PERFORMANCE REPORT

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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2013 Fisheries Management Survey Report

B. A. Steinhagen Reservoir

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July 31, 2014

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in B. A. Steinhagen Reservoir were surveyed in 2013 using electrofishing and trap netting and in 2014 using gill netting. Historical data are presented with the 2013-2014 data for comparison. 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 11 access points 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 fishes include Largemouth Bass, crappies, and catfishes. Vegetation is problematic in the reservoir, which includes common salvinia, giant 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 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 forage was present and consisted of Threadfin Shad, Gizzard Shad, and Bluegill.

  - **Catfishes:** Both Blue and Channel Catfish were present in the reservoir. Since 2010, Blue Catfish abundance has increased while Channel Catfish abundance has remained stable.

  - **Temperate basses:** White 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, with White Crappie as the predominate species. During the last three surveys, White Crappie abundance has increased, but Black Crappie numbers have decreased.

- **Management Strategies:** Continue to manage the fishery with statewide harvest regulations. Continue to monitor trends of vegetative coverage through annual aquatic vegetation surveys (2014-2017). Conduct standard population monitoring with fall electrofishing and trap net surveys in 2017, and a gill net survey in 2018.

INTRODUCTION

This document is a summary of fisheries data collected from B.A. Steinhagen Reservoir in 2013-2014. 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 2013-2014 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 levels are relatively stable (Figure 1), during May 2006 to June 2007 the reservoir was drawn down 12 feet 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. Currently, problematic plants include water hyacinth, common salvinia, alligatorweed, hydrilla, and giant salvinia. Most of the land around the reservoir is used for timber production.

Angler Access

Boat access is excellent at B. A. Steinhagen Reservoir, with 11 access points 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. B.A. Steinhagen has three designated paddling trails that range from 3 to 16 miles in length, more information can be obtained from the program's website http://www.tpwd.state.tx.us/fishboat/boat/paddlingtrails/inland/martin_dies_sp/ (TPWD 2014). Additional boat ramp characteristics are in Table 2.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Ashe and Driscoll 2010) included:

1. Continue to provide management recommendations to the USACE for the control of problematic vegetation.
   Action: In 2009, problematic vegetation coverage was 3,881 acres (39% coverage), including 96 acres of giant salvinia. The USACE has conducted herbicide treatments using TPWD recommendations since 2008. In January 2010, the USACE conducted a short term water draw down during a winter freeze event.

Harvest regulation history: Sport fishes in B.A. Steinhagen Reservoir are currently managed with statewide regulations (Table 3).

Stocking history: During the last ten years, only Blue Catfish (70,159) and Channel Catfish (210,557) were stocked (Table 4). Florida Largemouth Bass were last stocked in 2000 (408,432).

Vegetation/habitat management history: Historically, B.A. Steinhagen Reservoir has suffered from continual problems associated with excess aquatic vegetation coverage exacerbated by the average depth of 4 feet. A 12-feet reservoir drawdown was conducted in 2006 and 2007 (Figure 1). However, by 2009 vegetation had recovered and occupied over 70% of the reservoir. Dominant species included American lotus, common salvinia, and alligatorweed (Table 5). The drawdown successfully reduced water hyacinth coverage from 1,695 acres in 2005 to 599 acres in 2009. Furthermore, the USACE, in cooperation with the LNVA and TPWD, has conducted extensive aquatic herbicide treatments since 2008. The USACE conducted another short term reservoir draw down in January 2010 during a freeze event to further reduce problematic vegetation. The USACE, through its partnerships with LNVA and TPWD, has agreed that herbicide treatments will continue and drawdowns will be conducted during winter freeze event to help control problematic vegetation. Giant salvinia was first discovered in 2007 and peak coverage occurred 2012 (8%). However, only trace amounts were found in 2013.

Water transfer: LNVA is authorized to draw from the reservoir a maximum of 2,000 cubic feet per second. This water allotment is available to the agency whenever needed, and in the instances of demand, the water is taken directly through the Town Bluff Dam tainter gates. However, if the normal pool capacity is not adequate to satisfy the requirements over an extended period of time, Sam Rayburn Dam can release conservation water directly into B. A. Steinhagen Reservoir (USACE 2014). No other interbasin or intrabasin water transfers exist.

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). All survey sites were randomly selected and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), terminology modified by Guy et al. (2007)], 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). Standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE statistics.

Source for water level data was the United States Geological Survey (USGS 2013).

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 2011, over 5,784 acres of these problematic plants were observed (Table 5). Hydrilla was also problematic, but only at access points and boat lanes. Since 2011, it appears that herbicide treatments have been effective, as problematic vegetation coverage in 2013 decreased to 756 acres (7% coverage), primarily hydrilla. American lotus was the only native species detected that occupied a substantial area of the reservoir (11%).

Prey species: The most abundant prey species captured in electrofishing surveys consisted of Threadfin Shad, Gizzard Shad, and Bluegill (Figures 2 and 3; Appendix A). Gizzard shad catch rate (24.7/h) was lower than the previous surveys, but the majority of the fish observed were available as prey (IOV=62) (Figure 2). Bluegill was the predominant sunfish species, and catch rates have remained stable over the last two survey years (98.0/h in 2013; 129.3/h in 2009) (Figure 3).

Catfishes: Blue Catfish gill net catch rate in 2014 (9.3/nn) was greater than catch rates observed in 2010 (3.2/nn) and 2003 (4.9/nn) (Figure 4). PSD values have remained constant over the past 3 surveys (range = 14-19) and the increased catch during 2014 primarily included fish $\geq$ 15 inches. Relative weights exceeded 85 and were similar to the past three survey years.

Historically, Channel Catfish abundance has been low but appears to have improved. The 2014 gill net catch rate (3.1/nn) was similar to catch rates observed in 2010 (3.2/nn) and higher than observed in 2003 (0.6/nn) (Figure 5). Relative weights exceeded 85 and were similar to the past three survey years.

Temperate basses: During the last three survey years, catch rates of White Bass ranged from 0.3 - 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 7.8/h from the past three fall electrofishing surveys (Figure 7).

Electrofishing catch rates of Largemouth Bass ranged from 19.3 to 64.0/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 moderate, indicating that growth is not limited by lack of forage.

Crappies: White and Black Crappie were present in the reservoir (Figures 9 and 10). White Crappie has historically been the predominate species. White Crappie abundance has increased over the past three surveys with catch rates ranging from 6.7 to 18.4/nn (Figure 9). Black crappie abundance from the past survey (0.6/nn) decreased significantly from the 2009 survey (19.4/nn) (Figure 10). However, during that survey a single net yielded a disproportionate number fish and skewed the data upward.

