Twin Buttes 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 Twin Buttes Reservoir were surveyed in 2017 and 2019 using electrofishing, trap netting and in 2018 and 2020 using gill netting. Tandem hoop netting was used in 2020. Historical data are presented with the 2017-2020 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: Twin Buttes Reservoir is a 9,080-acre impoundment located 3 miles southwest of San Angelo, Texas in Tom Green County. The reservoir consists of two pools ("North Pool" and "South Pool") connected by an equalization channel. This eutrophic reservoir experiences dramatic water level fluctuations and has extensive fish habitat mostly in the form of flooded terrestrial vegetation.

Management History: Important sport fish include White Bass, Largemouth Bass, White Crappie, and catfishes. Sport fishes have been managed with statewide regulations.

Fish Community

- **Prey species:** Electrofishing catch of Gizzard Shad was poor and less than one-third of Gizzard Shad were available as prey to most sport fish. Electrofishing catch of Bluegill was adequate, but lower than previous surveys.
- **Catfishes:** The Blue, Channel, and Flathead Catfish populations continued to be characterized by low abundance, but with quality sizes. Blue and Channel Catfish over 20 inches were common and one Flathead Catfish at 38 inches was collected.
- **Temperate basses:** White Bass were present in the reservoir at low abundance. However, large individuals have been observed.
- **Largemouth Bass:** Largemouth Bass electrofishing catch rate was the highest on record due to a strong spawn in 2019. The electrofishing catch rate of fish over 14 inches was low, but catch rates were likely influenced by the increase in water levels. Largemouth Bass growth was good and body condition was above average.
- **White Crappie:** White Crappie abundance was good with many crappie over 10 inches available to anglers. Most crappie reached legal size within two years and size structure was excellent.

Management Strategies: Conduct additional electrofishing and trap netting surveys in 2021, and general monitoring surveys with trap nets, gill nets, and electrofishing surveys in 2023-2024. Access and vegetation surveys will be conducted in 2023. An access-point creel survey will be conducted from June 2023 through May 2024.

Introduction

This document is a summary of fisheries data collected from Twin Buttes Reservoir in 2017-2020. 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 2017-2020 data for comparison.

Reservoir Description

Twin Buttes Reservoir was constructed in 1963 on the South and Middle Concho Rivers, three miles southwest of San Angelo. The 9,082-acre impoundment is used for recreation, municipal water supply and irrigation. The reservoir consists of two pools ("North Pool" and "South Pool") connected by an equalization channel. Twin Buttes is susceptible to significant water level fluctuations when rainfall occurs within its catchment area. After construction in 1963, the reservoir remained low (< 10% capacity) until heavy rains in 1971 and 1974 filled the reservoir to full pool. From 1974 to 1977 Twin Buttes was at or near full pool, after which it never reached full pool again. Throughout its history, the reservoir has experienced sharp water level rises of greater than 20 vertical feet on five different occasions (1971,1974, 1986, 2004, and 2018). Conversely the reservoir has also experienced extended periods of very low water levels; Twin Buttes was below 15% capacity from 1963 to 1974, 1999 to 2004 and again from 2011 to 2018 (Figure 1). Twin Buttes Reservoir was eutrophic with a mean TSI Chl-*a* of 59.7 (Texas Commission on Environmental Quality 2020). Other descriptive characteristics for Twin Buttes Reservoir are presented in Table 1.

Angler Access

Twin Buttes Reservoir has five public boat ramps and no private boat ramps. Boat launching from unimproved bank areas was available during low water periods when ramps are out of the water. Additional boat ramp characteristics are in Table 2. Shoreline access is abundant at the public boat ramp areas during low water periods; however, bank access was limited after the water level rise in 2018, which pushed the shoreline up into the flooded terrestrial habitat. No fishing piers or disabled access facilities were available. Twin Buttes is located within the Twin Buttes Wildlife Management Area (TPWD) and the Limited Public Use Permit is required to access the reservoir.

Management History

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

1. Monitor Largemouth Bass with electrofishing in 2017 and 2019, Continue to stock Florida Largemouth bass, contingent upon good water levels, conduct genetic analysis in 2019, and conduct an access creel survey from 2019-2020.

   Action: Electrofishing surveys were conducted in 2017 and 2019. A genetics sample was taken in 2019. Florida Largemouth Bass were stocked in 2018 and 2019. The creel survey was delayed due to the extreme water level increase in 2018.

2. Sample Channel Catfish with baited tandem hoop nets in spring 2020 and Flathead Catfish with low frequency electrofishing in 2018.

   Action: Channel Catfish were sampled in 2020 and Flathead Catfish were sampled in 2017.

3. Cooperate with all controlling authorities (City of San Angelo, TPWD, Bureau of Reclamation) to post signage, educate the public about invasive species, and track existing and future inter-basin water transfers to facilitate potential invasive species responses.

Action: The San Angelo District continued to work with the controlling authorities to post signage and to educate the public on invasive species threats through media outlets.

Harvest regulation history: Sport fishes in Twin Buttes Reservoir are currently managed with statewide regulations (Table 3).

Stocking history: Species stocked have included Threadfin Shad, Blue Catfish, Channel Catfish, Florida and Northern Largemouth Bass, and Striped Bass. Additional Florida Largemouth Bass stockings were conducted in 2019 to take advantage of abundant flooded habitat. Sharelunker Largemouth bass fingerlings were stocked in 2018. Smallmouth Bass and Walleye were stocked in the past, but they failed to establish viable fisheries. The complete stocking history is in Table 4.

Vegetation/habitat management history: Historically, Twin Buttes Reservoir has had severely fluctuating water levels (Figure 1). Flooded terrestrial vegetation has been the primary fish habitat, but native submerged vegetation (e.g., Illinois pondweed, coontail) has been present in recent surveys. The reservoir has no significant habitat management history.

Water transfer: Water from Twin Buttes Reservoir is used by the City of San Angelo to maintain water levels in Nasworthy Reservoir. Farmers receive water through an irrigation system and are entitled to 10,000 acre/feet year only when Twin Buttes has greater than 50,000 acre/feet in storage. No interbasin water transfers are known to occur at this reservoir.

Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Twin Buttes Reservoir (Wright 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, sunfishes, Gizzard Shad, and Threadfin Shad were collected by electrofishing (1.6 hour at 19, 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 14.9 inches).

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

Gill netting – Blue Catfish, Channel Catfish, and White Bass were collected by gill netting (10 net nights at 10 stations). CPUE for gill netting was recorded as the number of fish caught per net night (fish/nn).

Low-frequency electrofishing – Flathead Catfish were collected by low-frequency electrofishing at 4 stations for a total of 70 minutes (three 20-minute stations and one 10-minute station). Sampling was exploratory with no defined objectives. Sampling locations were biologists selected. CPUE for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing.

Tandem hoop nets – Channel Catfish 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).

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 was used to determine genetic composition of individual fish since 2005. Electrophoresis analysis was used prior to 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 (W_r)] were calculated for target fishes according to Anderson and Neumann (1996). Index of Vulnerability (IOV) was calculated for Gizzard Shad (DiCenzo et al. 1996). Standard error (SE) was calculated for structural indices and IOV. Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE and creel statistics.

Habitat – A structural habitat survey was last conducted in 2007. A vegetation survey was conducted in 2019. 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 2020).

Results and Discussion

Habitat: The most recent structural habitat survey occurred in 2007 (Scott and Farooqi 2008). Nearly all shoreline areas are undeveloped and due to constantly fluctuating water levels, habitat conditions are constantly changing (Figure 1). Generally, shoreline habitat consists of gravel, rocky, and clay banks typical of many West Texas reservoirs. Due to a historic water level rise in fall of 2018, flooded terrestrial habitat (salt cedars and mesquite) was abundant and composes nearly all habitat in the north pool. The south pool receives constant inflow from the spring fed South Concho River and maintains a more stable water level. Nearly all aquatic vegetation occurs in the south pool. In 2019, 808 acres of native submerged vegetation was documented (Table 6) consisting primarily of Illinois pondweed, sago

pondweed, coontail, and chara. Emergent native vegetation was limited to 41 acres and was primarily Water willow and Cattail. Trace amounts of floating vegetation, yellow pond-lily and the non-native parrot feather, were also observed. The 2019 survey revealed a similar percent vegetation coverage from the 2007 survey (Table 6).

