Twin Buttes Reservoir

2023 Fisheries Management Survey Report

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-221-M-5

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

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Survey and Management Summary

Fish populations in Twin Buttes Reservoir were surveyed in 2021 and 2023 using electrofishing and trap netting, in 2023 using low-frequency electrofishing, and in 2024 using gill netting. Historical data are presented with the 2021-2024 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 moderate, and less than 40% of Gizzard Shad were available as prey to most sport fish. Electrofishing catch of Bluegill was high, but very few Bluegill were over 6-inches long.
- **Catfishes:** The Channel Catfish population was moderately abundant, and fish were available to anglers for harvest up to 28 inches. The Blue Catfish population exhibited low abundance but had large individuals available to anglers up to 39 inches. Flathead Catfish were present in the reservoir. Catfishes were the second most targeted group by anglers.
- **White Bass:** White Bass were present in the reservoir in moderate abundance and fish were available to anglers for harvest up to 17 inches.
- **Largemouth Bass:** Largemouth Bass were low to moderately abundant. Legal-size fish were available to anglers up to 23 inches. Largemouth Bass had average growth (age at 14 inches long was 2.9 years). Nearly 40% of all anglers at Twin Buttes Reservoir fished for Largemouth Bass.
- **White Crappie:** White Crappie abundance was moderate with legal-size fish available to anglers for harvest up to 14 inches. Most crappie reached legal size in 2.4 years. White Crappie were a popular sport fish and the third most targeted species by anglers.

Management Strategies: Conduct additional electrofishing and trap netting surveys in 2025, and general monitoring surveys with trap nets, gill nets, and electrofishing in 2027-2028. Access and vegetation surveys will be conducted in 2027.

Introduction

This document is a summary of fisheries data collected from Twin Buttes Reservoir from 2021-2024. 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 2020-2024 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 are 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. 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 2020) included:

1. Sample the Largemouth Bass population with fall electrofishing in 2021 and 2023.

   Action: Fall electrofishing surveys were conducted 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.

   Action: Due to low water level and limited boat ramp availability to anglers, a single-point access creel was conducted on the North Pool of Twin Buttes Reservoir in 2023-2024.

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. Sharelunker Largemouth Bass fingerlings were stocked in 2018. Lone Star Bass fingerlings, which are 2nd generation offspring of pure Florida strain ShareLunker Largemouth Bass that have proven to be able to grow to ≥ 13 pounds, were stocked in 2022 and 2023. Smallmouth Bass and Walleye were stocked in the past, but they failed to establish viable fisheries. The complete stocking history for Twin Buttes Reservoir is listed 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 2020). 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 2022). Only the North Pool of Twin Buttes Reservoir was sampled in 2023 and 2024 due to low water levels.

Common names of fishes and their hybrids in this report are used following Page et al. (2023) with an exception for Largemouth Bass. While we recognize recent changes to black bass names, Texas reservoirs contain a mix of Florida Bass, Largemouth Bass, and their intergrade offspring. Therefore, Largemouth Bass is used in this report for simplicity as well as consistency with previous reports.

Electrofishing – Largemouth Bass, sunfishes, Gizzard Shad, and Threadfin Shad were collected by electrofishing (1 hour at 12, 5-min stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing. Ages for Largemouth Bass were determined using otoliths from 13 randomly selected fish (range 13.0 to 14.9 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 White Crappie were determined using otoliths from 13 randomly selected fish (range 9.0 to 10.9 inches).

Gill netting – Catfishes 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 3 biologist-selected stations for 10 minutes each.

Genetics – Genetic analysis of Largemouth Bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2022). 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 Neumann et al. (2012). 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.

Creel survey – An annual access-point creel survey was conducted from 2023 through 2024. The creel period was June through May. Angler interviews were conducted on 5 weekend days and 4 weekdays per quarter to assess angler use and fish catch/harvest statistics in accordance with the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2022). The

average surface acreage during the creel period was 2,248 acres and was used to calculate creel statistics.

Habitat – A structural habitat survey was conducted in 2007. A vegetation survey was conducted in 2023. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2022).

Water level – Source for water level data was the United States Geological Survey (USGS 2024).

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. The south pool receives constant inflow from the spring fed South Concho River and maintains a more stable water level than the North pool. Nearly all aquatic vegetation occurs in the south pool when water level permits. Minimal aquatic vegetation was documented in 2023; less than an acre of native submerged vegetation (Coontail) was observed (Table 6). Emergent native vegetation (water willow) was limited to less than an acre.

Creel: Directed fishing effort by anglers at Twin Buttes Reservoir was highest for Largemouth Bass (37%), followed by anglers fishing for catfishes (31%) and White Crappie (13%, Table 7). Anglers fishing for “anything” comprised 13% of directed fishing effort. Total fishing effort for all species at Twin Buttes Reservoir was 54,385 hours, and direct expenditures was $392,110 (Table 8). Twenty-three percent of boating anglers at Twin Buttes Reservoir utilized forward facing sonar in 2023-2024. Analysis of angler zip code data indicates that anglers are willing to travel long distances to visit Twin Buttes Reservoir, though the majority of anglers were local (less than 25 miles). The mean angler travel distance was 124.1 miles during the 2023-2024 creel period. Over 99% of anglers interviewed were from Texas.

The most recent, and only, creel survey prior to the 2023-2024 creel was conducted in 2009-2010. Total fishing effort increased by 48% between the 2009-2010 and 2023-2024 creel surveys. Since the previous creel survey, there has been a slight shift in directed fishing effort at Twin Buttes Reservoir. In 2009-2010, 69% of anglers reported targeting black basses, 13% targeted “anything”, 10% targeted crappies, 4% targeted White Bass, and only 2% targeted catfishes (Scott and Farooqi 2011). The percentage of anglers fishing for crappies, White Bass, and “anything” was similar between the 2009-2010 and 2023-2024 creel surveys (Table 7). The percentage of anglers targeting Largemouth Bass, however, decreased from 69% to 37%, and the percentage of those fishing for catfishes increased from 2% to 31%. Anglers fishing Twin Buttes Reservoir spent an estimated $156,484 in 2009-2010; adjusting for inflation, anglers spent 73% more during the 2023-2024 creel period (Table 8). Both the 2009-2010 and 2023-2024 creel surveys were access creel surveys conducted at the North pool boat ramp at similar water levels.

Prey species: Gizzard Shad were available as forage for sport fishes in Twin Buttes Reservoir. Gizzard Shad abundance increased significantly in the most recent survey. The electrofishing catch of Gizzard Shad was 242.5/h in 2023, higher than 79.3/h in 2021 and 82.7/h in 2019 (Figure 2). Gizzard Shad abundance and vulnerability objectives were not met in 2021. Gizzard Shad ranged in size from 2 to 14 inches with most between 7 and 11 inches. Less than 40% were available to most predators in the most recent survey; IOV was 34 in 2023.

Bluegill were also available as forage in Twin Buttes Reservoir. Bluegill abundance decreased in the most recent survey and abundance and size structure objectives were not met. The total electrofishing catch rate of Bluegill was 92.8/h in 2023, down from 240.0/h in 2021 and 190.1/h in 2019 (Figure 3). In 2023, Bluegill observed in sampling ranged from 3 to 8 inches in total length with most measuring between 4 and 6 inches, providing a good prey source to predators. Bluegill size structure improved in the most recent survey; PSD was 37 in 2023, an increase from 16 in 2021 and 14 in 2019, indicating a shift to

larger individuals in the population. Other sunfishes observed in 2023 were Longear Sunfish, Green Sunfish, and Redear Sunfish. The total electrofishing catch rate of sunfishes in 2023 was 163.0/h (Appendix A).

Catfishes: In relation to other district reservoirs, Channel Catfish exhibited moderate abundance in the most recent survey and total catch increased from previous years. The total gill net catch rate of Channel Catfish was 3.5/nn in 2024, higher than 2.1/nn in 2020 and 1.9/nn in 2016 (Figure 4). In 2024, all Channel Catfish observed in sampling were stock-size and most were of desirable harvest size for anglers with fish up to 28 inches. Channel Catfish condition was poor-fair for smaller size classes and good for larger fish (Figure 4); relative weights ranged from 81 to 133 in 2024. Approximately 60% of legal-size Channel Catfish were released during the 2023-2024 creel period (Table 9), up from 25% in 2009-2010. An estimated 4,813 Channel Catfish were harvested, ranging in length from 11 to 28 inches, with 14 to 18 inches being the most common size harvested (Figure 5).

Blue Catfish were present in Twin Buttes Reservoir in low abundance and increased over the three most recent surveys. Total gill net catch rate of Blue Catfish was 2.0/nn in 2024, similar to 1.3/nn in 2020 and higher than 0.3/nn in 2016 (Figure 6). In 2024, all Blue Catfish observed in sampling were stock-size. All Blue Catfish observed in 2024 were of desirable size for anglers to harvest. Despite relatively low abundance, a quality Blue Catfish fishery is available to anglers. Larger individuals were available with fish up to 39 inches observed in 2024. Blue Catfish condition was good; relative weights were over 100 for nearly all size classes. All Blue Catfish observed during the 2023-2024 creel period were harvested by anglers (Table 9). An estimated 391 Blue Catfish were harvested, ranging in length from 17 to 38 inches (Figure 7).

Flathead Catfish were present in Twin Buttes Reservoir in low abundance; total gill net catch rate has been <0.6/nn over the past three surveys. A low frequency electrofishing (LFE) survey was conducted in fall 2023. Sampling biologist-selected locations yielded 271 total Flathead Catfish with a total catch rate of 542.0/h (Figure 8). Most individuals observed and collected were between 3 and 8 inches in total length; the sample included fish up to 20 inches (Figure 8). All legal-size Flathead Catfish observed during the 2023-2024 creel period were harvested by anglers (Table 9). An estimated 60 fish were harvested, ranging in length from 15 to 39 inches.

Catfishes were popular as sport fish and were the second most targeted group by anglers during the 2023-2024 creel period. Directed fishing effort by anglers targeting catfishes was 16,633.8 hours (Table 9), significantly higher than 908.0/hour in 2009-2010. Effort per acre increased from 0.36 hours/acre in 2009-2010 to 7.40 hours/acre in 2023-2024. Anglers caught approximately 0.39 fish/hour in 2023-2024, down from 0.54 fish/hour in 2009-2010. Live-release catfish tournament data was captured in the 2023-2024 creel survey and may partially account for the increase in angler effort.

