Lake Halbert

2018 Fisheries Management Survey Report

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-221-M-3

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

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Survey and Management Summary

Fish populations in Lake Halbert were surveyed in 2018 using electrofishing and trap netting and in 2019 using gill netting. Vegetation and angler access surveys were conducted in August 2018. This report summarizes results of these surveys and contains a management plan for the reservoir based on those findings.

Reservoir Description: Lake Halbert is a 531-acre reservoir on Elm Creek, a tributary of the Trinity River, constructed by the City of Corsicana in 1921 to provide water for municipal and industrial purposes. Boat access is adequate, and a fishing pier is available. In addition, shoreline access is available in the park along the west bank. A prolonged drought in 2005-2006 reduced reservoir capacity to approximately 28% volume and the reservoir was closed to recreation; water level has stabilized since the last survey.

Management History: Important sport fish include White Crappie and catfishes. City of Corsicana personnel have maintained Zebra Mussel inspections at the boat ramp. Local news media outlets have been contacted regarding the Blue Catfish and White Crappie fisheries potential. The City of Corsicana proposed control of aquatic vegetation but was advised that it was unnecessary.

Fish Community

- **Prey species:** Electrofishing catch of Gizzard Shad was excellent, and most were available as prey to sport fish. Bluegill and Longear Sunfish further contributed to the forage base.
- **Catfishes**: Blue Catfish relative abundance has declined since the last survey and Channel Catfish abundance increased and have become the predominant catfish species. No Blue Catfish reproduction or recruitment was documented.
- **White Bass:** White Bass continued to exhibit inconsistent recruitment and low abundance, likely due to limited spawning habitat. Body condition from the 2019 survey was above average and all specimens collected were legal length.
- **Largemouth Bass:** Largemouth Bass were present in low numbers and few legal-size fish were available to anglers. Body condition was average. Largemouth Bass have historically persisted at low densities in Lake Halbert.
- **Crappie:** Black Crappie were present, but at low abundance. Trap net catch rate of White Crappie was good in the 2018 survey. Both size distribution and relative weights of White Crappie were also good. Reproduction and recruitment of White Crappie has been consistent.

Management Strategies: Continue promoting the crappie fishery and consult with City of Corsicana personnel regarding placement of fish attractors near shoreline angler access points. Continue contact with City of Corsicana regarding monitoring for Zebra Mussels.

Introduction

This document is a summary of fisheries data collected from Lake Halbert in 2018-2019. 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 fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2018-2019 data for comparison.

Reservoir Description

Lake Halbert is a 531-acre impoundment constructed in 1921 on Elm Creek, a tributary of the Trinity River. It is in Navarro County approximately 1 mile southeast of Corsicana and is operated and controlled by the city of Corsicana. Primary water uses included municipal water supply and recreation. Other descriptive characteristics for Lake Halbert are presented in Table 1. High turbidity and frequent water level fluctuations limit growth of submersed aquatic vegetation. A prolonged drought in 2005-2006 reduced reservoir volume to approximately 28% capacity and the reservoir was temporarily closed to recreation. A second drought occurred from 2010-2013 and reservoir elevation has rarely reached conservation pool since then (Figure 1).

Angler Access

Lake Halbert has one public boat ramp and no private ramps. Additional boat ramp characteristics are available in Table 2. A fishing pier is available and accessed near the boat ramp. In addition, good shoreline access is available in the park along the west bank.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Norman and Ott 2015) included:

1. Continue monitoring the developing Blue Catfish *Ictalurus furcatus* population, conduct summertime low-pulse electrofishing in 2016 and standard spring gill netting in 2019; promote the fishery through media outlets.

   Action: Emphasis on low pulse electrofishing was shifted from Halbert to Waxahachie in 2016 as part of a multi-gear evaluation; gill net sampling was conducted in 2019. Information on the fishery was communicated via the Richland Creek Progress newspaper.

2. Promote the White Crappie *Pomoxis annularis* fishery through media outlets.

   Action: Information on the fishery was communicated via the Richland Creek Progress newspaper.

3. Coordinate with the controlling authority regarding invasive species monitoring and outreach.

   Action: City of Corsicana Environmental Services personnel have conducted bi-annual Zebra Mussel *Dreissena polymorpha* inspections at the boat ramp and reported results to the District office. Clean-Drain-Dry signage has been provided and placed at the boat ramp.

Harvest regulation history: All sport fishes in Lake Halbert are managed with statewide harvest regulations (Table 3). Regulations have not changed since the last survey.

Stocking history: Lake Halbert was first stocked with Florida Largemouth Bass *Micropterus salmoides floridanus* in 1974 and successive stockings occurred in 1992, 1995, and 1998 (Table 4). Coppernose Bluegill *Lepomis macrochirus* were stocked once in 1983. A management stocking of Threadfin Shad *Dorosoma petenense* was conducted in 1990 and 1991 to diversify the prey base.

Vegetation/habitat management history: The combination of high turbidity and frequent water level fluctuation limits growth of submerged aquatic vegetation. However, in summer 2018, City of Corsicana

personnel contacted the Tyler South District office with concerns regarding growth of emergent species in the far upper end of the reservoir and requested recommendations regarding treatment. A subsequent survey documented emergent species (primarily American Lotus *Nelumbo lutea* and Smartweed *Polygonum spp*.) in very shallow water (<3 feet) with heavy siltation. Because any access to this area was more limited by water depth than vegetation the district recommendation was that vegetation treatment would not be cost effective and habitat value outweighed any access issues thus treatment was counter recommended. No additional action by the City of Corsicana has been reported.

Water transfer: Lake Halbert is used primarily as water supply for municipal and industrial purposes, and for flood control. There is currently one permanent pump station and treatment facility on the reservoir. An additional 36-inch pipeline connects Lake Halbert directly to Richland-Chambers Reservoir. The pipeline allows water to be pumped directly from Richland Chambers Reservoir to the City of Corsicana water treatment facility or be diverted first to Lake Halbert and then to the water treatment facility. The City of Corsicana maintains a second permanent pump station and treatment facility on Navarro Mills Reservoir. Water from the two sources are blended after leaving the treatment facilities but prior to distribution. Treated effluent from the City of Corsicana waste-water treatment plant is discharged into Richland-Chambers Reservoir. However, no inter-basin transfers exist.

Methods

Surveys were conducted to achieve sampling objectives in accordance with the objective based sampling (OBS) plan for Lake Halbert (TPWD, unpublished). Primary components of the OBS plan are listed in Table 5. All survey sites were randomly selected, and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2017).

Electrofishing – Largemouth Bass, sunfishes *Lepomis spp*., Gizzard Shad *D. cepedianum* and Threadfin Shad were collected by electrofishing (0.9 hour at 11, 5-min stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fishes caught per hour (fish/h) of actual electrofishing.

Trap netting – Crappie were collected using trap nets (10 net nights at 10 stations). CPUE for trap netting was recorded as the number of fish caught per net night (fish/nn). Ages for crappie were determined using otoliths from 13 randomly-selected fish (range 9.0 to 10.9 inches).

