Nocona 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 Nocona Reservoir were surveyed in 2023 using electrofishing and trap netting. Aquatic vegetation was surveyed in 2023. Anglers were surveyed from March 2023 through August 2023 with a creel survey. Historical data are presented with the 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: Nocona Reservoir is a 1,362-acre impoundment of Farmers Creek, a tributary of the Red River, located in Montague County. In 2015, water level returned to conservation pool elevation after having been at a much lower level for a prolonged period. Water level remained near conservation pool elevation until fall of 2021 and has declined since. In 2023, the reservoir contained minimal vegetation.

Management History: Important sport fish include Largemouth Bass and White Crappie. Blue and Channel Catfish as well as White Bass are available to anglers. Sport fishes were managed with statewide regulations. Regulations to decrease harvest of large Blue and Channel Catfish were implemented in 2021 as part of a statewide effort to direct harvest to smaller individuals. Florida Largemouth Bass (FLMB) have been periodically stocked in the reservoir. Aquatic vegetation was problematic in the past but has become minimal in recent years. The management plan from the 2019 survey report included stocking FLMB, promoting the White Crappie and Largemouth Bass fisheries, and continuing to educate the public about the threats from invasive species.

Fish Community

- **Prey species:** Threadfin Shad were more abundant in 2023 compared to 2019. Electrofishing catch rate of Gizzard Shad has declined since 2015. Most Gizzard Shad were not suitable length to be prey for predator species. Electrofishing catch rate of Bluegill in 2023 was lower than 2019.
- **Catfishes:** Sampling was not conducted for catfish in 2023. Historically, Blue and Channel Catfish have been present in low-density. Flathead Catfish are also present.
- **White Bass:** Sampling was not conducted for White Bass in 2023. Historically, White Bass have been present in low-density.
- **Largemouth Bass:** Largemouth Bass abundance was similar to previous surveys. Legal-length fish were available to anglers, with occasional trophy-length fish reported.
- **White Crappie:** Trap net catch rate of White Crappie declined since the catch of record in 2019. Legal-length crappies were still available to angers. Crappie populations tend to be cyclical with the ability to rebound quickly.

Management Strategies: Continue stocking FLMB every several years to maintain genetic influence and trophy potential. Promote the Largemouth Bass fishery at Nocona Reservoir. Discuss access improvements with the City of Nocona and add habitat structures to the fishing pier at Joe Benton Park. Conduct general monitoring surveys with trap nets and electrofishing surveys in 2027. Access and vegetation surveys will be conducted in 2027. Continue public education about invasive species.

Introduction

This document is a summary of fisheries data collected from Nocona Reservoir in 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 2023 data for comparison.

Reservoir Description

Nocona Reservoir is a 1,362-acre impoundment on Farmers Creek, a tributary of the Red River, in Montague County. It was constructed by the North Montague County Water Supply District in 1961 for municipal water supply and recreation. The reservoir has a drainage area of approximately 94 square miles and a shoreline length of 24 miles. Nocona Reservoir was eutrophic with a mean TSI chl-*a* of 59.72 (Texas Commission on Environmental Quality 2022). The water level at Nocona Reservoir returned to conservation pool elevation (827.5 ft above mean sea level) in 2015, after having been at a much lower level for five years (Figure 1). Since 2015, the water level remained within two feet of conservation pool elevation until fall of 2021 when it began to slowly decline. Habitat at time of sampling consisted of rocky shoreline and minimal amounts of non-native submerged vegetation. Standing timber was also present, along with docks and piers. Other descriptive characteristics for Nocona Reservoir are in Table 1.

Angler Access

Nocona Reservoir has three public boat ramps with parking, boarding piers, and sufficient lighting. Shoreline access is limited to the areas adjacent to the boat ramps. There is a fishing dock in Joe Benton Park. Further information about Nocona Reservoir and its facilities can be found at the Texas Parks & Wildlife Department (TPWD) website:
http://www.tpwd.texas.gov/fishboat/fish/recreational/lakes/nocona/access.phtml
Additional boat ramp characteristics are in Table 2.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Cummings and Bennett 2020) included:

1. Stock Florida Largemouth Bass at 1,000/km shoreline in 2022 to maintain the proportion of FLMB genetics in the population.

   Action: Approximately 24,482 fingerling Lone Star Bass were stocked in 2022. 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.

2. Promote the White Crappie and Largemouth Bass fisheries available at Lake Nocona.

   Action: Sampling results and stockings were promoted on social media.

3. Continue public education campaign on the threats of invasive species.

   Action: Clean, Drain, Dry signage was maintained at each public boat ramp. Threats of aquatic invasive species were discussed with anglers during the creel survey.

Harvest regulation history: Sport fishes in Nocona Reservoir have always been managed with statewide regulations (Table 3). Regulations meant to decrease harvest of large Blue and Channel Catfish were implemented in 2021 as part of a statewide effort to direct harvest to smaller individuals.

Stocking history: Threadfin Shad have been periodically stocked since 1976 and were last stocked in 2016 to supplement the existing population. Florida Largemouth Bass fingerlings were stocked in the early 1980s and in 2018-2019 to increase Largemouth Bass trophy potential. ShareLunker Largemouth Bass fingerlings were stocked in 2010 and Lone Star Bass fingerlings were stocked in 2022. The complete stocking history is in Table 4.

Vegetation/habitat management history: Historically, non-native Eurasian watermilfoil was common and problematic (Hysmith and Moczygemba 1994 and 1997). Chemical treatment was not conducted due to the proximity of the water intake structure for municipal water supply.

Water transfer: No interbasin water transfer occurs.

Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Nocona Reservoir (Cummings and Bennett 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).

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 (h) 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 10 fish between 13.0 and 14.9 inches.

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

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 – A roving creel survey was conducted from March 2023 through August 2023. 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 – Vegetation and structural habitat surveys were conducted in 2023. Vegetation and structural habitat were 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: Structural habitat does not change much at Nocona Reservoir. In 2023, natural shoreline composed most of structural habitat with some piers, docks, and standing timber available (Table 6). In 2023, non-native Eurasian water milfoil occupied approximately 33 acres, an increase from previous surveys where trace amounts had been found (Table 7).

Creel: Directed fishing effort by anglers in 2023 was highest for White Crappie (36.3%) in the spring, and highest for Largemouth Bass (54.0%) in the summer (Table 8). Total fishing effort was estimated at 18,518 angler hours in the spring and 7,929 angler hours in the summer (Table 9). Total directed expenditures were estimated to be $121,395 in the spring and $53,295 in the summer. Among all angling parties fishing from boats, an estimated 36% were using forward facing sonar (FFS). Bass anglers comprised 90% of these FFS users, while crappie anglers comprised the remaining 10%. The majority of angling parties fishing Nocona Reservoir were from locations in Texas within 100 miles of the reservoir (Appendix D). Approximately 15% of angling parties were from Oklahoma.

Prey species: Electrofishing catch rates of Bluegill and Gizzard Shad were 153.0/h and 301.0/h, respectively. Gizzard Shad IOV was poor, indicating that 31% of Gizzard Shad were available to existing predators; this was lower than IOV estimates in previous years (Figure 2). Total CPUE of Gizzard Shad has declined since 2015 (Figure 2). Total CPUE of Bluegill in 2023 was lower than total CPUE in 2015 and 2019, and size structure continued to be dominated by small individuals (Figure 3). These results show prey species had higher catch rates in 2015 after a rapid rise in lake level, indicating improved spawning conditions. Catch rates have leveled off now that lake levels are declining again. All sampling objectives were met for Bluegill and Gizzard Shad. Threadfin Shad were more abundant in 2023 (318.0/h) compared to 2019 (229.0/h), but considerably lower than in 2011 (Appendix C).

Catfishes: Historical gill net catch rates for Blue and Channel Catfish have been low to moderate for Nocona Reservoir (Appendix C). The creel survey in 2023 indicated there was low directed angler effort for both species (7.9% in spring, 6.7% in summer). The catfish fisheries were considered low-density, so no sampling was conducted for these species. Total catch per hour by anglers for both species combined was 0.3 fish/h in the spring and 1.3 fish/h in the summer (Table 10). More Blue Catfish were harvested in the spring (1,190 fish) compared to summer (322). Harvest of Channel Catfish was low for both quarters. Blue Catfish were a more harvest-oriented species, with low numbers released for all three quarters listed. Harvested Blue Catfish ranged from 11 to 18 inches in length and Channel Catfish ranged from 16 to 18 inches in length (Figure 4). In December of 2021, a new Blue Catfish water body record was caught, weighing 38.25 pounds. In December of 2022, a new Blue Catfish junior angler record was caught, weighing 35.25 pounds. Both were released back into Nocona Reservoir.