White Bass: White Bass were moderately abundant in the most recent survey. In 2024, the total gill net catch rate of White Bass was 4.2/nn, higher than 3.2/nn in 2020 and 2.2/nn in 2016 (Figure 9). White Bass were available to anglers for harvest; over half of the individuals observed in the most recent survey were legal size. White Bass condition was fair-good and varied by size class; relative weights ranged between 80 and 100 for most size classes.

White Bass were the fourth most popular sport fish with anglers during the 2023-2024 creel survey (6.6%, Table 7). Directed fishing effort, catch per hour, and total harvest for White Bass was 3,614 hours, 3.9 fish/hour, and 7,120 fish, respectively (Table 10). More than half (55%) of all legal-size White Bass were released by anglers, down from 69% in 2009-2010 (Table 10). Harvested White Bass ranged in length from 10 to 17 inches, fish between 11 and 12 inches were the most common sizes harvested by anglers (Figure 10).

Largemouth Bass: The electrofishing catch rate of stock-length Largemouth Bass was 37.9/h in 2024, similar to 34.0/h in 2021 and higher than 24.6/h in 2019 (Figure 11). Size structure was good in the two most recent surveys; PSD was 72 in 2023, similar to 61 in 2021. Water level for Twin Buttes Reservoir reached a 20-year climax in 2019. High water levels and flooded terrestrial vegetation were accompanied

by increased Largemouth Bass recruitment in 2019. Since 2019, recruitment has declined steadily with decreasing water level (Figure 11). Growth of Largemouth Bass was good; average age at 14 inches (13.0 to 14.9 inches) was 2.9 years (N = 18; range = 2 - 6 years). Body condition was good in 2023 and was similar to previous surveys, relative weights were above 90 for most length groups (range 86 – 103, Figure 11). Legal size fish were available for anglers to harvest with fish over 20 inches observed in 2021 and 2023. Florida Largemouth Bass influence has remained relatively constant as Florida alleles have ranged from 50 to 57% over the last three genetics surveys (Table 11).

Largemouth Bass were the most popular species targeted by anglers at Twin Buttes Reservoir. Directed fishing effort, catch per hour, and total harvest for Largemouth Bass was 20,187 hours, 0.7 fish/hour, and 2,144 fish, respectively during the 2023-2024 creel period (Table 12). Despite the shift in overall percent directed effort at Twin Buttes Reservoir between the current and previous creel surveys, Largemouth Bass angler effort was relatively similar with an estimated 25,674 hours in 2009-2010 and 20,187 hours in 2023-2024 (Table 12). Approximately 91% of legal-size Largemouth Bass were released by anglers in 2023-2024, similar to 85% in 2009-2010. Non-tournament harvested Largemouth Bass observed during the 2023-2024 creel period ranged from 10 to 20 inches in total length, with the most common size being between 14 to 18 inches (Figure 12). Approximately 10% of Largemouth Bass angler effort was attributed to live-release tournaments, down from 18% during the 2009-2010 creel period. Approximately 28.4% of anglers targeting Largemouth Bass from a boat used forward facing sonar.

Since the previous management report (Wright 2020), anglers at Twin Buttes have submitted eight fish to the ShareLunker program. Four fish were awarded Lunker Class status (8.0 – 9.9lbs), three were awarded Elite Class (10.0 – 12.9lbs), and one was awarded Legend Class status (13+lbs, caught outside of the ShareLunker collection period).

White Crappie: The trap net catch rate of White Crappie was 5.7/nn in 2023, lower than 17.0/nn in 2021, and similar to 6.4/nn in 2019 (Figure 13). White Crappie size structure was high in the most recent survey, PSD was 89 in 2023, higher than 56 in 2019; PSD sample size requirements were not met in 2021. Body condition was good in 2023, all size classes had relative weights of 90 and above. Abundance and size structure sampling objectives were not met in 2021 and abundance objectives were not met in 2023. Legal sized White Crappie were available to anglers or harvest. White Crappie growth was average, fish reached 10 inches in 2.4 years (N = 19; range 2 – 4 years).

Crappies were the third most popular sport fish at Twin Buttes Reservoir. Directed fishing effort, catch per hour, and total harvest of crappies during the 2023-2024 creel period was 6,150 hours, 3.8 fish/hour, and 5,380 fish, respectively (Table 13). Angler effort for crappies increased by 73% between the 2009-2010 and 2023-2024 creel surveys (Table 13). Approximately 92% of harvested crappies were White Crappie in 2023-2024. The percent legal release of crappies was low, approximately 12%, similar to 11% in the 2009-2010 creel survey (Table 13). Harvested White Crappie ranged from 10 to 14 inches in length, with 11 inches being the most common size. Harvested Black Crappie ranged from 10 to 13 inches, and similarly to White Crappie, 11 inches was the most common size harvested by anglers (Figure 14). Approximately 47.3% of anglers targeting crappies from a boat used forward facing sonar.

Fisheries Management Plan for Twin Buttes Reservoir, Texas

Prepared – July 2024

ISSUE 1: Twin Buttes has a history of producing trophy bass and was heavily stocked with Florida strain Largemouth Bass in 2020, 2021, 2022, and 2023. 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 2025 and 2027.
2. Assess Largemouth Bass genetics in 2027.

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 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 (2025–2028)

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 2023-2024 creel survey data shows 37% of angler effort is directed towards Largemouth Bass. Anglers spent 20,187 hours fishing for Largemouth Bass during the 2023-2024 creel survey, and when water levels are up the population attracts local bass club tournaments. 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 2025 and 2027 (Table 14). 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 clip samples will be taken from 30 fish and submitted for genetic analysis in 2027. Otoliths from 13 fish between 13.0 and 14.9 inches will be collected to determine mean age at 14 inches in 2027.

White Crappie: The 2023-2024 creel survey indicated White Crappie were the third most popular species among anglers with 13% of the directed effort and a total of 6,150 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 2025 and 2027 (Table 14). 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 that 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 are to monitor catfish species abundance and length frequency with gill netting every 4 years. No objectives for the level of precision will be established due to variability of catch rate with fluctuating water level. A survey consisting of 10 randomly selected gill net sites will occur in spring 2028 (Table 14). 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. As per catfish objectives above, survey objectives are to monitor White Bass abundance and length frequency with gill netting every 4 years. No objectives for the level of precision will be established due to the variability of catch rates with fluctuating water levels. A survey consisting of 10 randomly selected gill net sites will occur in spring 2028 (Table 14). 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.

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Tables and Figures

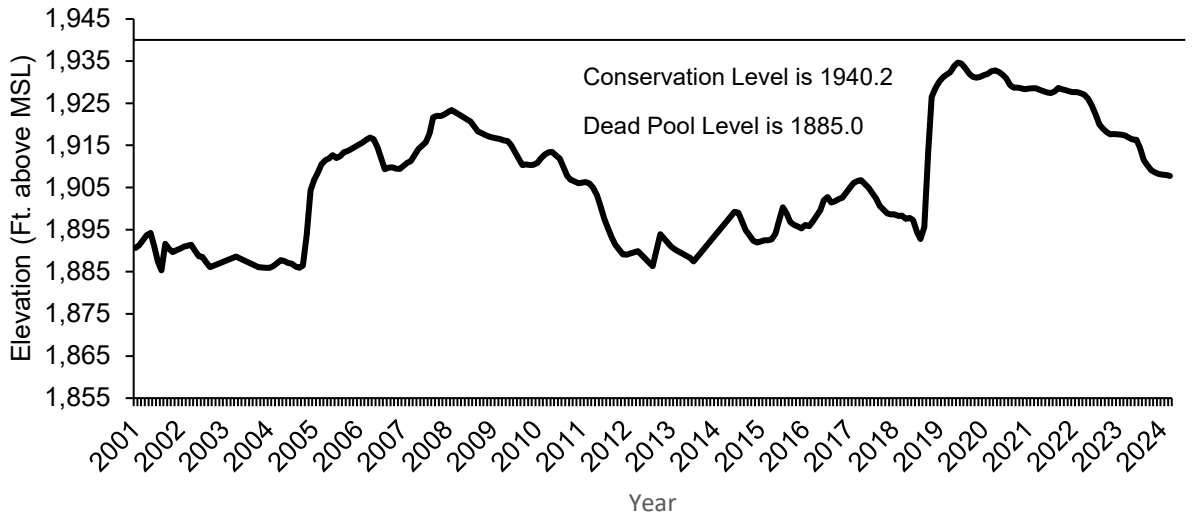


Figure 1. Monthly water level elevations in feet above mean sea level (MSL) recorded for Twin Buttes Reservoir, Texas.

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 2024. Reservoir elevation at time of survey was 1,906 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	Closed due to low water level
Twin Buttes Marina South	31.37468 -100.5538	Y	20	1,905	Closed due to low water level
12-mile Boat Ramp	31.37733 -100.6025	Y	30	1,906	Closed due to low water level
Equalization Channel North	31.34622 -100.5227	Y	20	1,923	Closed due to low water level
Equalization Channel South	31.32963 -100.5106	Y	20	1,926	Closed due to low water level

Table 3. Harvest regulations for Twin Buttes Reservoir, Texas.

Species	Bag limit	Length limit
Catfish: Channel and Blue Catfish, their hybrids and subspecies	25 (only 10 ≥ 20 inches)	None
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	Years Stocked	Number of years	Number	Size
Threadfin Shad	1982-1984	2	10,500	UNK
Blue Catfish	1972-1980	8	250,598	UNK
Channel Catfish	1966-1974	5	160,599	UNK
	1987-2005	3	296,983	FGL
	2014	1	562,773	FRY
Striped Bass	1995	1	51,196	FGL
Palmetto Bass	1979-1982	1	118,246	UNK
Warmouth	1966	1	4,000	UNK
Redear Sunfish	1972	1	3,000	UNK
Smallmouth Bass	1982-1983	2	186,512	UNK
	1984	1	168,070	FGL
	1987	1	30	ADL
Largemouth Bass	1966-1976	5	565,825	UNK
	1977-2021	11	1,121,051	FGL
	2005	1	135	ADL
Sharelunker Largemouth Bass [a]	2018	1	8,616	FGL
Lone Star Bass [b]	2022-2023	2	153,389	FGL
White Crappie	1972	1	53,000	UNK
Walleye	1971-1974	4	2,387,325	UNK
Green X Redear Sunfish	1966-1972	3	40,700	UNK

[a] ShareLunker Largemouth Bass are 1st generation offspring from angler-donated Largemouth Bass ≥ 13 pounds from the Toyota ShareLunker program.

