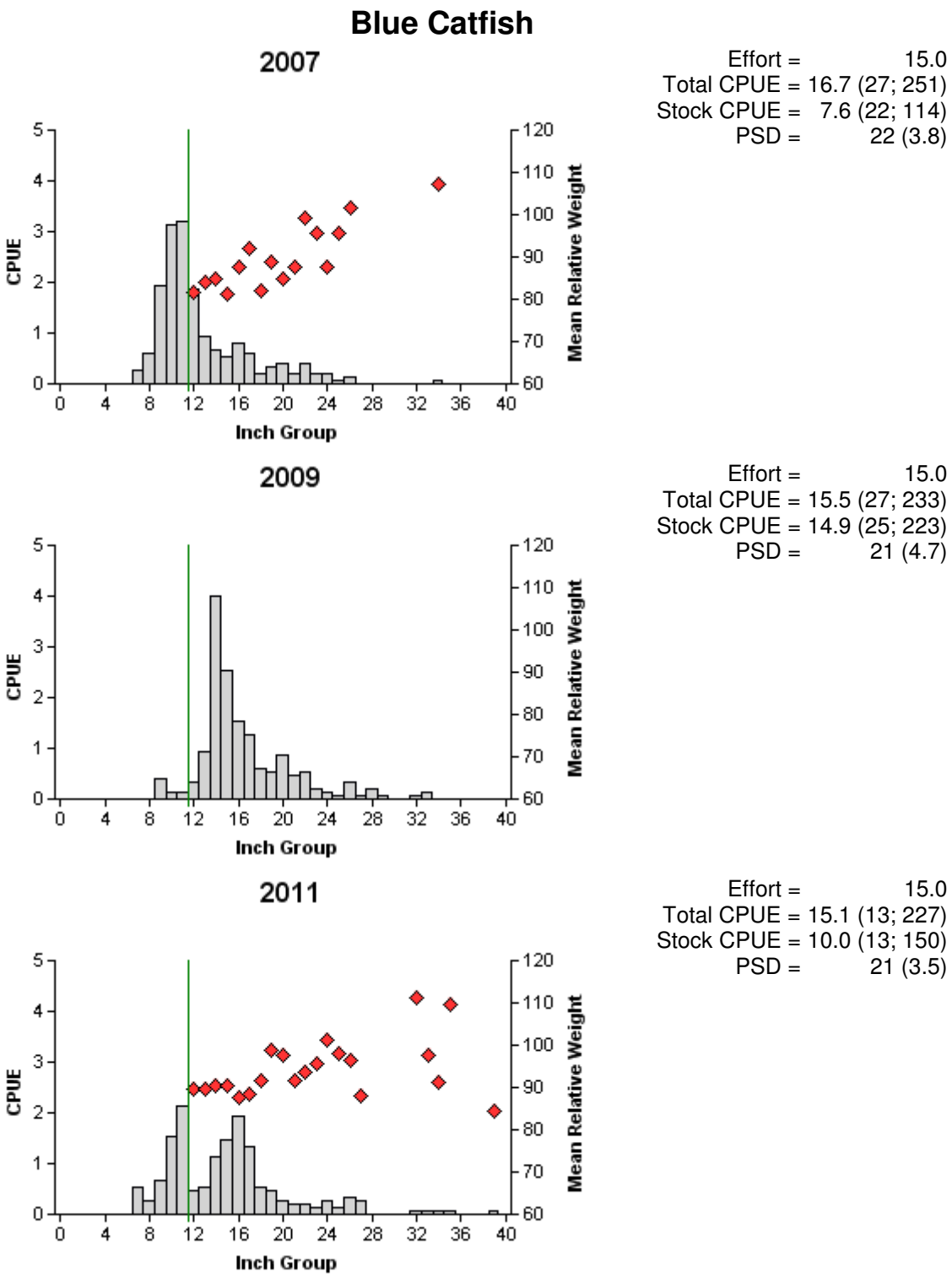


Figure 4. Number of blue catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lavon Reservoir, Texas, 2007, 2009, and 2011. Vertical lines represent length limit at time of collection.