White Bass: Historical gill net catch rates for White Bass have always been low (Appendix C). Spawning success has been sporadic, possibly due to the small watershed and variable inflows. Therefore, the White Bass fishery was considered low-density, so no sampling was conducted for this species. The angler directed effort from the 2023 creel survey was low. No anglers were surveyed fishing for White Bass in the spring, while anglers spent 473.0 hours targeting them in the summer (Table 11). Total harvest of White Bass was 1,388 in spring 2023, similar to harvest of spring 2009 (1,418). No White Bass were harvested in summer 2023. White Bass encountered in the creel survey ranged from 10 to 14 inches in length (Figure 5).

Largemouth Bass: The electrofishing catch rate of Largemouth Bass in 2023 (97.0/h) was similar to 2019 (101.0/h). Size-structure was similar as PSD was 40 in 2023 compared to 48 in 2019 (Figure 6). Average age at 14 inches was 3.2 years (N = 10; range = 2-4 years). Body condition in 2023 was poor (relative weight under 90) for many inch groups of fish, but somewhat improved for fish ≥ 18 inches. This may be due to a wider array of prey items available to larger fish and low prey availability for smaller fish. Density of smaller fish could also contribute to a decline in condition. Most sampling objectives were met for Largemouth Bass, except the sample for age and growth which only collected 10 fish rather than the desired 13. Directed effort for Largemouth Bass appears similar between 2009 and 2023, but tournament activity has declined (Tables 8 and 12). No tournaments were intercepted in spring 2023, but that could have resulted from random selection of creel days. Total catch per hour was similar between spring 2009 (0.8 fish/h) and spring 2023 (1.0 fish/h). Catch rate for anglers dropped in the summer (0.25 fish/h).

Harvested Largemouth Bass and tournament-retained fish ranged from 14 to 23 inches in length (Figure 7). Ten Largemouth Bass over 8 pounds have been submitted to date through the ShareLunker Program. Previous electrofishing surveys have collected six Largemouth Bass over 8 pounds and one over 10 pounds (Moczygemba and Bennett 2016).

White Crappie: The trap net catch rate of White Crappie was 7.6/nn in 2023, much lower than the record catch in 2019 (82.6/nn). Legal-length fish (≥ 10 inches) are still available to anglers and made up 54% of the sample. The decline in relative abundance may be related to lowering lake levels since 2021. The PSD in 2023 was 99 and similar to the previous survey (Figure 8). A high PSD usually indicates an unbalanced population, which risks collapse if the larger fish are removed by anglers or natural mortality. However, adequate spawning conditions and good year classes can easily replace those older fish. For example, the White Crappie catch rate for Nocona Reservoir in 2007 was 5.4/nn and recovered in subsequent years (Appendix C). Crappie populations tend to be cyclical and management options to counteract that are limited (Maceina 2003). Mean relative weight was over 90 for most size classes in 2023. White Crappie reached 10 inches in 1.9 years on average (N = 13, range = 1 - 2 years). Most sampling objectives were met for White Crappie except for RSE ≤ 25. With low catch rates and all other objectives met, it was deemed unnecessary to attempt further sampling. Percent directed angler effort for White Crappie in spring 2023 (36.3%) was slightly higher than spring 2009 (30.8%), then declined in summer (8.6%). Total catch per hour for anglers in 2023 was 4.4 fish/h in spring and 3.2 fish/h in summer (Table 13). Anglers harvested 37,114 White Crappie (30.1 per acre) in spring 2023, much higher than spring 2009 (3,874 crappie; 2.8 per acre). Harvested White Crappie ranged from 10 to 14 inches in length (Figure 9). Although this can be considered high harvest, it is unlikely that harvest alone is the reason for the decline in relative abundance. Also, most crappie anglers encountered in the creel (61%) were fishing from shore or dock. Most of the crappie were harvested during the spring spawning period and bank anglers estimated harvest rate (3.0/h) was three times that of all boat anglers (1.0/h) at Nocona. Only five fishing parties (10 anglers) using FFS harvested crappie during the six-month creel period. Collectively, they harvested 21 crappie at the time they were surveyed. The average number of crappie harvested by FFS users was 5.5/day, one less than the average of all crappie anglers (6.5/day).

Fisheries Management Plan for Nocona Reservoir, Texas

Prepared – July 2024

ISSUE 1: Florida Largemouth Bass have been stocked periodically since the 1980s. Genetic introgression of FLMB has improved in recent years along with size structure. Nocona Reservoir has a history of producing trophy bass (≥ 8 pounds), including a Legacy Class ShareLunker (13.34 pounds) in 2010.

MANAGEMENT STRATEGY

1. Request a stocking of Lone Star Bass fingerlings at a rate of 1,000/km shoreline in 2026. 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.

ISSUE 2: The Largemouth Bass population in Nocona Reservoir has abundant and large fish available for anglers. Bass over eight pounds are regularly caught but not submitted to the ShareLunker program. Some anglers in the region may not be aware of the quality bass fishery.

MANAGEMENT STRATEGIES

1. Promote the Largemouth Bass fishery at Nocona Reservoir through social media or news releases.
2. Encourage anglers to participate in the ShareLunker program.

ISSUE 3: The access facilities at Nocona Reservoir need improvement. Restrooms are rusted and worn down at each of the boat ramp sites. At Joe Benton Park, the fishing pier could use repairs and upgrades.

MANAGEMENT STRATEGIES

1. Discuss restroom improvements with the City of Nocona, including funding options like the Boating Access Grant or the Habitat and Angler Access Program.
2. Discuss repairing the fishing pier with the City of Nocona.
3. Add artificial habitat structures around the fishing pier using Conservation License Plate funding.

ISSUE 4: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches, and plugging engine cooling systems. 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 City of Nocona to maintain signage at access points around the reservoir.

2. Educate the public about invasive species through the use of media and the internet.
3. Make a speaking point about invasive species when presenting to constituent and user groups.
4. Keep track of (i.e., map) future inter-basin water transfers to facilitate potential invasive species responses.

Objective-Based Sampling Plan and Schedule (2024–2028)

Sport fish, forage fish, and other important fishes: Sport fishes in Nocona Reservoir include Blue and Channel Catfish, White Bass, Largemouth Bass, and White Crappie. Important forage species include Gizzard and Threadfin Shad and Bluegill.

Low-density fisheries:

White Bass: In the 2023 spring/summer creel survey, White Bass had 1.8 percent directed effort. Harvest of White Bass was predominately by anglers targeting other species or "anything". White Bass relative abundance declined between 2005 and 2012, and the historical average gill net catch rate was 1.1 fish per net night. Using the last gill net data from 2012, collecting 50 stock-length White Bass has no probability, and it would take over 75 net nights to get a CPUE-Stock RSE ≤ 25 (80% confidence). Due to low abundance and low directed angling effort, White Bass were considered a low-density fishery and will not be monitored by gill nets.

Catfishes: In the 2023 spring/summer creel survey, catfish had 6.7 percent directed effort. Blue Catfish gill net catch rates have fluctuated with an overall average of 3.0 fish per net night. Channel Catfish catch rates averaged 2.8 fish per net night. It would take 40+ net nights to collect 50 stock-length fish of either species, which is considered excessive for this fishery. Due to low to moderate abundance and marginal directed angling effort and harvest, Blue and Channel Catfish were considered low-density fisheries and will not be monitored by gill nets.

