PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-30-R-35

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2009 Survey Report

B. A. Steinhagen Reservoir

Prepared by:

Dan Ashe and Todd Driscoll
Inland Fisheries Division
District 3-D, Jasper, Texas

Carter P. Smith
Executive Director

Gary Saul
Director, Inland Fisheries

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in B. A. Steinhagen Reservoir were surveyed in 2009 and 2010 with fall electrofishing, trap netting, and gill netting. Vegetation and access surveys were also conducted in 2009. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir description:** B.A. Steinhagen Reservoir was impounded in 1951 on the Neches River; other tributaries include the Angelina River and Wolf, Sandy, Spring, and Rush creeks. The U.S. Army Corps of Engineers (USACE) is the controlling authority; primary uses are to regulate intermittent water releases from Sam Rayburn Reservoir, produce hydropower, and provide recreational opportunities. At conservation pool (82.5 feet mean sea level), B.A. Steinhagen Reservoir covers 10,687 acres and has a shoreline length of 160 miles. Mean depth is 4 feet and littoral areas (<15 feet) comprise 95 percent of the reservoir. Boat access is excellent, with 14 boat ramps and adequate parking at each. Bank access is provided by two lighted fishing piers at Martin Dies, Jr. State Park. Most of the land around the reservoir is used for timber production.

- **Management history:** Important sport fish include largemouth bass, crappie, and catfish. Vegetation is problematic in the reservoir, (mainly common salvinia, alligatorweed, hydrilla, and water hyacinth). The USACE conducted a water level draw down from May 2006 through June 2007 in an effort to reduce the vegetative coverage. Since 2008, the USACE has also conducted extensive herbicide treatments in cooperation with the Lower Neches Valley Authority (LVNA) and Texas Parks and Wildlife Department (TPWD). In January 2010, the USACE conducted a short-term winter water-level draw-down during a freeze event to further reduce problematic vegetation coverage. Blue and channel catfish fingerlings were stocked following the water-level draw-down that occurred during 2006 and 2007 to improve recruitment.

- **Fish community**
  - **Prey species:** Adequate prey were present with threadfin shad most abundant. Other prevalent prey species included gizzard shad and bluegill.

  - **Catfishes:** Both blue and channel catfish were present in the reservoir. Since 2001, blue catfish abundance has declined while channel catfish abundance has remained stable. In 2010, a greater number of legal-length ($\geq$12 inches) channel catfish were collected.

  - **Temperate basses:** White and yellow bass were present but abundance was low.

  - **Black basses:** Spotted bass were present in low numbers. Largemouth bass were moderately abundant and in good condition. Size structure was relatively similar over the last three surveys; most fish were <14 inches in length.

  - **Crappies:** White crappie and black crappie were present in the reservoir, and abundance was relatively high. During the last three surveys, white crappie abundance was relatively stable, but black crappie numbers increased. White and black crappie reached 9-11 inches in less than two years.

- **Management strategies:** Continue to manage the fishery with statewide harvest regulations. Continue to monitor trends of vegetative coverage through annual aquatic vegetation surveys (2010-2013). Conduct standard population monitoring with fall electrofishing and trap netting surveys in 2013, and a gill netting survey in 2014.

INTRODUCTION

This document is a summary of fisheries data collected from B.A. Steinhagen Reservoir in 2009 and 2010. The purpose of this 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 2009 and 2010 data for comparison.

Reservoir Description

B.A. Steinhagen Reservoir (impounded in 1951) is an impoundment of the Neches River (Table 1); other tributaries include the Angelina River and Wolf, Sandy, Spring, and Rush creeks. The U.S. Army Corps of Engineers (USACE) is the controlling authority; primary uses are to regulate intermittent water releases from Sam Rayburn Reservoir, produce hydropower, and provide recreational opportunities. At conservation pool (82.5 feet mean sea level), B.A. Steinhagen Reservoir covers 10,687 acres and has a shoreline length of 160 miles. Mean depth is 4 feet and littoral areas (< 15 feet) comprise 95 percent of the reservoir. Although water level fluctuations average 3 feet annually (Figure 1), during August 2001 to July 2002 (5 feet drawdown) and again during May 2006 to June 2007 (12 feet draw down) the reservoir was drawn down for dam repairs and to help reduce problematic vegetation. The 2006 to 2007 drawdown reduced all but the lower fourth of the reservoir to the main river channel. Boat access is excellent, with 14 boat ramps and adequate parking at each. Bank access is provided by two lighted fishing piers at Martin Dies, Jr. State Park. Handicap-specific facilities are limited to fishing piers. During times of peak vegetation coverage, angler access can become limited, especially in the upper end of the reservoir. Currently, problematic plants include water hyacinth, common salvinia, alligatorweed, hydrilla, and recently giant salvinia. Most of the land around the reservoir is used for timber production.

Management History

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

1. Reduce fish population sampling to the minimum (i.e. once every 4 years). From 1998 to 2002, electrofishing and gill netting had been conducted every 2 years.
   Action: Surveys were not conducted in 2006 due to the water draw down. Routine fish population monitoring was conducted in 2009 and 2010.
2. Continue to provide management recommendations to the USACE for the control of problematic vegetation.
   Action: Recommendations of a summer drawdown was proposed in 2006 to USACE in an effort to help reduce problematic vegetation. A draw down occurred from May 2006 to June 2007. In 2005, alligatorweed, common salvinia, and water hyacinth covered approximately 3,255 acres (33% coverage). In 2009, problematic vegetation coverage was 3,881 acres (39% coverage) including 96 acres of giant salvinia which was discovered in 2007. The USACE has conducted herbicide treatments through TPWD recommendations since 2008. In January 2010, the USACE conducted a short term water draw down during a winter freeze event.
3. Provide LVNA with guidance relative to dredging plans and their relation to angler access and effects on fish populations.
   Action: LVNA was provided with a volumetric survey in 2004.

Harvest regulation history: Sport fishes in B.A. Steinhagen Reservoir are currently managed with statewide regulations (Table 2).

Stocking history: During the last five years, only blue catfish (70,159) and channel catfish (210,557) were stocked (2007). Florida largemouth bass were last stocked in 2000 (408,432) (Table 3).

Vegetation/habitat history: Historically, B.A. Steinhagen Reservoir has suffered from continual problems associated with excess aquatic vegetation coverage exacerbated by the average depth (4 feet). Since 2005, total vegetative coverage has ranged from 60% to 75%, but relative species composition has varied (Table 4). In 2009, despite a 12-feet water draw-down that occurred from May 2006 to June 2007 (Figure 1), there was over 70% coverage (primarily American lotus, common salvinia, alligatorweed, and water hyacinth). The drawdown appeared to affect water hyacinth, as coverage decreased from 1,695 acres in 2005 to 599 acres in 2009. The USACE, in cooperation with the LNVA and TPWD, has conducted extensive aquatic herbicide treatments since 2008. Additionally, the USACE conducted a short- term water draw-down in January 2010 during a freeze event to further reduce problematic vegetation. The USACE, through its partnerships with LNVA and TPWD, has indicated that herbicide treatments will continue along with winter freeze event draw-downs to help control problematic vegetation. Giant salvinia was first discovered in 2007 with coverage remaining low (1% of surface area) through 2009.

