Amon G. Carter Reservoir

2020 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 Amon G. Carter Reservoir were surveyed in 2020 using electrofishing and trap netting and in 2021 using gill netting and bass-only electrofishing. Historical data are presented with the 2020-2021 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:** Amon G. Carter Reservoir is a 1,848-acre impoundment on Big Sandy Creek in Montague County. Water level was below conservation elevation from 2011 to 2015 but has been near conservation level since 2015. Habitat features consisted of rocky shoreline, standing timber, and native submersed aquatic vegetation.

- **Management History**: Important sport fish include Channel Catfish, White Bass, Largemouth Bass, and White Crappie. The reservoir has always been managed with statewide harvest regulations. Over 680,000 Florida Largemouth Bass have been stocked since 1982 to enhance the trophy potential of the bass population.

Fish Community

- **Prey species:** Electrofishing catch of Threadfin Shad and Gizzard Shad declined since the previous survey, and fewer Gizzard Shad were available as prey to most sport fish. Electrofishing catch of Bluegill was still above average for the reservoir, with a variety of sizes available to predators.
- **Catfishes:** Gill netting results for Channel Catfish was a catch of record, with most of the population over the legal length. Flathead Catfish were present in the reservoir.
- **White Bass:** White Bass abundance has declined since 2013, with the gill net catch rate below the historical average.
- **Largemouth Bass:** Electrofishing catch of stock-length Largemouth Bass has increased since the previous survey; however, few legal length fish were available to anglers. A spring bass-only electrofishing survey showed a higher proportion of legal length bass.
- **White Crappie:** Trap netting resulted in a catch of record for White Crappie. Most crappie were between 7 and 9 inches but should be legal length by fall 2021.

Management Strategies: Amon G. Carter Reservoir should continue to be managed with existing harvest regulations. Florida Largemouth Bass stockings should continue. Inform the public about the negative impacts of aquatic invasive species. Conduct general monitoring surveys with trap nets, gill nets, electrofishing, and bass-only electrofishing surveys in 2024-2025. Access and vegetation surveys will be conducted in 2024.

Introduction

This document is a summary of fisheries data collected from Amon G. Carter Reservoir from 2020-2021. 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 2020-2021 data for comparison.

Reservoir Description

Amon G. Carter Reservoir is a 1,848-acre impoundment on Big Sandy Creek in Montague County. It was constructed in 1956 by the City of Bowie for municipal and industrial uses. In 1985, a 500-acre extension was added by constructing a new dam downstream of the original dam. The two sides are connected by a tunnel accessible to boats. The reservoir drains approximately 111 square miles and has a shoreline of 22.5 miles. Water level was below conservation elevation (920 ft-msl) for several years until May 2015 (Figure 1). Since 2015, the reservoir has remained near conservation elevation. With a TSI chl–*a* of 53.94, Amon G. Carter Reservoir was eutrophic (Texas Commission on Environmental Quality 2019), signifying the reservoir is relatively rich in nutrients with high biological productivity. The average depth is 13 feet with a maximum depth of 50 feet. Habitat features consisted mainly of rip-rap, rocky shoreline, boulders, native submersed aquatic vegetation, dead standing timber, and boat docks. Other descriptive characteristics for Amon G. Carter Reservoir are in Table 1.

Angler Access

Boating access consisted of two public boat ramps with adequate parking and boarding piers (Table 2). Selma Park, owned by the City of Bowie, provides angler access to a mile of shoreline, as well as two fishing piers and there is public bank access adjacent to the FM 1125 boat ramp.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Clouse and Bennett 2017) included:

1. Stock Florida Largemouth Bass fingerlings in 2018 and 2019 and follow up with DNA analysis in 2020.

   Action: Florida Largemouth Bass fingerlings were stocked in 2018 (162,703) and 2019 (36,930). A genetics sample was derived from the fall 2020 electrofishing survey.

2. Inform the public about the threats of aquatic invasive species and how to prevent their spread.

   Action: Signage has been maintained at boat ramps and invasive species have been discussed on social media and outreach events.

Harvest regulation history: Sport fishes in Amon G. Carter Reservoir have always been managed with statewide regulations (Table 3).

Exploitation study: The Largemouth Bass population at Amon G. Carter Reservoir was the subject of an intensive exploitation study in 2007 (Hysmith et al. 2014). Results of that study showed that tournament mortality contributed to a greater proportion of Largemouth Bass mortality than at previously studied systems due to the high frequency of tournaments on Amon G. Carter and small reservoir size (Hysmith et al. 2014).

Stocking history: Amon G. Carter Reservoir was stocked with ShareLunker Largemouth Bass in 2013. Florida Largemouth Bass fingerlings were stocked in 2018 and 2019. The complete stocking history is in Table 4.

Vegetation/habitat management history: Hydrilla has been found in small isolated patches of the reservoir since 1995 but has not spread beyond trace amounts.

Water transfer: No inter-basin transfers exist at this time.

Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Amon G. Carter Reservoir (Clouse and Bennett 2017). Primary components of the OBS plan are listed in Table 5. All standard survey sites were randomly selected, and all standard surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2017).

Electrofishing – Largemouth Bass, sunfishes, Gizzard Shad, and Threadfin Shad were collected by electrofishing (1 hour at 12, 5-min stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing. Ages for Largemouth Bass were determined using otoliths from 11 randomly selected fish (range 13.0 to 14.9 inches).

Bass-only electrofishing – Largemouth Bass were collected by electrofishing (1 hour at 12, 5-min stations) during daylight in spring. Sites were biologist-selected to target spring habitats likely to hold Largemouth Bass. Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing.

Trap netting – Crappie were collected using trap nets (5 net nights at 5 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 – Channel Catfish and White Bass were collected by gill netting (5 net nights at 5 stations). CPUE for gill netting was recorded as the number of fish caught per net night (fish/nn). Ages for Channel Catfish were determined using otoliths from 10 randomly selected fish (range 11.0 to 12.9 inches).

Genetics – Genetic analysis of Largemouth Bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2017). Micro-satellite DNA analysis was used to determine genetic composition of individual fish since 2005. Electrophoresis analysis was used prior to 2005.

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

Habitat – A structural habitat survey was conducted in 2012. A vegetation survey was conducted in 2020. 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 2021).

Results and Discussion

Habitat: Littoral zone habitat consisted primarily of rocky shoreline, standing timber, native aquatic vegetation, and boat docks (Moczygemba and Hysmith 2013). High reservoir levels have provided some cover in the form of buttonbush, water willow, and other emergent vegetation (Table 6). Submersed vegetation growth has declined since 2012, likely a result of periodic flooding since 2015.

Prey species: Electrofishing catch rates of Bluegill and Gizzard Shad were 621.0/h and 62.0/h, respectively. Index of Vulnerability (IOV) for Gizzard Shad was poor, indicating that only 13% of Gizzard Shad were available to existing predators. This was lower than the IOV estimate in 2016 but similar to 2012 (Figure 2). Total CPUE of Gizzard Shad was lower in 2020 compared to the 2016 survey (Figure 2). Total CPUE of Bluegill in 2020 was lower than 2016 (804.8/h) but was still above the historical average (Figure 3. Appendix B). Catch rates for Threadfin Shad have declined since 2012 and the CPUE of 450.0/h in 2021 was below the historical average of 673.2/h (Appendix B).