[b] Lone Star Bass are 2nd generation offspring of pure Florida strain ShareLunker Largemouth Bass that have proven to be able to grow to ≥ 13 pounds.

Table 5. Objective-based sampling plan components for Twin Buttes Reservoir, Texas 2021–2024.

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
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

[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, 2019, and 2023. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2007	2019	2023
Surface Acres	3,545	6,502	2,590
Native submersed	402 (11.3)	808 (12.4)	<1 (<1%)
Native floating-leaved	Trace	Trace	NA
Native emergent	35 (0.1)	41 (< 0.1)	<1 (<1%)
Non-native			
Parrot feather (Tier III)*	0	Trace	0

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

Table 7. Percent directed angler effort by species for Twin Buttes Reservoir, Texas, March 2009-February 2010, and June 2023 – May 2024.

Species	Percent Directed Effort	
	2009-2010	2023-2024
Longnose Gar	0.1	0.1
Common Carp	0.2	NA
Bluegill	0.3	NA
Catfishes (any species)	0.3	30.6
Channel Catfish	2.1	NA
White Bass	4.4	6.6
Crappies	9.6	13.0
Anything	13.2	12.5
Largemouth Bass	69.7	37.1

Table 8. Total fishing effort (h) for all species and total directed expenditures at Twin Buttes Reservoir, Texas, March 2009 – February 2010 and June 2023 – May 2024. Relative standard error is in parentheses.

Creel statistic	2009/2010	2023/2024
Total fishing effort	36,854 (13)	54,385 (23)
Total directed expenditures	$156,484 (27)	$392,110 (32)

Gizzard Shad

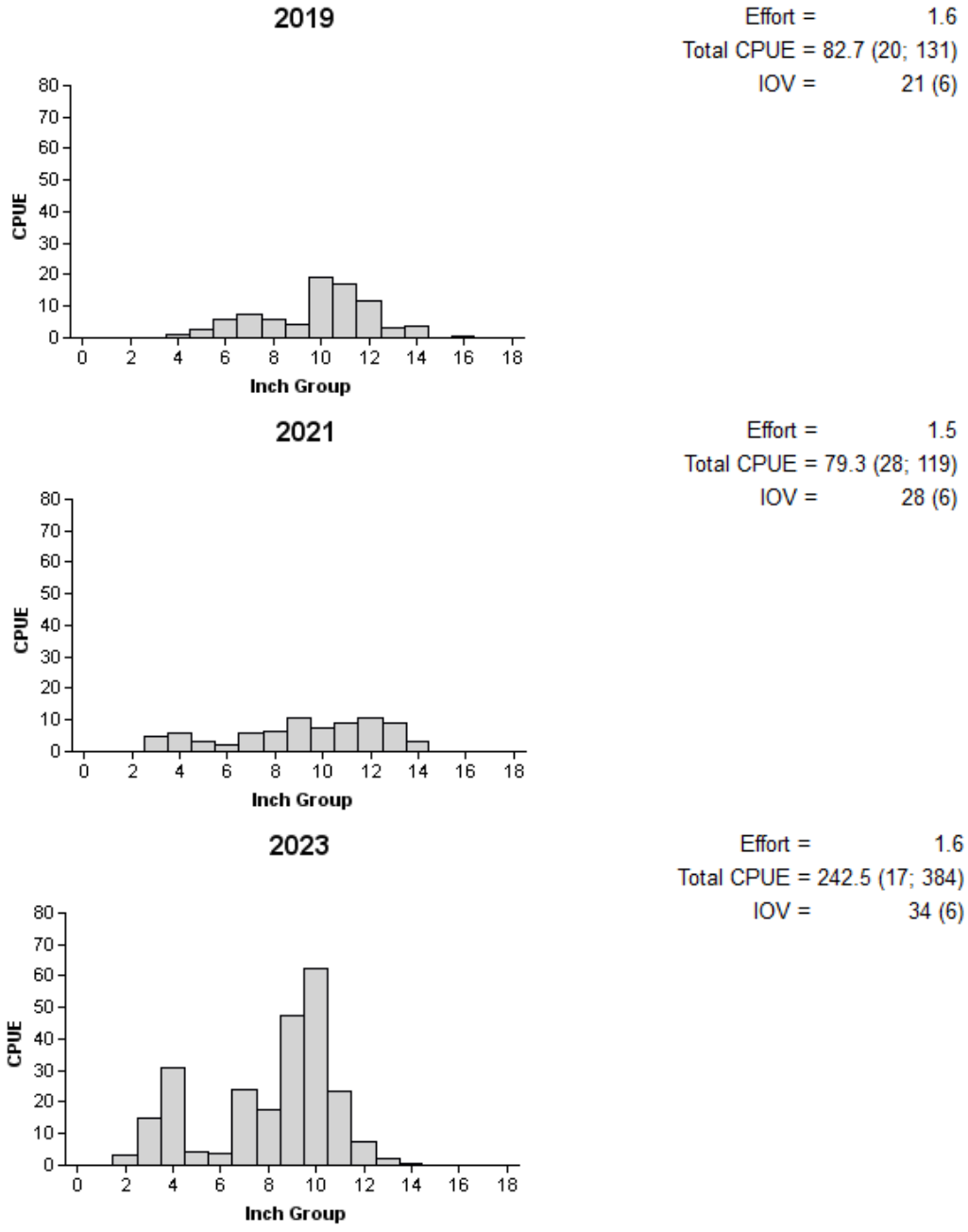


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Twin Buttes Reservoir, Texas, 2019, 2021, and 2023.

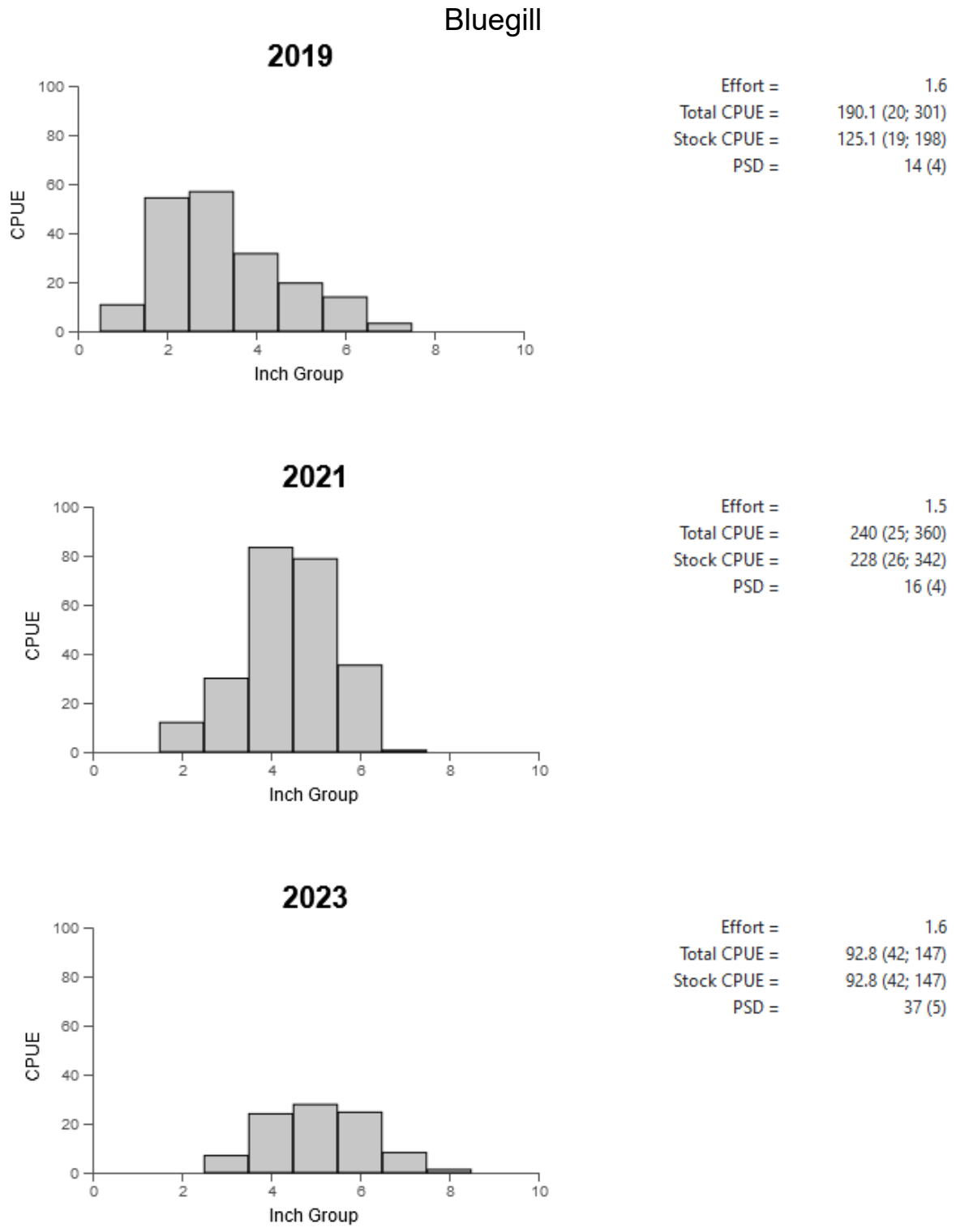


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Twin Buttes Reservoir, Texas, 2019, 2021, and 2023.

