

B. A. Steinhagen Reservoir

2021 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 B. A. Steinhagen Reservoir were surveyed in 2021 using electrofishing and trap netting and in 2022 using gill netting. Historical data are presented with the 2021-2022 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: B. A. Steinhagen Reservoir was impounded in 1951 on the Neches River; other tributaries include the Angelina River and Wolf, Sandy, Spring, and Rush creeks. The U.S. Army Corps of Engineers (USACE) is the controlling authority; primary uses are to regulate intermittent water releases from Sam Rayburn Reservoir, produce hydropower, and provide recreational opportunities. At conservation pool (82.5 feet mean sea level), B. A. Steinhagen Reservoir covers 10,687 acres and has a shoreline length of 160 miles. Mean depth is 4 feet and littoral areas (< 15 feet) comprised 95% of the reservoir. Boat access is excellent and provided by 12 public access points. Bank access is provided by two lighted fishing piers at Martin Dies, Jr. State Park. Most of the land around the reservoir is used for timber production.

Management History: Important sport fishes include Largemouth Bass, crappies, and catfishes. Historically, salvinia (both common and giant) and water hyacinth have been problematic in the reservoir and coverages have exceeded 40% of the reservoir surface area. The USACE has conducted numerous water level drawdowns during the summer and winter seasons to reduce vegetative coverage. However, these drawdowns were discontinued due to limited success as problematic coverages returned the following growing seasons. Since 2008, extensive herbicide treatments funded by the USACE, the Lower Neches Valley Authority, and Texas Parks and Wildlife Department have reduced problematic plant coverages during most years to < 20% of the reservoir surface area. During the summer of 2019, the reservoir was lowered for approximately 8 weeks (maximum drawdown was 26 feet below conservation pool) to repair the dam and spillway. This drawdown decreased hydrilla and native plant coverages and likely reduced Blue Catfish abundance. Historically, Blue and Channel Catfish were managed with the statewide 12-inch minimum length limit and 25-fish daily bag limit. In 2021, the statewide regulation was changed to a no minimum length limit and a daily bag limit of 25 (only 10 can be \geq 20 inches) and applied to B. A. Steinhagen Reservoir.

Fish Community

- **Prey species:** Primary prey species included Threadfin Shad, Bluegill, and Gizzard Shad. Threadfin shad were the most abundant and provided ample forage for sport fish. Electrofishing catch of Bluegill and Gizzard Shad were low.
- **Catfishes:** Blue and Channel Catfish were present in the reservoir. Historically, Blue Catfish were the most abundant, but the population declined in 2022. However, Channel Catfish abundance increased considerably in 2022.
- **Temperate basses:** White bass were present, but abundance was low.
- **Black basses:** Spotted Bass abundance increased in 2021 but size structure was poor. Largemouth Bass were moderately abundant and in desirable condition. Most fish were < 14 inches in length. In 2021, reproduction was likely high as catch of fish < 6 inches in length increased.
- **Crappies:** White Crappie abundance decreased over the last three surveys. Historically, Black Crappie were present in the reservoir but abundance was low. No Black Crappie were collected in 2021.

Management Strategies: Continue to manage the fishery with current harvest regulations. Conduct annual vegetation surveys and maintain invasive species signage. Support USACE as needed with herbicide treatments and salvinia weevil releases related to problematic aquatic vegetation.

Introduction

This document is a summary of fisheries data collected from B. A. Steinhagen Reservoir from 2021-2022. 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 2021-2022 data for comparison.

Reservoir Description

B. A. Steinhagen Reservoir (impounded in 1951) is an impoundment of the Neches River (Table 1); other tributaries include the Angelina River and Wolf, Sandy, Spring, and Rush creeks. The U.S. Army Corps of Engineers (USACE) is the controlling authority; primary uses are to regulate intermittent water releases from Sam Rayburn Reservoir, produce hydropower, and provide recreational opportunities. At conservation pool elevation of 82.5 feet mean sea level, B. A. Steinhagen Reservoir covers 10,687 acres and has a shoreline length of 160 miles. Mean depth is 4 feet and littoral areas (< 15 feet) comprise 95 percent of the reservoir. B. A. Steinhagen Reservoir was eutrophic with a mean TSI chl-a of 53.6 (Texas Commission on Environmental Quality 2020). Although water levels are relatively stable, during July to September 2019 the reservoir was lowered to a maximum of 26 feet below conservation pool for dam and spillway repairs, reducing the entire reservoir to the main river channel (Figure 1). There is no private shoreline development, as most of the land around the reservoir is used for timber production. The Texas Department of State Health Services (TDSHS) has a fish consumption advisory in effect due to dioxins and mercury (TDSHS 2012). Species affected include Smallmouth Buffalo, gars, Blue and Flathead Catfish, and Spotted and Largemouth Bass.

Angler Access

Boat access is excellent at B. A. Steinhagen Reservoir as 12 access points are present. Bank access is provided by two lighted fishing piers at Martin Dies, Jr. State Park. Handicap specific facilities are limited to fishing piers. During times of peak vegetation coverage, angler access can become limited in the upper end of the reservoir. B. A. Steinhagen Reservoir also has three designated paddling trails that range from 3 to 16 miles in length. Additional boat ramp characteristics are in Table 2.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Ashe and Driscoll 2018) included:

1. Conduct annual aquatic vegetation surveys and support annual aquatic herbicide treatments managed by the USACE.

Action: Annual aquatic vegetation surveys were conducted in August of 2018 through 2021 to monitor vegetation coverage. The USACE has managed and maintained an aggressive aquatic vegetation treatment program.

Harvest regulation history: Sport fishes in B. A. Steinhagen Reservoir are currently managed with statewide regulations (Table 3).

Stocking history: In 2007, Blue and Channel Catfish fingerlings were stocked to improve recruitment following an extensive water level drawdown (Table 4). No stockings have occurred since 2007.

Vegetation/habitat management history: Historically, the primary management issue at B. A. Steinhagen Reservoir has been excessive coverage of invasive aquatic vegetation, primarily salvinia and water hyacinth. Total coverages have exceeded 40% of the reservoir surface area during some years. An extensive 12-foot reservoir drawdown was conducted from May 2006 to June 2007, followed by brief drawdowns (duration of one week to one month) in 2009, 2010, 2011, and 2013 to help reduce coverage. However, effects of these drawdowns were short-term as coverage quickly returned. Since 2008, extensive herbicide treatments have reduced problematic plant coverage. These treatments are funded

by the USACE, the Lower Neches Valley Authority (LNVA), and Texas Parks and Wildlife Department (TPWD). Treatments are conducted by private applicators that are contracted and supervised by the USACE. Since 2018, annual herbicide treatments of salvinia and water hyacinth have ranged from 1,500 to 2,300 acres (75% of coverage salvinia) and coverage has been maintained at < 20% of the reservoir surface area. In addition, during 2018 and 2020 the USACE released salvinia weevils in areas of the reservoir that are difficult to conduct herbicide treatments.

Water transfer: The LNVA is authorized to draw a maximum of 2,000 cubic feet per second from the reservoir. This water allotment is available to the agency whenever needed and water is drawn directly through the Town Bluff Dam tainter gates. However, if the normal pool capacity is not adequate to satisfy the requirements over an extended period, Sam Rayburn Dam can release water directly into B. A. Steinhagen Reservoir. No interbasin water transfers exist.

Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for B. A. Steinhagen Reservoir (Ashe and Driscoll 2018). Primary components of the OBS plan are listed in Table 5. All survey sites were randomly selected, and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2017), except for the fall electrofishing survey. Electrofishing was conducted during daylight hours due to the turbid nature of the reservoir.

Electrofishing – Spotted Bass, Largemouth Bass, sunfishes, Gizzard Shad, and Threadfin Shad were collected by electrofishing (1.9 hours at 23, 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 – Crappies were collected using trap nets (20 net nights at 20 stations). CPUE for trap netting was recorded as the number of fish caught per net night (fish/nn).

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

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_t)] were calculated for target fishes according to Anderson and Neumann (1996). Index of Vulnerability (IOV) was calculated for Gizzard Shad (DiCenzo et al. 1996). Standard error (SE) was calculated for structural indices and IOV. Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE and creel statistics.

Habitat – Vegetation surveys were conducted annually from 2018–2021. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2017).

Water level – Source for water level data was the United States Geological Survey (USGS 2022).

Results and Discussion

Habitat: A habitat survey conducted in 2002 indicated that the littoral zone included primarily overhanging brush and dead timber (Smith and Driscoll 2003). Problematic aquatic plants in the reservoir included salvinia (both common and giant) and water hyacinth. Since 2008, coverage of problematic plants has been < 20% of the reservoir surface area during most years. In 2017 and 2018, beneficial aquatic vegetation coverage (native plants and hydrilla) comprised approximately 30-35% of the reservoir surface area (Table 6). However, the 26-foot drawdown in 2019 eliminated nearly all beneficial vegetation. In 2021, coverages of both beneficial and problematic plants comprised < 5% of reservoir surface area.