Channel Catfish: The gill net catch rate of Channel Catfish was 26.6/nn in 2021, which was a catch of record. This was a steep increase from 2017 (4.9/nn; Figure 4). Over 75% of Channel Catfish sampled were legal length or bigger, with many individuals between 20 and 29 inches in length. Recruitment was evident with the number of 7- to 9-inch catfish (Figure 4). Body condition was poor (relative weight under 90) for smaller fish but improved for larger size classes (Figure 4). Channel Catfish exhibited average growth in 2021; average age at 12 inches (11.0 to 12.9 inches) was 3.0 years (N = 10). Relatively stable water levels since 2015 may have contributed to the improvement in the Channel Catfish population. Originally, ten gill nets were to be set (5 on new side, 5 on old side). Wind conditions prevented setting on the new side and the high catch rate negated the need to set additional nets. This also impacted age and growth sample size.

White Bass: The gill net catch rate of White Bass was 5.6/nn in 2021. Catch rates for White Bass have declined since 2013 (Figure 5), but legal length individuals were available to anglers. Some recruitment was evident with 7- and 8-inch individuals collected (Figure 5). Body condition in 2020 was good with mean relative weights between 90 and 110 for all size classes (Figure 5).

Largemouth Bass: The electrofishing catch rate of stock-length Largemouth Bass was 50.0/h in 2020, higher than the 40.5/h in 2016. Size structure remained poor in 2020 as PSD was 34, similar to 2016 (Figure 6). Only 11% of Largemouth Bass sampled were legal length, and the largest bass sampled was 19 inches (Figure 6). Tournament mortality has been shown to decrease the abundance of Largemouth Bass between 14 to 18 inches in Amon G. Carter Reservoir (Hysmith et al. 2014). This could explain the reduction in abundance of larger Largemouth Bass. Growth of Largemouth Bass in Amon G. Carter Reservoir was good in 2020; average age at 14 inches (13.0 to 14.9 inches) was 2.8 years (N = 11; range = 2 – 4 years). We did not collect enough bass in the target length range to reach our desired sample size of 13 fish for age and growth analysis. Body condition in 2020 was good (relative weight over 90) for smaller size classes of fish yet was lower (<85 W_r) for bass over 17 inches in length (Figure 6). Florida Largemouth Bass influence has remained relatively constant since 2004 as Florida alleles have ranged from 57 to 48% (Table 7).

A bass-only electrofishing survey was conducted in spring 2021 to ascertain presence/absence of larger fish (>18 inches). The electrofishing catch rate for stock-length Largemouth Bass was 58.0/h. Size structure was very good as PSD was 81 and 52% of Largemouth Bass sampled were legal length (Figure 7). Several bass over 20 inches were collected, with the largest at 22 inches (Figure 7). While there may be a decline in legal length fish (due to angler harvest and tournament mortality) some larger fish remain. Since the modification of the ShareLunker program in 2018, six bass over eight pounds have been submitted including three Elite Class entries over ten pounds.

White Crappie: The trap net catch rate of White Crappie was 75.8/nn in 2020, which was a new catch of record. This rate was much higher than the previous surveys and the historical average (Figure 8; Appendix B). The PSD was 83 and was higher than the PSD in 2016 (Figure 8). Mean relative weight was over 90 for most size classes in 2020 (Figure 8). White Crappie average age at 10 inches (9.0 to

10.9 inches) was 2.4 years (N = 13; range = 1 – 5 years) in 2020. Most crappie collected were 7 to 9 inches in length and should reach legal length (10 inches) and be available to anglers by fall 2021.

Fisheries Management Plan for Amon G. Carter Reservoir, Texas

Prepared – July 2021

ISSUE 1: Largemouth Bass over 14 inches may be declining at Amon G. Carter Reservoir. An exploitation study on the reservoir in 2007 found that tournament mortality and angler harvest likely impact abundance of legal length bass. The reservoir is a popular tournament destination and has a history of producing trophy Largemouth Bass. Eight ShareLunkers have been documented for Amon G. Carter, including two Legacy Class ShareLunkers over 13 pounds.

MANAGEMENT STRATEGIES

1. Stock Florida Largemouth Bass fingerlings at the rate of 1,000 per shoreline kilometer (36,000) in 2022 to enhance trophy potential of Largemouth Bass.
2. Obtain tournament results from local bass clubs to get more data about larger bass in the reservoir.
3. Promote best practices for live release bass tournaments.
4. Promote angler-volunteered reporting of bass over 8 pounds through the ShareLunker program.
5. Conduct a spring, daytime bass-only electrofishing survey in 2025 for further trend analysis.

ISSUE 2: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches, and plugging engine cooling systems. Giant salvinia and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing, and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Cooperate with the City of Bowie to maintain appropriate 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 future inter-basin water transfers to facilitate potential invasive species responses.

Objective-Based Sampling Plan and Schedule (2021–2025)

Sport fish, forage fish, and other important fishes

Important sport fish in Amon G. Carter Reservoir include Channel Catfish, White Bass, Largemouth Bass, and Crappie. Important forage species include Bluegill, Gizzard Shad, and Threadfin Shad. A proposed sampling schedule is provided in Table 8.

Survey objectives, fisheries metrics, and sampling objectives

Channel Catfish: Channel Catfish are the third most sought-after species in Amon G. Carter Reservoir behind crappie and bass. General monitoring trend data to evaluate abundance, body condition, and size structure is desired to evaluate any large-scale changes in the population that would require further investigation. This data will be collected with gill nets in the spring once every four years. To collect 50 stock-size Channel Catfish with an RSE of CPUE-S ≤ 25, a minimum of 5 random gill nets will be set in spring 2025. If objectives are not met and it appears they can be met with reasonable effort, additional gill nets may be set.

White Bass: White Bass were first collected at Amon G. Carter Reservoir in 1995 and have fluctuated in abundance. General monitoring trend data is desired to estimate White Bass abundance, size structure, and body condition. White Bass will be collected in gill nets along with Channel Catfish, and no additional effort beyond that necessary to achieve objectives for Channel Catfish will be expended.

Largemouth Bass: Largemouth Bass are the most sought-after species in Amon G. Carter Reservoir. General monitoring for trend data will be collected with night electrofishing in the fall once every four years. These surveys will identify any large-scale changes in the Largemouth Bass population that may spur further investigation. A minimum of 12 randomly selected 5-min electrofishing sites will be sampled in fall 2024, but sampling will continue at random sites until 50 stock-size fish are collected and the RSE of CPUE-S is ≤ 25. For fall sampling the anticipated effort to meet an RSE of CPUE-S ≤ 25 is between 13 and 18 stations with 80% confidence. Six additional random stations will be pre-determined in the event some additional sampling is necessary. Thirteen Largemouth Bass between 13.0 and 14.9 inches will be collected to estimate age at the minimum length limit (14 inches). Relative weight of Largemouth Bass > 8” TL will be determined from their length/weight data (maximum of 10 fish weighed and measured per inch class). A daytime, spring, bass-only electrofishing survey will be conducted in 2025 at a minimum of 12 biologist-selected stations. Sampling will continue until 50 stock-size fish are collected and the RSE of CPUE-S is ≤ 25 for relative abundance and size structure data.

