

Mackenzie Reservoir

2020 Fisheries Management Survey Report

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-221-M-4

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

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Survey and Management Summary

Fish populations in Mackenzie Reservoir were surveyed in 2018 and 2020 using electrofishing, in 2017 and 2021 using gill netting, and in 2020 using tandem hoop netting. Historical data are presented with the 2017-2021 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:** Mackenzie Reservoir was constructed in 1974 on Tule Creek, a tributary of the Prairie Dog Town Fork of the Red River. It is located 12 miles northwest of Silverton in Briscoe County, Texas. The reservoir is owned by the Mackenzie Municipal Water Authority and is used for water supply and recreational purposes. Mackenzie Reservoir is characterized as being a deep, clear, eutrophic reservoir that experiences strong thermal stratification during summer months. At conservation pool (3,100 feet above mean sea level; FMSL) the reservoir is a 900-acre impoundment. At the time of sampling, the reservoir had a mean elevation of 3014 FMSL and a surface area of approximately 209 acres. Habitat consisted primarily of natural featureless shoreline and rock bluff.

Management History: Important sport fishes include Largemouth Bass, Hybrid Striped Bass, White Bass, White Crappie, and catfishes. All species have been managed with statewide harvest regulations.

Fish Community

- **Prey species:** Gizzard Shad and Bluegill were present in the reservoir. Electrofishing catch rate in 2020 for Gizzard Shad was similar to 2018 but much lower than 2016; however, a much greater percentage of the Gizzard Shad were available as prey to most sport fish. Electrofishing catch of Bluegill was higher, and all Bluegill sampled were ≤ 6 -inches in length.
- **Catfishes:** While Blue Catfish were present in the reservoir, Channel Catfish remain the dominate catfish species. The majority of Channel Catfish collected during the gill net sample were between 12 and 26 inches.
- **Temperate basses:** While White Bass were present in the reservoir, past creel surveys indicated that they received no directed angling effort. Gill net catch rates for Hybrid Striped Bass have fluctuated over the past four years; however, most of the fish sampled have been greater than the 18-inch minimum length.
- **Largemouth Bass:** Largemouth Bass abundance was fair and has remained steady since 2016, and most fish sampled were below the legal length limit (14 in).
- **White Crappie:** White Crappie were present in the reservoir. A total of 67 crappie were observed during the fall electrofishing and spring gill netting surveys.

Management Strategies: Stock Hybrid Striped Bass at 10 fish/acre annually, as long as lake remains above 200 surface acres. Continue management under current harvest regulations. The proposed sampling schedule is a continuation of the current schedule using electrofishing in 2022 and 2024, and gill netting in 2023 and 2025. Access and habitat surveys will be conducted in 2024.

Introduction

This document is a summary of fisheries data collected from Mackenzie Reservoir from 2017-2021. 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 2017-2021 data for comparison.

Reservoir Description

Mackenzie Reservoir is a 900-acre impoundment (at conservation pool) constructed in 1974 on Tule Creek, a tributary of the Prairie Dog Town Fork of the Red River. It is located 12 miles northwest of Silverton in Briscoe County, Texas. The reservoir is owned by the Mackenzie Municipal Water Authority (MMWA) and is used for water supply and recreational purposes. The reservoir has a history of water level fluctuations and has never caught sufficient runoff to fill to capacity (Figure 1). Mackenzie Reservoir is characterized as a mesotrophic reservoir with a mean Trophic State Index chl-a of 49.34 (Texas Commission on Environmental Quality 2020). The lake has also been known to experience strong thermal stratification during summer months. At the time of sampling, the habitat consisted primarily of natural featureless shoreline and rock bluff. Other descriptive characteristics for Mackenzie Reservoir are in Table 1.

Angler Access

Mackenzie Reservoir has two public boat ramps and one private boat ramp. At the time of sampling, lake levels only allowed for the use of the Mackenzie boat ramp located on the southeast side of the dam. Extension of the Marina boat ramp is not feasible due to reduced slope. Additional boat ramp characteristics are in Table 2. There is one courtesy fishing dock located near the Marina boat ramp. Shoreline access is limited to a beach area on the west end of the lake and to areas around the boat ramps. There are no ADA specific facilities.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Clayton and Munger 2017) included:

1. To maintain a quality Hybrid Striped Bass fishery, it is recommended that stocking every year at 5-10 fish/acre, based upon actual surface area of the reservoir, be continued.

Action: Sunshine Bass were stocked in 2017 and 2020. Production issues have resulted in a sporadic stocking schedule rather than an annual stocking schedule.
2. Conduct a creel survey to determine if angler preferences still rank Hybrid Striped Bass as the 4th most sought-after species in the reservoir.

Action: A creel survey was scheduled for 2020, but the survey was canceled due to the COVID-19 pandemic and various associated lockdowns that were taking place.
3. Continue to work with the MMWA to locate additional funding sources for habitat restoration projects.

Action: Numerous attempts have been made to meet with the MMWA; to date, no meetings have occurred.
4. Cooperate with the MMWA to post appropriate signage at access points around the reservoir; contact and educate marina owners about invasive species, and provide them with posters, literature, etc... so that they can in turn educate their customers; educate the public about invasive species through the use of media and the internet; and make a speaking point about invasive species when presenting to constituents and user groups.

Action: Presentations have been given to the Region O water planning group and various area civic groups and school groups. Interviews and news releases concerning invasive species have been done for area newspapers. Stories and posts have been added to the district Facebook page. Invasive Species literature has been sent to the controlling authority and placement of signage has been advised.

Harvest regulation history: Sport fishes in Mackenzie Reservoir have been and currently are managed with statewide regulations (Table 3).

Stocking history: Mackenzie Reservoir was last stocked in 2017 and 2020 with Hybrid Striped Bass. The complete stocking history is in Table 4.

Vegetation/habitat management history: There is no vegetation or habitat management history for this reservoir.

Water transfer: Mackenzie Reservoir is primarily used for municipal water supply and recreation. One permanent pumping station on the reservoir transfers water to the Mackenzie Municipal Water Authorities water treatment plant for municipal water supply. 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 Mackenzie Reservoir (Clayton and Munger 2017). 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, Gizzard Shad, and crappie 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.

Gill netting – Channel Catfish, White Bass, and Hybrid Striped Bass were collected by gill netting (8 net nights at 8 stations). CPUE for gill netting was recorded as the number of fish caught per net night (fish/nn).