Prey species: The primary prey species collected from electrofishing surveys was Threadfin Shad. The population was abundant (CPUE = 2,444.4/h; Appendix A) and provided ample forage for sport fish. Gizzard Shad catch rates were low and stable over the last three surveys (range = 17.4-25.6/h; Figures 2 and 3). Bluegill was the most abundant sunfish species but catch rate in 2021 was low (47.5/h) and similar to 2017 (42.6/h; Figure 5).

Catfishes: Historically, Blue Catfish were relatively abundant and catch rates exceeded those for Channel Catfish. However, gill net catch rates declined considerably in 2022 (2.6/nn) when compared to 2014 (9.3/nn) and 2018 (12.7/nn) (Figure 6). Sampling objectives for relative abundance and size structure (Table 5) were not achieved. The extensive drawdown in 2019 reduced the entire reservoir to the main river channel and could have reduced recruitment. In addition, Blue Catfish are primarily a large river species (Etnier and Starnes 1993), prefer deep channels with current (Jenkins and Burkhead 1994),

and are more migratory than other catfishes (Pflieger 1975). During the drawdown, a significant portion of the population could have migrated out of the reservoir during the two weeks of relatively high flows through the flood gates. However, water levels were stable throughout 2020 and 2021 which should have resulted in higher recruitment and an increase in population abundance. Nonetheless, current abundance of adult Blue Catfish is adequate for increased reproduction and recruitment when conditions become favorable.

The 2019 drawdown seemed to have no negative effects on the Channel Catfish population. In 2022, Channel Catfish catch rates were considerably higher (15.4/nn) than those from 2014 and 2018 (3.1 and 4.8/nn, respectively; Figure 7). The increase in population abundance could be due to reduced interspecific competition with the declining Blue Catfish population. Relative weights exceeded 80 for most inch groups for all three survey years.

Temperate basses: During the last three survey years, catch rates of White Bass ranged from 0.0–1.9/nn and reflected a low-density population in the reservoir (Figure 8). Yellow bass were present (Appendix A).

Black basses: Historically, Spotted Bass were present but in low abundance. In 2021, catch rates increased to 32.3/h and were considerably higher than 2013 (6.7/h) and 2017 (1.2/h) (Figures 9 and 10). However, size structure was poor as most fish collected were < 6 inches in length.

Surprisingly, the 2019 drawdown had little effect on the Largemouth Bass population. In 2021, electrofishing catch rates were 71.5/h and similar to 2013 (64.0/h) and 2017 (54.6/h) (Figures 11 and 12). Size structure was also similar across sampling years (PSD range: 35–50). Relative weights were desirable and improved in 2021, exceeding 90 for most inch groups. Growth of Largemouth Bass was adequate; average age at 14 inches (13.0 to 14.9 inches) was 3.2 years (N = 13; range = 2-5 years).

Crappies: White Crappie has historically been the most abundant species. In 2021, White Crappie catch (2.3/nn) decreased when compared to 2013 (18.4/nn) and 2017 (6.6/nn) (Figure 13). No Black Crappie were collected in 2021 (Figure 14).

Fisheries Management Plan for B. A. Steinhagen Reservoir, Texas

Prepared – July 2022

ISSUE 1: Historically, the primary management issue at B. A. Steinhagen Reservoir has been excessive coverage of invasive aquatic vegetation, primarily common salvinia, giant salvinia, and water hyacinth. Although numerous water level drawdowns were conducted from 2006 to 2013 to reduce problematic coverage, effects were short-term as coverage quickly returned. Since 2008, herbicide treatments have been successful at controlling problematic vegetation (i.e., coverage < 20% of the reservoir surface area).

MANAGEMENT STRATEGIES

1. Conduct annual vegetation surveys to monitor coverage of problematic plants.
2. Maintain educational signage at access points around the reservoir to minimize transport of problematic plants to other waters.
3. In cooperation with Aquatic Habitat Enhancement (AHE) staff, support annual aquatic herbicide treatments managed by the USACE to maintain public access and control large areas of problematic plant infestations.
4. Support salvinia weevil releases by USACE in areas that are not easily accessible for herbicide treatments.

Objective-Based Sampling Plan and Schedule (2022–2026)

Sport fish, forage fish, and other important fishes

Sport fishes in B. A. Steinhagen Reservoir include Largemouth Bass, Spotted Bass, crappies, Blue Catfish, Channel Catfish, Flathead Catfish, and White Bass. Important forage species include Bluegill, Threadfin Shad, and Gizzard Shad.

Low-density fisheries

Historically, White Bass population abundance has been low. Anecdotal information indicates few anglers target White Bass. Although no future directed sampling is planned, White Bass catch will be recorded from gill net surveys directed at catfishes (see below).

Survey objectives, fisheries metrics, and sampling objectives

Largemouth Bass: Historically, Largemouth Bass have been managed with the statewide 14-inch minimum length limit. From 2002 to 2013, trend data on CPUE, size structure, and body condition was collected every four years with nighttime fall electrofishing. Since 2017, fall electrofishing has been conducted during the day due to the shallow and turbid nature of the reservoir. Population abundance is relatively low but stable and size structure has been consistent. Daytime fall electrofishing (2025, and every four years thereafter) will allow for determination of any large-scale changes in the Largemouth Bass population. The anticipated effort to meet sampling objectives (N = 50 stock-size fish; RSE-S \leq 25) is approximately 20 5-min stations with 80% confidence. An additional 5-10 sites will be sampled if objectives are not attained.

Average age of Largemouth Bass between 13.0 and 14.9 inches (Category 2; N = 13) will be estimated in 2025, and every four years thereafter.

Catfishes: Anecdotal information indicates that the passive gear fishery is popular. Catfish populations have always been managed with statewide regulations. Since 2003, gill netting has been conducted every four years. Surveys through 2018 indicated relatively stable Channel and Blue Catfish recruitment and abundance, and Blue Catfish were the most abundant species. However, 2022 data reflected a shift in population abundance, as Channel Catfish catch increased and exceeded that of Blue Catfish. Continuation of gill netting every four years should provide adequate insight relative to population-level trends in abundance of both species. A minimum of 10 randomly selected gill netting sites will be sampled in 2026, but sampling will continue at random sites (5-10 additional sites) until 50 stock-size Blue Catfish and Channel Catfish are collected and the RSE of CPUE-S is \leq 25 (the anticipated effort to meet both sampling objectives is 10-15 stations with 80% confidence).

Crappies: Since 1995, trap netting has been conducted every four years, and catch rates have averaged 10-15/nn. Continuation of this sampling frequency should provide adequate population-level insight relative to large-scale changes that would dictate further investigation. A minimum of 10 randomly selected trap netting sites will be sampled in 2025, but sampling will continue at random sites (5-10 additional sites) until 50 stock-size crappie are collected and the RSE of CPUE-S is \leq 25 (the anticipated effort to meet both sampling objectives is 10-15 stations with 80% confidence).

Prey species: Threadfin Shad, Bluegill, and Gizzard Shad are the primary forage species at B. A. Steinhagen Reservoir. Fall electrofishing every four years (per Largemouth Bass sampling) will likely result in sufficient numbers of Bluegill to achieve the sampling objective (N = 50 fish). Largemouth Bass body condition (fish \geq 8" TL) will be used to provide additional information on forage abundance and vulnerability.

Habitat: Historically, excess aquatic vegetation has been a significant issue at B. A. Steinhagen, preventing access to as much as 50% of the reservoir. Problematic plants have included salvinia and

water hyacinth. Aquatic vegetation will be monitored annually to document trends in abundance and recommend appropriate management strategies.