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

Prepared – July 2014

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 of the 10,687 acre reservoir. In 2006 to 2007, a reservoir drawdown 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. Although coverage in 2011 exceeded 5,000 acres, herbicide treatments reduced coverage to 756 acres in 2013.

MANAGEMENT STRATEGIES

1. In cooperation with Aquatic Habitat Enhancement (AHE) staff, continue to monitor aquatic vegetation annually (2014 to 2017). 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 to assist USACE with funding for herbicide treatments.
3. Recommend that the USACE conduct drawdowns 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.

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 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 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.

MANAGEMENT STRATEGIES

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.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes annual aquatic vegetation surveys (2014 to 2017). Standard monitoring with fall electrofishing, trap nets, and gill nets will be conducted in 2017 to 2018 (Table 6). Annual aquatic vegetation surveys are required to monitor water hyacinth, alligatorweed, common and giant salvinia, and hydrilla coverage.

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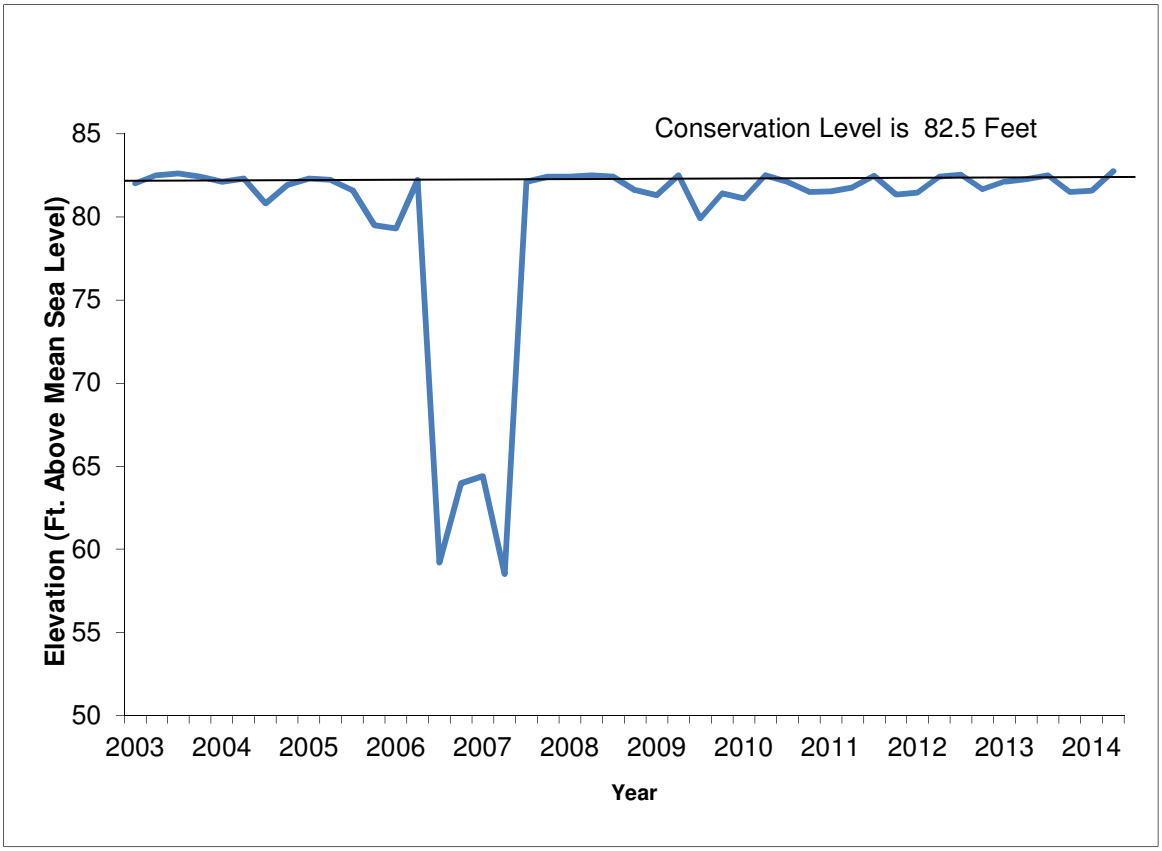


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for B.A. Steinhagen Reservoir, Texas.

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. Boat ramp characteristics B.A. Steinhagen Reservoir, Texas, May 2014. Reservoir elevation at time of survey was 82.5 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Camper's Cove	30.82559 -94.20559	Y	15	76	No access issues
Magnolia Ridge	30.87973 -94.23164		15	76	No access issues
Sandy Creek Park	30.81839 -94.17083 30.83127 -94.15888	Y	25	77-78	No access issues
Bar-Pit	30.85449 -94.21381	Y	20	78	No access issues
Cherokee Park	30.85176 -94.21009		20	79	No access issues
Walnut Ridge	30.86287 -94.18279	Y	30	77	No access issues
Hen House Ridge	30.84305 -94.17474 30.84505 - 94.17485	Y	20	78	No access issues
Beech Grove	30.85266 -94.17317	Y	20	78	No access issues
Bevilport	30.92399 -94.15666	Y	25	78	No access issues
State Park Ramp (N 190)	30.87010 - 94.17593	Y	5	80	No access issues
CR 155 Ramp	30.89275 - 94.23797	Y	10	78	No access issues

Table 3. Harvest regulations for B.A. Steinhagen Reservoir, Texas.

Catfishes: Channel and Blue Catfish, their hybrids and subspecies	25 (in any combination)	12-inch minimum
Catfish, Flathead	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass, Spotted	5[a]	None
Bass, Largemouth	5[a]	14-inch minimum
Crappies: White and Black crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

[a]Bag limit for Largemouth and Spotted Bass is 5 in the aggregate.

Table 4. Stocking history of B. A. Steinhagen Reservoir, Texas. FGL = fingerling; AFGL = advanced fingerling; UNK = unknown.