Channel Catfish

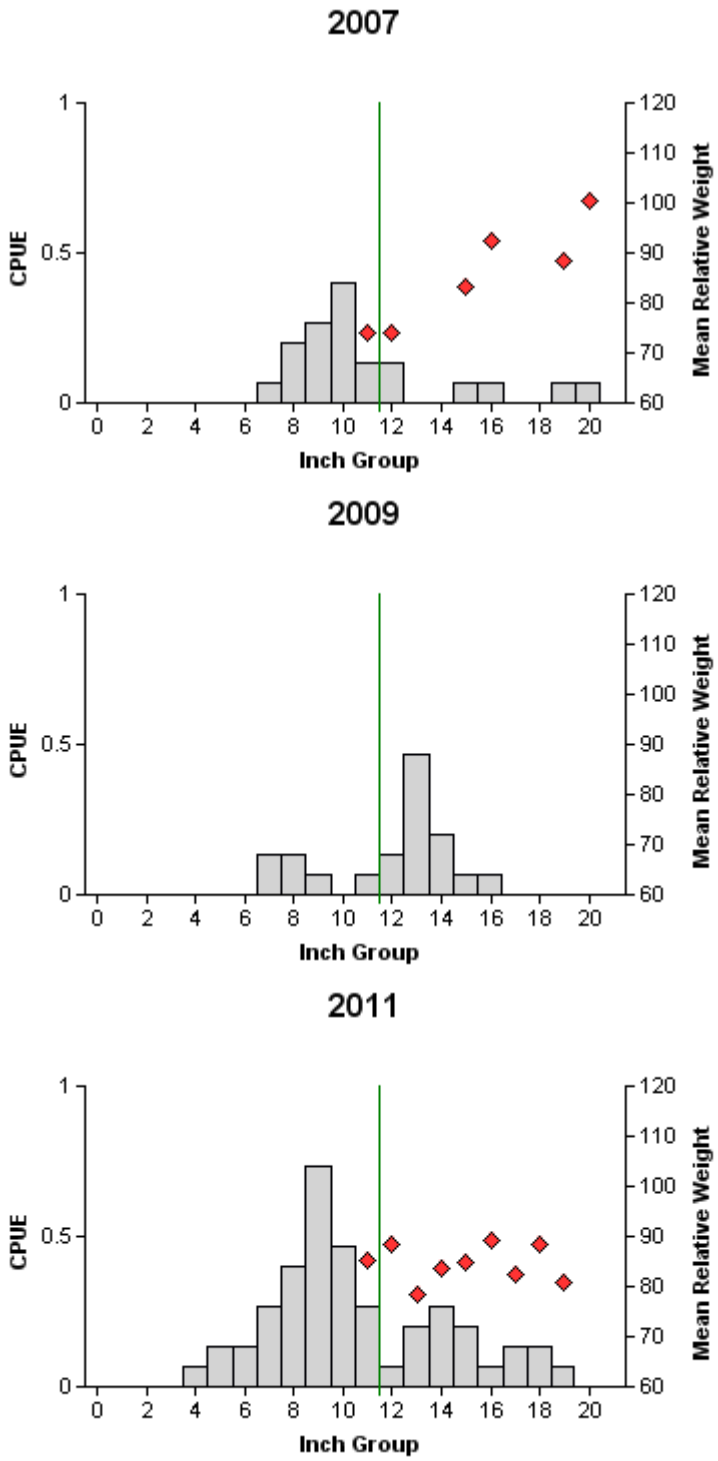


Figure 5. Number of channel catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lavon Reservoir, Texas, 2007, 2009, and 2011. Vertical lines represent length limit at time of collection.

