

Gladewater City Lake

2017 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 Gladewater City Lake were surveyed in 2017 using electrofishing and in 2018 using baited tandem hoop nets. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings. Historical data are presented with the 2017-2018 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: Gladewater City Lake is a 481-acre reservoir on Glade Creek, and was constructed in 1953 by the City of Gladewater for use as municipal and industrial water supply. Habitat features consisted of inundated timber, brush, creek channels, and riprap. The lake has a history of limited aquatic vegetation. Water hyacinth, a non-native invasive plant, was detected at the reservoir in 2005. Periodic herbicide treatments have prevented the spread of water hyacinth in the reservoir.

Management History: Important sport fishes include Largemouth Bass, Channel Catfish, Bluegill, Redear Sunfish, and crappie. Texas Parks and Wildlife Department (TPWD) Inland Fisheries Marshall District staff stocked Threadfin Shad in 2008 to improve the prey fish community. The City of Gladewater purchased (from a private fish retailer) and stocked the reservoir with 15,000 pure Florida Largemouth Bass fingerlings each year from 2008-2010. TPWD stocked 52,113 Florida Largemouth Bass fingerlings in 2016.

Fish Community

- **Prey species:** Threadfin Shad continued to be present in the reservoir. Electrofishing catch of Gizzard Shad was higher than it was in the previous two surveys, but only 31% of fish were small enough to be available as prey to most sport fish. Bluegill catch was lower in 2017 than it was in 2013, but higher than 2009. Bluegill size structure indicates that they are an adequate prey source for most sport fish. Redear Sunfish serve as an additional prey source for predators and grow to sizes desirable to anglers.
- **Catfishes:** Channel Catfish were collected using tandem hoop nets, but the population sample was limited. Fish ranged from 8-19 inches.
- **Largemouth Bass:** Largemouth Bass electrofishing catch rates were higher than the two previous surveys. Largemouth Bass were collected up to 21 inches, and size structure was above average. Spotted Bass catch rate was lower than it was in previous surveys, but these fish provide additional angling opportunities.
- **Crappie:** Crappie were collected using tandem hoop nets. White Crappie were more abundant than Black Crappie and were collected up to 14 inches.

Management Strategies: Continue to stock Florida Largemouth Bass fingerlings every 4 years to maintain a quality bass population. Florida Largemouth Bass will next be stocked in 2020 at a rate of 100 fish/acre. Monitor water hyacinth and alligatorweed and provide technical guidance to the City of Gladewater regarding invasive aquatic vegetation management and consult with TPWD's Aquatic Habitat Enhancement team on vegetation control as necessary.

Introduction

This document is a summary of fisheries data collected from Gladewater City Lake in 2017-2018. 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 2017-2018 data for comparison.

Reservoir Description

Gladewater City Lake is located in Upshur County on Glade Creek. It was constructed in 1953 by the City of Gladewater for use as a municipal and industrial water supply and for public recreation. The lake has a drainage area of approximately 42 square miles. Shoreline length is 10 miles with a shoreline development ratio of 2.7:1. Water level has been relatively stable, and during dry periods the water level has not dropped more than 3 feet (Figure 1). Water hyacinth was discovered in the reservoir during the 2005 vegetation survey. Abundant residential development exists along the lower half of the reservoir. The City of Gladewater operates a boat ramp on the reservoir, and bank angling access is limited. Other descriptive characteristics for Gladewater City Lake are recorded in Table 1.

Angler Access

Gladewater City Lake has public boat ramps located at the Garland P. Ferguson City Park with parking for about 15 trucks/trailers. The park has two boat ramps located at each end of the parking area. Additional boat ramp characteristics are recorded in Table 2. Shoreline access is limited to the public boat ramp areas, lighted fishing pier, and city park shoreline areas. Boat ramps are operated by the City of Gladewater and a use fee is required.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Wright and Bister 2014) included:

1. Monitor the Largemouth Bass population with electrofishing every 4 years in Gladewater City Lake and determine if it has the potential to produce 8+ pound bass. If so, stock Florida Largemouth bass every 4 years at a rate of 100 fish/acre.
Action: Electrofishing survey was conducted in 2017. In 2016, 52,113 Florida Largemouth Bass fingerlings stocked.
2. Conduct annual water hyacinth and alligator weed surveys and continue to work with Gladewater City officials and lake advisory board regarding exotic vegetation management efforts.
Action: Annual water hyacinth and alligator weed surveys have been conducted. Water hyacinth and alligator weed coverage remained low in recent years, and currently only annual monitoring and spot herbicide treatments are needed.
3. Provide news releases regarding the quality Channel Catfish fishing opportunities at Gladewater City Lake.
Action: The opportunity to promote the Channel Catfish fishery did not present itself. Anecdotal evidence suggests that fishing pressure remains low.

Harvest regulation history: Sport fishes in Gladewater City Lake are currently managed with statewide regulations (Table 3). Largemouth Bass have been managed with a 14-inch minimum length and 5-fish daily bag since 1986. Other black basses were included under this regulation in 1988. The minimum length limit on Spotted Bass was removed in 2000, but the daily bag for black basses in any combination remains at 5 fish/day. The 12-inch minimum length limit and 25-fish daily bag for Channel Catfish and Blue Catfish (in any combination) has been in effect since 1995. The minimum length limit for Flathead Catfish was reduced from 24 inches to 18 inches in 1995. There is a 5-fish daily bag on Flathead Catfish.

Stocking history: Channel Catfish were stocked from the early 1970s to the mid-1990s in order to maintain a fishable population. The population has maintained itself since the last stocking in 1996. TPWD stocked Threadfin Shad in 2008 to improve the prey fish community. The Gladewater City Lake Advisory Board stocked 15,000 Florida Largemouth Bass obtained from a private fish retailer annually from 2008 to 2010 to further improve the fishery. Florida Largemouth Bass were not stocked by TPWD from 1992 to 2016, but in 2016 there were 52,113 Florida Largemouth Bass fingerlings stocked to further enhance the bass fishery. The complete stocking history is listed in Table 4.

Vegetation/habitat management history: The discovery of water hyacinth during the 2005 aquatic vegetation survey was the first case of a non-native plant species present in this water body. Water hyacinth has been spot treated with herbicide when necessary and coverage has remained at low levels without inhibiting recreational access.

Water transfer: No interbasin transfers are known to exist.

Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Gladewater City Lake (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 2015).

Electrofishing – Largemouth Bass, Sunfishes, Gizzard Shad, and Threadfin Shad were collected by electrofishing (1 hour at 12, 5-min stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing. Ages for Largemouth Bass were determined using otoliths from 13 randomly-selected fish (range 13.0 to 14.6 inches) in 2017.