Prey species: Total CPUE of Gizzard Shad was less than 100.0/h over the past two surveys (Figure 2) indicating a poor abundance. Index of Vulnerability (IOV) for Gizzard Shad was poor, over the past 3 surveys IOV has ranged from 21 to 37 (Figure 2), indicating that fewer than one-third of all Gizzard Shad were small enough to be utilized by most sportfish. Electrofishing catch rates of Bluegill was 190.1/h in 2019, which was somewhat lower than the 330.0/h in 2017 (Figure 3). Bluegill size structure continued to be dominated by individuals less than 6 inches as indicated by PSD values of 12 and 14 (Figure 3). Combined total catch rate of all sunfish species was 344.8/h in 2019 (Appendix A). Although the forage base appears to be somewhat below average, relative weights for most sport fish were above 90, thus these species are providing an adequate forage base.

Catfishes: The total catch rate of Blue Catfish was low at 1.3/nn in 2020, but slightly higher than previous surveys (Figure 4). Most Blue Catfish collected in gill nets ranged from 20-25 inches, a size desirable to most catfish anglers. Condition was adequate for Blue Catfish around 20 inches, but increased with increasing fish size, as larger Blue Catfish could presumably take advantage of the larger Gizzard Shad present in the reservoir. Blue Catfish were not collected during LFE in 2017.

Channel Catfish abundance in Twin Buttes Reservoir was low. The gill net catch rate of Channel Catfish was 2.1/nn in 2020, which is marginally higher than 1.3/nn in 2016 and 1.0/nn in 2008 (Figure 5). Despite the low catch rate, quality size Channel Catfish were present with a good proportion over 20 inches (Figure 5). Channel Catfish condition was good, relative weights were above 100 for most length groups in 2020. Catch rate of Channel catfish in tandem baited hoop nets in spring 2020 was 0.5/net series (Appendix A). Channel Catfish collected in hoop nets ranged from 10-23 inches.

Flathead Catfish were collected with low-frequency electrofishing in summer 2017 and total catch was 82.3/h (Figure 6). Flathead Catfish from 2 to 27 inches were collected, however, we were unable to collect any large fish which are known to be present in the reservoir. Sampling was only effective near the riprap along the dam and we focused our effort in that area; thus, the sample is likely biased toward smaller Flathead that prefer riprap habitat and would not be representative of size structure. Despite this, the presence of many small Flathead Catfish would indicate recruitment is good. Body condition for Flathead over 18 inches was marginal with relative weights around 90 (Figure 6). Gill net catch rate of Flathead Catfish has been low over the past three surveys (< 1.0/nn), however, the few fish collected have been of quality size ranging from 21 to 38 inches. Anecdotal evidence indicates the catch of large Flathead Catfish in Twin Buttes Reservoir is not uncommon and the lake record is 73.35 lbs. and was caught in 2014.

White Bass: The gill net catch rate of White Bass was 3.4/nn in 2020, which was slightly up from the 2.2/nn caught in 2016 and 2008 (Figure 7). The presence of 5 to 6-inch White Bass indicate a successful spawn. Rivers were still flowing in spring 2019 and conditions were likely good for White Bass spawning and recruitment. White Bass condition was good in 2020, relative weights were near or above 100 for most inch groups (Figure 7). A new lake record for Twin Buttes was caught in January 2020 and was 18.13 inches long and weighed 3.5 lbs.

Largemouth Bass: The total electrofishing catch rate Largemouth Bass was 425.1/h in 2019, which was the highest on record for Twin Buttes and more than double any other survey (Figure 8). The high catch rate can be attributed to the strong year-class produced in spring 2019, as the catch rate of Largemouth Bass from 3-6 inches was 379.6/h. Size structure was not adequate as a PSD of 26 was estimated in both 2019 and 2017 (Figure 8). Size structure will likely continue to be dominated by smaller individuals until the large 2019 year-class grows into quality and preferred sizes. Growth of Largemouth Bass in Twin Buttes Reservoir was good in 2017; average age at 14 inches (13.0 to 14.9 inches) was 2.0 years (N = 13; all 2 years old). This was marginally faster than in 2007 when Largemouth Bass, on average, reached 14 inches in 2.3 years (N = 7; range 2-3 years). Body condition in 2019 was above average with relative

weights from 92 to 112 among all size classes of fish and was similar to body condition in 2017 (Figure 10). Florida Largemouth Bass influence has remained relatively stable as Florida alleles were 57% in both 2015 and 2019 (Table 7). A legacy class Sharelunker (13.4 lbs.) was caught and loaned to TPWD in March 2018. Due to increases in water levels that affected sampling in 2019, we did not meet our objective to collect 50 stock size fish and data indicated sufficient numbers would not be collected within reasonable effort.

White Crappie: The trap net catch rate of stock-size White Crappie was 6.2/nn in 2019, which was similar to 2017 (6.8/nn) but lower than 2015 (8.5/nn). The proportion of White crappie over 10 inches (PSD-P) has improved over the past three surveys, increasing from 1 to 39 from 2015 to 2019 (Figure 9). Body condition was adequate in 2019; mean relative weight was near 95 for most inch groups (Figure 9). Growth was fast in 2019, average age at 10 inches (9.0 to 10.9 inches) was 1.8 years (N = 8; range 1-3 years) and was slightly faster than the 2.2 years observed in 2017 (N = 14; range 1-3 years). Due to limited catch of crappies from 9.0-10.9 inches, we did not meet our objectives for a 13 fish age and growth sample.

Fisheries Management Plan for Twin Buttes Reservoir, Texas

Prepared – July 2020

ISSUE 1: A strong Largemouth Bass year-class was produced in spring 2019 due primarily to a historic water level rise the previous fall which created abundant flooded habitat. Twin Buttes has a history of producing trophy bass and was heavily stocked with Florida strain Largemouth Bass in 2018 and 2019. Additional sampling is needed to monitor changes to the bass population and angler trends.

MANAGEMENT STRATEGY

1. Sample the Largemouth Bass population with fall electrofishing in 2021 and 2023.
2. Conduct a year-long creel survey in 2023-2024. Choice of access or roving creel will be dependent on water level at time of survey.

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 (*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 (2021–2024)

Sport fish, forage fish, and other important fishes

Sport fish in Twin Buttes Reservoir include Largemouth Bass, White Crappie, White Bass, and Catfish species. Important prey species include sunfish and Gizzard Shad.

Low-density fisheries

None.

Survey objectives, fisheries metrics, and sampling objectives

Largemouth Bass: Largemouth Bass are the most sought-after fish in Twin Buttes Reservoir. Results from the 2009-2010 creel survey data shows 70% of angler effort is directed towards Largemouth Bass. Anglers spent 25,764 hours fishing for Largemouth Bass during the 2009-2010 creel survey and when water levels are up, attracts local bass club tournaments. A very strong year-class of Largemouth Bass was produced in 2019 and the development of this fishery needs to be monitored. Our objectives are to monitor trends in abundance, size structure, condition, and growth. Continuation of biennial trend data in this reservoir with night electrofishing in the fall will allow for determination of any large-scale changes in the Largemouth Bass population. A minimum of 18 randomly selected 5-min electrofishing sites will be sampled in fall 2021 and 2023 (Table 8). Sampling objectives are to obtain 50 stock-size fish for size structure estimation and an RSE of CPUE-Stock < 25 (the anticipated effort to meet both sampling objectives is 18 stations with 80% confidence). Eighteen random stations will be sampled, and six additional random stations will be pre-determined in the event some extra sampling is necessary. A maximum of 24 stations will be sampled. Fin samples will be taken from 30 fish and submitted for genetic analysis in 2023. Otoliths from 13 fish between 13.0 and 14.9 inches will be collected to determine mean age at 14 inches in 2023.