Gill netting – Blue Catfish *Ictalurus furcatus*, Channel Catfish *I. punctatus,* and White Bass *Morone chrysops* were collected by gill netting (5 net nights at 5 stations). CPUE for gill netting was recorded as the number of fish caught per net night (fish/nn).

Statistics – 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 (SE) was calculated for structural indices and IOV. Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE statistics.

Habitat – A structural habitat survey was conducted in 2002 (Ott and Bister 2003). Comprehensive vegetation surveys were conducted in 2010, 2014, and 2018. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2017).

Water level – Source for water level data was the United States Geological Survey (USGS 2019).

Results and Discussion

Habitat: The aquatic plant community was like that described in the previous report (Norman and Ott 2015). Emergent species were still the dominant growth form. Combined Smartweed and American lotus occupied approximately 5% of the reservoir surface area (Table 6). Other emergent species identified

included Giant Bulrush *Schoeneoplectus californicus*, cattail *Typha spp*., and American Water Willow *Justicia americana.* Pondweed *Potamogeton spp.* was the only submersed species identified, occurring in small isolated patches (8-acre total) along the shoreline of the city park. Low species diversity and overall coverage of aquatic vegetation is likely due to turbidity and frequent water level fluctuation (Figure 1). Giant Reed *Arundo donax* was the only non-native species detected and was similar in coverage to previous surveys. Bister and Ott (2003) reported that most of the shoreline habitat was featureless with 13% riprap by length.

Prey species: Electrofishing catch rates of Bluegill and Gizzard Shad were 66.5/h and 291.3/h, respectively (Appendix A). Index of vulnerability (IOV) for Gizzard Shad was excellent with 92% available to predators; this was comparable to IOV estimates in previous years (Figure 2). Total CPUE of Gizzard Shad was lower than the high of 924.0/h in 2014 but higher than 71.0/h collected in 2010 (Figure 2). Total CPUE of Bluegill in 2019 was higher (66.5/h) than previous surveys in 2010 and 2014, and size structure continued to be dominated by small individuals suitable as prey (Figure 3). Longear Sunfish catch rate was 43.6/h (Appendix A) and contribute to diversity of the prey base.

Catfish: Blue Catfish were not collected at Lake Halbert in surveys prior to 2003 (Bister and Ott 2003) and have fluctuated in community dominance since that time. No recorded stocking of Blue Catfish has been documented by TPWD; the mechanism of their introduction is unknown. By 2011, Blue Catfish had become well established and the gill net catch rate (6.8/nn) was higher than that of Channel Catfish 2.2/nn (Figures 4 and 5). At that time sub legal-length Blue catfish were present and the population showed evidence of natural recruitment. However, no additional small Blue Catfish have been collected in the past two surveys and total catch rate has declined. Body condition of Blue Catfish was acceptable ($Wr, \geq 90$) suggesting that prey availability is likely not the limiting factor. Gill net catch rate of Channel Catfish had increased substantially to 10.8/nn in the present survey and annual reproduction and recruitment of Channel Catfish appears to be occurring (Figure 5). At current, Channel Catfish have become the dominant catfish species. Channel Catfish body condition continued to be acceptable (W_r 80-90) for most size classes.

White Bass: Lake Halbert has a history of low relative abundance of White Bass. This is likely due to limited tributary connectivity above the reservoir resulting in limited incoming flow rates, likely inhibiting successful reproduction. Although White Bass have been collected in the past three gill net samples (Figure 6), little more than presence/absence can be inferred.

Largemouth Bass: Lake Halbert continued to support a low-density Largemouth Bass population, likely due to limited littoral habitat and turbidity. The electrofishing catch rate of stock-length fish was 30.5/h (RSE=33) in 2018 and was similar to the 30.0/h (RSE=21) in the 2010 survey but double the 15.0/h in 2014 (Figure 7). Low abundance in 2014 was likely an anomaly resulting from the prolonged drought in 2010-2012 (Figure 1) and did not represent the true carrying capacity of the system. Size structure had been acceptable in the two previous surveys (PSD-14 range: 14-20) and PSD has historically been with in the balanced (40-60) range. However, PSD was low in 2018 evidently resulting from a surge in recruitment in 2017 and 2018 which likely benefitted from stabilization in water level. Body condition was generally good with most being > 90 but did exhibit variability in harvestable size ($\geq$14 inch) specimens. However, inferences may be limited as sample size of harvestable-size fish was small.

Crappie: Crappie likely provide the most consistent fishery at Lake Halbert. Black *Crappie P. nigromaculatus* were present but only 7 specimens were collected during the 2018 trap net survey. However, trap net catch rate of stock length ($\geq$ 5 inch) White Crappie was 15.9/nn (Figure 8). This is slightly below 22.6/nn in 2014, but considerably above 7.0/nn in 2010. Furthermore, almost 60% of the stock-length fish were of legal length (PSD-10 = 57), providing excellent harvest opportunity. Reproduction and recruitment have been evident in all three of the recent surveys. Relative weights were at or above 100 except for a single large specimen; indicating excellent prey availability. White Crappie growth was average; mean age at 10 inches (9.0 to 11.0 inches) was 1.5 year (N = 13; Range = 1-3).

Fisheries Management Plan for Lake Halbert, Texas

Prepared – July 2019

ISSUE 1: Lake Halbert provides a consistent White Crappie population that provides excellent angler opportunity.

MANAGEMENT STRATEGIES

1. Continue to promote the White Crappie fishery through media outlets.
2. Consult with City of Corsicana Parks Department regarding placement of fish attractors in the areas utilized by anglers.

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 *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

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 using local 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. Maintain contact with the controlling authority regarding periodic Zebra Mussel inspections at the boat ramp.

Objective-Based Sampling Plan and Schedule 2019-2023

Sport fishes in Lake Halbert include crappies, Blue and Channel Catfish, White Bass, and Largemouth Bass. Important forage species are primarily Gizzard and Threadfin Shad and sunfishes.

Low-density or underutilized fisheries: White Bass

Survey objectives, fisheries metrics, and sampling objectives

Crappie: While there is no creel data, anecdotal information suggests crappie are a popular fishery at Lake Halbert and likely account for most of the directed effort. Historical trap net data conducted every four years indicates a reliable population of White Crappie, with catch rates ranging from 9.8/nn, to 34.2/nn in the three most recent surveys. Due to the importance of this fishery relative to other species trend data on relative abundance, size structure, and body condition (measured by CPUE, PSD and W_r) will continue to be monitored every four years. Ten randomly selected trap netting sites will be sampled in the fall of 2022 with the goal of collecting $\geq$ 50 stock-sized fish for PSD and relative abundance estimates (CPUE-S) with RSE $\leq$ 25.