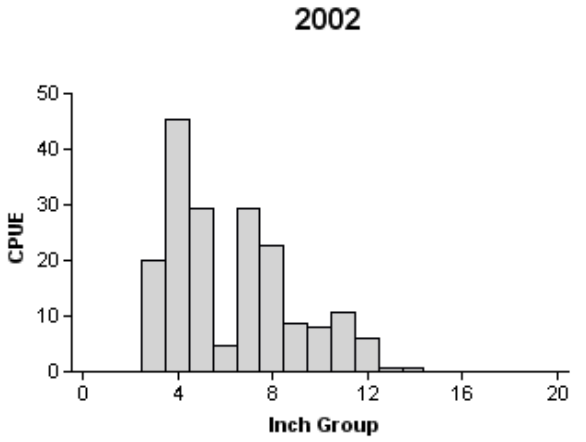
Species	Year	Number	Size
Blue Catfish	2007	70,159	FGL
	Total	70,159	
Channel Catfish	1973	8,000	AFGL
	2007	210,557	FGL
	Total	218,557	
Florida Largemouth Bass	1990	339,035	FRY
	2000	408,432	FGL
	Total	747,467	
Largemouth Bass	1973	16,670	UNK
	Total	16,670	
Mixed Largemouth Bass	1990	271	
	Total	271	
Paddlefish	1989	31,986	
	1990	84,371	
	1992	10,827	
	Total	127,184	
Walleye	1976	2,750,000	FRY
	Total	2,750,000	

Table 5. Survey of prevalent aquatic vegetation, B.A. Steinhagen Reservoir, September 2008, 2009, and 2011 - 2013. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

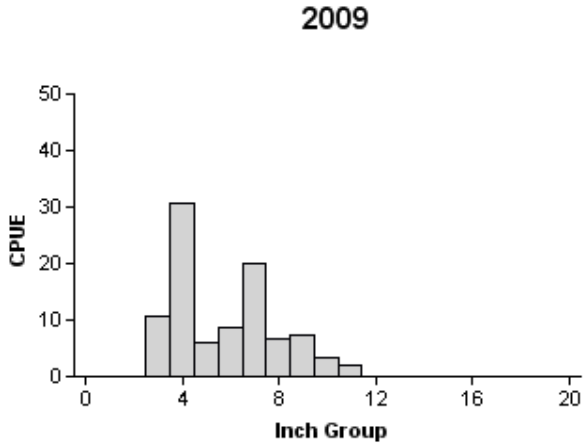
Species	2008	2009	2011	2012	2013
American lotus	889 (9)	2,800 (29)	3,186 (30)	1,893 (18)	1,134 (11)
Common salvinia (Tier II)*	696 (7)	2,249 (23)	4,000 (37)	NA	NA
Hydrilla (Tier II)*	1,489 (15)	500 (5)	284 (3)	306 (3)	756 (7)
Alligatorweed (Tier II)*	1,601 (16)	937 (10)	926 (9)	NA	NA
Water hyacinth (Tier II)*	109 (1)	599 (6)	444 (4)	438 (4)	NA
Giant salvinia (Tier II)*	72 (< 1)	96 (1)	130 (1)	824 (8)	NA

*Tier II is Maintenance, Tier III is Watch Status

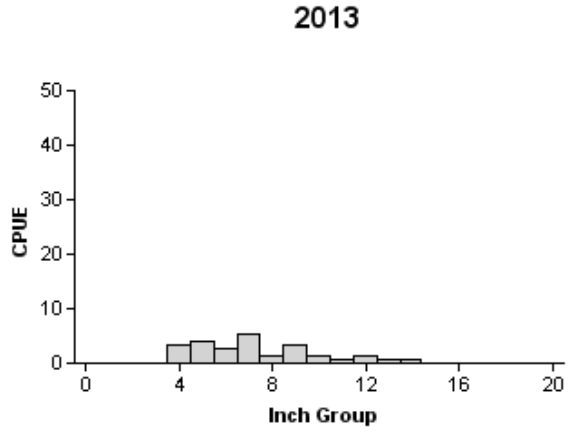
Gizzard Shad



Effort = 1.5
Total CPUE = 186.0 (22; 279)
IOV = 69 (6.5)



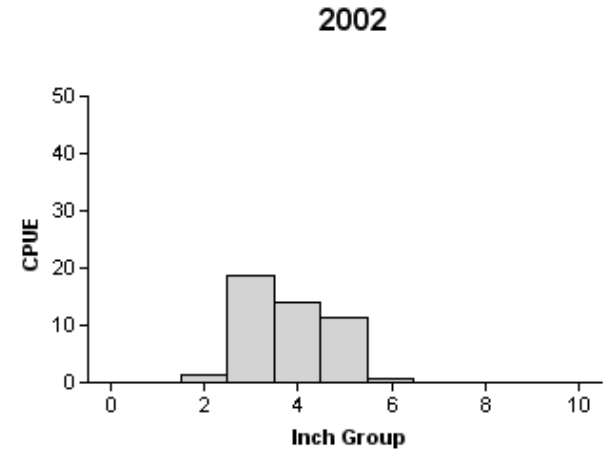
Effort = 1.5
Total CPUE = 95.3 (34; 143)
IOV = 80 (7.5)

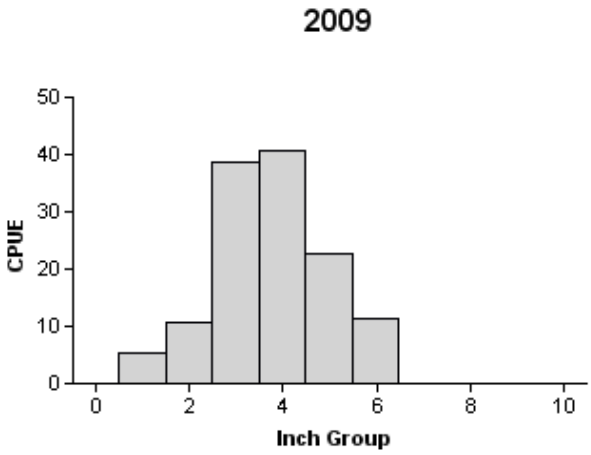


Effort = 1.5
Total CPUE = 24.7 (25; 37)
IOV = 62 (8)

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, 2002, 2009, and 2013.

Bluegill





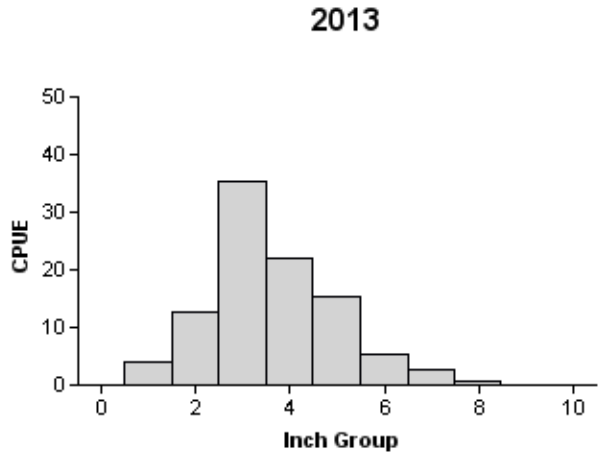


Figure 3. Number of Bluegill caught per hour (CPUE, bars) and population indices (RSE and N for CPUE are in parentheses) for fall electrofishing surveys, B.A. Steinhagen Reservoir, Texas, 2002, 2009, and 2013.