White Crappie: The 2009-2010 creel survey indicated White Crappie were the second most popular species among anglers with 10% of the directed effort and a total of 3,544 hours/year fished. This crappie fishery is popular with local anglers. Our objectives are to monitor trends in abundance, size structure, condition, and growth. A minimum of 10 randomly selected trap net sites will be sampled in 2021 and 2023 (Table 8). Sampling objectives are to obtain 50 stock-size fish, an RSE of CPUE-Stock < 25, and otoliths from 13 fish between 9.0 and 10.9 inches will be collected to determine mean age at 10 inches. The anticipated effort to meet these sampling objectives is 10-15 stations. Beyond the original 10 random stations, 5 additional random stations will be pre-determined in the event some extra sampling is necessary. A maximum of 15 stations will be sampled.

Catfishes: Blue, Channel, and Flathead Catfish are all present in Twin Buttes Reservoir. The catfish populations can be described as low abundance, but with quality size fish. Despite low catch rates, survey data indicate quality size catfish are present in the reservoir and lake records indicate the large fish can be produced. The lake record Flathead is 73.35 lbs. while the Blue Catfish record is 52.5 lbs. Baited tandem hoop nets and LFE have been ineffective for sampling catfish populations and will not be used. Survey objectives will be to monitor catfish species abundance and length frequency with gill netting every 4 years. No objectives for the level of precision will be established. A survey consisting of 10

randomly selected gill net sites will occur in spring 2024 (Table 8). No additional sampling will be conducted beyond the original 10 random stations.

White Bass: White Bass are present in Twin Buttes Reservoir, however historical catch rates in gill nets have been low. Despite the low catch rates, anglers frequently target White Bass on Twin Buttes indicating the fishery may be better off than the gill net data would indicate. In January 2020 a new lake record White Bass was caught weighing 3.5 lbs. As per catfish objectives above, survey objectives will be to monitor White Bass abundance and length frequency with gill netting every 4 years. No objectives for the level of precision will be established. A survey consisting of 10 randomly selected gill net sites will occur in spring 2024 (Table 8). No additional sampling will be conducted beyond the original 10 random stations.

Gizzard Shad and Bluegill: Gizzard Shad and Bluegill are the primary forage fish in Twin Buttes Reservoir. Sampling effort based on sampling objectives for Largemouth Bass will be sufficient to determine IOV and CPUE-Total of Gizzard Shad and CPUE-Total and size structure of Bluegill. No additional sampling effort will be expended to achieve an RSE ≤ 25 for CPUE-Total for Gizzard Shad or Bluegill.

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.

DiCenzo, V. J., M. J. Maceina, and M. R. Stimpert. 1996. Relations between reservoir trophic state and Gizzard Shad population characteristics in Alabama reservoirs. North American Journal of Fisheries Management 16:888-895.

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.

Scott, M. K., and M. A. Farooqi. 2008. Statewide freshwater fisheries monitoring and management program survey report for Twin Buttes Reservoir, 2007. Texas Parks and Wildlife Department, Federal Aid Report F-30-R, Austin.

Texas Commission on Environmental Quality. 2020. Trophic classification of Texas reservoirs. 2020 Texas Integrated Report for Clean Water Act Sections 305(b) and 303(d), Austin. 15 pp.

United States Geological Society (USGS). 2020. National water information system: Web interface. Available: http://waterdata.usgs.gov/tx/nwis (May 2020).

Wright, L. D. 2016. Statewide freshwater fisheries monitoring and management program survey report for Twin Buttes Reservoir, 2015. Texas Parks and Wildlife Department, Federal Aid Report F-221-M-6, Austin.

Tables and Figures

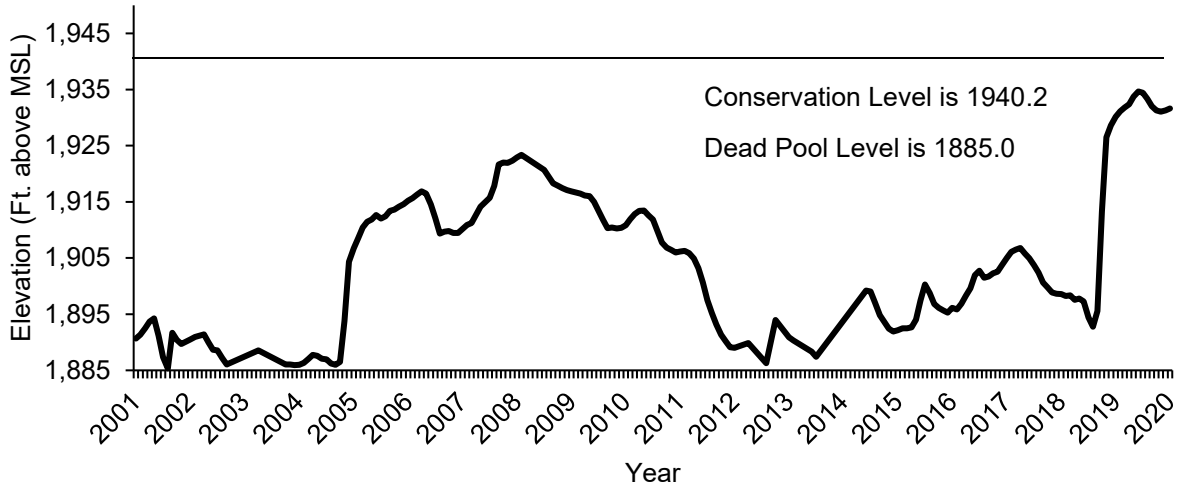


Figure 1. Monthly water level elevations in feet above mean sea level (MSL) recorded for Twin Buttes Reservoir, Texas.

Table 1. Characteristics of Twin Buttes Reservoir, Texas.

Characteristic	Description
Year constructed	1963
Controlling authority	City of San Angelo, U.S. Bureau of Reclamation
County	Tom Green
Reservoir type	Mainstem – Concho River basin
Shoreline Development Index (SDI)	4.0 [north (3.8) and south (4.2) pools, averaged]
Conductivity	1817 μmhos/cm
Watershed:Surface Area Ratio	188:1

Table 2. Boat ramp characteristics for Twin Buttes Reservoir, Texas, May, 2020. Reservoir elevation at time of survey was 1,932 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Twin Buttes Marina North	31.39073 -100.5535	Y	15	1,912	Excellent, no access issues
Twin Buttes Marina South	31.37468 -100.5538	Y	20	1,905	Excellent, no access issues
12-mile Boat Ramp	31.37733 -100.6025	Y	30	1,906	Excellent, no access issues
Equalization Channel North	31.34622 -100.5227	Y	20	1,923	Excellent, no access issues
Equalization Channel South	31.32963 -100.5106	Y	20	1,926	Excellent, no access issues

Table 3. Harvest regulations for Twin Buttes 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, Largemouth	5	14-inch minimum
Crappie: White and Black crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

Table 4. Stocking history of Twin Buttes Reservoir, Texas. FGL = fingerling; ADL = adults; UNK = unknown.