METHODS

Fishes were collected by electrofishing (1.5 hour at 18, 5-min stations during November), trap netting (10 net nights at 10 stations during December), and gill netting (10 net nights at 10 stations during February). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing and for trap nets and gill nets as the number of fish caught per net night (fish/nn). A vegetation survey was conducted in September 2005 and was repeated annually from 2007 through 2009; only non-native species were recorded in 2007. All survey sites were randomly selected and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2009).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), as defined by Guy et al. (2007)], Relative Stock Density (RSD)], and condition indices [relative weight (W_r)] 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 for creel statistics and SE was calculated for structural indices and IOV. For white crappie, ages were determined using otoliths from 8 fish with lengths ranging from 9.0 – 11.8 inches; for black crappie ages were determined from otoliths from 7 fish with lengths ranging from 9.0 – 9.3 inches. Water level data were obtained from the United States Geological Survey web site (USGS 2010).

RESULTS AND DISCUSSION

Habitat: A habitat survey conducted in 2002 indicated that the littoral zone included primarily overhanging brush and dead timber (Smith and Driscoll 2003). Problematic plants in the reservoir include common salvinia, water hyacinth, alligatorweed, and giant salvinia; during 2009, over 3,881 acres of these problematic plants were observed (Table 4). Hydrilla was also problematic, but only at access points and boat lanes. The USACE conducted a short term water draw down in January 2010 during a freeze event to further help control problematic vegetation. In addition to the freeze event draw down in 2010, the USACE has committed to future herbicide treatments to provide access to swimming, boat launching, and boat lane areas of the reservoir. The goal of the USACE is to bring the problematic vegetation coverage to a point where it can be manageably controlled through a combination of maintenance herbicide treatments and periodic winter draw downs during freeze events.

Prey species: Threadfin shad were the most abundant prey species captured in electrofishing surveys, and catch rates were high in 2009 (2,288/h; Appendix A). Gizzard shad catch rate (95.3/h) was lower than the previous survey in 2002 (186.0/h), but the majority of the fish observed were available as prey (IOV=79.72) (Figure 2). Bluegill was the predominant sunfish species, and catch rates increased over the last three survey years to 129.3/h in 2009 (Figure 3).

Catfish: Blue catfish gill net catch rate in the spring of 2010 (3.2/nn) was lower than catch rates observed in 2003 (4.9/nn) and 2001 (13.1/nn) (Figure 4), despite a stocking of 70,159 fish in 2007. Relative weights exceeded 85 and were similar to the past two survey years.

Historically, channel catfish abundance has been low but appears to be improving. The gill net catch rate in the spring of 2010 (3.2/nn) was higher than catch rates observed in 2003 (0.6/nn) and 2001 (1.7/nn) (Figure 5). Channel catfish recruitment is likely limited by lack of invertebrate prey for juvenile fish. Relative weights exceeded 85 and were similar to the past two survey years.

Temperate basses: White and yellow bass were present, although yellow bass were sparse with only four fish observed during last three gill net surveys. During the last three survey years, white bass catch rates ranged from 0.3 to 3.3/nn and reflected a low-density population in the reservoir (Figure 6).

Black basses: Electrofishing catch rates of spotted bass have been moderate, averaging 17.8/h in the past three fall electrofishing surveys prior to 2009. In 2009, spotted bass catch rates (3.3/h) declined from previous surveys (Figure 7). The decrease in catch rates may be a result of the reservoir draw-down that occurred during 2006 to 2007, limiting recruitment. A decrease in catch rates was observed in 2002 with 13.3/h after the 2001 drawdown, where prior to a drawdown in 2000, a catch rate of 23.5/h was observed.

Fall electrofishing catch rates of largemouth bass ranged from 19.3 to 68.5/h during the last three surveys (Figure 8), and population size structure has been consistently dominated by smaller individuals <14 inches in length. Relative weights were good, indicating that growth is not limited by lack of forage.

Crappies: White and black crappie were abundant in the reservoir (Figure 9). White crappie abundance has remained relatively stable over the past three surveys with catch rates ranging from 6.7/nn to 10.9/nn. Black crappie abundance from the past two surveys was low (0.3/nn). However, in 2009, catch rates were 19.4/nn (majority of the sampled fish were captured in a single net), and most fish were less than 10 inches. Growth for both species was moderate. Average age for white crappie at 10 inches (9.2 – 11.8 in) was 1.8 years (N=8, range 1-2 years). Black crappie average age at 10 inches (9.0 – 9.3 in) was 1.0 years (N=7, all were age 1).

Fisheries management plan for B.A. Steinhagen Reservoir, Texas

Prepared – July 2010

ISSUE 1: Historically, vegetative coverage in B.A. Steinhagen Reservoir has exceeded 50%, mostly by problematic plants (water hyacinth, common salvinia, hydrilla, and alligatorweed). In 2005, problematic plants covered approximately 3,255 acres (30.5%) of the 10,687 acre reservoir. In 2006 to 2007, a water-level draw-down was conducted to allow desiccation of problematic plants. Beginning in 2008, the USACE has maintained an aggressive aquatic herbicide program (approximately $250,000 annually) during each growing season to further control problematic plants in the reservoir. In January 2010, the USACE temporarily drew the reservoir down during a freeze event to further control problematic plant coverage. A supplemental USACE survey after this freeze indicated that plant coverage was reduced significantly.

MANAGEMENT STRATEGIES

1. In cooperation with Aquatic Habitat Enhancement (AHE) staff, continue to monitor aquatic vegetation annually (2010 to 2014). Continue to provide support and results of vegetation surveys to the USACE.

2. In cooperation with AHE staff, recommend that the USACE continue annual aquatic herbicide treatments to maintain public access and control large areas of problematic plant infestations. LNVA has agreed in partnership with USACE to help provide funding for herbicide treatments. Suggest reservoir-wide herbicide treatments for salvinia (both common and giant) and water hyacinth, and treatments of alligatorweed and hydrilla only at access points and boat lanes.

3. Recommend the USACE to temporarily draw-down the reservoir during predicted winter freeze events to further control problematic aquatic plant infestations.

4. If giant salvinia coverage expands and plants are not accessible for herbicide treatments, assist AHE staff with salvinia weevil introduction in these areas.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes annual aquatic vegetation surveys (2010 to 2013). Standard monitoring with fall electrofishing, trap netting, and gill netting will be conducted in 2013 to 2014 (Table 12). Annual aquatic vegetation surveys are required to monitor water hyacinth, alligatorweed, common and giant salvinia, and hydrilla coverage.