Catfish: Both Blue and Channel Catfish are present at Lake Halbert and recent gill net surveys have identified shifts in community dominance between Channel Catfish and Blue Catfish (as indicated by relative abundance). Historical data suggest estimates of Blue Catfish relative abundance (CPUE-stock) with RSE $\leq$ 25 and N $\geq$ 50 stock-sized individuals for PSD estimates would require 15 net nights of effort; Channel Catfish would require 58 net nights. Because depth profiles only provide approximately 300 acres of sample-able water this level of effort is excessive. Therefore, in the spring of 2023, only 5 randomly selected gill net sites will be sampled. If samples do not provide estimates of CPUE-stock with RSE $\leq$ 25 and N $\geq$ 50 stock sized individuals (for either species) that species will be reported as presence/absence only.

White Bass: The White Bass population has been traditionally surveyed every four years with gill netting. Catch rate data has ranged from 0.8/nn – 2.2/nn in the three most recent surveys and the effort necessary to estimate relative abundance (CPUE-S, RSE $\leq$ 25) is not justified. In accordance with the catfish sample objectives, 5 randomly selected gill netting sites will be sampled in the spring of 2023 to monitor White Bass for presence/absence.

Largemouth Bass: Lake Halbert has historically supported a low-density Largemouth Bass population; catch rates of stock-size specimens from standard night-time electrofishing in the past three surveys ranged from 15/h – 30.5/h with RSEs of 21-33. Limited stable littoral habitat and high turbidity has likely limited recruitment of bass within the reservoir. The quality of the Largemouth Bass fishery has historically been poor and likely does not provide a significant fishery. Therefore, only 12 randomly selected 5-minute electrofishing sites will be sampled in the fall of 2022 with the goal of documenting presence/absence. Largemouth Bass relative abundance will only be reported if catch rates approach precision goals (CPUE-stock, RSE $\leq$ 25). However, relative weight data will be collected on all stock-size Largemouth Bass as a supplemental method of monitoring the prey base.

Prey Species: Gizzard Shad and sunfish species are the primary prey species in Lake Halbert. Traditionally, trend data on relative abundance and size structure (CPUE, IOV) of Gizzard Shad was monitored every four years with fall nighttime electrofishing. In accordance with the Largemouth Bass sample objectives, 12 randomly selected electrofishing sites will be sampled in the fall of 2022 to monitor the prey base. No additional effort will be expended, regardless of survey precision or sample size; relative weight of Largemouth Bass will provide additional information on the prey base availability within Lake Halbert.

Habitat: Giant Reed was the only non-native species detected and was similar in coverage to previous surveys. Coverage of American Lotus and Smartweed caused concern to the City of Corsicana but is providing valuable habitat. Cover of other native aquatic species has historically been low. A complete-reservoir comprehensive vegetation survey will be conducted every four years, beginning in 2022, to monitor the littoral habitat within the reservoir.

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Tables and Figures

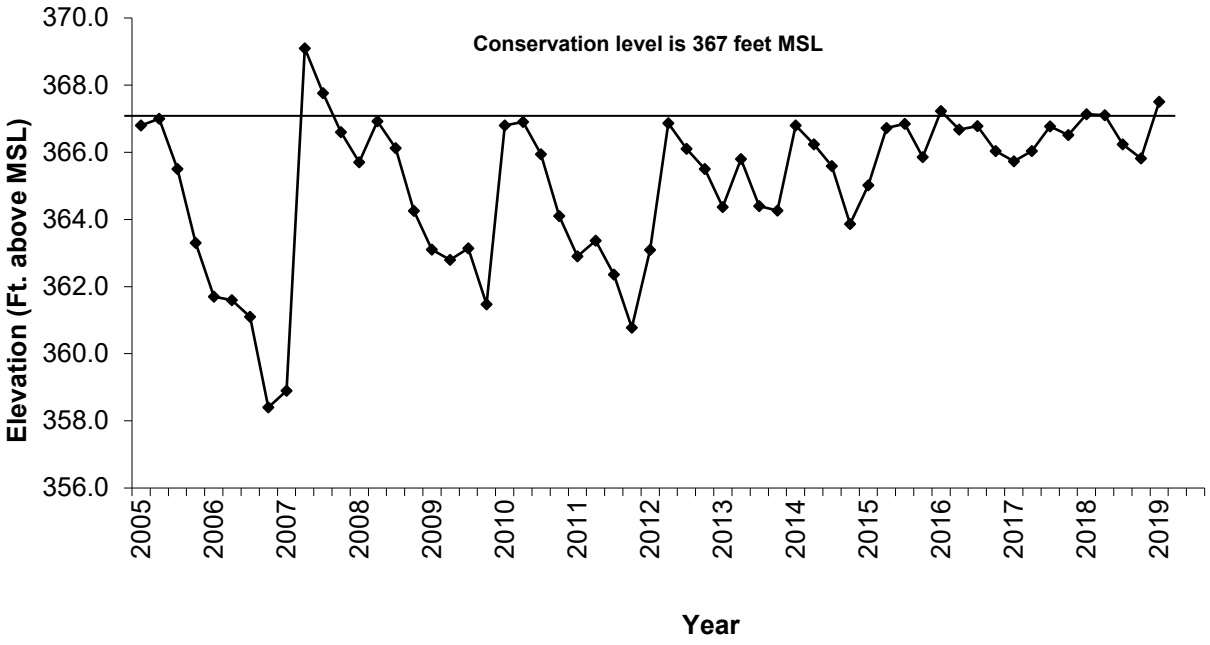


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Lake Halbert, Texas.

Table 1. Characteristics of Lake Halbert, Texas.

Characteristic	Description
Year constructed	1921
Controlling authority	City of Corsicana
County	Navarro
Reservoir type	Tributary
Shoreline Development Index	1.8
Conductivity	280 µS/cm

Table 2. Boat ramp characteristics for Lake Halbert, Texas, August 2018. Reservoir elevation at time of survey was 366.2 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
City Park	32.07702 -96.40717	Y	15	361.5	Excellent, no access issues

Table 3. Harvest regulations for Lake Halbert, Texas.

Species	Bag limit	Length limit
Catfish: 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, Largemouth	5	14-inch minimum
Crappie: White and Black crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

Table 4. Stocking history of Lake Halbert, Texas. FGL = fingerling; ADL = adults.

Species	Year	Number	Size
Threadfin Shad	1990	3,367	ADL
	1991	2,700	ADL
	Total	6,067	
Bluegill (copper nose)	1983	35,000	FGL
	Total	35,000	
Florida Largemouth Bass	1974	32,000	FGL
	1975	25,000	FGL
	1992	59,984	FGL
	1995	66,340	FGL
	1998	65,289	FGL
	Total	248,613	

Table 5. Objective-based sampling components for Lake Halbert, Texas 2018–2019.

