Baylor Creek Reservoir

2019 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 Baylor Creek Reservoir were surveyed in 2019 using electrofishing and trap netting. Gill nets were planned in 2020 but were canceled due to the COVID-19 pandemic. Historical data are presented with the 2019 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: Baylor Creek Reservoir is a 600-acre impoundment constructed in 1950 on Baylor Creek, a tributary of the Red River, located nine miles west of Childress, Texas. During the 2019 survey period the reservoir covered approximately 213 surface acres. The reservoir is owned by the City of Childress and is maintained for recreation. Water elevations are variable, and the reservoir is prone to extreme low water. Shoreline access is poor and boat access is restricted to one boat ramp. The reservoir has high conductivity levels and is subject to occasional Golden Algae kills.

Management History: Important sport fish include Largemouth Bass, White Crappie, and catfish. The lake level increased in 2016. Prior to this increase, the lake had not been sampled since 2007. Baylor Creek Reservoir is managed under statewide regulations.

Fish Community

- **Prey species:** Bluegill are present in the reservoir, but sampling effectiveness was decreased due to high salinity.
- **Catfishes:** Gill net surveys were canceled in 2020. Data from 2017 indicates poor Channel Catfish relative abundance.
- **Largemouth Bass:** Effectively sampling with electrofishing equipment is difficult because of high conductivity levels. Largemouth Bass relative abundance was low, but larger fish were observed.
- **Crappie:** Catch rates of both White Crappie and Black Crappie were poor. There were few legal fish documented.

Management Strategies: Monitor the waterbody for Golden Algae and inform the public about the negative impacts of aquatic invasive species. Conduct additional electrofishing and gill net surveys in 2021-22, and general monitoring surveys with trap nets, gill nets, and electrofishing surveys in 2023-2024. All planned electrofishing surveys will be postponed if conductivity levels are above 3,500 µmhos/cm. Access, habitat, and vegetation surveys will be conducted in 2023.

Introduction

This document is a summary of fisheries data collected from Baylor Creek Reservoir in 2019-2020 All sampling activities planned for 2020 were cancelled in response to the COVID-19 pandemic. Gill net data from 2017 is reported in lieu of the missing 2020 data. 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 2019 data for comparison.

Reservoir Description

Baylor Creek Reservoir is a 600-acre impoundment constructed in 1950 on Baylor Creek, a tributary of the Red River, located nine miles west of Childress, Texas. During the survey period the reservoir covered approximately 213 surface acres. The reservoir is owned by the City of Childress and maintained for recreation. There are no official water level gauges or records. Water level in the reservoir declined from 2000-2011 due to drought conditions and boat access was lost in 2008. The lake level improved greatly in the spring of 2016 and peaked at approximately 300 acres and boat access was restored. However, the elevation has been slowly declining since the highwater event in 2016. Baylor Creek Reservoir has experienced fish kills caused by Golden Algae (*Prymnesium parvum*) blooms beginning in spring 2003. Conductivity has increased from an average of 1,150 µmhos/cm in the 1980's and peaked at approximately 10,000 µmhos/cm. Conductivity values have fallen somewhat, but still ranged from 4,000-4,500 µmhos/cm in 2019. No specific source of chlorides has been identified but it is suspected that there may be brine springs in the watershed on private property. Habitat in 2019 was primarily natural shoreline and flooded timber. Other descriptive characteristics for Baylor Creek Reservoir are in Table 1.

Angler Access

Baylor Creek Reservoir has two public boat ramps and no private boat ramps. Boat access is restricted to the South Ramp only by the local marina operator. Extension of the ramps is not feasible. Additional boat ramp characteristics are in Table 2. There are no ADA compliant angler access points at Baylor Creek Reservoir and shoreline access is limited to the lower half of the reservoir.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Munger and Clayton 2016) included:

1. Monitor Golden Algae and stock the reservoir when conditions improve.

   Action: Channel Catfish, Florida Largemouth Bass, and Black Crappie were stocked in 2016. Bluegill and Florida Largemouth Bass were stocked in 2017. There have been recent reports of a possible fish kill in Spring 2020 but have not been confirmed by Golden Algae toxicity monitoring or direct observation.

2. Reduce sampling efforts until lake levels improve and conductivity declines enough to permit the use of electrofishing equipment.

   Action: Baylor Creek Reservoir was electrofished in 2016 and 2019. Conductivity levels in 2019 were approximately 4,400 µmhos/cm, and electrofishing effectiveness was poor.

3. Evaluate boating access and the feasibility of extending the existing facilities.

   Action: Boat ramp extension is not feasible, but access is adequate at this time following lake level increases in June 2016

4. Threat of invasive species in Texas can adversely affect the state ecologically, environmentally, and economically.
   Action: Risk has been communicated to the marina management.

Harvest regulation history: Sport fishes in Baylor Creek Reservoir have been managed with statewide regulations (Table 3).