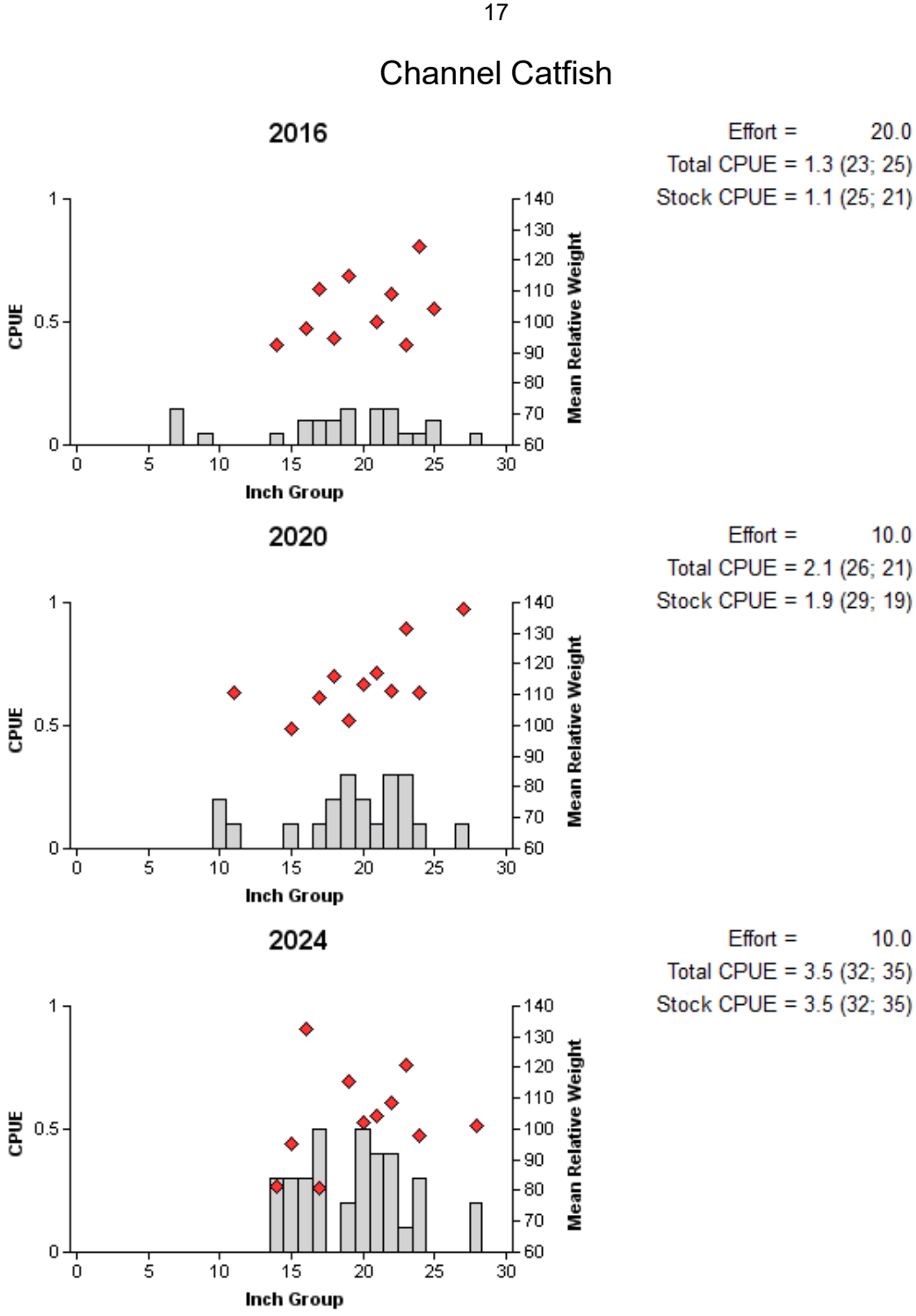


Figure 4. Number of Channel Catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Twin Buttes Reservoir, Texas, 2016, 2020, and 2024.

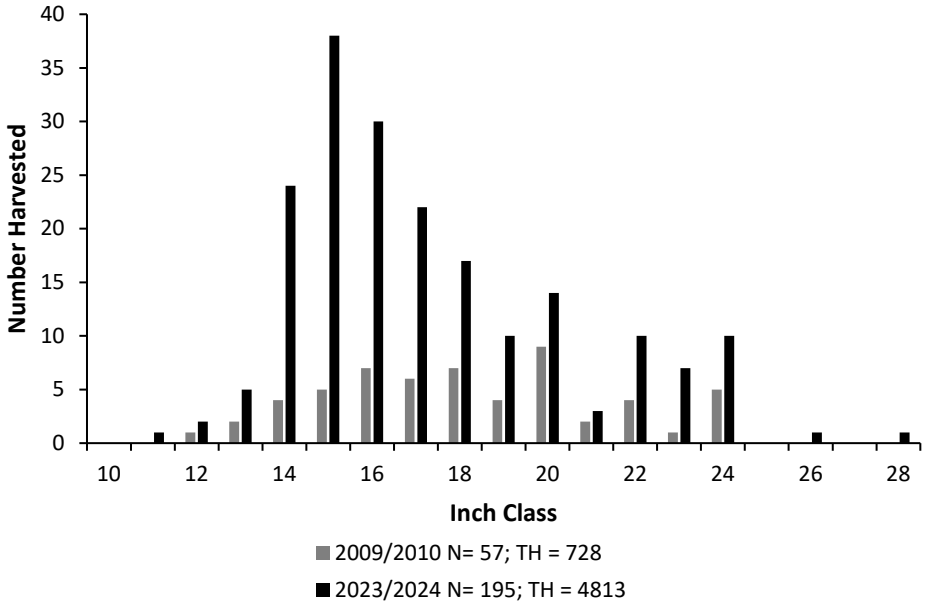


Figure 5. Length frequency of harvested Channel Catfish observed during creel surveys at Twin Buttes Reservoir, Texas, March 2009 through February 2010 and June 2023 through May 2024, all anglers combined. N is the number of harvested Channel Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

Blue Catfish

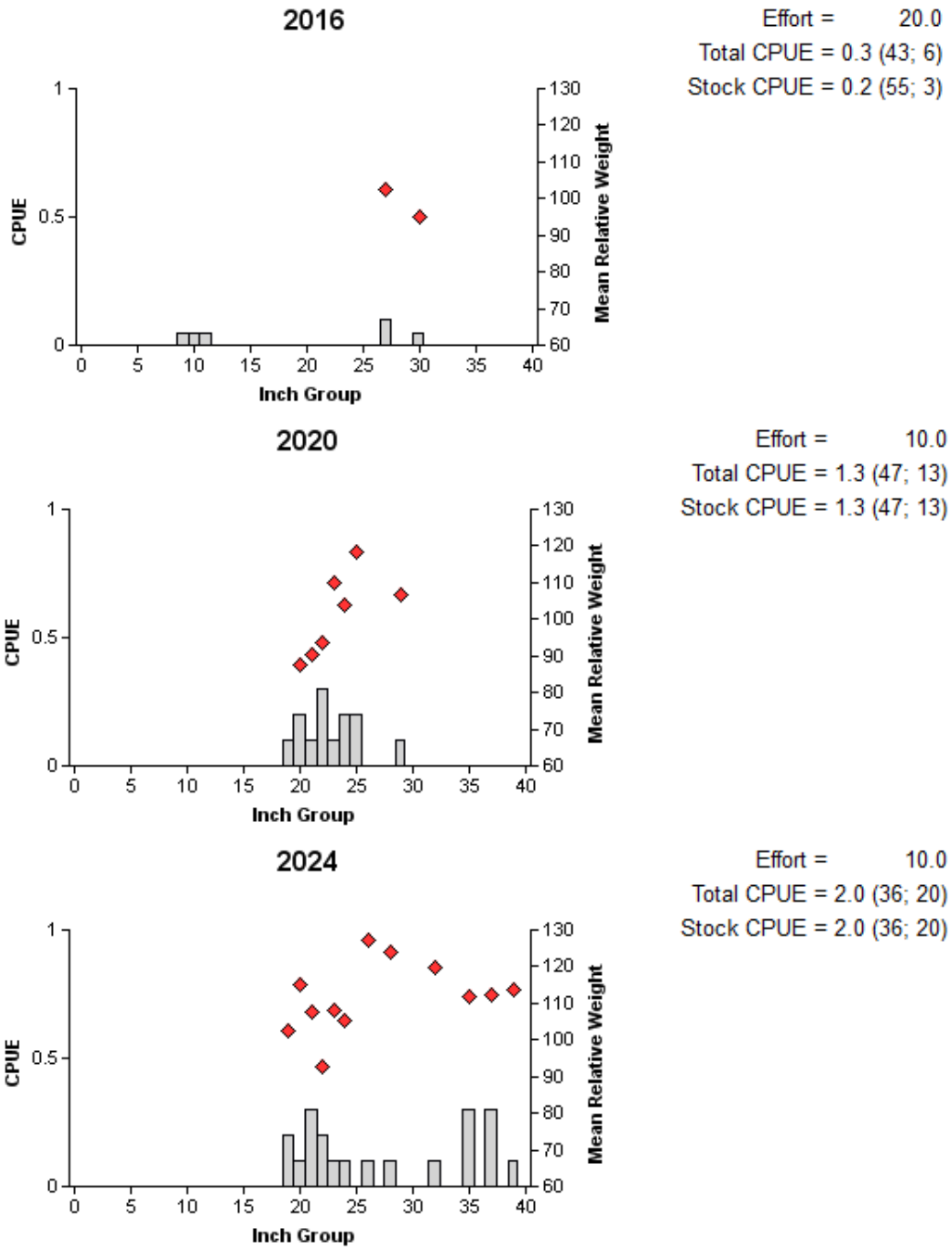


Figure 6. Number of Blue Catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Twin Buttes Reservoir, Texas, 2016, 2020, and 2024.