Gear/target species	Survey objective	Metrics	Sampling objective
Electrofishing			
Largemouth Bass	Relative Abundance	CPUE–Stock	RSE ≤ 25
	Size structure	PSD, length frequency	N ≥ 50 stock
	Condition	*Wr*	10 fish/inch group (max)
	Age-and-growth	Age at 14 inches	N = 13, 13.0 – 14.9 inches
Bluegill [a]	Relative Abundance	CPUE–Total	RSE ≤ 25
	Size structure	PSD, length frequency	N ≥ 50
Gizzard Shad [a]	Relative Abundance	CPUE–Total	RSE ≤ 25
	Prey availability	IOV	N ≥ 50
Trap netting			
Crappie	Relative Abundance	CPUE-Stock	RSE $\leq$ 25
	Size Structure	PSD, Length frequency	N $\geq$ 50
	Condition	*Wr*	10 fish/inch group (max)
	Age-and-growth	Age at 10 inches	N = 13, 9.0 – 10.9 inches
Gill netting			
Blue Catfish	Relative Abundance	CPUE–Stock	RSE ≤ 25
	Size structure	PSD, length frequency	N ≥ 50 stock
Channel Catfish	Relative Abundance	CPUE–Stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	N ≥ 50 stock
White Bass	Presence-absence		

[a] No additional effort will be expended to achieve an RSE ≤ 25 for CPUE of Bluegill and Gizzard Shad if not reached from designated Largemouth Bass sampling effort. Instead, Largemouth Bass body condition can provide information on forage abundance, vulnerability, or both relative to predator density.

Table 6. Survey of aquatic vegetation, Lake Halbert, Texas, 2010, 2014, and 2018. Surface area (acres) is listed with percent of total reservoir surface area in parentheses. Tr indicates trace amount.

Vegetation	2010	2014	2018
Native submersed			
Pondweed	9 (1.8)	2 (0.4)	8 (1.5)
Native Emergent			
American Lotus	<1 (0.1)	7 (1.4)	6 (1.1)
American lotus/Smartweed			24 (4.5)
Bulrush	Tr	1 (0.2)	Tr
Button Bush			7 (1.3)
Cattail	<1 (<0.1)	1 (0.2)	1 (0.2)
Smartweed	28 (5.3)	15 (3.1)	4 (0.7)
Water Willow	Tr	8 (1.7)	1 (0.2)
Non-native			
Giant Reed (Tier III)*	<1 (0.1)		1 (0.2)

*Tier III is Watch Status

Gizzard Shad

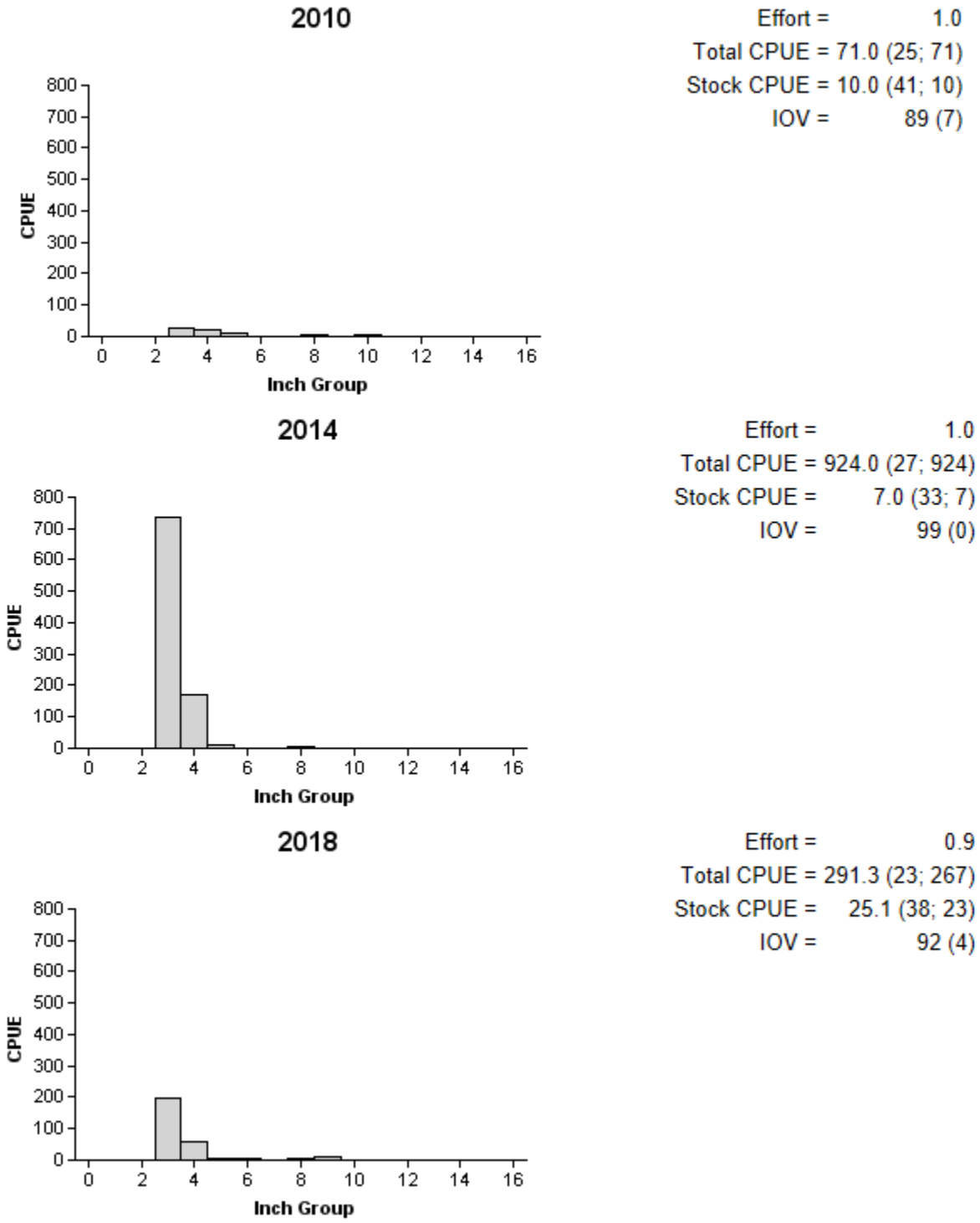


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Lake Halbert, Texas, 2010, 2014, and 2018.