Stocking history: Baylor Creek Reservoir was stocked with Channel Catfish fingerlings, Bluegill fingerlings, and Black Crappie fingerlings in 2016. Florida Largemouth Bass fingerlings and adults were stocked in 2017. The complete stocking history is available Table 4.

Water transfer: Baylor Creek Reservoir is currently used only for recreation, and no interbasin water transfers are known to exist or planned for the reservoir.

Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Baylor Creek Reservoir (Munger and Clayton 2016). 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 and sunfishes were collected by electrofishing (50 min at 10, 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.

Trap netting – Crappie were collected using trap nets (5 net nights at 5 stations). CPUE for trap netting was recorded as the number of fish caught per net night (fish/nn).

Gill netting – A gill net survey was not conducted in 2020 due to travel restrictions in response to the COVID-19 pandemic. A gill net survey was conducted in 2017. Channel Catfish 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). Standard error (SE) was calculated for structural indices. Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE.

Habitat – A structural habitat survey was conducted in 2019. Vegetation surveys were conducted in 2019 but no aquatic vegetation was observed. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2017).

Results and Discussion

Habitat: Littoral zone structural habitat consisted primarily of rocky and natural shoreline (Table 6). There was no aquatic vegetation documented at Baylor Creek Reservoir. Standing timber covered 44 percent of the total surface acres (44.2 acres) and the remaining acres were classified as open water.

Prey species: No Bluegill were sampled during the 2019 fall electrofishing survey. The catch rate in 2016 was 48.0/h, and the size structure was dominated by the 4-5 inch groups (Figure 1). The lack of Bluegill was most likely caused by inability to effectively electrofish because of high conductivity levels (4,400 µmhos/cm) in fall 2019. Anecdotally, Bluegill were seen by the field staff but were not successfully sampled. Survey objectives where met for prey species (Table 5).

Channel Catfish: Due to concerns about the COVID-19 pandemic and the safety of our personnel, the 2020 spring gill net survey for Baylor Creek Reservoir was canceled. Gill net data is reported for 2017 and 1999 (Figure 2). Gill netting was conducted in 2004 and 2008 but no catfish were documented during those surveys. The gill net catch rate of Channel Catfish was 1.2/nn in 2017 and 2.6/nn in 1999. Channel Catfish were last stocked in 2005 (Table 4). The fish surveyed in 2017 either survived the previous drought and Golden Algae kills, came from the surrounding watershed, or were stocked by the local angling club. Based on historical data, Baylor Creek has maintained a small but stable population of Channel Catfish. Size structure and body condition appear good, but conclusions are limited due to the small sample size. Because the 2020 survey was cancelled sampling objectives from the previous objective-based sampling plan were not met (Table 5).

Largemouth Bass: The electrofishing catch rate of total and stock-length Largemouth Bass was 10.8 and 7.2/h respectively in 2019, lower than the 28.h and 22.8/h recorded in 2016 (Figure 3). Size structure was not meaningful due the absence of substock length fish in 2019. The Largemouth Bass population seemed to have shifted toward larger fish when compared to the 2016 electrofishing survey. Relative weights were varied, ranging from 80 to 100. Effective electrofishing Baylor Creek is difficult due to high water conductivity and clear water. Survey objectives were met for Largemouth Bass (Table 5).

Crappie: The trap net catch rate for White Crappie was 0.6/nn in 2019, comparable to 2003 (1.0/nn) and lower than 2000 (12.0/nn; Figure 4). Black Crappie were stocked in 2016 by the local sports club but were absent in the 2019 survey. The catch rate for Black Crappie was 1.0/nn in 2016 and 0.2/nn in 2005 (Figure 5). Size indices and body condition are not meaningful due to the low sample size for both species. Crappie populations have fallen significantly following the low water event and Golden Algae kills discussed above. There are no plans to stock crappie at this time because it is likely lake levels will continue to decline and Golden Algae kills will persist in the future.

Fisheries Management Plan for Baylor Creek Reservoir, Texas

Prepared – July 2020

ISSUE 1: Baylor Creek Reservoir has been repeatedly impacted by Golden Algae. Historic blooms have decimated its fish populations and the potential for blooms in the future is high.

MANAGEMENT STRATEGIES

1. Continue conducting periodic monitoring for P. parvum during February and March to monitor algal community and potential toxicity.
2. Perform exploratory sampling to assess the possibility of an unconfirmed fish kill reported in Spring 2020.

ISSUE 2: High conductivity in the reservoir hinders electrofishing effectiveness. It is unlikely that inflows will improve, and conductivity will continue to rise in the future.

MANAGEMENT STRATEGIES

1. Postpone electrofishing surveys until water conductivity drops below 3,500 µmhos/cm.
2. Identify alternative sampling strategies that could be implemented to monitor Largemouth Bass and available forage species.

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 (2020–2024)

Note: All scheduled surveys are dependent on the availability of lake access and the ability to launch and navigate a boat. Baylor Creek Reservoir is subject to extended periods of low elevation, and the proposed schedule may be amended as necessary.

