Nasworthy Reservoir

2022 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 Nasworthy Reservoir were surveyed in 2020-2022 using electrofishing and trap netting and with gill netting in 2021 and 2023. Anglers were surveyed from June 2021 through May 2022 with a creel survey. Historical data are presented with the 2020-2023 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: Nasworthy Reservoir is a 1,380-acre impoundment located on the southwestern edge of San Angelo, Texas in Tom Green County. It is a shallow turbid reservoir with stable water levels and emergent vegetation. Access is excellent with numerous public boat ramps and parks.

Management History: Important sport fish include Largemouth Bass, White Crappie, Channel Catfish, and Hybrid Striped Bass. Red Drum were once an important game species, but the discontinued operation of the power plant on Nasworthy Reservoir in 2003 eliminated the fishery that was dependent on the plant's heated water effluent. Palmetto Bass (Striped Bass female x White Bass male) were stocked from 1974 to 2007. In 2018 and 2019 Palmetto Bass stockings resumed at a higher stocking density to restructure the Gizzard Shad population. In 2020 and 2022 Sunshine Bass (White Bass female x Striped Bass male) were stocked instead of Palmetto Bass.

Fish Community

- **Prey species:** Threadfin Shad were present in the reservoir. Electrofishing catch of Gizzard Shad was adequate, however Gizzard Shad IOV was marginal. Electrofishing catch of Bluegill was slightly lower than previous years with most fish being 2 to 6 inches long.
- **Catfishes:** The Channel Catfish population had good size structure with fish up to 26 inches observed during sampling. Channel Catfish was the most sought-after species in Nasworthy Reservoir. Blue and Flathead Catfish were present in the reservoir in low abundance.
- **Temperate basses:** White Bass were present in the reservoir in low abundance. Hybrid Striped Bass continued to increase in size and abundance from 2018-2020 stockings.
- **Largemouth Bass:** The Largemouth Bass population continued to be characterized by poor size structure and slow growth. Largemouth Bass below the slot limit tended to be in poor condition, while bass above the slot were in good condition. Just over 16% of all angler effort at Nasworthy Reservoir targeted Largemouth Bass.
- **White Crappie:** White Crappie were highly abundant and showed modest improvements in condition. Growth of crappie also improved, with crappie reaching 10 inches in 2.3 years. The minimum length limit was removed on September 1, 2020 to increase harvest and reduce intraspecific competition.

Management Strategies: Conduct gill netting in 2025 and 2027. Conduct additional electrofishing and trap net surveys in 2023, 2024 and 2025, and general monitoring surveys with trap nets and electrofishing surveys in 2026-2027. Conduct a roving creel survey from June 2026 through May 2027. Access and vegetation surveys will be conducted in 2026.

Introduction

This document is a summary of fisheries data collected from Nasworthy Reservoir from 2020-2023. 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 2020-2023 data for comparison.

Reservoir Description

Nasworthy Reservoir is a 1,380-acre impoundment constructed in 1930 on the South Concho River. It is located in Tom Green County on the southwestern edge of San Angelo and is operated and controlled by the City of San Angelo. Primary water uses included municipal water supply, irrigation and recreation. Water level remains fairly constant (Figure 1) due to supplemental flows from upstream Twin Buttes Reservoir. The reservoir was used for power plant cooling until 2003, when the plant ceased operation. Nasworthy Reservoir was eutrophic with a mean trophic state index chl-a of 58.32 (Texas Commission on Environmental Quality 2022). The reservoir experienced a mild golden alga fish kill in spring 2014, but the impacts were minimal. Habitat consisted mainly of bulkhead, riprap, boat docks, and native emergent vegetation (bulrushes and water willow). Other descriptive characteristics for Nasworthy Reservoir are in Table 1.

Angler Access

Nasworthy Reservoir has 13 public boat ramps and numerous private boat ramps (Table 2). All ramps are currently open except for Red Bluff Road ramp, which is closed and in need of repairs and Spring Creek Marina East, which is closed to the public. Under normal conditions, all ramps are in the water and useable due to water supplementation from the Twin Buttes Reservoir dam just upstream. Shoreline access is abundant at seven city-maintained parks around the lake which offers a combined 5.3 miles of bank access.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Wright 2019) included:

1. Recommend removal of the 10-inch minimum length limit on crappies but maintain the 25 fish daily bag. Evaluate crappie harvest with a roving creel survey from June 2022 to May 2023.

   Action: The 10-inch minimum length limit was removed effective September 1, 2019. The follow-up creel evaluation period was completed June 1, 2021, to May 31, 2022.

2. Request high density (75 fingerlings/acre) Hybrid Striped Bass stockings in 2020, monitor stocking success with gill netting in 2021 and 2023, and assess changes to Gizzard Shad IOV, and sportfish growth and condition with fall electrofishing and trap netting from 2020 and 2022.

   Action: Hybrid Striped Bass were stocked in 2020 and 2022. All surveys to monitor stocking success and sportfish populations were conducted as planned.

3. Monitor Largemouth Bass through electrofishing and creel surveys to assess the special 14-to-18-inch slot limit.

   Action: Largemouth Bass were monitored with electrofishing and creel surveys as planned. Recommendations were made to remove the 14-to-18-inch slot limit and revert to statewide regulations in 2022. The proposed regulation change was approved in March 2023 and will take effect September 1, 2023.

4. Cooperate with the City of San Angelo 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 City of San Angelo to post signage and to educate the public on invasive species threats through media outlets.

Harvest regulation history: In 2005, the minimum length limit and bag limit on Red Drum were removed to allow harvest of any remaining Red Drum after the closure of the reservoir's power plant. The discontinuation of hot-water discharge from the power plant made the reservoir unsuitable for this species. On September 1, 2015, the length limit for Largemouth Bass changed to a 14- to 18-inch slot limit. On September 1, 2020, the minimum length limit for crappie was changed to a no minimum length limit. All other species are managed with statewide regulations. Current regulations are found in Table 3.

Stocking history: Species stocked have included Channel Catfish, Largemouth Bass, Palmetto Bass, Sunshine bass, and Red Drum. Palmetto Bass were stocked from 1974 to 2007 but were discontinued due to poor growth and lack of a fishery. However, Palmetto Bass stockings resumed in 2018 and stocked at a higher rate in an attempt to restructure the Gizzard Shad population. Sunshine Bass were stocked instead of Palmetto Bass in 2020 and 2022. Red Drum stockings were discontinued after 2002 because the power plant on the reservoir stopped operation, eliminating the heated water effluent that enabled overwinter survival of Red Drum. The complete stocking history is in Table 4.

Vegetation/habitat management history: The City of San Angelo completed a dredging project in 2002 to remove excess sediment. The dredging project removed 3.8 million cubic yards of sediment and added 2,500 acre feet of reservoir capacity. The city also periodically controls the spread of bulrushes with chemical methods.

Water transfer: Nasworthy Reservoir is primarily used for municipal water supply, irrigation, and recreation. When the Twin Buttes dam gates are opened by the City of San Angelo, the water feeds directly into downstream Nasworthy Reservoir. Water from Nasworthy Reservoir is fed downstream directly into the South Concho River which flows through south San Angelo to a pumping station near Ave L, supplying municipal water for San Angelo. An irrigation canal is sometimes used to provide water to Concho River watershed farmers. No interbasin transfers are known to exist.

Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Nasworthy Reservoir (Wright 2019). 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).

Electrofishing – Largemouth Bass, sunfishes, Gizzard Shad, and Threadfin Shad were collected by electrofishing (1.2 hour at 14, 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 (15 net nights at 15 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 – Catfishes, White Bass, and Hybrid Striped 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).

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).

Statistics – Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), terminology modified by Guy et al. 2007], and condition indices [relative weight (W_r)] were calculated for target fishes according to Anderson and Neumann (1996). Hybrid Striped Bass PSD was calculated according to Dumont and Neely (2011). Index of Vulnerability (IOV) was calculated for Gizzard Shad (DiCenzo et al. 1996). Standard error (SE) was calculated for structural indices and IOV. Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE and creel statistics.

Creel survey – A roving creel survey was conducted from June 2021 through May 2022. 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).

Habitat – A vegetation survey were conducted in 2022. 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 2013) and from the Heaven County Water Control & Irrigation District No. 1.

Results and Discussion

Habitat: A structural habitat survey was last conducted in 2002 (Van Zee 2003) and has remained relatively unchanged. Due to the turbid waters in Nasworthy Reservoir, little submerged vegetation is present, but small amounts of Coontail were observed in 2022. Native emergent vegetation, primarily reeds, cattails, and water willow, covered just over 10% of the reservoir's surface area, a slight increase from previous surveys (Table 6). Native floating vegetation, primarily American Lotus, has expanded significantly in recent years from 11 acres in 2018 to nearly 40 acres in 2022. The expansion of the American Lotus has raised concerns from boaters and waterfront property owners as thick mats have started to encroach on boating lanes and obstructing access to backwater areas. The City of San Angelo conducts limited herbicide applications for the purposes of maintaining boating and bank access and has included the American Lotus in its most recent treatment plan. Fish attractors were placed in the reservoir in three locations in 2022 to enhance angler catch rates.

Creel: Directed fishing effort by anglers was highest for anglers fishing for anything (38.2%), followed by anglers fishing for Catfishes (32.9%) and Largemouth Bass (16.3%, Table 7). However, among boat anglers, Largemouth Bass have been the most popular species over the past three creel surveys (Table 7) Total fishing effort for all species combined has ranged from 59-74 hours/acre at Nasworthy Reservoir (Table 8). Total direct expenditures by anglers have exceeded $470,000 over the past two surveys (Table 8). Due to the extensive bank access available at Nasworthy Reservoir, directed effort from bank anglers and has ranged from 80-87% of the total angler effort over the past three surveys. Bank anglers accounted for the majority of all fish harvested, including 42% of all Channel Catfish harvest, 100% of all Bluegill harvest, 97% of all Largemouth Bass harvest, 99% of all White Crappie harvest, and 88% of all Hybrid Striped Bass harvest (Table 9). Analysis of ZIP code data indicates that while most anglers are local to the area, many anglers travel from areas further west (Appendix C). Anglers from the San Angelo area account for 67.8% of all anglers interviewed while anglers from the Midland/Odessa area accounted for 13.0%. Nearly one-quarter (24.1%) of anglers traveled 100 miles or more to fish at Nasworthy Reservoir while 2.7% of all anglers were from out-of-state. Channel Catfish and Sunfish species accounted for over 58% of the total catch for anglers seeking anything and overall harvest of all fish species by anglers seeking anything was low (Appendix D).

Prey species: The abundance of prey species have been relatively stable over the past three surveys. Gizzard Shad catch rates has ranged from 207.4/h to 303.0/h, while IOV has ranged from 58-60 (Figure 2). Gizzard Shad abundance was similar to data from 2014-2018 where total CPUE ranged from 230.0/h to 426.0/h (Wright 2019). Attempts to restructure the Gizzard Shad population and increase IOV through high density stockings of Hybrid Striped Bass have shown modest results thus far. Mean IOV from 2011-2018 was 41 and has since increased to a mean of 59 from 2020-2022, an increase of about 44%. While the increase in IOV is a positive sign, we have yet to see significant population level impacts on Largemouth Bass relative weights. Past survey data indicates Largemouth Bass relative weights are higher when Gizzard Shad IOV exceeds 80 (Wright 2019), thus we would likely need to see consistent IOV levels at or above 80 to see long-term improvements in Largemouth Bass condition values. Further monitoring will be necessary to determine if Hybrid Striped Bass stockings can be an effective tool for improving sportfish relative weights in Nasworthy Reservoir.