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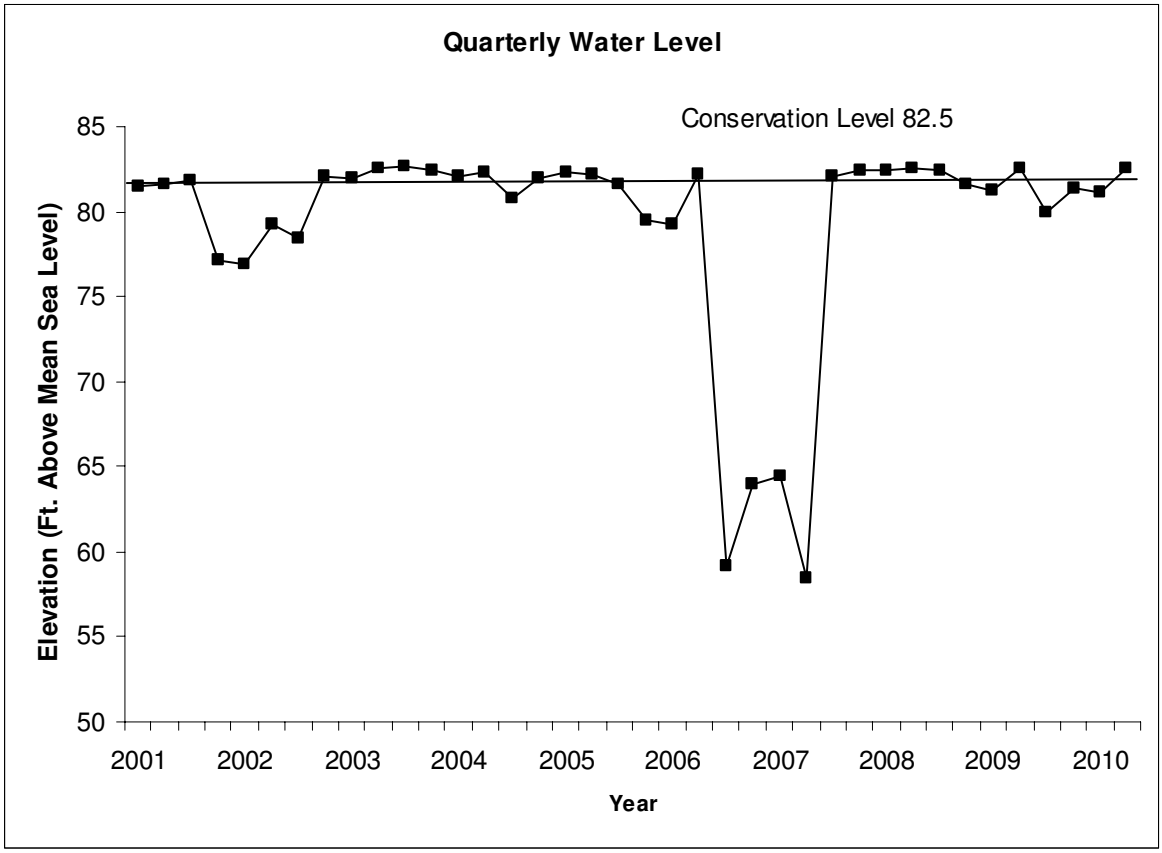


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for B.A. Steinhagen Reservoir, Texas.

Table 1. Characteristics of B.A. Steinhagen Reservoir, Texas.

Characteristic	Description
Year constructed	1951
Controlling authority	U.S. Army Corps of Engineers
Counties	Jasper and Tyler
Reservoir type	Mainstream
Shoreline Development Index (SDI)	5.0
Conductivity	180 umhos/cm

Table 2. Harvest regulations for B.A. Steinhagen Reservoir, Texas.

Species	Bag Limit	Minimum-Maximum Length (inches)
Catfish: channel and blue catfish, their hybrids and subspecies	25 (in any combination)	12 - No Limit
Catfish, flathead	5	18 - No Limit
Bass: white	25	10 - No Limit
Bass: spotted	5[a]	No Limit – No Limit
Bass: largemouth	5[a]	14 – No Limit
Crappie: white and black crappie, their hybrids and subspecies	25 (in any combination)	10 - No Limit

[a]Bag limit for largemouth and spotted bass is 5 in the aggregate.

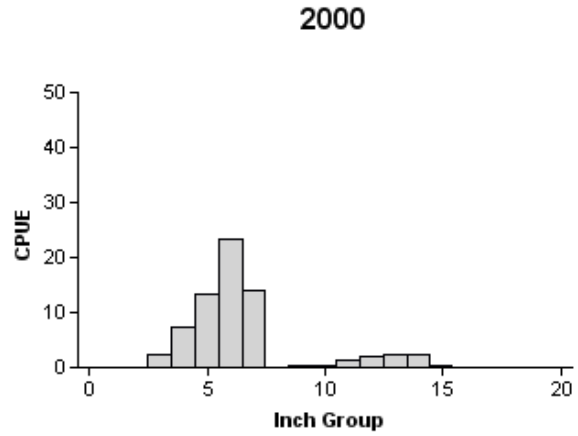
Table 3. Stocking history of B. A. Steinhagen Reservoir, Texas. Life stages are fry (FRY), fingerlings (FGL), advanced fingerlings (AFGL), and unknown (UNK). For each year and life stage the species mean total length (Mean TL; in) is given. For years where there were multiple stocking events for a particular 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	2007	70,159	FGL	2.5
	Total	70,159		
Channel catfish	1973	8,000	AFGL	7.9
	2007	210,557	FGL	2.4
	Total	218,557		
Florida largemouth bass	1990	339,035	FRY	0.6
	2000	408,432	FGL	1.3
	Total	747,467		
Largemouth bass	1973	16,670	UNK	UNK
	Total	16,670		
Mixed largemouth bass	1990	271		3.5
	Total	271		
Paddlefish	1989	31,986		5.9
	1990	84,371		8.5
	1992	10,827		9.3
	Total	127,184		
Walleye	1976	2,750,000	FRY	0.2
	Total	2,750,000		

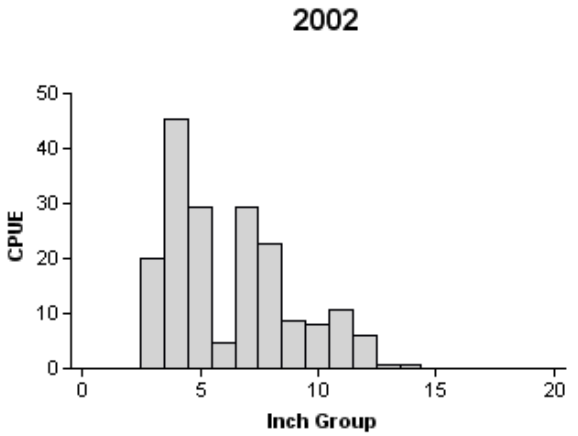
Table 4. Survey of prevalent aquatic vegetation species, B.A. Steinhagen Reservoir, September 2005, and 2007 to 2009. Acreage of each species and percent of total surface area coverage (in parentheses) are presented. In 2007, only non-native vegetation was reported.

Species	2005	2007	2008	2009
American lotus	1,950 (20)	NA	889 (9)	2,800 (29)
Common salvinia	1,064 (11)	3,727 (38)	696 (7)	2,249 (23)
Hydrilla	655 (7)	Trace	1,489 (15)	500 (5)
Alligatorweed	496 (5)	3,174 (33)	1,601 (16)	937 (10)
Water hyacinth	1,695 (17)	385 (4)	109 (1)	599 (6)
Giant salvinia	0 (0)	Trace	72 (< 1)	96 (1)

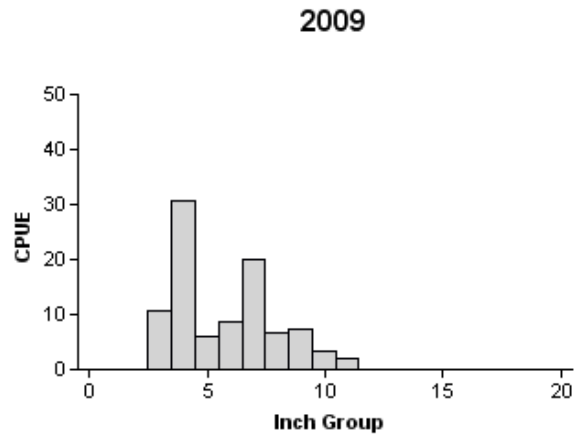
Gizzard Shad



Effort = 2.0
Total CPUE = 71.0 (37; 142)
IOV = 85.92 (4.1)



Effort = 1.5
Total CPUE = 186.0 (22; 279)
IOV = 69.18 (6.5)



Effort = 1.5
Total CPUE = 95.3 (34; 143)
IOV = 79.72 (7.5)

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, B.A. Steinhagen Reservoir, Texas, 2000, 2002, and 2009.