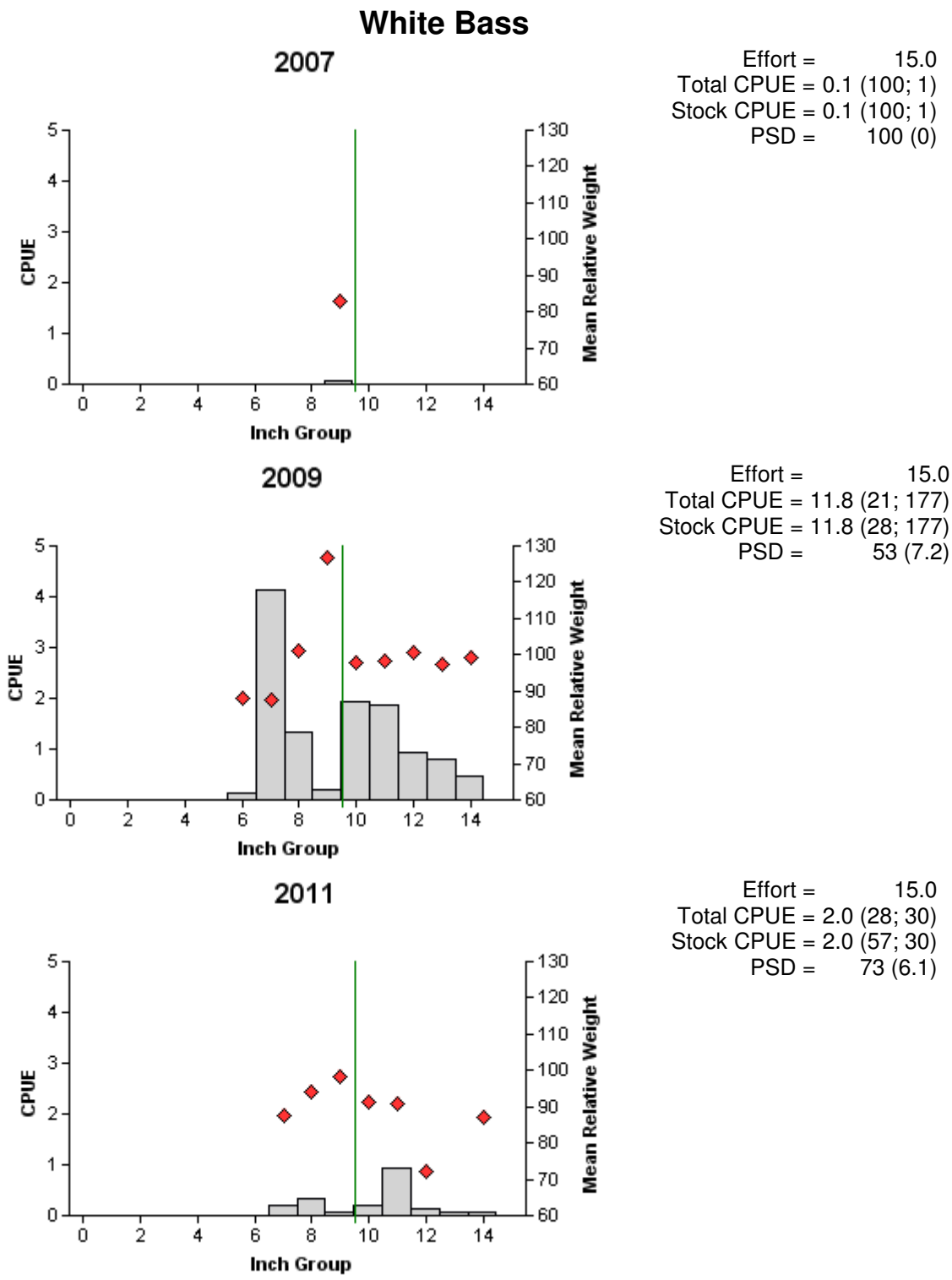


Figure 6. Number of white bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lavon Reservoir, Texas, 2007, 2009, and 2011. Vertical lines represent length limit at time of collection.