Crappie: Crappie are the second most sought-after sport fish at Amon G. Carter Reservoir. Both White Crappie and Black Crappie are present in Amon G. Carter Reservoir; however, White Crappie are in greater abundance. We will collect trend data to evaluate size structure, age and growth, and body condition of White Crappie with trap nets in fall 2024. Obtaining a high level of precision necessary to estimate relative abundance is unlikely. We estimate that the effort required to meet sampling objectives to collect at least 50 stock-size White Crappie to be between 4 and 8 net nights with 80% confidence. This level of sampling should provide a sufficient number of White Crappie between 9.0 and 10.9 inches to estimate mean age at legal length. A minimum of five random stations will be sampled, with additional stations possible if objectives can be met with reasonable effort. Data on Black Crappie will be collected along with White Crappie; however, no additional effort will be expended beyond that which is necessary to achieve sampling objectives for White Crappie.

Sunfish and Shad: Bluegill, Gizzard Shad, and Threadfin Shad are the primary forage at Amon G. Carter Reservoir. We intend to collect trend data on abundance and prey availability for forage species once every four years. No additional effort beyond that necessary to achieve our desired number of

Largemouth Bass will be expended to achieve an RSE ≤ 25 for CPUE of Bluegill and Gizzard Shad. Instead, predator body condition can provide information on forage abundance, vulnerability, or both relative to predator density.

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Tables and Figures

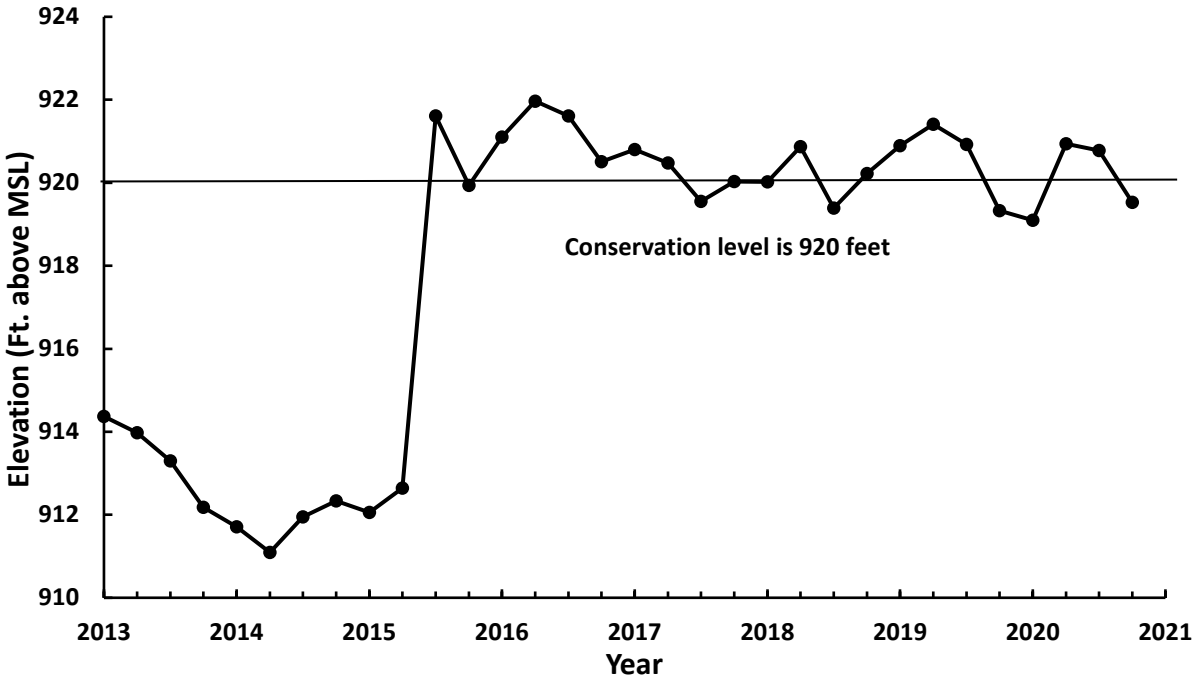


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Amon G. Carter Reservoir, Texas, 2013-2021.

Table 1. Characteristics of Amon G. Carter Reservoir, Texas.

Characteristic	Description
Year constructed	1956
Controlling authority	City of Bowie
County	Montague
Reservoir type	Tributary
Shoreline Development Index (SDI)	4.9
Conductivity	243 µS/cm

Table 2. Boat ramp characteristics for Amon G. Carter Reservoir, Texas, July 2020. Reservoir elevation at time of survey was 921.3 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Selma Park	33.4819 -97.8881	Y	20	910	Excellent. Extension feasible
FM 1125	33.4670 -97.8756	Y	40	910	Excellent. Extension not feasible

Table 3. Harvest regulations for Amon G. Carter Reservoir, Texas.

Species	Bag limit	Length limit
Catfish: Channel and Blue Catfish, their hybrids and subspecies	25 (in any combination)	12-inch minimum
Catfish, Flathead	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass, Largemouth	5	14-inch minimum
Crappie: White and Black Crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

Table 4. Stocking history of Amon G. Carter Reservoir, Texas. FGL = fingerling; AFGL = advanced fingerling; ADL = adults; UNK = unknown.

Species	Year	Number	Size
Channel Catfish	1966	8,000	AFGL
	1969	40,000	AFGL
	1970	25,000	AFGL
	1971	23,000	AFGL
	1972	5,000	AFGL
	Total	101,000	
Florida Largemouth Bass	1982	77,533	FGL
	1983	36,980	FGL
	1984	101,932	FGL
	1985	56,000	FRY
	2000	106,500	FGL
	2001	106,816	FGL
	2018	162,703	FGL
	2019	36,930	FGL
	Total	685,394	
Largemouth Bass	1971	75,000	UNK
	1985	60	ADL
	Total	75,060	
ShareLunker Largemouth Bass	2013	6,497	FGL
	Total	6,497	
Threadfin Shad	1978	800	AFGL
	1980	1,800	AFGL
	1984	1,500	AFGL
	1985	4,100	AFGL
	2003	925	ADL
	Total	9,125	

Table 5. Objective-based sampling plan components for Amon G. Carter Reservoir, Texas 2020–2021.