Bluegill

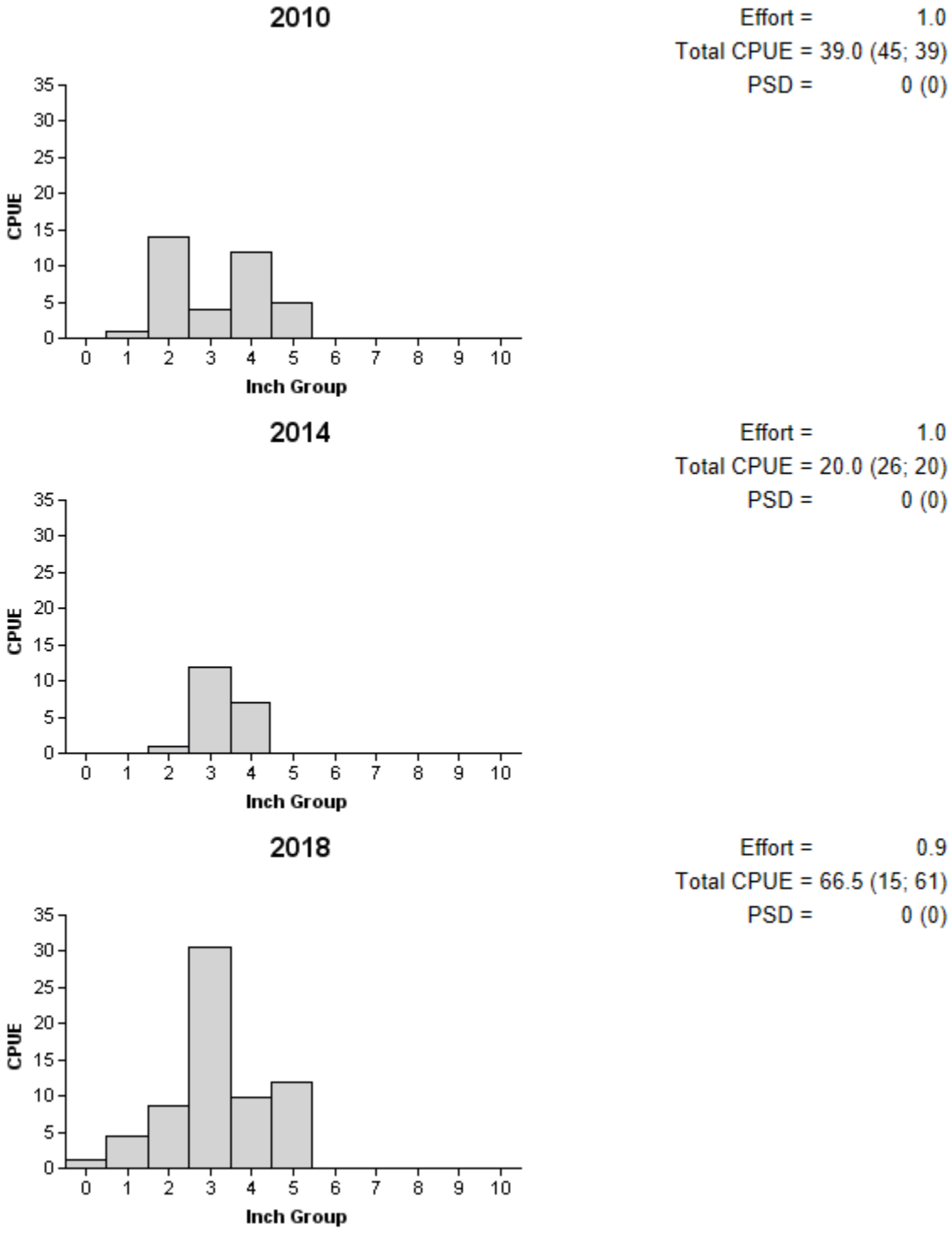


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Halbert, Texas, 2010, 2014, and 2018.

Blue Catfish

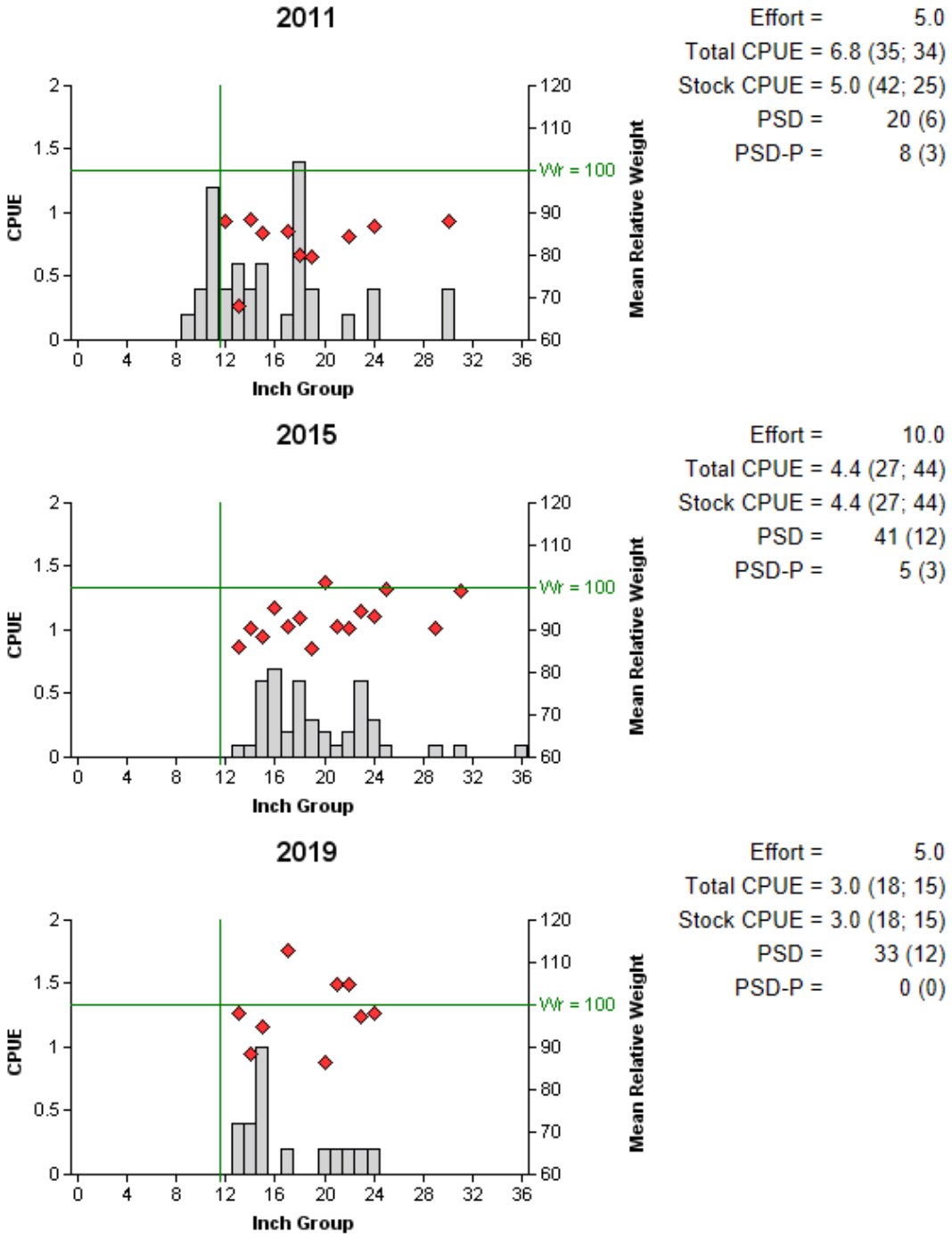


Figure 4. Number of Blue Catfish caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Halbert, Texas, 2011, 2015, and 2019. Vertical line represents minimum legal-length at time of survey.

