

Clyde 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

Prepared by:

Michael D. Homer Jr., District Management Supervisor
and
Natalie Goldstrohm, Assistant District Management Supervisor

Inland Fisheries Division
Abilene District, Abilene, Texas

Carter Smith
Executive Director

Craig Bonds
Director, Inland Fisheries

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Survey and Management Summary

Fish populations in Clyde Reservoir were surveyed in fall 2018 and fall 2020 by using electrofishing, tandem hoop netting in summer 2020, and trap netting in fall 2020. Historical data are presented with the 2018-2021 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: Clyde Reservoir is a 449-acre impoundment of the north prong of Pecan Bayou created in 1970. It is located 15 miles southeast of Abilene and is controlled by the City of Clyde. Primary water uses are municipal water supply and recreation. In 2020, the shoreline was predominantly featureless, natural shoreline with rocky segments, and present vegetation throughout the reservoir consisted of mostly flooded terrestrial vegetation. Prior to 2016, the reservoir had nearly gone dry. In spring 2016, substantial rainfall refilled the reservoir to above conservation pool. Since refilling, the water level declined 3-5 feet. A fee is required to access the bank for fishing or to launch a boat at the two public boat ramps.

Management History: Clyde Reservoir historically supported a quality Largemouth Bass fishery. The current lake record Largemouth Bass is 14.8 pounds and was caught 2001. Fathead Minnows and Bluegill were stocked in 2016 to re-establish forage for sportfish. Florida Largemouth Bass were stocked in 2016 and 2017 to re-establish the previously existing quality fishery. Channel Catfish were stocked in 2016, 2017, and 2019 to help re-establish the fishery devastated by severe drought conditions.

Fish Community

- **Prey Species:** Gizzard Shad were numerous throughout the survey period, though Bluegill were dominant prey species in the 2020 survey. Longear Sunfish and Inland Silversides were also relatively abundant and were available as forage for sportfish.
- **Catfishes:** Channel Catfish had high relative abundance in the summer 2020 tandem hoop net survey. Availability of legal length fish was sufficient.
- **Largemouth Bass:** Catch of Largemouth Bass has declined since 2016, though the population appeared more balanced and had greater representation of legal length fish.
- **Crappie:** Black and White Crappie exist in Clyde Reservoir, though White Crappie are the predominant species. Catch rates of legal length crappie were low and similar to prior surveys.

Management Strategies: During summer 2024, tandem hoop netting will be conducted to monitor Channel Catfish. An electrofishing survey will be conducted during fall 2024 to monitor Largemouth Bass and prey species. Trap netting will be conducted during fall 2022 and fall 2024 to survey for White and Black Crappie. A vegetation survey will be conducted during summer 2024. Measures to educate constituents about prevention of the spread of invasive species will be implemented.

Introduction

This document is a summary of fisheries data collected from Clyde Reservoir during 2018-2021. 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 species of fishes was collected, this report deals primarily with major sport fishes and important prey species. Management strategies are included to address existing problems and/or opportunities. Historical data are presented with the 2018-2021 data for comparison.

Reservoir Description

Clyde reservoir is a 449-acre impoundment of the north prong of Pecan Bayou created in 1970. It is located 15 miles southeast of Abilene and is controlled by the City of Clyde. Primary water uses are municipal water supply and recreation. Prior to 2016, the reservoir had nearly gone dry from prolonged drought. Though, in spring 2016, substantial rainfall refilled the reservoir to above conservation level. Since refilling in 2016, the water level appeared to decline approximately 3-5 feet. Additional reservoir characteristics are presented in Table 1.

Angler Access

Access to Clyde Reservoir is limited to two public boat ramps with bank fishing access within Clyde Lake Park. The reservoir has no private boat ramps. Additional boat ramp characteristics are in Table 2.

Management History

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

1. Request and stock Channel Catfish at 15/acre in 2018 and 2020. Conduct a management stocking of White Crappie in fall 2017.

Actions: Instead of 2018 and 2020, Channel Catfish fingerlings were stocked in 2016 (37,174 fish), 2017 (45,417 fish), and 2019 (48,462 fish) and at a greater rate of about 100/acre. Angler reports indicated crappie were being caught in Clyde Reservoir in 2017. During fall 2018 sampling, both White and Black Crappie were observed while electrofishing. Additional adult White Crappie were not stocked in Clyde Reservoir given that they were already present with acceptable relative abundance.

2. Conduct hoop netting, trap netting and biennial electrofishing.

Action: Electrofishing was conducted during fall 2018 and fall 2020, tandem hoop net sampling was conducted during summer 2020, and trap netting was conducted during fall 2020.

3. Map the extent of Salt Cedar (*Tamarix* spp.) at the reservoir. Discuss Salt Cedar establishment with the controlling authority.

Action: Salt Cedar establishment and potential detriments were discussed with the Clyde Reservoir lake manager in 2018 prior to fisheries surveys. Flooding rains inundated much of the existing Salt Cedar within the lakebed, thus coverage was not mapped. No additional actions by the City of Clyde and TPWD were taken during the survey period.

4. Cooperate with the controlling authority to post appropriate invasive species signage at access points throughout the reservoir. Educate the public about invasive species using social and other media. Make a speaking point about invasive species when presenting to constituent and user groups. Keep track of (i.e., map) all existing and future inter-basin water transfer routes to facilitate potential invasive species responses.

Action: Invasive species signage was maintained at Clyde Reservoir. District biologists have made a speaking point about invasive species over the past several years. Signage has also been posted and maintained at the ramp areas notifying users of invasive species threats. Inter-basin water transfers will be updated as needed.

Harvest regulation history: Sportfishes in Clyde Reservoir have been managed with statewide regulations (Table 3).

Stocking history: Historical stockings have included Threadfin Shad, Blue Catfish, Channel Catfish, Largemouth Bass, and Walleye. Prior to 2016, the reservoir had not been stocked since a 2005 stocking of Florida Largemouth Bass. In 2016, the reservoir was stocked with several species including Bluegill, Fathead Minnows, Channel Catfish, and Florida Largemouth Bass to re-establish fisheries. Channel Catfish and Florida Largemouth Bass fingerlings were stocked in 2017; Channel Catfish fingerlings were also stocked in 2019. A complete stocking history is presented in Table 4.