Survey objectives, fisheries metrics, and sampling objectives:

Largemouth Bass: Based on a creel survey from March 1 through August 31, 2023, Largemouth Bass were the most-sought sport fish in Nocona Reservoir. Largemouth Bass CPUE, size structure, and body condition have been collected at multi-year intervals since 1996 using fall nighttime electrofishing. Continuation of nighttime electrofishing every four years in the fall should allow for determination of any large-scale changes in the Largemouth Bass population. A minimum of 12 randomly selected 5-min electrofishing sites will be sampled in fall 2027, but sampling will continue at random sites until 50 stock-size fish are collected and the RSE of CPUE-S is ≤ 25 (the anticipated effort to meet both objectives is 12 stations). If either objective is not met after one night of sampling and they can be attained with 6 additional random stations, another night of effort will be expended. A category-2 age analysis of 13 Largemouth Bass between 13.0 and 14.9 inches will be conducted to determine average age at legal length.

White Crappie: A creel survey from March 1 through August 31, 2023, indicated White Crappie were the second most-sought sport fish in Nocona Reservoir. Continuation of multi-year trend data collection on White Crappie with single-cod trap netting every four years in the fall should allow for determination of any large-scale changes in the White Crappie population. A minimum of five randomly selected single-cod trap netting stations will be sampled in fall 2027, but sampling will continue at random sites until 50 stock-size fish are collected and the CPUE-Stock RSE is ≤ 25 (the anticipated effort to meet both objectives is five net-nights). If either objective is not met, additional sampling may be conducted if objective can be met with reasonable effort. A category-2 age analysis of 13 White Crappie between 9.0

and 10.9 inches in total length will be conducted to determine average age at legal length. Abundance, size structure, and body condition will also be assessed.

Prey species: Bluegill along with Gizzard and Threadfin Shad are the primary forage at Nocona Reservoir. Abundance and size structure has been estimated for these species at multi-year intervals. Continuation of this survey frequency and protocol will allow for determination of any large-scale changes in the Gizzard Shad, Threadfin Shad, and Bluegill populations. A minimum of 12 randomly selected 5-min electrofishing sites will be sampled in fall 2027, but sampling will continue in conjunction with Largemouth Bass sampling and/or until sufficient numbers for Bluegill PSD and Gizzard Shad IOV (50 fish) have been collected. No additional effort will be expended to achieve an RSE ≤ 25 for CPUE of Bluegill and Gizzard Shad. Instead, Largemouth Bass body condition (relative weight of Largemouth Bass ≥ 8”) can provide information on forage abundance, vulnerability, or both, relative to predator density.

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Tables and Figures

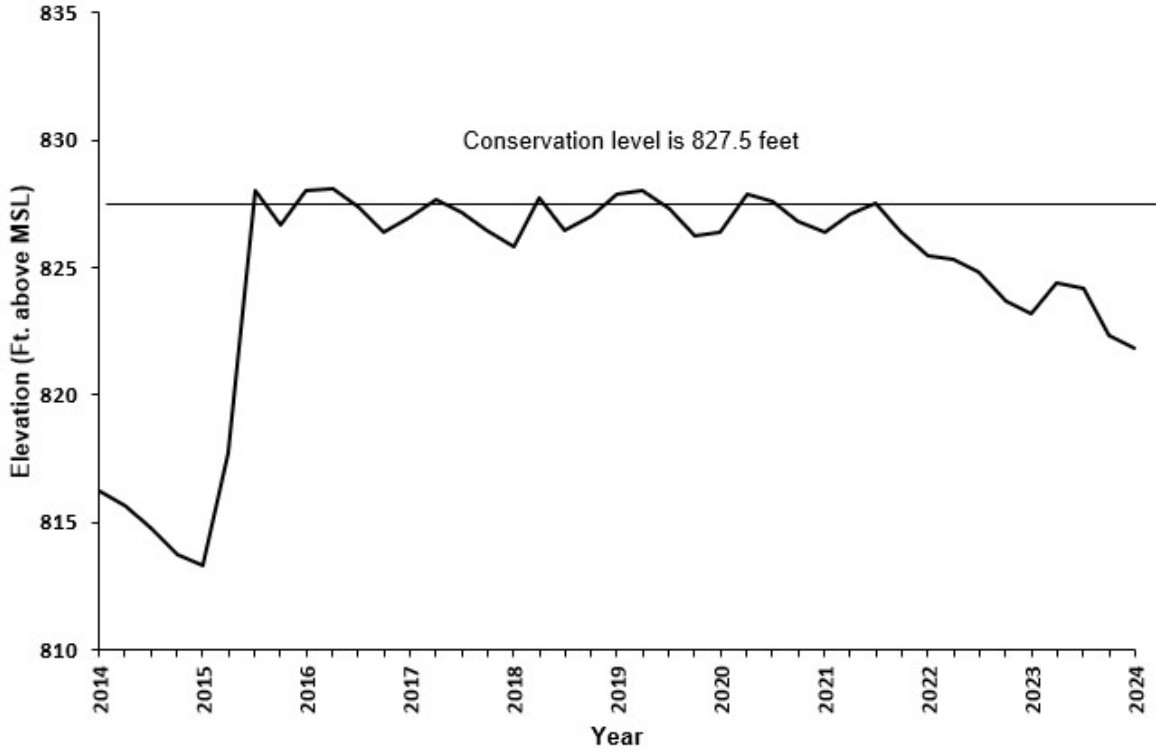


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Nocona Reservoir, January 2014 to January 2024.

Table 1. Characteristics of Nocona Reservoir, Texas.

Characteristic	Description
Year constructed	1961
Controlling authority	City of Nocona
County	Montague
Reservoir type	Tributary
Shoreline Development Index	9.3
Conductivity	707 µS/cm

Table 2. Boat ramp characteristics for Nocona Reservoir, Texas, August 2023. Reservoir was approximately five feet below conservation elevation at time of survey.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Weldon Robb	33.86151 -97.65984	Y	40	818.66	Excellent, extension not feasible
Joe Benton	33.87873 -97.65749	Y	40	817.16	Excellent, extension is feasible
Boone	33.88087 -97.64581	Y	20	818.16	Excellent, no access issues

Table 3. Harvest regulations for Nocona Reservoir, Texas.

Species	Bag limit	Length limit
Catfish: Channel and Blue Catfish, their hybrids and subspecies	25 (in any combination, only 10 can be ≥ 20 inches)	No limit
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 Nocona Reservoir, Texas. FGL = fingerling; AFGL = advanced fingerling; ADL = adults; UNK = unknown.

Species	Year	Number	Life Stage
Florida Largemouth Bass	1981	75,600	FGL
	1982	73,692	FGL
	2018	133,825	FGL
	2019	28,387	FGL
	Total	311,504	
Lone Star Bass	2022	24,482	FGL
	Total	24,482	
Palmetto Bass (Striped X White Bass hybrid)	1983	16,362	UNK
	1994	23,700	FGL
	1995	29,439	FGL
	1996	20,055	FGL
	1997	14,700	FGL
	Total	104,256	
ShareLunker Largemouth Bass	2010	2,220	FGL
	Total	2,220	
Threadfin Shad	1976	8,500	AFGL
	1984	1,500	AFGL
	1985	700	AFGL
	2003	1,295	ADL
	2016	1,500	AFGL
	Total	13,495	
Tiger Musky (Northern Pike X Muskellunge)	1976	747	UNK
	Total	747	

Table 5. Objective-based sampling plan components for Nocona Reservoir, Texas 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)
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			
White 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 structural habitat types, Nocona Reservoir, Texas, 2023. Shoreline habitat type units are in miles and standing timber and piers and docks are in acres.

Habitat type	Estimate	% of total
Bulkhead	0.5 miles	2.1
Natural	22.2 miles	92.5
Rocky	1.3 miles	5.4
Standing timber	5 acres	0.4
Piers and docks	2.2 acres	0.2

Table 7. Survey of aquatic vegetation, Nocona Reservoir, Texas, 2015 – 2023. Surface area (acres) is listed with percent of total reservoir surface area in parentheses. Surface area at time of survey was approximately 1,150 acres.

Vegetation	2015	2019	2023
Native terrestrial (black willow, inundated)	135.0(10.2)	22.6(1.7)	NA (0)
Native floating leaved (American lotus)	0.1(<0.1)	10.5(0.8)	0 (0)
Native submerged (American pondweed)	6.1(0.5)	19.4(1.5)	0 (0)
Non-Native	<0.1(<0.1)	trace	33 (2.8)
Eurasian water milfoil (Tier III)*			

*Tier III is watch status.

Table 8. Percent directed effort by species for Nocona Reservoir, Texas. Survey periods were from March – May 2009, March – May 2023, and June – August 2023.