Tandem hoop nets – Channel Catfish were collected using 6 tandem hoop-net series at 6 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).

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). Hybrid Striped Bass PSD was calculated according to Dumont and Neely (2011). 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 and a vegetation survey were conducted in 2020. 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 2021).

Results and Discussion

Habitat: Littoral zone structural habitat consisted primarily of natural featureless shoreline (63.3 %) and rock (24.8 %); remaining shoreline consisted of rock bluff (11.9 %; Table 6). There were approximately 16.5 acres of flooded standing timber (7.2 %), and very little aquatic vegetation was present in the reservoir; a very small amount of Sago Pondweed was found in one small cove.

Prey species: Electrofishing catch rates of Gizzard Shad and Bluegill were 106.0/h and 115.0/h, respectively. Total CPUE of Gizzard Shad in 2020 was similar to 2018 but considerably lower than the 2016 survey; however, Index of Vulnerability (IOV) for Gizzard Shad was fair, having improved from 27% in 2016 and 22% in 2018 to 57% in 2020 (Figure 2). Total CPUE of Bluegill in 2020 was higher than total CPUE from surveys in 2016 and 2018, and size structure continued to be dominated by small individuals (Figure 3).

Channel Catfish: Channel Catfish CPUE was 4.3/nn in 2021, a slight increase over the 2017 survey (3.8/nn) and 2013 (2.4/nn; Figure 4). Most Channel Catfish sampled exhibited good body condition with a mean relative weight (W_r) greater than 90. Reproduction was indicated by the catch of smaller fish. Baited hoop nets proved to be inadequate for sampling Channel Catfish in Mackenzie Reservoir as only 8 fish between 8 and 9 inches were sampled over 6 hoop-net series. Due to the size of the reservoir and the excessive amount of survey effort needed, OBS goals were not achieved.

Temperate basses: There appeared to be a healthy White Bass population present in the reservoir as Total CPUE has shown a steady increase over the past 6 years, and most fish sampled have been of legal-size (Figure 5). However, a 2004 creel survey showed no directed angler effort toward White Bass.

Hybrid Striped Bass CPUE was 0.5/nn in 2021, identical to Total CPUE in 2017 and lower than 1.8/nn in 2015 (Figure 6). Only four fish were sampled during the 2017 and the 2021 gill net surveys. Low relative abundance is most likely attributed to the sporadic stockings rather than annual stockings. Due to the size of the reservoir and the excessive amount of survey effort required, OBS goals were not achieved.

Largemouth Bass: The electrofishing catch rate of Largemouth Bass was 48.0/h in 2020, similar to 2018 at 52.7/h, and 56.0/h in 2016 (Figure 7). Although the Total CPUE has remained fairly stable, the Stock CPUE has declined from a high of 50.0/h in 2016 to a low 30.7/h and 32.0/h in 2018 and 2020 respectively (Figure 7). Due to the size of the reservoir and the excessive amount of survey effort required, OBS goals were not achieved.

White Crappie: Due to the high variability of White Crappie trap net catch rates, trend data has only been able to determine presence/absence of the species. White Crappie observed during the electrofishing survey were documented and measured to the nearest inch class; fifteen White Crappie between 3 and 10 inches were recorded. A total of 52 White Crappie were also observed during the spring gill net survey (Appendix A).

Fisheries Management Plan for Mackenzie Reservoir, Texas

Prepared – July 2021

ISSUE 1: Recent low reservoir water levels and intermittent stockings have resulted in substantial decreases in gill net catch rates for Hybrid Striped Bass since 2009. Stocking of Hybrid Striped Bass is required to sustain the population and maintain the fishery. Low relative abundance has most likely resulted in less angler effort currently targeting Hybrid Stiped Bass, and extended periods of low lake levels and loss of habitat have made maintaining a quality fishery difficult.

MANAGEMENT STRATEGY

1. Suspend stocking of Hybrid Striped Bass until the reservoir size increases to 300 acres or greater. Once the reservoir reaches 300 acres in size, reevaluate stocking of Hybrid Striped Bass.
2. Conduct a Spring quarter Creel survey in 2024 to determine angler use and preference for the reservoir.

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.

MANAGEMENT STRATEGIES

1. Cooperate with the MMWA 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 (2021–2025)

Sport fish, forage fish, and other important fishes

Sport fishes in Mackenzie Reservoir have historically included Channel Catfish, Blue Catfish, Flathead Catfish, White Bass, Hybrid Striped Bass, Largemouth Bass, and White Crappie. The primary forage species are Gizzard Shad and Bluegill.

Low-density fisheries

Blue Catfish: Blue Catfish are typically collected in gill nets at a rate below 1.0/nn, and past angler surveys indicated no directed effort toward this species. General monitoring trend data (without precision or sampling size requirement) will be gathered for this species while sampling for Channel Catfish and Hybrid Striped Bass as outlined below.

White Bass: Although, White Bass are typically collected in gill nets at a rate of 2.4/nn to 4.4/nn, and the 2021 gill net survey showed a large increase in the relative abundance; past angler surveys indicated no directed effort towards this species. Until a new Creel Survey can be conducted, general monitoring trend data (without precision or sampling size requirement) will be gathered for this species while sampling for Channel Catfish and Hybrid Striped Bass as outlined below.

Walleye: Walleye stockings were discontinued after 1985. There is a remnant population of Walleye that reproduce naturally. Walleye are typically collected in gill nets at a rate of 0.2/nn; past angler surveys indicate no directed effort towards this species. General monitoring trend data (without precision or sampling size requirement) will be gathered for this species while electrofishing for Largemouth Bass and gill netting for Channel Catfish and Hybrid Striped Bass as outlined below.

Survey objectives, fisheries metrics, and sampling objectives

Channel Catfish: According to the 2004 creel survey, Channel Catfish were the most sought species in the reservoir, with 35.1% of angler effort. Trend data on relative abundance and size structure of Channel Catfish has been collected biennially since 1999. Continuation of trend data will allow for general monitoring of large-scale changes in relative abundance and size structure. Gill net sampling effort needed to achieve sampling objectives for relative abundance (CPUE-S; RSE25 with 80% confidence) is 25 random stations. Effort for size structure estimation (PSD; 50 fish minimum with 80% confidence) is 21 random gill net stations. Due to the excessive amount of sampling effort needed to achieve objectives, Channel Catfish will be sampled with general monitoring (without precision or sampling size requirements). In 2025 Channel Catfish data will be collected using 5 random gill net stations. Baited hoop nets were found to be ineffective at sampling Channel Catfish in this reservoir and will no longer be used for catfish sampling.