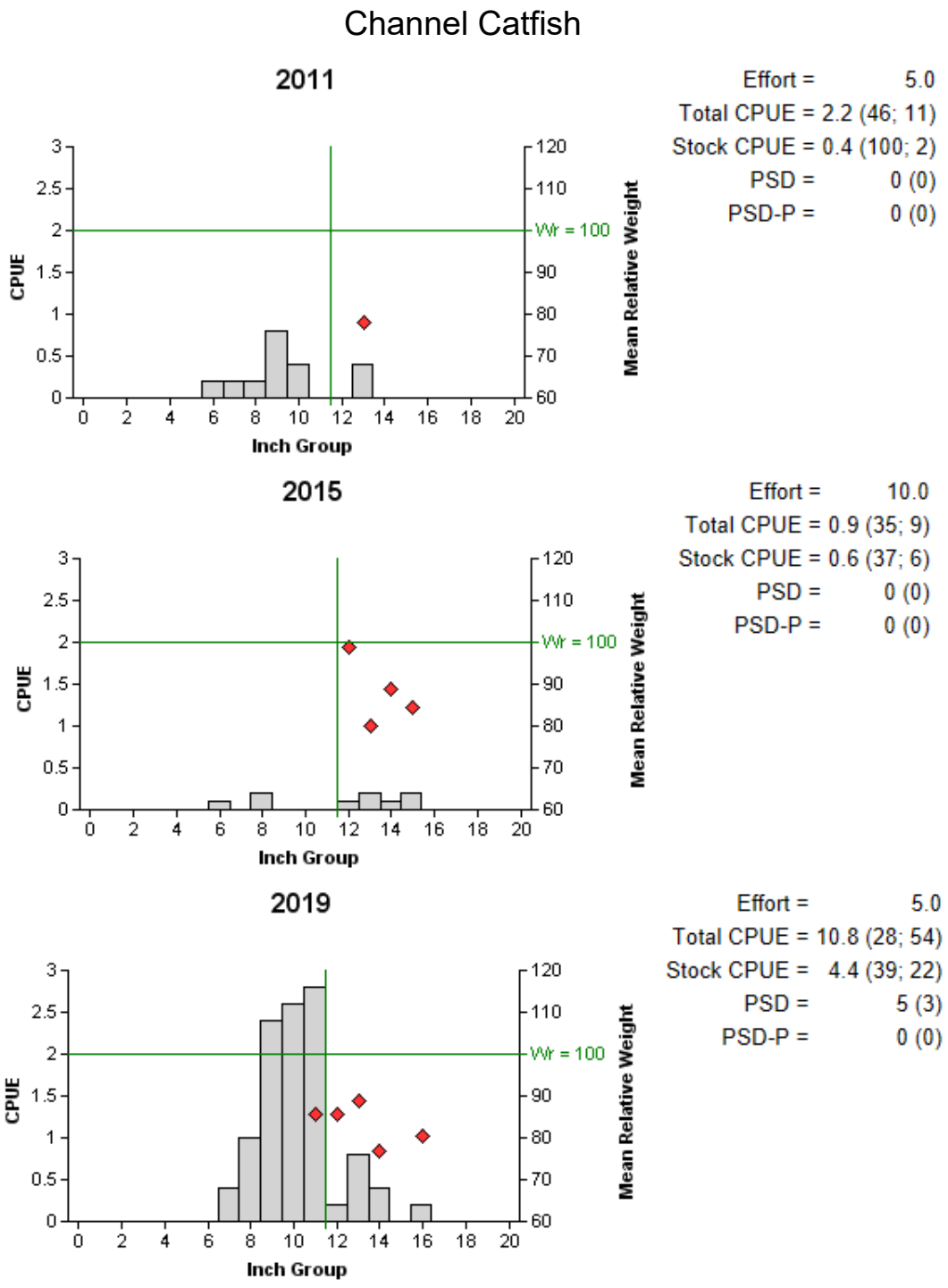


Figure 5. Number of Channel Catfish caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Halbert, Texas, 2011, 2015, and 2019. Vertical line represents minimum legal-length at time of survey.

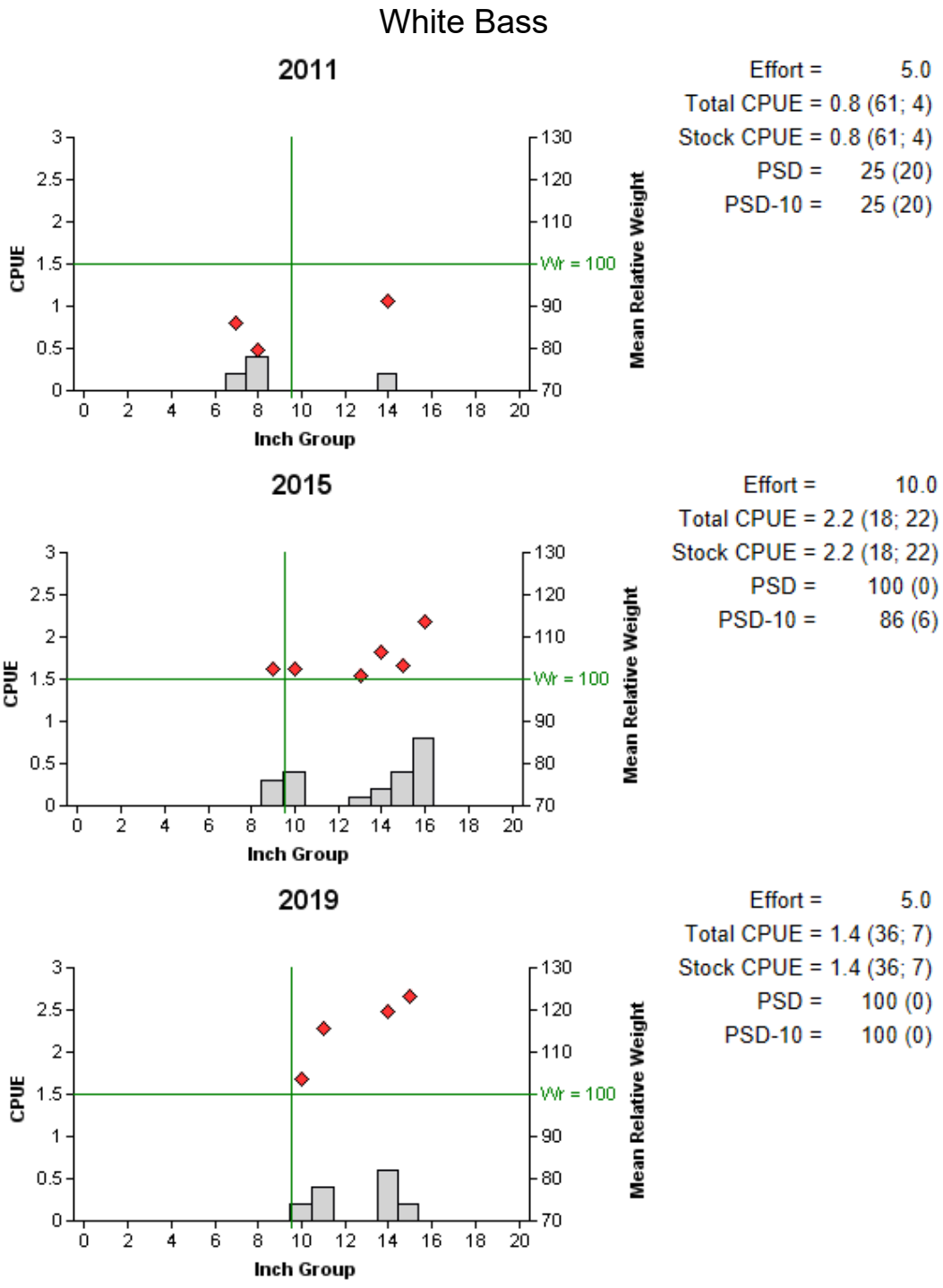


Figure 6. Number of White Bass caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Halbert, Texas, 2011, 2015, and 2019. Vertical line represents minimum legal-length at time of survey.