Total CPUE of Bluegill ranged from 266.6/h to 381.0/h, while PSD ranged from 3-13, with few individuals over 6 inches available for anglers (Figure 3). Bluegill CPUE and size structure were similar to data from 2014-2018 where total CPUE ranged from 157.7/h to 375.0/h and PSD ranged from 7 to 8 (Wright 2019). The total catch rate of all sunfish species combined was 324.8/h in 2022 (Appendix A). Only 1.9% of anglers targeted sunfishes during the most recent creel period (Table 8) and an estimated 1,989 Sunfishes were harvested by anglers and ranged from 4 to 6 inches in length. The overall abundance of prey species would suggest an adequate forage availability; however Largemouth Bass continue to show low relative weights.

Catfishes: Blue Catfish continued to be present in Nasworthy Reservoir in low abundance. Total gill net catch rate was 0.8/nn in 2019, and 0.6/nn in 2021 (Figure 4). However, no Blue Catfish were collected

during gill netting in 2023. Blue Catfish up to 28 inches were collected and fish over 20 inches tended to have relative weights near or exceeding 100 (Figure 4), indicating good condition. No Blue Catfish harvest was observed in the 2021/2022 creel survey.

The gill net catch rate of Channel Catfish was 3.7/nn in 2023, which was slightly lower, but similar to past surveys (Figure 5). The Channel Catfish population continued to show relatively consistent abundance and size structure with total CPUE ranging from 3.7 to 5.7/nn (Figure 5). Sample sizes of stock size fish from gill net sampling have been too low for accurate estimation of size structure indices, however, Channel Catfish from 20 to 25 inches are commonly collected indicating a quality population is present in the reservoir. Relative weights for Channel Catfish tended to increase with length and fish over 20 inches tended to have excellent relative weights exceeding 120 in some inch groups. Catch rate of Channel Catfish in baited tandem hoop nets ranged from 2.3 to 6.0/nn (Figure 6). Catch rates from tandem hoop nets were low and failed to catch many Channel Catfish over 16 inches. Dues to low catch rates, tandem hoop netting will be discontinued on Nasworthy Reservoir. Channel Catfish harvest has ranged from about 2,000-4,500 fish annually (Table 10). Approximately half of all legal-size catfish were released during the 2021-2022 creel period. Observed harvest of Channel Catfish ranged in length from 10 to 25 inches, with 15 to 18 inches most common size harvested (Figure 7).

Flathead Catfish were present in the reservoir with gill net CPUE ranging from 0.3 to 1.1/nn over the past three surveys. Flathead Catfish ranged from 16 to 38 inches long and were in adequate condition with most fish with relative weights ranging from 90 to 100. Over the past two creel surveys, angler harvest of Flathead Catfish has been low with estimates of only 85-136 fish harvested annually (Table 10).

White Bass: White Bass continue to be present in Nasworthy Reservoir in low abundance. Gill net catch rate has ranged from 0.2 to 1.0/nn over the past three surveys (Figure 8). Fish up to 14 inches were observed in the surveys and were in adequate condition. No directed angling effort for White Bass were observed during the 2021/2022 creel period.

Hybrid Striped Bass: The Hybrid Striped Bass population continued to develop following fingerling stockings from 2018-2022. The gill net catch rate of legal-size Hybrid Striped Bass has increased from 0.1/nn in 2019, to 0.2/nn in 2021, to 1.0/nn in 2023 (Figure 9). Hybrid Striped Bass up to 20 inches were observed in the most recent gill net survey. Condition remained below average with many inch groups in the 80's and low 90's. Directed effort for Hybrid Striped Bass was 1,006 hours and total harvest was moderate with in estimated harvested of 494 fish (Table 11). Harvested fish ranged in size from 12 to 21 inches in length (Figure 8). Sub-legal harvest was observed as some anglers confused Hybrid Striped Bass with White Bass.

Largemouth Bass: The electrofishing catch rate of stock-length Largemouth Bass was 43.7/h in 2022, lower than the 78.0/h in 2021 and 67.0/h in 2020 (Figure 11). The catch rate of bass over 14 inches (CPUE-14) has fluctuated from 9.0/h in 2020, to 18.0/h in 2021, to 14.6/h in 2022. Size structure has increased over the past three surveys with PSD improving from 25, to 47, to 67 and PSD-P improving from 12, to 18, to 25 from 2020, 2021, and 2022, respectively (Figure 11). However, increased size structure appears to be related to reduced numbers of stock size bass from 8-11 inches and not due to increased numbers of quality and preferred size bass, as the CPUE of stock to quality size bass declined from 50.0/h in 2020, to 41.0/h in 2021, and 14.6/h in 2022. No significant changes in the abundance (CPUE-20) or size structure (PSD-M) of Largemouth Bass over 20 inches was observed over the past three surveys (Figure 11). Improvement in the growth rate of Largemouth Bass in Nasworthy Reservoir was marginal; average age at 14 inches (13.0 to 14.9 inches) was 3.3 years (N = 16; range = 2 – 5 years), which was slightly faster than the long-term average of 3.9 years, but still slower than most other reservoirs. Body condition has remained average to below average, with most bass less than 18 inches possessing relative weights from the mid 90's to low 80's (Figure 11). Bass over 18 inches have typically had above average condition, likely owing to their ability to consume larger size range of prey. Directed fishing effort, catch per hour, and total harvest for Largemouth Bass was 13,419 h, 0.26 fish/h, and 126 fish, respectively, from June 2021 through May 2022, and no trends were apparent among years (Table

12). Harvest of Largemouth Bass was insignificant and only two bass were observed during the creel survey from June 2021 to May 2022 (Figure 12).

On September 1, 2015, a 14–18-inch slot limit regulation was placed on Nasworthy Reservoir to increase harvest on bass below 14 inches, reduce competition, and improve growth and condition. Comparing mean population metrics from 7 years pre (2008-2014) and 7 years post (2016-2022) regulation change periods, no significant differences in Largemouth Bass growth rates or condition were observed. Furthermore, creel data from 2018/2019 and 2021/2022 indicated angler harvest of Largemouth Bass to be insignificant. Based on these data it was determined that the slot limit regulation was ineffective at improving the Largemouth Bass population in Nasworthy Reservoir. In 2022, district biologists submitted a proposal to change the regulations from the 14–18-inch slot to the 14-inch minimum length limit (statewide regulation). The proposed change was approved in March 2023 and goes into effect on September 1, 2023.

White Crappie: The trap net catch rate of White Crappie was 30.3/nn in 2022 which was the highest catch on record for Nasworthy Reservoir and higher than the 2021 (9.7/nn) and 2020 (22.3/nn) surveys (Figure 13). The CPUE of White Crappie above 10 inches was 4.7/nn in 2022, higher than both previous surveys (Figure 11). The percentage of crappie over 10 inches (PSD-P) was 16 (Figure 13) which was similar to the long-term average of 18. Mean relative weights have shown improvement over the last 2 surveys, with relative weights ranging from 99-102, higher than the long-term average of 92 (Figure 13). Growth rates of White Crappie have also shown significant improvements over the past two surveys. Growth of White Crappie in Nasworthy Reservoir was adequate; average age at 10 inches (9.0 to 10.9 inches) was 2.3 years (N = 20; range = 1 – 8 years) in 2022 and 2.4 years (N = 25; range = 1 – 5 years) in 2021, which was significantly faster than the average of 3.6 years from 2018-2020.

From 2003 to 2022 directed effort for White Crappie was relatively consistent and ranged from 4,938 to 7,443 hours per year. Estimated total harvest increased significantly post regulation change, increasing from less than 2,000 per year to over 10,000 in 2021/2022 (Table 13). Size of harvested White Crappie in 2021/2022 ranged from 8 to 13 inches in total length with 10-inch White Crappie the most harvested size (Figure 14).

Fisheries Management Plan for Nasworthy Reservoir, Texas

Prepared – July 2023

ISSUE 1: The minimum length limit for crappie was removed on September 1, 2020, on Nasworthy Reservoir to increase harvest and potentially improve growth and condition through reduced competition. Early results have been promising, but further monitoring is required to evaluate the special regulation.

MANAGEMENT STRATEGIES

1. Monitor crappie population metrics through annual trap net surveys from 2023-2026.
2. Conduct a creel survey from June 1, 2026, to May 31, 2027, to estimate crappie harvest

ISSUE 2: Hybrid Striped Bass were stocked at high densities from 2018-2022 to restructure the Gizzard Shad population. Early results have shown modest results, but further monitoring is required to evaluate this management strategy.

MANAGEMENT STRATEGIES

1. Evaluate Gizzard Shad IOV and sportfish condition and growth rates through annual fall electrofishing surveys 2023-2026.
2. Monitor Hybrid Striped Bass population metrics through spring gill netting in 2025 and 2027

ISSUE 3: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels 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 (2023–2027)

Sport fish, forage fish, and other important fishes

Sport fishes in Nasworthy Reservoir include catfish species, White Bass, Hybrid Striped Bass, Largemouth Bass, and White Crappie. Known important forage species include Bluegill and Gizzard Shad.

Low-density fisheries

Blue and Flathead Catfish: While both are present in the reservoir, gill net catch rates are low. Although, anglers fishing for catfishes is high, we did not document any directed effort and very little harvest for Flathead Catfish or Blue Catfish in the 2021-2022 creel survey. Sampling these populations is unnecessary in 2023-2027.

White Bass: White Bass are present in low numbers (0.2-1.4/nn in past four surveys) and received less than 1% of all angling effort. Sampling these populations is unnecessary in 2023-2027.

Survey objectives, fisheries metrics, and sampling objectives

Channel Catfish: Channel Catfish are the most sought-after species in Nasworthy Reservoir with angler effort ranging from 20-32 hours/acre. Gill net catch rates of Channel Catfish have ranged from 3.5/nn to 9.5/nn for the past 21 years. Survey objectives will be estimate abundance, length frequency, and condition. Data from gill netting from 2009-2023 indicates an RSE ≤ 25 would be achieved with 6-10 gill nets in most years. As per the Hybrid Striped Bass sampling effort, we will sample with 10 randomly selected gill net sets in 2025 and 2027 (Table 14). No additional sampling will be conducted beyond the original 15 random stations.

Hybrid Striped Bass: Hybrid Striped Bass have been stocked in Nasworthy Reservoir for the purpose of restructuring the Gizzard Shad population. Hybrid Striped Bass were stocked from 2018-2022 at high densities, ranging from 40-75/acre. Survey objectives will be to monitor stocking success, condition, and length frequency. We will sample with 10 randomly selected gill net sets in spring 2025 and 2027 to monitor the Hybrid Striped Bass population (Table 14).

Largemouth Bass: Largemouth Bass are second most sought-after species and most popular among boat anglers during the 2021-2022 creel survey. Largemouth Bass have been managed with a 14-to-18-inch slot limit since 2015, however, the regulation will return to the statewide 14-inch MLL on September 1, 2023. Annual monitoring with fall electrofishing is necessary to monitor large-scale changes in Gizzard Shad IOV and the subsequent effects on Largemouth Bass condition and growth. Survey objectives are to monitor abundance, size structure, condition, and growth. A minimum of 12 randomly selected 5-min electrofishing sites will be sampled in fall 2023, 2024, 2025, and 2026 (Table 14), but sampling will continue at random sites until 50 stock-size fish are collected and the RSE of CPUE-Stock is < 25 (the anticipated effort to meet both sampling objectives is 12-15 stations with 80% confidence). Exclusive of the original 12 random stations, 6 additional random stations will be pre-determined in the event extra sampling is necessary. A maximum of 18 stations will be sampled. Otoliths from 13 fish between 13.0 and 14.9 inches will be collected annually to determine mean age at 14 inches.