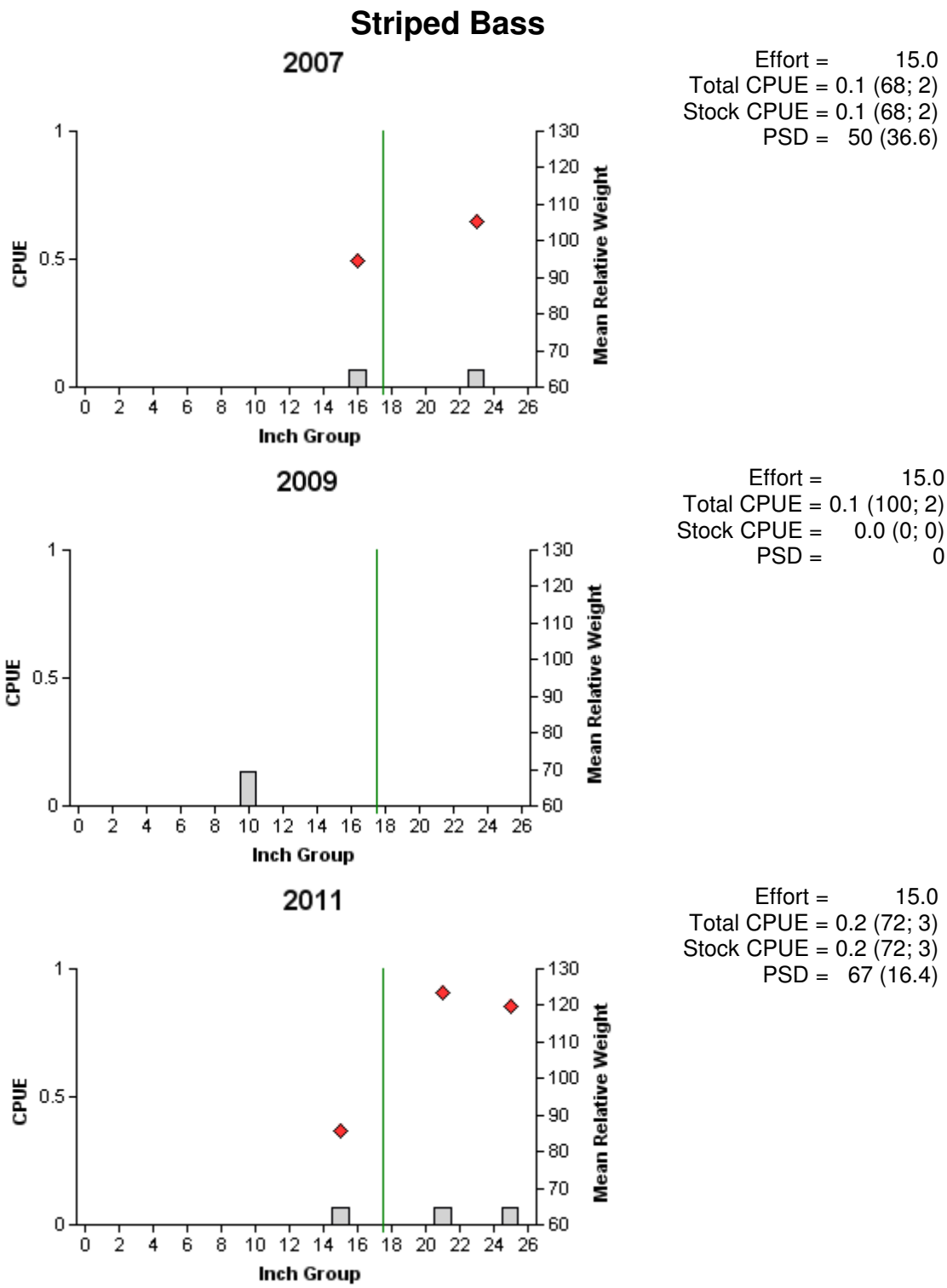


Figure 7. Number of striped bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lavon Reservoir, Texas, 2007, 2009, and 2011. Vertical lines represent length limit at time of collection.