Tandem hoop nets – Channel Catfish and Crappie were collected using 10 tandem hoop-net series at 10 stations. Nets were baited with soap and deployed for 2-night soak durations. CPUE for tandem hoop netting was recorded as the number of fish caught per tandem hoop net series (fish/series). Ages for White Crappie were determined using otoliths from 13 randomly-selected fish (range 9.0 to 10.2 inches).

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 (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). 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.

Habitat – A structural habitat survey was conducted in 2013. No further development had occurred at the reservoir, and there was no perceived change in structural habitat. Vegetation surveys were conducted in 2014-2017 to monitor invasive plants including alligator weed, giant salvinia, hydrilla, and water hyacinth. Native aquatic vegetation groups were surveyed and summarized in 2017. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2015).

Water level – Source for water level data was the United States Geological Survey (USGS 2018).

Results and Discussion

Habitat: Wright and Bister (2014) reported that littoral zone structural habitat consisted primarily of natural shoreline, bulkhead, and submerged timber (Table 6). Native aquatic vegetation covered roughly 12% of the reservoir's surface area and was primarily located in the upper end of the reservoir (Table 7). Water hyacinth was present in the reservoir, but at low density (<1 acre) (Table 7). Alligator weed, which has been present in previous surveys, was not observed in the 2015-2017 vegetation surveys (Table 7).

Prey species: The 2017 electrofishing catch rate of Gizzard Shad (244.0/h) was higher than the 2013 survey (74.0/h) and the 2009 survey (148.0/h) (Figure 2). The index of vulnerability (IOV) indicated that 31% of Gizzard Shad were available to existing predators, which was higher than the two previous surveys (Figure 2). Bluegill was the most abundant prey species collected during the survey (CPUE = 446.0/h) (Figure 3). This was a lower CPUE than the 2013 survey (758.0/h), but higher than the 2009 survey (399.0/h) (Figure 3). Size structure of Bluegill was less than optimum with a PSD of 5 and similar to past surveys with few fish over 5 inches (Figure 3). Redear Sunfish and Threadfin Shad serve as additional prey species. The CPUE of Redear Sunfish and Threadfin Shad are 49.0/h and 47.0/h, respectively (Figure 4, Appendix A). The presence of Redear Sunfish over 6 inches provided additional angling opportunities in Gladewater City Lake (Figure 4).

Channel Catfish: The Channel Catfish population was surveyed in spring 2018 using baited tandem hoop nets as an alternative method to historical gill netting. Tandem hoop nets have been successful in other reservoirs and they have also been used to collect population data for crappie. No other target species traditionally caught by gill netting were present in Gladewater City Lake. Switching from gill

netting to tandem hoop netting also reduces bycatch of non-target species and potential unnecessary mortality. The sampling objective was to catch ≥ 100 stock size fish for size structure analysis. However, after 10 net series, only 31 fish had been collected (Figure 5). Fish ranged from 8 to 19 inches. Wright and Bister (2014) reported Channel Catfish catch in gill nets up to 28 inches. Further evaluation of tandem hoop netting is required for Channel Catfish surveys in this reservoir. If tandem hoop nets are proven to be effective they can be also used to collect population data on crappie.

Spotted Bass: Total catch rate of Spotted Bass was 40.0/h in 2017 which was lower than 2013 (48.0/h), and 2009 (69.0/h) (Figure 6). Size structure decreased since past surveys with a PSD of 5, compared to 2013 (PSD = 30) and 2009 (PSD = 10). Only one Spotted Bass >10 inches was collected during the 2017 survey. Condition of Spotted Bass was somewhat below average with most fish W_r between 75 and 90. Even though no Spotted Bass >12 inches were collected, this species provides additional opportunity for anglers in Gladewater City Lake.

Largemouth Bass: The electrofishing catch rate of Largemouth Bass has increased in recent years. Total CPUE was 113.0/h in 2017, 79.0/h in 2013, and 70.0/h in 2009 (Figure 7). The CPUE of fish above 14 inches has also increased from 17.0/h in 2013 to 22.0/h in 2017 (Figure 7). Body condition in 2017 was slightly below average (W_r between 80 and 95) for nearly all size classes of fish (Figure 7). Growth rate was moderate in 2017; average age at 14 inches (13.0 to 14.9 inches) was 2.6 years ($N = 13$; range = 2 – 4 years). This was slightly better than previous surveys; 2013 average age at 14 inches was 2.7 years ($N = 13$; range = 2 – 3 years), and 2009 average age at 14 inches was 2.9 years ($N = 16$; range = 2 – 4 years; Wright and Bister 2014).

Crappie: Both White and Black Crappie were present in Gladewater City Lake, but White Crappie have been the more abundant species (Wright and Bister 2014). Historical fall trap netting surveys have been inconsistent. Therefore, during this survey period we utilized baited tandem hoop nets during spring 2018 to collect crappie. Over 100 White Crappie (Figure 8) and 27 Black Crappie (Figure 9) were collected during the most recent survey. Body condition was poor for both species with average $W_r < 90$ for most inch groups (Figures 8 and 9). Despite poor W_r , White Crappie growth was fast. Average age at 10 inches (9.0 to 10.2 inches) was 1.9 years ($N = 13$, range = 1-2 years) for fish collected during spring hoop netting.

Fisheries Management Plan for Gladewater City Lake, Texas

Prepared – July 2018

ISSUE 1: Gladewater City Lake has the potential to produce large bass. Anecdotal evidence from anglers suggests that the reservoir is capable of producing fish >8 pounds. The winning fish in the 2018 East Texas Gusher Days Bass Tournament weighed 8.79 pounds. In 2016, Florida Largemouth Bass fingerlings were stocked in Gladewater City Lake for the first time by TPWD in over 20 years. The continued stocking of Florida Largemouth Bass is needed to maintain the quality fishery.

MANAGEMENT STRATEGIES

1. Stock Florida Largemouth Bass at a rate of 100 fish/acre every 4 years.
2. Encourage anglers to report catches of bass over 8 pounds to the Sharelunker program, so they can be tracked over time.

ISSUE 2: Water hyacinth is currently present and Alligator weed has been historically present in Gladewater City Lake; however, coverage has remained low and not problematic.

MANAGEMENT STRATEGIES

1. Continue to monitor invasive aquatic plants with annual surveys.
2. Advise the City of Gladewater and Lake Advisory Board as needed if coverage increases.
3. Coordinate with TPWD's Aquatic Habitat Enhancement team to treat nuisance aquatic vegetation with herbicide when necessary

ISSUE 3: 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.

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.

Objective-Based Sampling Plan and Schedule (2018–2022)

Sport fish, forage fish, and other important fishes

Sport fishes in Gladewater City Lake include White Crappie, Black Crappie, Channel Catfish, Spotted Bass, and Largemouth Bass. Known important forage species include Bluegill, Redear Sunfish, Gizzard Shad, and Threadfin Shad. The proposed sampling schedule to meet the following OBS Plan can be found in Table 8.