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
Electrofishing (Bass-only)			
Largemouth Bass	Abundance	CPUE – stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	N ≥ 50 stock
Trap netting			
White Crappie	Size structure	PSD, length frequency	N = 50
	Age-and-growth	Age at 10 inches	N = 13, 9.0 – 10.9 inches
Gill netting			
White Bass	Abundance	CPUE – Total	RSE ≤ 25
	Size structure	PSD, length frequency	N ≥ 50 stock
Channel Catfish	Abundance	CPUE– stock	RSE-Stock ≤ 25
	Size structure		N ≥ 50 stock

[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, Amon G. Carter Reservoir, Texas, 2012–2020. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2012	2016	2020
Native submersed[a]	18.5 (1.0)	trace	0.06 (<0.1)
Native floating-leaved[b]	0.3 (<0.1)	0.1 (<0.1)	none
Native emergent[c]	1.3 (<0.1)	5.0 (0.3)	3.0 (0.2)
Non-native[d]			
Eurasian water-milfoil	<0.1 (<0.1)	none	none
Hydrilla	<0.1 (<0.1)	trace	none
Spiny leaf naiad	3.5 (0.2)	none	0.25 (<0.1)

[a] Pondweed, bushy pondweed, and coontail

[b] American lotus

[c] Water willow and buttonbush

[d] Non-native vegetation is a tier III level of concern where surveys are conducted once every four years

Gizzard Shad

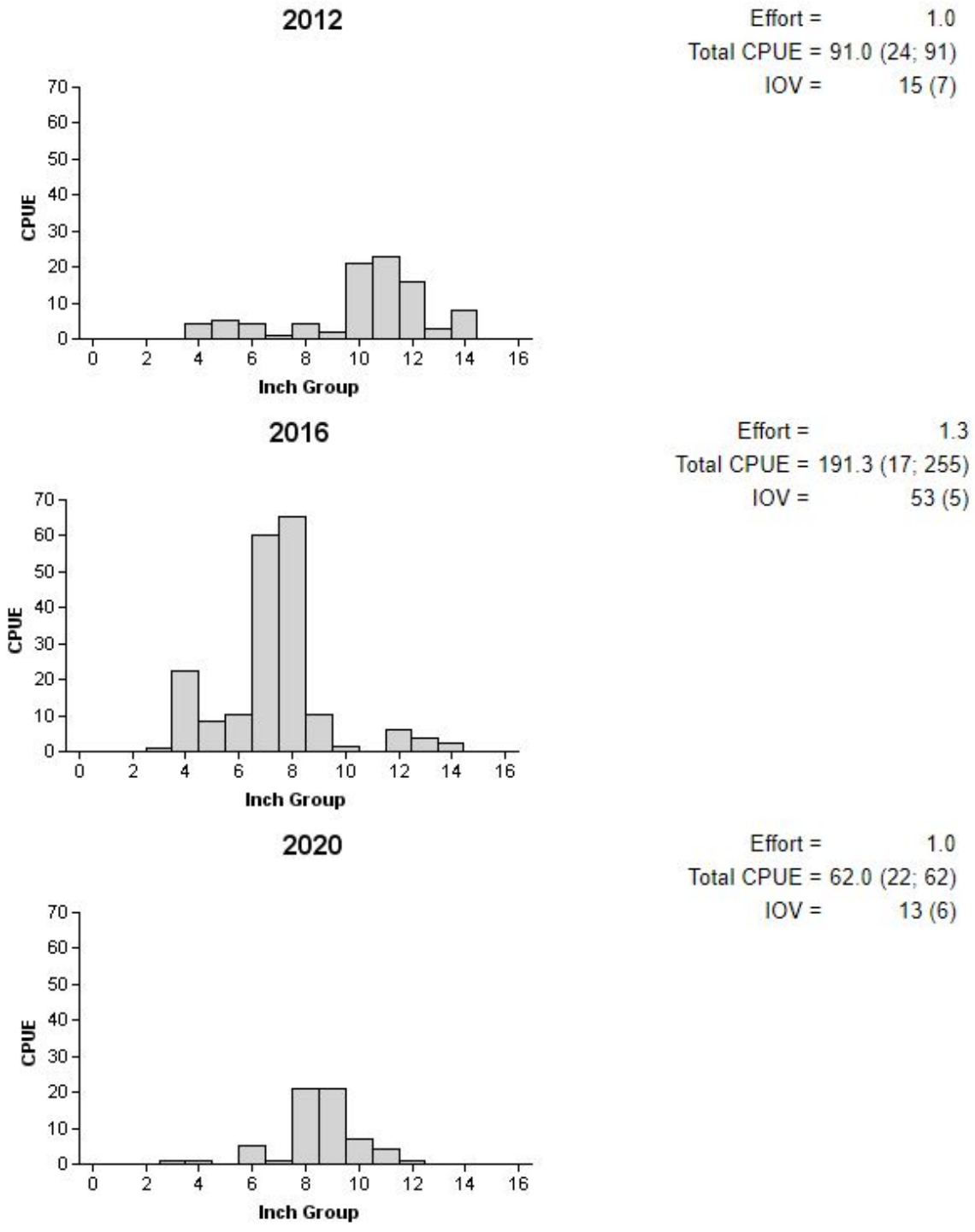


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Amon G. Carter Reservoir, Texas, 2012, 2016, and 2020.