Species	Year	Number	Size
Threadfin Shad	1982	2,000	UNK
	1984	8,500	UNK
	Total	10,500	
Blue Catfish	1972	1,400	UNK
	1973	11,610	UNK
	1974	4,840	UNK
	1976	28,000	UNK
	1977	39,200	UNK
	1978	24,515	UNK
	1979	83,903	UNK
	1980	57,130	UNK
	Total	250,598	
Channel Catfish	1966	9,550	UNK
	1967	20,000	UNK
	1970	10,500	UNK
	1971	100,549	UNK
	1974	20,000	UNK
	1987	100,300	FGL
	2004	41,950	FGL
	2005	154,733	FGL
	2014	562,773	FRY
	Total	1,020,355	
Striped Bass	1995	51,196	FGL
Palmetto Bass	1979	90,720	UNK
	1982	27,526	UNK
	Total	118,246	
Warmouth	1966	4,000	UNK
Redear Sunfish	1972	3,000	UNK
Smallmouth Bass	1982	105,611	UNK
	1983	80,901	UNK
	1984	168,070	FGL
	1987	30	ADL
	Total	354,612	
Largemouth Bass	1966	100,000	UNK
	1967	10,000	UNK
	1968	416,000	UNK
	1970	33,725	UNK
	1976	6,100	UNK
	Total	510,305	

Table 4. Stocking history continued.

Species	Year	Number	Size
Florida Largemouth Bass	1975	188,500	FGL
	1976	200,500	FGL
	1977	199,900	FRY
	1977	25,750	FGL
	1978	183,776	FGL
	1986	14,981	FGL
	1996	139,304	FGL
	2005	150,017	FGL
	2005	135	ADL
	2008	190,545	FGL
	2016	53,869	FGL
	2018	80,049	FGL
	2019	165,776	FGL
	2020	39,327	FGL
	Total	1,241,061	
Sharelunker Largemouth Bass	2018	8,616	FGL
White Crappie	1972	53,000	UNK
Walleye	1971	100,000	UNK
	1972	782,325	UNK
	1973	1,400,000	UNK
	1974	105,000	UNK
	Total	2,387,325	
Green X Redear Sunfish	1966	24,500	UNK
	1967	9,000	UNK
	1972	7,200	UNK
	Total	40,700	

Table 4. Objective-based sampling plan components for Twin Buttes Reservoir, Texas 2017–2020.

Gear/target species	Survey objective	Metrics	Sampling objective
Electrofishing			
Largemouth Bass	Abundance	CPUE–Stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	N ≥ 50 stock
	Age-and-growth	Age at 14 inches	N = 13, 13.0 – 14.9 inches
	Condition	W_r	10 fish/inch group (max)
	Genetics	% FLMB	N = 30, any age
Bluegill [a]	Abundance	CPUE–Total	RSE ≤ 25
	Size structure	PSD, length frequency	N ≥ 50
Gizzard Shad [a]	Abundance	CPUE–Total	RSE ≤ 25
	Size structure	PSD, length frequency	N ≥ 50
	Prey availability	IOV	N ≥ 50
Low-frequency electrofishing			
Flathead Catfish	Abundance	CPUE–Total	Exploratory
Gill netting			
Blue Catfish	Abundance	CPUE–stock	Exploratory
Channel Catfish	Abundance	CPUE–stock	Exploratory
Flathead Catfish	Abundance	CPUE–stock	Exploratory
Trap netting			
Crappie	Abundance	CPUE–stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	N = 50
	Age-and-growth	Age at 10 inches	N = 13, 9.0 – 10.9 inches
Tandem hoop netting			
Channel Catfish	Abundance	CPUE–stock	Exploratory
	Size structure	Length frequency	Exploratory

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

Table 6. Survey of aquatic vegetation, Twin Buttes Reservoir, Texas, 2007 and 2019. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2007	2019
Surface Acres	3,545	6,502
Native submersed	402 (11.3)	808 (12.4)
Native floating-leaved	Trace	Trace
Native emergent	35 (0.1)	41 (< 0.1)
Non-native		
Parrot feather (Tier III)*	0	Trace

*Tier I is immediate Response, Tier III is Watch Status

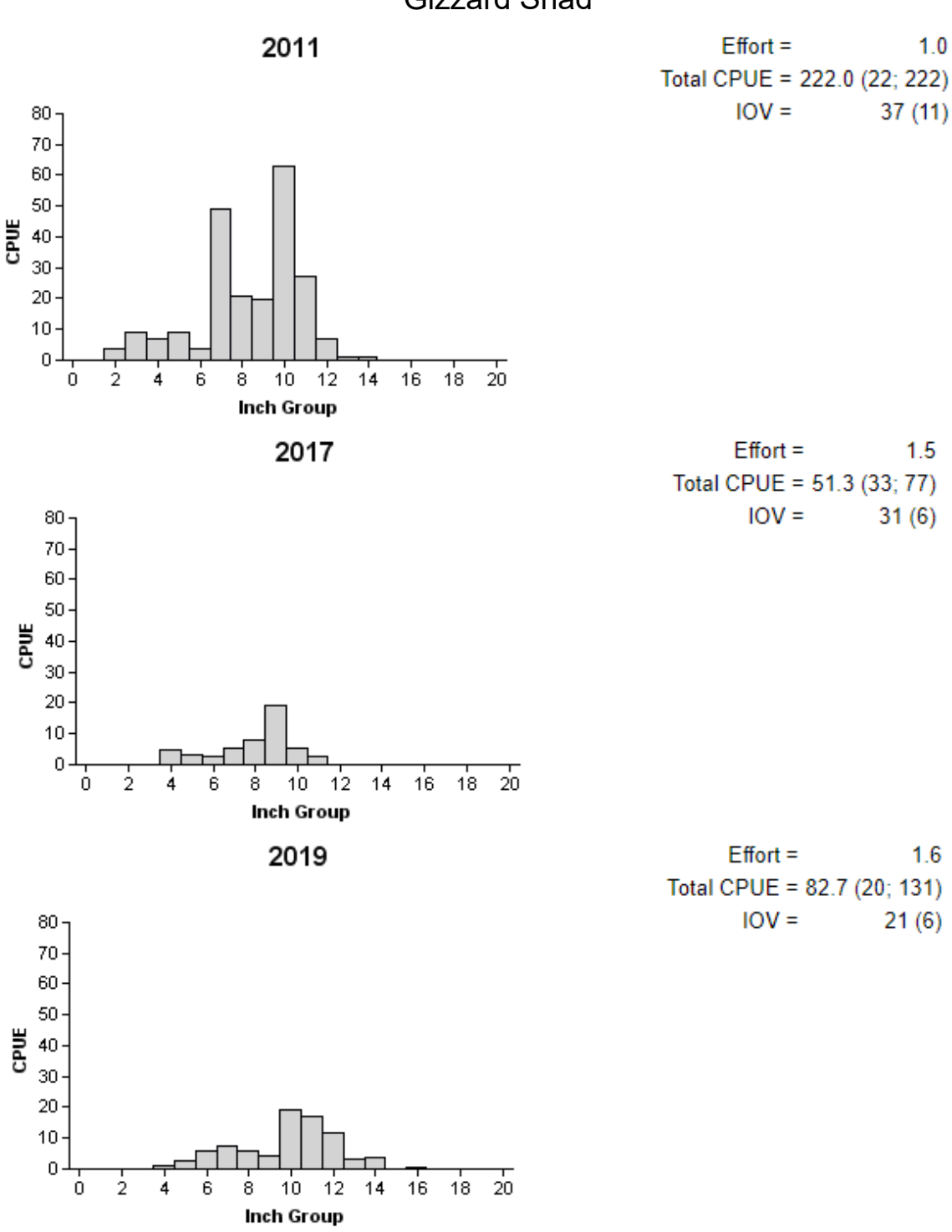


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Twin Buttes Reservoir, Texas, 2011, 2017, and 2019.