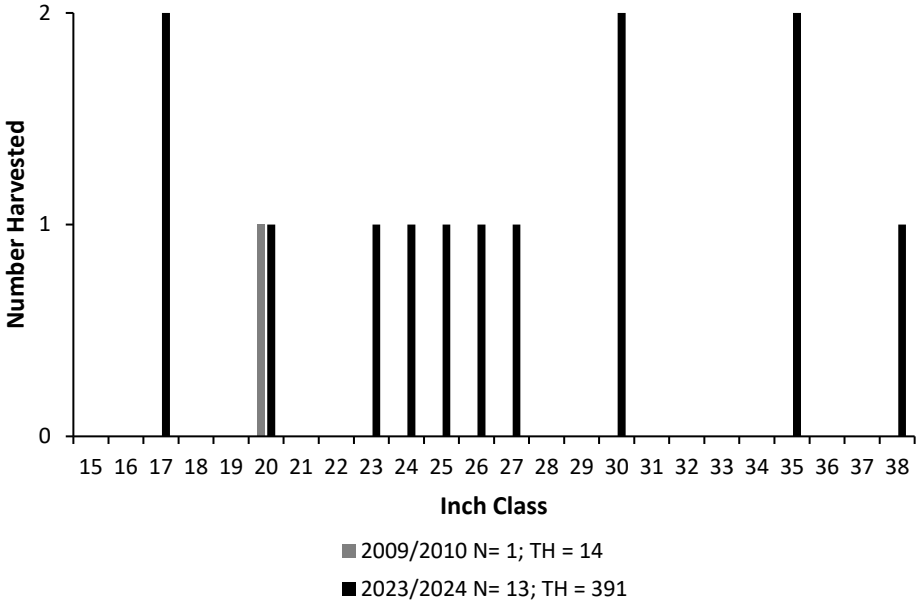


Figure 7. Length frequency of harvested Blue Catfish observed during creel surveys at Twin Buttes Reservoir, Texas, March 2009 through February 2010 and June 2023 through May 2024, all anglers combined. N is the number of harvested Blue Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

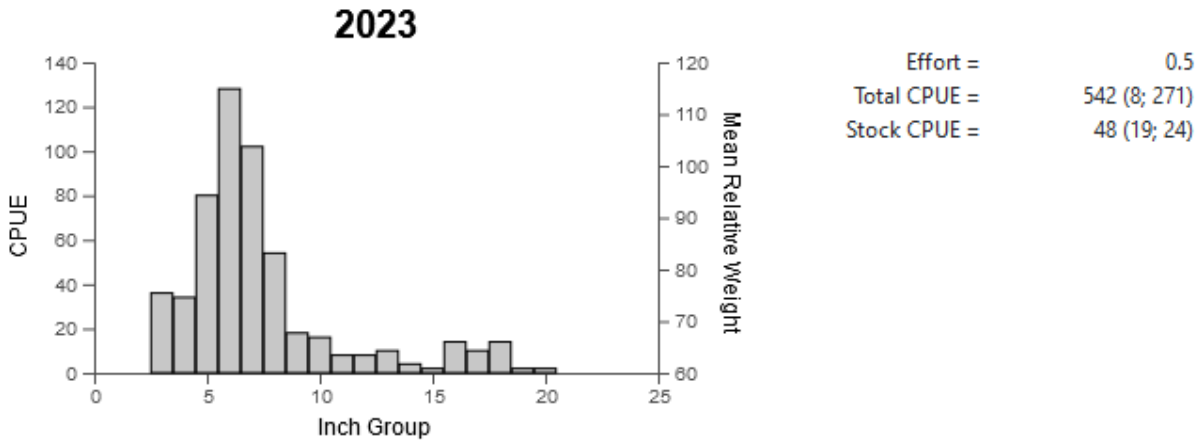


Figure 8. Number of Flathead Catfish caught per hour (CPUE, bars), and population indices (RSE and N for CPUE) for non-standard fall low-frequency electrofishing survey, Twin Buttes Reservoir, Texas, 2023.

Table 9. Creel survey statistics for catfishes at Twin Buttes Reservoir, Texas, from March 2009 through February 2010, and June 2023 through May 2024.Total catch per hour is for anglers targeting catfishes and total harvest is the estimated number of catfishes (by species) harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	2009-2010	2023-2024
Surface acreage	2,500	2,248
Directed effort (h)	908 (34)	16,634 (27)
Directed effort/acre	0.36	7.40
Total catch per h	0.54 (119)	0.39 (68)
Total harvest		
Channel Catfish	728 (66)	4,813 (35)
Blue Catfish	14 (1,731)	391 (150)
Flathead Catfish	25 (642)	60 (340)
Harvest/acre		
Channel Catfish	0.29	2.14
Blue Catfish	<0.01	0.17
Flathead Catfish	0.01	0.03
Percent legal released*		
Channel Catfish	6	60
Blue Catfish	0	0
Flathead Catfish	0	0

*Channel Catfish and Blue Catfish harvest regulation was updated between the 2009-2010 and 2023-2024 creel surveys.

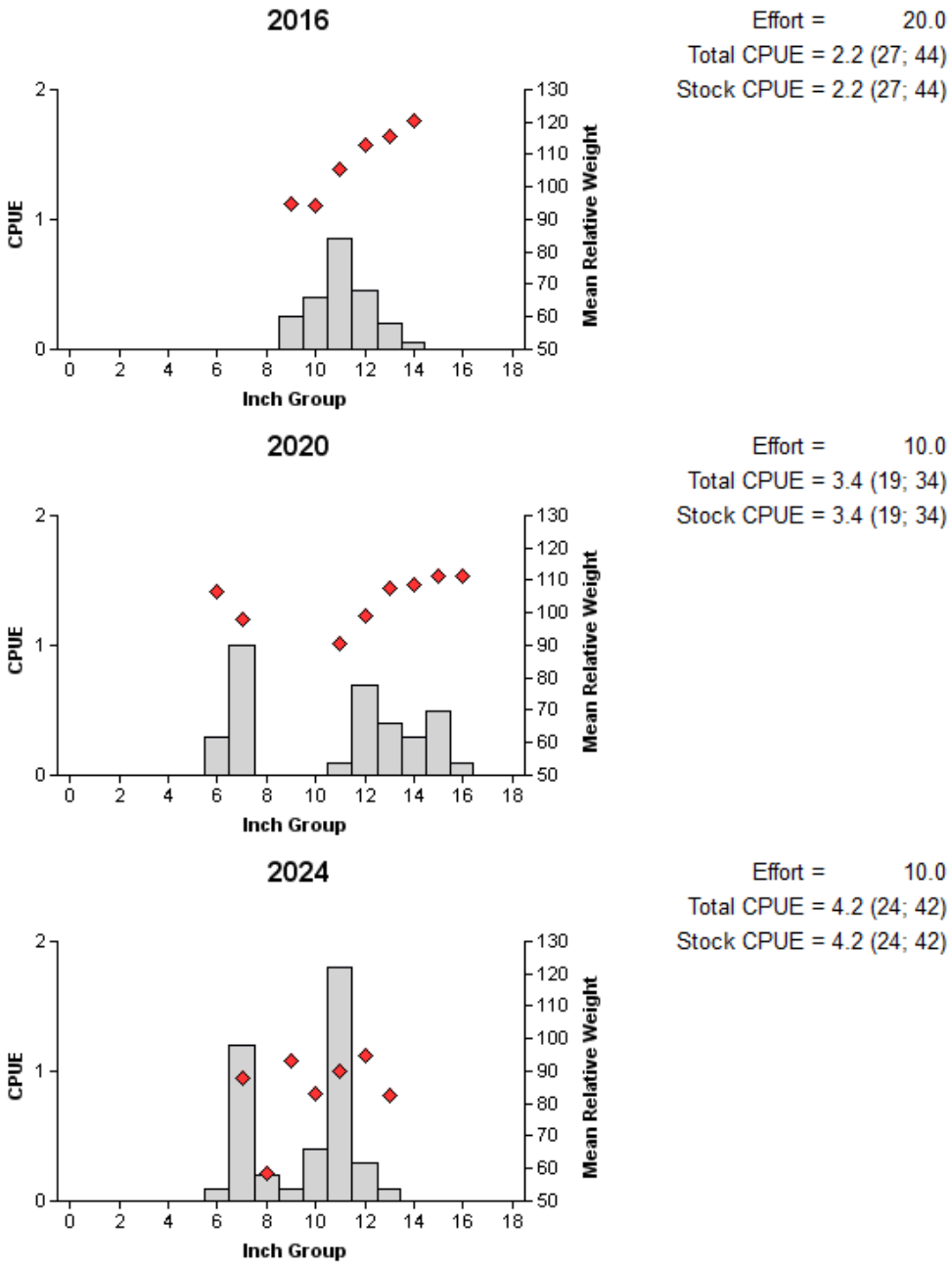


Figure 9. Number of White Bass caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Twin Buttes Reservoir, Texas, 2016, 2020, and 2024.