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Tables and Figures

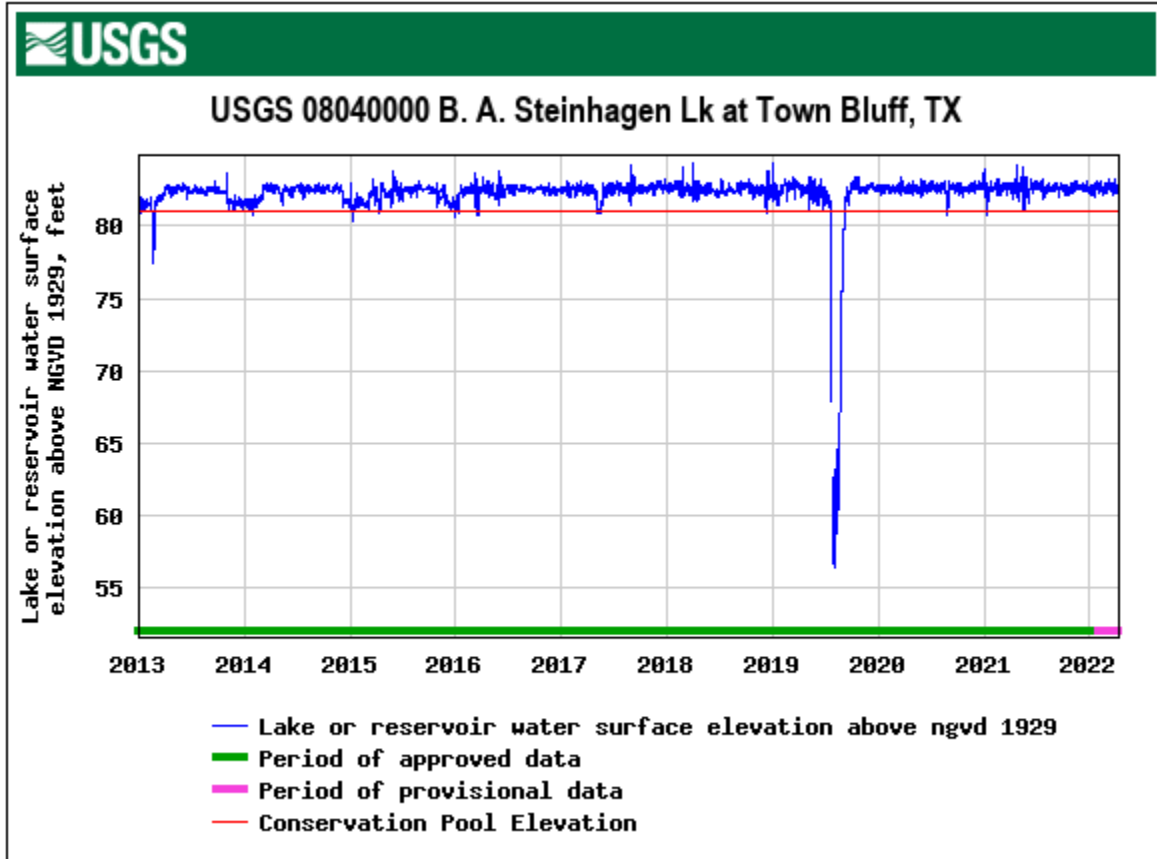


Figure 1. U. S. Geological Survey daily water level elevations in feet above mean sea level (MSL) recorded for B. A. Steinhagen Reservoir, Texas.

Table 1. Characteristics of B. A. Steinhagen Reservoir, Texas.

Characteristic	Description
Year constructed	1951
Controlling authority	U.S. Army Corps of Engineers
Counties	Jasper and Tyler
Reservoir type	Mainstem
Shoreline Development Index	5.0
Conductivity	180 $\mu\text{S/cm}$

Table 2. Boat ramp characteristics for B. A. Steinhagen Reservoir, Texas, April 2022. Reservoir elevation at time of survey was 82.4 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Camper's Cove	30.82559 -94.20559	Y	5	76	No access issues
Cherokee Park	30.85176 -94.21009	Y	20	79	No access issues
Borrow Pit	30.85449 -94.21381	Y	20	78	No access issues
Magnolia Ridge #1	30.87061 -94.23401	Y	5	78	No access issues
Magnolia Ridge #2	30.87973 -94.23164	Y	15	76	No access issues
Magnolia Ridge #3	30.89275 -94.23797	Y	10	78	No access issues
Walnut Ridge	30.86287 -94.18279	Y	30	77	No access issues
Beech Grove	30.85266 -94.17317	Y	20	78	No access issues
Hen House Ridge	30.84305 -94.17474	Y	20	78	No access issues
Sandy Creek Park #1	30.83127 -94.15888	Y	0	77	No access issues
Sandy Creek Park #2	30.82771 -94.16121	Y	7	76	No access issues
Sandy Creek Park #3	30.81839 -94.17083	Y	15	76	No access issues

Table 3. Harvest regulations for B. A. Steinhagen Reservoir, Texas.

Species	Bag limit	Length limit
Gar, Alligator	1 ^a	None
Catfish: Channel and Blue Catfish, their hybrids and subspecies	25 ^b	None
Catfish, Flathead	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass, Largemouth	5 ^c	14-inch minimum
Bass, Spotted	5 ^c	None
Crappie: White and Black Crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

^a Mandatory harvest reporting required for all harvested Alligator Gar (reporting available through the My Texas Hunt Harvest app or at <https://apps.tpwd.state.tx.us/huntharvest/home.faces>).

^b Daily bag for Channel and Blue Catfish = 25 fish in any combination, but only 10 can be \geq 20 inches.

^c Daily bag for Largemouth Bass and Spotted Bass = 5 fish in any combination.

Table 4. Stocking history of B. A. Steinhagen Reservoir, Texas. Size categories are FRY = <1 inch; FGL = 1-3 inches; AFGL = 8 inches; ADL = adult; UNK = unknown.

Species	Year	Number	Size
Blue Catfish	2007	70,159	FGL
Channel Catfish	1973	8,000	AFGL
	2007	210,557	FGL
	Total	218,557	
Florida Largemouth Bass	1990	339,035	FRY
	2000	408,432	FGL
	Total	747,467	
Largemouth Bass	1973	16,670	UNK
Mixed Largemouth Bass	1990	271	UNK
Paddlefish	1989	982	AFGL
	1989	31,004	FRY
	1990	84,351	FRY
	1990	20	ADL
	1992	6,113	AFGL
	1992	4,714	FRY
	Total	127,184	
Walleye	1976	2,750,000	FRY

Table 5. Objective-based sampling plan components for B. A. Steinhagen Reservoir, Texas 2021–2022.

Gear/target species	Survey objective	Metrics	Sampling objective
<i>Electrofishing</i>			
Largemouth Bass	Abundance	CPUE–Stock	RSE-Stock \leq 25
	Size structure	PSD, length frequency	N \geq 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	Abundance	CPUE–Total	
	Size structure	PSD, length frequency	N \geq 50
Gizzard Shad	Abundance	CPUE–Total	
	Prey availability	IOV	
<i>Trap netting</i>			
Crappie	Abundance	CPUE-Total	RSE \leq 25
	Size structure	PSD, length frequency	N \geq 50
<i>Gill netting</i>			
Blue Catfish	Abundance	CPUE–stock	RSE-Stock \leq 25
	Size structure	PSD, length frequency	N \geq 50 stock

Table 6. Survey of aquatic vegetation, B. A. Steinhagen Reservoir, Texas, 2017–2021. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Species	2017	2018	2019	2020	2021
American lotus	65 (1)	674 (6)		18 (< 1)	23 (< 1)
Cattail	51 (1)	47 (< 1)			7 (< 1)
Common rush				Trace	
Elephant ear				1 (< 1)	1 (< 1)
Giant cutgrass				Trace	
Pondweed <i>spp.</i>	724 (7)	731 (7)			15 (< 1)
Water primrose	822 (8)	1,281 (12)	237 (2)	10 (< 1)	30 (< 1)
Hydrilla (Tier II)*	2,312 (22)	2,436 (23)			85 (1)
Torpedograss (Tier III)*				5 (< 1)	3 (< 1)
Salvinia (both common and giant) (Tier II)*	995 (9)	1,238 (12)	727 (7)	362 (4)	249 (2)
Water hyacinth (Tier II)*	619 (6)	550 (5)	803 (8)	833 (8)	225 (2)

* Response tiers for potentially invasive non-native species. Tier II is Maintenance, Tier III is Watch Status.

Gizzard Shad

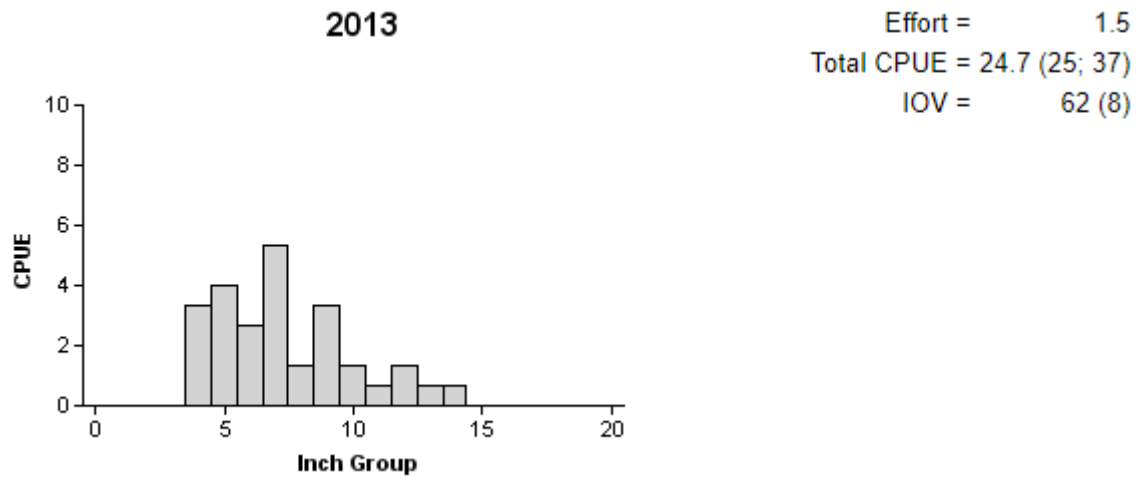


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for the 2013 fall electrofishing survey, B. A. Steinhagen Reservoir, Texas. This survey was conducted at night.