Bluegill

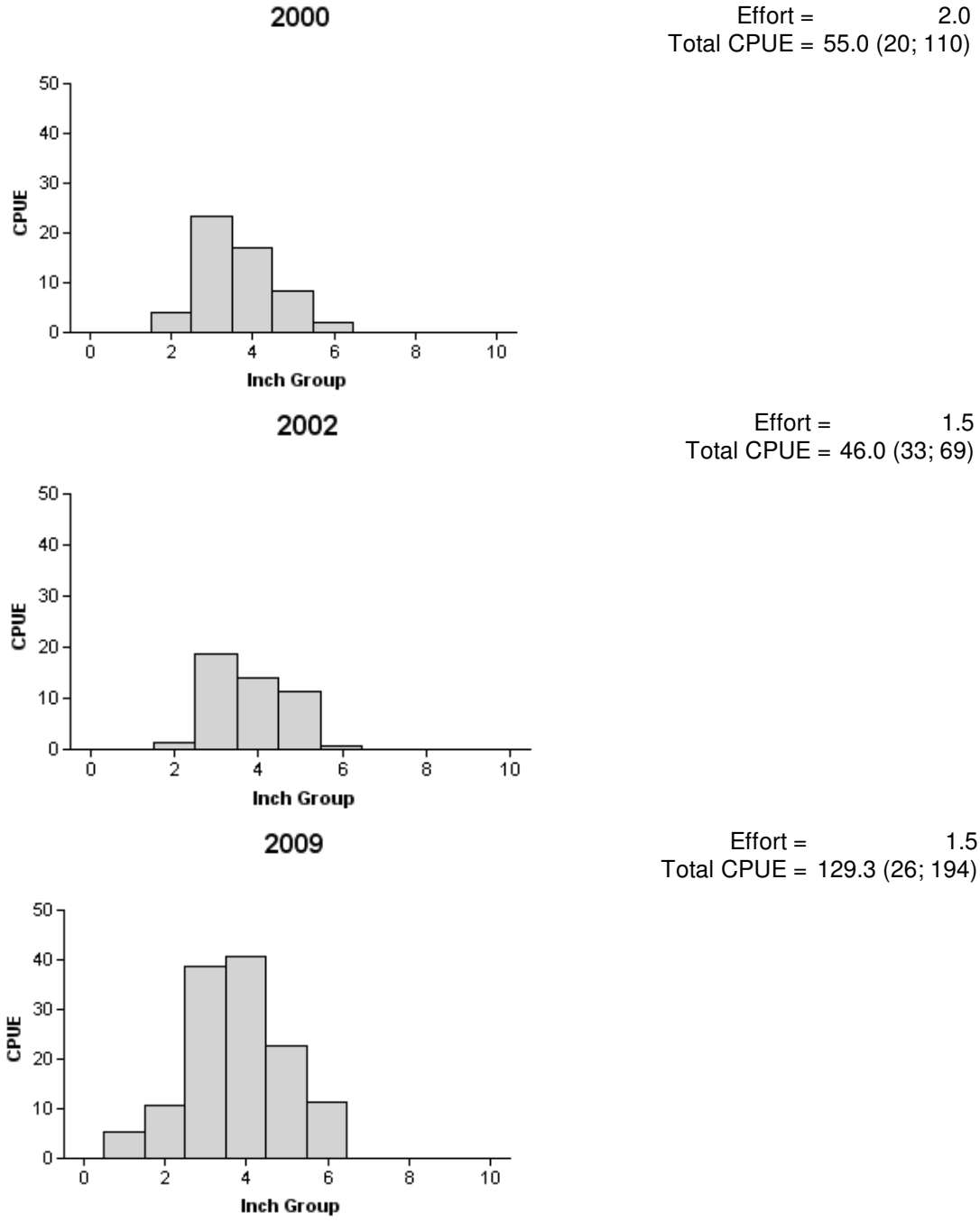


Figure 3. Number of bluegill caught per hour (CPUE, bars) and population indices (RSE and N for CPUE are in parentheses) for fall electrofishing surveys, B.A. Steinhagen Reservoir, Texas, 2000, 2002, and 2009.

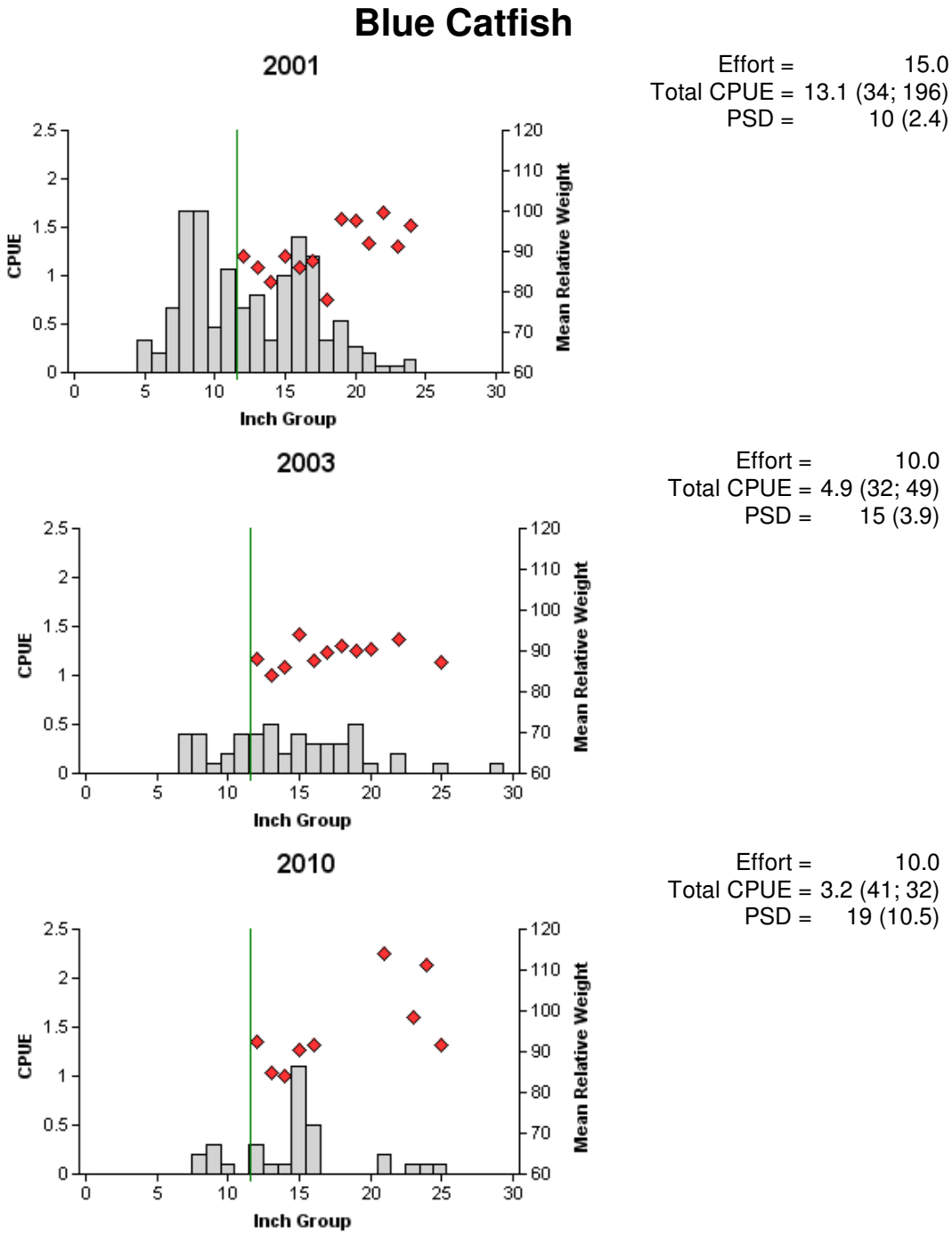


Figure 4. Number of blue catfish caught per net night (CPUE, bars) mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, B.A. Steinhagen Reservoir, Texas, 2001, 2003, and 2010. Vertical lines indicate minimum length limit at time of survey.