Species	Spring 2009	Spring 2023	Summer 2023
White Bass	0.8	-	6.0
Largemouth Bass	39.2 (25.1)*	31.9 (0.0)*	54.0 (16.0)*
Crappies	30.8	36.3	8.6
Catfishes	3.7	7.9	6.7
Sunfish	-	2.2	-
Anything	25.5	21.7	11.6

*Percent effort for tournament anglers

Table 9. Total fishing effort (h) for all species and total directed expenditures at Nocona Reservoir, Texas, 2009 and 2023. Estimated values are listed with RSE in parentheses. Survey periods were from March – May 2009, March – May 2023, and June – August 2023.

Creel statistic	Spring 2009	Spring 2023	Summer 2023
Total fishing effort	14,497 (14)	18,518 (24)	7,929 (27)
Total directed expenditures	$84,881 (32)	$121,395 (46)	$53,295 (37)

Gizzard Shad

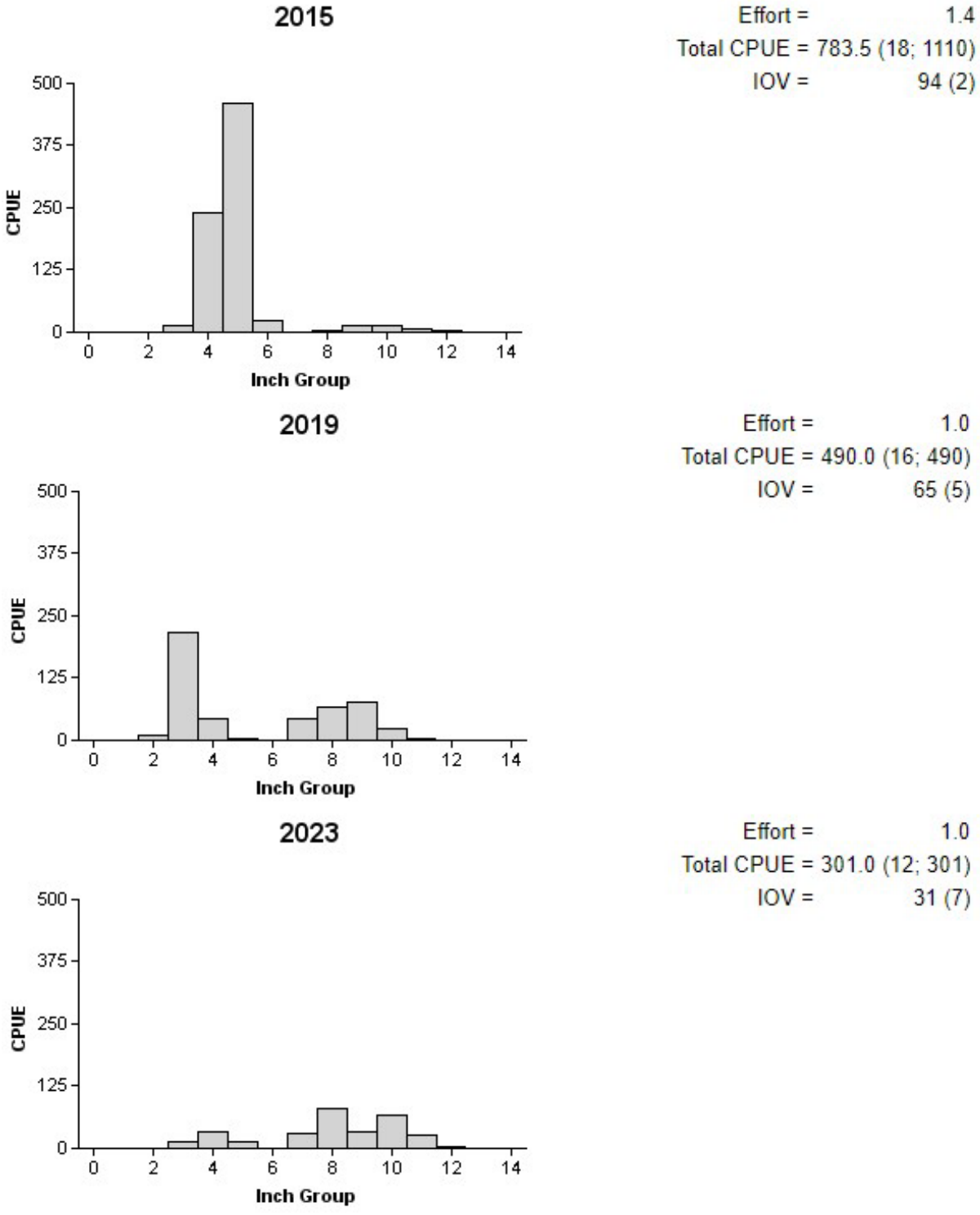


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Nocona Reservoir, Texas, 2015, 2019, and 2023.

Bluegill

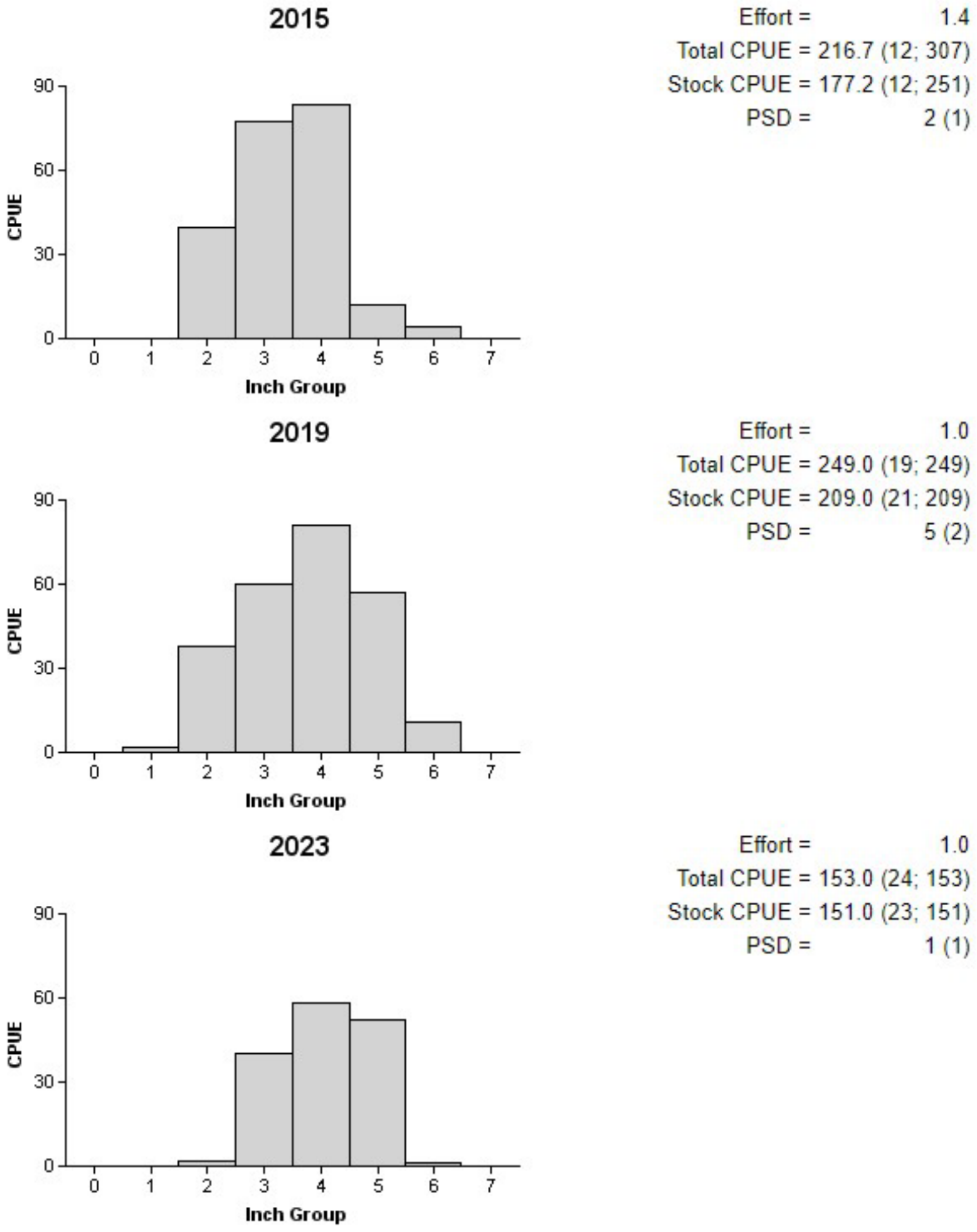


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Nocona Reservoir, Texas, 2015, 2019, and 2023.