Gizzard Shad

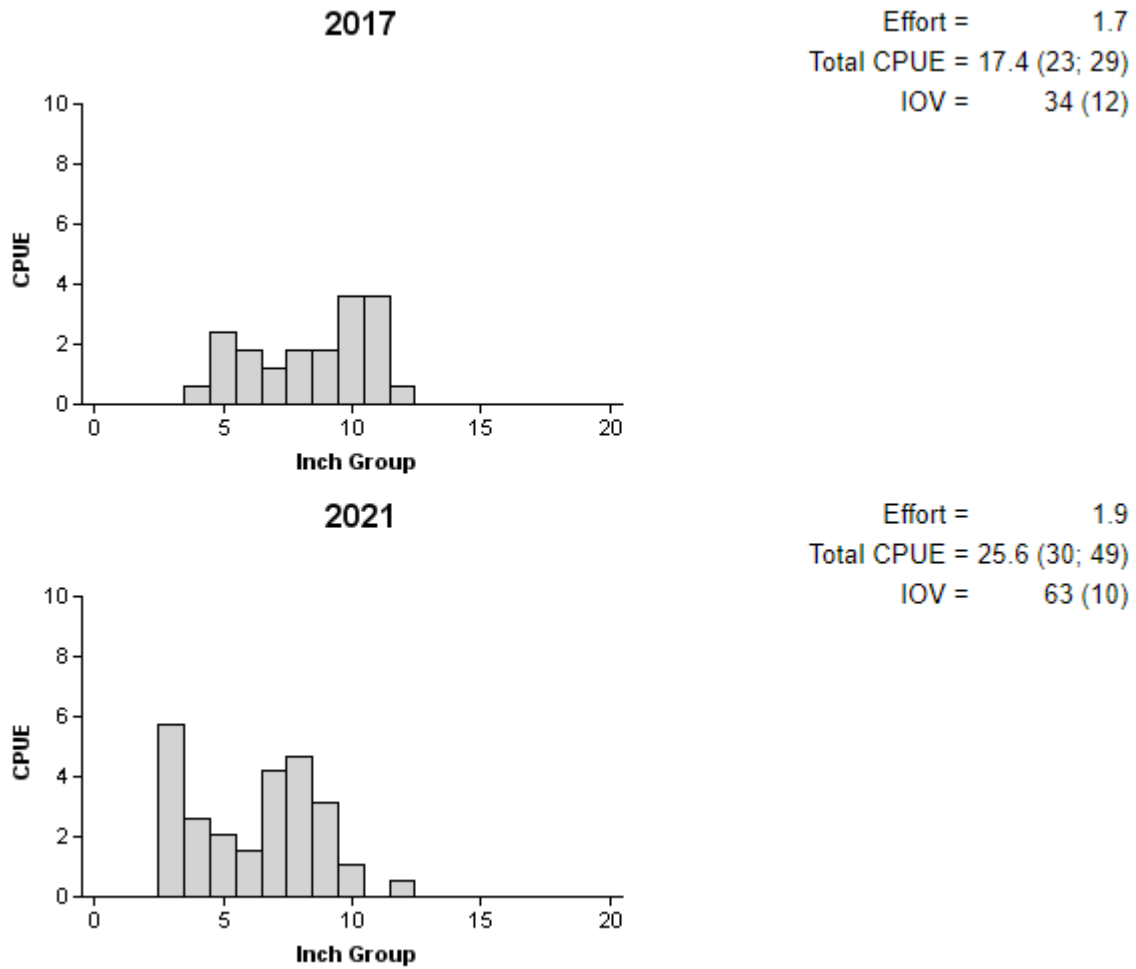


Figure 3. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, B. A. Steinhagen Reservoir, Texas, 2017 and 2021. These surveys were conducted during the day.

Bluegill

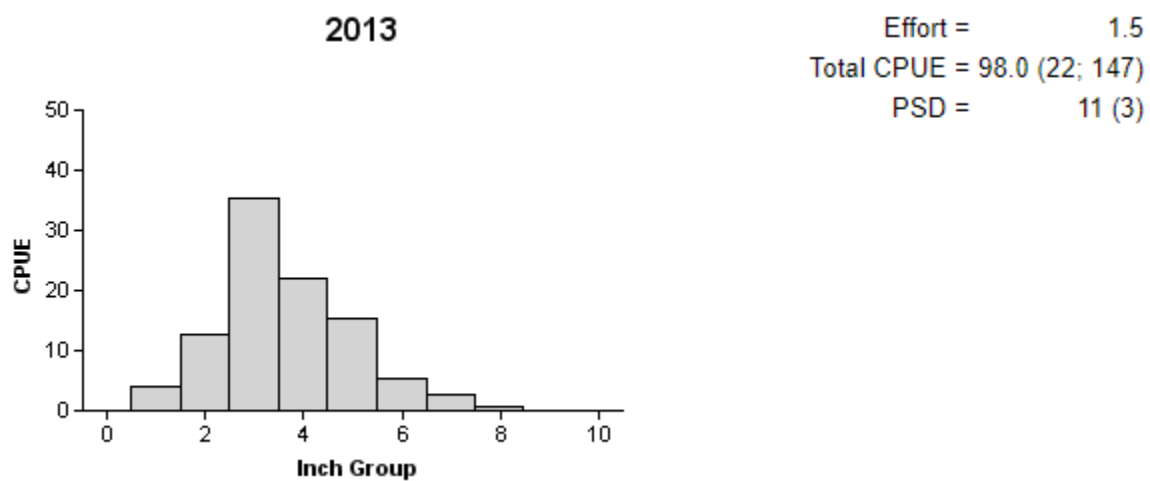
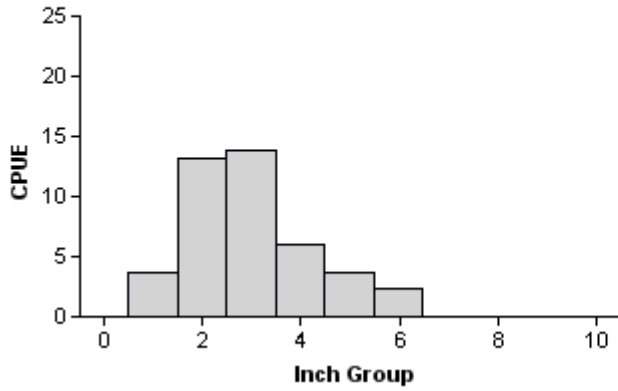


Figure 4. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for the 2013 fall electrofishing survey, B. A. Steinhagen Reservoir, Texas. This survey was conducted at night.

Bluegill

2017

Effort = 1.7
 Total CPUE = 42.6 (19; 71)
 PSD = 9 (4)



2021

Effort = 1.9
 Total CPUE = 47.5 (19; 91)
 PSD = 0 (0)

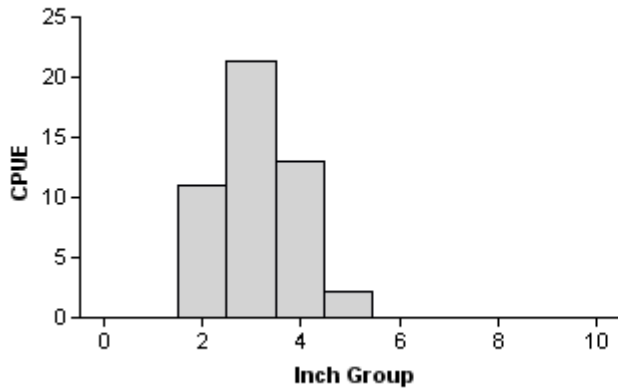


Figure 5. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, B. A. Steinhagen Reservoir, Texas, 2017 and 2021. These surveys were conducted during the day.