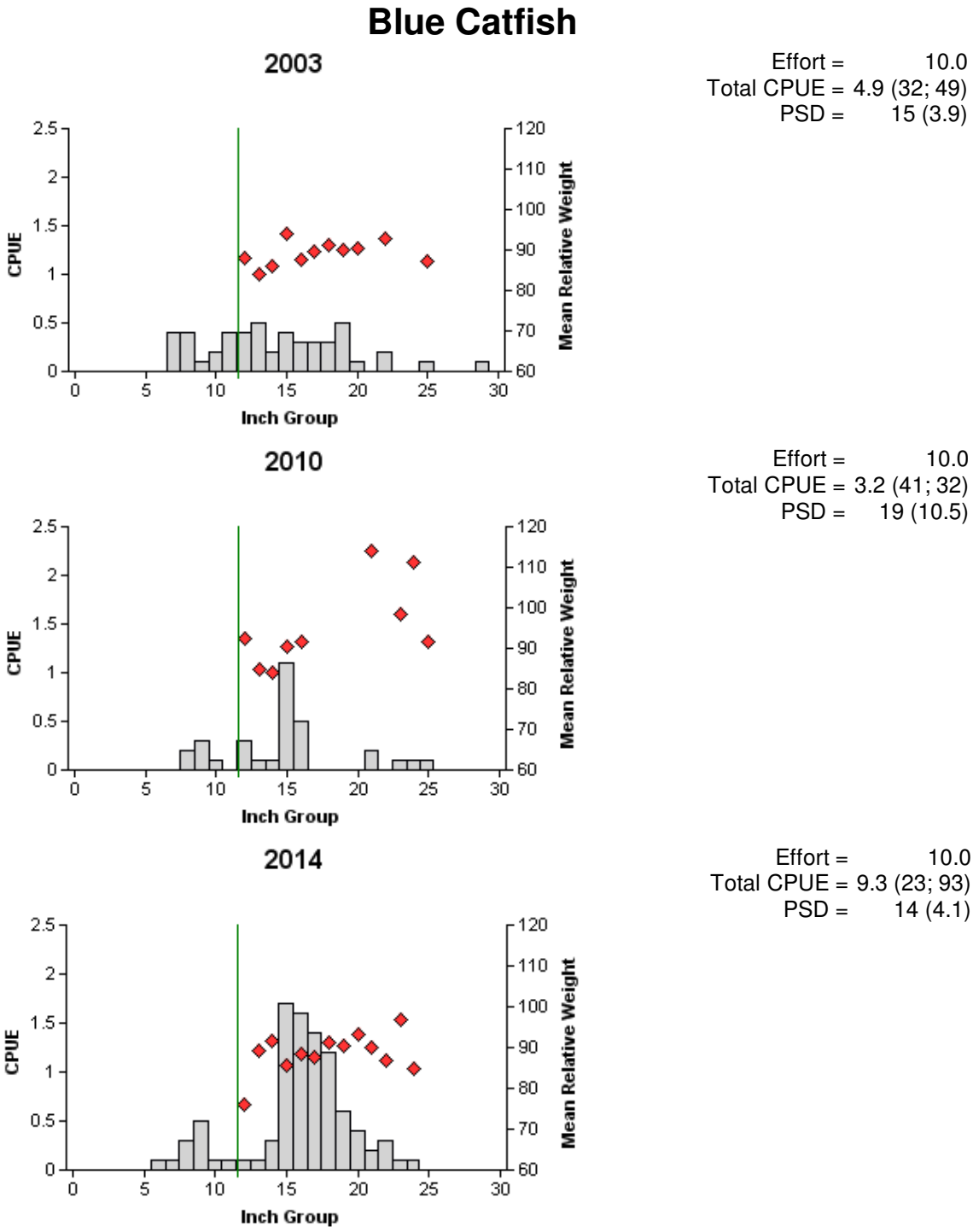


Figure 4. Number of Blue Catfish caught per net night (CPUE, bars) mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, B.A. Steinhagen Reservoir, Texas, 2003, 2010, and 2014. Vertical lines indicate minimum length limit at time of survey.