Vegetation/habitat management history: Clyde Reservoir has no vegetation/habitat management history.

Water Transfer: No interbasin transfers are known to exist.

Methods

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

Electrofishing – Largemouth Bass, sunfishes, Gizzard Shad, and Threadfin Shad were collected by night-time electrofishing (1 hour at 12, 5-min stations) during fall 2020. 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 13.0 to 14.9 inches were determined using otoliths from 14 randomly selected fish.

Trap netting – White and Black Crappie were collected using trap nets (5 net nights at 5 stations) during fall 2020. Catch per unit of effort trap netting was recorded as the number of fish caught per net night (fish/nn). Additional fish were collected by experimental gill nets and were used for age estimation.

Tandem hoop netting – Channel Catfish were collected using tandem hoop nets (6 tandem series set at 6 stations) during summer 2020. Tandem hoop net CPUE was recorded as the number of fish caught per tandem series (fish/tandem series).

Genetics – Genetic analysis of Largemouth Bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2017). Micro-satellite DNA analysis has been used to determine genetic composition of individual fish since 2005.

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 statistics.

Habitat – A structural habitat and vegetation survey was conducted in summer 2020 by using the random point method (TPWD, Inland Fisheries Division, unpublished manual revised 2017). Habitat features and vegetation were surveyed at 99 random points throughout the reservoir. Shoreline vegetation and structural habitat features were surveyed at 75 of the random stations and were analyzed separately to assess

shoreline structural habitat. Plants and structural habitat types were identified at or below the waterline and marked as “1” for present or “0” for absent. Percent occurrence (% = [# stations present / total stations sampled] X 100) and associated 95% confidence intervals were calculated (Ausvet 2021) for native and exotic plant species and structural habitat types.

Water level – Clyde Reservoir does not have an operational water level gauge.

Results and Discussion

Habitat: In summer 2020, the shoreline was mostly undeveloped, natural shoreline (52.0%) and rocky segments (44.0%). Most surveyed points in the reservoir were featureless (68.7%), and other vegetation encountered was flooded terrestrial vegetation (31.3%), cattail (2.0%) and standing timber (2.0%; Table 7). Flooded terrestrial vegetation occurrence had declined by 31.9% as well as buttonbush had declined by nearly 10% since the last survey conducted in summer 2016 (Homer and Goldstrohm 2017). Loss of vegetation coverage and diversity of habitat features could be attributed to the decline in water level.

Prey species: Bluegill, Gizzard Shad, and other sunfishes were the predominant prey species observed in fall 2020. Gizzard Shad CPUE was 199.0/h, which was a substantial decrease from the prior surveys in 2016 (1,338.0/h) and 2018 (2,584.0/h; Figure 1). Gizzard Shad IOV in 2020 was 74, which decreased from the 99 reported in 2018. However, IOV was sufficient and indicated that most shad were available to predators. Bluegill were the most relatively abundant prey species caught, and their CPUE was 1,182.0/h in fall 2020 (Figure 2), This was a large increase from the prior surveys in 2016 (268.0/h) and 2018 (592.0/h; Figure 2). Bluegill PSD has remained low, which suggests that there was high representation of sub-stock length fish. Green Sunfish catch declined from 2016 (268.0/h) to 2020 (30.0/h; Figure 3) and other sunfishes observed included Longear Sunfish (23.0/h), Warmouth (11.0/h), Redear Sunfish (5.0/h), and Orangespotted Sunfish (1.0/h; see Appendix A).

Channel Catfish: Channel Catfish were numerous in the summer 2020 tandem hoop netting survey. Overall catch rate was 122.3/tandem series (Figure 4). Catch rate for stock length fish was 47.3/tandem series, of which 56% were legal length (CPUE-12=26.5/tandem series). The size structure as represented by PSD was 11, which the sample was comprised mostly of fish < stock length. The high catch rate of sub-stock length fish was likely attributed to high survival of fish from recent stockings. Mean relative weights ranged from poor (<85) to optimal (>95) and improved with body length.

Largemouth Bass: Largemouth Bass CPUE declined from 191.0/h in 2016, to 91.0/h in 2018, to 85.0/h in 2020 (Figure 5). Catch rates of stock length fish fluctuated from 132.0/h in 2016 to 44.0/h in 2018 and to 77.0/h in 2020. Catch rate of legal length individuals increased from 2.0/h in 2016 to 26.0/h in 2020. Size structure, as represented by PSD, had increased representation of fish >stock length, but recruitment appeared to be lower in 2020 compared to the 2016 survey. Reduced recruitment was likely attributed to a decrease in water level and reduced littoral and optimal spawning habitat. Largemouth Bass mean relative weights ranged from 89 – 116, with most inch groups having relative weights 90 – 93. All Largemouth Bass collected for age estimation at legal length (13.0-14.9 inches) were 2 years old (i.e., 2018 year class; Figure 6). Genetic analysis of fin clips collected from the 2020 sample indicated that three fish were pure Florida Largemouth Bass, and two individuals were pure Northern Largemouth Bass; the other fish in the sample were intergrade Largemouth Bass (Table 8). Overall, FLMB allele frequencies were similar in the 2020 sample compared to 2016, though fewer pure NLMB were observed in 2020.

Crappie: Prior to 2016, Black Crappie were not found in Clyde Reservoir, and were likely introduced during the flooding. Both White and Black Crappie exist in Clyde Reservoir, although White Crappie were the dominant species. In 2020, crappie were caught at 10.6/nn, and most were stock length (7.6/nn; Figure 7). Catch of legal crappie was 2.4/nn. In the 2020 survey, PSD was 58, thus the sample represented a relatively balanced population with sufficient recruitment as well as adequate representation of fish ≥ stock length. Mean relative weights for crappie ranged from 78 to 112, and most inch groups were in fair condition (i.e., 85-95).