Catfishes

Table 10. Creel survey statistics for catfish at Nocona Reservoir, Texas, 2009 and 2023. Creel survey periods were from March – May 2009, March – May 2023, and June – August 2023, where 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		
	Spring 2009*	Spring 2023	Summer 2023
Surface area (acres)	1,188	1,231	1,231
Directed effort (h)	532 (66)	1,457 (52)	315 (84)
Directed effort/acre	0.4 (66)	1.2 (52)	0.3 (84)
Total catch per hour	0.3 (100)	0.3 (50)	1.3 (-)
Total harvest			
Blue Catfish	87 (270)	1,190 (242)	322 (109)
Channel Catfish	214 (183)	198 (502)	215 (139)
Harvest/acre			
Blue Catfish	0.1 (270)	1.0 (242)	0.3 (109)
Channel Catfish	0.2 (183)	0.2 (502)	0.2 (139)
Percent legal released			
Blue Catfish	0	0	15
Channel Catfish	41	86	55

*MLL was 12-inches in 2009, no MLL after 2021

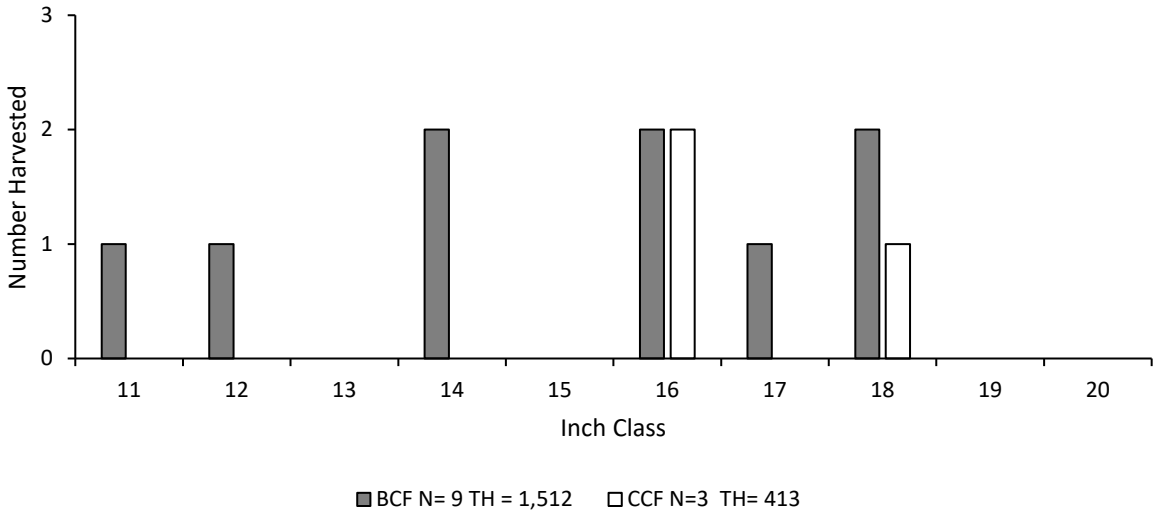
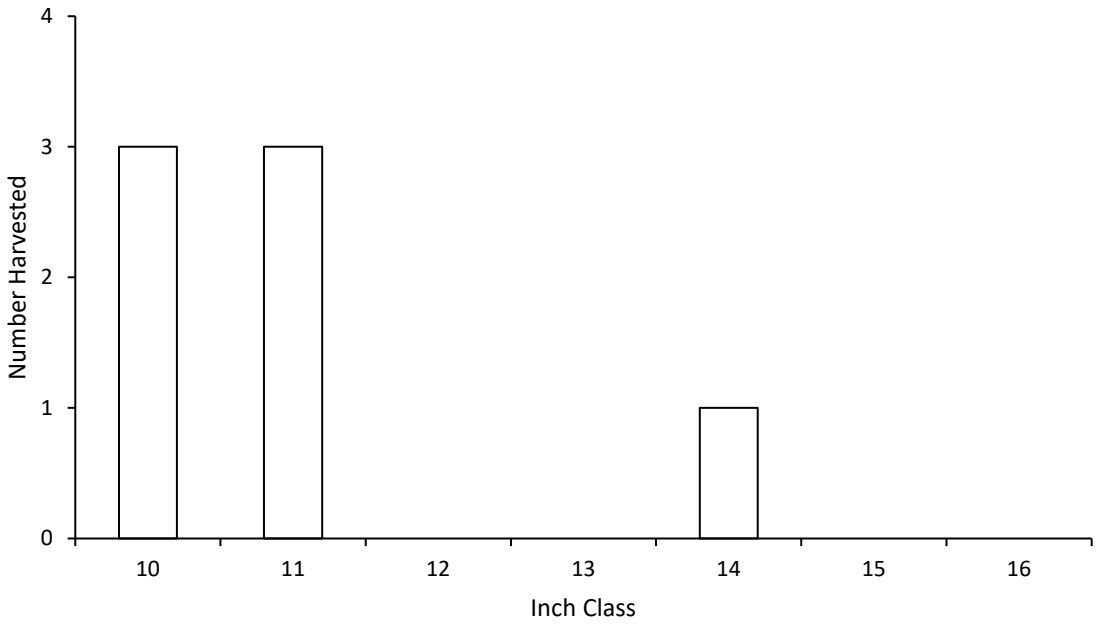


Figure 4. Length frequency of harvested Channel Catfish (CCF) and Blue Catfish (BCF) observed during creel surveys at Lake Nocona, Texas, 2023. N is the number of harvested catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

White Bass

Table 11. Creel survey statistics for White Bass at Lake Nocona, Texas, 2009 and 2023. Creel survey periods were from March – May 2009, March – May 2023, and June – August 2023. 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	Year		
	Spring 2009	Spring 2023	Summer 2023
Surface area (acres)	1,188	1,231	1,231
Directed effort (h)	113 (120)	0	473 (69)
Directed effort/acre	0.1 (120)	0	0.4 (69)
Total catch per hour	-	-	2.6 (92)
Total harvest	1,418 (30)	1,388 (148)	0
Harvest/acre	1.2 (30)	1.1 (148)	0
Percent legal released	20	84	100



N = 7, TH = 1,388

Figure 5. Length frequency of harvested White Bass observed during a spring/summer creel survey at Lake Nocona, Texas, 2023. N is the number of harvested White Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