Hybrid Striped Bass: In 2004 Hybrid Striped Bass received 12.8% of the angler effort. Trend data on relative abundance of Hybrid Striped Bass has been collected biennially since 1999. Continuation of trend data will allow for general monitoring of any large-scale changes in relative abundance. Catch rates have been variable ranging from a low of 0.4/nn (2005, 2013) to 14.6/nn (1999); however, catch rates have typically been greater than 3.8/nn. Utilizing catch rate data from the past 3 gill net surveys, achieving a relative abundance precision with an RSE of CPUE-S < 25 with 80% confidence would require 67 random gill net stations. Effort for size structure estimation (PSD; 50 fish minimum with 80% confidence) would also require 75 random stations. Due to the size of the reservoir and the excessive amount of effort required to meet relative abundance and size structure estimation objectives, Hybrid Striped Bass data will be collected using the sampling strategy for Channel Catfish (5 random gill net stations).

Largemouth Bass: In the last creel survey (2004) Largemouth Bass were the third most sought species in the reservoir, with 15.1% of the angler effort. Trend data on relative abundance and size structure of Largemouth Bass has been collected biennially since 2000 with fall nighttime electrofishing. Continuation of trend data with night electrofishing in the fall will allow for general monitoring of any large-scale changes in the Largemouth Bass population that may spur further investigation. Analysis of past sampling indicates that it would require a minimum of 19 electrofishing sites to achieve a CPUE-S RSE < 25. Effort for size structure estimation (PSD; 50 fish minimum with 80% confidence) would require a minimum of 21 random electrofishing stations. Due to the excessive amount of effort required to meet objectives, twelve randomly selected 5-min electrofishing sites will be sampled in 2024.

White Crappie: White Crappie have received approximately 3% of direct angler effort at Mackenzie Reservoir. Due to trap net catch rates of White Crappie being highly variable, trend data has only been able to determine presence/absence of the species. General monitoring on a quadrennial basis will allow for the evaluation of presence/absence of White Crappie. To determine presence/absence we will document any White Crappie observed in the electrofishing survey and the gill net survey. If no White Crappie are detected in the electrofishing survey, additional effort will include 5 biologist selected trap net stations. Stations will be selected based upon historic catch rates from previous surveys.

Prey species: Bluegill and Gizzard Shad are the primary forage species at Mackenzie Reservoir. Trend data has been collected biennially since 2000. Continuation of sampling, as per Largemouth Bass above, will allow for general monitoring of large-scale changes in relative abundance and size structure. No additional effort will be extended beyond what is used for Largemouth Bass sampling.

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Tables and Figures

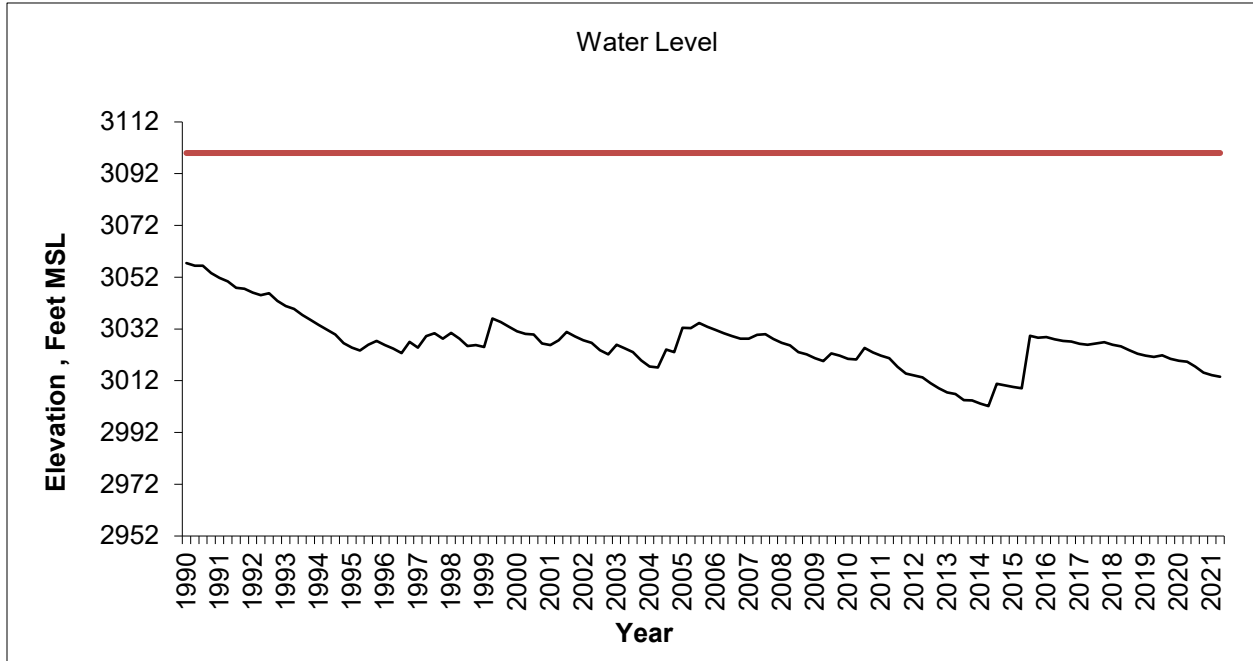


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Mackenzie Reservoir, Texas. Conservation pool elevation is 3,100 feet above mean sea level.

Table 1. Characteristics of Mackenzie Reservoir, Texas.

Characteristic	Description
Year constructed	1974
Controlling authority	Mackenzie Municipal Water Authority
County	Briscoe
Reservoir type	Mainstem
Shoreline Development Index	3.96
Conductivity	1,080 $\mu\text{S/cm}$

Table 2. Boat ramp characteristics for Mackenzie Reservoir, Texas, August 2020. Reservoir elevation at time of survey was 3,019 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Mackenzie	34.54498 -101.44220	Y	20	unknown	Useable, currently no access issues.
Marina	34.54467 -101.54083	Y	10	3,035	Out of water. Extension is not feasible.
Coronado Shores	34.55237 -101.44977	N	unknown	3,055	Out of water.