Low-density fisheries

Directed angling effort toward Channel Catfish was only one percent of the total effort during a spring (March through May) angler creel survey in 2008. Tandem hoop netting was utilized in spring 2018 as an alternative method to collect Channel Catfish population data, but results were poor. With limited directed angling effort for this species at Gladewater City Lake, we will continue to collect population data through tandem hoop netting in 2022, but no specific sampling objectives will be set for Channel Catfish.

Black Bass: The last creel survey on Gladewater City Lake during spring (March – May 2008) indicated 54% of angling effort was for Largemouth Bass. Largemouth Bass are managed with a 14-inch minimum length limit. Trend data on relative abundance and size structure have been collected every 2 to 4 years (most recently every 4 years) during fall nighttime electrofishing surveys with 1 hour of effort at 12, 5-minute stations. The continuation of trend data collection in this reservoir every 4 years with fall nighttime electrofishing will allow for determination of any large-scale changes in the Largemouth Bass population that may spur further investigation.

A minimum of 12 randomly selected 5-min electrofishing sites will be sampled in 2021, but sampling will continue at random sites until 50 stock-size fish are collected and the RSE of CPUE-S is ≤ 25 . The last three surveys have achieved a sample size of >50 stock length Largemouth Bass with an RSE of CPUE-S < 25 , so we are confident we will achieve this level of precision with the minimum sampling effort. An additional 3 random stations will be determined in the event they are necessary to meet our sampling objectives. A maximum of 15 stations will be sampled.

Sampling objectives for Largemouth Bass will include size structure (PSD and length frequency), growth (mean age at 14 inches using a sample size of 13 fish between 13.0 and 14.9 inches), relative abundance (stock size fish $N > 50$, CPUE-stock with RSE < 25), condition (mean W_r using lengths and weights from 10 fish per inch group).

Population trend data will also be collected for Spotted Bass (PSD, length frequency, and condition). However, sampling objectives set for Largemouth Bass will determine our extent of electrofishing effort.

Crappie: White Crappie and Black Crappie are present in this reservoir. However, the catch of crappie during fall trap netting surveys at Gladewater City Lake has been poor. However, a crappie fishery does exist at the reservoir. The spring 2008 angler creel survey estimated 21% of total fishing effort was for crappie. While traditional trap netting has been unsuccessful in collecting population trend data, tandem hoop nets baited with soap were successful in collecting an adequate number of crappie for population assessment.

Therefore, we will deploy 10 baited tandem hoop net series during spring 2022. Sampling objectives for crappie will include size structure (PSD and length frequency; $N \geq 50$), relative abundance (CPUE-stock with RSE <25), and condition (10 fish/inch group).

Forage Fish: Trend data on relative abundance and size structure of sunfish, Gizzard Shad and Threadfin Shad have been collected every 2 to 4 years since 1998. Continuation of sampling, as per Largemouth Bass above, will allow for monitoring of large-scale changes in sunfish and shad relative abundance and size structure. No additional effort will be expended beyond effort necessary to achieve Largemouth Bass objectives. Instead, Largemouth Bass body condition can provide information on forage abundance.

Literature Cited

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Tables and Figures

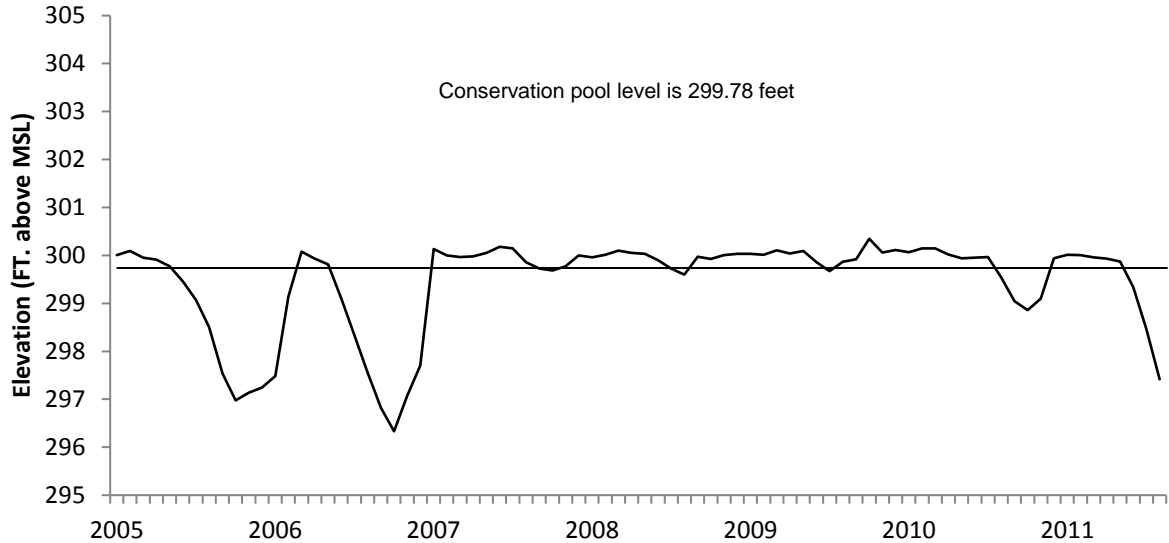


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Gladewater City Lake, Texas. USGS gauge station operation at Gladewater City Lake was discontinued after August 2011.

Table 1. Characteristics of Gladewater City Lake, Texas.

Characteristic	Description
Year constructed	1953
Controlling authority	City of Gladewater
County	Upshur
Reservoir type	Tributary
Surface Area	481 Acres
Shoreline Development Index (SDI)	2.7
Drainage Area	42 Square Miles
Conductivity	77.2 $\mu\text{S}/\text{cm}$

Table 2. Boat ramp characteristics for Gladewater City Lake, Texas, August, 2017. Reservoir elevation at time of survey was near full pool.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
G. P. Ferguson City Park east ramp	32.55730 -94.96225	Y	15	294.7	Good, no access issues
G. P. Ferguson City Park west ramp	32.55754 -94.96319	Y	15	292.7	Good, no access issues

Table 3. Harvest regulations for Gladewater City Lake, Texas.

Species	Bag limit	Length limit
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, Largemouth	5 ^a	14 – No Limit
Bass: Spotted	5 ^a	No Limit – No Limit
Crappie: White and Black Crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

^a Daily bag for Largemouth Bass and Spotted Bass = 5 fish in any combination.

Table 4. Stocking history of Gladewater City Lake, Texas. FGL = fingerling; AFGL = advanced fingerling; ADL = adults.