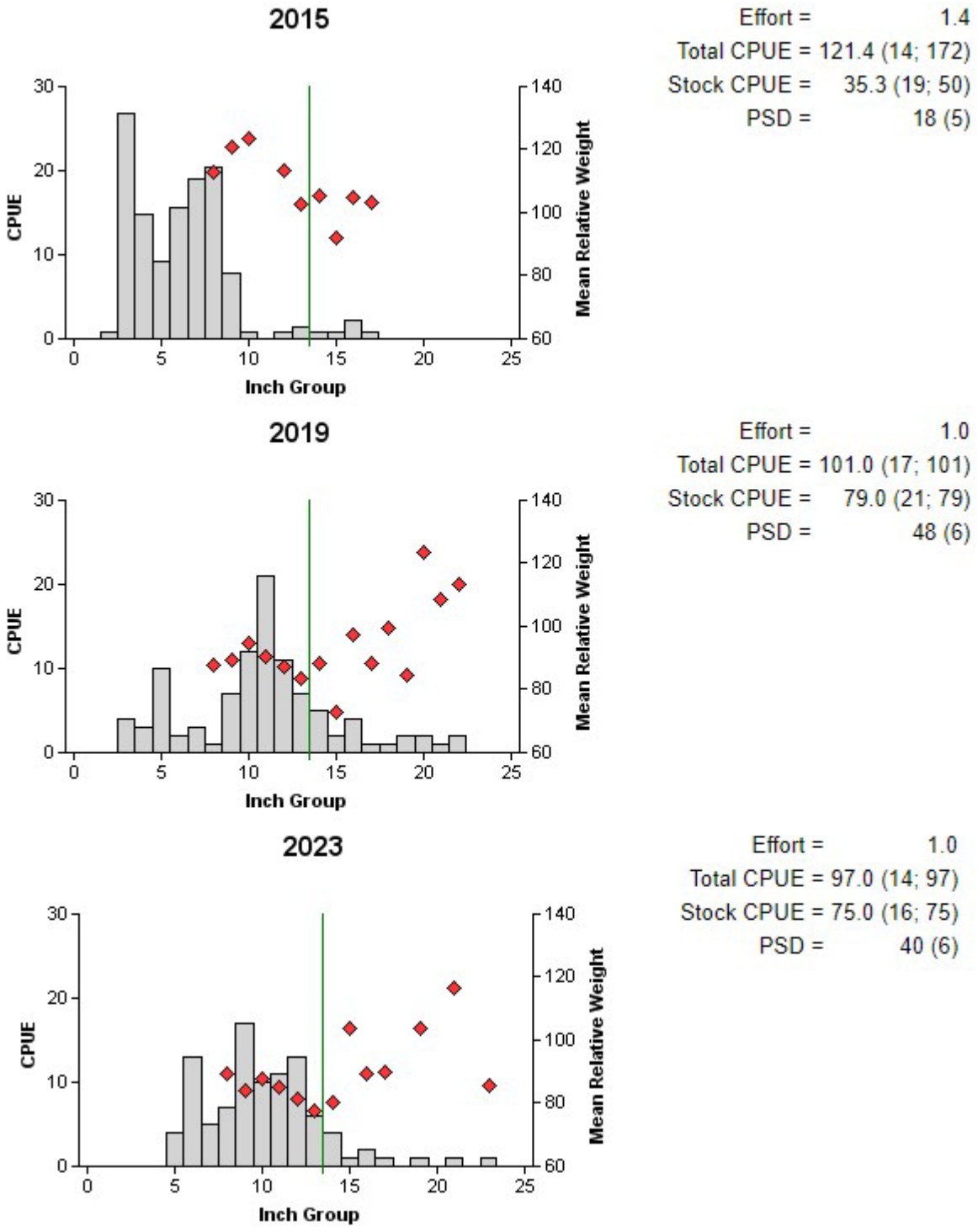


Figure 6. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Nocona Reservoir, Texas, 2015, 2019, and 2023. Vertical line indicates minimum length limit.

Table 12. Creel survey statistics for Largemouth Bass at Lake Nocona, Texas, 2009 and 2023. Creel survey periods were from March – May 2009, March – May 2023, and June – August 2023. Total catch per hour is for anglers targeting black bass and total harvest is the estimated number of Largemouth Bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year		
	Spring 2009	Spring 2023	Summer 2023
Surface area (acres)	1,188	1,231	1,231
Directed effort (h)			
Tournament	3,643 (24)	0	1,261 (43)
Non-tournament	2,042 (30)	5,912 (26)	4,280 (29)
All black bass anglers combined	5,685 (26)	5,912 (26)	5,541 (36)
Directed effort/acre	4.8 (26)	4.8 (26)	4.5 (36)
Total catch per hour	0.8 (28)	1.0 (19)	0.25 (43)
Harvest			
Tournament	770 (78)	0	751 (83)
Non-tournament	162 (112)	226 (338)	107 (123)
Harvest/acre	0.1 (112)	0.2 (338)	0.1 (123)
Percent legal released (non-tourn.)	80	94	88

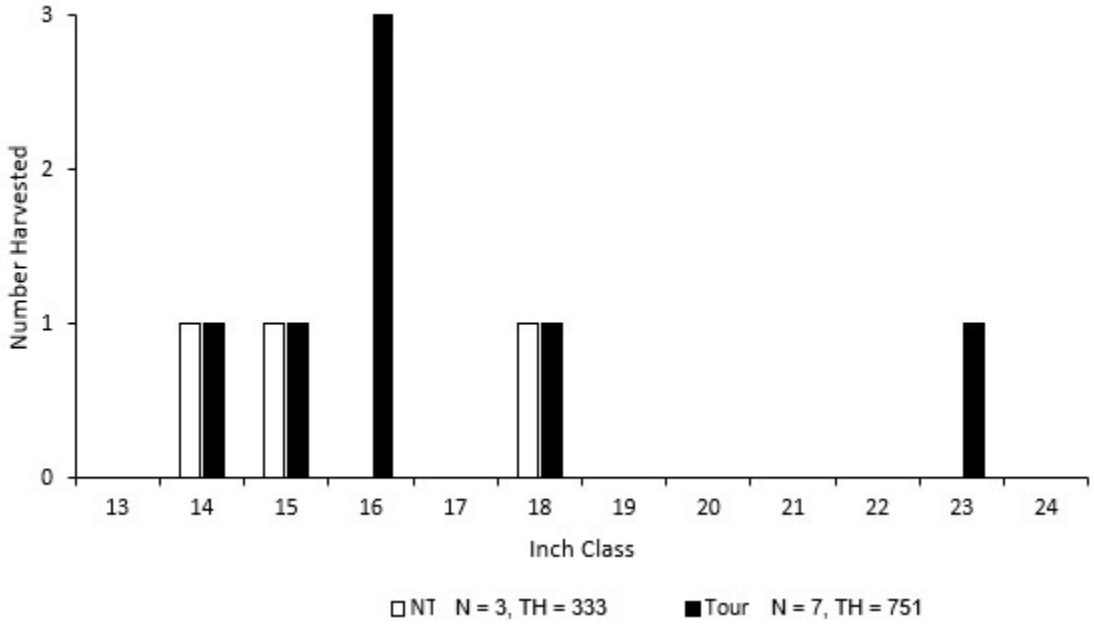


Figure 7. Length frequency of harvested Largemouth Bass observed during creel surveys at Lake Nocona, Texas, March through August 2023. N is the number of harvested Largemouth Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