Sport fish, forage fish, and other important fishes

Sport fishes in Baylor Creek include Channel Catfish, Flathead Catfish, Largemouth Bass, White Crappie, and Black Crappie. The primary forage species is Bluegill.

Low-density fisheries

Flathead Catfish: Historically, the reservoir maintained a population of Flathead Catfish, but they have not been documented in many years. No targeted effort is necessary. Any sampled fish will be recorded to document presence/absence. If the population begins to expand, sampling objectives will be reevaluated.

Survey Objectives, fisheries metrics, and sampling objectives

Channel Catfish: Catch rates of Channel Catfish have been historically low and angler utilization is unknown at Baylor Reservoir. Trend data has been collected irregularly due to fluctuating water levels and poor lake access. Continuation of trend data with spring gill netting is planned in order to monitor large-scale changes in the Channel Catfish populations. Analysis of past data indicates that approximately 15 net nights would be needed to achieve a CPUE-Total RSE ≤ 25 and 45 net nights would be needed to estimate size structure (PSD; 50 fish minimum with 80% confidence). Due to the excessive effort needed to meet those objectives, a practical effort of five random gill net stations will be sampled in Spring 2024 with no specific CPUE or RSE requirements (Table 7). In addition, staff will sample using tandem baited hoop nets at three random stations in summer 2023 to determine if catch rates are improved versus gill netting.

Largemouth Bass: Electrofishing effectiveness is hindered by high conductivity at Baylor Creek Reservoir. If conductivity falls below 3,500 mhos/cm, electrofishing surveys are scheduled for Fall 2021 and 2023. Sampling objectives are to monitor general trends of CPUE (CPUE-Total & CPUE-S; RSE≤25) and size structure. Analysis of historical data (that meets previously stated conductivity requirements) indicates that 12 random stations would be needed to achieve minimum CPUE objectives. Thirty random stations would be needed to achieve suggested minimum size structure objectives (PSD; 50 stock-length fish minimum with 80% confidence). Due to excessive effort no objectives are specified for size structure. Twelve random electrofishing stations will be sampled in 2021 and 2023 (Table 7).

Crappie: White Crappie and Black Crappie are both present in Baylor Creek Reservoir. Historical catch rates have been low and for the purpose of this plan, both species will be combined. General monitoring of trend data will be conducted quadrennially using fall trap nets. Based on analysis of historic data, 50 random trap net station are needed to achieve minimum CPUE objectives (CPUE-Total ; RSE≤25). In addition, >100 random stations would be needed to achieve suggested minimum size structure objectives (PSD: 50 stock-length fish minimum with 80% confidence). Due to the excessive effort necessary to meet the desired objectives, five random trap nets stations will be sampled fall 2023 (Table 7). The objective of this survey will be to maintain minimum trend data for crappie and detect any large-scale changes in crappie abundance and size structure.

Bluegill: Bluegill is the primary forage species in Baylor Creek Reservoir. General CPUE and size structure trend data has been collected as part of past Largemouth Bass surveys. Continued sampling, as per Largemouth Bass previously described, will allow for monitoring of large-scale changes in Bluegill abundance and size structure. No additional effort will be expended beyond what is used for Largemouth Bass sampling.

Literature Cited

Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-482 in B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.

Guy, C. S., R. M. Neumann, D. W. Willis, and R. O. Anderson. 2007. Proportional size distribution (PSD): a further refinement of population size structure index terminology. Fisheries 32(7): 348.

Munger, C., and J. Clayton. 2016. Baylor Creek Reservoir, 2015 fisheries management survey report. Texas Parks and Wildlife Department, Federal Aid Report F-221-M-6, Austin.

Tables and Figures

Table 1. Characteristics of Baylor Creek Reservoir, Texas.

Characteristic	Description
Year constructed	1950
Controlling authority	City of Childress
County	Childress
Reservoir type	Mainstem
Shoreline Development Index	2.39
Conductivity	4,400 µS/cm

Table 2. Boat ramp characteristics for Baylor Creek Reservoir, Texas, September 2019.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
North	34.47828 -100.37404	Y	10	1,794	Usable. Extension is not feasible
South	34.47220 -100.37190	Y	15	1,797	Usable. Extension is not feasible

Table 3. Harvest regulations for Baylor Creek Reservoir, Texas.

Species	Bag limit	Length limit
Catfish: Channel and Blue, their hybrids and subspecies	25 (in any combination)	12-inch minimum
Catfish, Flathead	5	18-inch minimum
Bass: Largemouth	5	14-inch minimum
Crappie: White and Black, their hybrids and subspecies	25 (in any combination)	10-inch minimum

Table 4. Stocking history of Baylor Creek Reservoir, Texas. FGL = fingerling; AFGL = advanced fingerling; ADL = adults.