White Crappie: White Crappie in Nasworthy Reservoir are the third most sought-after species in the 2021-2022 creel survey. The White Crappie population has historically been characterized by high abundance, poor size structure, condition, and growth. However, growth rates and condition has improved since the removal of the MLL. Annual surveys are needed to assess the effects of recent management actions (Hybrid Striped Bass stockings and regulation changes) on the White Crappie population. Objectives are to monitor trends in abundance, size structure, condition, and growth. Analysis of historical trap net data from 1998-2022 indicates that a CPUE-Stock with an RSE ≤ 25 and collection of 50 stock size crappie would be achieved most years with 10 net nights. Ten randomly selected trap net sites will be sampled in 2023, 2024, 2025, and 2026 (Table 14). Otoliths from 13 fish between 9.0 and

10.9 inches will be collected to determine mean age at 10 inches each year. In the event objectives are not met, up to 5 additional net nights will be sampled.

Bluegill and Gizzard Shad: Sunfish, Gizzard Shad, and Threadfin Shad are important forage fish in Nasworthy Reservoir. Over the past five surveys, total catch rates of Bluegill have ranged from 157.7 fish/h to 374.0 fish/h while Gizzard Shad have ranged from 207.4 fish/h to 426.0 fish/h. Threadfin Shad are present in low abundance. Continuation of sampling, as per Largemouth Bass above, will allow for monitoring of large-scale changes in Bluegill and Gizzard Shad relative abundance, size structure, and IOV. Sampling effort based on achieving sampling objectives for Largemouth Bass should result in sufficient numbers of Bluegill and Gizzard Shad for size structure estimation (PSD and IOV) and relative abundance estimates (RSE < 25 of CPUE-Total). If the target for Bluegill and Gizzard Shad sampling is not attained, no additional effort will be expended to achieve an RSE$\leq$25 for CPUE.

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.

Dumont, S. C., and B. C. Neely. 2011. A proposed change to Palmetto Bass proportional size distribution length categories. North American Journal of Fisheries Management 31: 722-725.

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.

Texas Commission on Environmental Quality. 2022. Trophic classification of Texas reservoirs. 2022 Texas Integrated Report for Clean Water Act Sections 305(b) and 303(d), Austin. 17 pp.

Texas Water Development Board (TWDB). 2023. Water Data for Texas: Web interface. Available: https://www.waterdatafortexas.org/reservoirs/individual/nasworthy (May 2023).

Van Zee, B. 2003. Statewide freshwater fisheries monitoring and management program survey report for Nasworthy Reservoir, 2002. Texas Parks and Wildlife Department, Federal Aid Report F-30-R, Austin.

Wright, L. D. 2019. Statewide freshwater fisheries monitoring and management program survey report for Nasworthy Reservoir, 2018. Texas Parks and Wildlife Department, Federal Aid Report F-221-M-3, Austin.

Tables and Figures

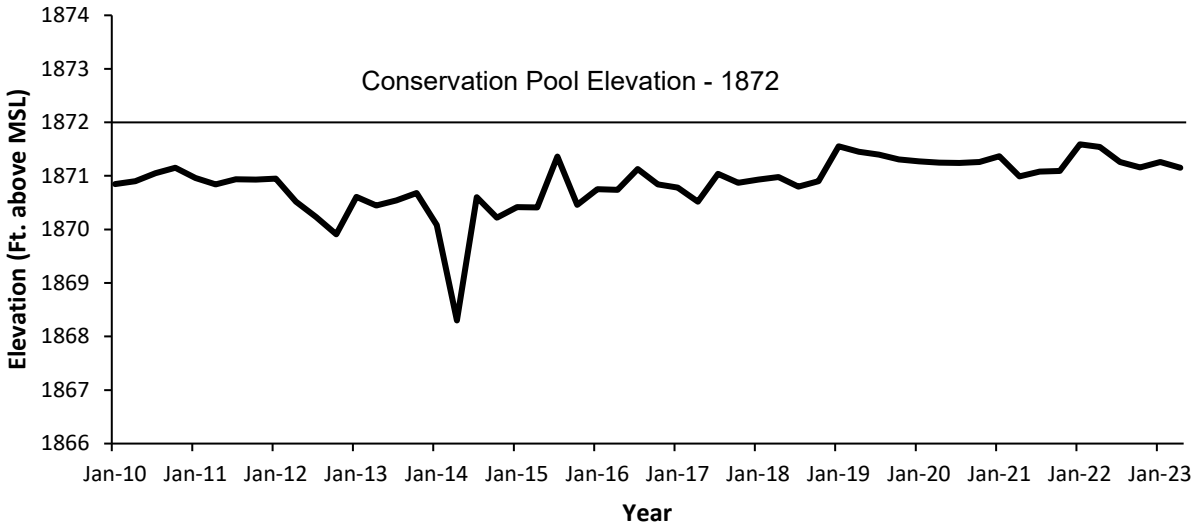


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Nasworthy Reservoir, Texas.

Table 1. Characteristics of Nasworthy Reservoir, Texas.

Characteristic	Description
Year constructed	1930
Controlling authority	City of San Angelo
County	Tom Green
Drainage basin	Colorado River Basin
Reservoir type	Tributary
Shoreline Development Index	7.01
Conductivity	1,250 µmhos/cm

Table 2. Boat ramp characteristics for Nasworthy Reservoir, Texas, August 2022. Reservoir elevation at time of survey was 1,871.2 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Red Bluff Road	31.38603 -100.5045	Y	2	unknown	Poor (closed, needs repair)
Spring Creek Marina W	31.37662 -100.5134	Y	10	1865	Excellent, no access issues
Spring Creek Marina E	31.3786 -100.5068	N	5	1867	Closed to public
Middle Concho Park W	31.37856 -100.5208	Y	11	1867	Excellent, no access issues
Middle Concho Park E	31.37803 -100.5135	Y	5	1865	Excellent, no access issues
Fisherman's Road	31.37283 -100.4968	Y	10	1867	Excellent, no access issues
Mary E. Lee Park	31.37558 -100.4912	Y	5	1867	Excellent, no access issues
Nasworthy Marina	31.37731 -100.4899	Y	3	1867	Excellent, no access issues
Goodfellow AFB	31.37817 -100.4859	Y	3	1867	Excellent, no access issues
Pecan Creek North	31.36772 -100.4812	Y	20	1867	Excellent, no access issues
Pecan Creek South	31.36281 -100.4762	Y	5	1868	Excellent, no access issues
Beaty Road Park	31.39763 -100.4841	Y	20	1867	Excellent, no access issues
Knickerbocker Park	31.39201 -100.4895	Y	16	1866	Excellent, no access issues

Table 3. Harvest regulations for Nasworthy 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, Hybrid Striped	5	18-inch minimum
Bass, Largemouth	5	14- to 18-inch slot
Crappie: White and Black crappie, their hybrids and subspecies	25 (in any combination)	None

Table 4. Stocking history of Nasworthy reservoir, Texas. Size categories are FRY =<1 inch, FGL = 1-3 inches, AFGL = 8 inches, and UNK = unknown.

Species	Year(s) Stocked	Number of Years	Number Stocked	Size
Threadfin Shad	1984	1	8,800	UNK
Channel Catfish	1966–1974	8	148,425	UNK
	1975-2012	4	37,650	FGL
	2011	1	157	ADL
Palmetto Bass	1974-1982	6	90,373	UNK
	1994-2019	14	355,889	FGL
Sunshine Bass	2020	1	104,869	FGL
	2022	1	56,457	FGL
	2022	1	127,038	FRY
Bluegill	2010	1	360	ADL
Redear Sunfish	1970	1	4,900	UNK
Largemouth Bass	1968-1972	4	364,140	UNK
	1993	1	145	ADL
	1997	1	52,600	FGL
Florida Largemouth Bass	1990	1	159,799	FRY
	1980-1995	4	529,394	FGL
	1995	2	2,331	ADL
White Crappie	1972	1	16,000	UNK
Green x Redear Sunfish	1966	1	14,700	UNK
Red Drum	1984-2002	11	1,912,854	FGL

Table 5. Objective-based sampling plan components for Nasworthy Reservoir, Texas 2022–2023.

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
Trap netting			
Crappie	Abundance	CPUE–Total	RSE ≤ 25
	Size structure	PSD, length frequency	N = 50
	Condition	W_r	10 fish/inch group (max)
	Age-and-growth	Age at 10 inches	N = 13, 9.0 – 10.9 inches
Gill netting			
Channel Catfish	Abundance	CPUE–stock	RSE-Stock ≤ 25
	Size structure	length frequency	N ≥ 50 stock
	Condition	W_r	10 fish/inch group (max)
Hybrid Striped Bass	Size structure	length frequency	N ≥ 50 stock
	Condition	W_r	10 fish/inch group (max)

[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, Nasworthy Reservoir, Texas, 2006–2022. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2006	2014	2018	2022
Native submersed	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	3.6 (0.3)
Native floating-leaved	Unknown	8.0 (0.6)	11.0 (0.8)	38.7 (2.8)
Native emergent	92.0 (6.7)	115.0 (8.3)	115.0 (8.3)	139.8 (10.1)

Table 7. Percent directed angler effort by species for Nasworthy Reservoir, Texas. Survey periods were from September 2003 through August 2004, June 2018 through May 2019, and June 2021 through May 2022.

	2003/2004			2018/2019			2021/2022		
Species	Boat	Bank	**Total**	Boat	Bank	**Total**	Boat	Bank	**Total**
Common Carp	0.0	< 0.1	**< 0.1**	0.0	< 0.1	**< 0.1**	0.4	2.1	**2.5**
Catfishes	3.3	41.5	**44.8**	2.6	51.0	**53.6**	1.9	31.0	**32.9**
Temperate Bass	0.5	0.9	**1.4**	0.6	0.0	**0.6**	1.2	0.3	**1.5**
Sunfishes	0.5	0.8	**1.3**	0.0	0.5	**0.5**	0.0	1.9	**1.9**
Largemouth Bass	7.4	4.6	**12.0**	12.9	2.0	**14.9**	7.6	8.7	**16.3**
Crappies	1.2	3.6	**4.8**	1.6	7.5	**9.1**	1.3	5.5	**6.8**
Anything	2.9	32.9	**35.8**	2.8	16.9	**19.7**	0.5	37.7	**38.2**

Table 8. Total fishing effort (h) for all species and total expenditures at Nasworthy Reservoir, Texas. Survey periods were from September 2003 through August 2004, June 2018 through May 2019, and June 2021 through May 2022. Relative standard error is in parentheses.