Fisheries Management Plan for Clyde Reservoir, Texas

Prepared – July 2021

ISSUE 1: Clyde Reservoir is subject to extreme water fluctuations and prolonged drought. The drought conditions cause reductions in available fisheries, habitat, and poor recruitment. Addition of structural habitat and aquatic vegetation may help add refugia for popular sport fish and prey during extreme drought periods.

MANAGEMENT STRATEGIES

1. Discuss potential habitat enhancement opportunities with the City of Clyde.
2. Consider stocking Largemouth Bass, Channel Catfish, and Bluegill fingerlings upon a substantial rise in water level (i.e., >6 feet) after periods of prolonged drought.

ISSUE 2: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches, and plugging engine cooling systems. Giant salvinia and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing, and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Contact and educate marina owners about invasive species, and provide them with posters, literature, etc. so that they can in turn educate their customers.
3. Educate the public about invasive species with 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 Management Plan and Schedule (2021-2025)

Sport fish, prey fish, and other important fishes: Historically important sport fisheries included Largemouth Bass, White and Black Crappie, Blue Catfish, and Channel Catfish. Important prey species in the reservoir included Gizzard Shad, Bluegill, Green Sunfish, Longear Sunfish, and Inland Silversides. Sampling schedule for 2021-2024 is displayed in Table 9.

Low-density Species

Blue and Flathead Catfish: Blue and Flathead Catfish previously existed in the reservoir and catch of both species in gill netting surveys was low. Monitoring of presence/absence of these fishes will be conducted during surveys targeting other important sportfish species.

Survey objectives, fisheries metrics, and sampling objectives

Prey species: Monitoring surveys for prey have traditionally been conducted biennially while sampling for Largemouth Bass. However, biennial monitoring may be unnecessary to assess trends in relative abundance unless there are substantial changes to habitat availability from drought and consequently low water level. Trend data for CPUE and size structure will be collected during a fall 2024 electrofishing survey. During sampling, target precision for CPUE-Total of important prey will be $RSE \leq 25\%$, specifically Gizzard Shad, Bluegill, and Longear Sunfish. Index of Vulnerability will be calculated from a sample for Gizzard Shad to assess the relative proportion of individuals in the population that are of suitable prey sizes for sport fish. A target of ≥ 50 stock length fish will be sampled to and PSDs will be calculated for Bluegill to evaluate their size structures. Additional sampling to meet objectives for prey species will occur only if additional sampling for Largemouth Bass is needed.

Largemouth Bass: Largemouth Bass support an anecdotally popular fishery, and monitoring has traditionally been conducted biennially. Biennial monitoring may be unnecessary to assess trends in relative abundance unless there are substantial changes to habitat availability from drought and low water level. Largemouth Bass will be surveyed during fall 2024 for 1 hour at 12, 5-minute randomly selected stations. Target precision will be $RSE \leq 25$ for CPUE-Total and Stock CPUE will be attempted; for legal fish, no target level of precision will be set. A sample of ≥ 50 stock fish will be sampled to calculate PSD to evaluate size structure. Lengths and weights will be measured from a target of 5 fish per represented inch group $>$ stock length to calculate mean relative weights and assess body conditions. Collect otoliths from 13 fish 13.0-14.9 inches TL to assess growth to legal length. If objectives are not achieved, then up to 1.0 hour of additional electrofishing may be conducted to improve data precision and/or sample size.

Channel Catfish: Channel Catfish support a popular fishery and tandem hoop netting has been an effective method at catching fish for monitoring. Tandem hoop netting will be conducted during summer 2024 for Channel Catfish to monitor trends in relative abundance and body condition. Tandem hoop nets will be set over two nights at 5 randomly selected stations for a total of 5 tandem series sets. Series will be set at depths ≤ 12 feet to avoid potentially anoxic conditions. Relative abundance (i.e., CPUE-Total, Stock CPUE, and CPUE-12) will be calculated and length data will be recorded. A target $RSE \geq 25$ will be attempted for CPUE-Total and Stock CPUE. A sample of ≥ 50 fish will be collected to assess PSD, and at least 5 fish/inch group will be weighed and measured to evaluate body conditions. A Category I age sample will be collected to determine what year classes are present in the reservoir, and to determine if individuals are recruits from the prior stockings. If objectives are not met, up to 5 additional tandem series may be set if deemed feasible.

Crappie: White Crappie supported a quality fishery at the reservoir prior to the recent drought. Black Crappie were introduced and have now become established in low numbers. Currently, White and Black Crappie both support a recovering fishery. Exploratory trap netting was conducted during fall 2020, and the lower catch rates of White and Black Crappie suggested that these populations are still developing. Biennial trap

netting may be necessary to monitor the recovery of crappie in the reservoir as well as to help inform crappie management decisions to be made for the reservoir. Sampling will be conducted at 5 randomly selected stations for a total of 5 net nights during fall 2022 and fall 2024. A target of $RSE \geq 30$ for CPUE-Total and Stock CPUE will be attempted for White and Black Crappie in combination, and ≥ 50 stock length fish will be collected to evaluate PSD. Five fish per inch group \geq stock length will be measured and weighted to assess body conditions.

Literature Cited

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Tables and Figures

Table 1. Characteristics of Clyde Reservoir, Texas.

Characteristic	Description
Year Constructed	1970
Controlling Authority	City of Clyde
County	Callahan
Reservoir Type	Mainstem
River Basin	Colorado
Conservation Pool Level (ft. above mean sea level)	1,872
USGS 8-Digit Hydrologic Unit Code for Watershed	12090107 (Pecan Bayou)

Table 2. Boat ramp characteristics for Clyde Reservoir, Texas.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Ramp #1	32.31463° -99.47263°	Y	15	1,858	Accessible
Ramp #2	32.31531° -99.47217°	Y	15	1,863	Accessible

Table 3. Harvest regulations for Clyde Reservoir, Texas.