Bluegill

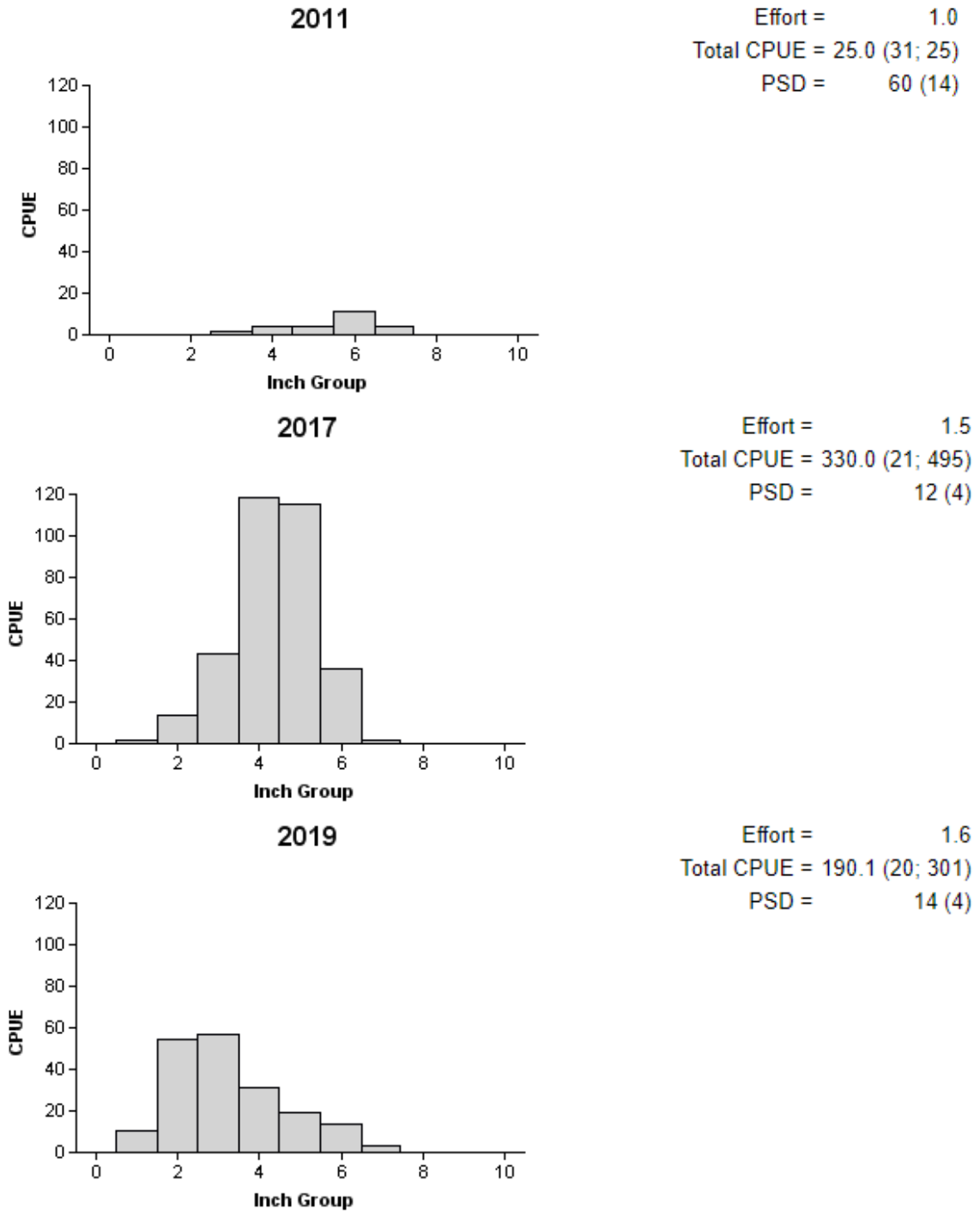


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Twin Buttes Reservoir, Texas, 2011, 2017, and 2019.

Blue Catfish

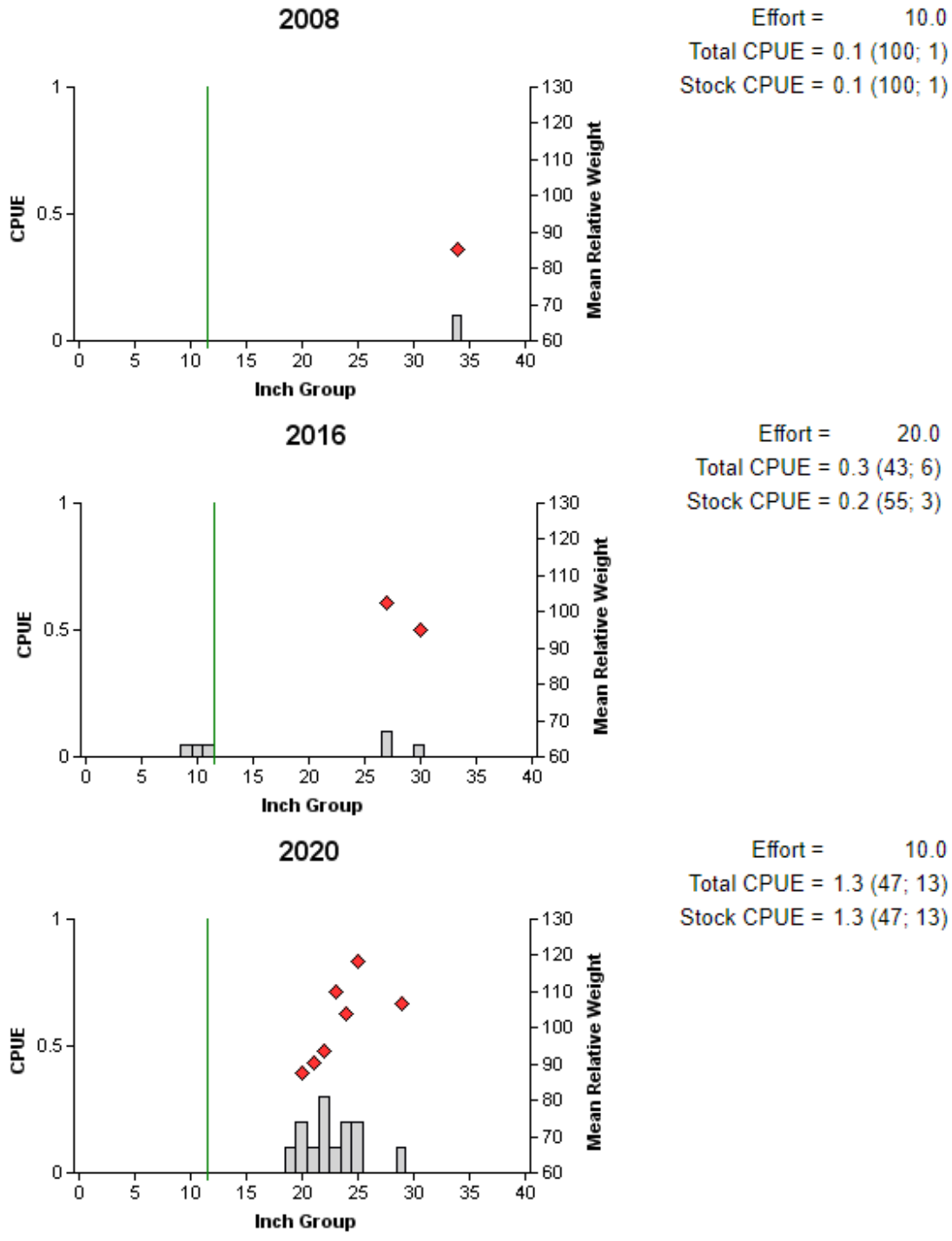


Figure 4. Number of Blue Catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Twin Buttes Reservoir, Texas, 2008, 2016, and 2020. Vertical line indicates minimum length limit.