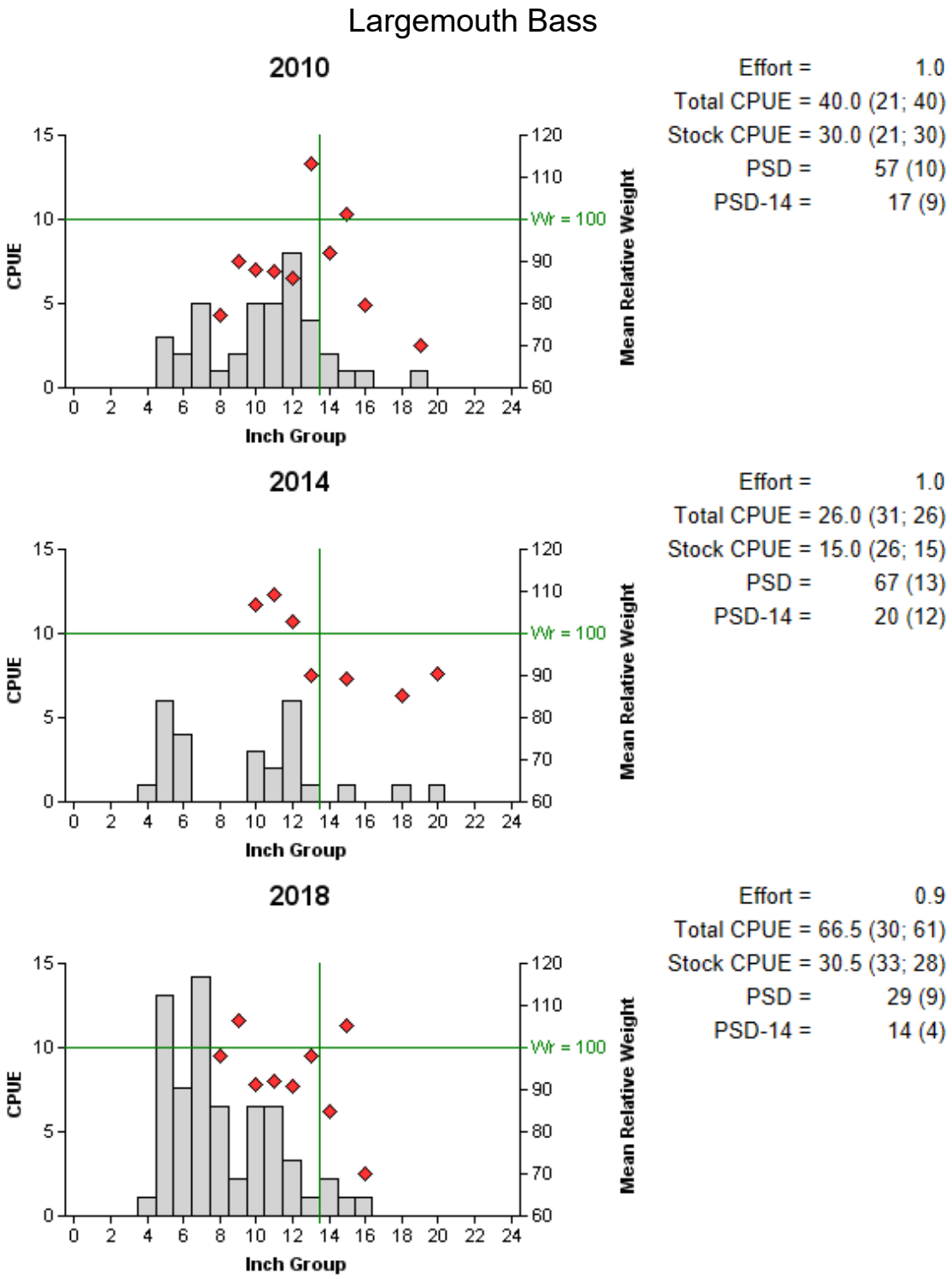


Figure 7. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Halbert, Texas, 2010, 2014, and 2018. Vertical line represents minimum legal-length at time of survey.