Species	Year	Number	Size
Blue Catfish	1981	15,682	FGL
Channel Catfish	1965	6,000	ADL
	1966	4,000	ADL
	1967	3,500	ADL
	1967	500	UNK
	1968	5,000	ADL
	1969	5,000	ADL
	1971	5,000	ADL
	1972	10,000	ADL
	1973	10,000	ADL
	1975	5,000	ADL
	1976	6,000	ADL
	1977	6,000	ADL
	1978	6,000	ADL
	2005	17,151	FGL
	2016	1,200	FGL
	Total	91,351	
Bluegill	2005	66,101	FGL
	2017	54,418	FGL
	Total	120,519	
Coppernose Bluegill	1981	60,000	FGL
x Green Sunfish	1982	60,000	FGL
	Total	120,000	
Flathead Catfish	1975	2,000	UNK
Black Crappie	2016	600	FGL
Largemouth Bass	1967	20,000	FGL
	1968	9,400	FGL
	1970	20,000	FGL
	1971	24,000	FGL
	1972	10,000	FGL
	1973	5,000	FGL
	2002	11	ADL
	Total	88,411	
Florida Largemouth Bass	1981	32,000	FGL
	1999	280	FGL
	2000	60,069	FGL
	2002	61,000	FGL
	2004	72,668	FGL
	2005	61,222	FGL
	2016	1,200	FGL
	2017	56,460	FGL
	2017	112	ADL
	Total	343,811	

Table 5. Objective-based sampling plan components for Baylor Creek Reservoir, Texas 2019-2020.

Gear/target species	Survey objective	Metrics	Sampling objective
Electrofishing			
Largemouth Bass	Exploratory	CPUE-Total	Presence/Absence
Bluegill [a]	Exploratory	CPUE-Total	Presence/Absence
Gizzard Shad [a]	Exploratory	CPUE-Total	Presence/Absence
Trap netting			
Crappie	Exploratory	CPUE-Total	Presence/Absence
Gillnetting			
Channel Catfish	Exploratory	CPUE-Total	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 structural habitat types, Baylor Creek Reservoir, Texas, 2019. Shoreline habitat type units are in miles and standing timber is acres. Total surface acreage of the reservoir at time of survey was 213.6 acres.

Habitat type	Estimate	% of total
Natural	9.5 miles	96.9
Rocky	0.3 miles	3.1
Open Water	119.2 acres	55.8
Standing Timber	94.4 acres	44.2