Table 3. Harvest regulations for Mackenzie Reservoir, 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, Hybrid Striped	5	18-inch minimum
Bass, Smallmouth and Largemouth	5 (in any combination)	14-inch minimum
Crappie: White and Black crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum
Walleye	5	No more than 2 under 16 inches

Table 4. Stocking history of Mackenzie Reservoir, Texas. FGL = fingerling; FRY = Fry; ADL = adult.

Species	Year	Number	Size
Rainbow Trout	1975	10,000	ADL
Brown Trout	1975	5,000	ADL
Blue Catfish	1980	3,000	FGL
	1982	44,998	FGL
	Total	47,998	
Channel Catfish	1973	4,000	FGL
	1974	50,000	FGL
	1986	40,000	FGL
	Total	94,000	
Flathead Catfish	1975	5,000	FGL
Hybrid Striped Bass Palmetto Bass	1979	5,000	FGL
	1981	10,951	FGL
	1994	13,507	FGL
	1995	13,500	FGL
	1997	9,202	FGL
	1998	9,025	FGL
	1999	13,511	FGL
	2003	9,020	FGL
	2005	9,214	FGL
	2007	9,333	FGL
	2009	10,160	FGL
	2011	2,039	FGL
	2013	2,696	FGL
	2015	2,200	FGL
	2017	5,130	FGL
Sunshine Bass	2020	12,240	FRY
	Total	136,728	
Florida Largemouth Bass	1982	20,680	FGL
	1988	35,400	FGL
	1993	90,194	FGL
	1994	44,944	FGL
	Total	191,218	

Table 5. Stocking history continued.

Smallmouth Bass	1976	10,600	FGL
	1977	39,800	FGL
	1978	<u>50,000</u>	FGL
	Total	100,400	
Walleye	1976	350,000	FRY
	1977	180,000	FRY
	1978	350,000	FRY
	1983	1,122,000	FRY
	1984	720,000	FRY
	1985	<u>630,000</u>	FRY
	Total	3,352,000	

Table 6. Objective-based sampling plan components for Mackenzie Reservoir, Texas 2017–2021.

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
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	$N \geq 50$
White Crappie	Exploratory	Presence/Absence	$N \geq 1$
<i>Gill netting</i>			
Channel Catfish	Abundance	CPUE–Stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	$N \geq 50$ Stock
Hybrid Striped Bass	Abundance	CPUE–Stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	$N \geq 50$ Stock
<i>Tandem hoop netting</i>			
Channel Catfish	Abundance	CPUE–stock	RSE-stock ≤ 25
	Size structure	PSD, length frequency	$N \geq 50$ stock

^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 7. Survey of structural habitat types, Mackenzie Reservoir, Texas, 2020. Shoreline habitat type units are in miles and standing timber is acres.

Habitat type	Estimate	% of total
Natural	5.69 miles	63.3
Rock Bluff	1.07 miles	11.9
Rock	2.23 miles	24.8
Standing timber	16.5 acres	7.2

Gizzard Shad

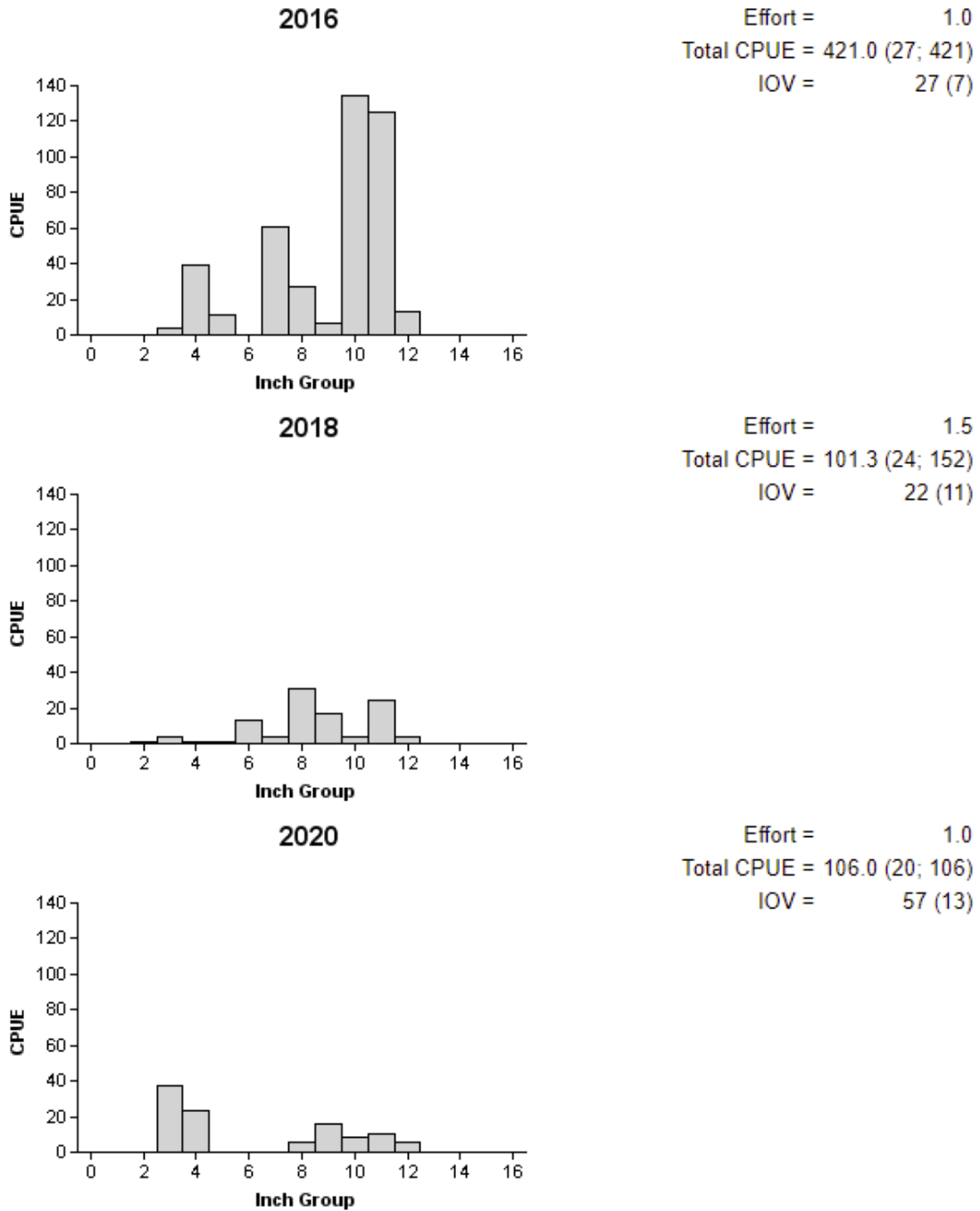


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Mackenzie Reservoir, Texas, 2016, 2018, and 2020.