Creel statistic	2003/2004	2018/2019	2021/2022
Total fishing effort	103,424 (NA)	81,662 (12)	84,614 (16)
Boat	16,133 (NA)	16,531 (18)	10,900 (17)
Bank	87,921 (NA)	65,131 (14)	73,714 (17)
Total expenditures	$323,121 (NA)	$473,729 (35)	$487,496 (35)
Boat	$61,204 (NA)	$105,251 (43)	$79,434 (60)
Bank	$261,917 (NA)	$368,478 (43)	$408,062 (40)

Table 9. Comparison of total harvest and catch rate between bank and boat anglers for selected species at Nasworthy Reservoir, Texas. Survey periods were from September 2003 through August 2004, June 2018 through May 2019, and June 2021 through May 2022. Total catch per hour is for anglers targeting each respective species and total harvest is the estimated number of fish harvested by all anglers.

Creel statistic	2003/2004		2018/2019		2021/2022	
	Boat	Bank	Boat	Bank	Boat	Bank
Total Harvest						
Channel Catfish	131	3,110	217	4,285	1,152	842
Bluegill	9	4,257	355	1,709	0	1989
Largemouth Bass	73	271	59	497	3	126
White Crappie	480	1,432	313	792	134	10,731
Hybrid Striped Bass	9	94	-	-	58	436
Total Catch Per Hour						
Catfishes	0.43	0.21	0.09	0.15	0.80	0.10
Bluegill	0.56	0.42	-	0.62	-	0.77
Largemouth Bass	0.42	0.23	0.34	0.26	0.49	0.06
White Crappie	0.98	0.75	3.95	0.88	0.94	2.19
Hybrid Striped Bass	-	-	-	-	0.00	-

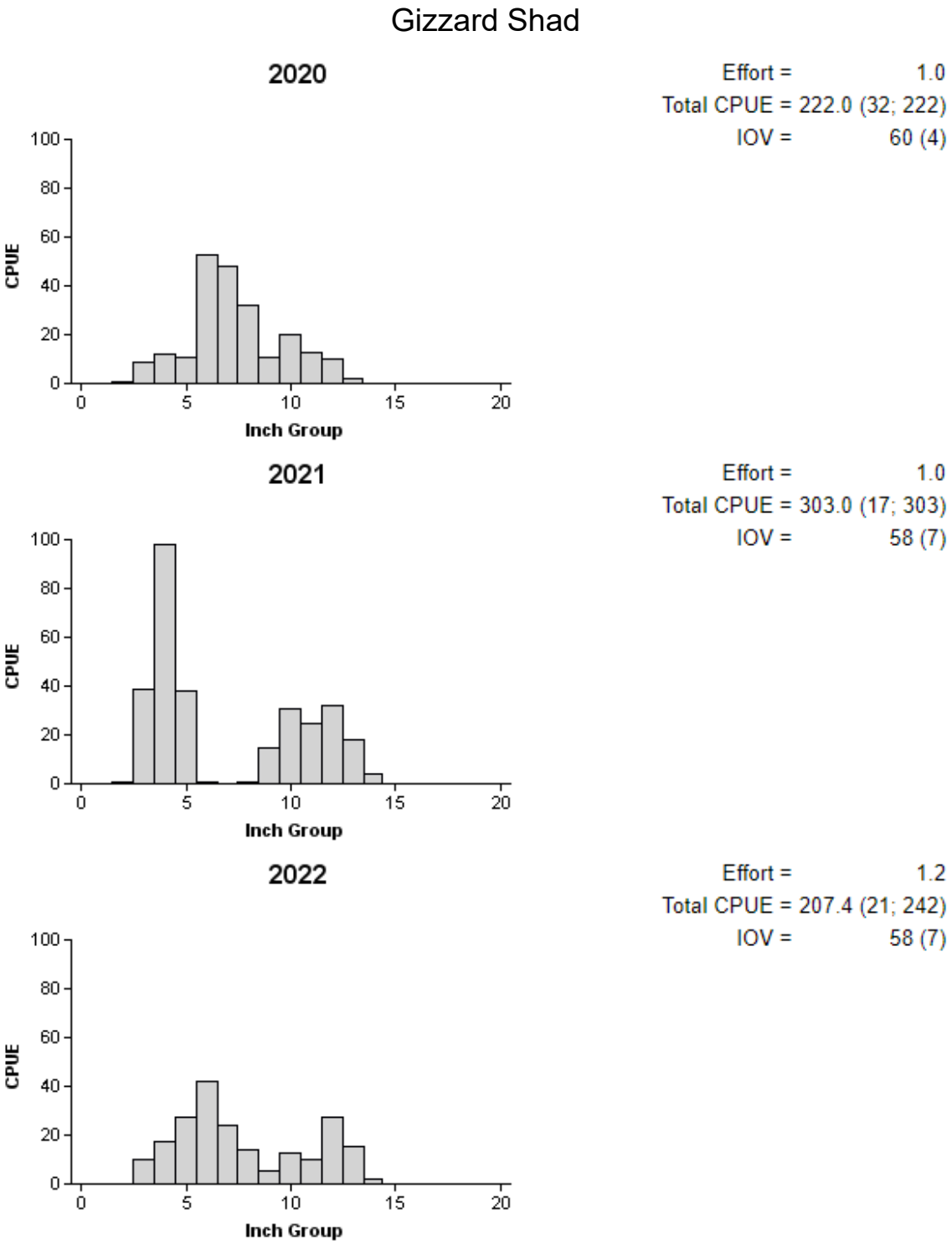


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Nasworthy Reservoir, Texas, 2020, 2021, and 2022.

Bluegill

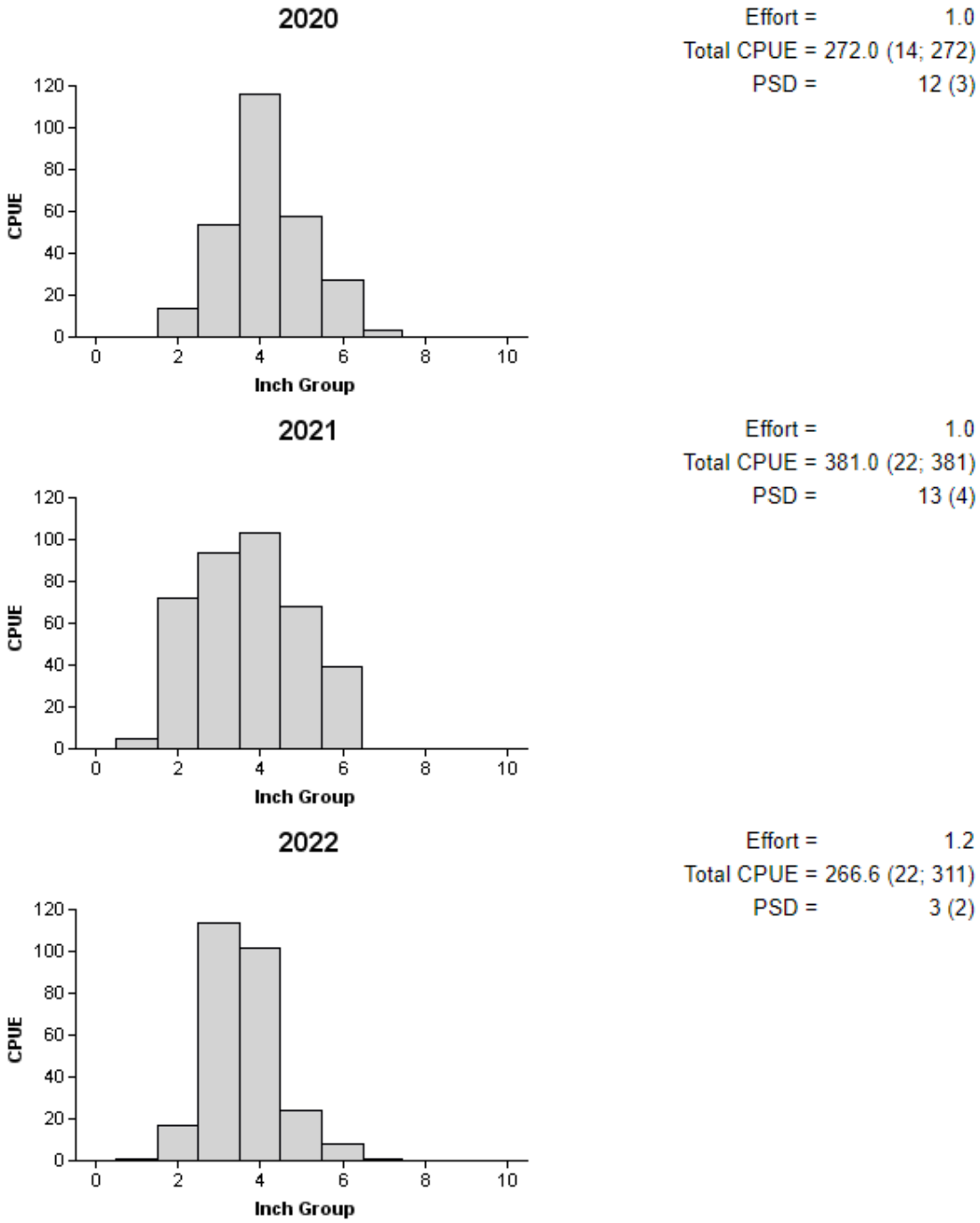
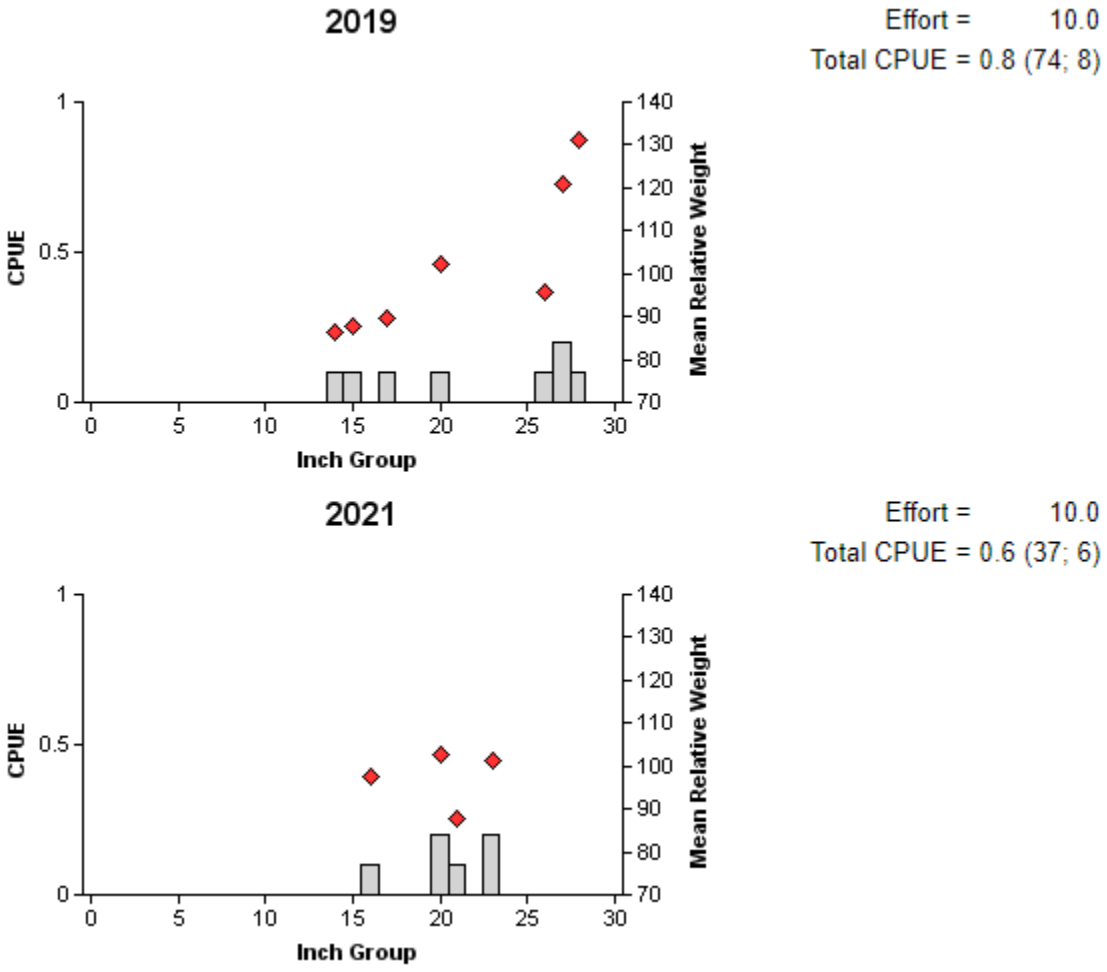


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Nasworthy Reservoir, Texas, 2020, 2021, and 2022.