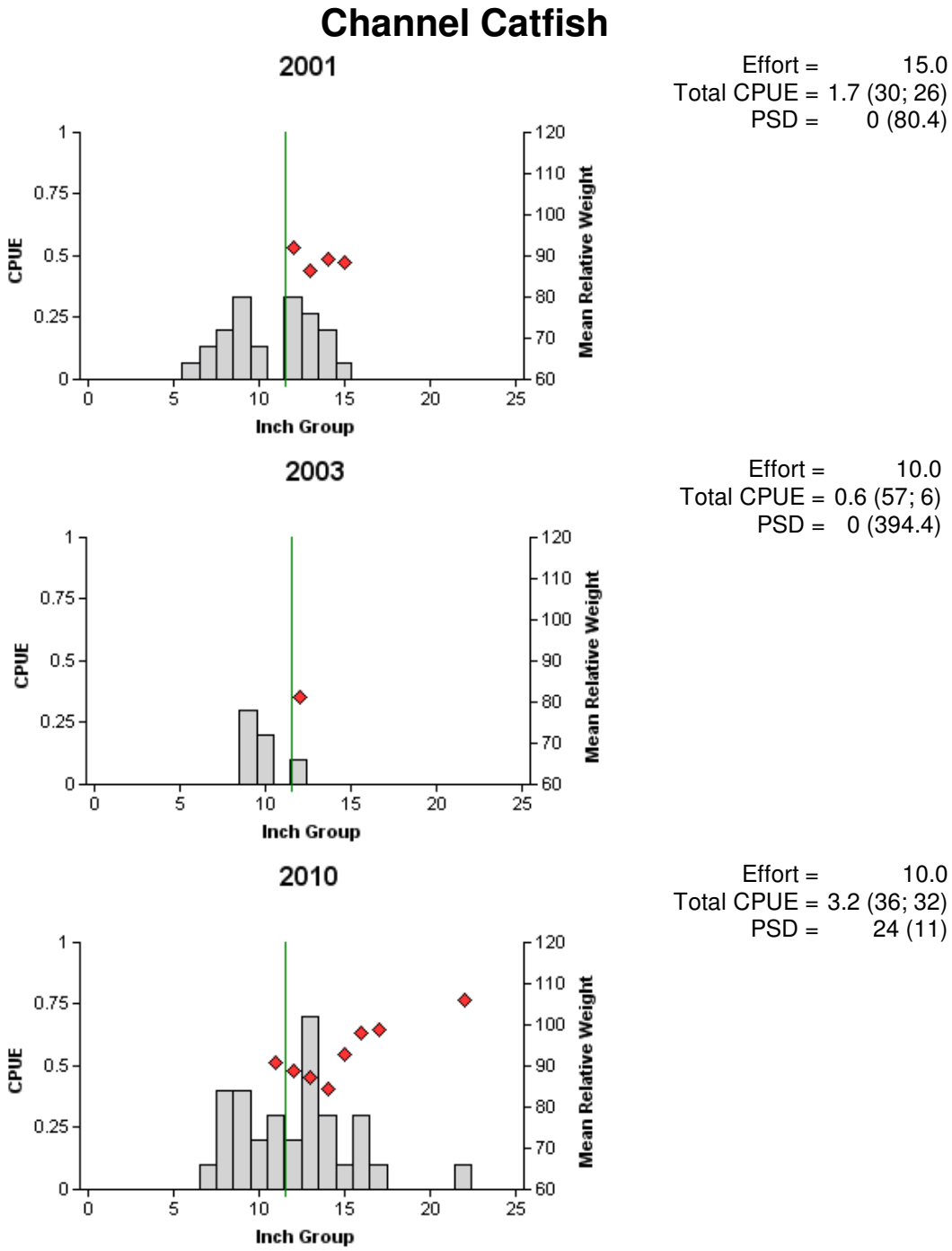


Figure 5. Number of channel catfish caught per net night (CPUE, bars) mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, B.A. Steinhagen Reservoir, Texas, 2001, 2003, and 2010. Vertical lines indicate minimum length limit at time of survey.