Table 10. Creel survey statistics for White Bass at Twin Buttes Reservoir, Texas, from March 2009 through February 2010 and June 2023 through May 2024. Total catch per hour is for anglers targeting White Bass and total harvest is the estimated number of White Bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	2009-2010	2023-2024
Surface acreage	2,500	2,248
Directed effort (h)	1,622 (30)	3,614 (33)
Directed effort/acre	0.65	1.61
Total catch per h	0.79 (57)	3.93 (28)
Total harvest	2,133 (37)	7,120 (45)
Harvest/acre	0.85	3.17
Percent legal released	69	55

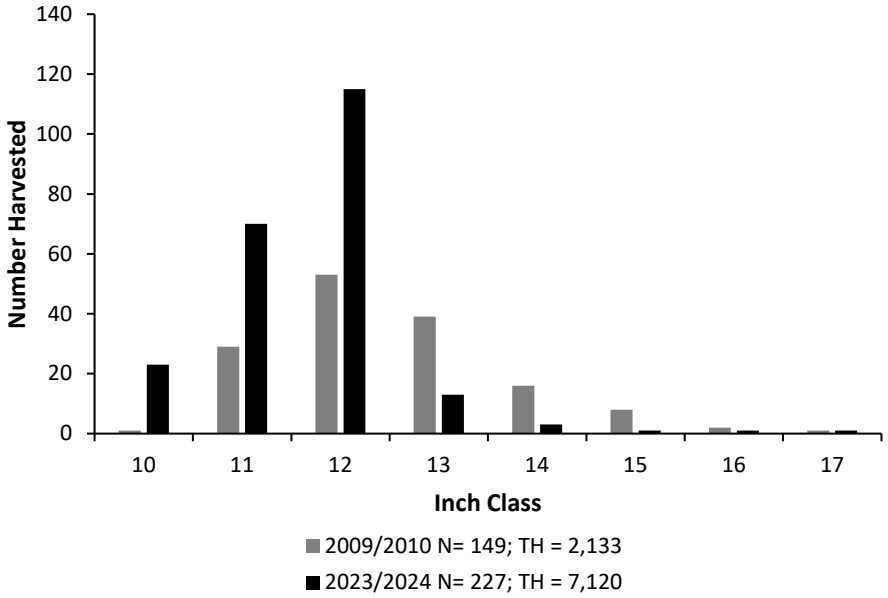


Figure 10. Length frequency of harvested White Bass observed during creel surveys at Twin Buttes Reservoir, Texas, March 2009 through February 2010, and June 2023 through May 2024, all anglers combined. N is the number of harvested White Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

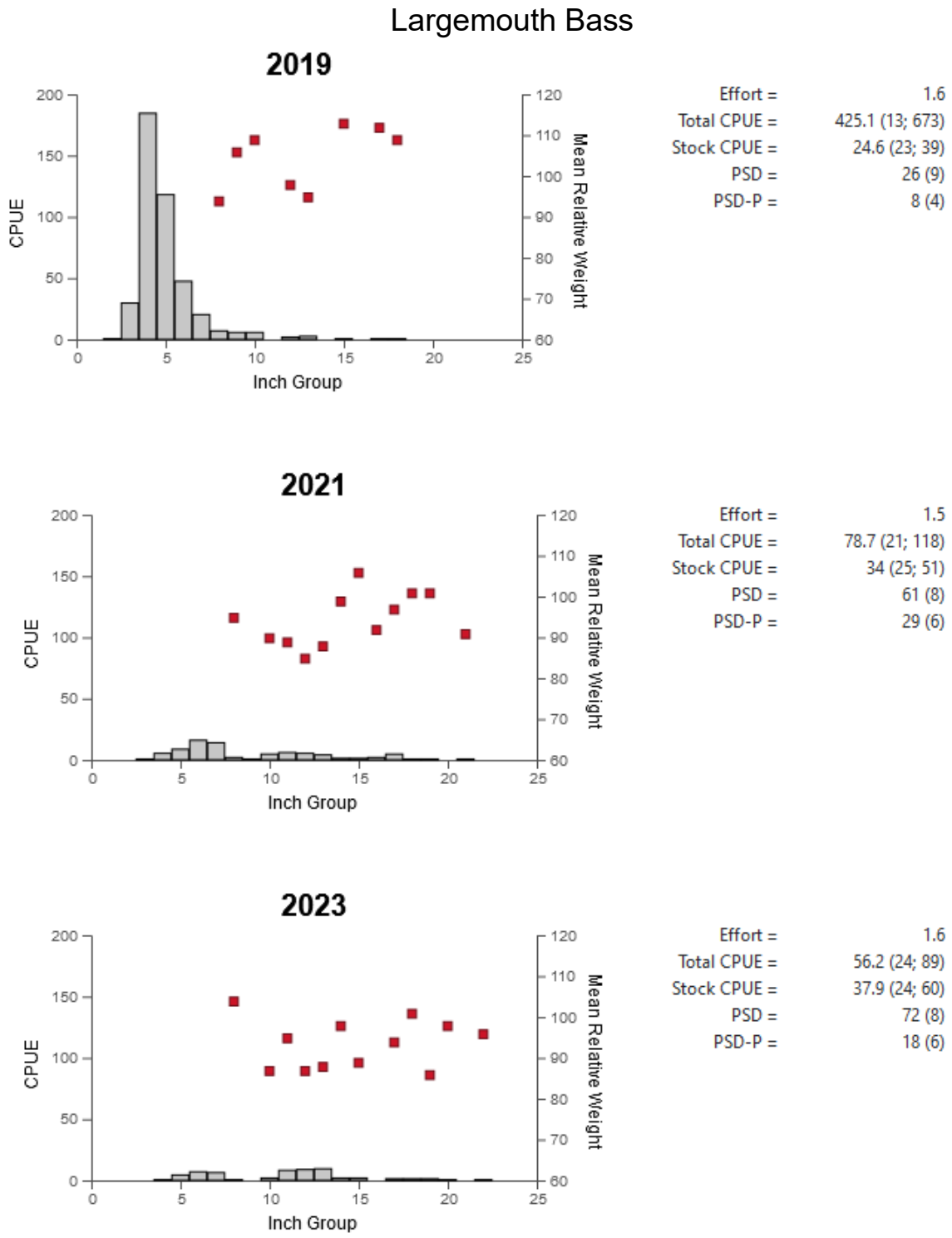


Figure 11. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Twin Buttes Reservoir, Texas, 2019, 2021, and 2023.

Table 11. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Twin Buttes Reservoir, Texas, 1996, 1998, 2015, 2019, and 2023. 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
2023	29	0	29	0	50.0	0.0

Table 12. Creel survey statistics for Largemouth Bass at Twin Buttes Reservoir, Texas, from March 2009 through February 2010. Catch rate is for all anglers targeting Largemouth Bass. Harvest is partitioned by the estimated number of fish harvested by non-tournament anglers and the number of fish retained by tournament anglers for weigh-in and release. The estimated number of fish released by weight category is for anglers targeting Largemouth Bass. Relative standard errors (RSE) are in parentheses.

Statistic	2009/2010	2023/2024
Surface area (acres)	2,500	2,248
Directed angling effort (h)		
Tournament	4,536 (19)	5,373 (30)
Non-tournament	21,138 (14)	14,814 (22)
All black bass anglers combined	25,674 (14)	20,187 (21)
Angling effort/acre	10.27	8.98
Catch rate (number/h)	0.71 (19)	0.70 (25)
Harvest		
Non-tournament harvest	575 (39)	263 (86)
Harvest/acre	0.23	0.12
Tournament weigh-in and release	843 (49)	1,881 (44)
Release by weight		
<4.0 lbs	NA	10,760 (63)
4.0-6.9 lbs	NA	469 (79)
7.0-9.9 lbs	NA	31 (134)
≥10.0 lbs	NA	0 (0)
Percent legal released (non-tournament)	85	91

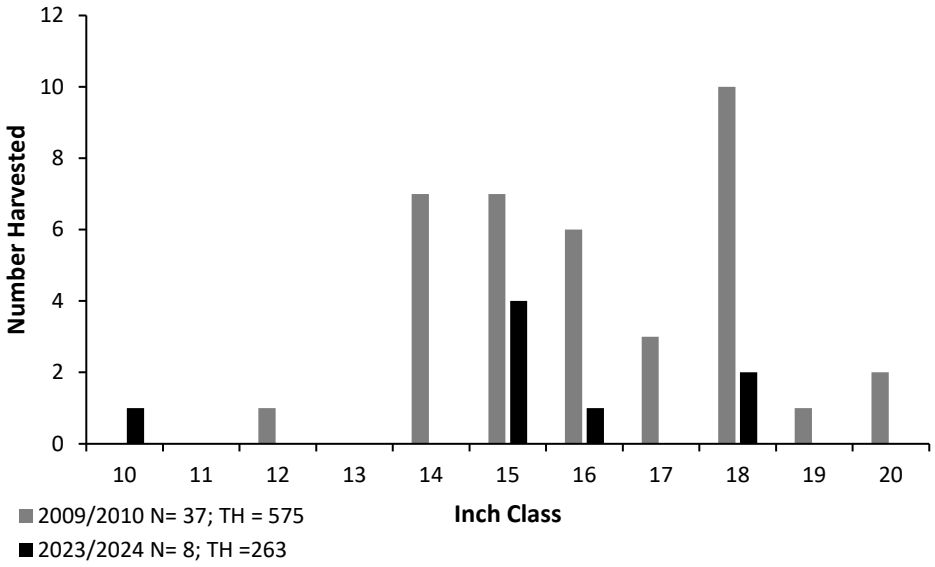


Figure 12. Length frequency of non-tournament harvested Largemouth Bass observed during creel surveys at Twin Buttes Reservoir, Texas, March 2009 through February 2010, and June 2023 through May 2024, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and NTH is the estimated non-tournament harvest for the creel period.