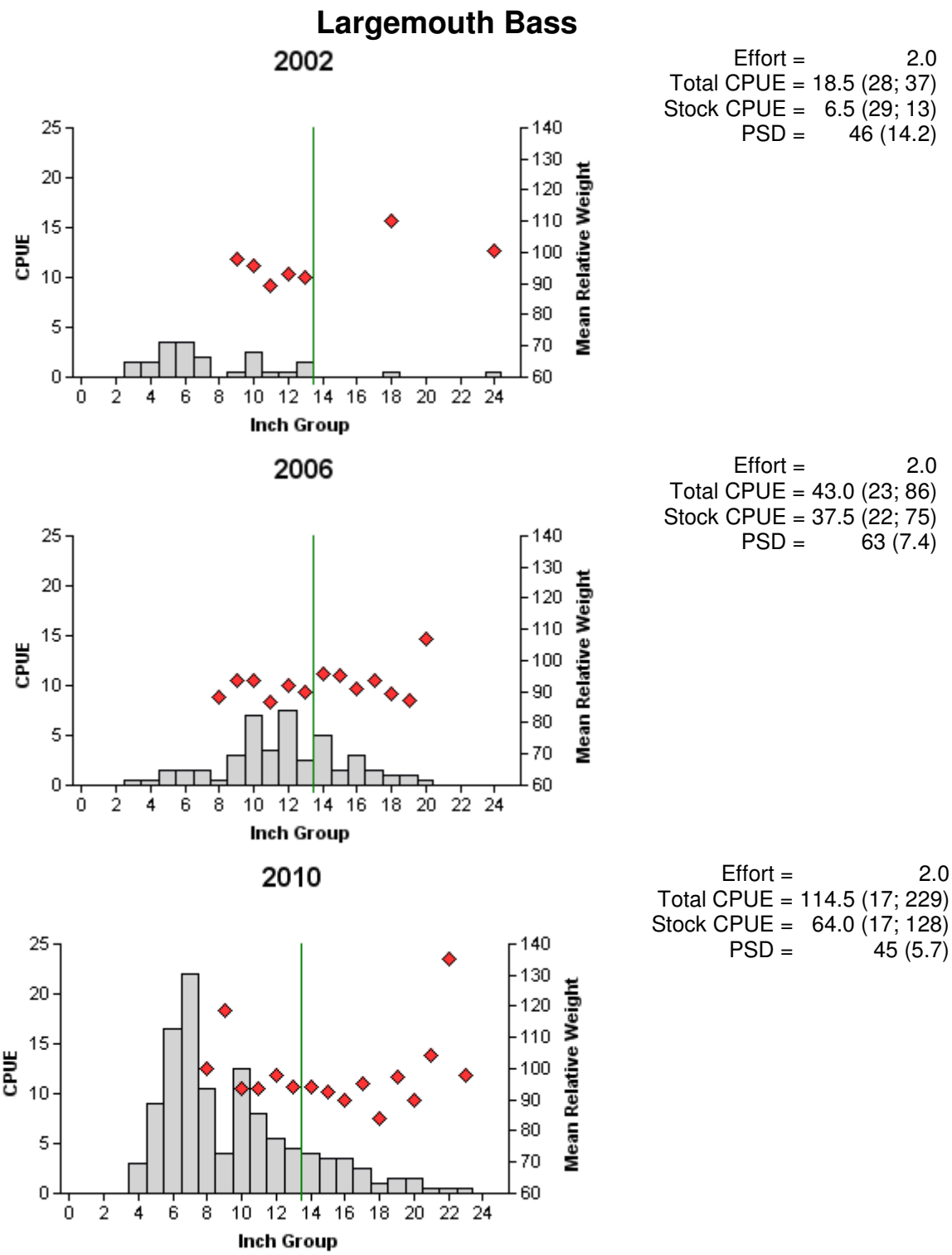


Figure 8. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lavon Reservoir, Texas, 2002, 2006, and 2010. Vertical lines represent length limit at time of collection.