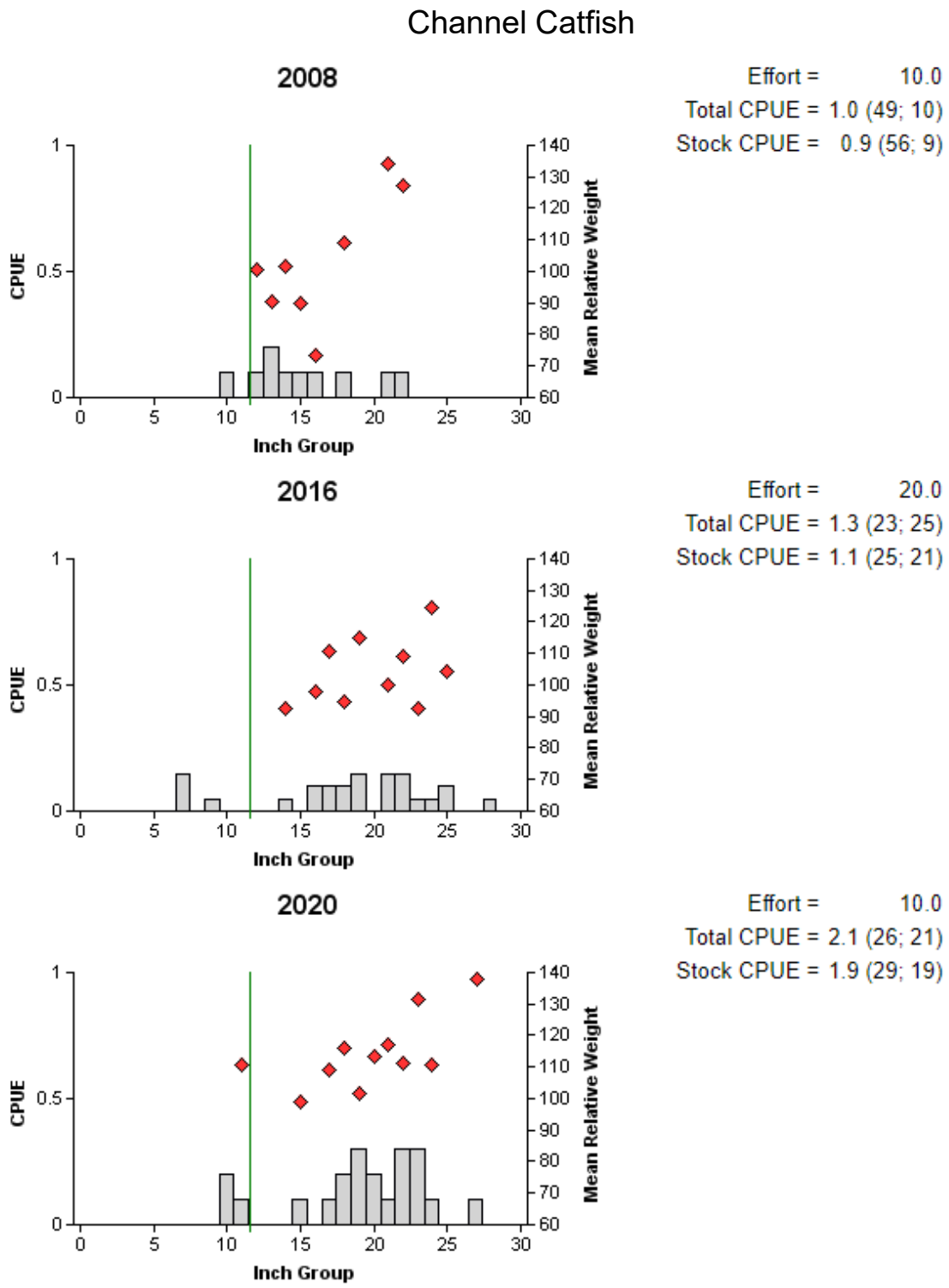


Figure 5. Number of Channel Catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Twin Buttes Reservoir, Texas, 2008, 2016, and 2020. Vertical line indicates minimum length limit.

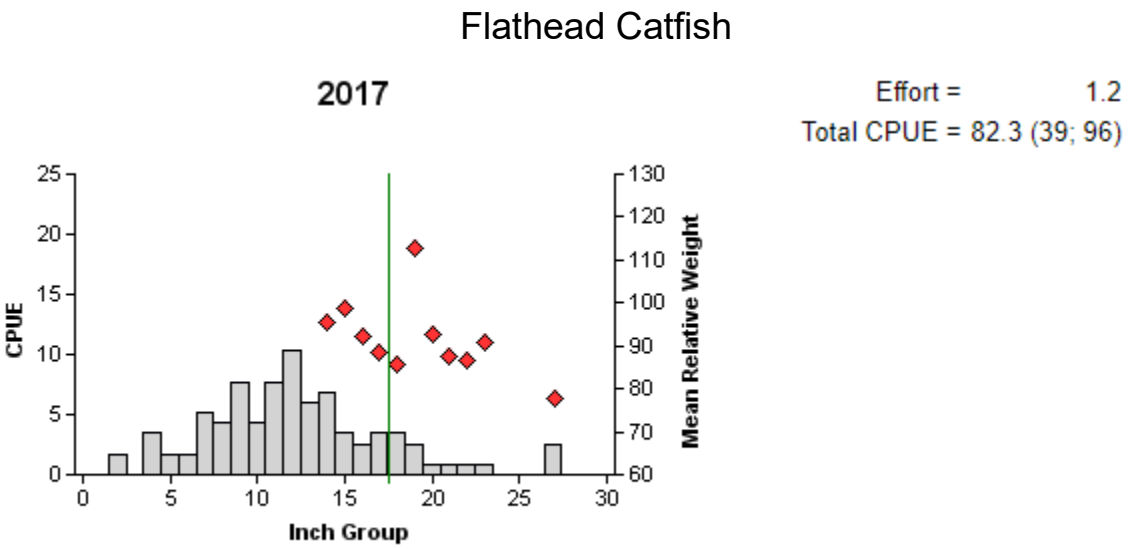


Figure 6. Number of Flathead Catfish caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE are in parentheses) for low-frequency electrofishing survey, Twin Buttes Reservoir, Texas, 2017. Vertical line indicates minimum length limit.