Blue Catfish

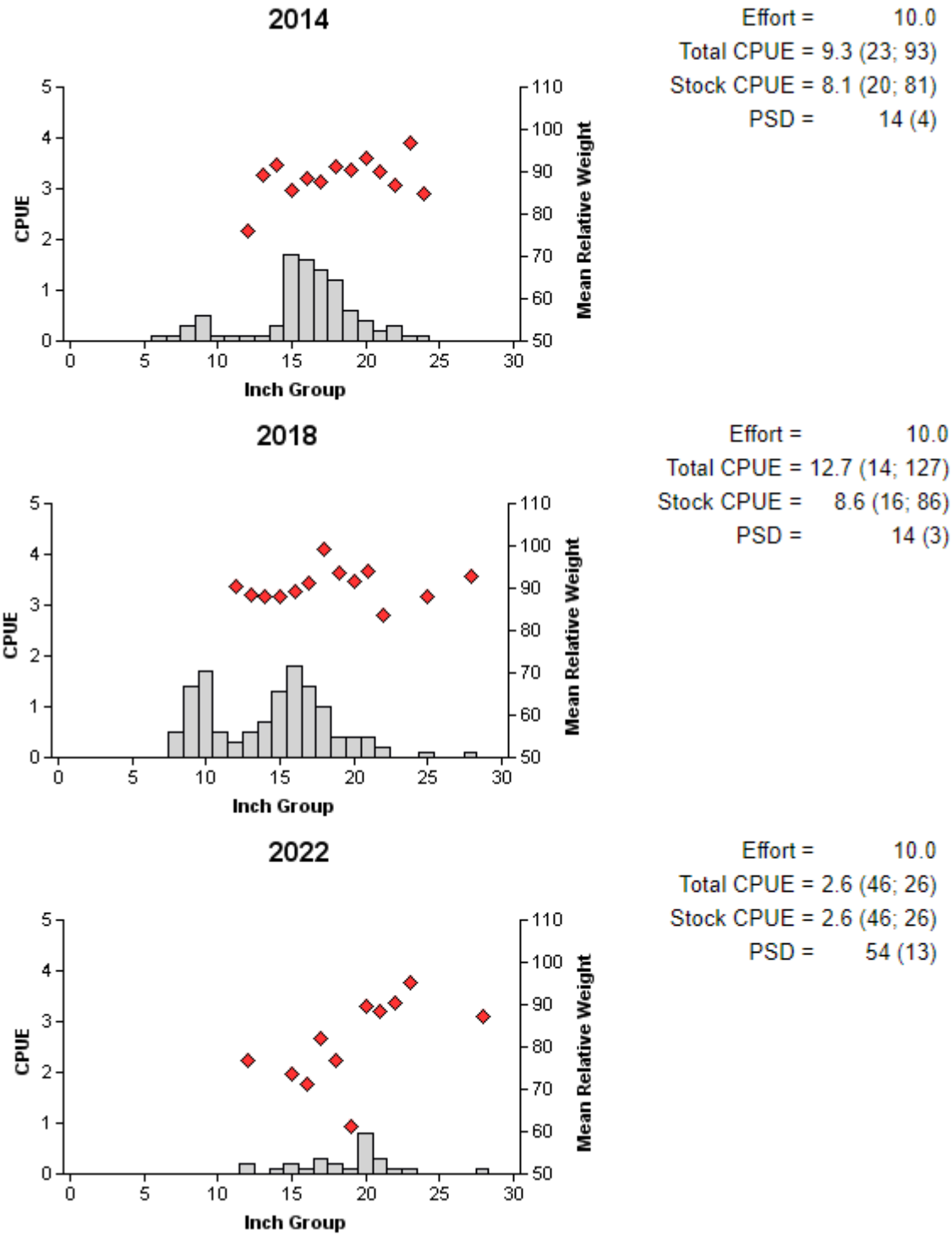


Figure 6. Number of Blue Catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for winter gill net surveys, B. A. Steinhagen Reservoir, Texas, 2014, 2018, and 2022.

Channel Catfish

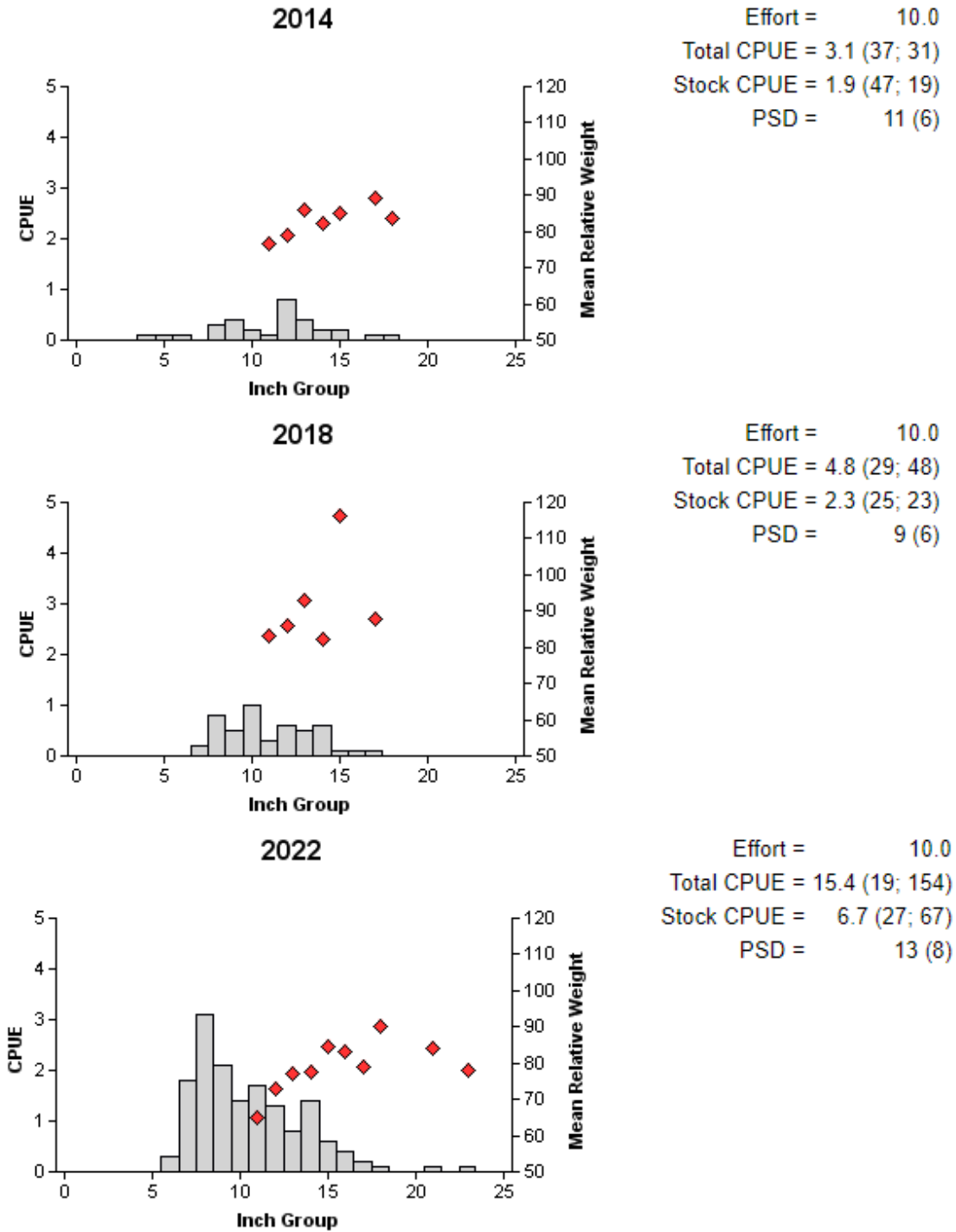


Figure 7. Number of Channel Catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for winter gill net surveys, B. A. Steinhagen Reservoir, Texas, 2014, 2018, and 2022.