Species	Bag Limit	Length limit
Catfish: Channel and Blue, their hybrids and subspecies	25 (in any combination)	12-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 for Clyde Reservoir, Texas. FGL = Fingerlings; AFGL=Advanced Fingerlings; ADL = Adult; FRY=Fry; UNK=Unknown.

Species	Year	Number	Size
Threadfin Shad	1984	1,000	ADL
	1990	2,343	ADL
	1991	2,812	ADL
	Total	6,155	
Blue Catfish	1980	6,800	UNK
	1997	50,800	FGL
	1998	50,839	FGL
	Total	108,439	
Channel Catfish	1980	12,000	ADL
	1981	28,015	ADL
	1991	12,548	AFGL
	2004	21,957	ADL
	2016	37,174	FGL
	2017	45,417	FGL
	2019	48,462	FGL
Total	205,573		
Bluegill	2016	15,811	FGL
Largemouth Bass	1976	10,000	UNK
Florida Largemouth Bass	1979	2,500	AFGL
	1988	50,784	FGL
	1997	50,428	FGL
	2004	45,277	FGL
	2005	45,398	FGL
	2016	15,986	FGL
	2017	49,350	FGL
Total	259,723		
Fathead Minnow	2016	4,167	ADL
Walleye	1979	900,000	FRY

Table 5. Objective-based sampling plan for Clyde Reservoir, Texas (2017-2021).

Gear/target Species	Survey Objective	Metrics	Sampling Objective
<i>Electrofishing</i>			
Largemouth Bass	Abundance	CPUE-Total, Stock CPUE, CPUE-14	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	$N \geq 50$ stock
	Condition	W_r	10 fish/inch group (max)
	Genetics	% FLMB	$N = 30$, any age
Bluegill	Abundance	CPUE–Total	$RSE \leq 25$
	Size structure	PSD, length frequency	$N \geq 50$
Gizzard Shad	Abundance	CPUE–Total	$RSE \leq 25$
	Prey availability	IOV	$N \geq 50$
<i>Tandem hoop netting</i>			
Channel Catfish	Abundance	CPUE-Total, Stock CPUE, CPUE-12	Practical effort
	Size Structure	PSD, length frequency	$N \geq 50$
<i>Trap netting</i>			
Crappie	Abundance	CPUE-Total, Stock CPUE, CPUE-10	Practical effort
	Size structure	PSD, length frequency	$N \geq 50$

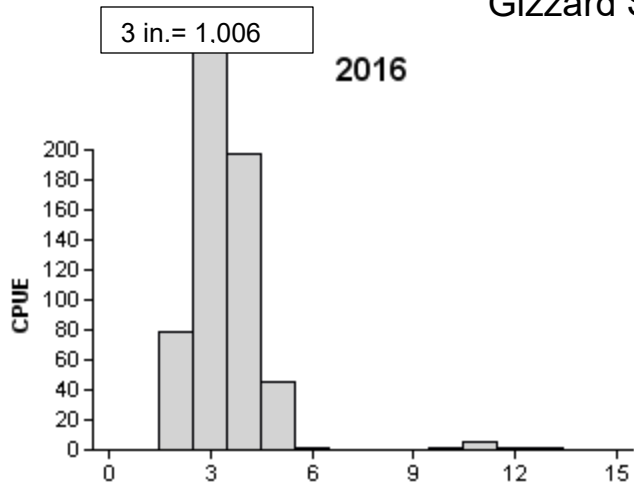
Table 6. Survey of structural habitat types, Clyde Reservoir, Texas, July 2020. Percent occurrence with lower and upper 95% confidence limits (CL) of shoreline structural habitat at 75 random sites.

Structural Habitat Type	Percent Occurrence	Lower CL	Upper CL
Natural Shoreline	52.0	40.9	62.9
Rocky Shoreline	44.0	33.3	55.3
Gravel	2.7	0.7	9.2
Rock Bluff	1.3	0.2	7.2

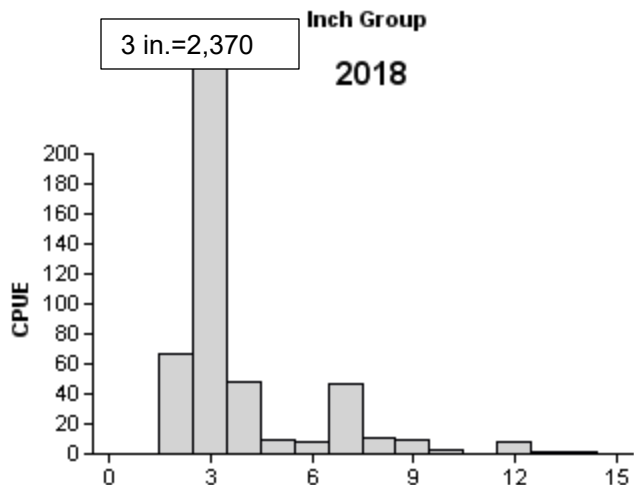
Table 7. Percent occurrence with lower and upper 95% confidence limits (CL) of vegetation at 99 random sites throughout the reservoir and 75 sites along the shoreline in Brownwood Reservoir, Texas, July, 2020.

Habitat	Throughout the Reservoir			Shoreline		
	Percent Occurrence	Lower CL	Upper CL	Percent Occurrence	Lower CL	Upper CL
Open Water/Featureless	68.7	59.0	77.0	82.7	72.6	89.6
Flooded Terrestrial Brush	31.3	23.0	41.0	6.7	2.9	14.7
Standing Timber	2.0	0.6	7.1	0.0	0.0	0.0
Common Buttonbush	2.0	0.6	7.1	10.7	5.5	19.7