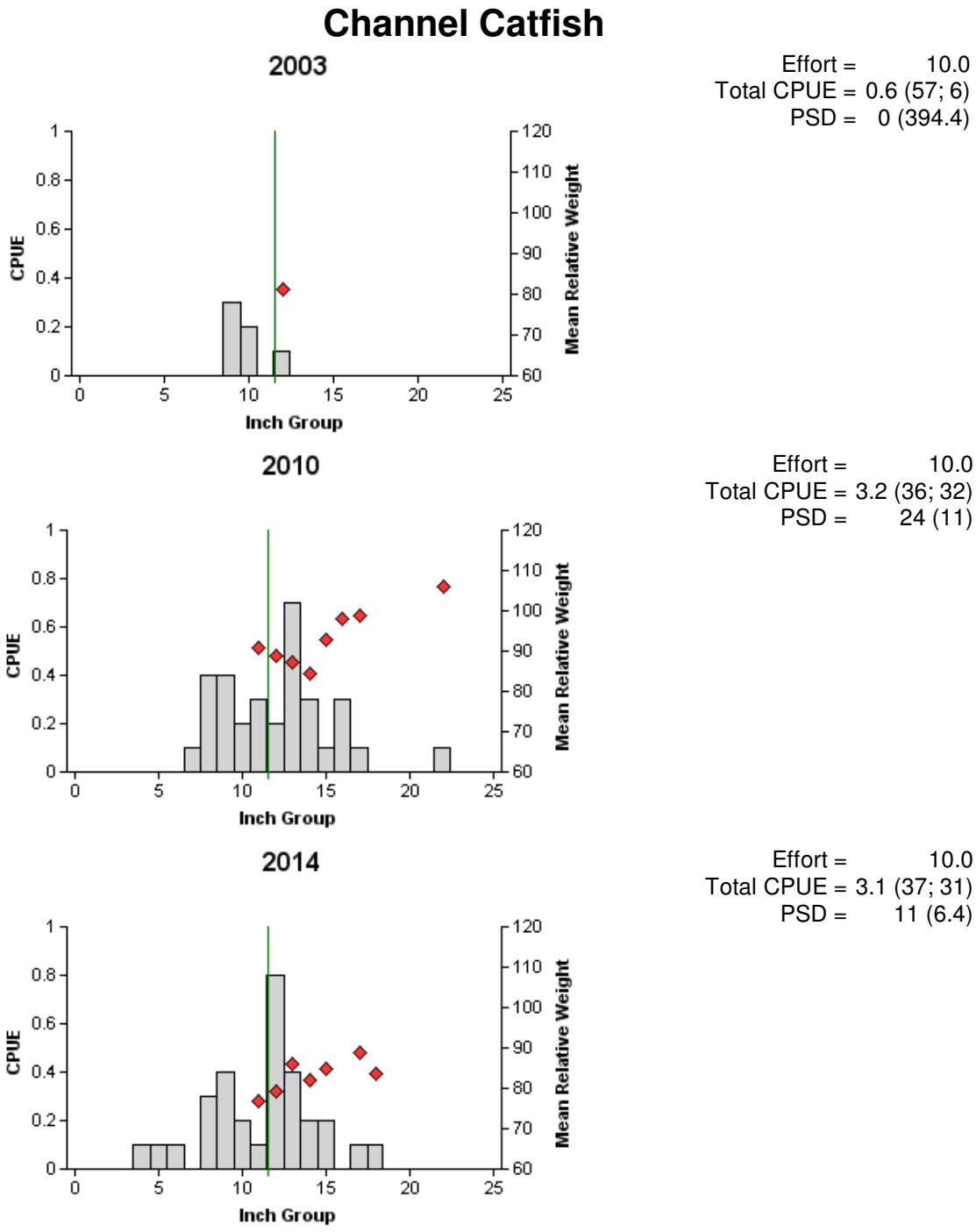


Figure 5. Number of Channel Catfish caught per net night (CPUE, bars) mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, B.A. Steinhagen Reservoir, Texas, 2003, 2010, and 2014. Vertical lines indicate minimum length limit at time of survey.

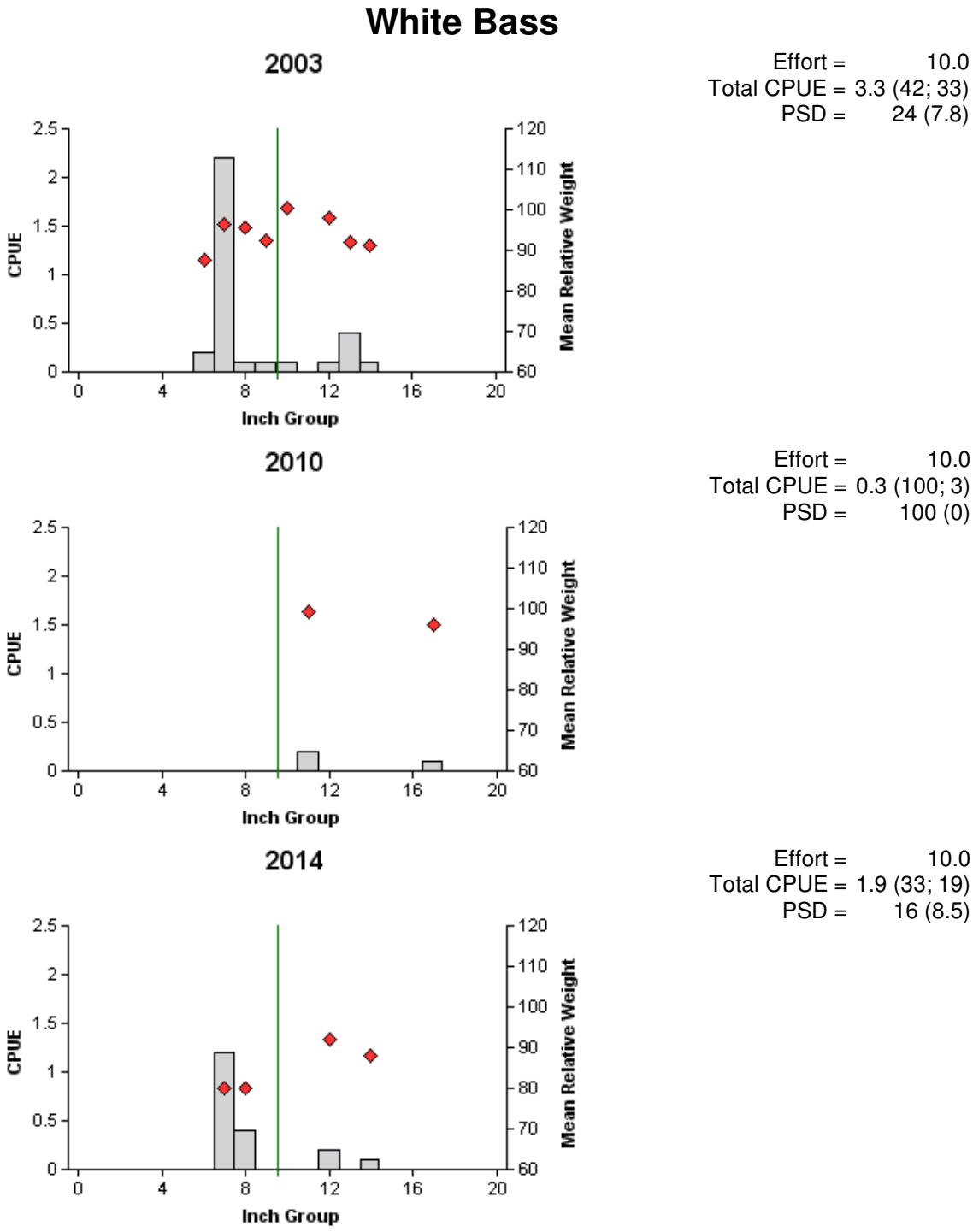


Figure 6. Number of White Bass caught per net night (CPUE, bars) mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, B.A. Steinhagen Reservoir, Texas, 2003, 2010, and 2014. Vertical lines indicate minimum length limit at time of survey.