White Crappie

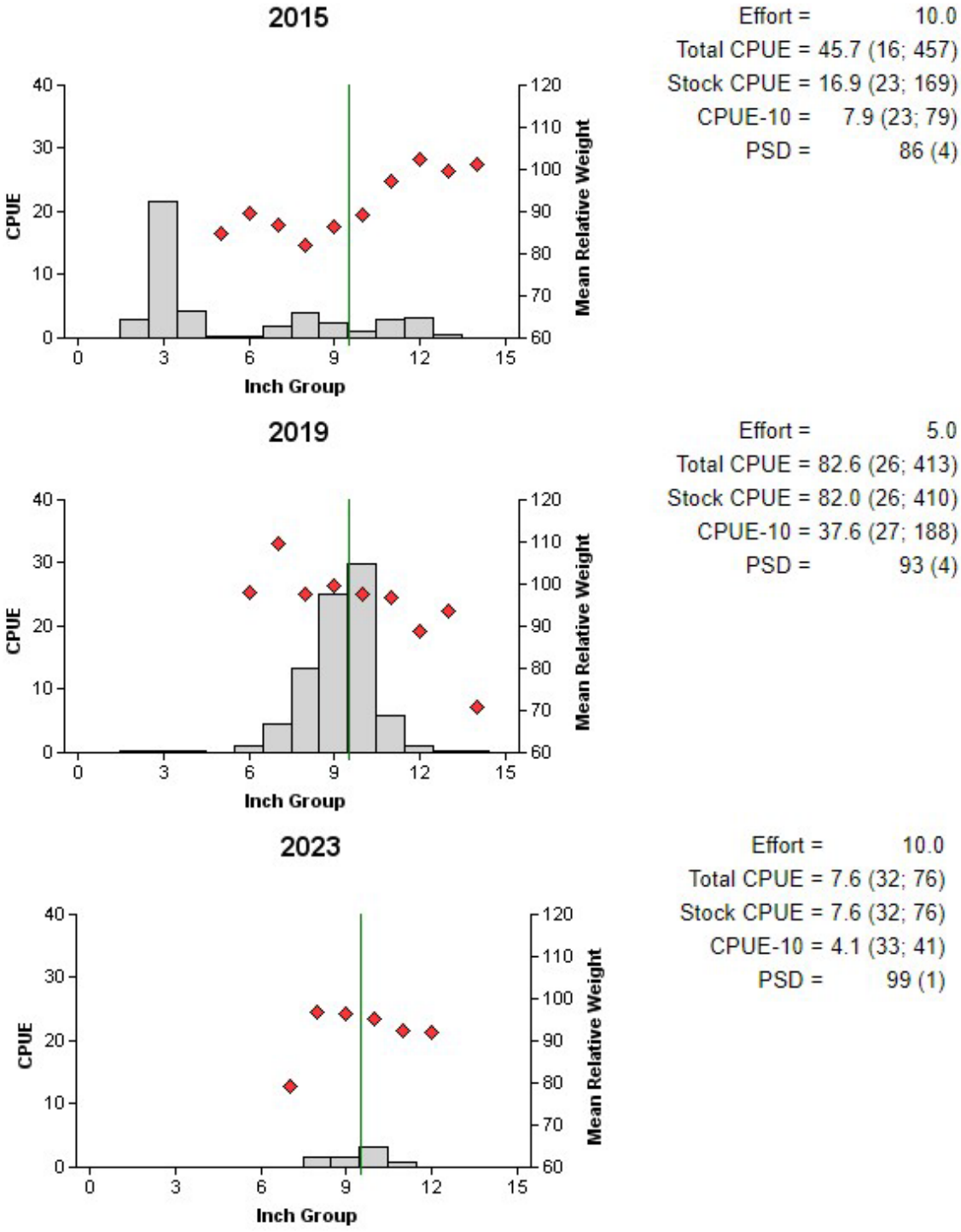


Figure 8. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Nocona Reservoir, Texas, 2015, 2019, and 2023. Vertical line indicates minimum length limit.

Table 13. Creel survey statistics for White Crappie at Lake Nocona, Texas, 2009 and 2023. Creel survey periods were from March – May 2009, March – May 2023, and June – August 2023. Total catch per hour is for anglers targeting crappie and total harvest is the estimated number of crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year		
	Spring 2009	Spring 2023	Summer 2023
Surface area (acres)	1,188	1,231	1,231
Directed effort (h)	4,463 (26)	6,716 (27)	679 (62)
Directed effort/acre	3.28 (26)	5.5 (27)	0.6 (62)
Total catch per hour	1.1 (35)	4.4 (30)	3.2 (137)
Total harvest	3,874 (61)	37,114 (40)	761 (83)
Harvest/acre	2.8 (61)	30.1 (40)	0.6 (83)
Percent legal released	0.5	2	13

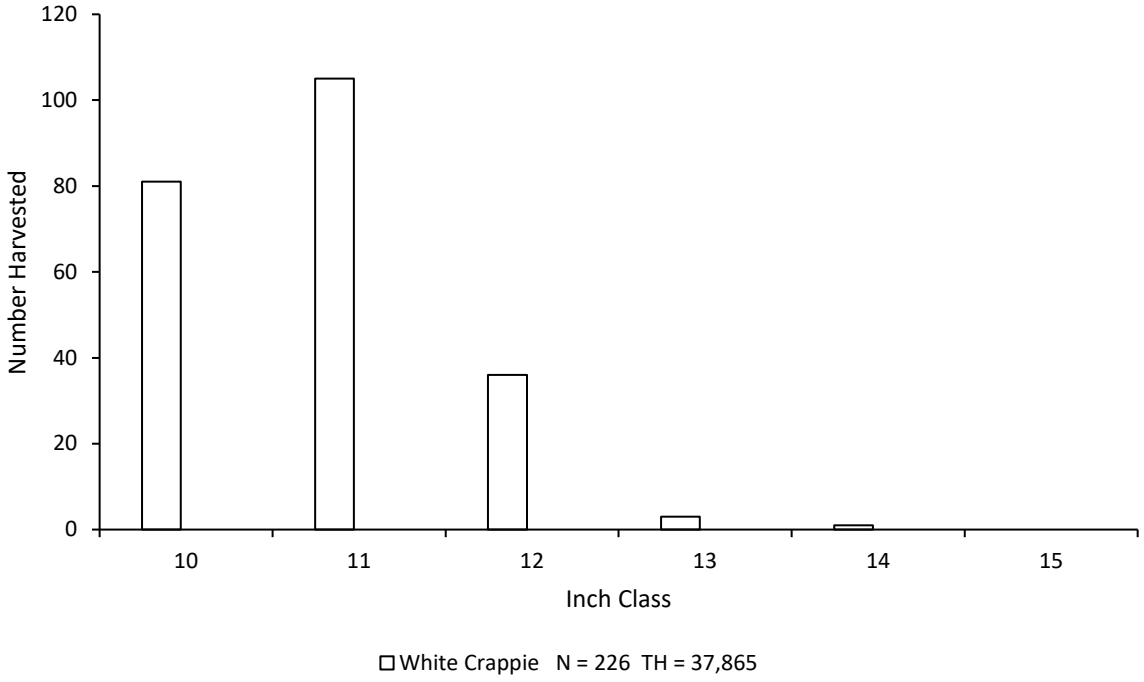


Figure 9. Length frequency of harvested White Crappie observed during creel surveys at Lake Nocona, Texas, 2023. N is the number of harvested White Crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Proposed Sampling Schedule

Table 64. Proposed sampling schedule for Nocona Reservoir, Texas. Survey period is June through May. Electrofishing and trap netting surveys are conducted in the fall.

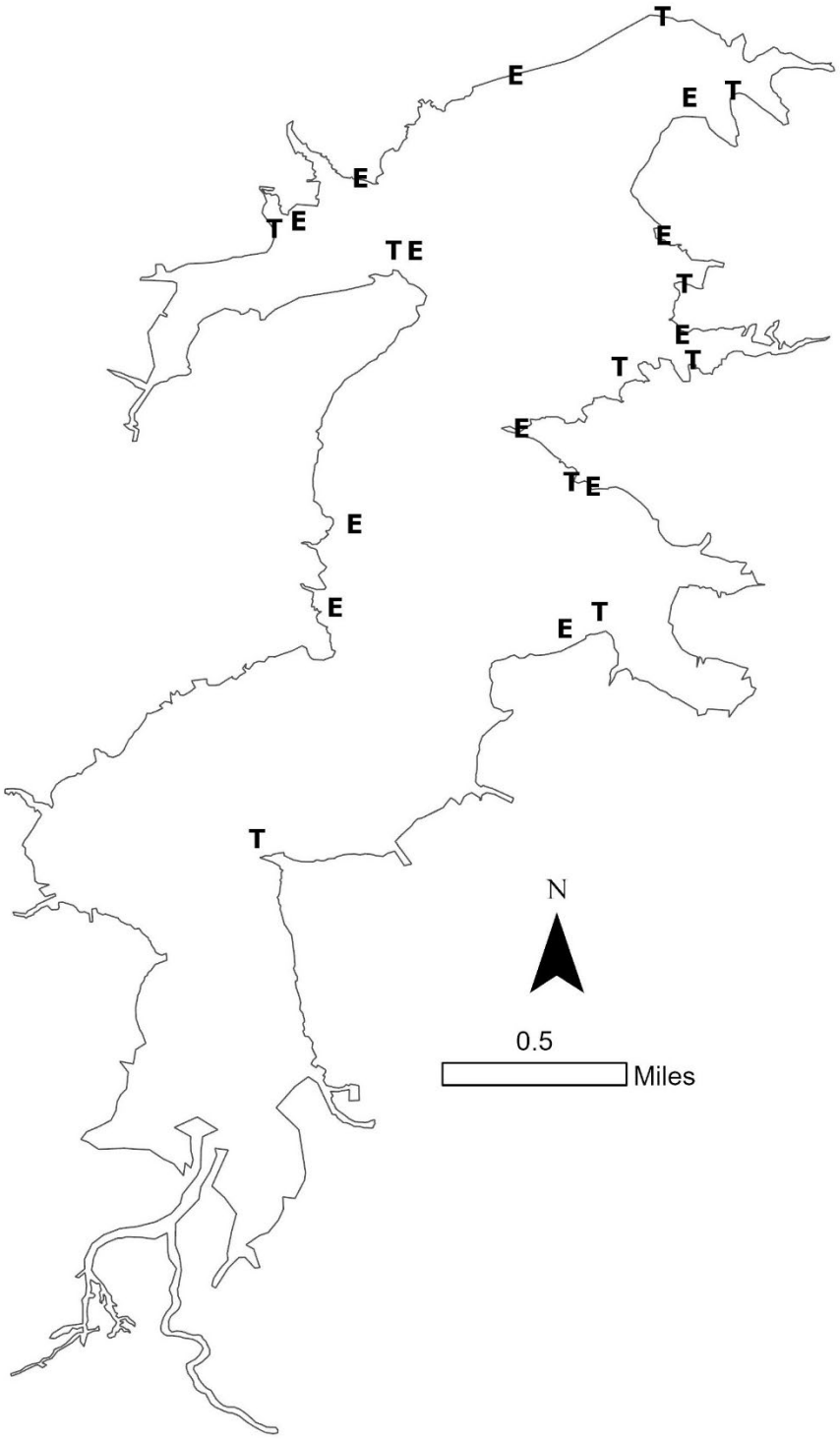
	Survey year			
	2024-2025	2025-2026	2026-2027	2027-2028
Angler Access				X
Structural Habitat				X
Vegetation				X
Electrofishing – Fall				X
Trap netting				X
Creel survey				
Report				X