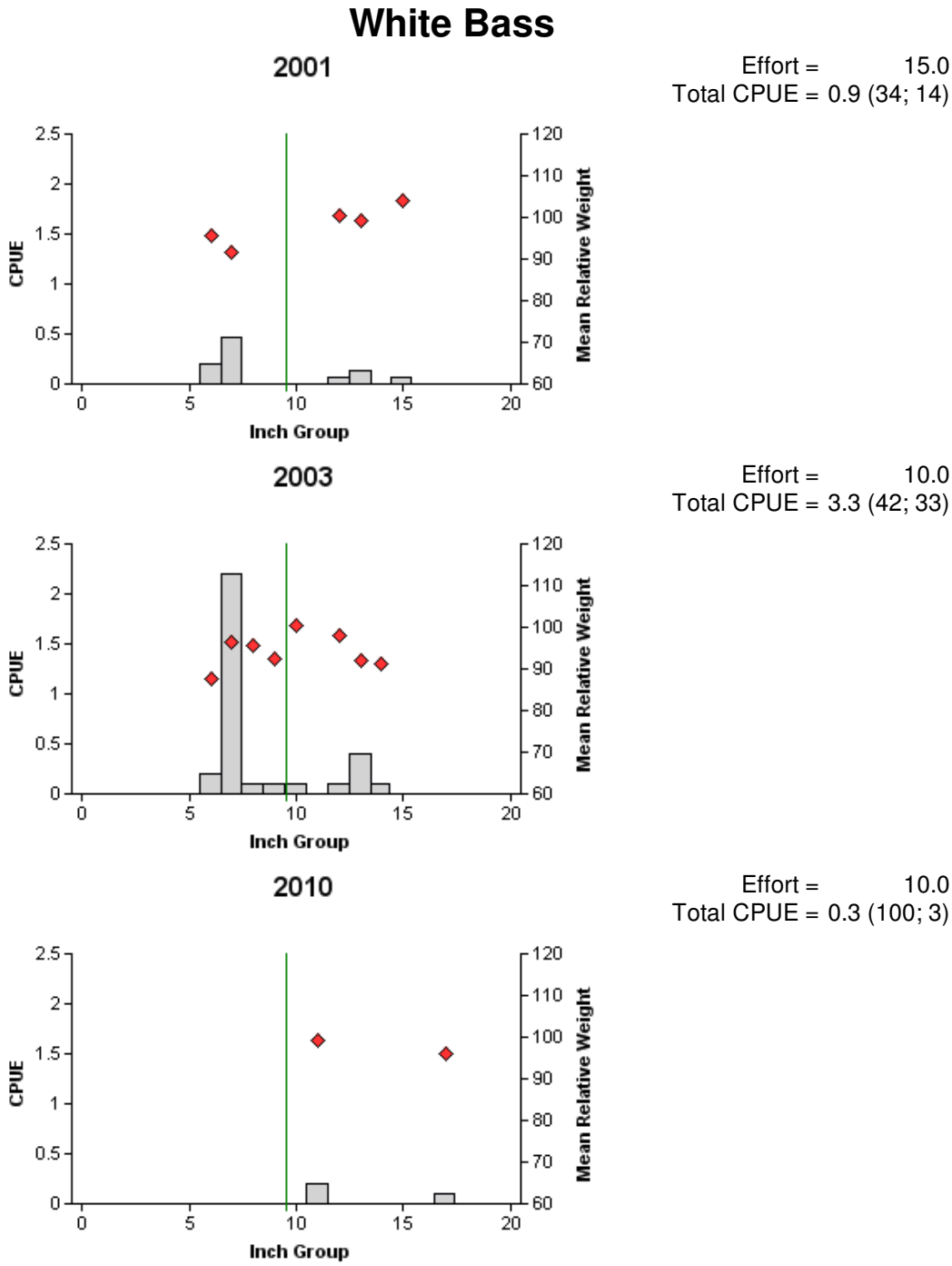


Figure 6. Number of white bass caught per net night (CPUE, bars) mean relative weight (diamonds), and population indices (RSE and N for CPUE are in parentheses) for spring gill net surveys, B.A. Steinhagen Reservoir, Texas, 2001, 2003, and 2010. Vertical lines indicate minimum length limit at time of survey.

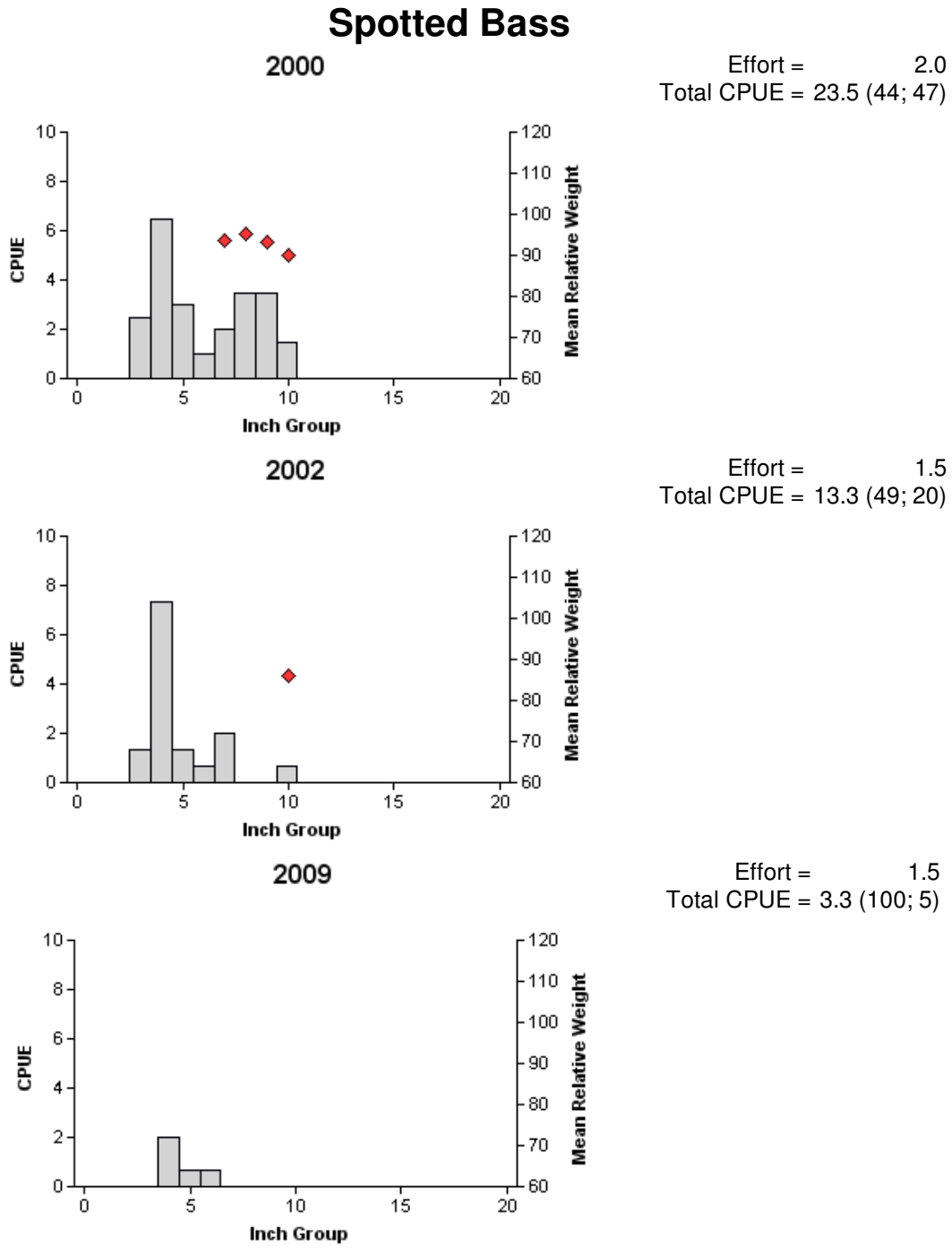


Figure 7. Number of spotted bass caught per hour (CPUE, bars) mean relative weight (diamonds), and population indices (RSE and N for CPUE are in parentheses) for fall electrofishing surveys, B.A. Steinhagen Reservoir, Texas, 2000, 2002, and 2009.