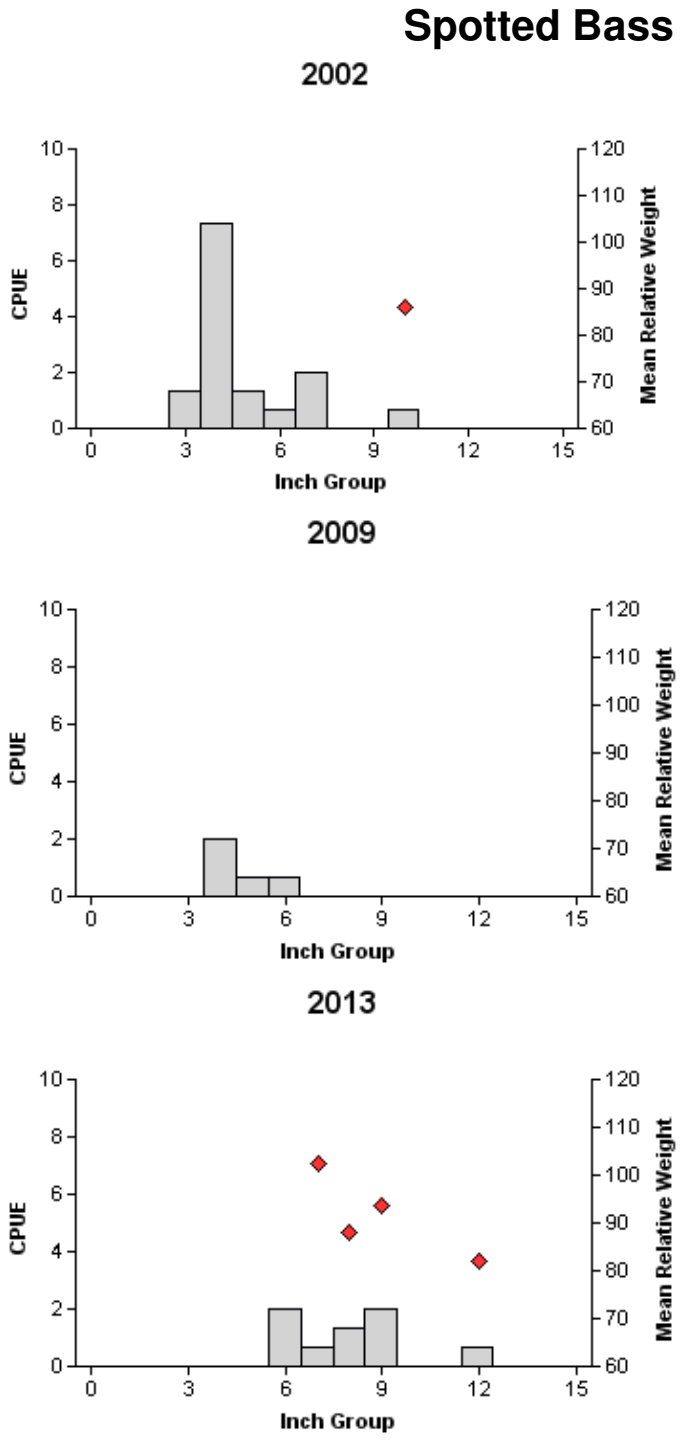


Figure 7. Number of Spotted Bass caught per hour (CPUE, bars) mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, B.A. Steinhagen Reservoir, Texas, 2002, 2009, and 2013.

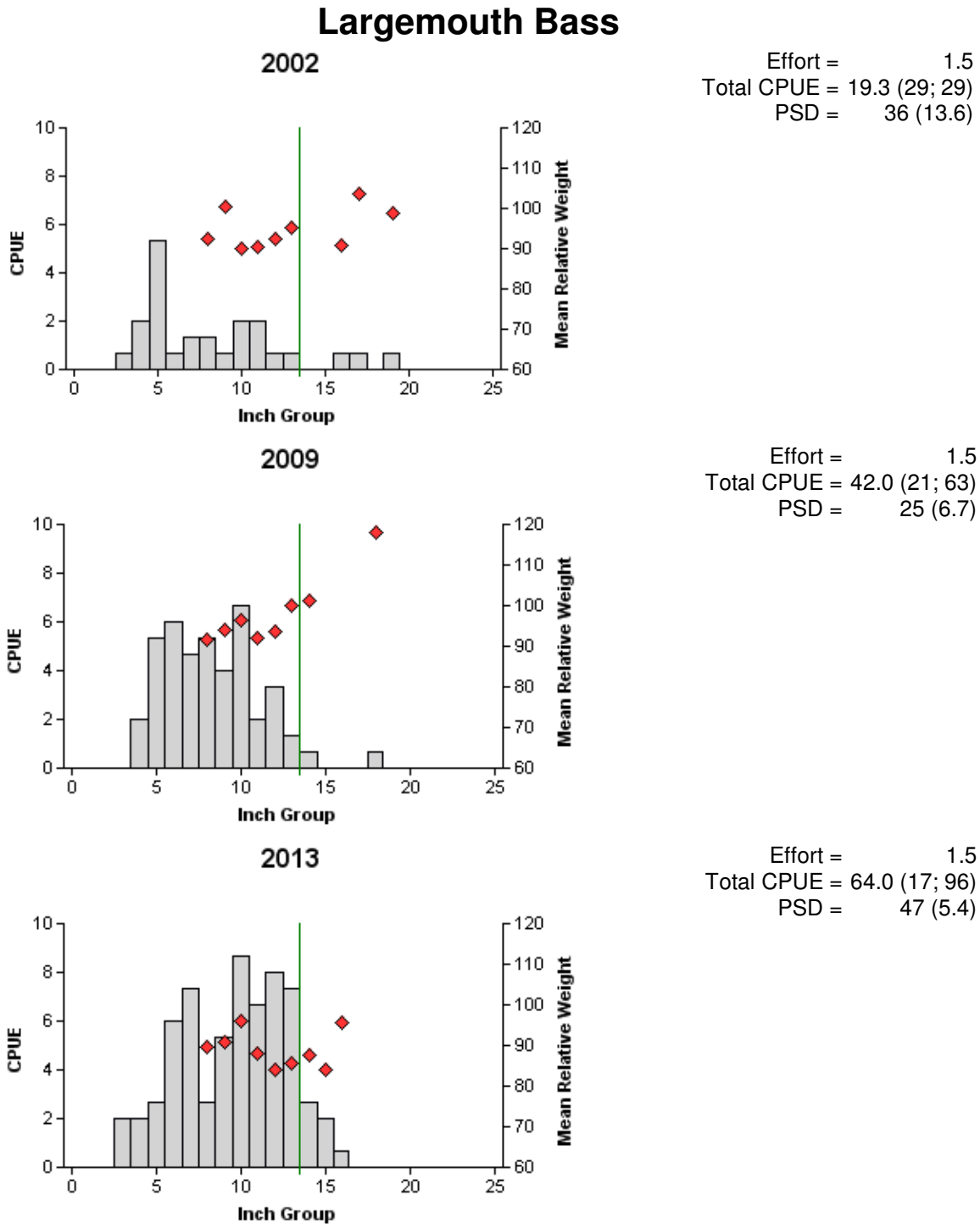


Figure 8. Number of Largemouth Bass caught per hour (CPUE, bars) mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, B.A. Steinhagen Reservoir, Texas, 2002, 2009, and 2013. Vertical lines indicate minimum length limit at time of survey.