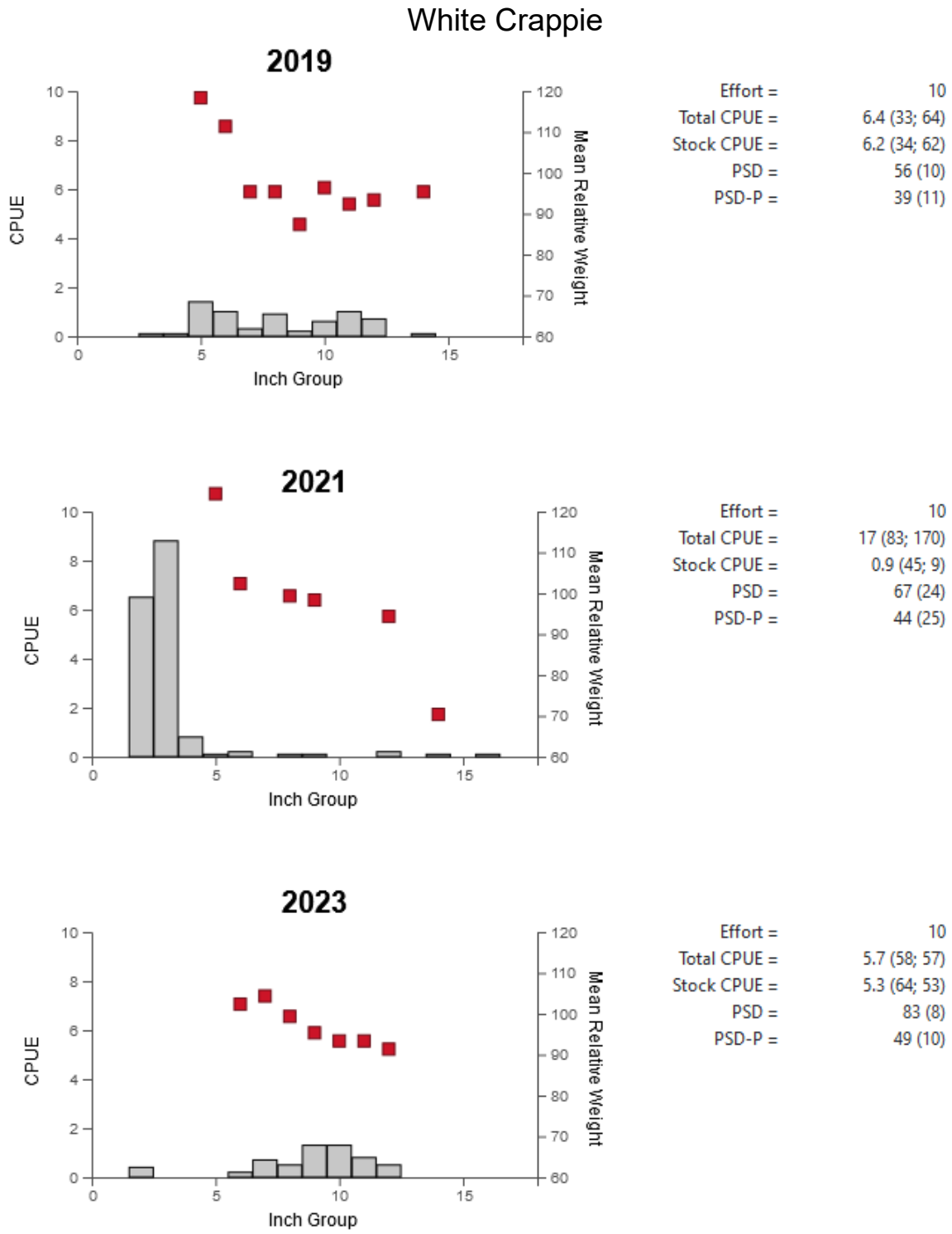


Figure 13. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Twin Buttes Reservoir, Texas, 2019, 2021, and 2023. Vertical line indicates minimum length limit.

Table 13. Creel survey statistics for Crappies at Twin Buttes Reservoir, Texas, from March 2009 through February 2010, and June 2023 through May 2024. Total catch per hour is for anglers targeting White Crappie and total harvest is the estimated number of White Crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	2009/2010	2023/2024
Surface acreage	2,500	2,248
Directed effort (h)	3,544 (23)	6,150 (33)
Directed effort/acre	1.42	2.74
Total catch per h	1.14 (31)	0.98 (37)
Total harvest		
White Crappie	3,555 (37)	4,951 (33)
Black Crappie	14 (1,731)	429 (174)
Harvest/acre	1.42	2.39
Percent legal released	11	12

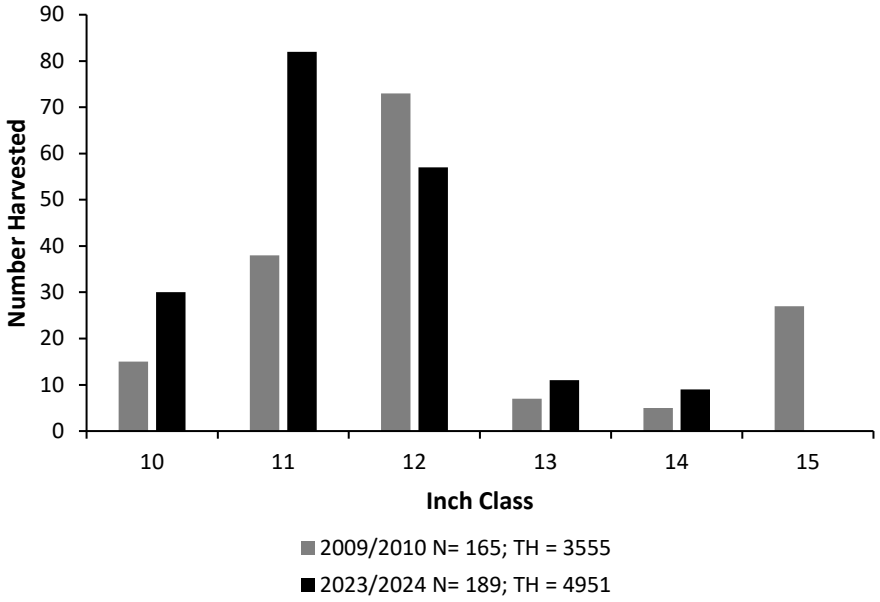


Figure 14. Length frequency of harvested White Crappie observed during creel surveys at Twin Buttes Reservoir, Texas, March 2009 through February 2010, and June 2023 through May 2024, all anglers combined. N is the number of harvested White Crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Proposed Sampling Schedule

Table 14. 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.

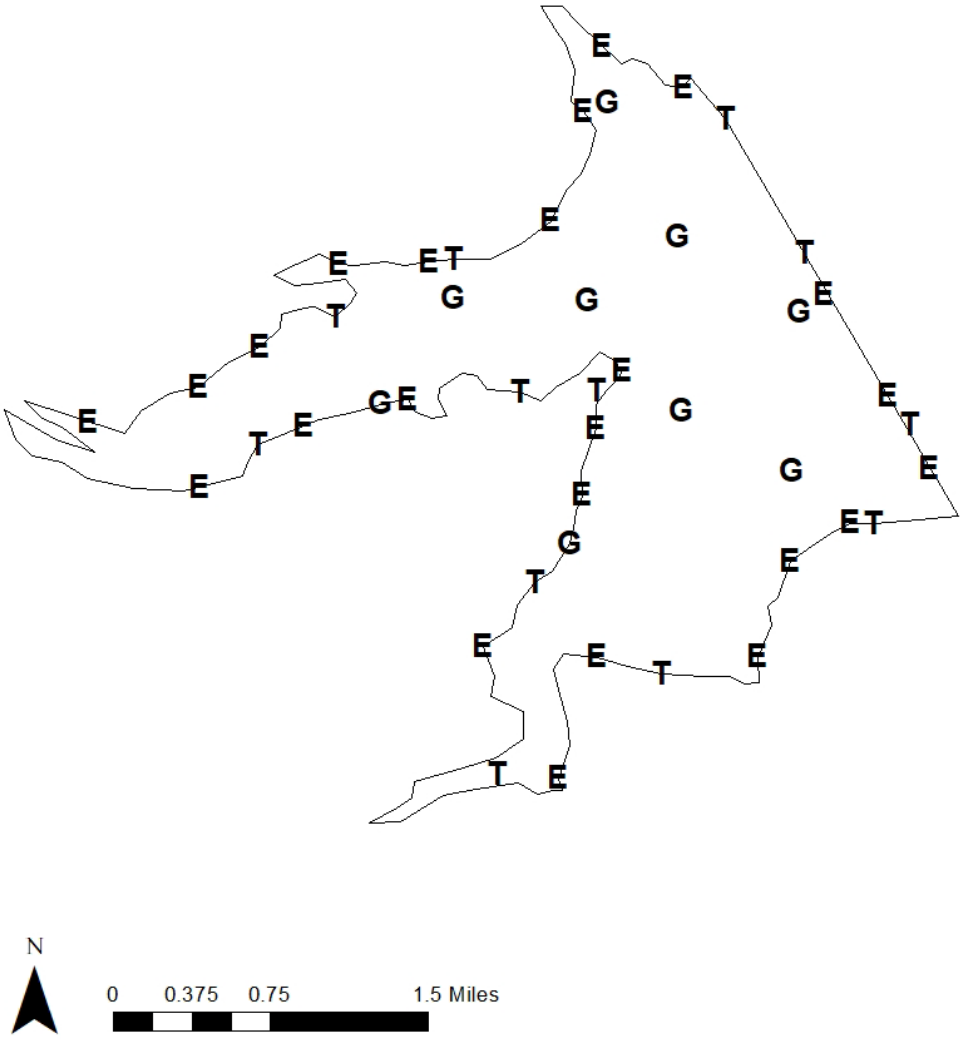
	Survey year			
	2024-2025	2025-2026	2026-2027	2027-2028
Angler Access				X
Vegetation				X
Electrofishing – Fall		X		X
Trap netting		X		X
Gill netting				X
Report				X

Appendix A - Catch rates for all species from all gear types

Number (N) and catch rate (CPUE) (RSE in parentheses) of all target species collected from all gear types from Twin Buttes Reservoir, Texas, 2023-2024. Sampling effort was 10 net nights for gill netting, 10 net nights for trap netting, and 1 hour for electrofishing.