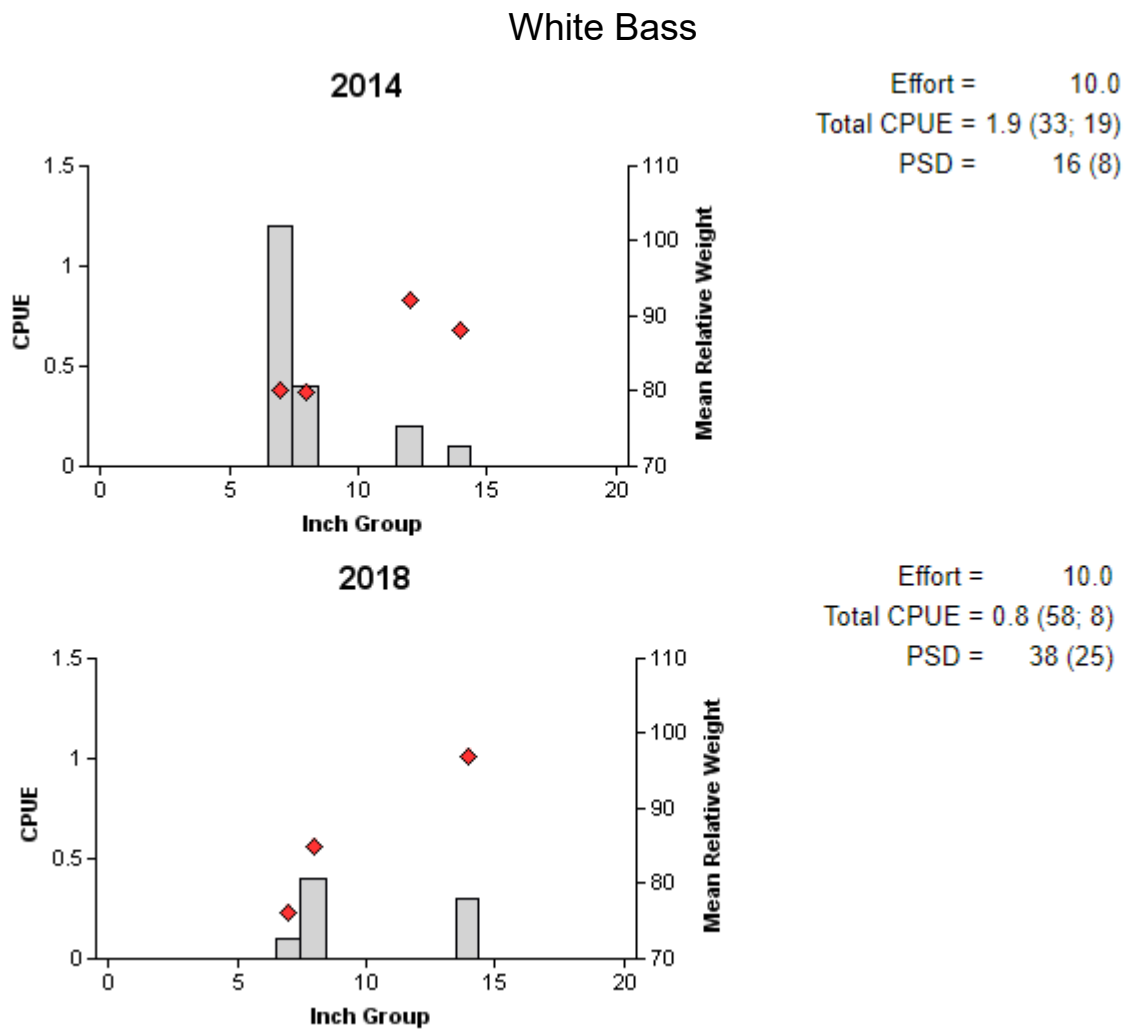


Figure 8. Number of White Bass caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for winter gill net surveys, B. A. Steinhagen Reservoir, Texas, 2014 and 2018. No White Bass were collected in 2022.

Spotted Bass

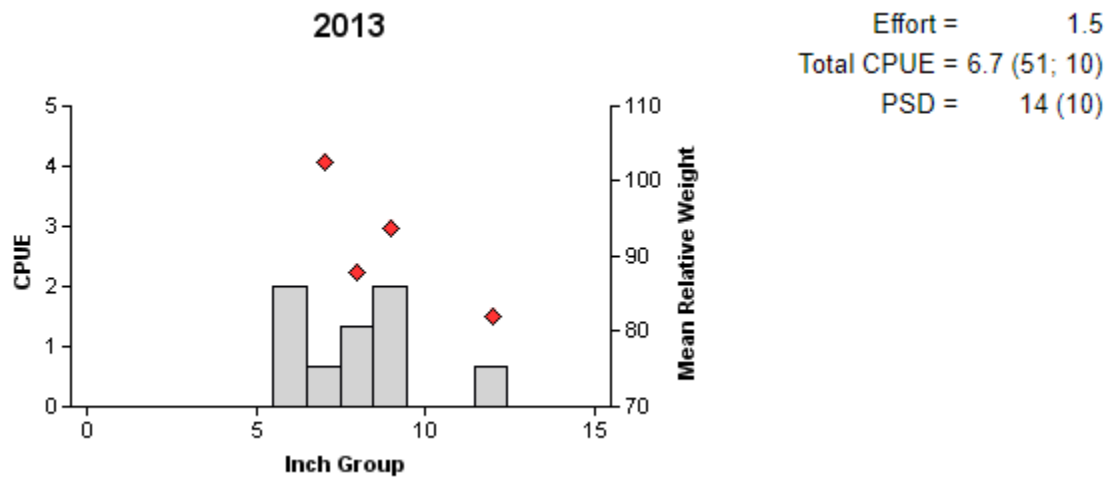


Figure 9. Number of Spotted Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for the 2013 fall electrofishing survey, B. A. Steinhagen Reservoir, Texas. This survey was conducted at night.

Spotted Bass

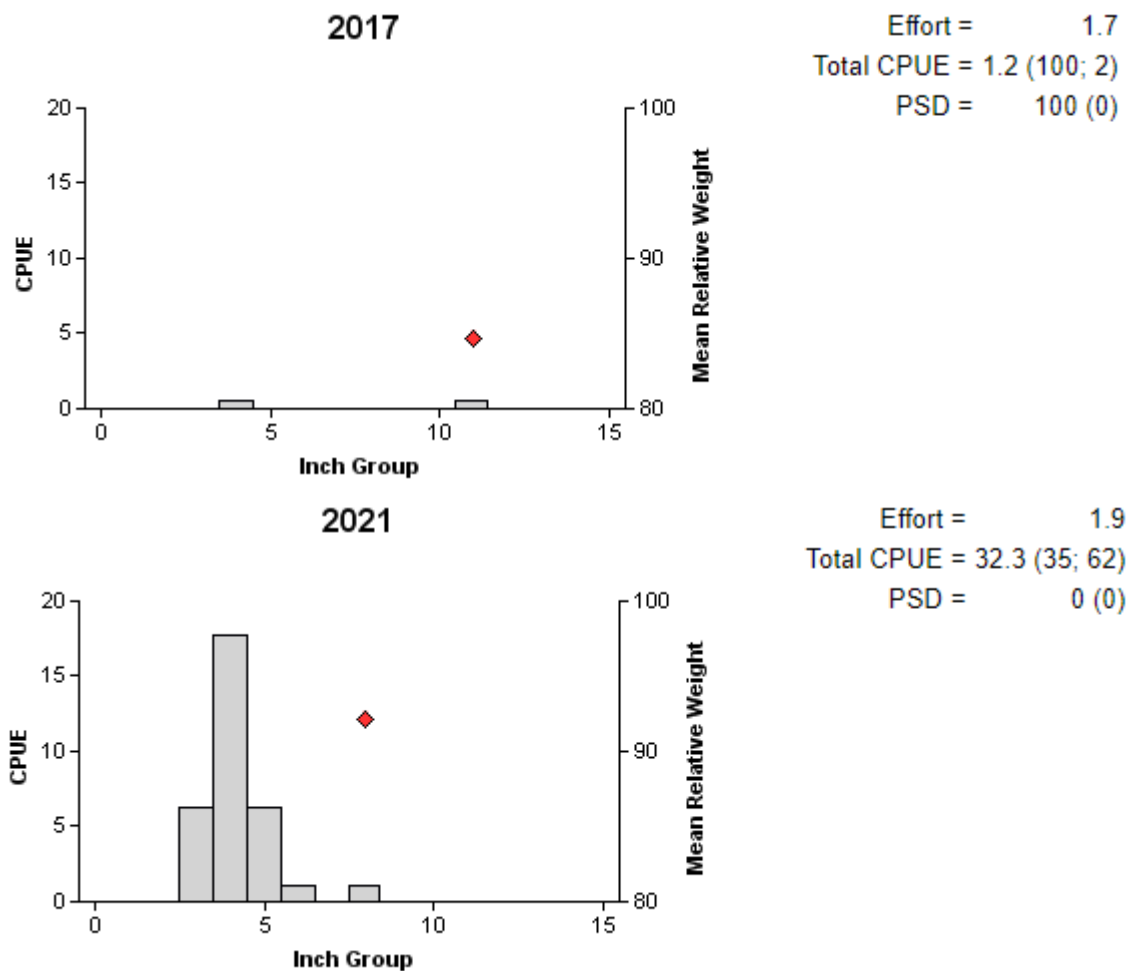


Figure 10. Number of Spotted Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, B. A. Steinhagen Reservoir, Texas, 2017 and 2021. These surveys were conducted during the day.

Largemouth Bass

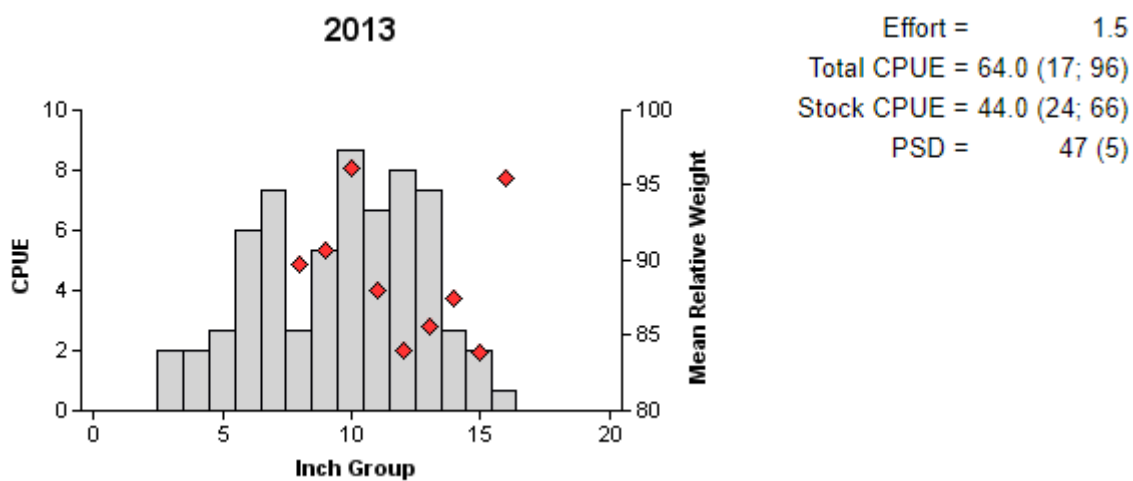


Figure 11. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for the 2013 fall electrofishing survey, B. A. Steinhagen Reservoir, Texas. This survey was conducted at night.