Table 10. Creel survey statistics for Sunfishes at Nasworthy Reservoir, Texas, from September 2003 through August 2004, June 2018 through May 2019, and June 2021 through May 2022. Total catch per hour is for anglers targeting Sunfishes and total harvest is the estimated number of Sunfishes harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year		
	2003/2004	2018/2019	2021/2022
Surface area (acres)	1,380	1,380	1,380
Directed effort (h)	1,221.10 (40)	385.52 (93)	1571.83 (45)
Directed effort/acre	0.88 (40)	0.28 (93)	1.14 (45)
Total catch per hour	0.48 (93)	0.62 (-)	0.77 (184)
Total harvest	4,226.00 (56)	2063.56 (45)	1989.36 (81)
Harvest/acre	3.06 (56)	1.50 (45)	1.44 (81)
Percent legal released	67	72	36

Blue Catfish



No Blue Catfish Collected in 2023

Figure 4. Number of Blue Catfish caught per net night (CPUE) and population indices (RSE and N for CPUE) for spring gill net surveys, Nasworthy Reservoir, Texas, 2019, 2021, and 2023.

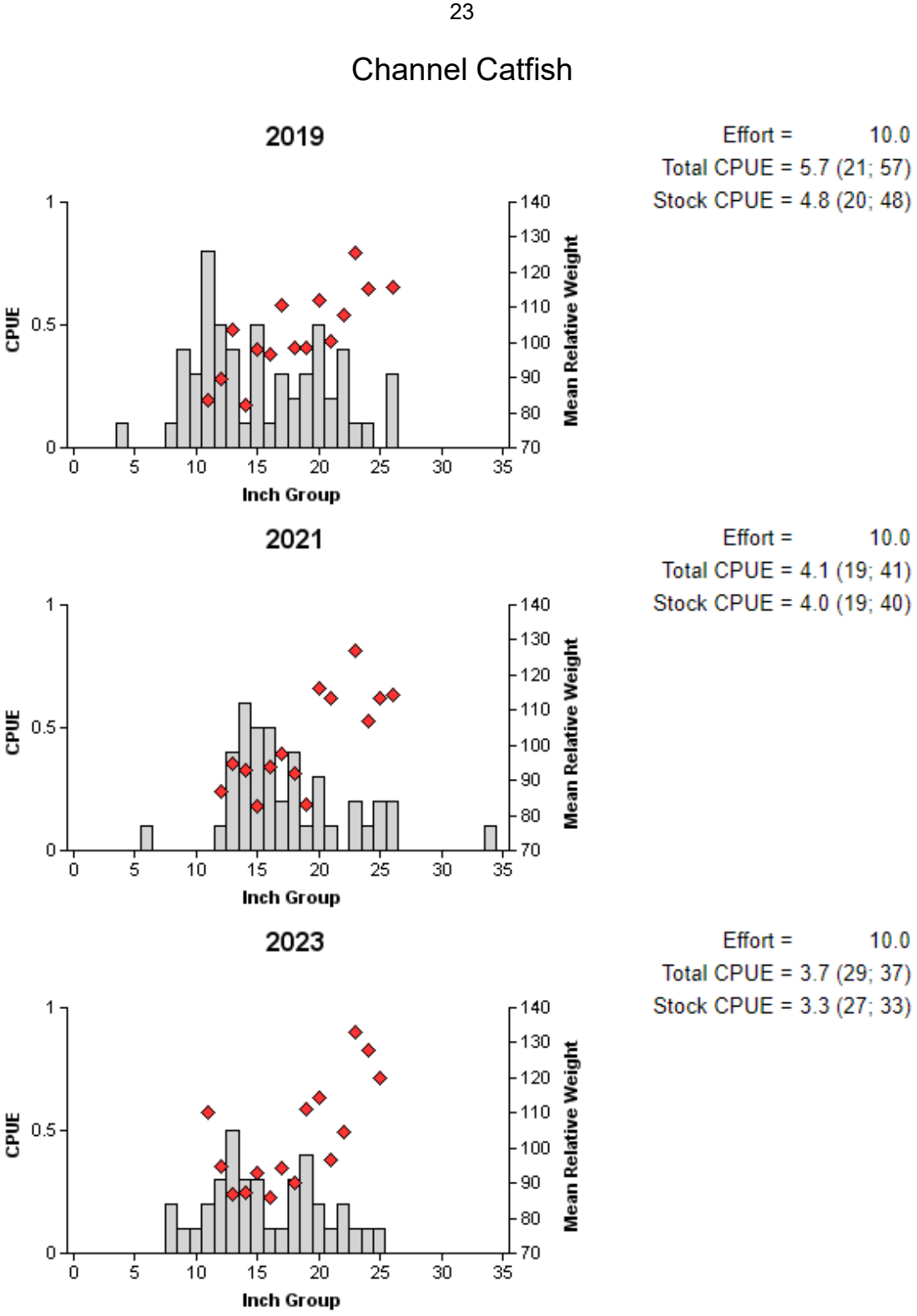


Figure 5. Number of Channel Catfish caught per net night (CPUE) and population indices (RSE and N for CPUE) for spring gill net surveys, Nasworthy Reservoir, Texas, 2019, 2021, and 2023.

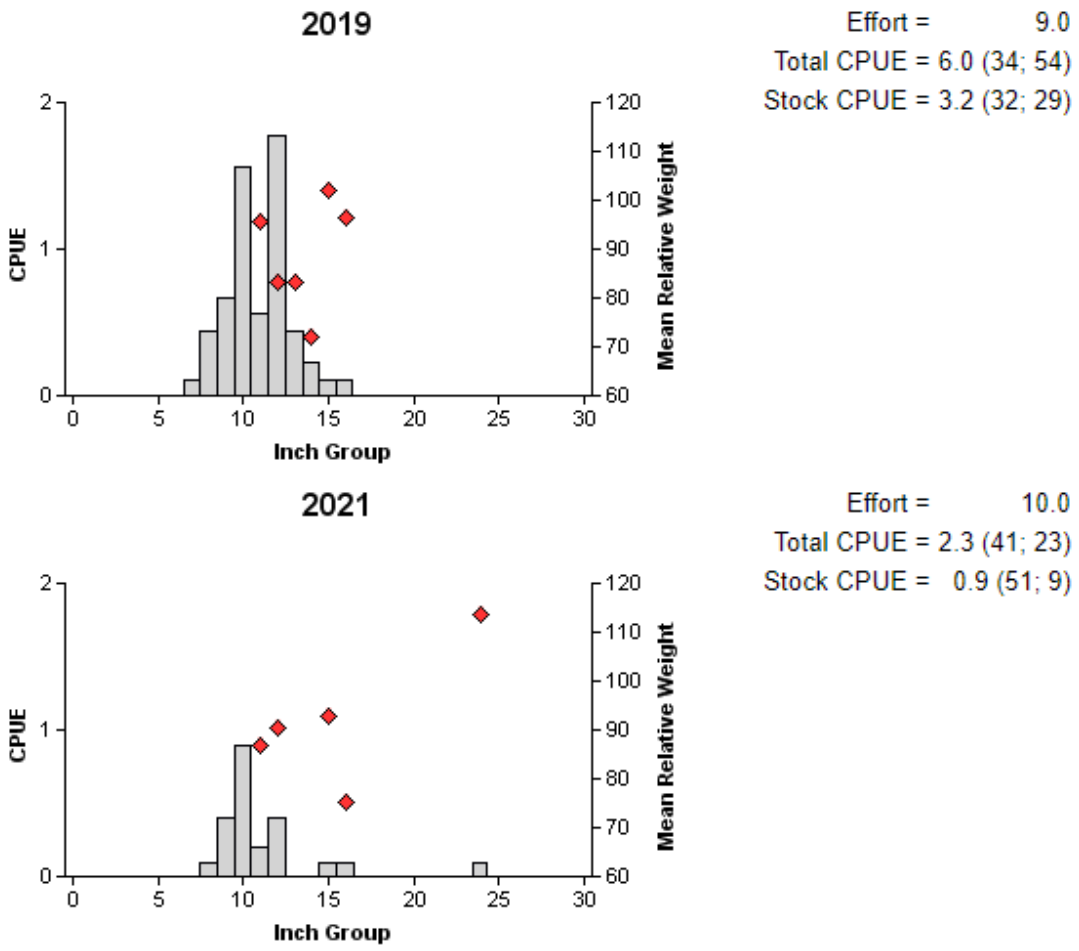


Figure 6. Number of Channel Catfish caught per net night (CPUE) and population indices (RSE and N for CPUE) for spring tandem hoop net surveys, Nasworthy Reservoir, Texas, 2019 and 2021.

Table 11. Creel survey statistics for Catfish species combined at Nasworthy Reservoir, Texas, from September 2003 through August 2004, June 2018 through May 2019, and June 2021 through May 2022. Total catch per hour is for anglers targeting Catfish and total harvest is the estimated number of Catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year		
	2003/2004	2018/2019	2021/2022
Surface area (acres)	1,380	1,380	1,380
Directed effort (h)	44,580 (13)	43,730 (14)	27,810 (18)
Directed effort/acre	32.3 (13)	31.7 (14)	20.2 (18)
Total catch per hour	0.2 (36)	0.2 (45)	0.1 (30)
Total harvest	3,241 (45)	4,678 (44)	2,079 (59)
Blue catfish	0	39 (183)	0
Channel Catfish	3,241 (45)	4,502 (36)	1,994 (53)
Flathead Catfish	0	136 (270)	85 (232)
Harvest/acre	2.4 (45)	3.4 (44)	1.5 (60)
Percent legal released	9	41	51
Blue catfish	NA	86	NA
Channel Catfish	9	39	52
Flathead Catfish	NA	52	0