Species	Year	Number	Size
Threadfin Shad	1984	2,600	
	2008	3,000	
	Total	5,600	
Channel Catfish	1972	6,000	AFGL
	1974	3,000	AFGL
	1975	4,000	AFGL
	1976	2,000	AFGL
	1978	3,000	AFGL
	1979	3,000	AFGL
	1982	9,160	AFGL
	1983	10,000	AFGL
	1984	2,000	FGL
	1985	1,998	AFGL
	1986	2,000	FRY
	1989	2,193	FGL
	1991	10,005	FGL
	1992	5,100	FGL
	1993	9,420	FGL
	1995	5,156	FGL
	1996	5,066	FGL
Total	83,098		
Paradise Bass (Yellow bass X Striped bass)	1977	40,000	
Redbreast Sunfish	1985	3,438	
Largemouth Bass	1969	6,000	FGL
Florida Largemouth Bass	1976	84,000	FRY
	1977	3,000	FRY
	1979	2,499	FRY
	1989	6	ADL
	1992	13,667	FGL
	2008	15,000	FGL
	2009	15,000	FGL
	2010	15,000	FGL
	2016	52,113	FGL
Total	200,285		

Table 5. Objective-based sampling plan components for Gladewater City Lake, Texas 2017–2018.

Gear/target species	Survey objective	Metrics	Sampling objective
<i>Electrofishing</i>			
Largemouth Bass	Abundance	CPUE – stock	RSE-stock ≤ 25
	Size structure	PSD, length frequency	$N \geq 50$ stock
	Age-and-growth	Age at 14 inches	$N = 13$, 13.0 – 14.9 inches
	Condition	W_r	10 fish/inch group (max)
Bluegill ^a	Abundance	CPUE – Total	RSE ≤ 25
	Size structure	PSD, length frequency	$N \geq 50$
Gizzard Shad ^a	Abundance	CPUE – Total	RSE ≤ 25
	Size structure	length frequency	$N \geq 50$
	Prey availability	IOV	$N \geq 50$
Threadfin Shad ^a			Presence/absence
<i>Tandem hoop netting</i>			
Channel Catfish	Abundance	CPUE– stock	RSE-stock ≤ 25
	Size structure	PSD, length frequency	$N \geq 100$ stock
Crappie ^b	Abundance	CPUE - stock	RSE-stock ≤ 25
	Size structure	PSD, length frequency	$N \geq 50$
	Age-and-growth	Age at 10 inches	$N = 13$, 9.0 – 10.9 inches
	Condition	W_r	10 fish/inch group

^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.

^b Sampling objectives are based off the catch of both Black and White Crappie. Due to past variability in CPUE, we will not increase sampling to achieve RSE of CPUE-S ≤ 25 .

Table 6. Survey of structural habitat types, Gladewater City Lake, Texas, 2013. Shoreline habitat type units are in miles and standing timber is acres.

Habitat type	Estimate	% of total
Bulkhead	3.7 miles	37.0
Natural	5.9 miles	59.0
Rocky	0.4 miles	4.0
Standing timber	8.7 acres	1.8

Table 7. Survey of aquatic vegetation, Gladewater City Lake, Texas, 2014–2017. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2014	2015	2016	2017
Native submersed				<1 (0.2)
Native floating-leaved				35 (7.3)
Native emergent				20 (4.2)
Non-native				
Alligatorweed (Tier III) ^a	6 (1.2)			
Water hyacinth (Tier III) ^a	2 (0.4)	2 (0.4)	1 (0.2)	<1 (0.2)

^a Tier I is Immediate Response, Tier II is Maintenance, and Tier III is Watch Status.

Gizzard Shad

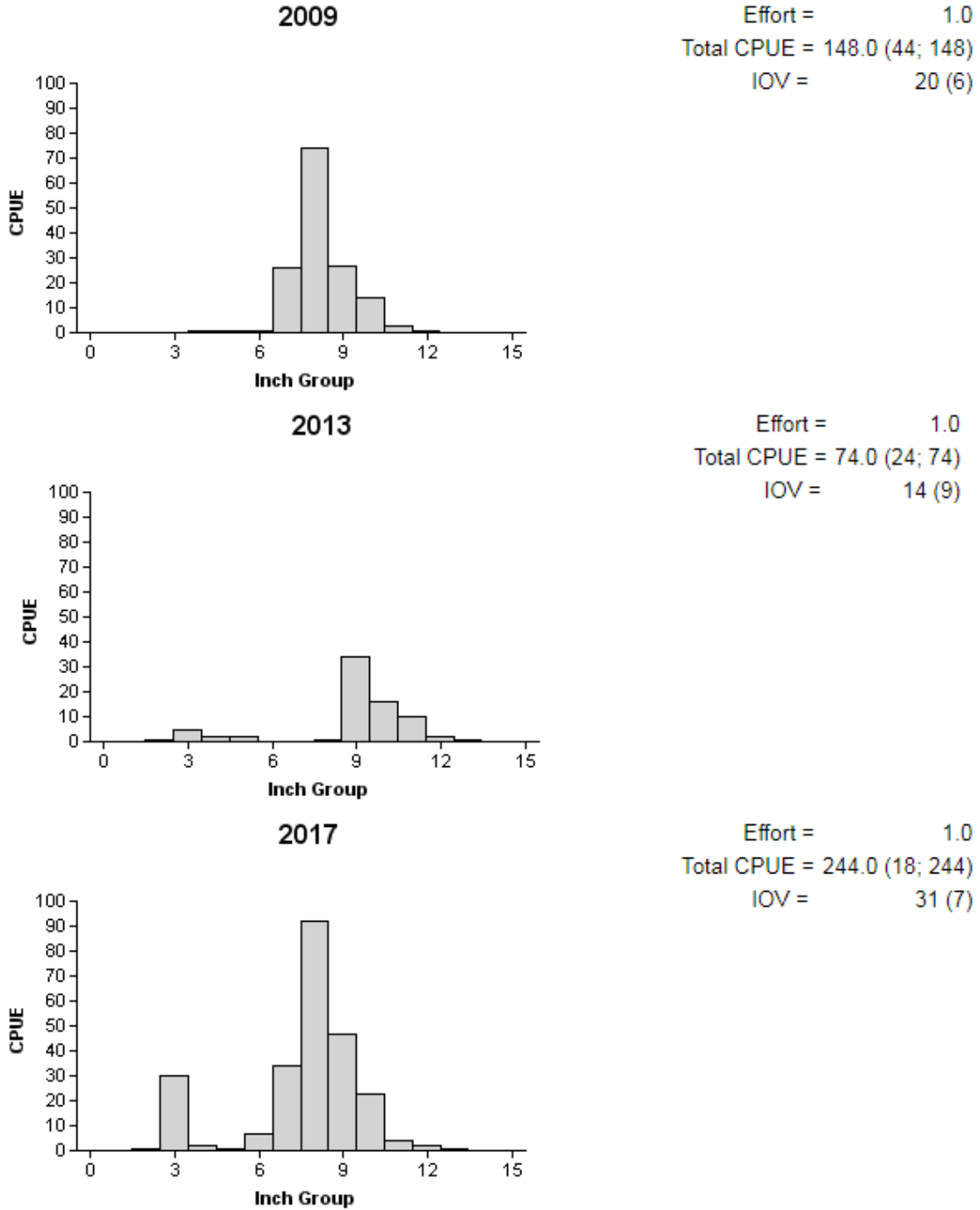


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Gladewater City Lake, Texas, 2009, 2013, and 2017.