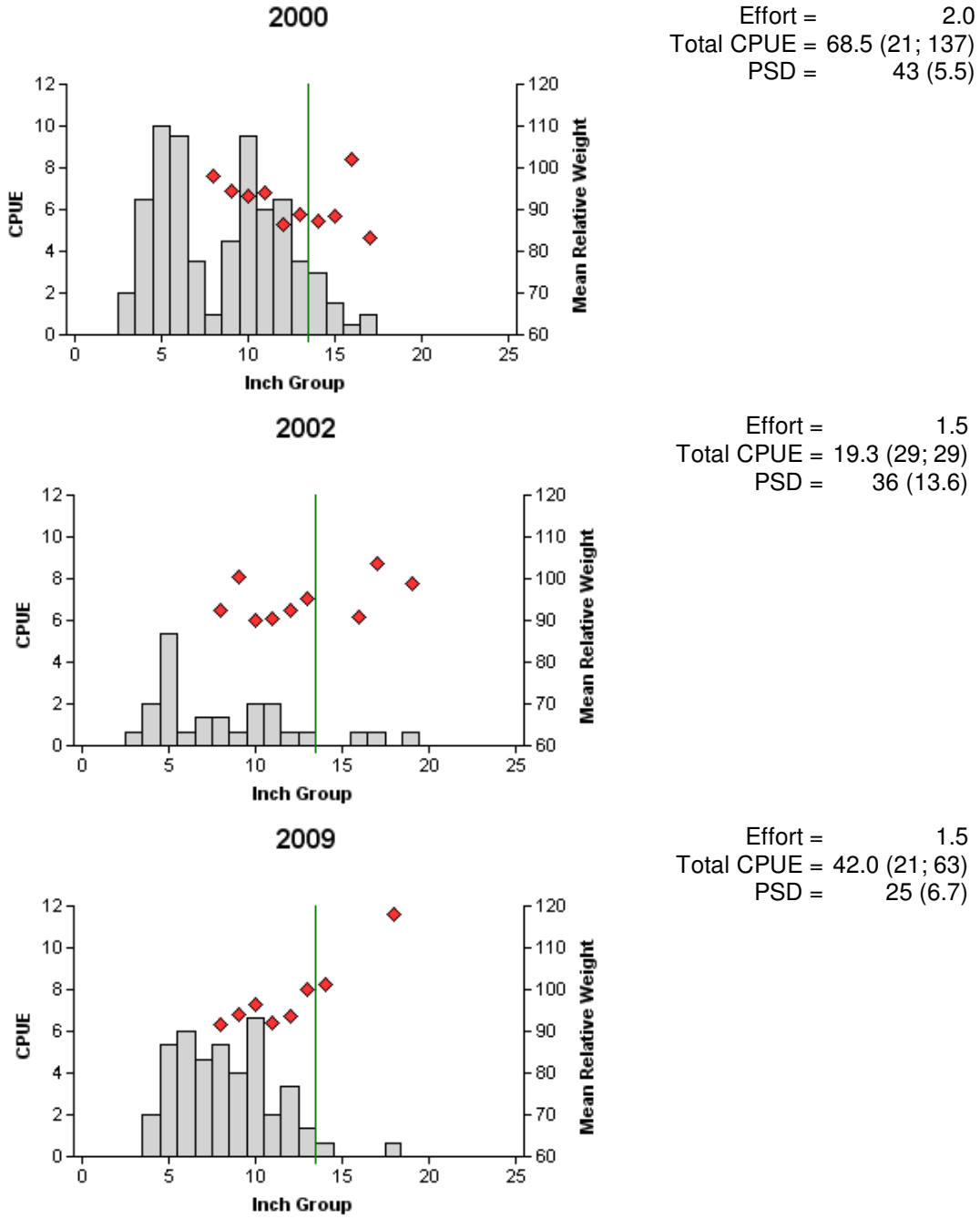


Figure 8. Number of largemouth bass caught per hour (CPUE, bars) mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, B.A. Steinhagen Reservoir, Texas, 2000, 2002, and 2009. Vertical lines indicate minimum length limit at time of survey.

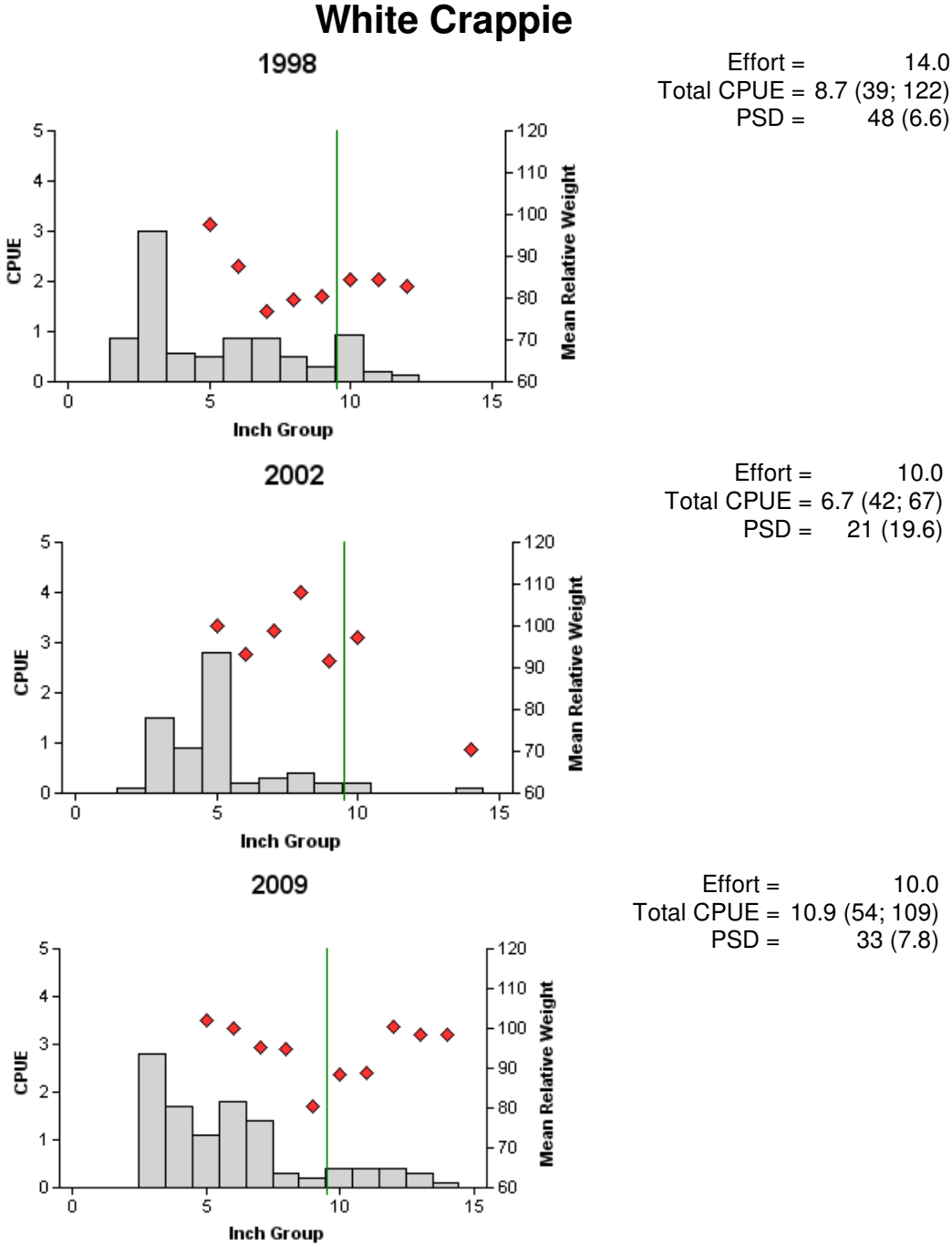


Figure 9. Number of white crappie caught per hour (CPUE, bars) mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, B.A. Steinhagen Reservoir, Texas, 1998, 2002, and 2009. Vertical lines indicate minimum length limit at time of survey.