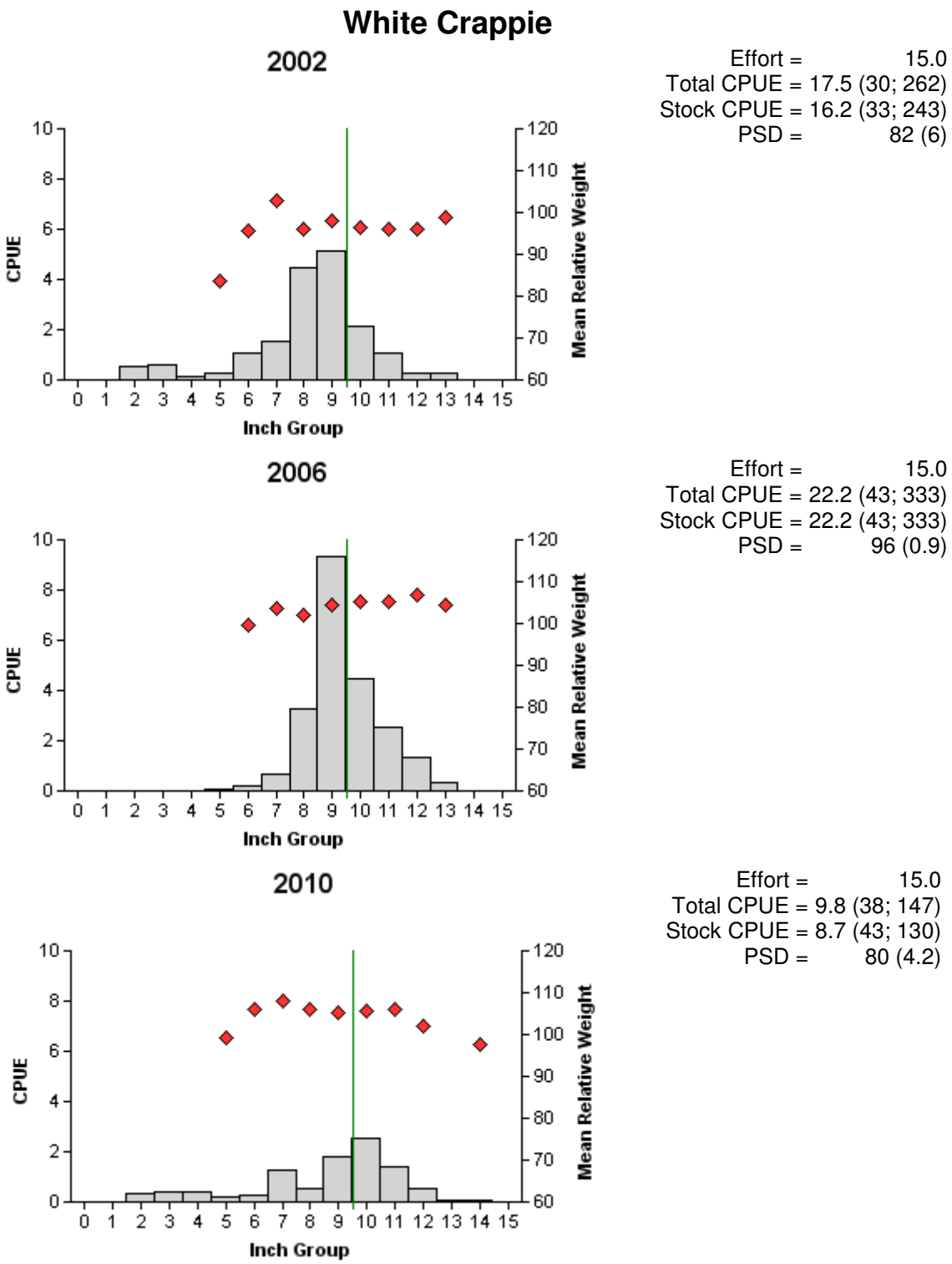


Figure 9. Number of white crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Lavon Reservoir, Texas, 2002, 2006, and 2010. Vertical lines represent length limit at time of collection.