Bluegill

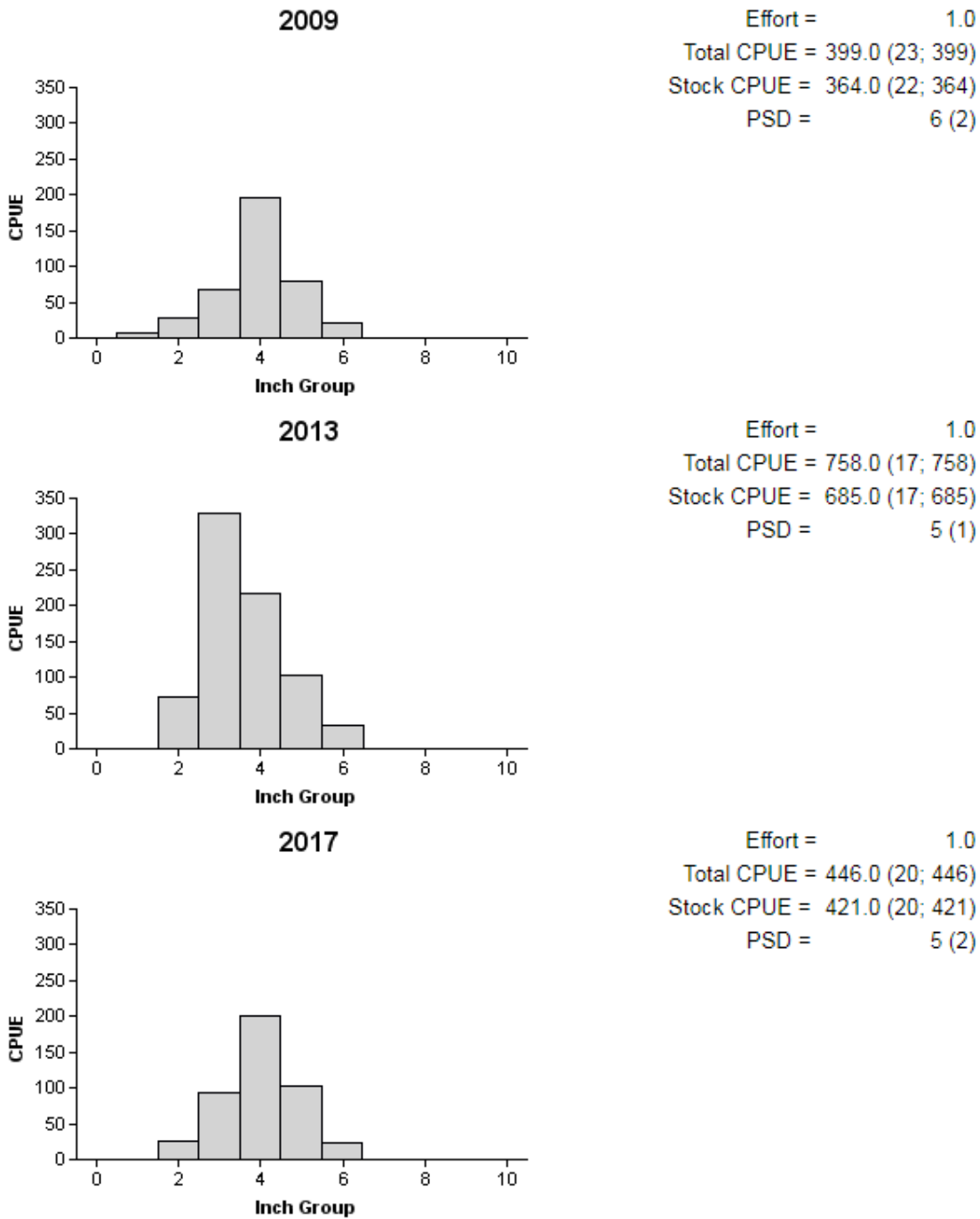


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Gladewater City Lake, Texas, 2009, 2013, and 2017.