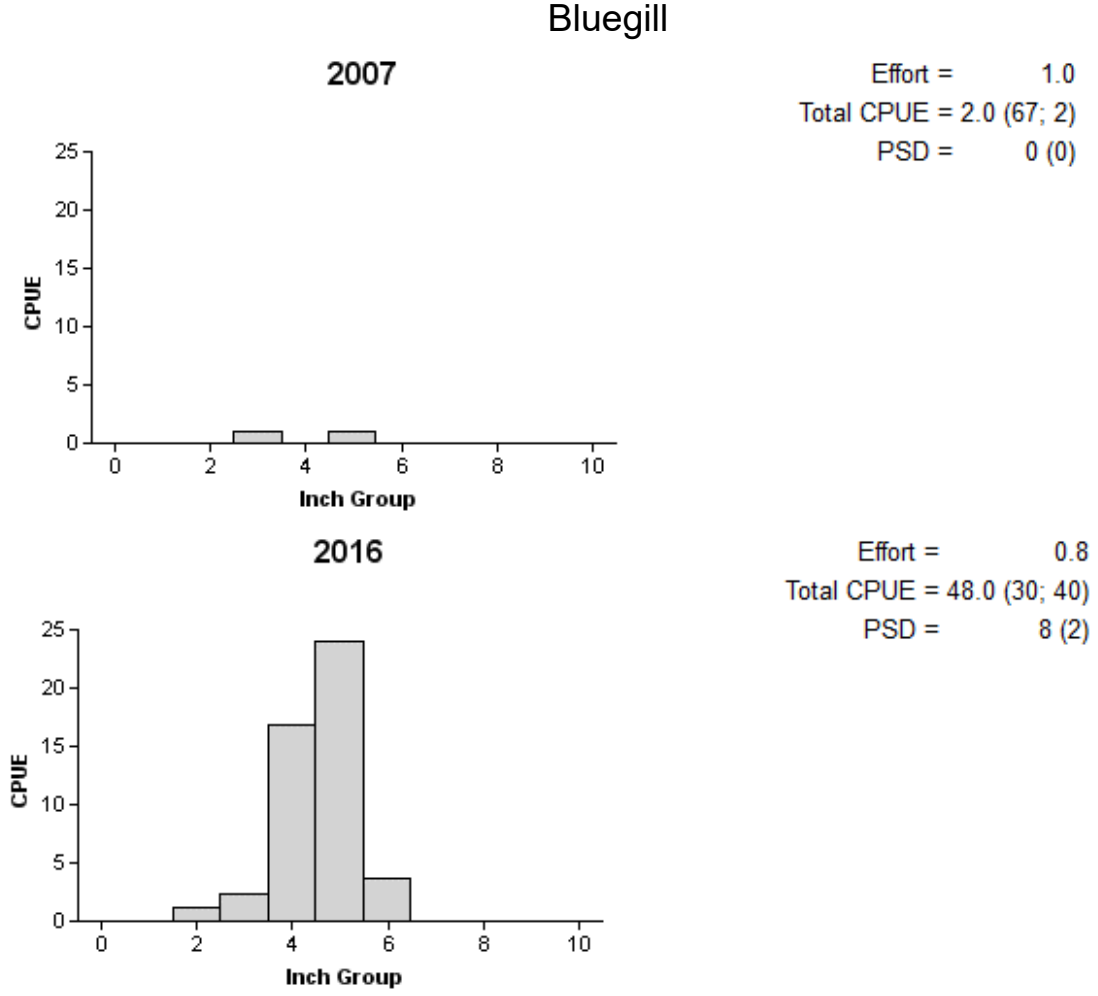


Figure 1. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Baylor Creek Reservoir, Texas, 2007 and 2016. No Bluegill were collected in the 2019 electrofishing survey.

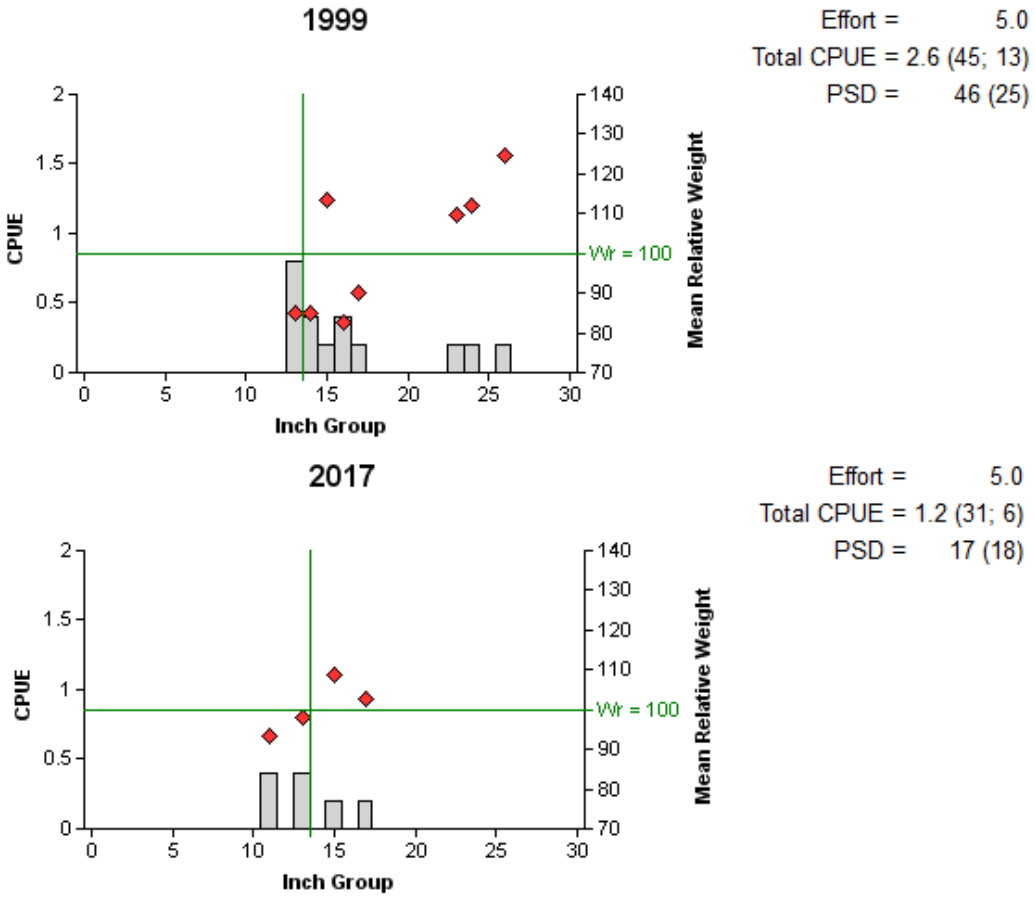


Figure 2. Number of Channel Catfish caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Baylor Creek Reservoir, Texas, 1999 and 2017. Horizontal line indicates optimum relative weight equal to 100. Vertical line indicates minimum length limit. A spring gill net survey was not conducted in 2020 due to concerns related to the COVID-19 pandemic.