Bluegill

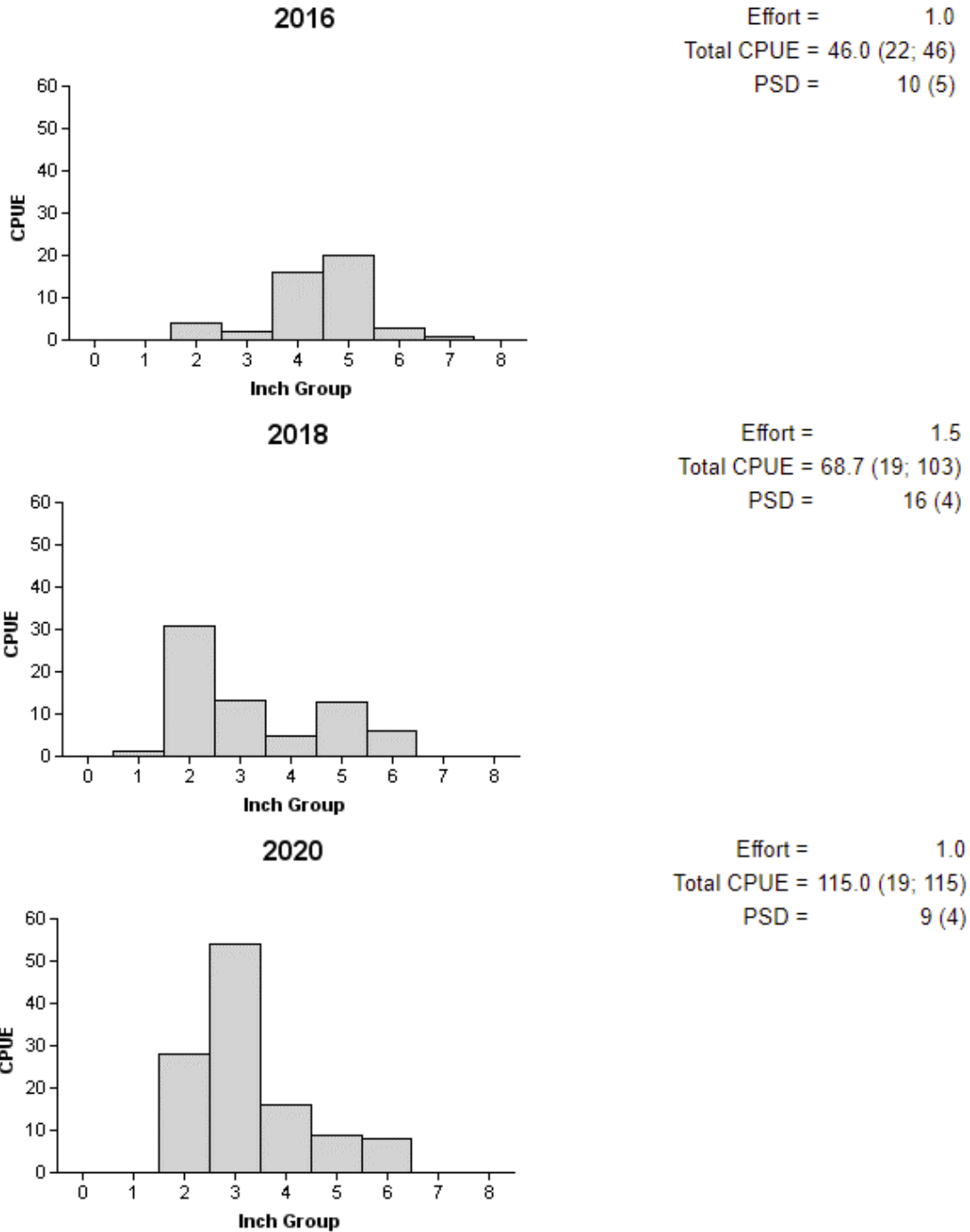


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Mackenzie Reservoir, Texas, 2016, 2018, and 2020.