Redear Sunfish

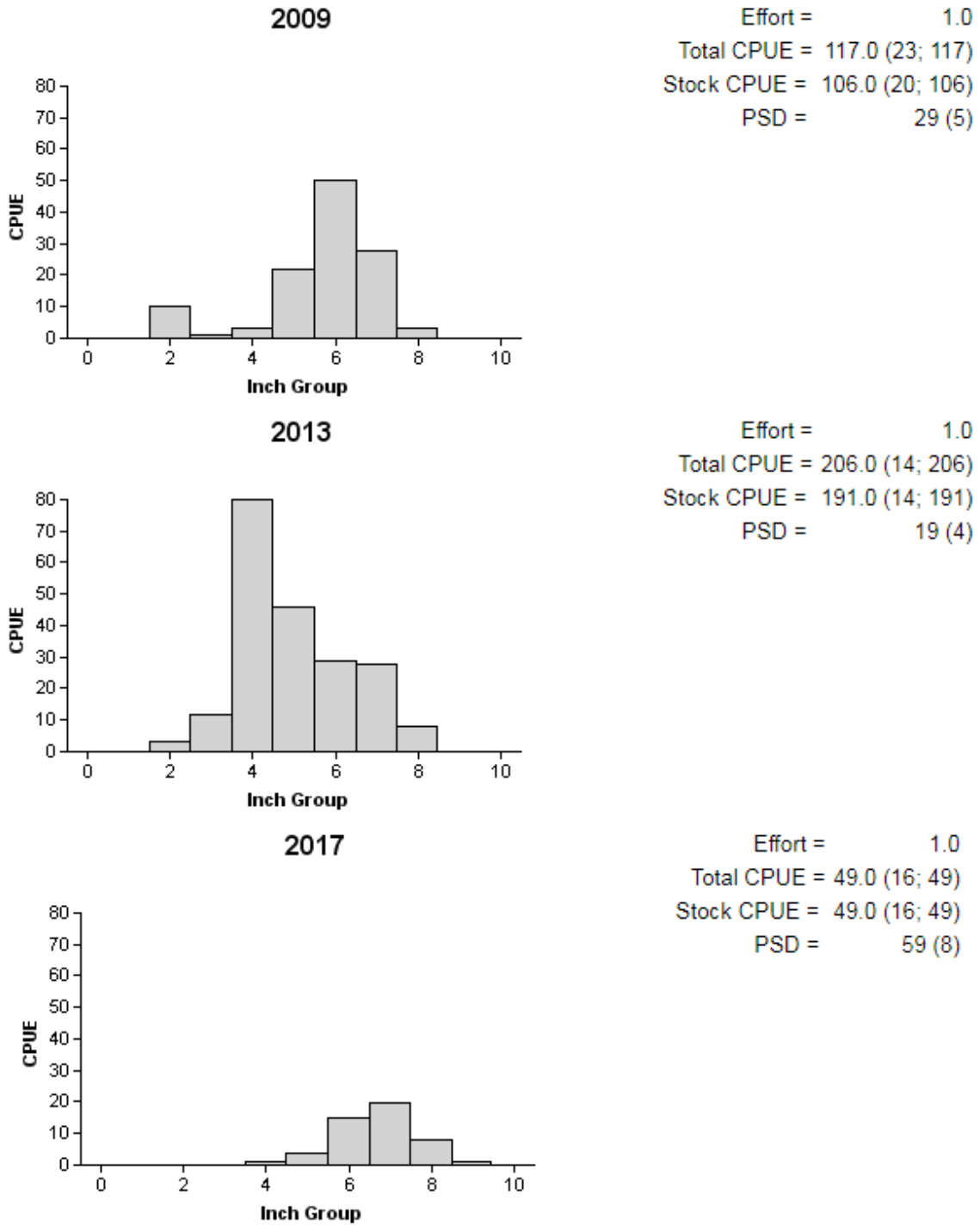


Figure 4. Number of Redear Sunfish caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Gladewater City Lake, Texas, 2009, 2013, and 2017.

Channel Catfish

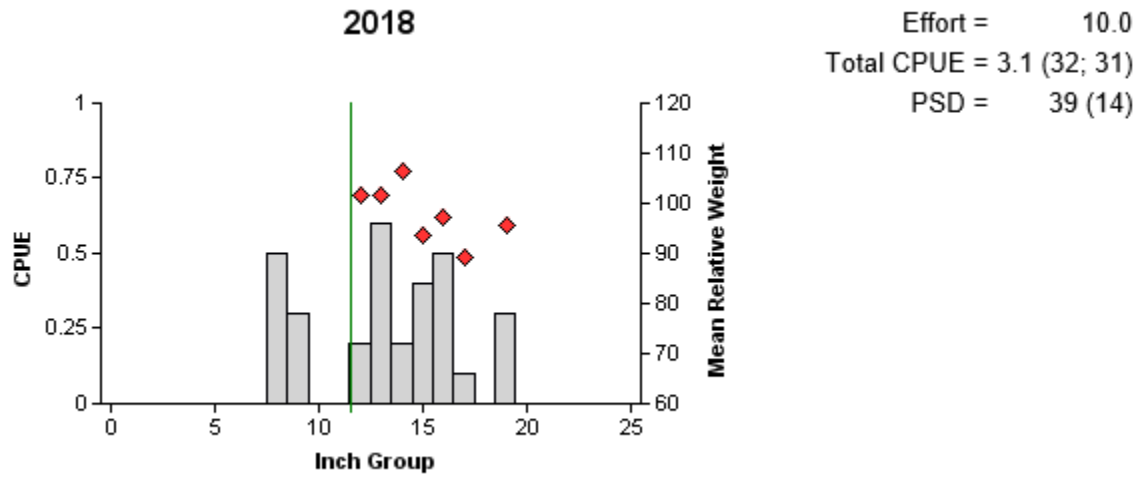


Figure 5. Number of Channel Catfish caught per net series (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring hoop net surveys, Gladewater City Lake, Texas, 2018.

Spotted Bass

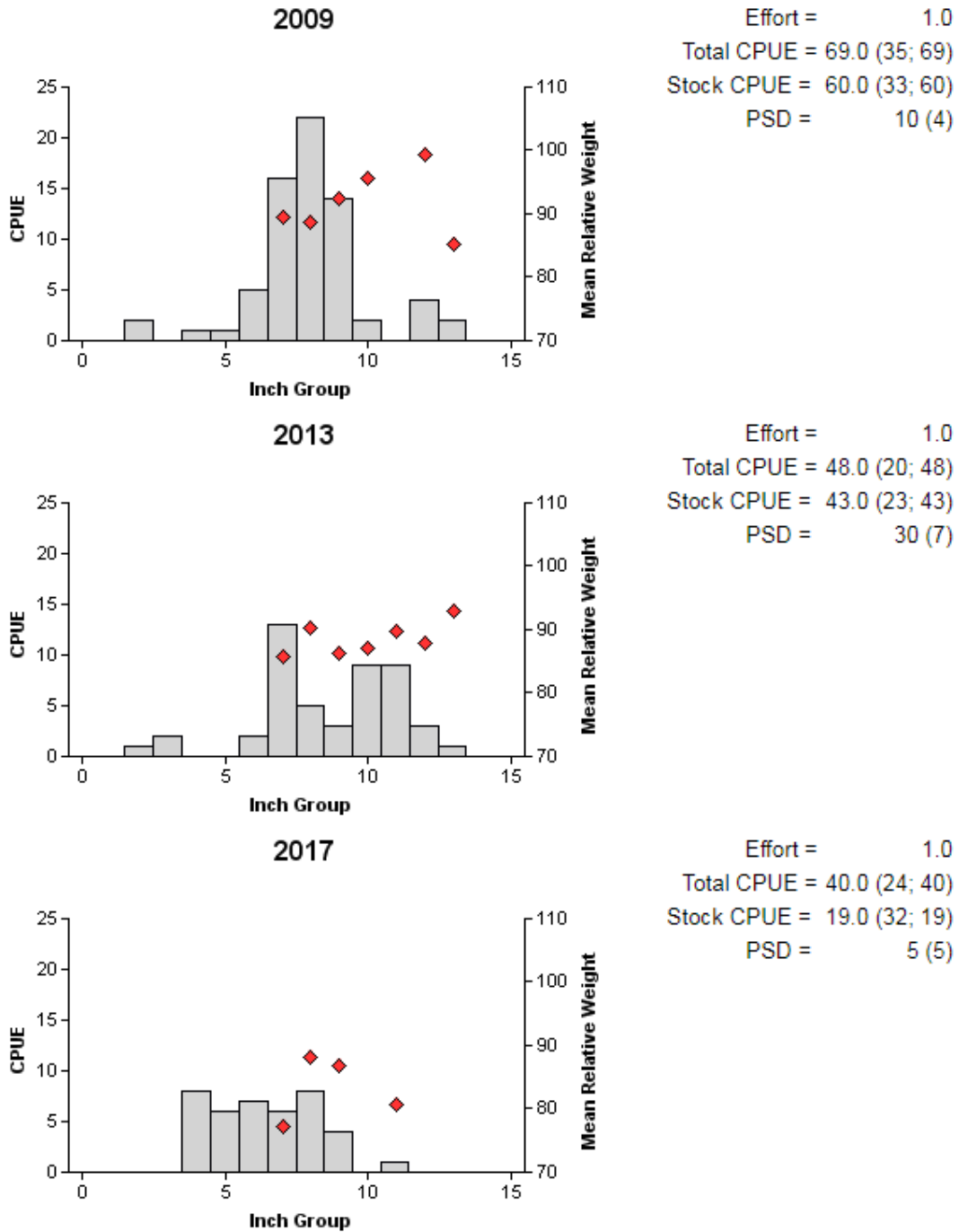


Figure 6. Number of Spotted Bass caught per hour (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Gladewater City Lake, Texas, 2009, 2013, and 2017.