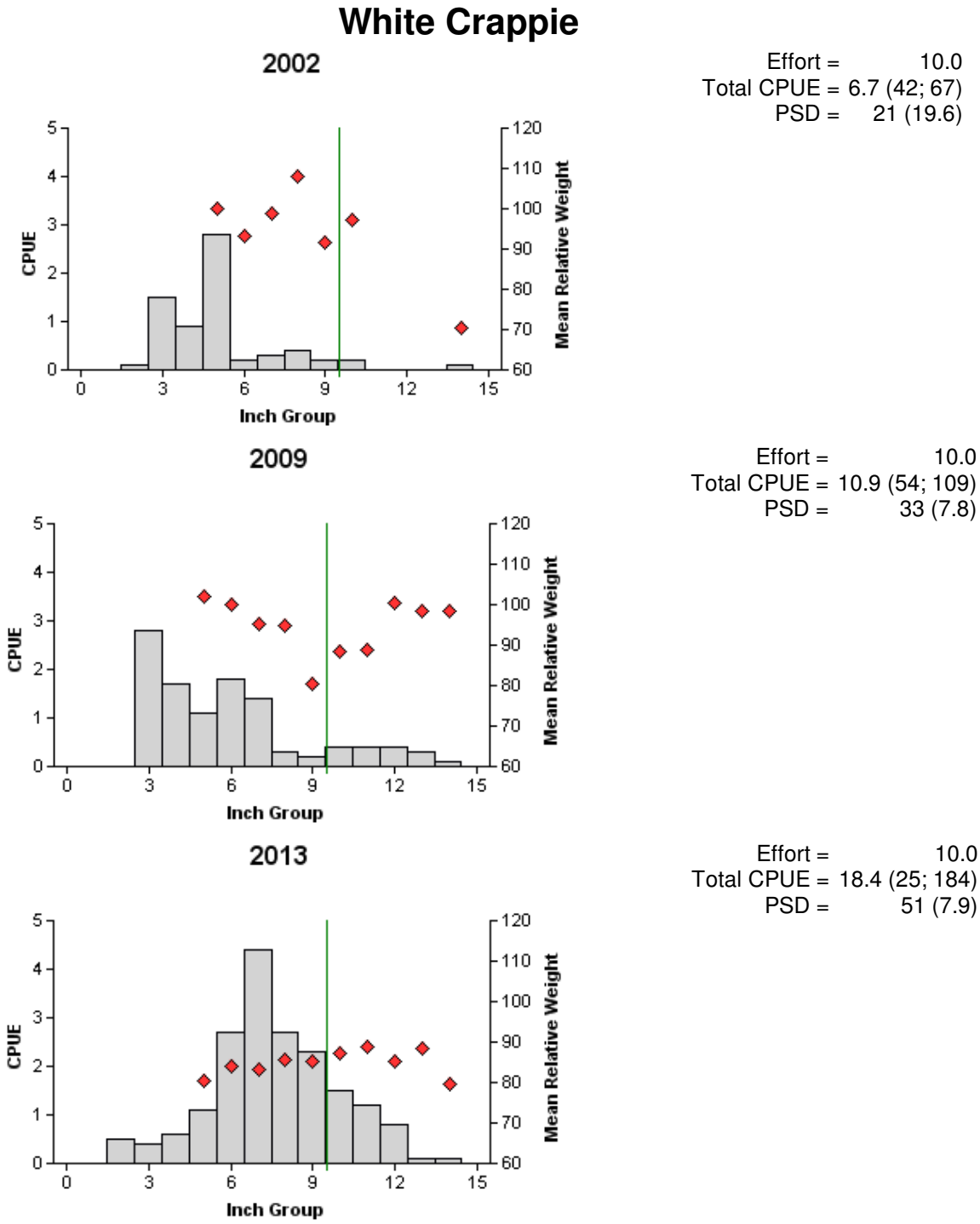


Figure 9. Number of White Crappie caught per hour (CPUE, bars) mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, B.A. Steinhagen Reservoir, Texas, 2002, 2009, and 2013. Vertical lines indicate minimum length limit at time of survey.