Bluegill

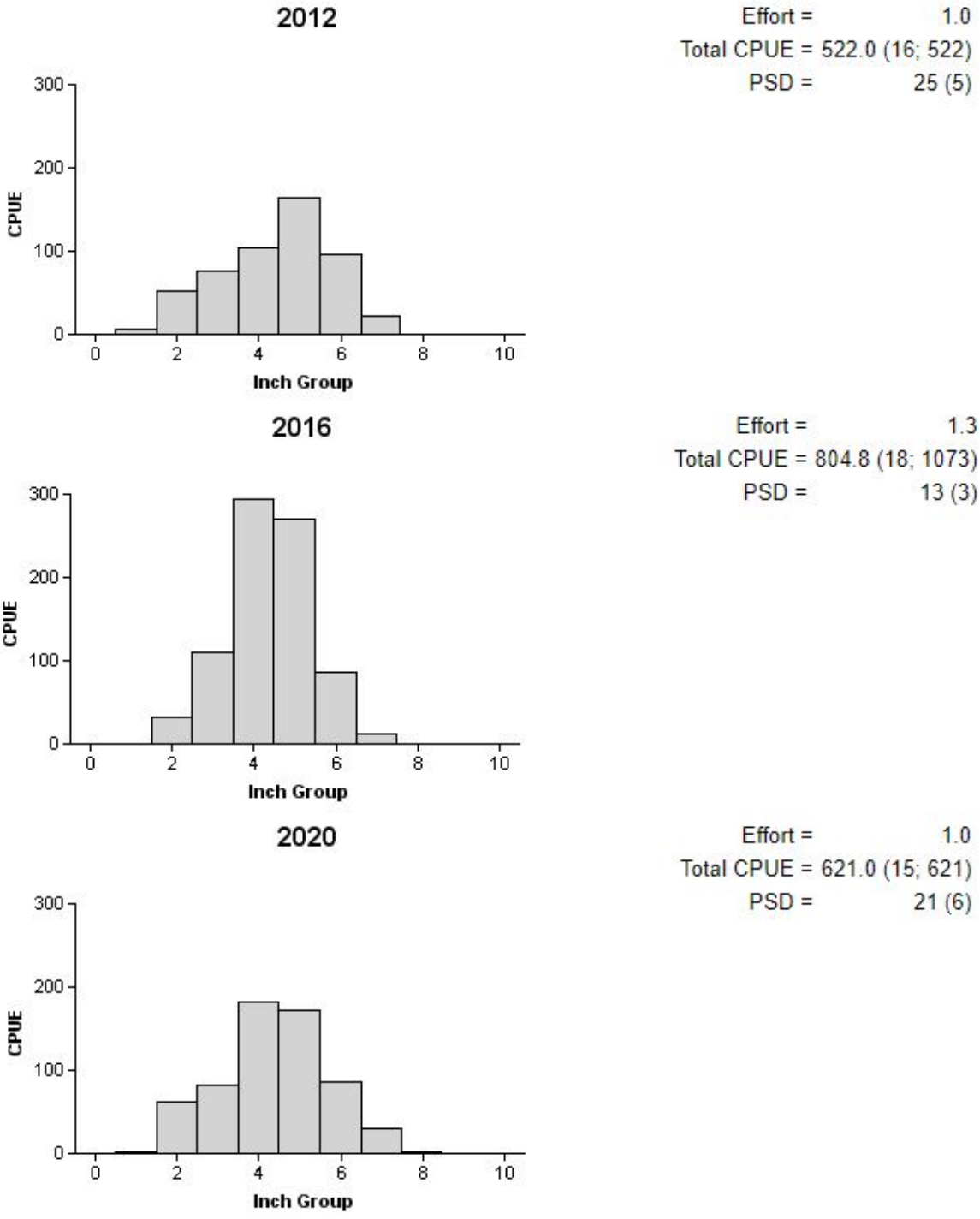


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Amon G. Carter Reservoir, Texas, 2012, 2016, and 2020.

Channel Catfish

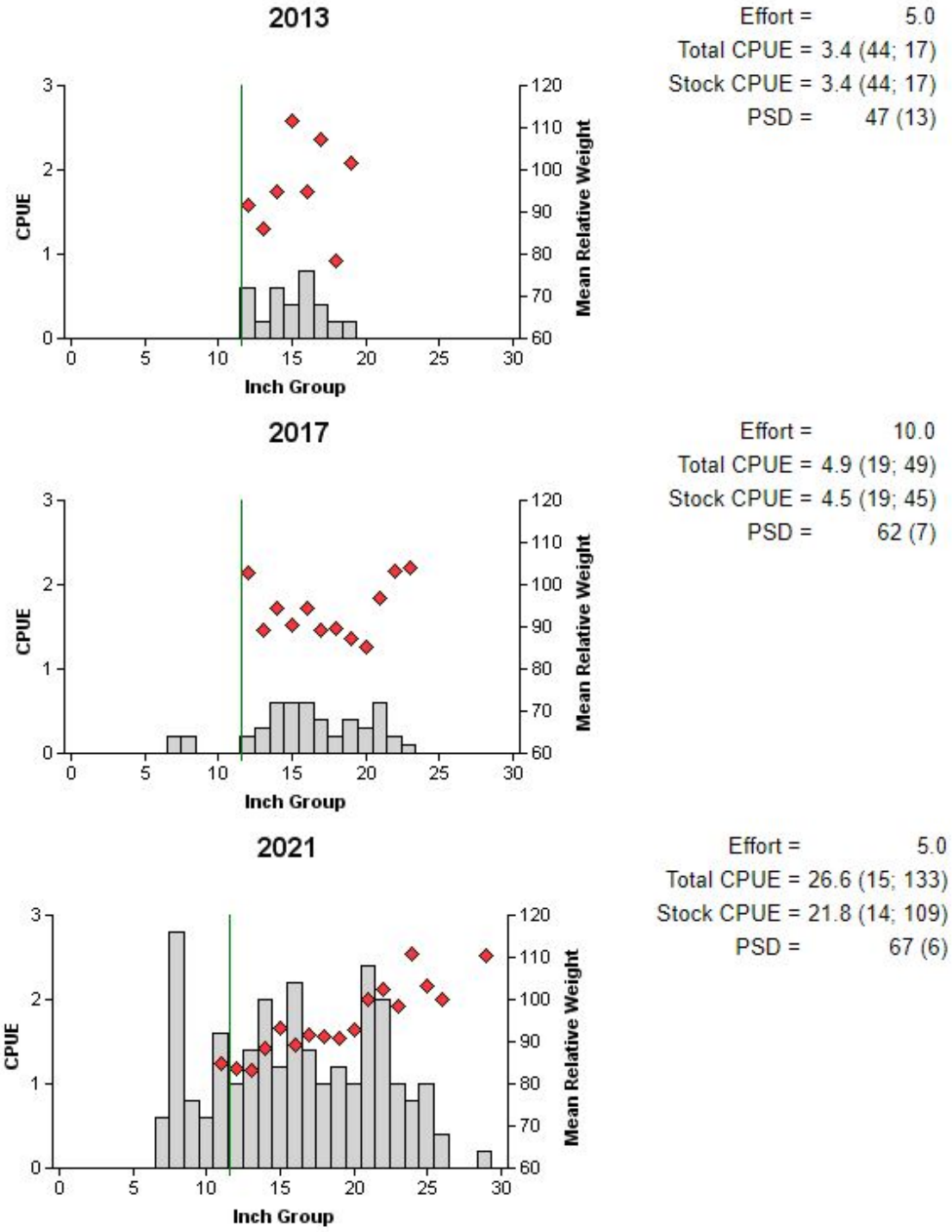


Figure 4. Number of Channel Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Amon G. Carter Reservoir, Texas, 2013, 2017, and 2021. Vertical line indicates minimum length limit.