Largemouth Bass

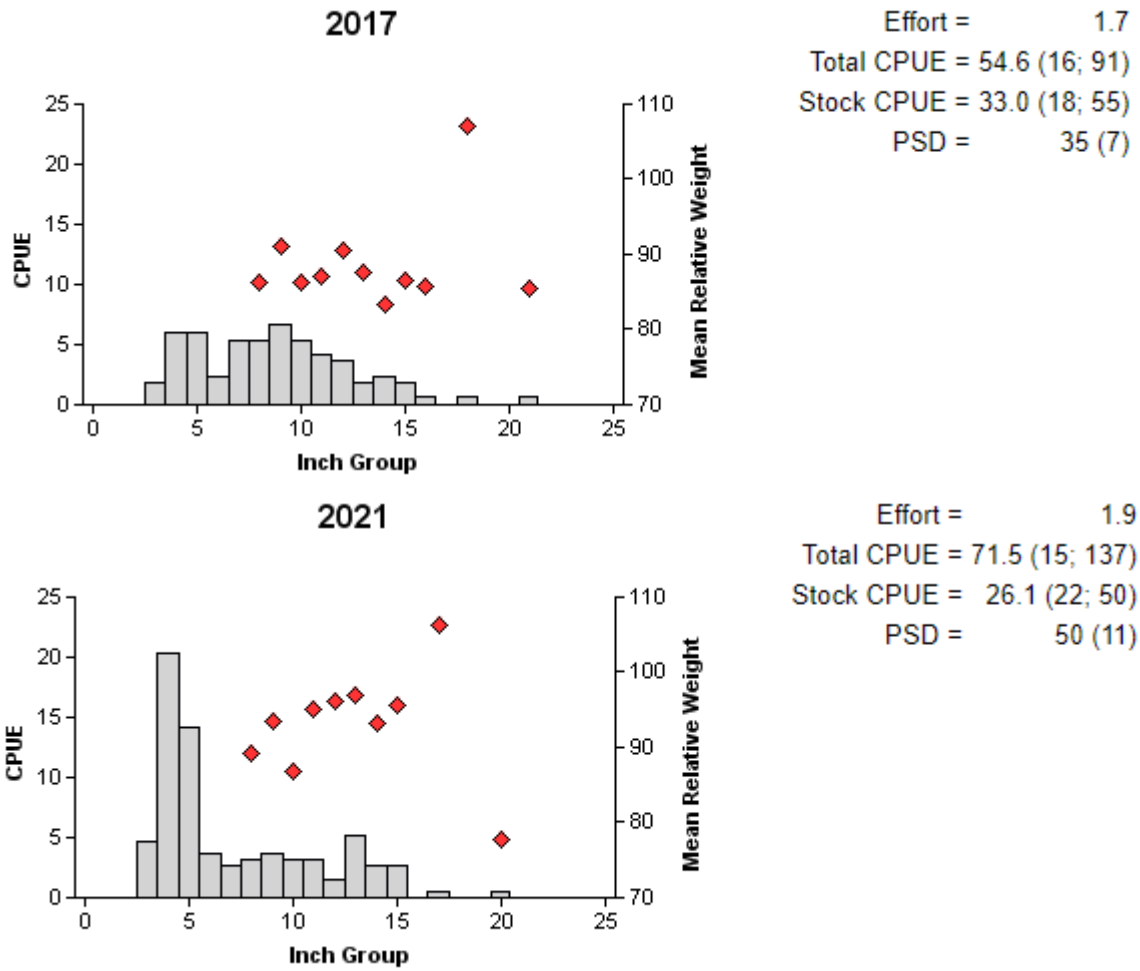


Figure 12. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, B. A. Steinhagen Reservoir, Texas, 2017 and 2021. These surveys were conducted during the day.

White Crappie

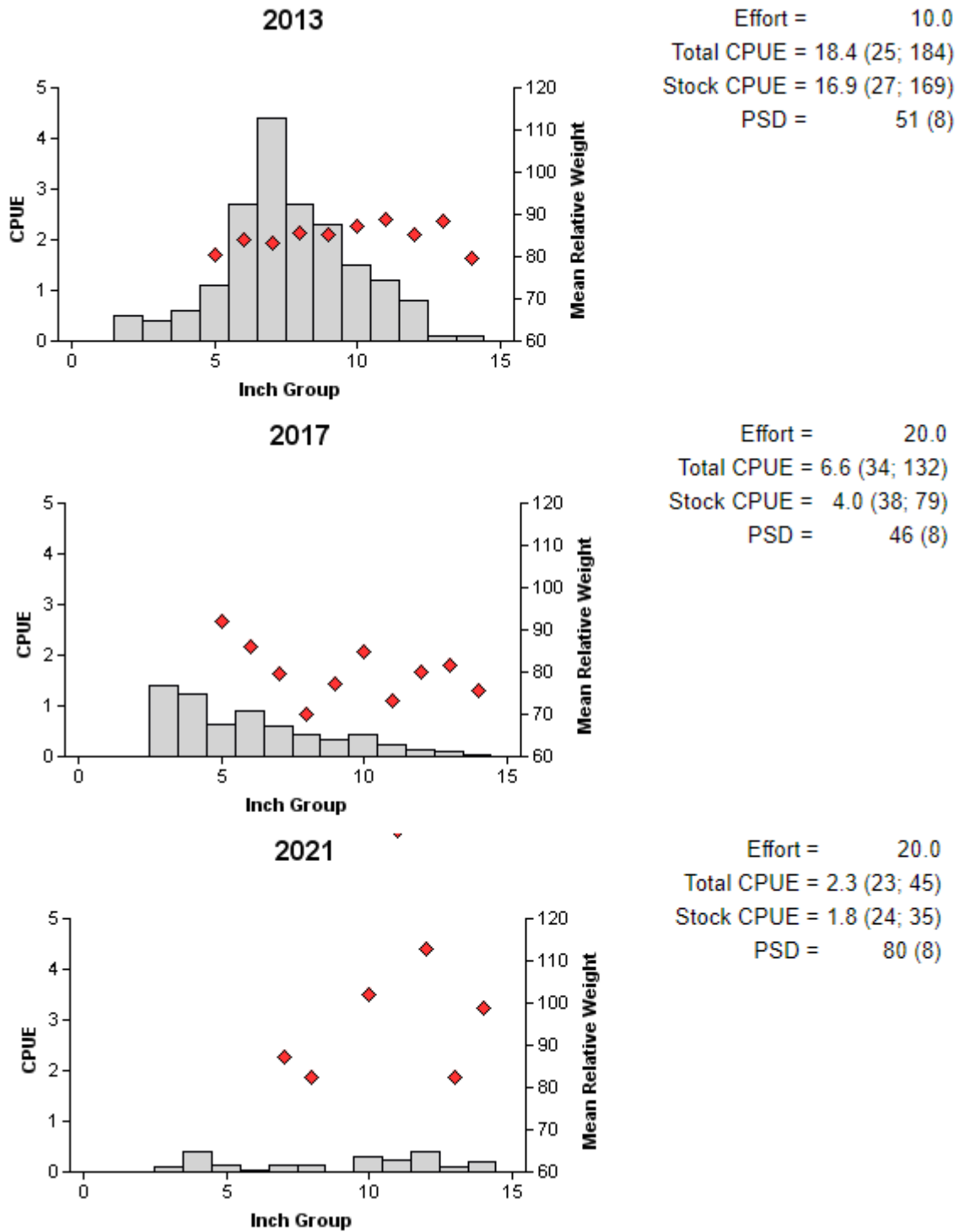


Figure 13. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, B. A. Steinhagen Reservoir, Texas, 2013, 2017, and 2021.