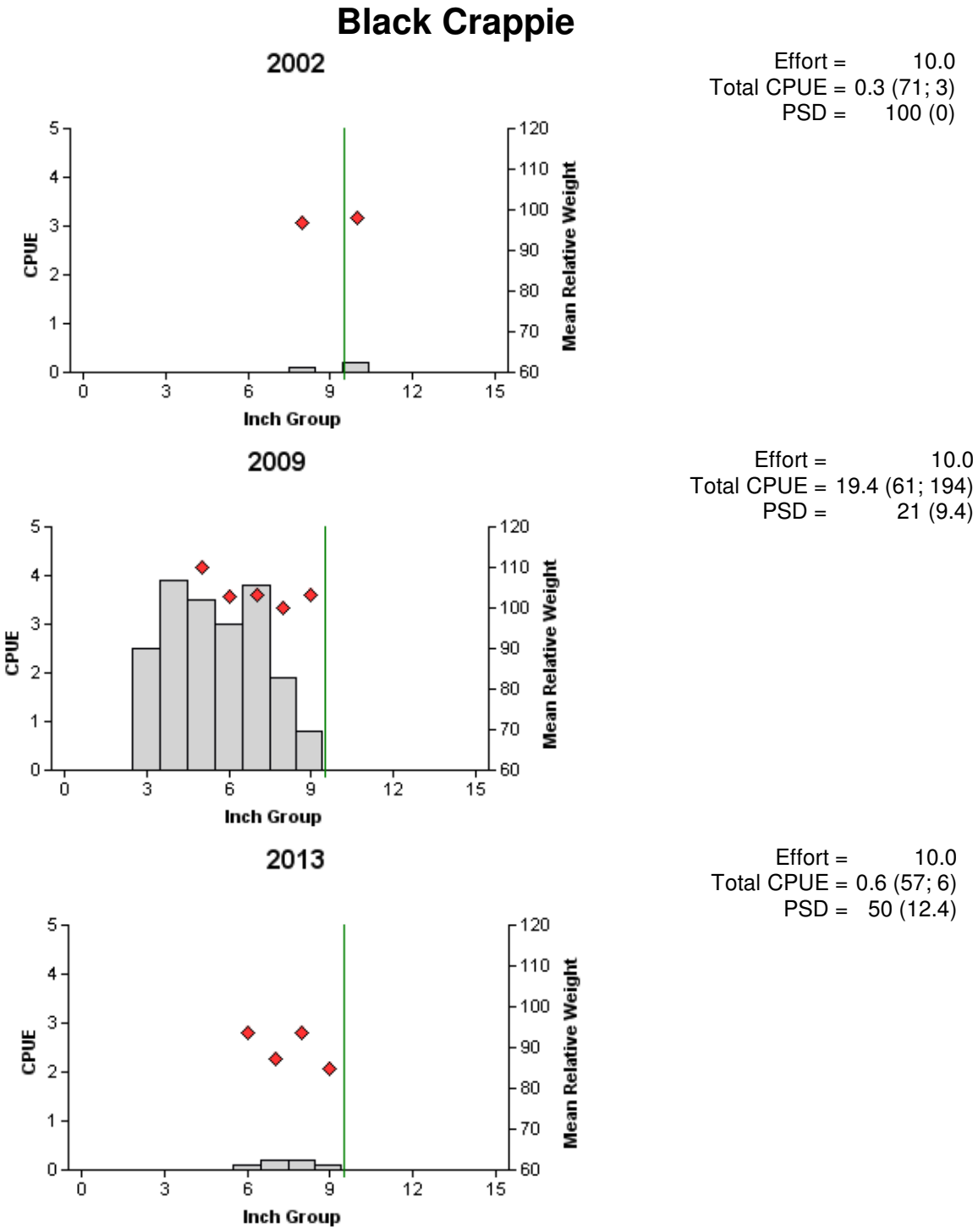


Figure 10. Number of Black Crappie caught per hour (CPUE, bars) mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, B.A. Steinhagen Reservoir, Texas, 2002, 2009, and 2013. Vertical lines indicate minimum length limit at time of survey.

Table 6. Proposed sampling schedule for B.A. Steinhagen Reservoir, Texas. Survey period is June through May. 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.

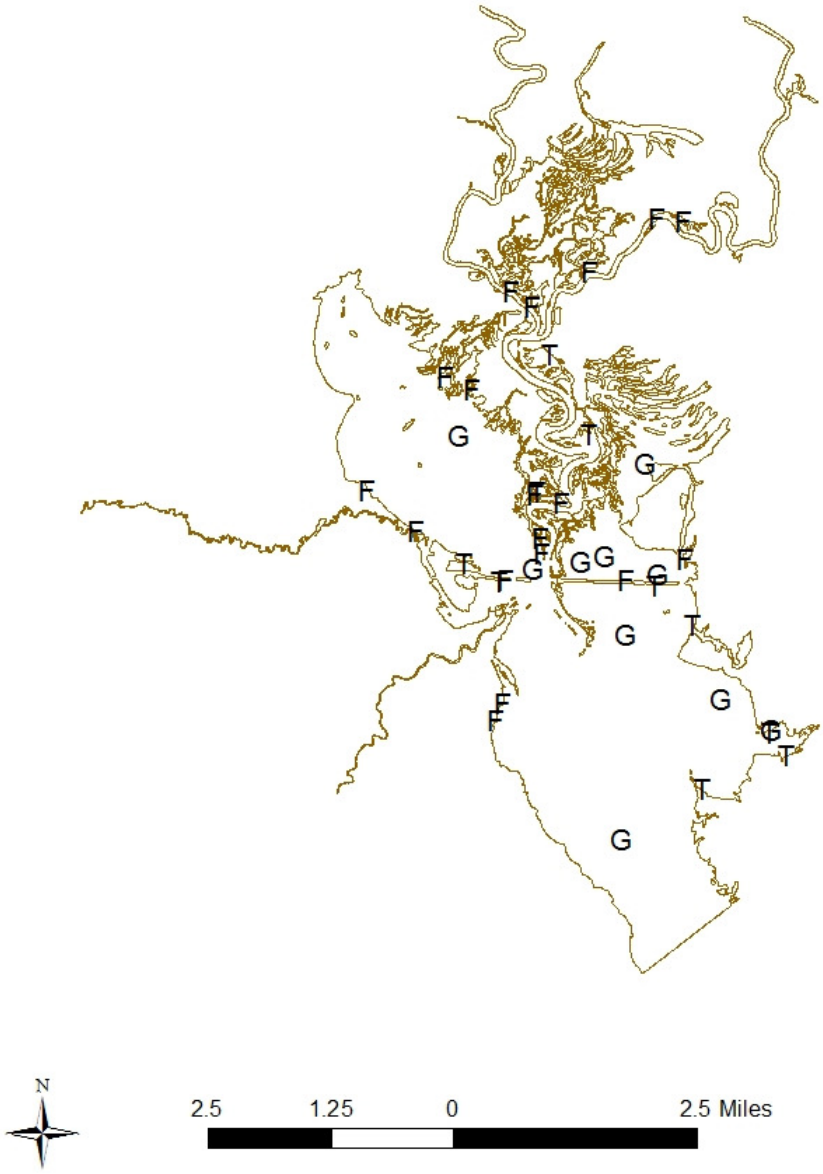
Survey year	Electrofish Fall(Spring)	Trap net	Gill net	Vegetation	Access	Report
2014-2015				A		
2015-2016				A		
2016-2017				A		
2017-2018	S	A	S	S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from B.A. Steinhagen Reservoir, Texas, 2013-2014. Sampling effort was 10 net nights for gill netting and trap netting, and 1.5 hours for electrofishing.

Species	Gill Netting		Trap Netting		Fall Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad					37	24.7
Threadfin Shad					37	24.7
Blue Catfish	93	9.3				
Channel Catfish	31	3.1				
Flathead Catfish	3	0.3				
White Bass	19	1.9				
Redbreast Sunfish					1	0.7
Warmouth					9	6.0
Bluegill					147	98.0
Longear Sunfish					12	8.0
Redear Sunfish					52	34.7
Spotted Sunfish					10	6.7
Spotted Bass						
Largemouth Bass					96	64.0
White Crappie	7	0.7	184	18.4		
Black Crappie	1	0.1	6	0.6		

APPENDIX B



Location of sampling sites, B.A. Steinhagen Reservoir, Texas, 2013-2014. Gill net, fall electrofishing, and trap net stations are indicated by G, F, and T respectively. Water level was near full pool at time of sampling.