White Bass

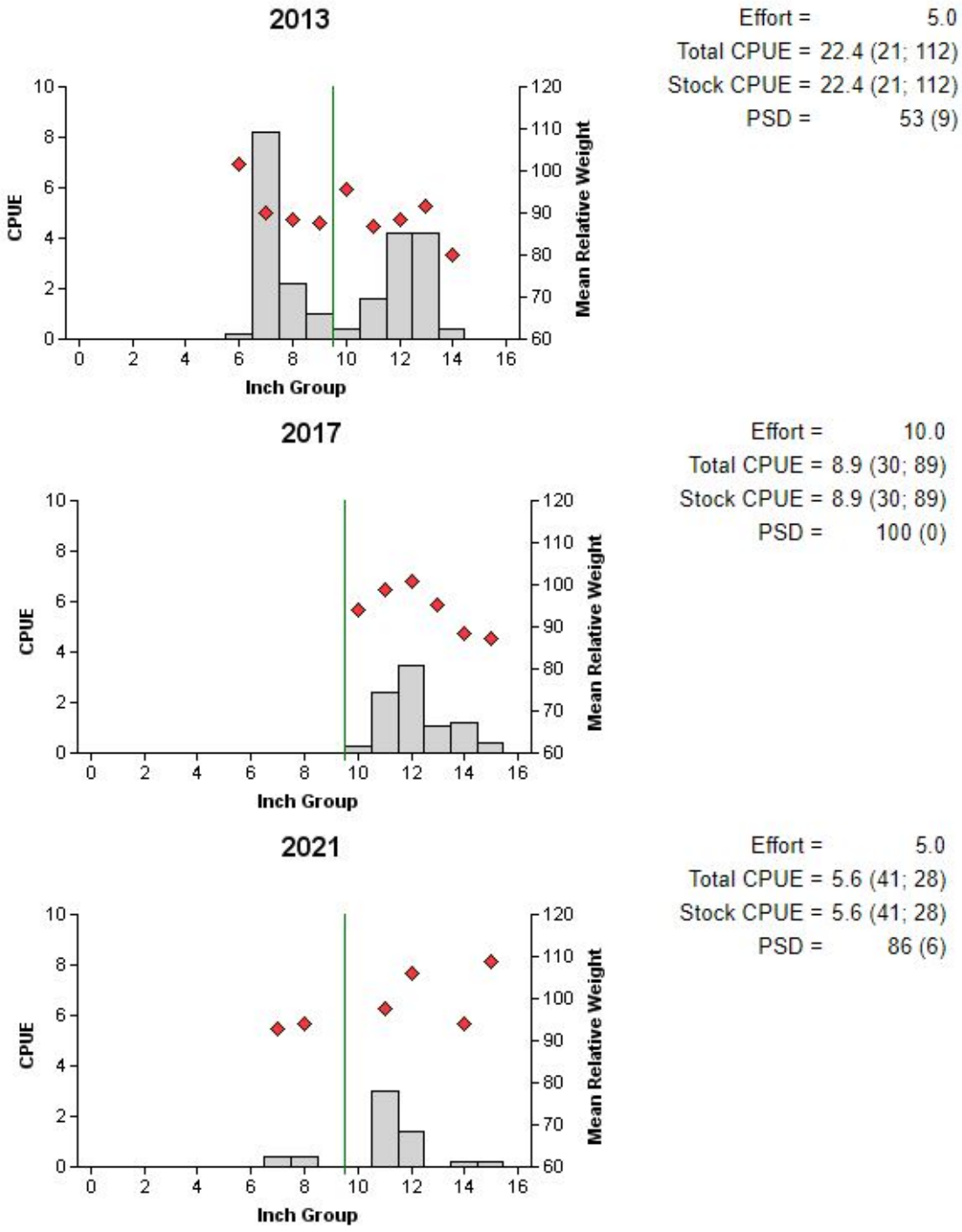


Figure 5. Number of White Bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Amon G. Carter Reservoir, Texas, 2013, 2017, and 2021. Vertical line indicates minimum length limit.

Largemouth Bass

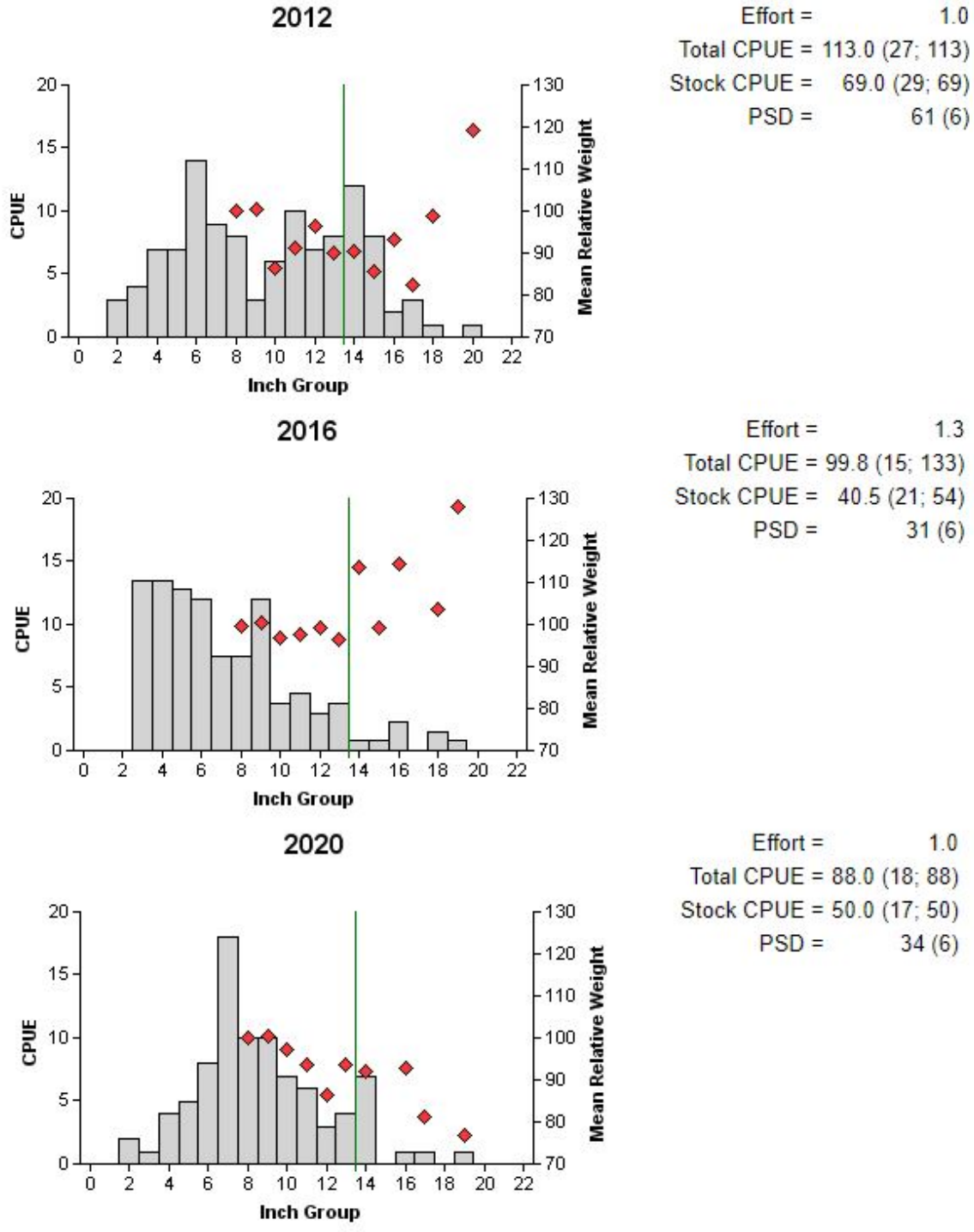


Figure 6. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Amon G. Carter Reservoir, Texas, 2012, 2016, and 2020. Vertical line indicates minimum length limit.