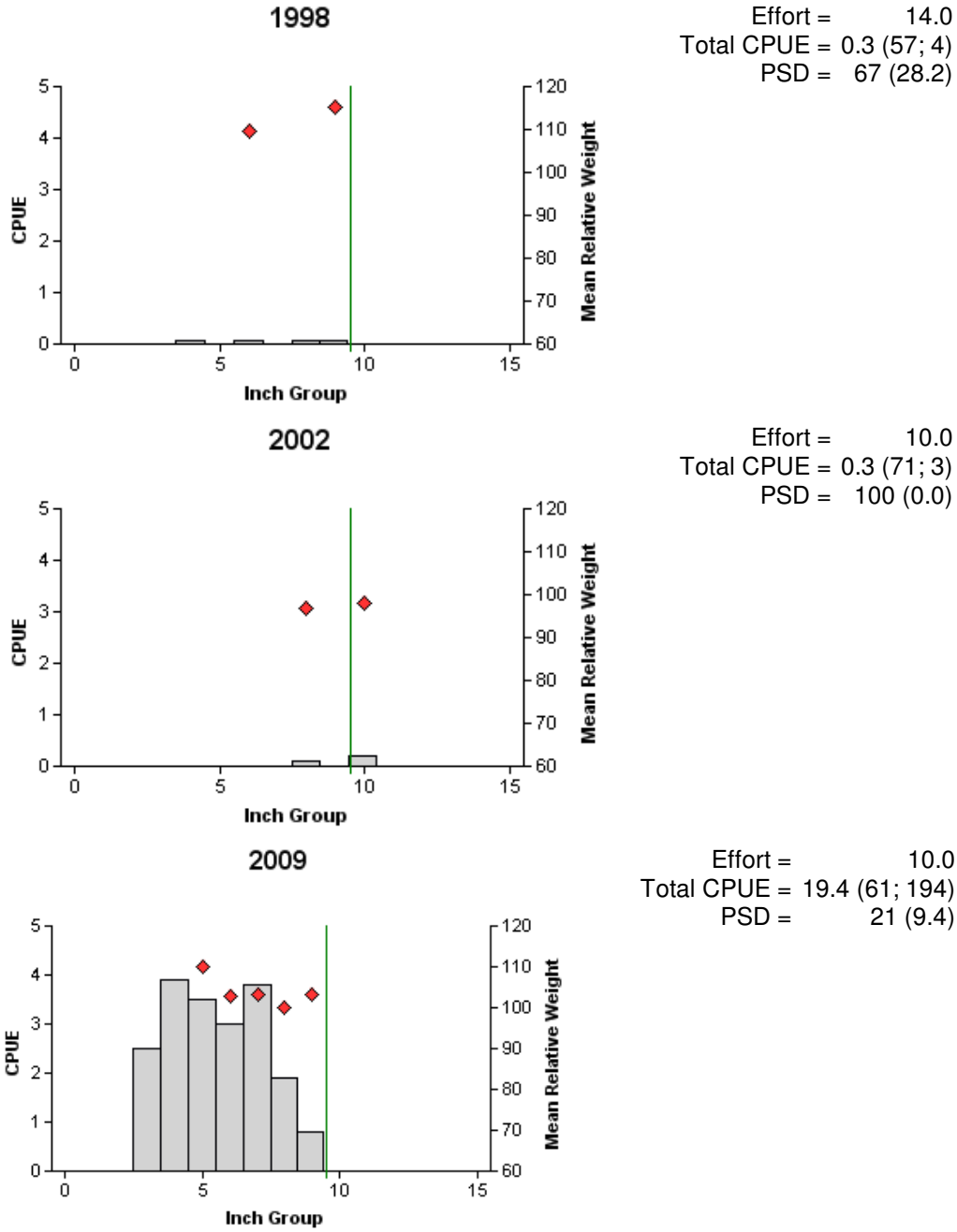


Figure 10. Number of black crappie caught per hour (CPUE, bars) mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, B.A. Steinhagen Reservoir, Texas, 1998, 2002, and 2009. Vertical lines indicate minimum length limit at time of survey.

Table 5. Proposed sampling schedule for B. A. Steinhagen Reservoir, Texas. Gill netting surveys are conducted in the winter, while electrofishing and trap netting surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

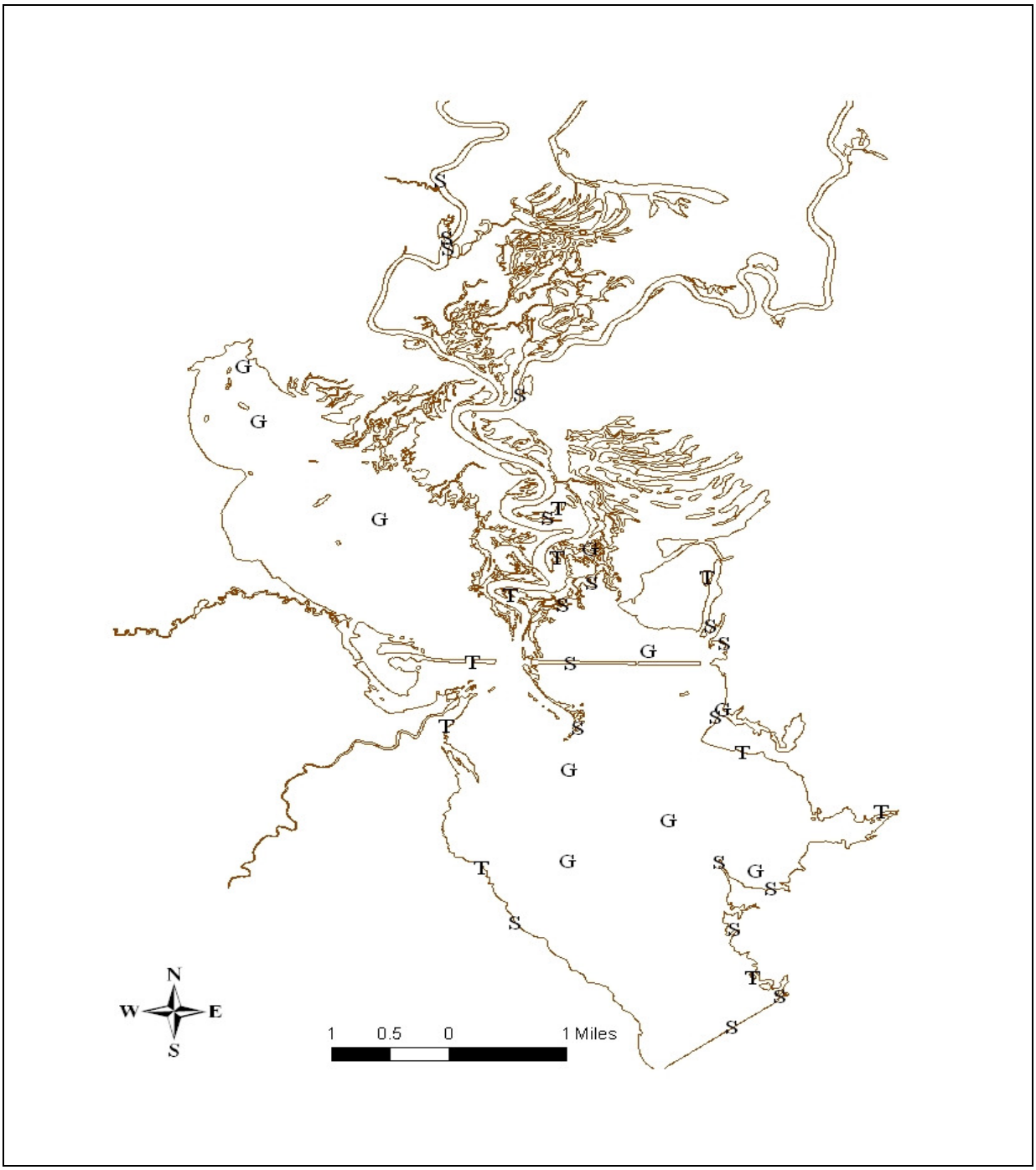
Survey Year	Fall Electrofisher	Gill Net	Trap Net	Vegetation	Report
2010-2011				A	
2011-2012				A	
2012-2013				A	
2013-2014	S	S	A	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all species collected from all gear types from B.A. Steinhagen Reservoir, Texas, 2009-2010.

Species	Gill Netting		Trap Netting		Fall Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Spotted gar	5	0.5				
Alligator gar	1	0.1				
Bowfin	15	1.5				
Gizzard shad					143	95.3
Threadfin shad					3,433	2,288.7
Smallmouth buffalo	27	2.7				
Spotted sucker	3	0.3				
Blue catfish	32	3.2				
Channel catfish	32	3.2				
White bass	3	0.3				
Yellow bass	4	0.4				
Warmouth					14	9.3
Bluegill					194	129.3
Longear sunfish					99	66.0
Redear sunfish					68	45.3
Spotted sunfish					5	3.3
Spotted bass					5	3.3
Largemouth bass					63	42.0
White crappie			109	10.9		
Black crappie			194	19.4		
Freshwater drum	2	0.2				

APPENDIX B



Location of sampling sites, B.A. Steinhagen Reservoir, Texas, 2009-2010. Gill net, fall electrofishing, and trap net stations are indicated by G, S, and T respectively.