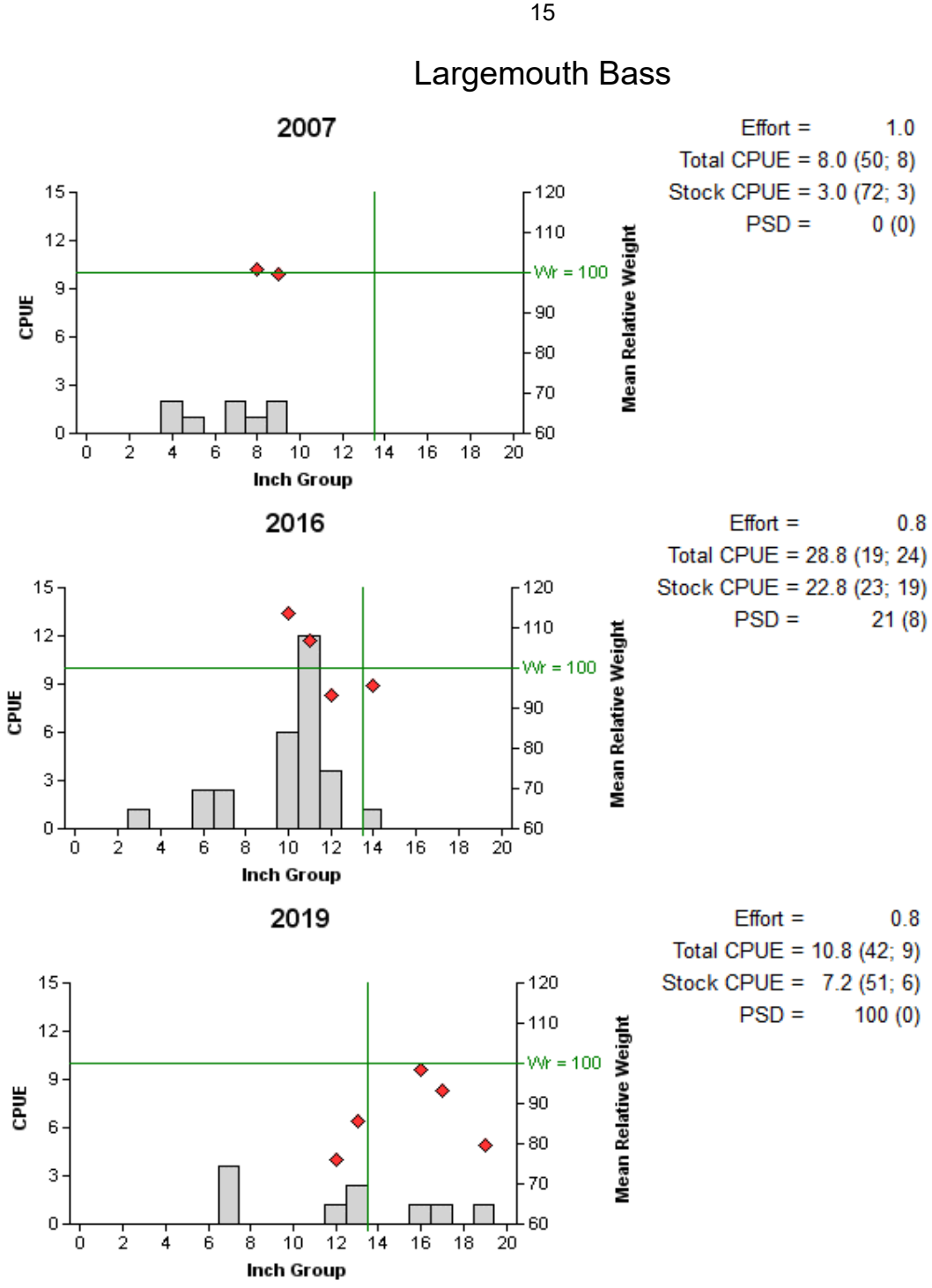


Figure 3. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Baylor Creek Reservoir, Texas, 2007, 2016, and 2019. Horizontal line indicates optimum relative weight equal to 100. Vertical line indicates minimum length limit.