Table 6. Proposed sampling schedule for Lavon Reservoir, Texas. Electrofishing and trap netting surveys are conducted in the fall, while gill netting surveys are conducted during the following spring. Standard survey denoted by S.

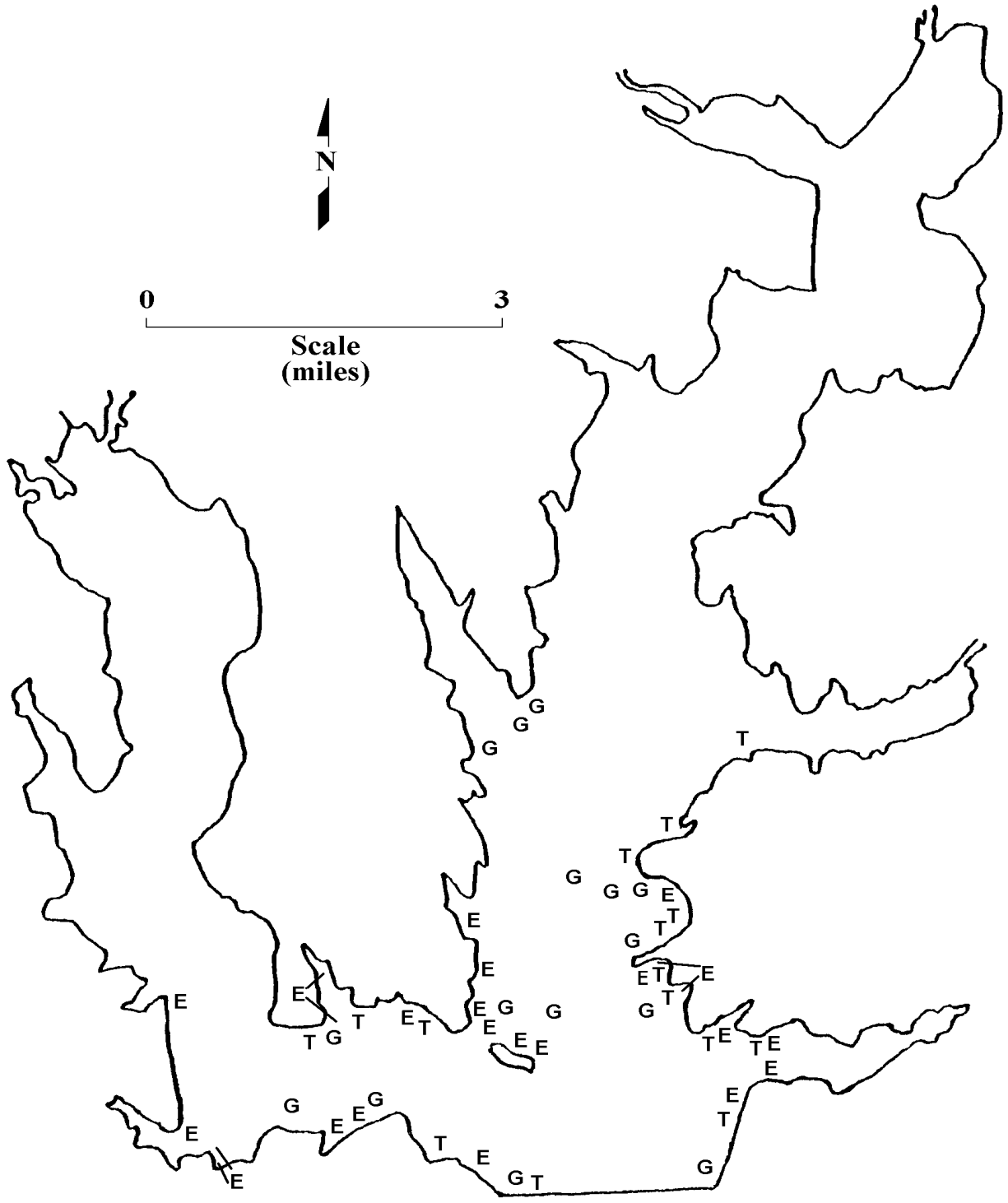
Survey Year	Electrofisher	Trap Net	Gill Net	Creel Survey	Vegetation Survey	Access Survey	Report
Fall 2011-Spring 2012							
Fall 2012-Spring2013							
Fall 2013-Spring 2014							
Fall 2014-Spring 2015	S	S	S		S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Lavon Reservoir, Texas, 2010-2011.