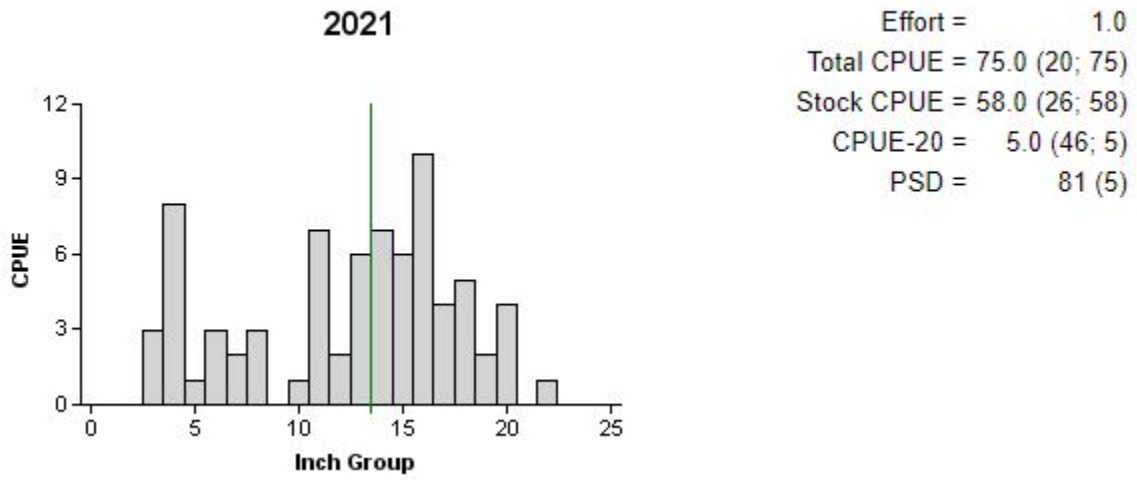


Figure 7. Number of Largemouth Bass caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring bass-only electrofishing surveys, Amon G. Carter Reservoir, Texas, 2021. Vertical line indicates minimum length limit.

Table 7. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Amon G. Carter Reservoir, Texas, 2002, 2004, 2012, and 2020. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, Intergrade = hybrid between a FLMB and a NLMB. Genetic composition was determined by electrophoresis prior to 2005 and with micro-satellite DNA analysis since 2005.

Year	Sample size	Number of fish			% FLMB alleles	% pure FLMB
		FLMB	Intergrade	NLMB		
2002	30	2	20	8	38.3	6.6
2004	30	3	25	2	56.7	10.0
2012	25	1	24	0	48.0	4.0
2020	29	2	25	2	51.0	6.9

White Crappie

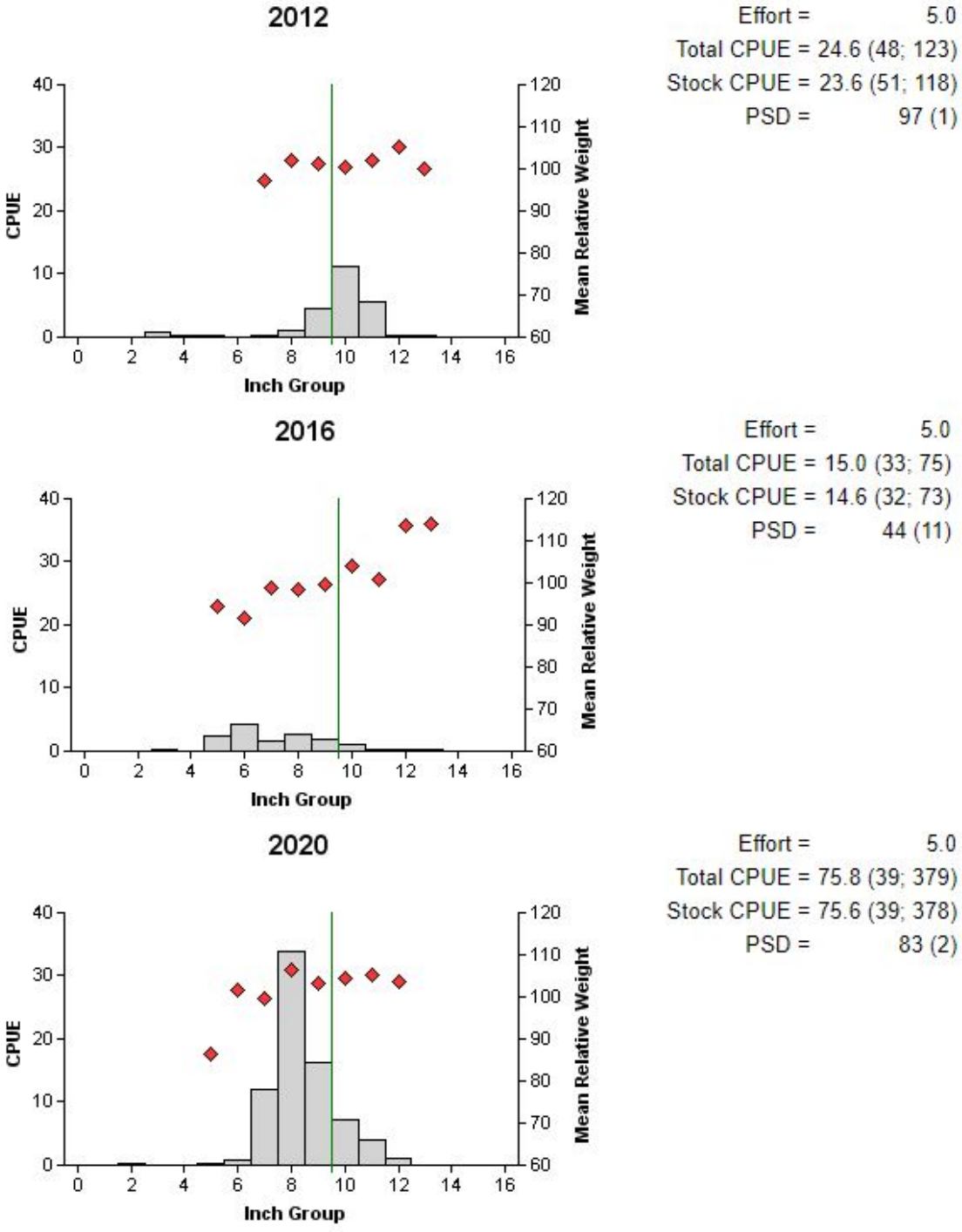


Figure 8. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Amon G. Carter Reservoir, Texas, 2012, 2016, and 2020. Vertical line indicates minimum length limit.

Proposed Sampling Schedule

Table 8. Proposed sampling schedule for Amon G. Carter Reservoir, Texas. Survey period is June through May. Gill netting and bass-only electrofishing surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall.

	Survey year			
	2021-2022	2022-2023	2023-2024	2024-2025
Angler Access				X
Vegetation				X
Electrofishing - Fall				X
Electrofishing - Spring				X
Trap netting				X
Gill netting				X
Creel survey				
Report				X

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

Number (N) and catch rate (CPUE) (RSE in parentheses) of all target species collected from standard gear types from Amon G. Carter Reservoir, Texas, 2020-2021. Sampling effort was 5 net nights for gill netting, 5 net nights for trap netting, and one hour for electrofishing.