White Crappie

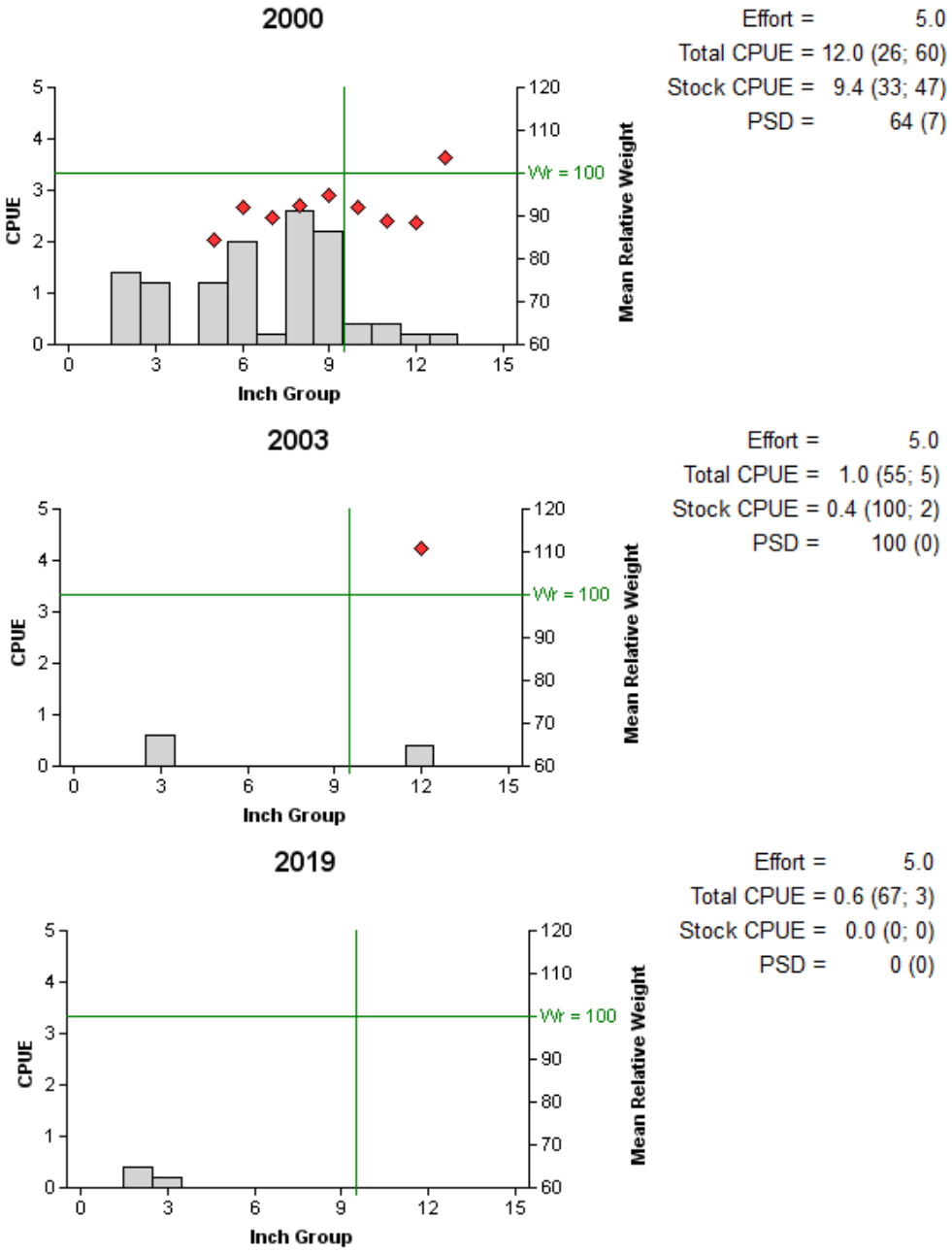


Figure 4. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Baylor Creek Reservoir, Texas, 2000, 2003, and 2019. Horizontal line indicates optimum relative weight of 100. Vertical line indicates minimum length limit.