Channel Catfish

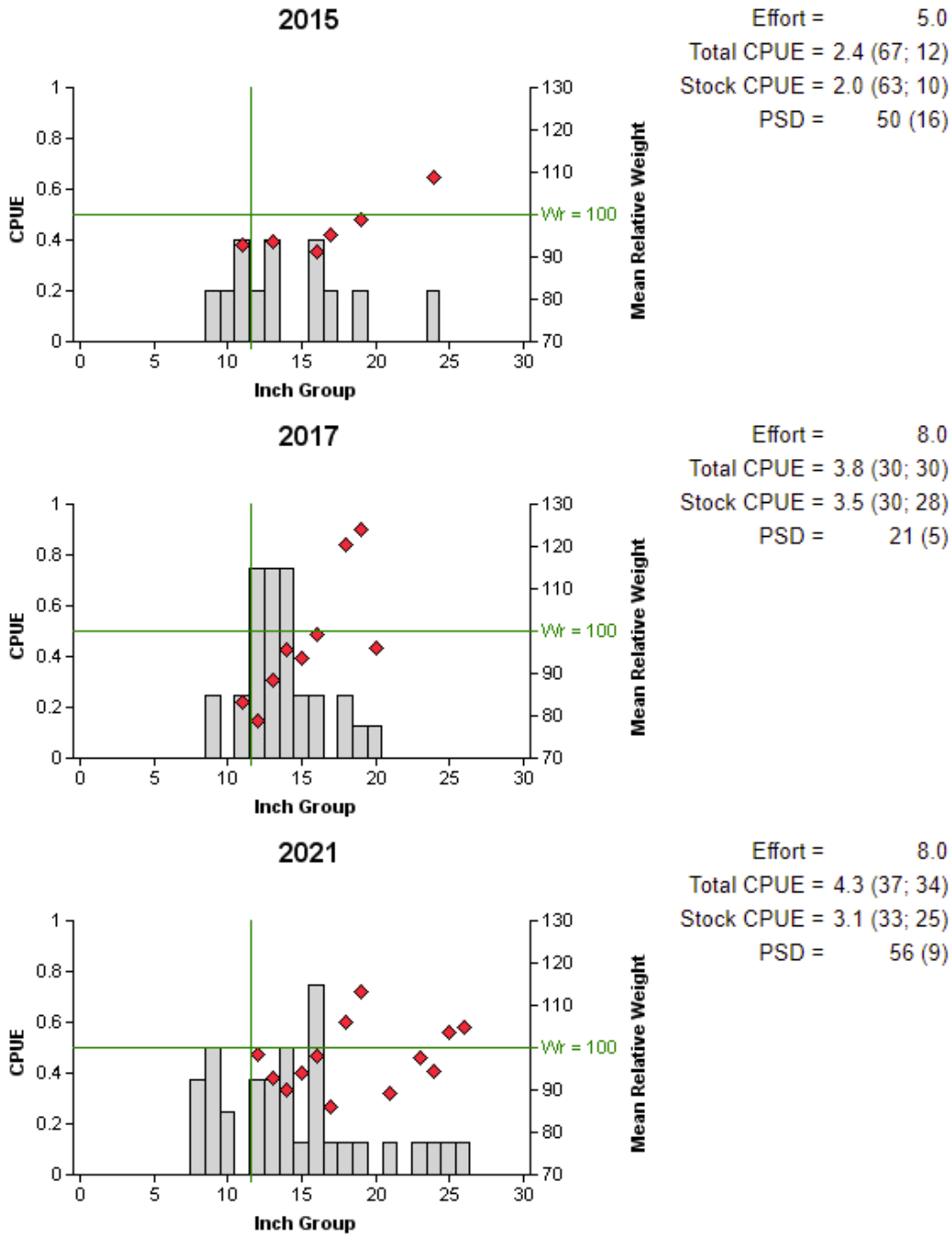


Figure 4. Number of Channel Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Mackenzie Reservoir, Texas, 2015, 2017, and 2021. Vertical line represents minimum length limit of 12 inches, and horizontal line represents relative weight of 100.

White Bass

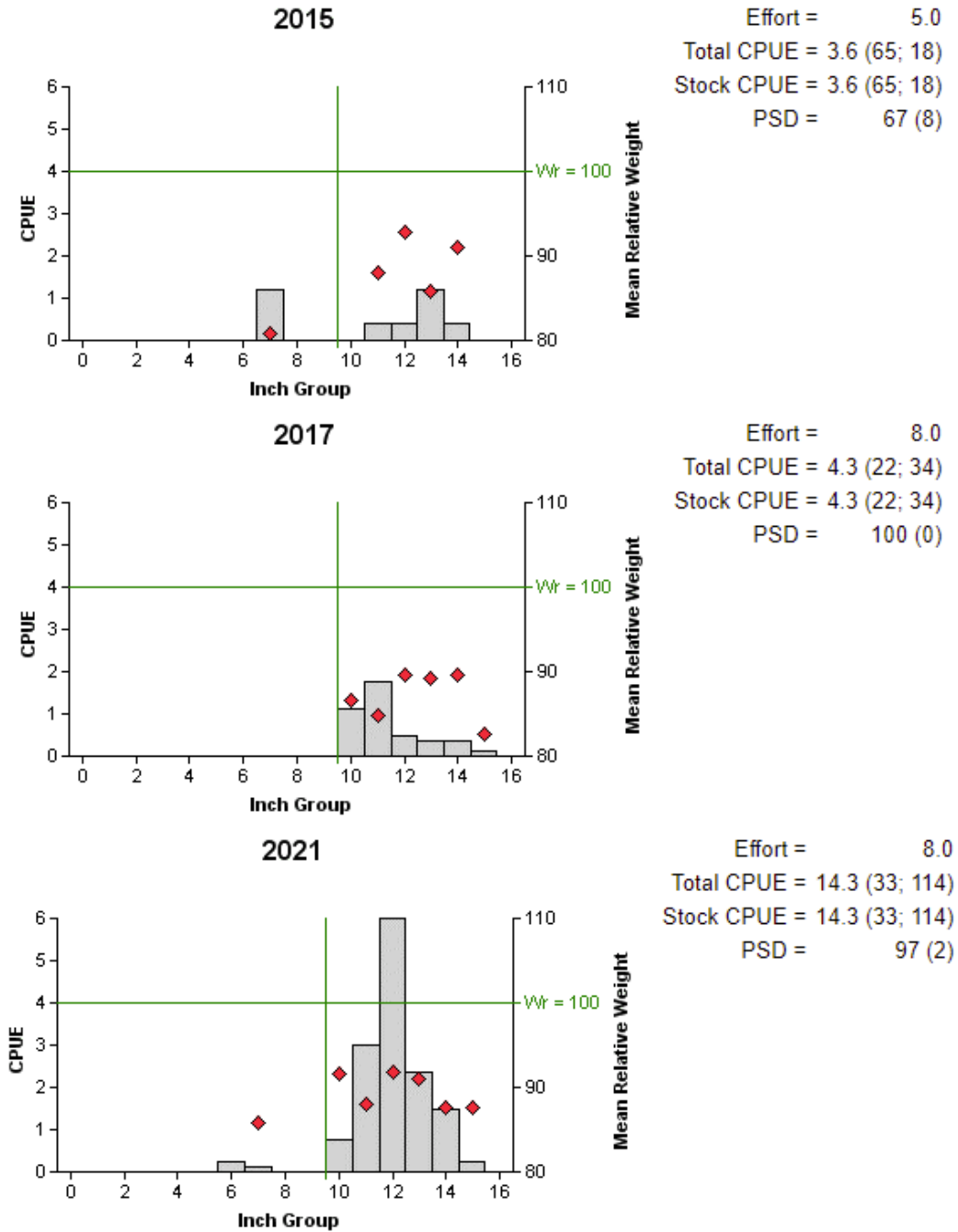


Figure 5. Number of White Bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Mackenzie Reservoir, Texas, 2015, 2017, and 2021. Vertical line represents minimum length limit of 10 inches, and horizontal line represents relative weight of 100.