Black Crappie

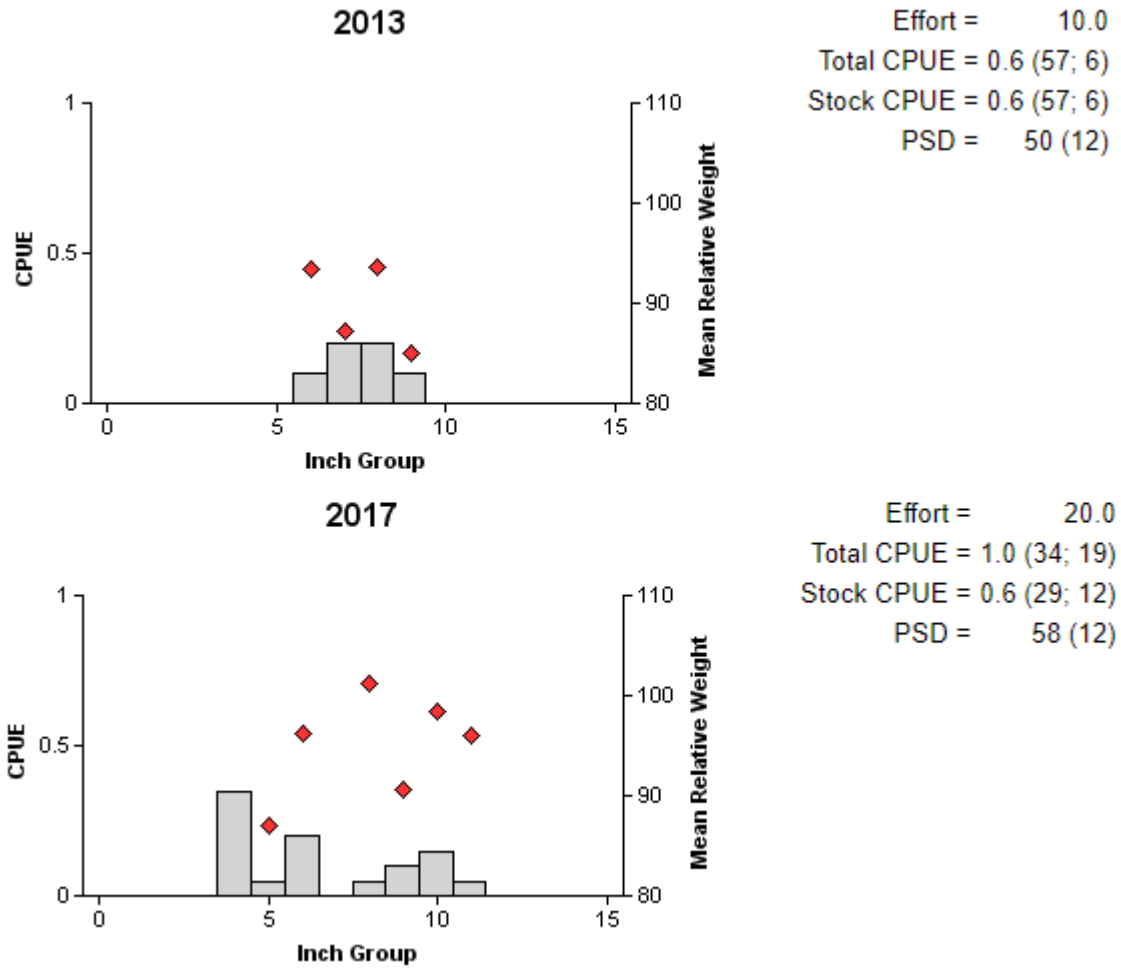


Figure 14. Number of Black Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, B. A. Steinhagen Reservoir, Texas, 2013 and 2017. No Black Crappie were collected in 2021.

Proposed Sampling Schedule

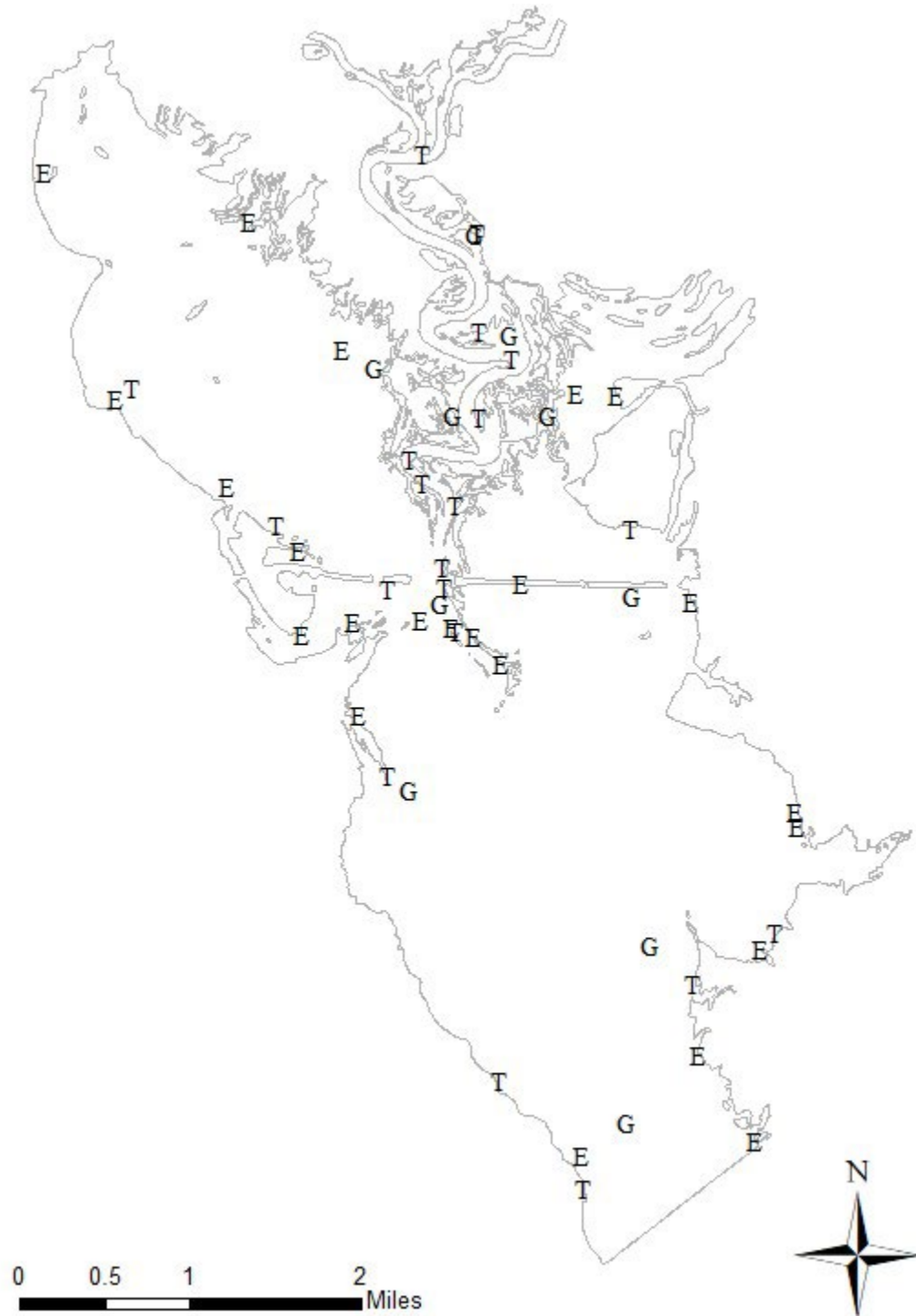
Table 7. Proposed sampling schedule for B. A. Steinhagen Reservoir, Texas. Survey period is June through May. Electrofishing and trap netting surveys are conducted in the fall, while gill netting surveys are conducted in the winter.

	Survey year			
	2022-2023	2023-2024	2024-2025	2025-2026
Angler Access				X
Vegetation	X	X	X	X
Electrofishing – Fall				X
Trap netting				X
Gill netting				X
Report				X

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

Number (N) and catch rate (CPUE) (RSE in parentheses) of all target species collected from all gear types from B. A. Steinhagen Reservoir, Texas, 2021-2022. Sampling effort was 10 net nights for gill netting, 20 net nights for trap netting, and 1.9 hours for electrofishing.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad					49	25.6 (30)
Threadfin Shad					4,685	2,444.4 (38)
Common Carp	12	1.2 (55)				
Blue Catfish	26	2.6 (46)				
Channel Catfish	154	15.4 (19)				
Yellow Bass	1	0.1 (100)				
Warmouth					3	1.6 (55)
Bluegill					91	47.5 (19)
Longear Sunfish					5	2.6 (40)
Redear Sunfish					31	16.2 (17)
Redspotted Sunfish					2	1.1 (69)
Spotted Bass					62	32.4 (35)
Largemouth Bass					137	71.5 (15)
White Crappie			45	2.3 (23)		
Freshwater Drum	22	2.2 (63)				

APPENDIX B – Map of sampling locations

Location of sampling sites, B. A. Steinhagen Reservoir, Texas, 2021-2022. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively. Water level was near full pool at time of sampling.



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