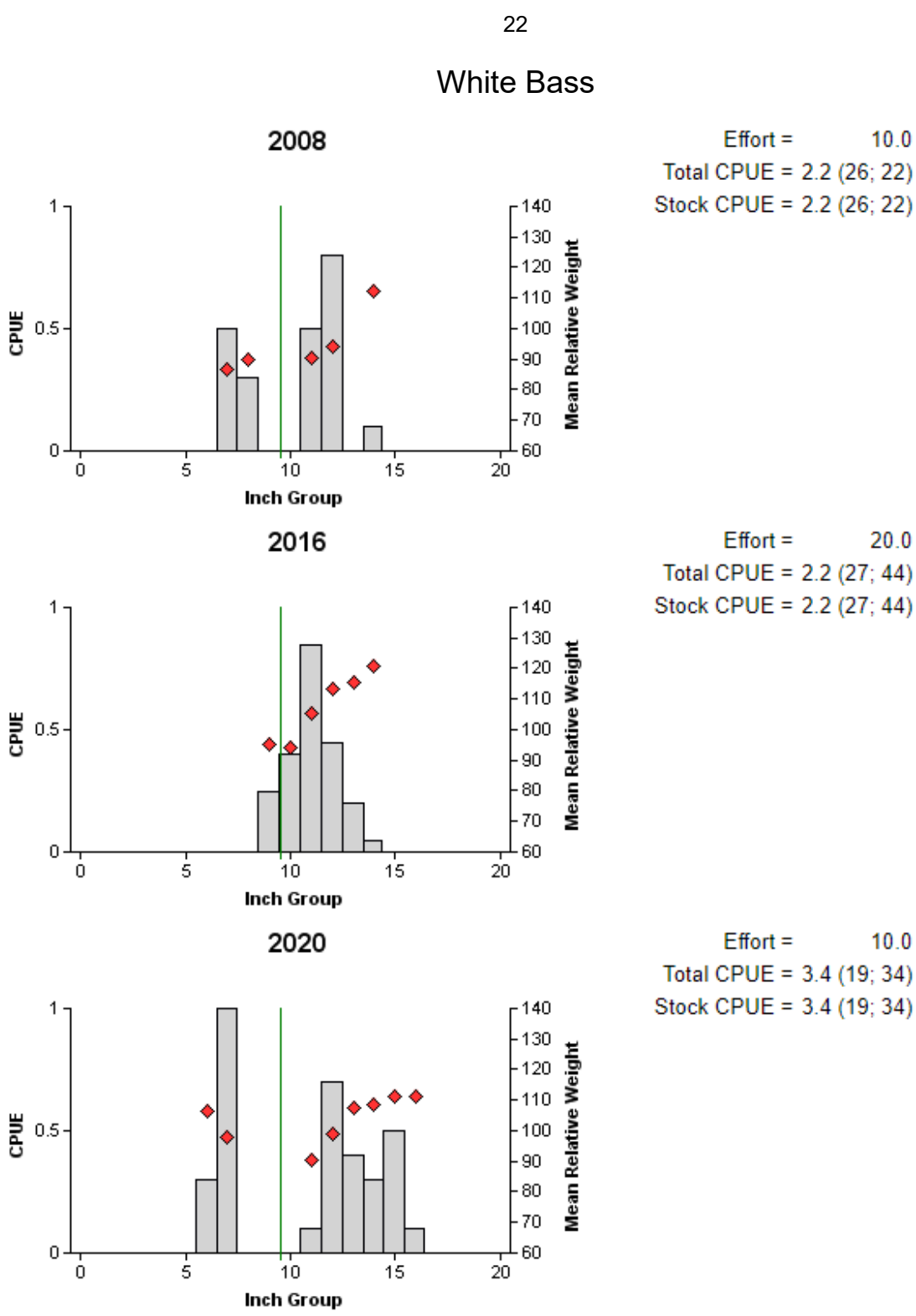


Figure 7. Number of White Bass caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Twin Buttes Reservoir, Texas, 2008, 2016, and 2020. Vertical line indicates minimum length limit.

Largemouth Bass

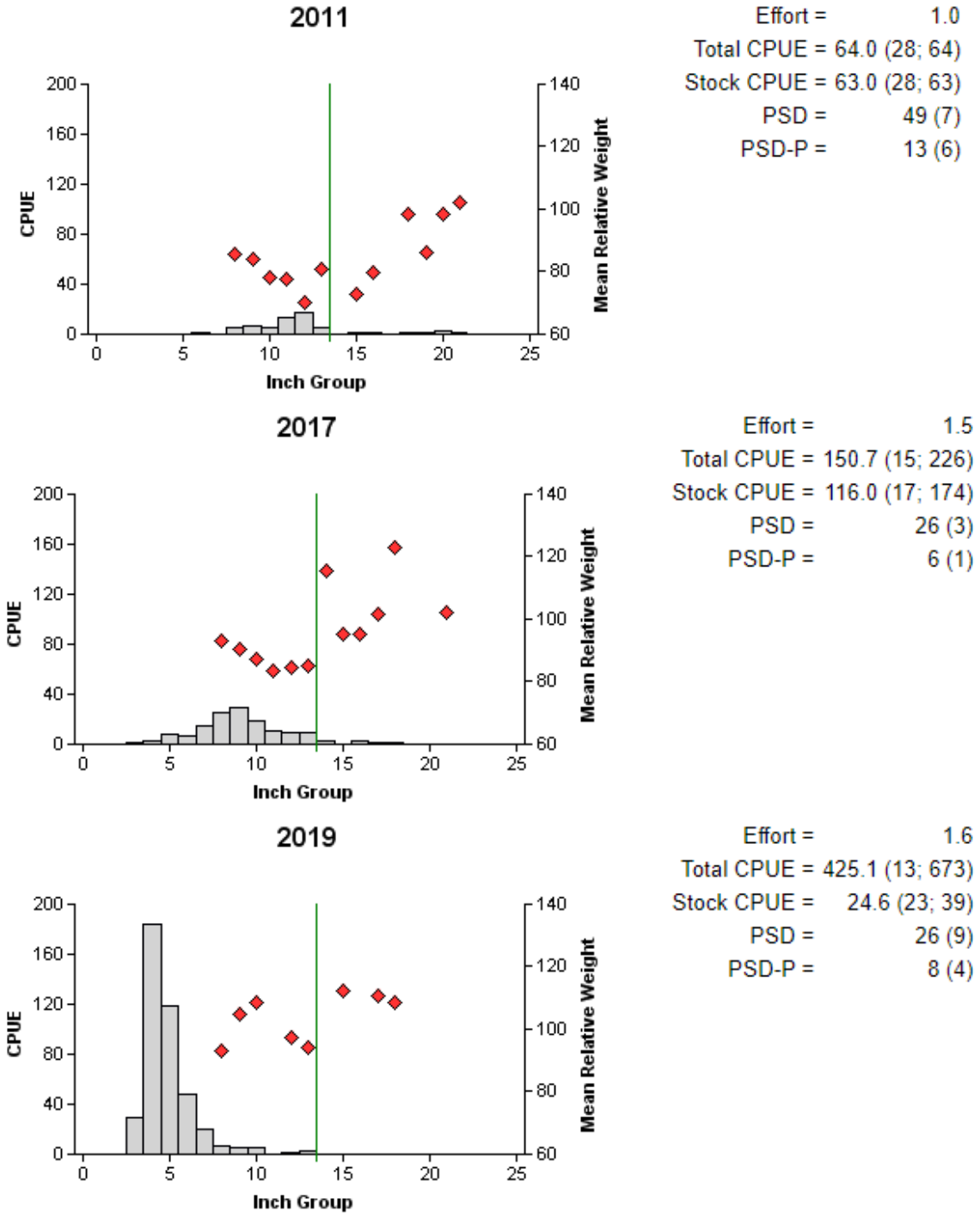
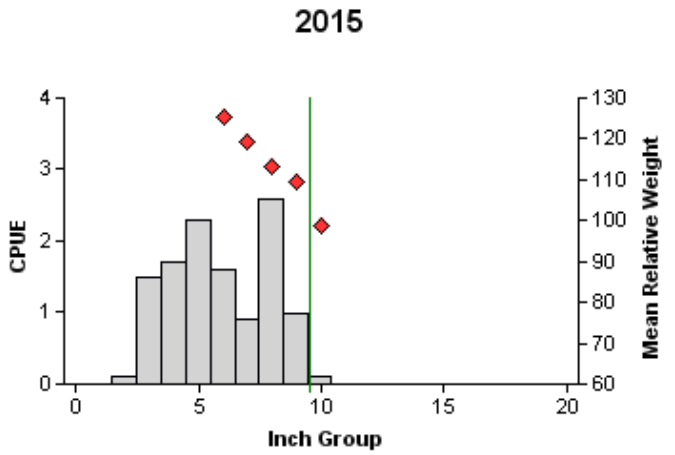


Figure 8. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Twin Buttes Reservoir, Texas, 2011, 2017, and 2019. Vertical line indicates minimum length limit.

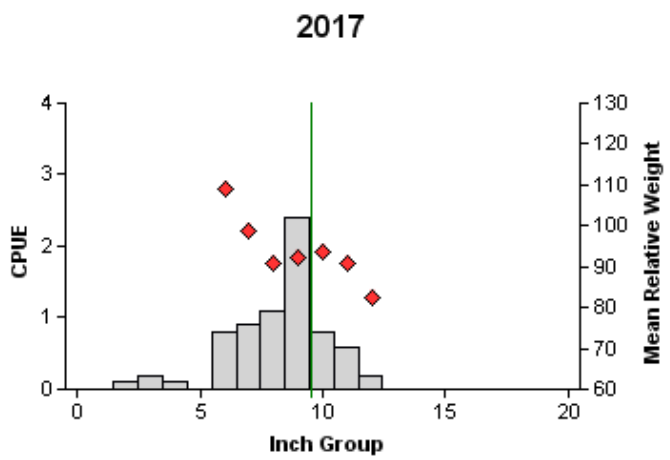
Table 7. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Twin Buttes Reservoir, Texas, 2015 and 2019. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, Intergrade = hybrid between a FLMB and a NLMB. Genetic composition was determined by electrophoresis prior to 2005 and with micro-satellite DNA analysis since 2005.