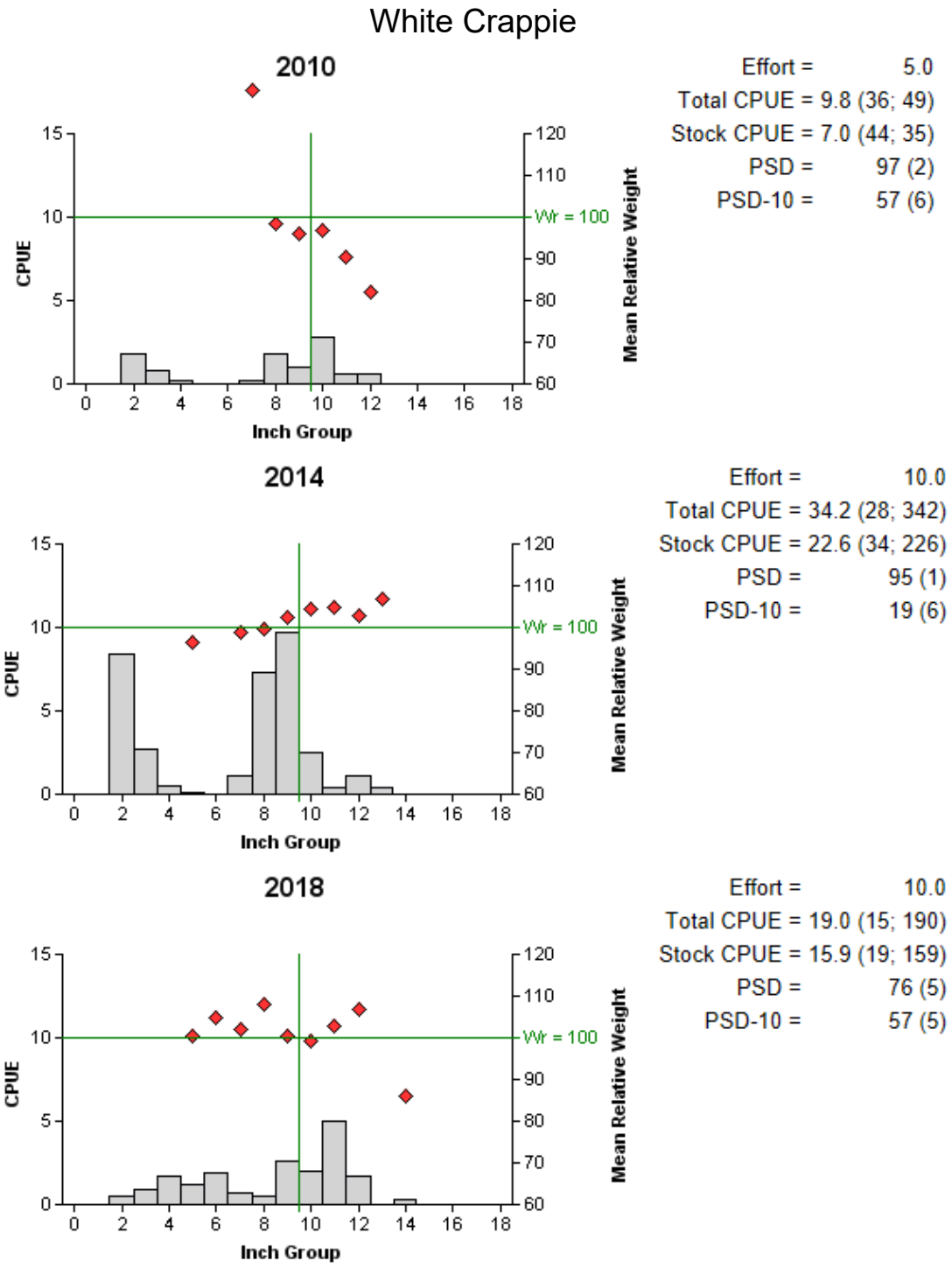


Figure 8. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Lake Halbert, Texas, 2010, 2014, and 2018. Vertical line represents minimum legal-length at time of survey.

Proposed Sampling Schedule

Table 7. Proposed sampling schedule for Lake Halbert, 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.

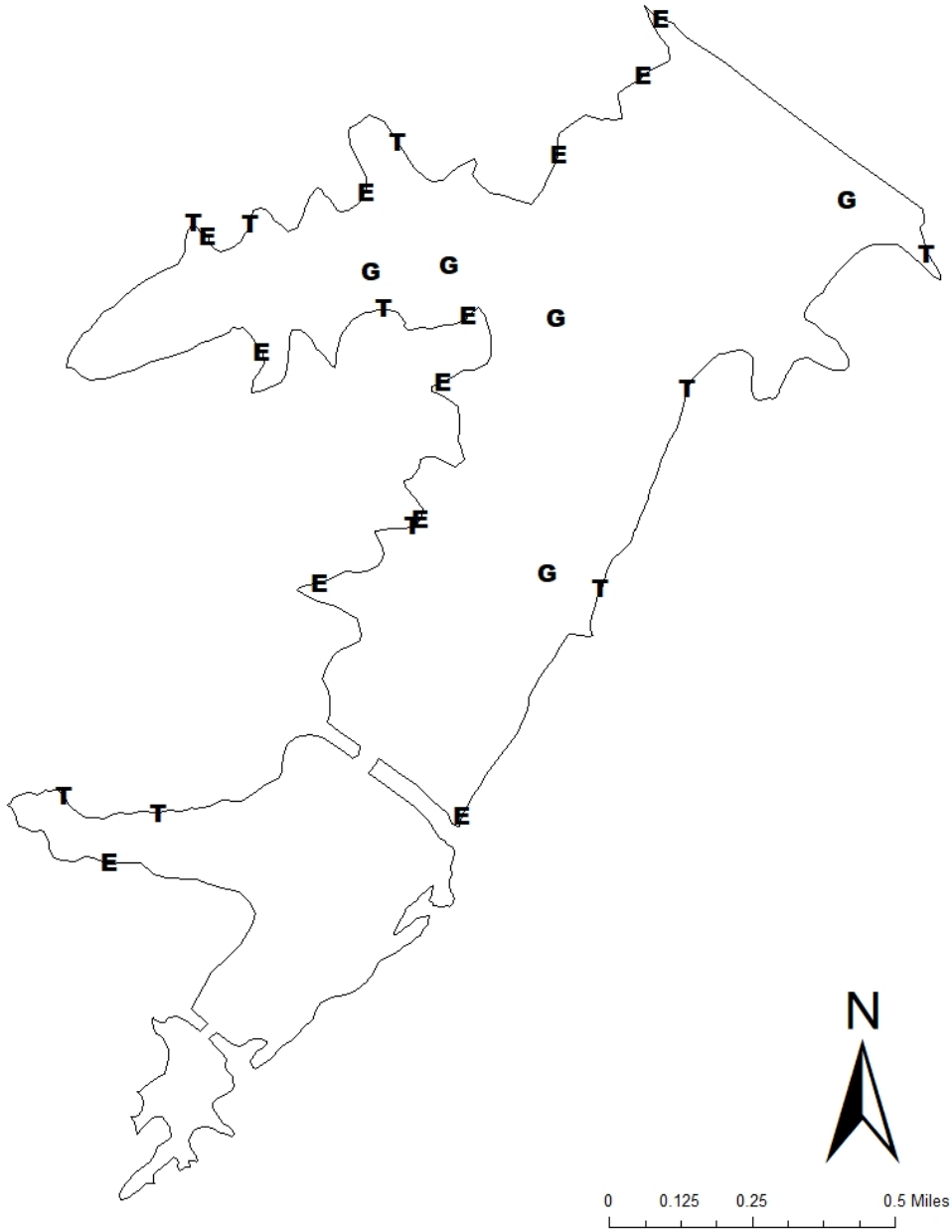
	Survey year			
	2019-2020	2020-2021	2021-2022	2022-2023
Angler Access				S
Vegetation				S
Electrofishing – Fall				S
Trap netting				A
Gill netting				S
Report				S

APPENDIX A – Catch rates for all species from all gear types

Number (N) and catch rate (CPUE) (RSE in parentheses) of all target species collected from all gear types from Lake Halbert, Texas, 2018-2019. Sampling effort was 5 net nights for gill netting, 10 net nights for trap netting, and 0.92 hour for electrofishing.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad					267	291.2 (23)
Blue Catfish	15	3.0 (18)				
Channel Catfish	54	10.8 (28)				
White Bass	7	1.4 (36)				
Warmouth					2	2.2 (67)
Bluegill					61	66.5 (15)
Longear Sunfish					40	43.6 (20)
Redear Sunfish					1	1.1 (100)
Largemouth Bass					61	66.5 (30)
White Crappie			190	19.0 (15)		
Black Crappie			7	0.7 (30)		

APPENDIX B – Map of sampling locations



Location of sampling sites, Lake Halbert, Texas, 2018-2019. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively. Water level was near full pool at time of sampling.

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