Largemouth Bass

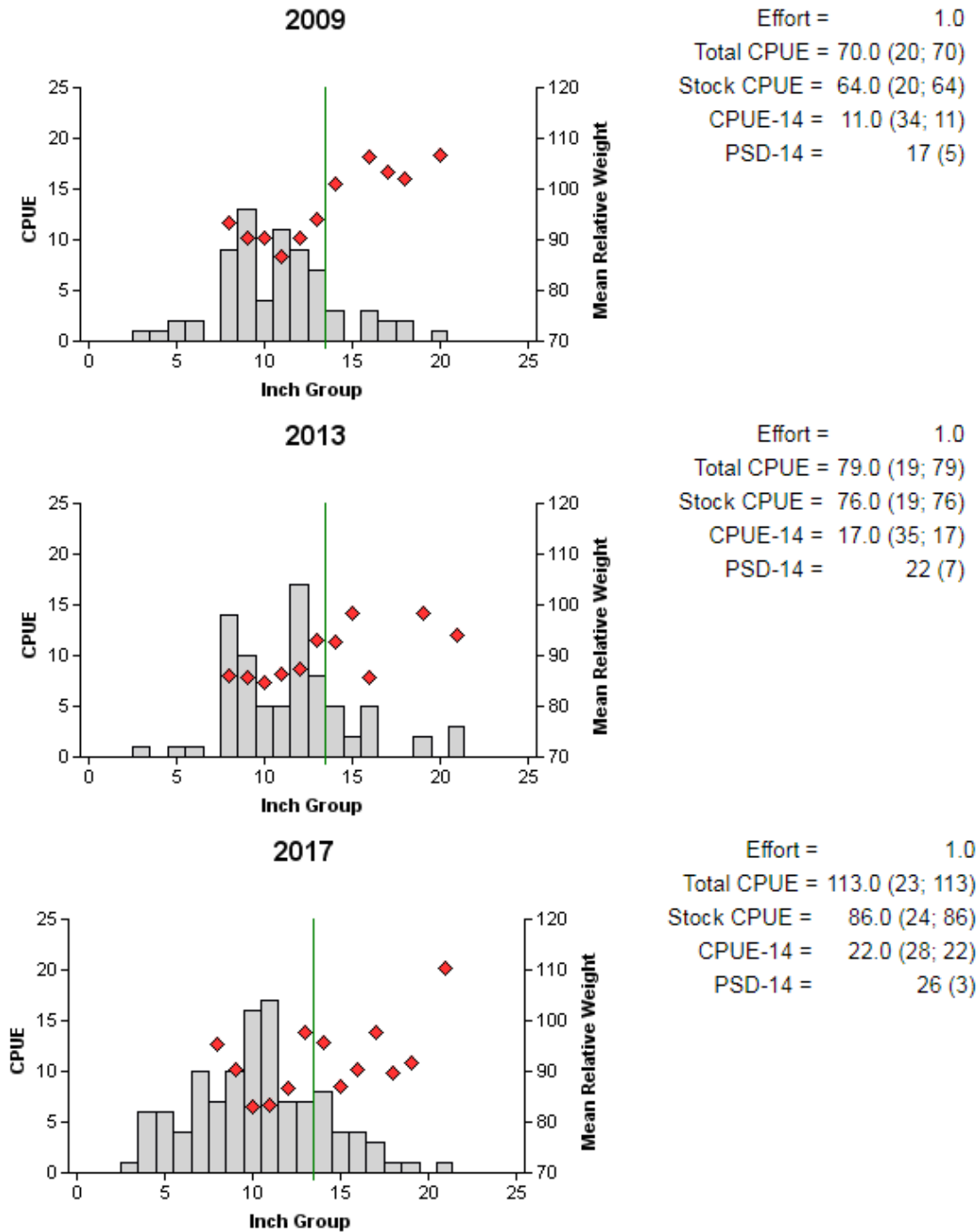


Figure 7. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Gladewater City Lake, Texas, 2009, 2013, and 2017. Vertical line indicates minimum length limit.

White Crappie

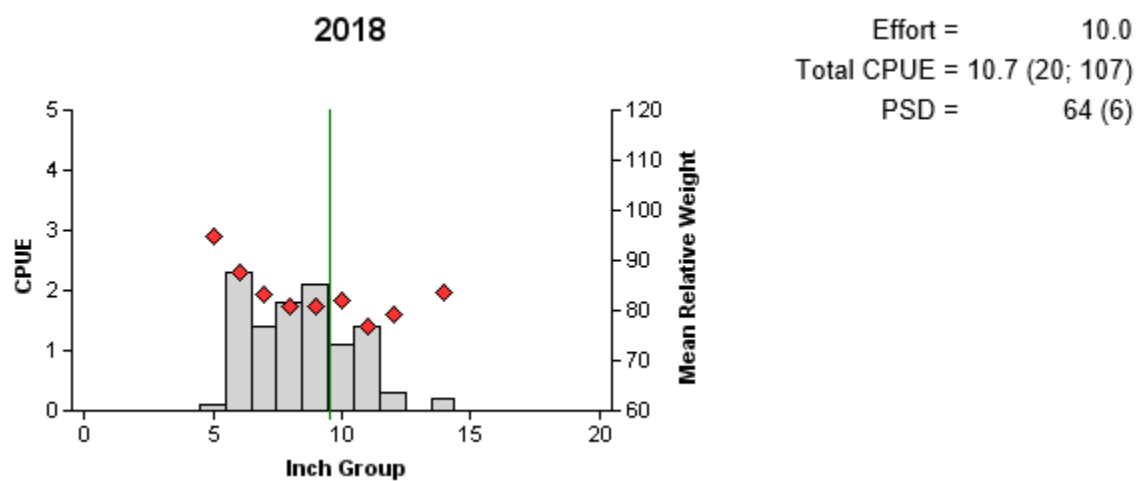


Figure 8. Number of White Crappie caught per net series (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring hoop netting surveys, Gladewater City Lake, Texas, 2018. Vertical line indicates minimum length limit.