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

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

	Trap Netting		Electrofishing	
Species	N	CPUE	N	CPUE
Gizzard Shad			301	301.0 (12)
Threadfin Shad			318	318.0 (40)
Green Sunfish			4	4.0 (56)
Warmouth			1	1.0 (100)
Bluegill			153	153.0 (24)
Longear Sunfish			8	8.0 (59)
Largemouth Bass			97	97.0 (14)
White Crappie	76	7.6 (32)		

APPENDIX B – Map of sampling locations



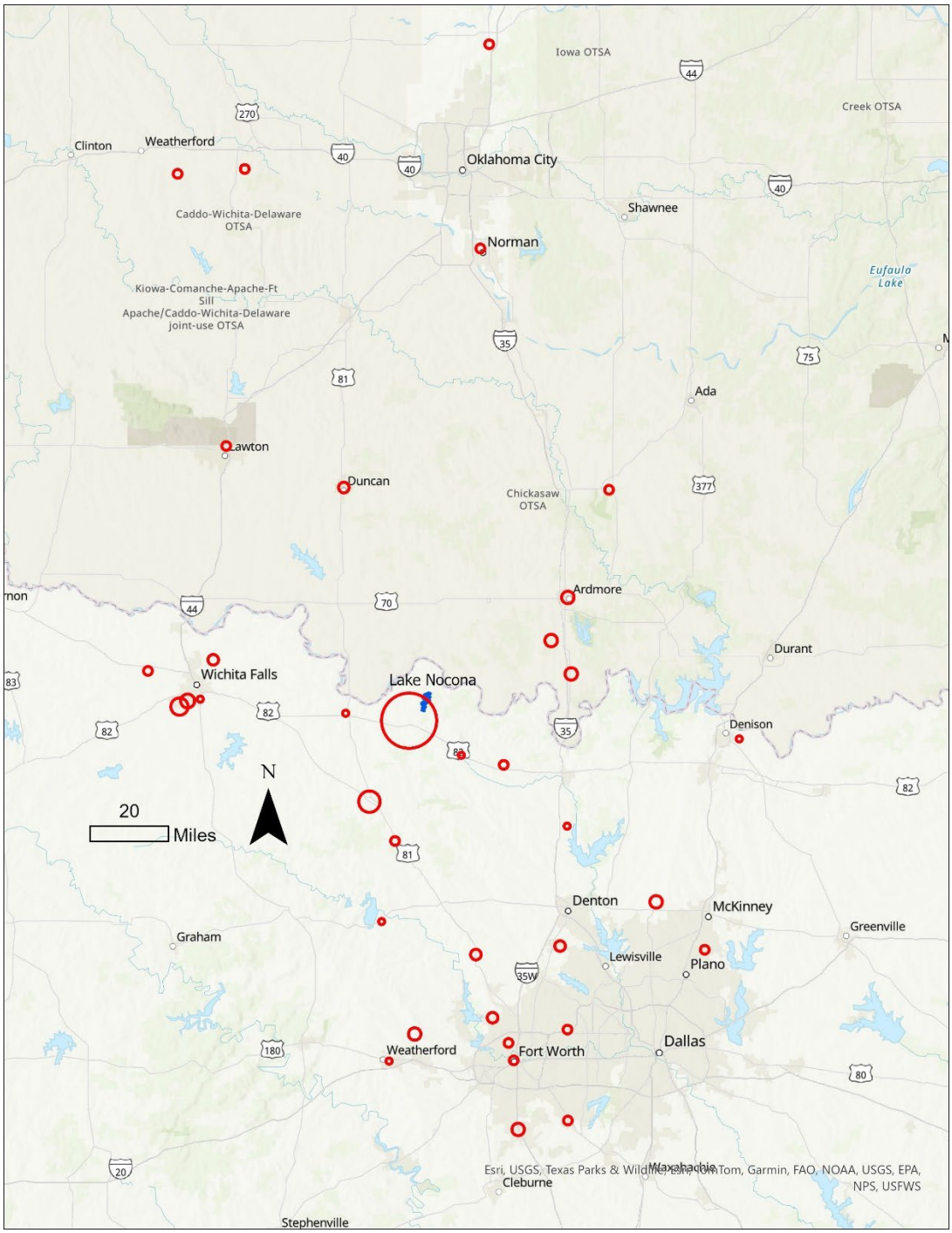
Location of sampling sites, Nocona Reservoir, Texas, 2023. Trap net and electrofishing stations are indicated by T and E, respectively. Upper (south) end of reservoir has been silted in, so water is shallow and difficult to navigate. Water level was approximately five feet below conservation elevation at time of sampling.

APPENDIX C – Historical catch rates

Catch rates (CPUE) of targeted species by gear type for standard surveys on Nocona Reservoir, Texas, 1996 - 2019. Electrofishing surveys in 2007 and after were conducted using a 7.5 Smith-Root Gas Powered Pulsator (GPP). Electrofishing surveys prior to 2007 were conducted using a Smith-Root 5.0 GPP. Gill net sampling was performed the following spring of the year listed. The catch rates from the latest surveys are excluded from this analysis and are available in Appendix A.

		Year							
Gear	Species	1996	1999	2003	2007	2011	2015	2019	**Historical Average**
Gill Net	Blue Catfish	6.8	4.4	1.4	0.8	1.4			**3.0**
(fish/net night)	Channel Catfish	1.8	1.0	5.0	2.4	3.6			**2.8**
	Flathead Catfish	0.4	0.0	0.2	0.2	0.4			**0.2**
	White Bass	1.4	1.8	1.4	0.6	0.2			**1.1**
	Palmetto Bass	2.6	13.2	0.0	0.4	0.0			**3.2**
Electrofisher	Gizzard Shad	120.7	362.0	177.0	76.0	274.0	783.5	490.0	**326.2**
(fish/hour)	Threadfin Shad	0.0	0.0	138.0	656.0	1,284.0	0.0	229.0	**329.6**
	Green Sunfish	10.0	3.0	5.0	10.0	1.0	4.2	2.0	**5.0**
	Warmouth	4.7	2.0	0.0	2.0	3.0	1.4	0.0	**1.9**
	Bluegill	36.0	41.0	100.0	229.0	79.0	216.7	249.0	**135.8**
	Longear Sunfish	4.0	7.0	30.0	70.0	11.0	62.1	57.0	**34.4**
	Redear Sunfish	4.0	3.0	6.0	9.0	3.0	1.4	1.0	**3.9**
	Largemouth Bass	129.3	80.0	70.0	90.0	123.0	121.4	101.0	**102.1**
Trap Net	White Crappie	28.4	16.0	17.8	5.4	9.9	45.7	82.6	**29.4**
(fish/net night)									

APPENDIX D – Map of angler ZIP codes



Location, by ZIP code, and quantity of anglers that were interviewed at Nocona Reservoir, Texas during the March through August 2023 creel survey. The size of the circle represents the proportion of anglers from each ZIP code centroid. Locations in Oklahoma and Texas are pictured.

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