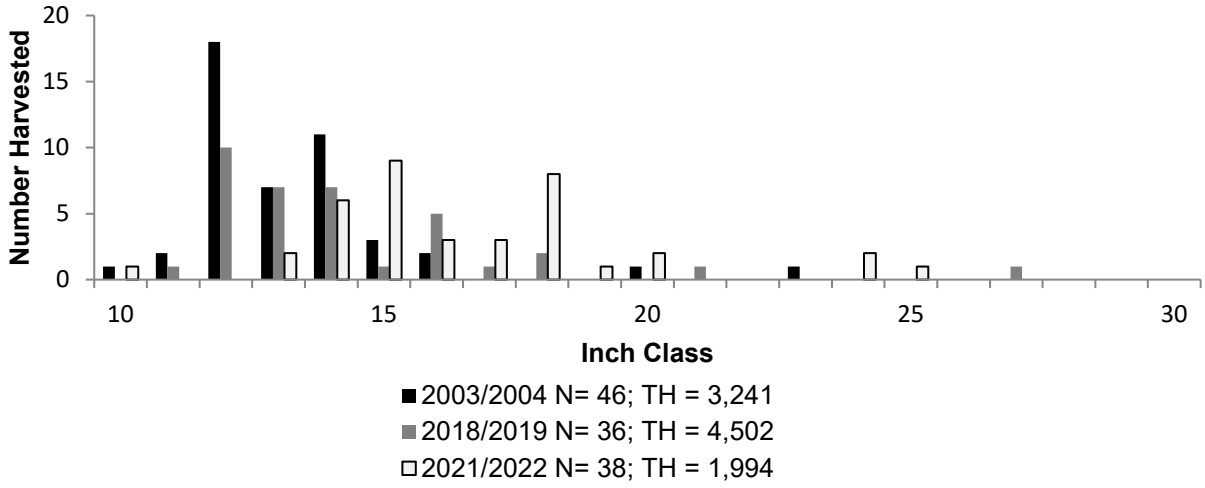


Figure 7. Length frequency of harvested Channel Catfish observed during creel surveys at Nasworthy Reservoir, Texas, September 2003 through May 2022, all anglers combined. N is the number of harvested Channel Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

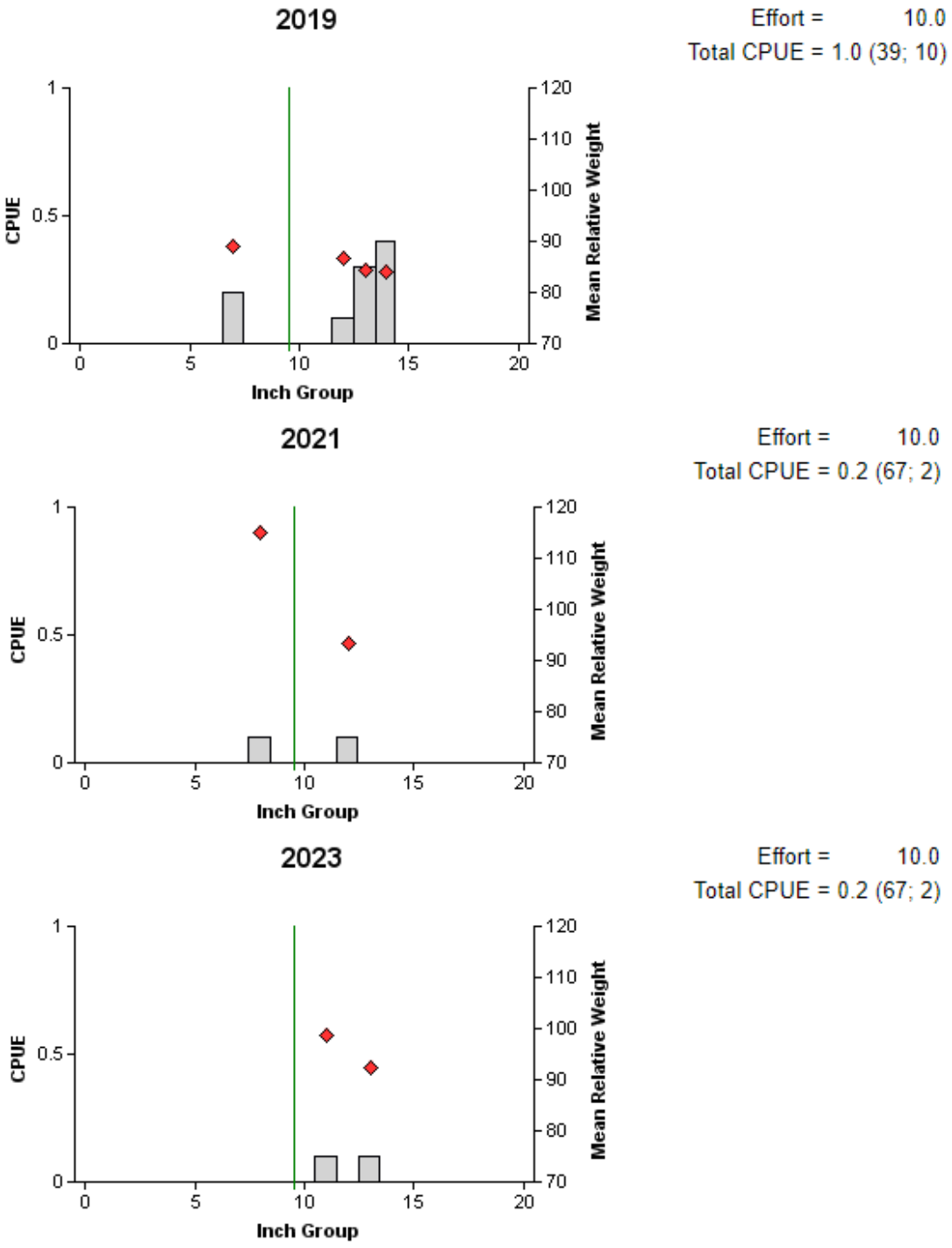


Figure 8. Number of White Bass caught per net night (CPUE) and population indices (RSE and N for CPUE are in parentheses) for spring gill net surveys, Nasworthy Reservoir, Texas, 2019, 2021, and 2023.

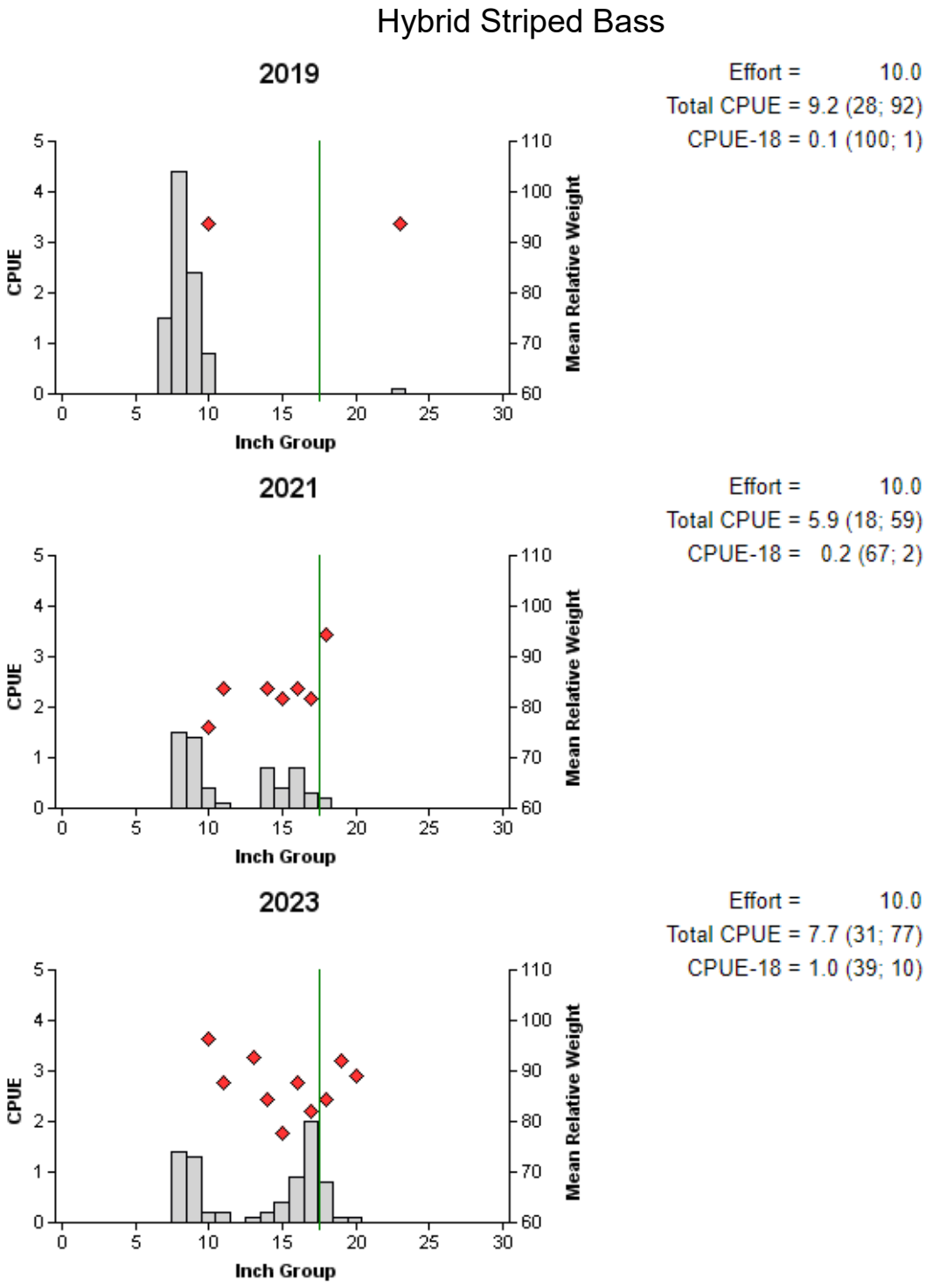


Figure 9. Number of Hybrid Striped Bass caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Nasworthy Reservoir, Texas, 2019, 2021, and 2023.

Table 12. Creel survey statistics for Hybrid Striped Bass at Nasworthy Reservoir, Texas, from September 2003 through August 2004, June 2018 through May 2019, and June 2021 through May 2022. Total catch per hour is for anglers targeting Hybrid Striped Bass and total harvest is the estimated number of Hybrid Striped Bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year		
	2003/2004	2018/2019	2021/2022
Surface area (acres)	1,380	1,380	1,380
Directed effort (h)	440 (65)	0.00	1,006 (53)
Directed effort/acre	0.32 (65)	0.00	0.73 (60)
Total catch per hour	0.00	0.00	0.00
Total harvest	102 (336)	0.00	494 (166)
Harvest/acre	0.07 (336)	0.00	0.36 (166)
Percent legal released	24	NA	6