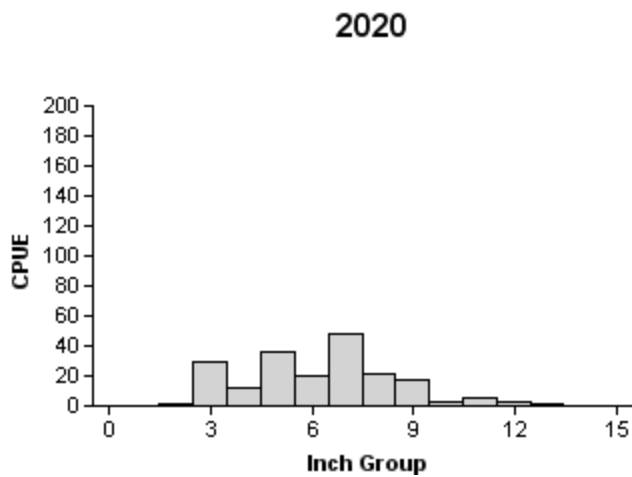
Gizzard Shad



Effort = 1.0
 Total CPUE = 1,338.0 (32; 1338)
 IOV = 99 (0)



Effort = 1.0
 Total CPUE = 2,584.0 (24; 2584)
 IOV = 99 (1)



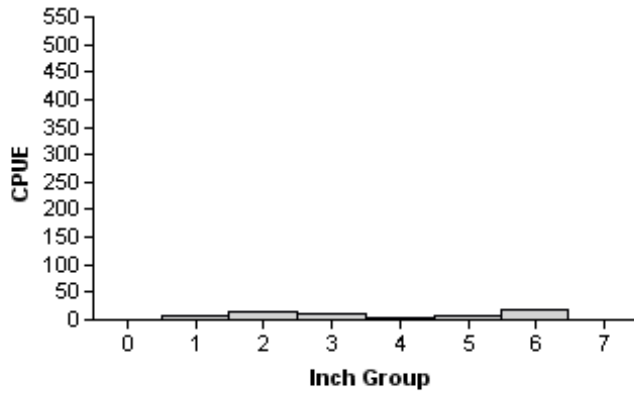
Effort = 1.0
 Total CPUE = 199.0 (38; 199)
 IOV = 74 (4)

Figure 1. Number of Gizzard Shad caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for Index of Variability are in parentheses) during the 2016, 2018, and 2020 fall electrofishing surveys, Clyde Reservoir, Texas.

Bluegill

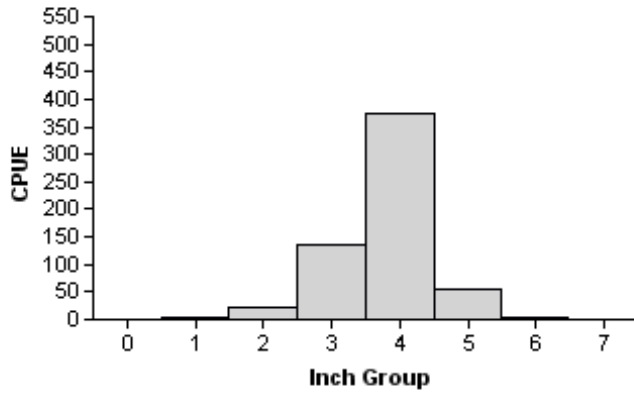
2016

Effort = 1.0
 Total CPUE = 63.0 (23; 63)
 PSD = 44 (7)



2018

Effort = 1.0
 Total CPUE = 592.0 (16; 592)
 PSD = 0 (0)



2020

Effort = 1.0
 Total CPUE = 1,182.0 (16; 1182)
 PSD = 1 (0)

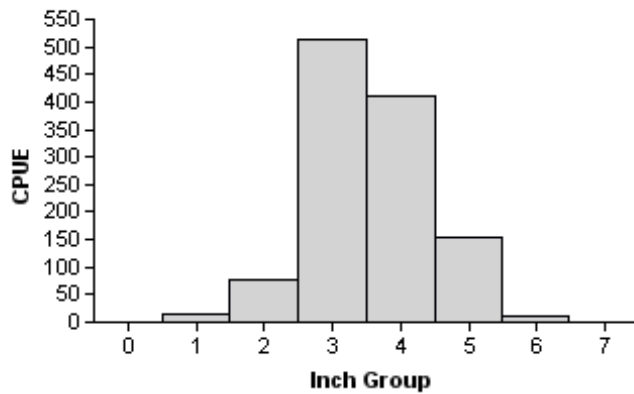


Figure 2. Number of Bluegill caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) during the 2016, 2018, and 2020 fall electrofishing surveys, Clyde Reservoir, Texas.