Black Crappie

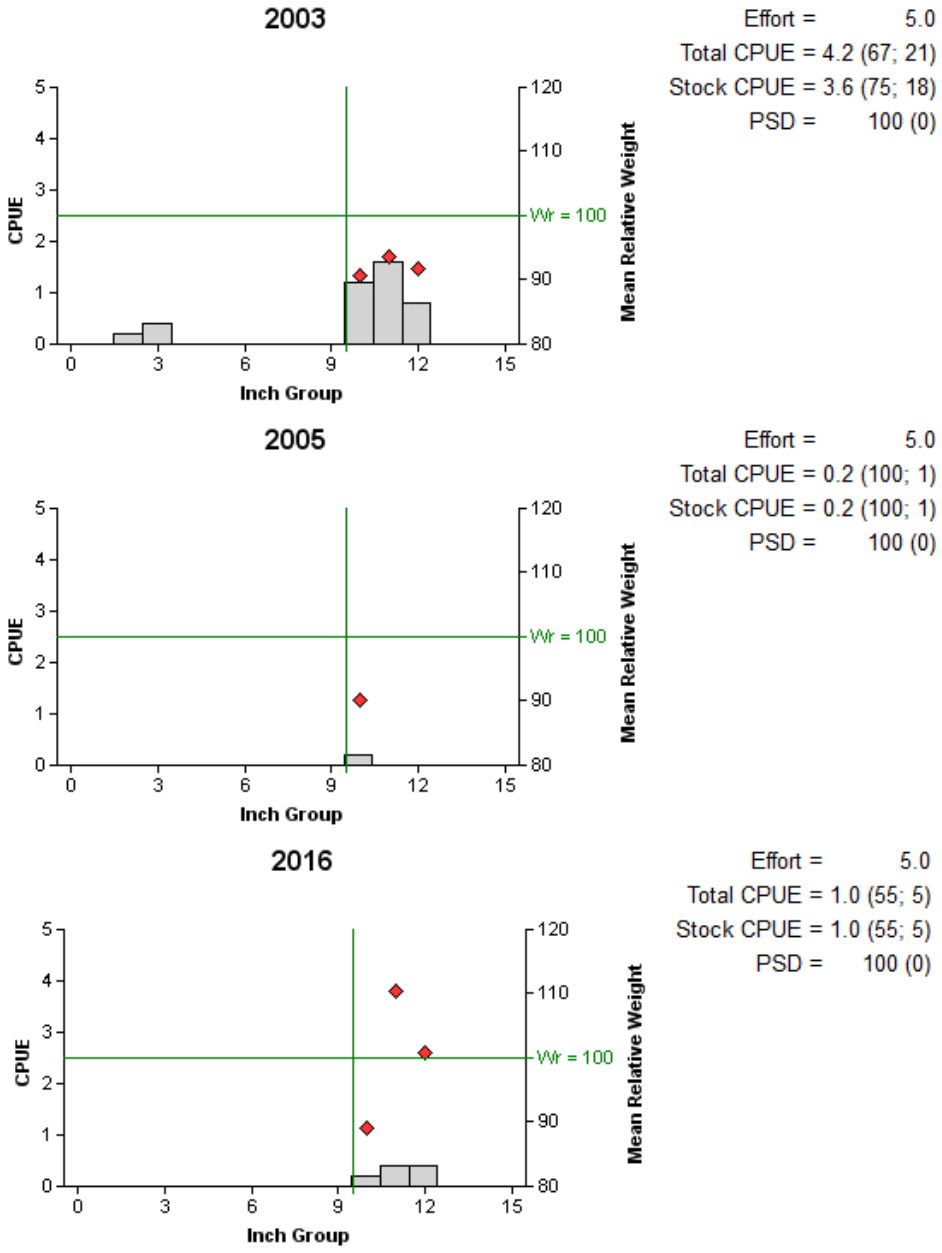


Figure 5. Number of Black Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Baylor Creek Reservoir, Texas, 2003, 2005, and 2016. Horizontal line indicates optimum relative weight of 100. Vertical line indicates minimum length limit.

Proposed Sampling Schedule

Table 7. Proposed sampling schedule for Baylor Creek Reservoir, Texas. Survey period is June through May. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

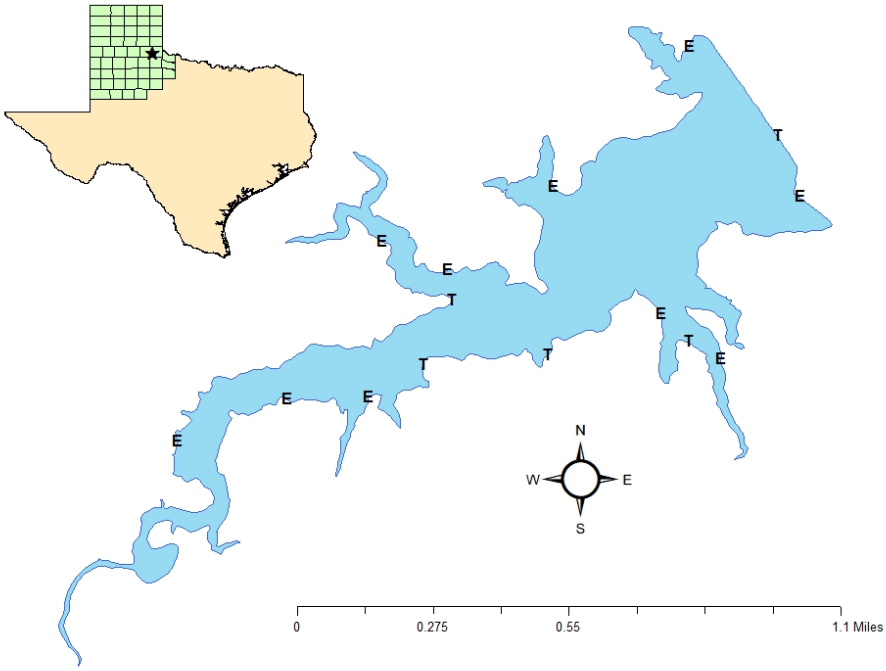
	Survey year			
	2020-2021	2021-2022	2022-2023	2023-2024
Angler Access				S
Structural Habitat				S
Vegetation				S
Electrofishing – Fall		A		S
Trap netting				S
Baited Hoop Nets				S
Gill netting				S
Report				S

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

Number (N) and catch rate (CPUE) (RSE in parentheses) of all species collected from all gear types from Baylor Creek Reservoir, Texas, 2019-20. Sampling effort was 5 net nights for trap netting, and 0.8 hour for electrofishing.

Species	Trap Netting		Electrofishing	
	N	CPUE	N	CPUE
Common Carp			7	8.4 (30)
Bluegill	18	3.6 (51)		
Largemouth Bass	4	0.8 (47)	42	10.8 (42)
White Crappie	3	10.4 (23)		

APPENDIX B – Map of sampling locations



Location of sampling sites, Baylor Creek Reservoir, Texas, 2019-2020. Trap net and electrofishing stations are indicated by T and E, respectively. Water level was estimated at 213 acres at the time of these surveys.

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