	Gill Netting		Trap Netting		Electrofishing	
Species	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad					62	62.0 (22)
Threadfin Shad					450	450.0 (88)
Channel Catfish	133	26.6 (15)				
White Bass	8	0.8 (52)				
Green Sunfish					27	27.0 (48)
Warmouth					12	12.0 (43)
Orangespotted Sunfish					1	1.0 (100)
Bluegill					621	621.0 (15)
Longear Sunfish					199	199.0 (23)
Redear Sunfish					18	18.0 (43)
Largemouth Bass					88	88.0 (18)
White Crappie			379	75.8 (39)		
Black Crappie			7	1.4 (53)		

APPENDIX B – Historical catch rates of targeted species

Catch rates (CPUE) of targeted species by standard gear type and year for Amon G. Carter Reservoir, Texas, 1998-2016.

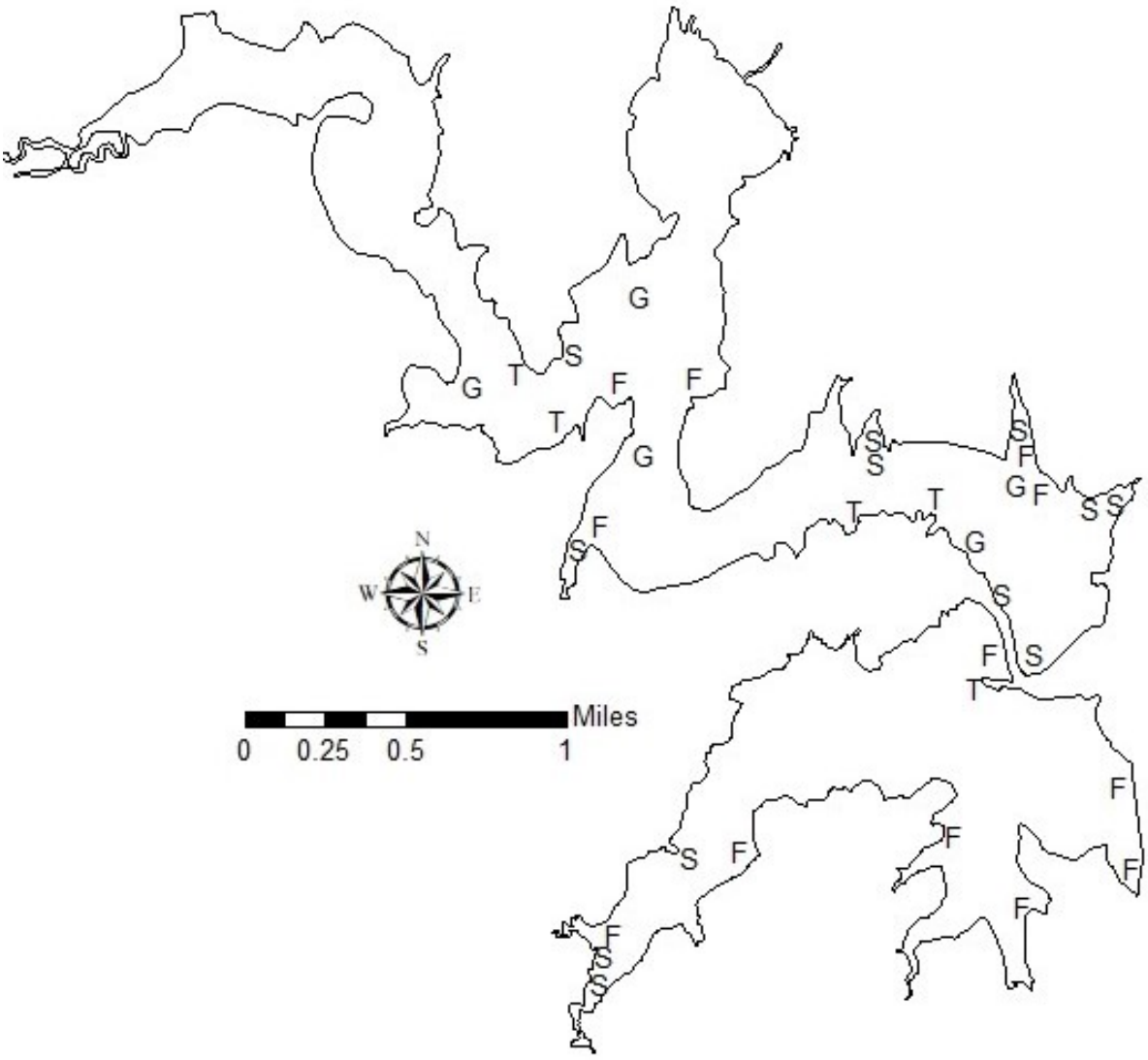
		Year						
Gear	Species	1998	2000	2004	2008	2012	2016	**Avg.**
Gill Netting	Channel Catfish	2.4	2.8	6.8	4.6	3.4	4.9	**4.2**
(fish/net night)	Flathead Catfish	0.0	0.0	0.4	0.2	0.2	0.3	**0.2**
	White Bass	3.8	0.0	5.6	11.0	22.4	8.9	**8.6**
Electrofishing	Gizzard Shad	468.7	111.0	709.0	65.0	91.0	191.3	**272.7**
(fish/hour)	Threadfin Shad	183.3	125.0	219.0	575.0	2,060.0	876.8	**673.2**
	Green Sunfish	14.0	31.0	102.0	34.0	55.0	42.0	**46.3**
	Warmouth	18.0	2.0	11.0	7.0	14.0	8.3	**10.1**
	Orangespotted Sunfish	0.0	0.0	0.0	1.0	0.0	0.8	**0.3**
	Bluegill	222.7	172.0	537.0	305.0	522.0	804.8	**427.3**
	Longear Sunfish	108.0	44.0	242.0	105.0	155.0	192.8	**141.1**
	Redear Sunfish	2.0	9.0	6.0	8.0	20.0	12.0	**9.5**
	Largemouth Bass	130.7	36.0	149.0	105.0	113.0	99.8	**105.6**
Trap Netting	White Crappie	5.2	7.0	14.4	10.8	24.6	15.0	**12.8**
(fish/net night)	Black Crappie	0.2	2.8	1.2	2.0	3.0	4.0	**2.2**

*Electrofishing surveys prior to 2007 were conducted using a Smith-Root 5.0 GPP (gas powered pulsator). Since 2007, surveys have been conducted using a Smith-Root 7.5 GPP.

*Gill netting surveys were conducted the following spring of the posted year, except in 1998.

*Objective based sampling started in 2016.

APPENDIX C – Map of sampling locations



Location of sampling sites, Amon G. Carter Reservoir, Texas, 2020-2021. Trap net, gill net, fall electrofishing, and spring electrofishing stations are indicated by T, G, F and S, respectively. Water level was near full pool at time of sampling.

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