Hybrid Striped Bass

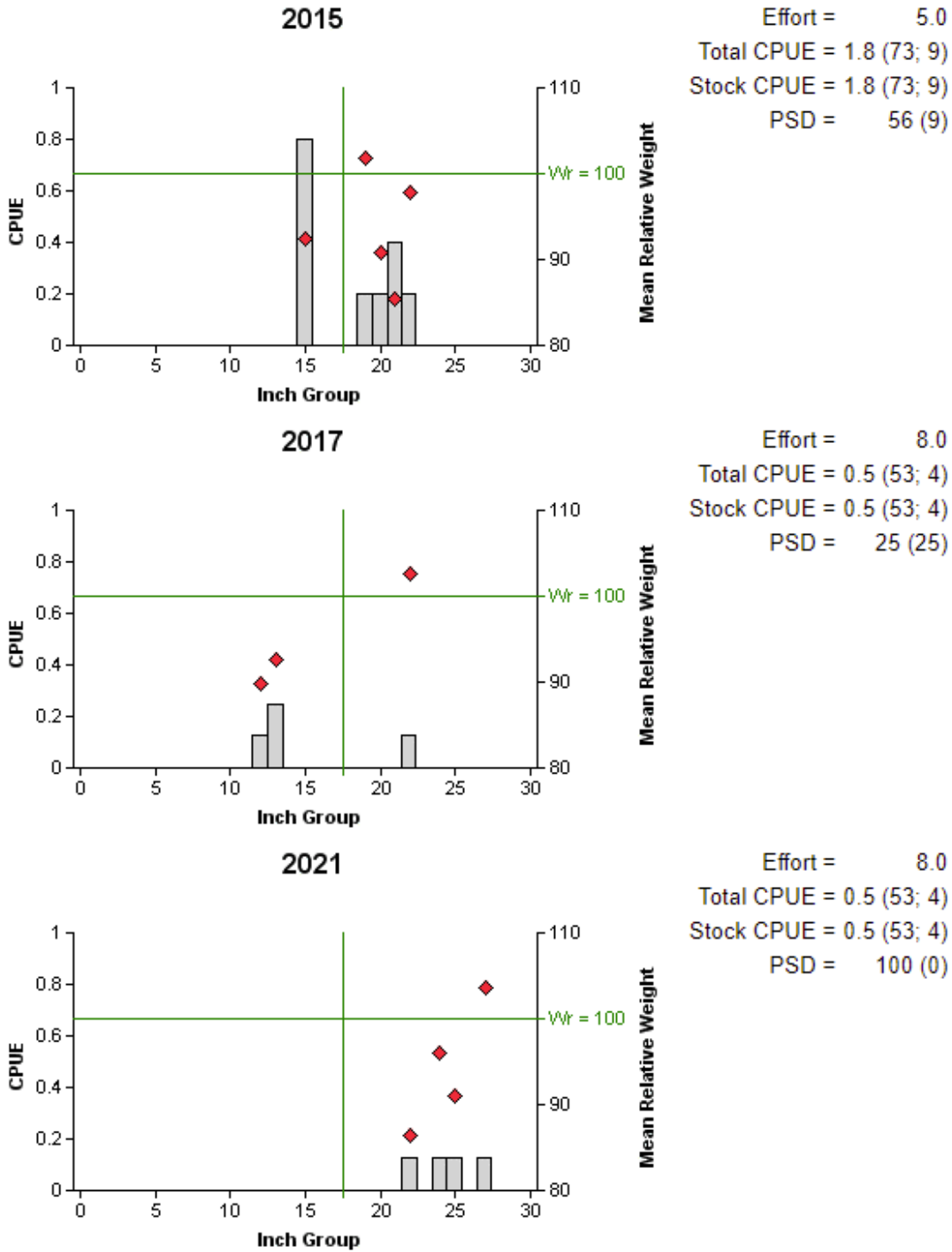


Figure 6. Number of Hybrid Striped Bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Mackenzie Reservoir, Texas, 2015, 2017, and 2021. Vertical line represents minimum length limit of 18 inches, and horizontal line represents relative weight of 100.