Green Sunfish

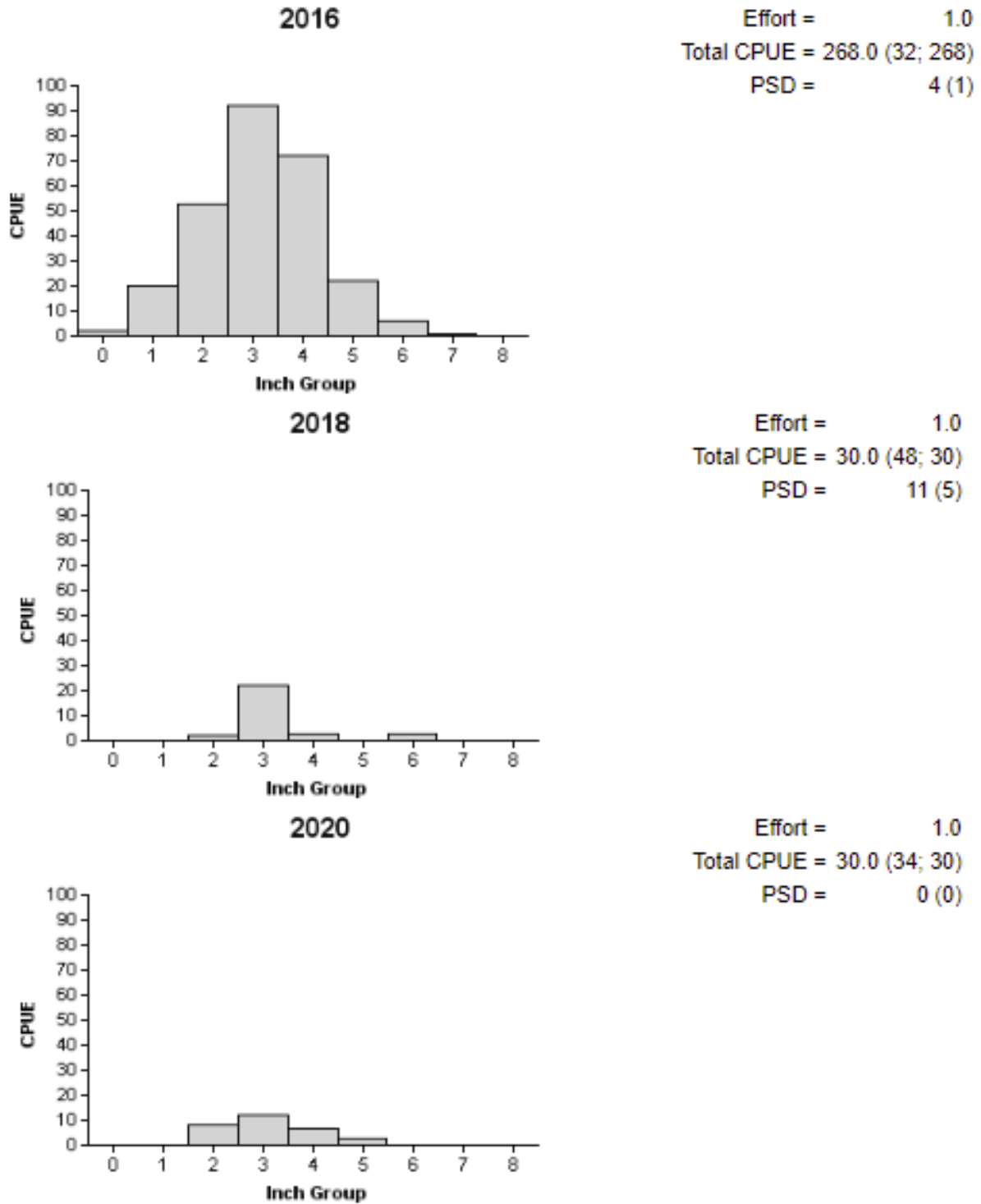


Figure 3. Number of Green Sunfish caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) during the 2016, 2018, and 2020 fall electrofishing surveys, Clyde Reservoir, Texas.

Channel Catfish

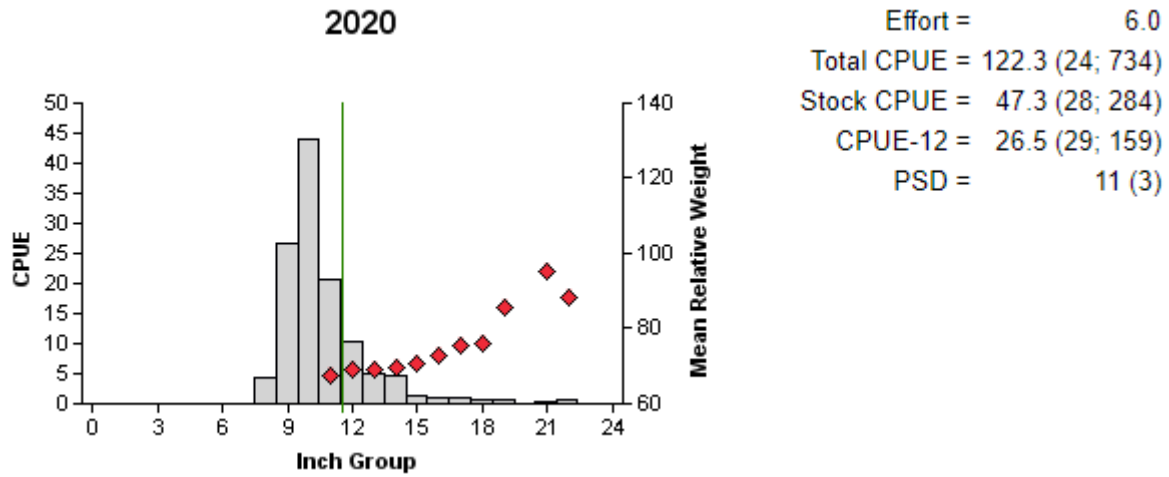


Figure 4. Number of Channel Catfish caught per tandem series (CPUE, bars), population indices (RSE and N for CPUE and SE for size structure are in parentheses), and mean relative weights (diamonds) during the summer 2020 tandem hoop netting survey, Clyde Reservoir, Texas. The vertical line depicts the 12-inch minimum length limit.