	Gill Netting		Trap Netting		Electrofishing	
Species	N	CPUE	N	CPUE	N	CPUE
Gizzard shad	321	21.4			4900	2450.0
Threadfin shad					341	170.5
Blue catfish	227	15.1				
Channel catfish	55	3.7				
Flathead catfish	2	0.1				
White bass	30	2.0				
Striped bass	3	0.2				
Green sunfish					13	6.5
Warmouth					29	14.5
Orangespotted sunfish					2	1.0
Bluegill					567	283.5
Longear sunfish					489	244.5
Redear sunfish					6	3.0
Largemouth bass					229	114.5
White crappie			147	9.8		
Black crappie			13	0.9		

APPENDIX B



Location of sampling sites, Lavon Reservoir, Texas, 2010-2011. Trap netting, gill netting, and electrofishing stations are indicated by T, G, and E, respectively. Water level was 5.5 feet below conservation for trap netting and electrofishing and 5 feet below during gill netting.

APPENDIX C

Historical catch rates of targeted species by gear type for Lavon Reservoir, Texas, 1996, 1999, 2002 - 2003, 2006 - 2007, 2009, and 2010 – 2011.

		Year									
Gear	Species	1996[a]	1999	2002	2003	2006	2007	2009	2010	2011	**Avg.**
Gill Netting	Blue catfish	1.1	8.3		14.8		16.7	15.5		15.1	**11.9**
(fish/net night)	Channel catfish	1.9	2.5		0.9		1.5	1.3		3.7	**2.0**
	Flathead catfish	0.0	0.0		0.0		0.1	0.0		0.1	**0.0**
	White bass	3.8	3.8		2.5		0.1	11.8		2.0	**4.0**
	Striped bass	1.3	1.5		0.1		0.1	0.1		0.2	**0.6**
Electrofishing	Gizzard shad	202.5	215.5	209.5		208.0			2450.0		**657.1**
(fish/hour)	Threadfin shad	120.5	330.0	58.5		832.0			170.5		**251.9**
	Green sunfish	1.5	4.0	0.0		0.0			6.5		**2.4**
	Warmouth	0.5	3.0	2.5		8.0			14.5		**5.7**
	Orangespotted sunfish	0.0	0.0	2.5		0.0			1.0		**0.7**
	Bluegill	33.0	40.5	79.0		91.0			283.5		**105.4**
	Longear sunfish	4.0	88.0	66.5		65.5			244.5		**93.7**
	Redear sunfish	0.0	0.0	0.0		1.0			3.0		**0.8**
	Largemouth bass	9.0	66.0	18.5		43.0			114.5		**50.2**
Trap Netting	White crappie	3.5	17.8	17.5		22.2			9.8		**14.2**
(fish/net night)	Black crappie	0.0	0.0	0.0		0.1			0.9		**0.2**

[a]Trap netting was conducted in January 1997.