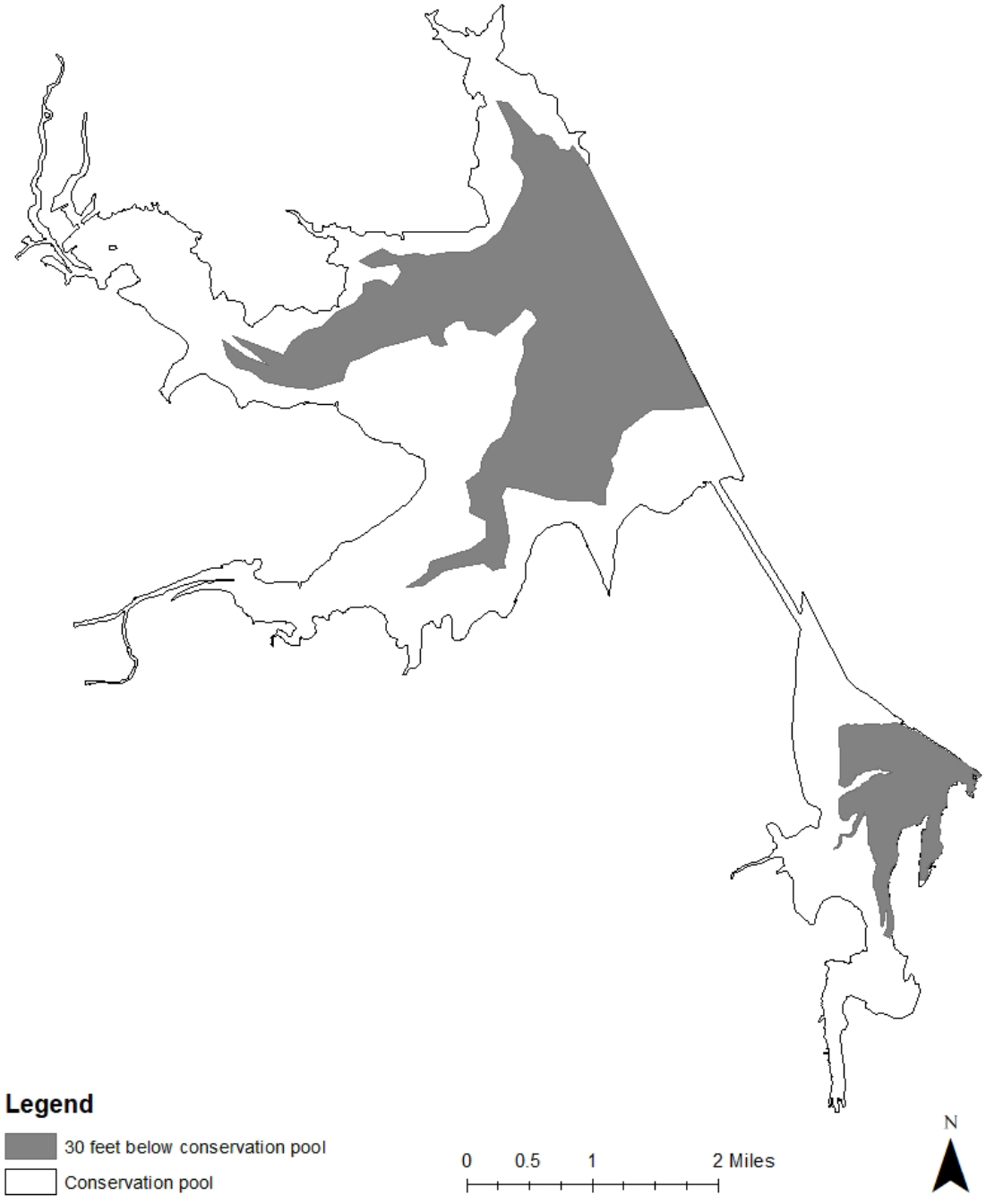
Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad					384	242.5 (17)
Blue Catfish	20	2.0 (36)				
Channel Catfish	35	3.5 (32)				
Flathead Catfish	1	0.1 (100)				
White Bass	42	4.2 (24)				
Green Sunfish					1	0.6 (100)
Bluegill					147	92.8 (42)
Longear Sunfish					14	8.8 (93)
Redear Sunfish					1	0.6 (100)
Largemouth Bass					89	56.2 (24)
White Crappie			57	5.7 (58)		
Black Crappie			2	0.2 (67)		

Appendix B - Map of sampling locations

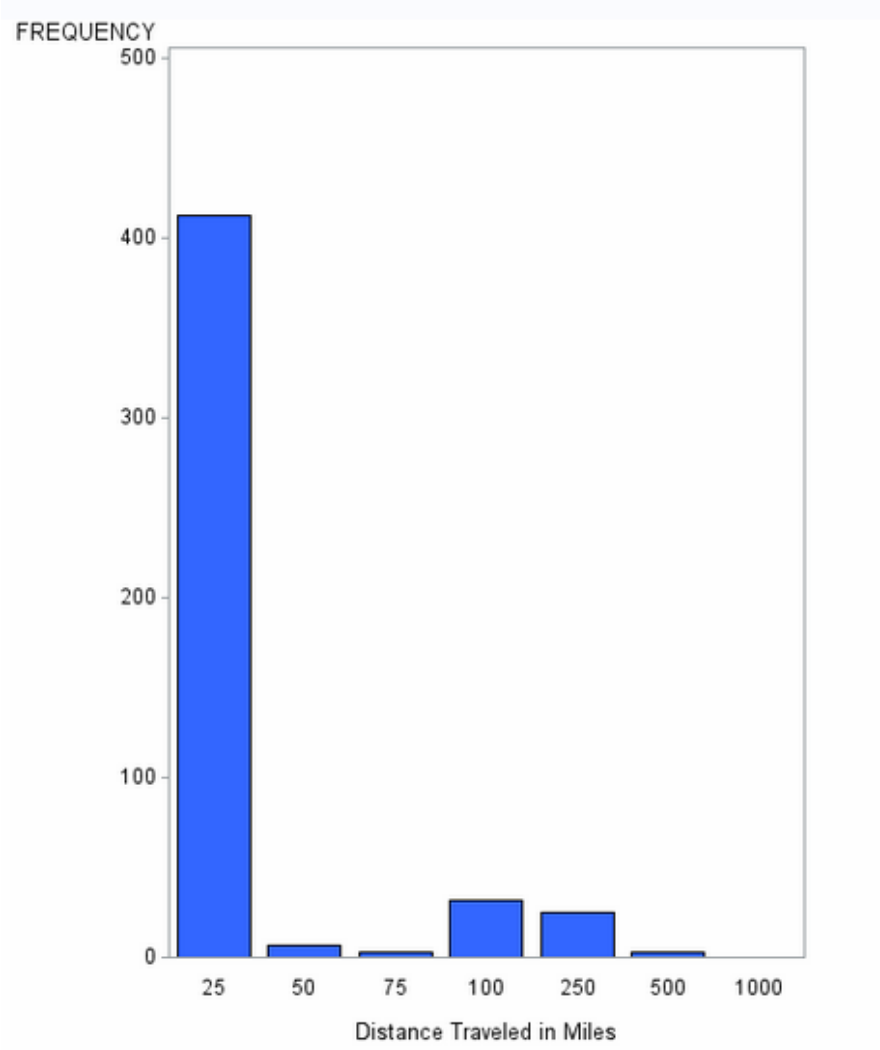


Location of sampling sites, Twin Buttes Reservoir, Texas, 2023-2024. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively.

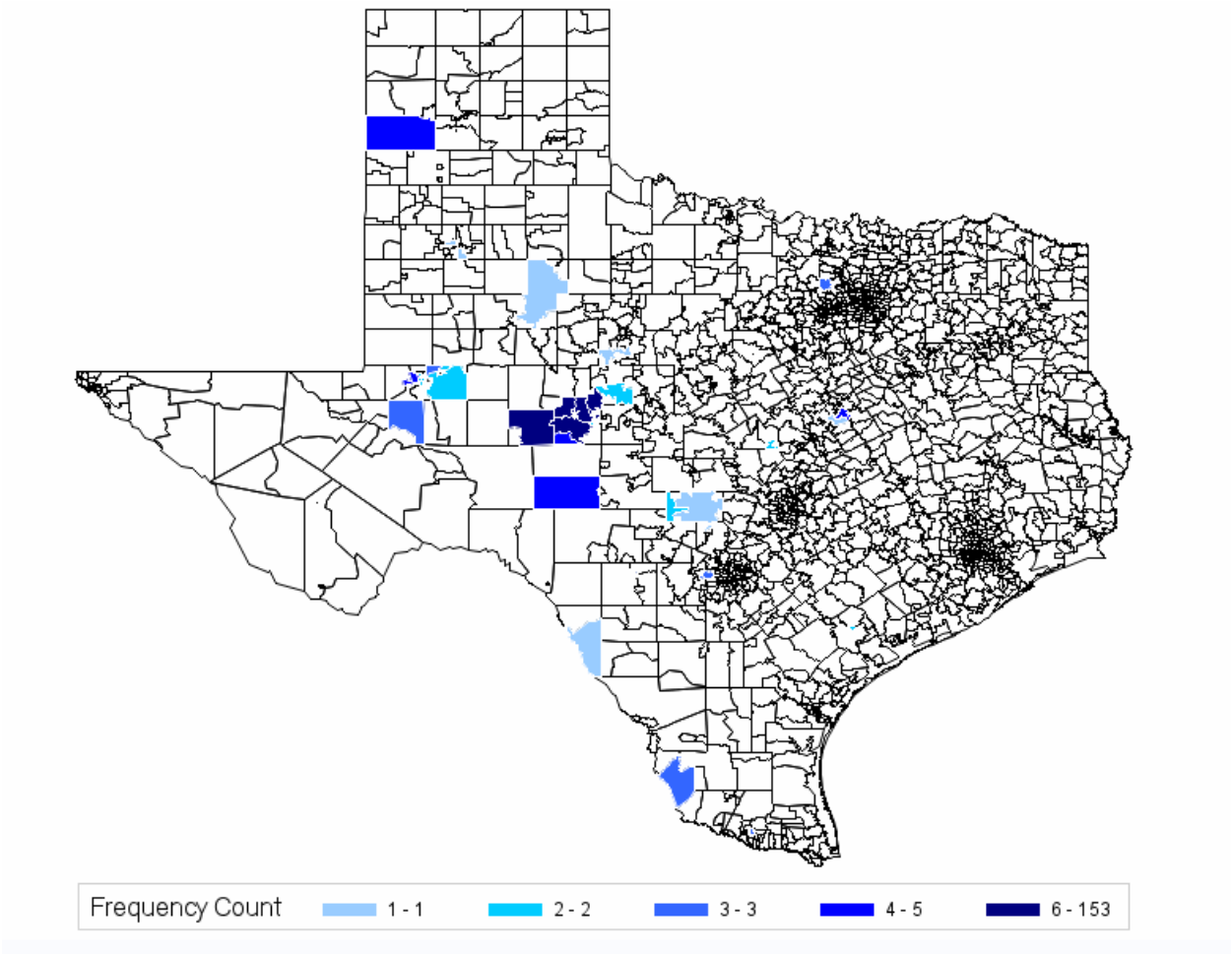
Appendix C - Map of lake during sampling period



Appendix D - Reporting of creel zip code data



Frequency of anglers that traveled various distances (miles) to Twin Buttes Reservoir, Texas, as determined from the June 2023 through May 2024 creel survey.



Location, by ZIP code, and frequency of anglers that were interviewed at Twin Buttes Reservoir, Texas, during the June 2023 through May 2024 creel survey.

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