Largemouth Bass

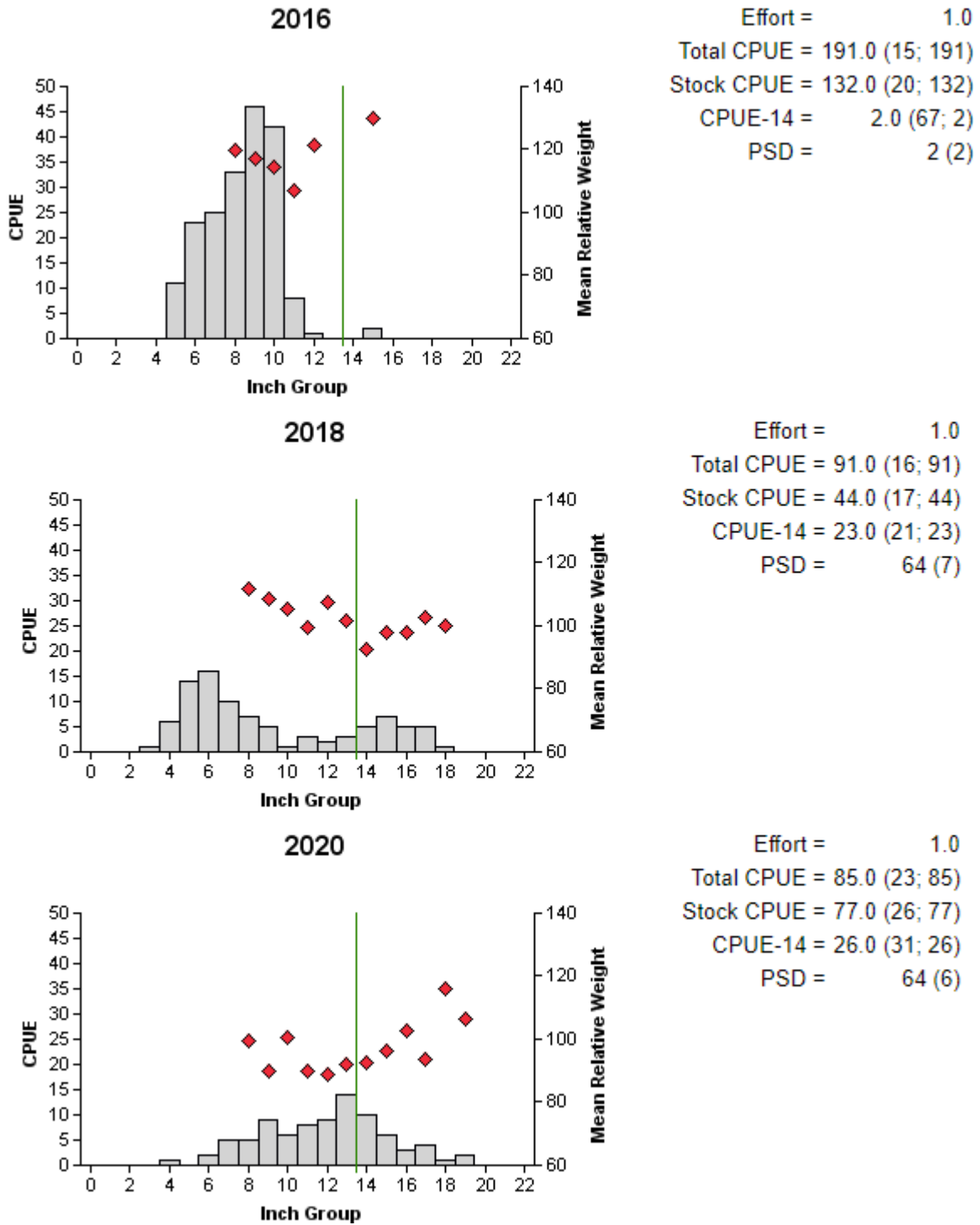


Figure 5. Number of Largemouth Bass caught per hour (CPUE, bars), population indices (RSE and N for CPUE and SE for size structure are in parentheses), and mean relative weights (diamonds) during the 2016, 2018, and 2020 fall electrofishing surveys, Clyde Reservoir, Texas. The vertical line depicts the 14-inch minimum length limit.

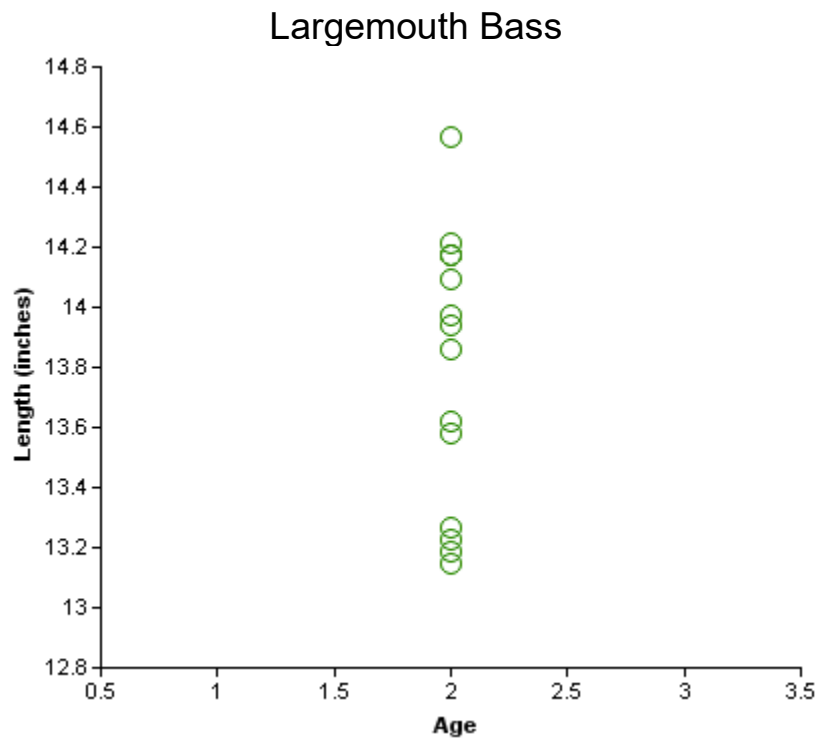


Figure 6. Age at 13.0-14.9 inches total length for Largemouth Bass collected during fall 2020 electrofishing, Clyde Reservoir, Texas.

Table 8. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Clyde Reservoir, Texas, 2016 and 2020. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, F1 = first generation hybrid between a FLMB and a NLMB, Fx = second or higher generation hybrid between a FLMB and a NLMB. Genetic composition was determined with micro-satellite DNA analysis.