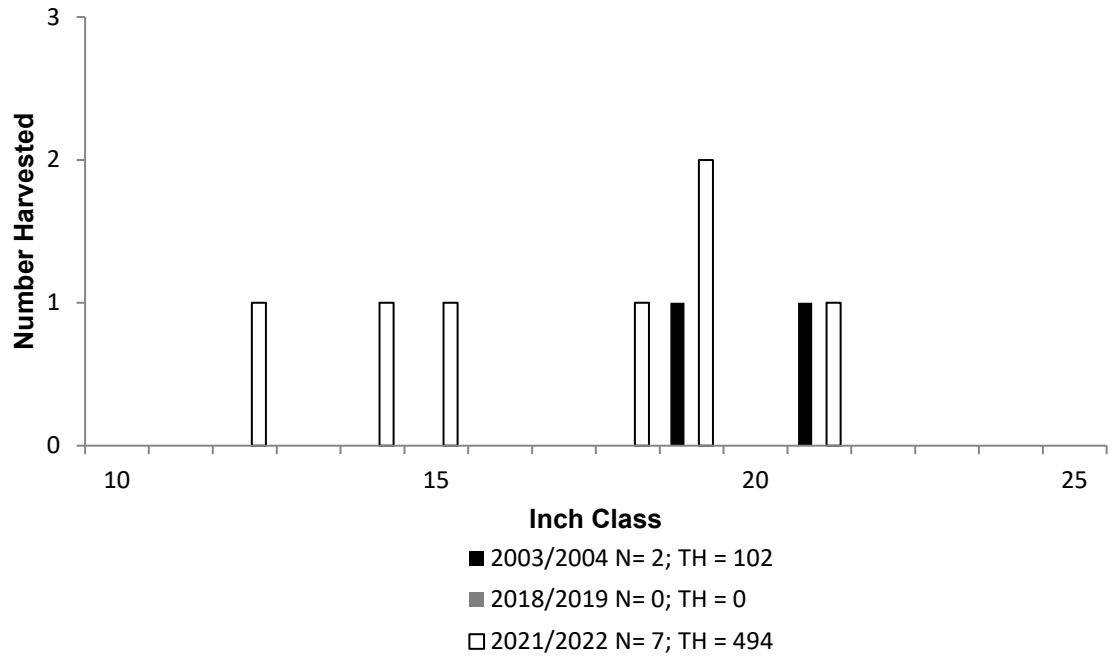


Figure 10. Length frequency of harvested Hybrid Striped Bass observed during creel surveys at Nasworthy Reservoir, Texas, June 2021 through May 2022, all anglers combined. N is the number of harvested Hybrid Striped Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

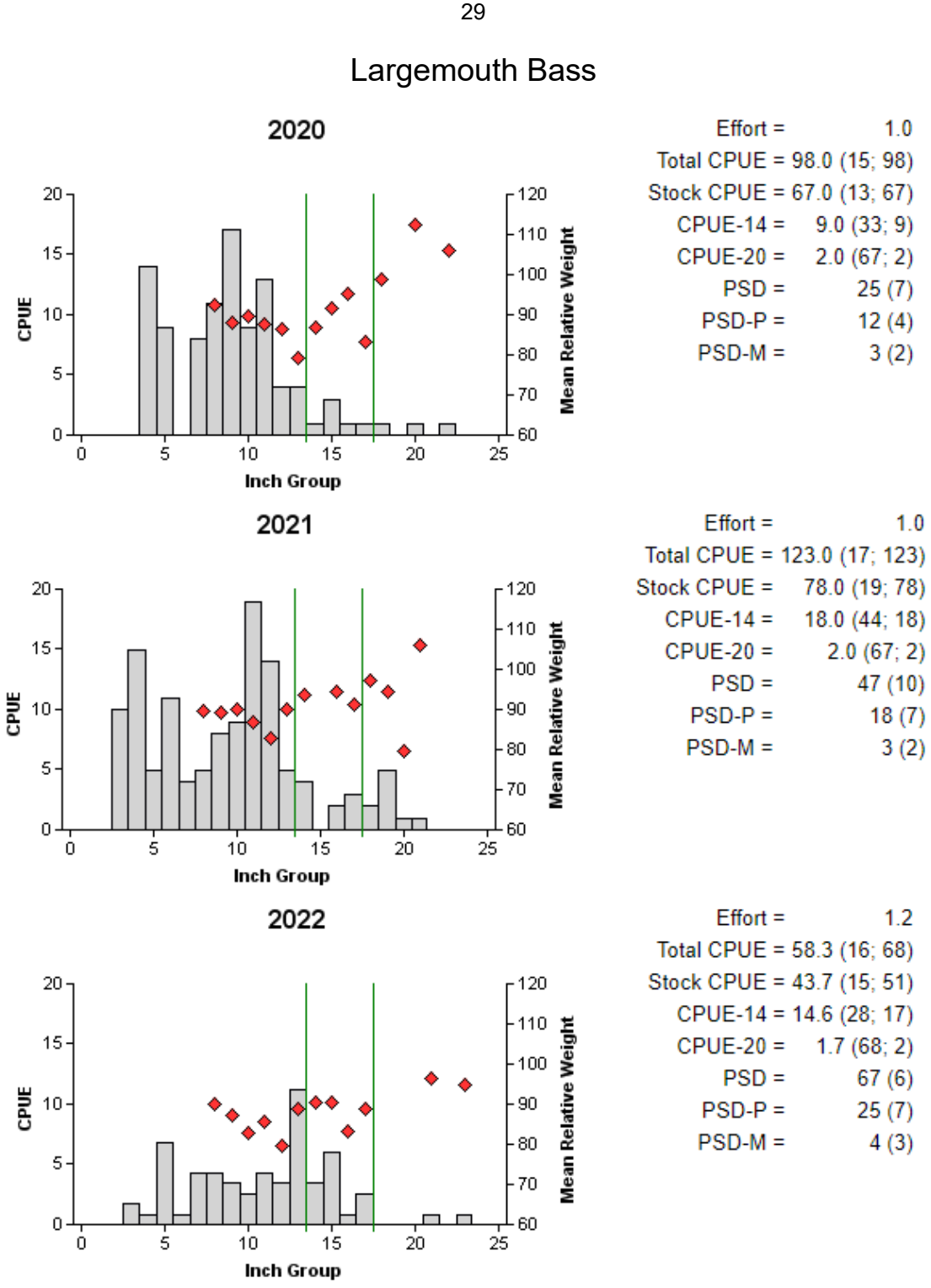


Figure 11. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Nasworthy Reservoir, Texas, 2020, 2021, and 2022. Vertical lines indicate upper and lower slot length limits.

Table 13. Creel survey statistics for Largemouth Bass at Nasworthy Reservoir, Texas, from September 2003 through August 2004, June 2018 through May 2019, and June 2021 through May 2022. 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	2003/2004	2018/2019	2021/2022
Surface area (acres)	1,380	1,380	1,380
Directed angling effort (h)			
Tournament	NA	1,101 (51)	414 (67)
Non-tournament	NA	12,137 (17)	13,419 (19)
All black bass anglers combined	12,391 (15)	13,324 (18)	13,833 (19)
Angling effort/acre	9.0 (15)	9.7 (18)	10.0 (19)
Catch rate (number/h)	0.35 (52)	0.33 (41)	0.26 (82)
Harvest			
Non-tournament harvest	344 (53)	556 (73)	126 (102)
Harvest/acre	0.2 (53)	0.4 (73)	0.1 (102)
Tournament weigh-in and release	264 (53)	532 (67)	3 (100)
Release by weight			
<4.0 lb.	NA	7,967 (44)	3,852 (61)
4.0-6.9 lb.	NA	54 (74)	253 (72)
7.0-9.9 lb.	NA	0	248 (39)
≥10.0 lb.	NA	0	0
Percent legal released (non-tournament)	64	96	97

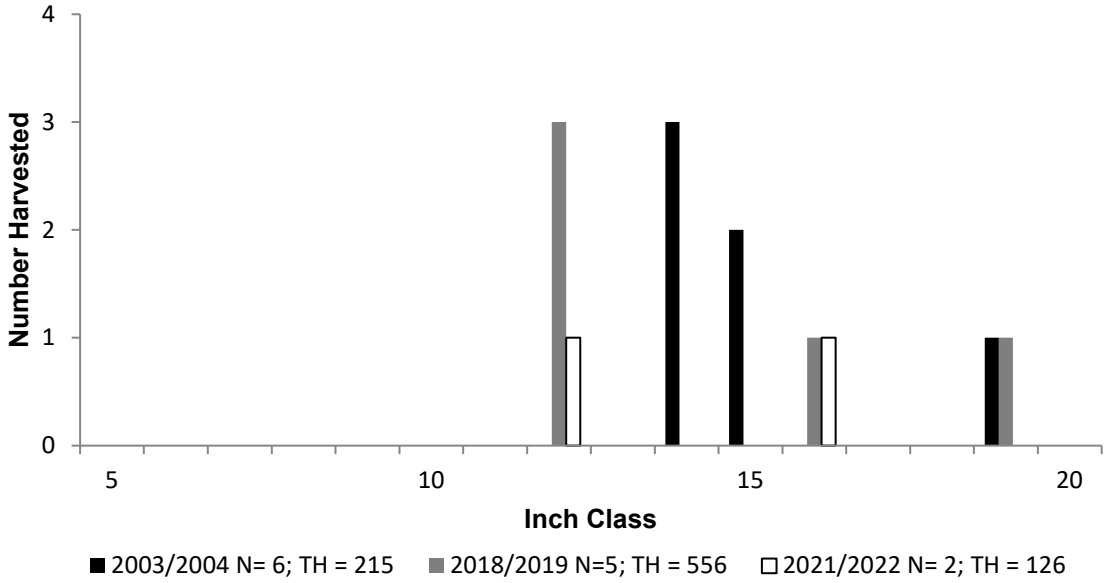


Figure 12. Length frequency of non-tournament harvested Largemouth Bass observed during creel surveys at Nasworthy Reservoir, Texas, September 2003 through May 2022, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and TH is the estimated non-tournament harvest for the creel period.

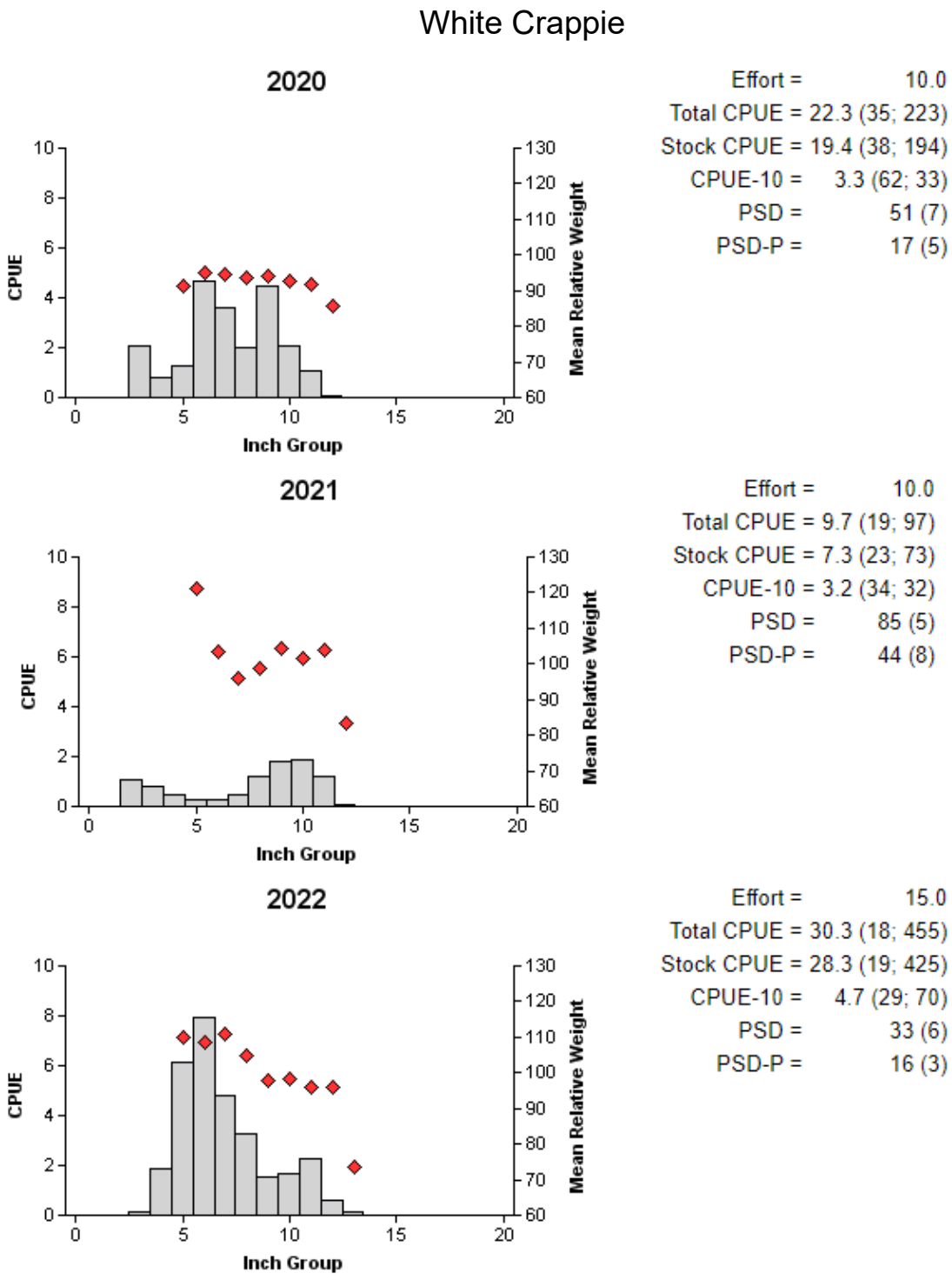


Figure 13. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Nasworthy Reservoir, Texas, 2020, 2021, and 2022.