Largemouth Bass

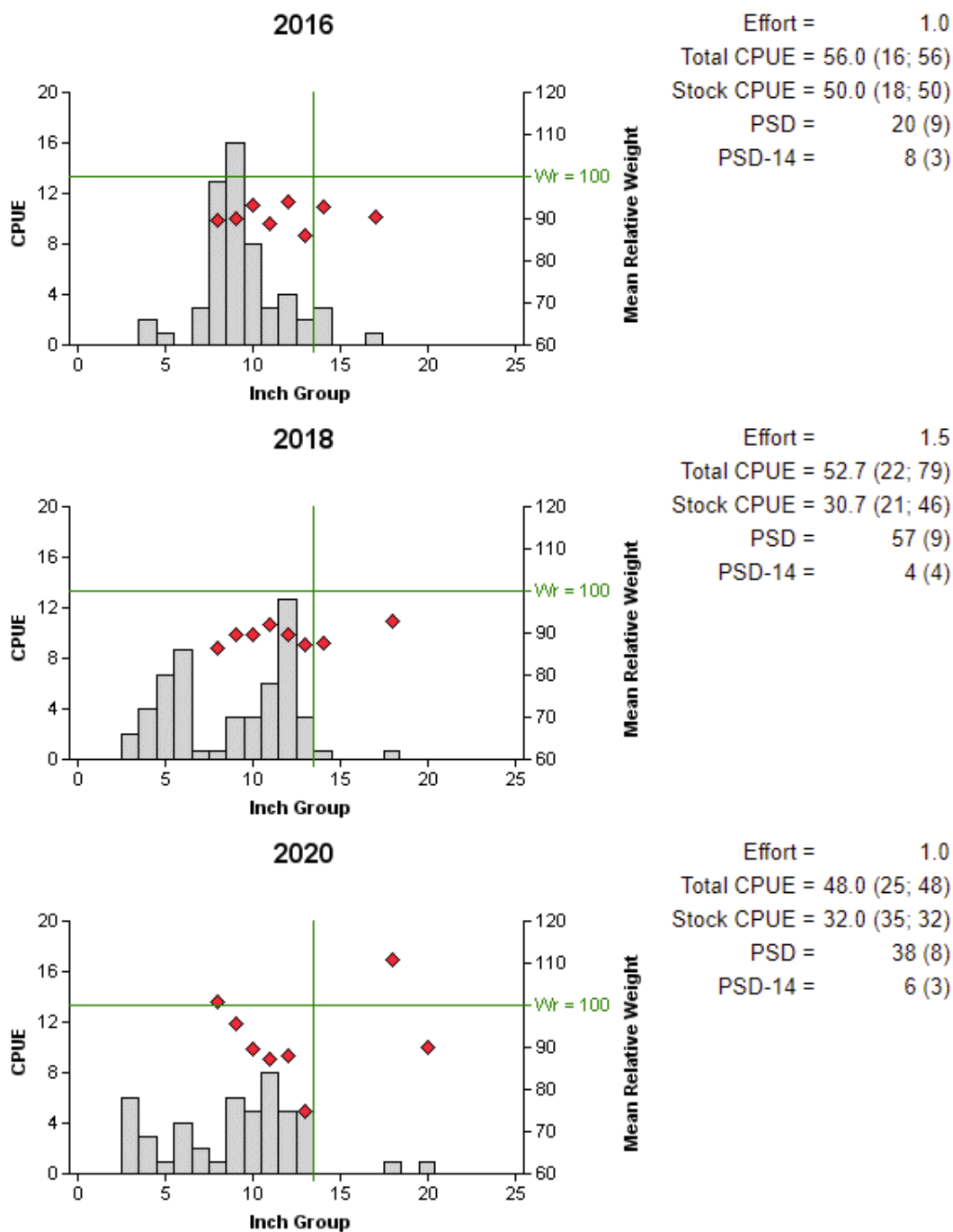


Figure 7. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Mackenzie Reservoir, Texas, 2016, 2018, and 2020. Vertical line represents minimum length limit of 14 inches, and horizontal line represents relative weight of 100.

Proposed Sampling Schedule

Table 7. Proposed sampling schedule for Mackenzie 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.

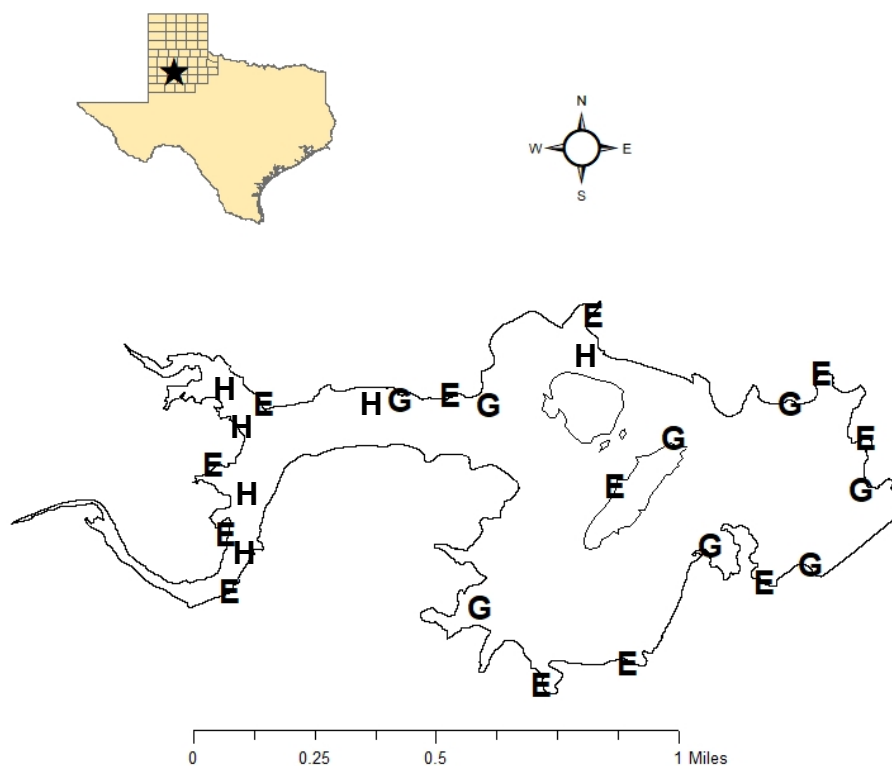
	Survey year			
	2021-2022	2022-2023	2023-2024	2024-2025
Angler Access				X
Structural Habitat				X
Vegetation				X
Electrofishing – Fall				X
Electrofishing – Spring				
Electrofishing – Low frequency				
Trap netting				
Gill netting				X
Baited tandem hoop netting				
Creel survey			X	
Report				X

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

Number (N) and catch rate (CPUE; RSE in parentheses) of all species collected from all gear types from Mackenzie Reservoir, Texas, 2020-2021. Sampling effort was 8 net nights for gill netting, and 1 hour for electrofishing.

Species	Gill Netting		Electrofishing		Hoop Netting	
	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad	53	6.6 (29)	106	106.0 (20)		
Common Carp	14	1.8 (26)	22	22.0 (28)		
Inland Silverside			4	4.0 (56)		
River Carpsucker			1	1.0 (100)		
Blue Catfish	3	0.4 (49)				
Channel Catfish	34	4.3 (37)	10	10.0 (49)	8	1.3 (63)
Flathead Catfish	1	0.1 (100)	6	6.0 (39)	1	0.2 (100)
White Bass	114	14.3 (33)	22	22.0 (39)		
Hybrid Striped Bass	4	0.5 (53)				
Green Sunfish			44	44.0 (39)		
Warmouth	1	0.1 (100)	2	2.0 (67)		
Bluegill	1	0.1 (100)	115	115.0 (19)	59	9.8 (61)
Longear Sunfish			32	32.0 (20)	3	0.5 (68)
Largemouth Bass	7	0.9(45)	48	48.0 (25)		
White Crappie	52	6.5 (16)	15	15.0 (50)	49	8.2 (57)
Hybrid Sunfish					1	0.2 (100)

APPENDIX B – Map of sampling locations



Location of sampling sites, Mackenzie Reservoir, Texas, 2020-2021. Gill net, Hoop net, and electrofishing stations are indicated by G, H, and E, respectively. Water level at time of sampling was 3014 feet MSL.



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