Year	Sample size	Number of Fish				% FLMB alleles	% pure FLMB
		FLMB	F1	Fx	NLMB		
2016	30	5	0	18	7	42.5	16.7
2020	28	3	4	19	2	45.7	10.7

Crappie

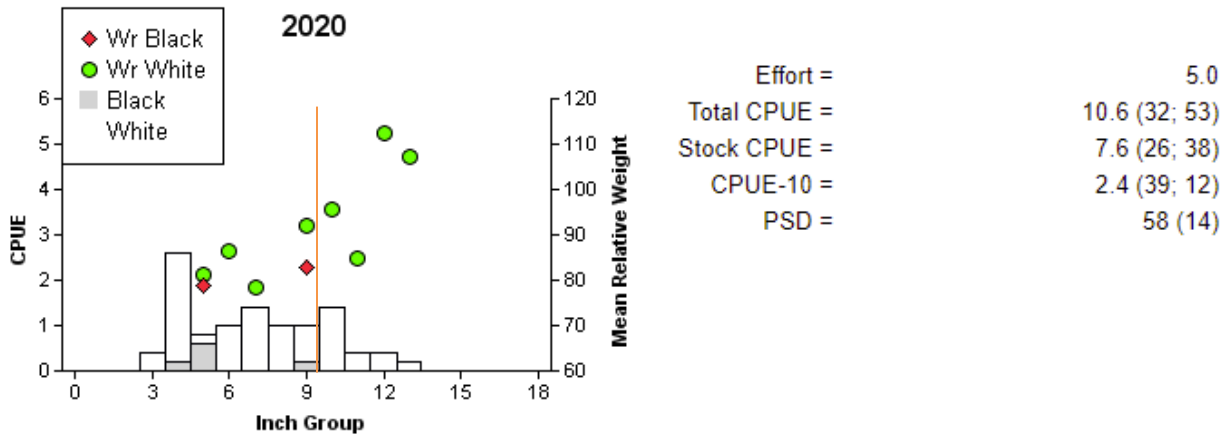


Figure 7. Number of White Crappie (white bars) and Black Crappie (gray bars) caught per net night (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses), and mean relative weights (circles, White Crappie; diamonds, Black Crappie) during the 2004, 2008, and 2020 fall trap netting surveys, Clyde Reservoir, Texas. The vertical line depicts the 10-inch minimum length limit.

Proposed Sampling Schedule

Table 9. Proposed sampling schedule for Clyde Reservoir, Texas. The survey period is June through May. Tandem hoop net surveys are conducted in the summer, and electrofishing and trap netting surveys are conducted in the fall. Scheduled surveys are denoted with "X."

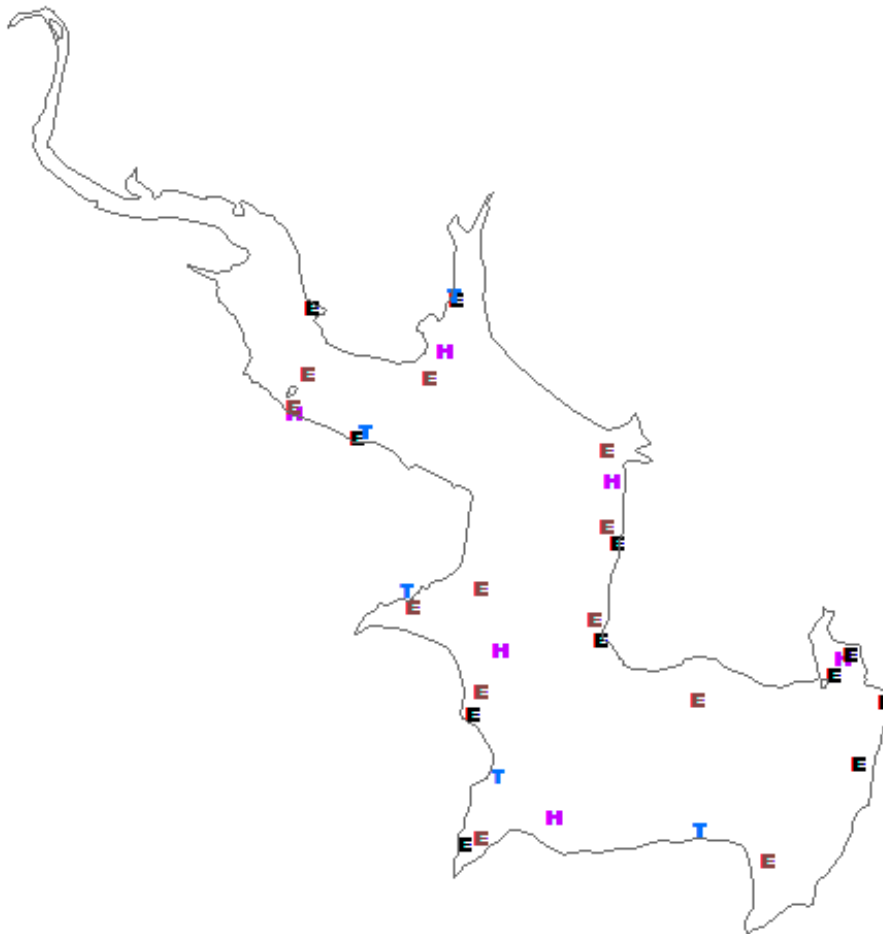
Survey Type	Survey year			
	2021-2022	2022-2023	2023-2024	2024-2025
Angler Access				X
Structural Habitat				
Vegetation				X
Tandem Hoop Netting				X
Electrofishing – Fall				X
Trap Netting		X		X
Report				X

APPENDIX A – Catch rates for all species and all gears

Number (N), catch rate (CPUE), and associated relative standard error (RSE; in parentheses) for all species collected from fall 2020 electrofishing, summer 2020 tandem hoop netting, and fall 2020 trap netting in Clyde Reservoir, Texas.

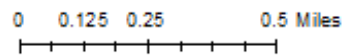
Species	Electrofishing		Trap Netting		Tandem Hoop Netting	
	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad	199	199.0 (38)				
Channel Catfish					734	122.2 (24)
Green Sunfish	30	30.0 (34)				
Warmouth	11	11.0 (41)				
Orangespotted Sunfish	1	1.0 (100)				
Bluegill	1,182	1,182.0 (16)				
Longear Sunfish	23	23.0 (30)				
Redear Sunfish	5	5.0 (46)				
Largemouth Bass	85	85.0 (23)				
White Crappie			48	9.6 (33)		
Black Crappie			5	1.0 (45)		

APPENDIX B – Map of sampling locations



Legend

-  Reservoir
-  2018 Electrofishing
-  2020 Trap Net
-  2020 Hoop Net
-  2020 Electrofishing



A map of the electrofishing (E), tandem hoop netting (H), and trap netting (T) stations sampled during the 2017-2021 monitoring period, Clyde Reservoir, Texas.



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