Table 14. Creel survey statistics for White Crappie at Nasworthy Reservoir, Texas, from September 2003 through August 2004, June 2018 through May 2019, and June 2021 through May 2022. 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	Year		
	2003/2004	2018/2019	2021/2022
Surface area (acres)	1,380	1,380	1,380
Directed effort (h)	4,938 (23)	7,443 (22)	5,778 (25)
Directed effort/acre	3.58 (23)	5.39 (22)	4.19 (25)
Total catch per hour	0.80 (64)	1.43 (56)	1.90 (45)
Total harvest	1,912 (51)	1,105 (56)	10,864 (66)
Harvest/acre	1.39 (51)	0.80 (56)	7.87 (66)
Percent legal released	0	59	45

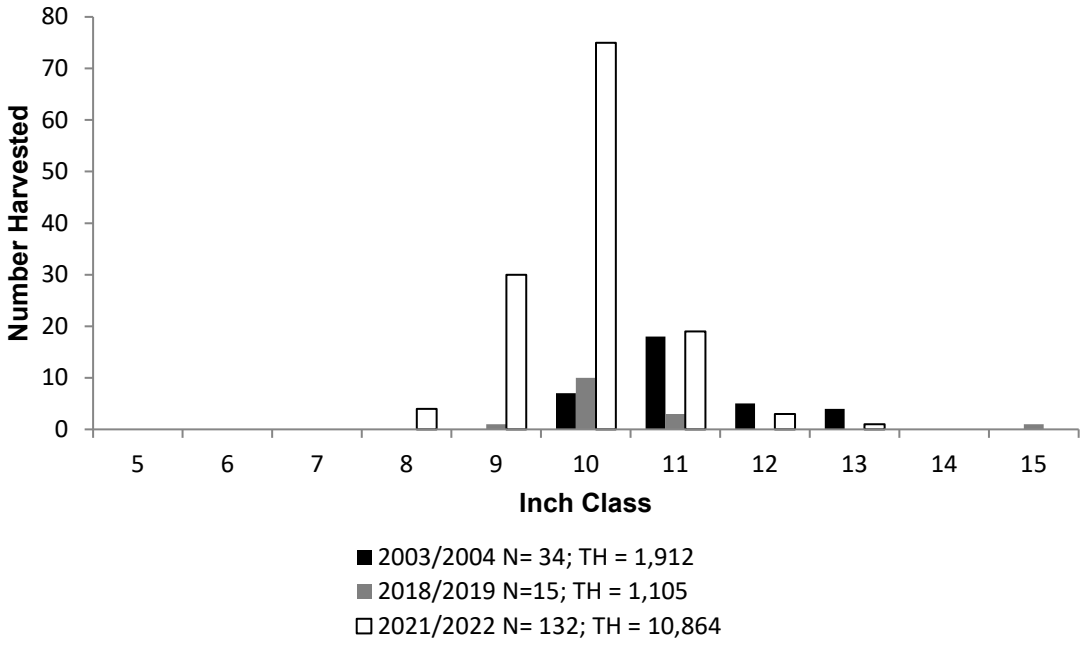


Figure 14. Length frequency of harvested White Crappie observed during creel surveys at Nasworthy Reservoir, Texas, June 2021 through May 2022, all anglers combined. N is the number of harvested White Crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Proposed Sampling Schedule

Table 15. Proposed sampling schedule for Nasworthy 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			
	2023-2024	2024-2025	2025-2026	2026-2027
Angler Access				X
Vegetation				X
Electrofishing – Fall	X	X	X	X
Trap netting	X	X	X	X
Gill netting		X		X
Creel survey				X
Report				X

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

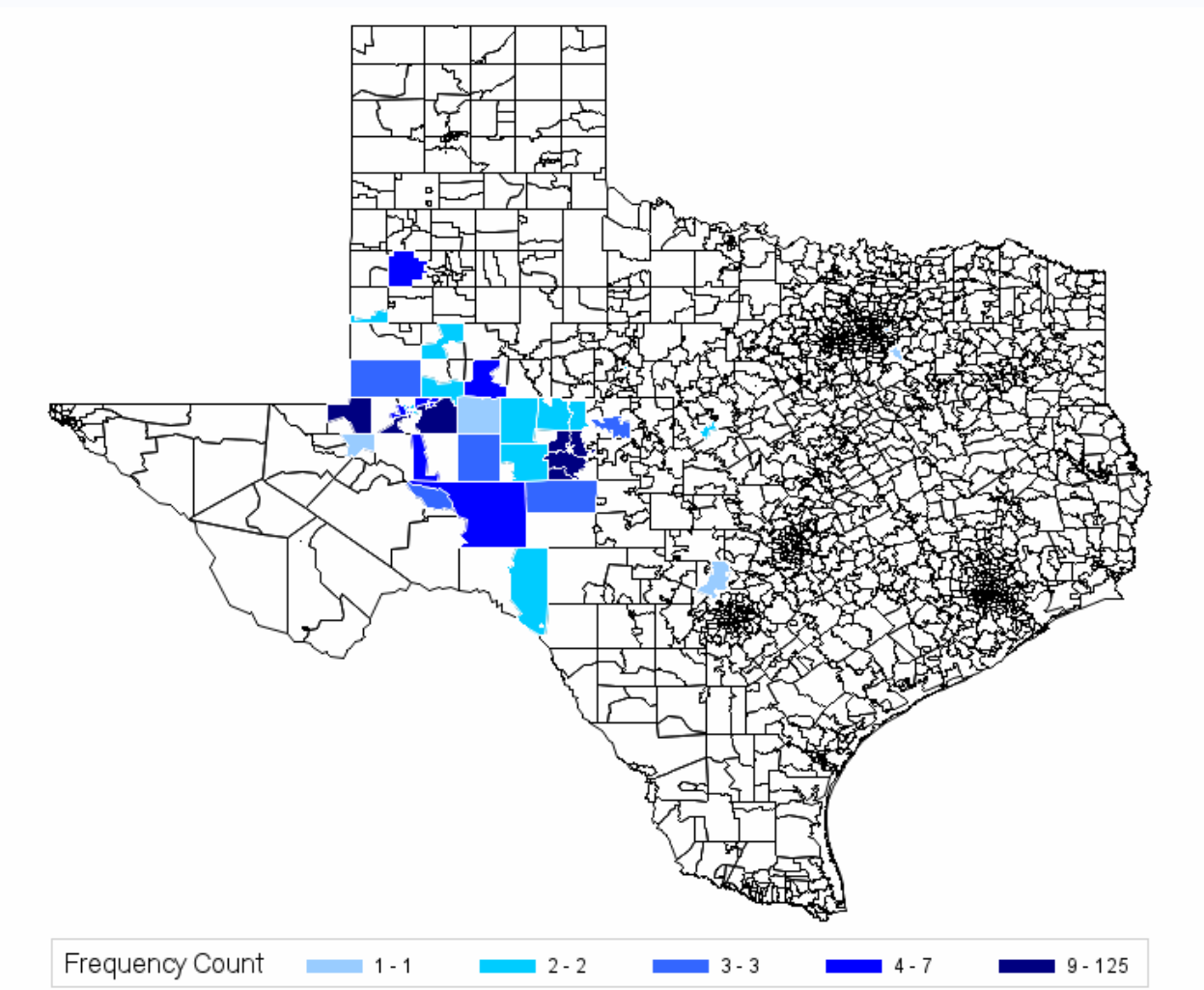
Number (N) and catch rate (CPUE) (RSE in parentheses) of all target species collected from all gear types from Nasworthy Reservoir, Texas, 2022-2023. Sampling effort was 10 net nights for gill netting, 15 net nights for trap netting, and 1.2 hours for electrofishing.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad					242	207.4 (21)
Threadfin Shad					4	3.4 (77)
Channel Catfish	37	3.7 (29)				
Flathead Catfish	3	0.3 (51)				
White Bass	2	0.2 (67)				
Hybrid Striped Bass	77	7.7 (31)				
Green Sunfish					3	2.6 (100)
Warmouth					20	17.1 (24)
Bluegill					311	266.6 (22)
Longear Sunfish					34	29.1 (22)
Redear Sunfish					11	9.4 (54)
Largemouth Bass					68	58.3 (16)
White Crappie			455	30.3 (18)		

APPENDIX B – Map of sampling locations

Location of sampling sites, Nasworthy Reservoir, Texas, 2021-2023. Trap net, gill net, tandem hoop net, and electrofishing stations are indicated by T, G, H, and E, respectively. Water level was near full pool at time of sampling.

APPENDIX C – reporting of creel ZIP code data



Location, by ZIP code, and frequency of anglers that were interviewed at Nasworthy Reservoir, Texas, during the June 2021 through May 2022 creel survey.

APPENDIX D – Creel Data for Anglers Seeking Anything

Creel survey statistics for anglers seeking anything at Nasworthy Reservoir, Texas, from September 2003 through August 2004, June 2018 through May 2019, and June 2021 through May 2022. Percent total catch by species is the percentage of each species caught by anglers seeking any species of fish. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year		
	2003/2004	2018/2019	2021/2022
Surface area (acres)	1,380	1,380	1,380
Directed effort (h)	37,026 (UNK)	16,076 (18)	32,354 (19)
Directed effort/acre	26.8 (UNK)	11.7 (22)	23.4 (25)
Total catch per hour	UNK	0.55 (57)	0.22 (43)
Estimated total catch	UNK	8,842 (57)	7,118 (43)
Total harvest per hour	UNK	0.03 (102)	0.04 (100)
Percent total catch by species			
Common Carp	1.3	0.0	0.9
Blue Catfish	0.4	4.5	0.0
Channel Catfish	22.4	5.7	23.4
Flathead Catfish	0.4	1.1	0.9
White Bass	14.8	8.0	1.9
Hybrid Striped Bass	4.5	5.7	12.1
Sunfish Species	27.4	34.1	35.5
Largemouth Bass	14.3	4.5	9.3
White Crappie	4.0	29.5	7.5
Freshwater Drum	10.3	6.8	8.4

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