Black Crappie

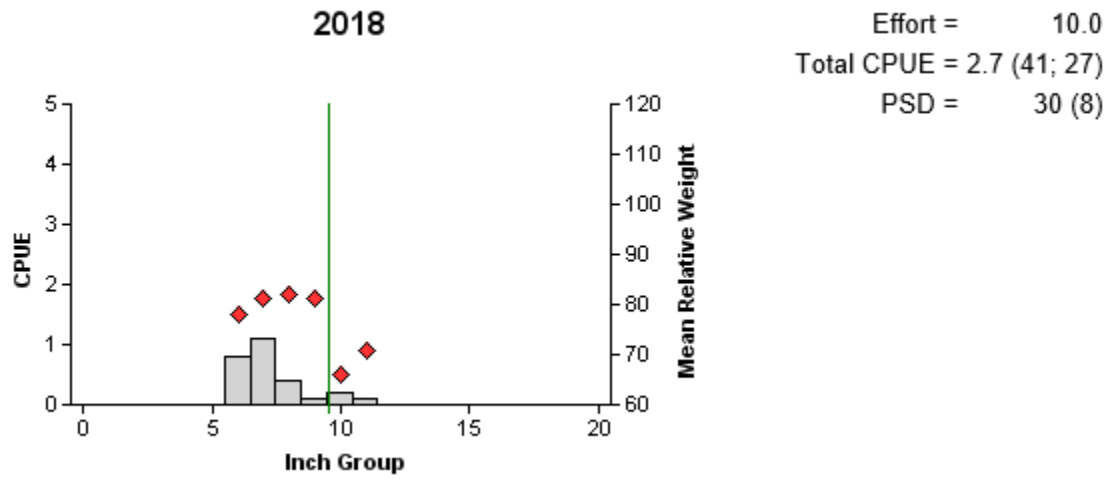


Figure 9. Number of Black Crappie caught per net series (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring hoop netting surveys, Gladewater City Lake, Texas, 2018. Vertical line indicates minimum length limit.

Proposed Sampling Schedule

Table 8. Proposed sampling schedule for Gladewater City Lake, Texas. Survey period is June through May. Baited tandem hoop netting surveys are conducted in the spring, while electrofishing surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

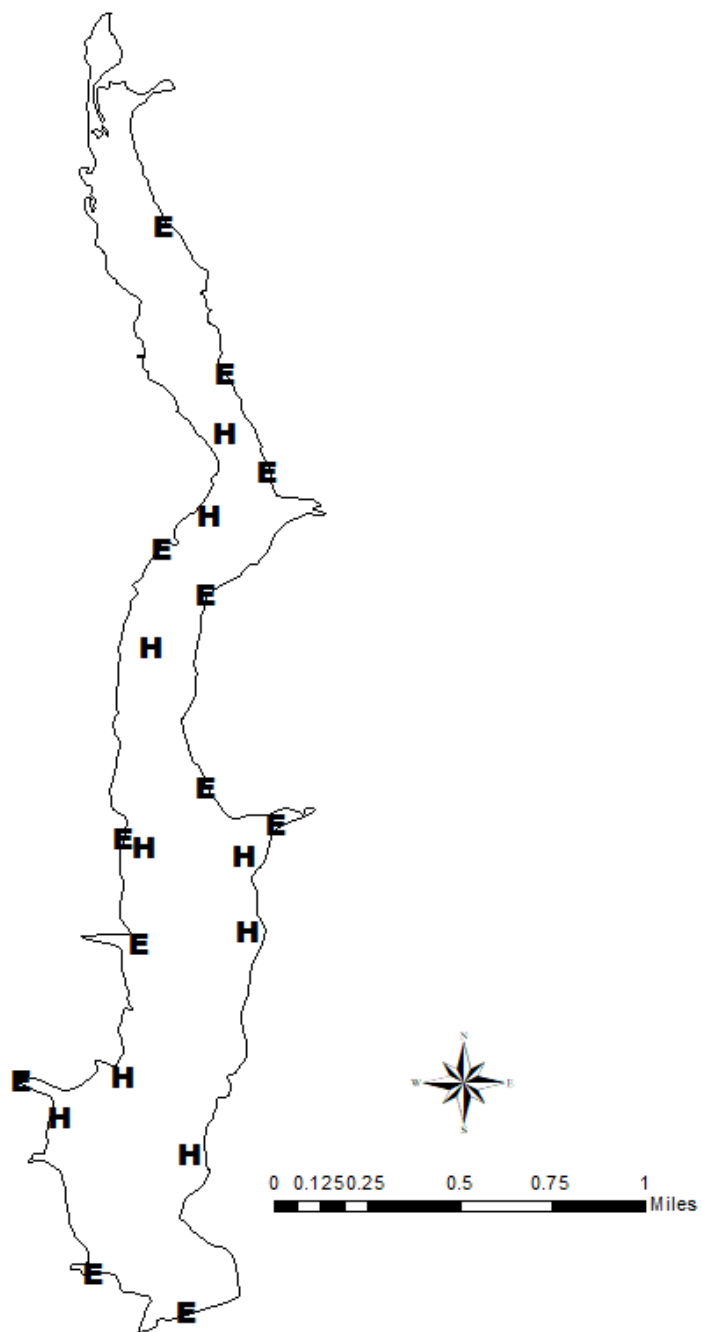
	Survey year			
	2018-2019	2019-2020	2020-2021	2021-2022
Angler Access				S
Structural Habitat				S
Vegetation	A	A	A	S
Electrofishing – Fall				S
Baited tandem hoop netting				A
Report				S

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 Gladewater City Lake, Texas, 2017-2018. Sampling effort was 10 net series for tandem hoop netting and 1 hour for electrofishing.

Species	Electrofishing		Hoop Netting	
	N	CPUE	N	CPUE
Gizzard Shad	244	244.0 (18)		
Threadfin Shad	47	47.0 (62)		
Channel Catfish			31	3.1 (32)
Green Sunfish	1	1.0 (100)		
Warmouth	3	3.0 (52)		
Orangespotted Sunfish	5	5.0 (62)		
Bluegill	446	446.0 (20)		
Longear Sunfish	26	26.0 (53)		
Redear Sunfish	49	49.0 (16)		
Spotted Bass	40	40.0 (24)		
Largemouth Bass	113	113.0 (23)		
White Crappie			107	10.7 (20)
Black Crappie			27	2.7 (41)

APPENDIX B – Map of sampling locations



Location of sampling sites, Gladewater City Lake, Texas, 2017-2018. Hoop netting and electrofishing stations are indicated by H and E, respectively. Water level was near full pool at time of sampling.



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