		Number of fish				
Year	Sample size	FLMB	Intergrade	NLMB	% FLMB alleles	% FLMB
1996	49	1	30	18	25.2	2.0
1998	52	11	35	6	59.1	21.2
2015	30	3	27	0	57.0	10.0
2019	25	0	25	0	57.0	0.0

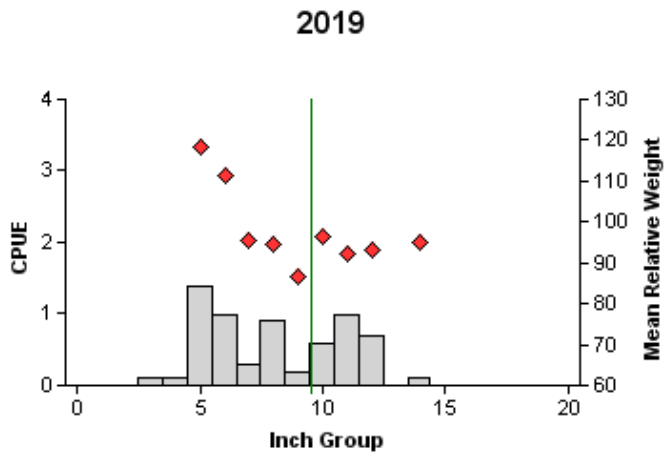
White Crappie



Effort = 10.0
Total CPUE = 11.8 (36; 118)
Stock CPUE = 8.5 (35; 85)
PSD = 44 (9)
PSD-P = 1 (1)



Effort = 10.0
Total CPUE = 7.2 (26; 72)
Stock CPUE = 6.8 (27; 68)
PSD = 75 (6)
PSD-P = 24 (7)



Effort = 10.0
Total CPUE = 6.4 (33; 64)
Stock CPUE = 6.2 (34; 62)
PSD = 56 (10)
PSD-P = 39 (11)

Figure 9. 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, Twin Buttes Reservoir, Texas, 2015, 2017, and 2019. Vertical line indicates minimum length limit.

Proposed Sampling Schedule

Table 8. Proposed sampling schedule for Twin Buttes 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.

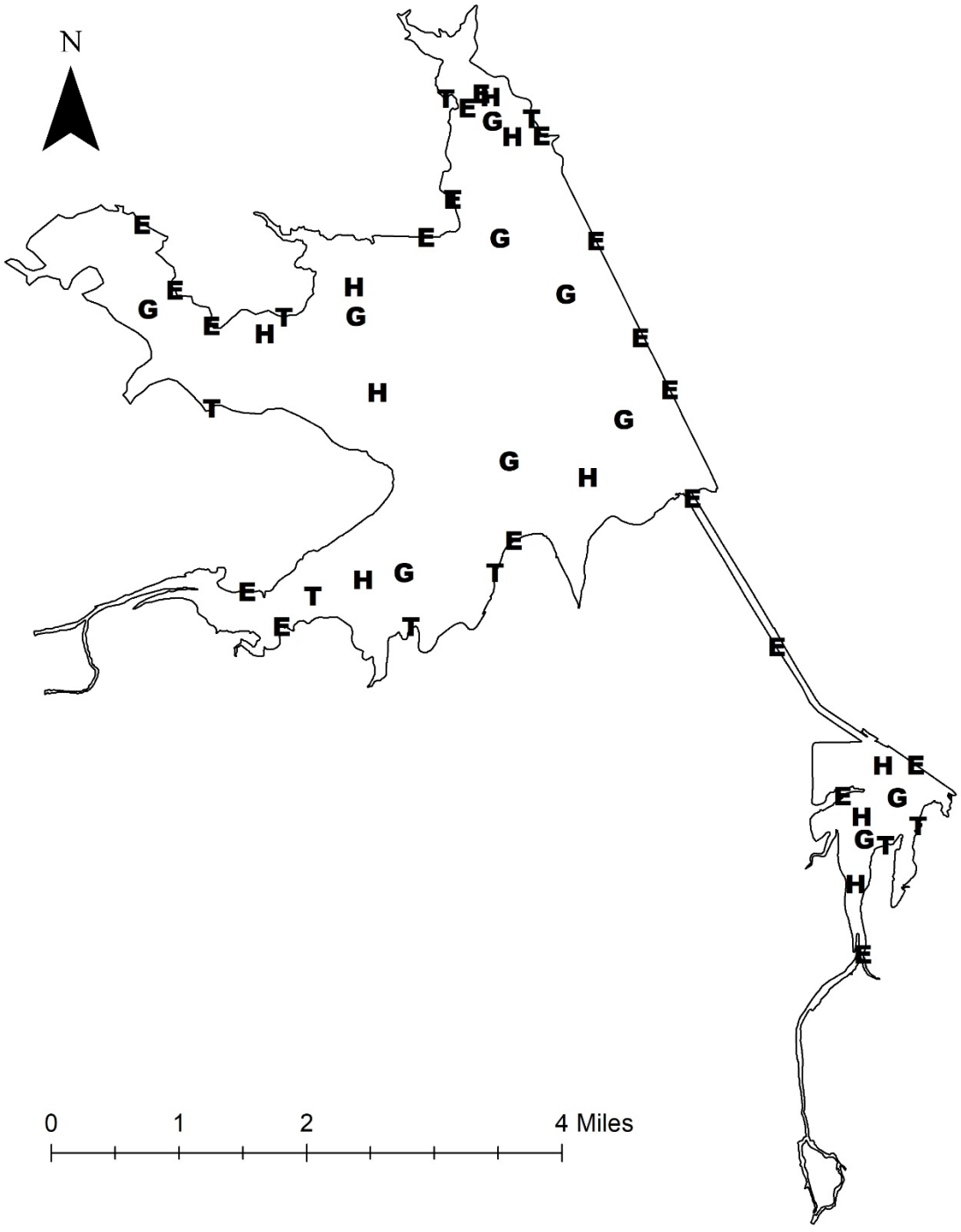
	Survey year			
	2020-2021	2021-2022	2022-2023	2023-2024
Angler Access				S
Structural Habitat				
Vegetation				S
Electrofishing – Fall		A		S
Trap netting		A		S
Gill netting				S
Baited tandem hoop netting				
Creel survey				A
Report				S

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 Twin Buttes Reservoir, Texas, 2019-2020. Sampling effort was 10 net nights for gill netting, 10 net-series for tandem hoop netting, 10 net nights for trap netting, and 1.6 hour for electrofishing.

Species	Gill Netting		Trap Netting		Electrofishing		Hoop Netting	
	N	CPUE	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad					131	82.7 (20)		
Blue Catfish	13	1.3 (47)						
Channel Catfish	21	2.1 (26)					5	0.5 (80)
Flathead Catfish	5	0.5 (45)						
White Bass	34	3.4 (19)						
Redbreast Sunfish					2	1.3 (69)		
Green Sunfish					79	49.9 (33)		
Warmouth					48	30.3 (55)		
Bluegill					301	190.1 (20)		
Longear Sunfish					109	68.8 (35)		
Redear Sunfish					7	4.4 (69)		
Largemouth Bass					673	425.1 (13)		
White Crappie			64	6.4 (33)				
Black Crappie			13	1.3 (50)				

APPENDIX B – Map of sampling locations



Location of sampling sites, Twin Buttes Reservoir, Texas, 2019-2020. Trap net, gill net, hoop net, and electrofishing stations are indicated by T, G, and E, respectively. Water level was approx. 8 feet below conservation pool at time of sampling.

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